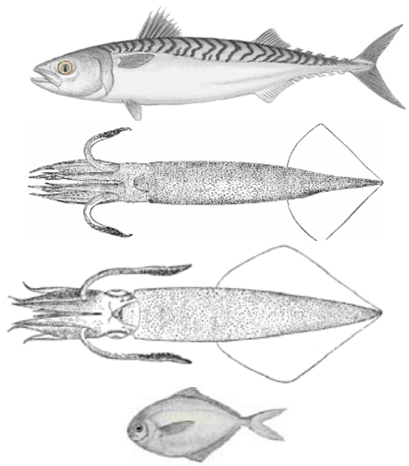
AMENDMENT 14 TO THE
ATLANTIC MACKEREL, SQUID, AND BUTTERFISH (MSB)
FISHERY MANAGEMENT PLAN (FMP)

Draft Environmental Impact Statement
The Executive Summary will serve as the Public Hearing Document



-------------------April 2012 --------------------

Mid Atlantic Fishery Management Council
in cooperation with
the National Marine Fisheries Service (NOAA Fisheries)

A Publication of the Mid-Atlantic Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award No. NA10NMF4410009

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2.0 EXECUTIVE SUMMARY

This Amendment deals with incidental catch and general management of blueback herring, alewife, American shad, and hickory shad. In this document, "river herrings" include blueback herring and alewife. "Shads" include American shad and hickory shad. These four species are described together as **"RH/S"** and the Amendment addresses three potential RH/S management problems, described below (A,B, and C). Considering, and if appropriate, implementing solutions to these potential problems are the purposes of this Amendment. The analytical goals described below summarize the analyses conducted to support decisions for this Amendment.

Problem A: Relatively low levels of catch monitoring have resulted in relatively high uncertainty about the incidental catch of river herrings and shads in ocean intercept fisheries.

> **Purpose A**: "**Implement Effective RH/S Catch Monitoring**" **–** Purpose A is to consider alternatives that would implement monitoring programs for the Mackerel, Squid, and Butterfish (MSB) fisheries that are sensitive enough and robust enough to the spatial and temporal variability of RH/S distributions so that good RH/S catch estimates can be generated. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires Councils "to specify the pertinent data which shall be submitted to the Secretary with respect to…fishing…in the fishery" (Section 303(a)(5)) and Section 8 under discretionary fishery management plan provisions allows implementation of observer requirements.

Analytical Goals:

A1. "**RH/S Catch**" - Establish the best available information on the catch of RH/S in the MSB and/or other fisheries.

A2. **"Effectiveness"** - Evaluate how effective various alternatives would be in terms of improving the precision of RH/S catch estimates.

A3. **"Practicability"** - Evaluate the socioeconomic impacts from the alternatives and the ability of management to implement them.

Problem B: Catch of RH/S in the MSB fisheries may be negatively impacting RH/S populations.

> **Purpose B**: "**Reduce RH/S Bycatch and/or Catch**" **–** Purpose B is to consider alternatives to reduce bycatch (discards) and/or total catch of RH/S in the MSB fisheries. The MSA requires Councils to minimize bycatch (discards) to the extent practicable (Section 301 – National Standard 9) and provides discretionary authority to "include management measures in the plan to conserve…non-target species…considering the variety of ecological factors affecting fishery populations" (Section 303(b)(12)). Because information on how much RH/S catch might be sustainable is lacking, it is not currently possible to quantify the impact on RH/S stocks of any catch reductions that may occur but such catch reductions would be likely to have a positive impact to some degree.

Analytical Goals:

B1. "**RH/S Bycatch**" - Evaluate if bycatch (discards) of river herrings and shads in the MSB fisheries has been minimized to the extent practicable (National Standard 9).

<u>Analytical Goals</u>: (continued)	B2. **"Effectiveness"** - Evaluate how effective various alternatives would be in reducing the bycatch and/or or catch of RH/S.
	B3. **"Practicability"** - Evaluate the socioeconomic impacts from the alternatives and the ability of management to implement them.

<u>Problem C</u>: The overall existing federal/state/regional management framework may be insufficient to adequately conserve RH/S stocks.

<u>Purpose C</u>: "**Consider RH/S NS1 Stock Issues**" **–** Purpose C is to consider alternatives that would bring RH/S into the MSB plan as a managed stock in terms of Council management responsibilities, including annual catch limits and accountability measures, in order to improve overall RH/S management and conservation. The Magnuson-Stevens Fishery Conservation and Management Act's National Standard One (NS1) states "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery…" NMFS guidance on NS1 suggests that Councils have the discretion to add additional non-target species as stocks in the fishery to existing FMPs.

<u>Analytical Goals</u>:	C1. **"Effectiveness"** - Evaluate how effective various alternatives would be in terms of improving RH/S management.
	C2. **"Practicability"** - Evaluate the socioeconomic impact on the fisheries of various alternatives and the ability of management to implement them.

<u>Alternatives</u>

In this document, each purpose will be referenced by the bolded phrases in quotes above. Each purpose is addressed by one or more related set of alternatives, organized below by each purpose, summarized later in this executive summary, and fully described and analyzed in this document. Throughout this document the reader will note that the focus of the alternatives is on the Atlantic mackerel and longfin squid fisheries. This is intentional because those are the MSB fisheries that appear to have substantial RH/S interactions. Butterfish is primarily a incidental catch fishery and the *Illex* fishery appears to rarely interact with RH/S (see table 21).

Alternatives Related to Purpose A: <u>Implement Effective RH/S Catch Monitoring</u>

<u>Alternative Set 1</u>: Additional Vessel Reporting Measures

<u>Alternative Set 2</u>: Additional Dealer Reporting Measures

<u>Alternative Set 3</u>: Additional At-Sea Observation Optimization Measures

<u>Alternative Set 4</u>: Port-side and Other Sampling/Monitoring Measures

<u>Alternative Set 5</u>: At-Sea Observer Coverage Requirements

Alternatives Related to Purpose B: <u>Reduce RH/S Bycatch and/or Catch</u>

<u>Alternative Set 6</u> : Mortality Caps

<u>Alternative Set 7</u> : Restrictions in areas of high RH/S catch

<u>Alternative Set 8</u> : Hotspot Restrictions

Alternatives Related to Purpose C: <u>Considering RH/S NS1 Stock Issues</u>

<u>Alternative Set 9</u>: Addition of RH/S as "Stocks in the Fishery" in the MSB FMP.

<u>Approximate Timeline</u>

April/May 2012	– Public hearings for Am 14 with DEIS
June 2012	– Council receives comments on the Draft Environmental Impact Statement, (DEIS) , Council makes edits to the DEIS as appropriate, Council chooses alternatives to recommend to NMFS, and Council approves submitting FEIS to NMFS
July 2012	– FEIS Document Perfection w/ NMFS
Sept 2012	– Proposed Rule and FEIS made available for public comment
Nov 2012	– Comment Period Closes
Feb 1, 2013	– Final Rule Publishes
Mar 1, 2013	– Rule Effective

<u>Wording Conventions</u>

All acronyms and abbreviations used in this document should be listed in **Section 3.0, List of Acronyms and abbreviations**. Several critical wording conventions are noted below.

The Magnuson-Stevens Fishery Conservation and Management Act is the primary law governing marine fisheries management in United States federal waters. The Act was first enacted in 1976 and amended in 1996 and in 2007. In this document, the abbreviation "MSA" refers to the Magnuson-Stevens Fishery Conservation and Management Act as currently amended.

RH/S refers to blueback herring, alewife, American shad, and hickory shad collectively. "Mackerel" refers to "Atlantic mackerel." "Am14" refers to "Amendment 14 to the Atlantic Mackerel, Squid, and Butterfish (MSB) Fishery Management Plan (FMP)." "The Council" refers to "the Mid-Atlantic Fishery Management Council." "Bycatch" refers to discards while "Incidental catch" is the catch of one species while directing upon another species (incidental catch may be retained or discarded).

Longfin squid have previously been referenced as *Loligo pealeii* or just *Loligo*. There has been a scientific name change for this species from *Loligo pealeii* to *Doryteuthis (Amerigo) pealeii*. To avoid confusion, this document will utilize the common name “longfin squid” wherever possible. Some historical documents will still refer to these squid as “*Loligo*.”

2.1 SUMMARY OF THE ALTERNATIVES AND THEIR IMPACTS

The alternatives are primarily designed to 1) improve monitoring and observing of incidental RH/S catch; 2) consider ways to reduce RH/S catch; and 3) consider adding RH/S as managed stocks in the MSB FMP (i.e. as stocks in the fishery) so as to improve overall RH/S conservation. While there are some potential impacts related to the managed species, habitat, and protected resources, those effects are secondary to the primary goals of Amendment 14. Given the impacts to the managed species, habitat, and protected resources are generally low, indirect, and positive, the textual summary in this Executive Summary focuses on impacts related to non-target species, especially river herrings and shads, and the related fishery business and human community impacts (Socio-Economic impacts). Managed species, habitat, and protected resource impacts are described in Section 7 and summarized in Table 8 later in this Executive Summary. Some alternatives with very similar impacts are grouped together.

Note: There are over 80 alternatives in this document. This means that there are millions of different possible combinations. At the beginning of each Alternative Set, it is noted which alternatives may, and which alternatives may not be, grouped together within the Alternative Set. Between Alternative Sets, alternatives generally may be combined without problem. The only broad exception to this rule is that it would appear unlikely that alternatives from both of the area-based alternatives (Sets 7 and 8) would be chosen together.

Note: To the extent that alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other species, then choosing such alternatives might result in long term additional benefits related to future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). However, due to the uncertainty about how the productivity of RH/S is impacted by current incidental catch levels, it is difficult to quantity such benefits. One would expect that higher related benefits would result from actions that were more likely to restore RH/S populations. This theme is repeated as appropriate in the Impacts Section (Section 7) and in the rest of this Executive Summary the following sentence is used to reiterate the ideas described in this paragraph rather than repeating the paragraph many times: "While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1."

2.1.1 Alternative Set 1: Additional Vessel Reporting Measures

Background/Statement of Problem/Need for Action:

The current suite of reporting and monitoring requirements may be insufficient to precisely enough estimate RH/S incidental catch in the mackerel and longfin squid fisheries based on the Council's management goals.

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase vessel reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates. While some of the focus may appear to be on mackerel and/or longfin squid general reporting compared to just RH/S in those fisheries, because extrapolations of non-target species are often made based on total landings (including the target species), accurate monitoring of the target species can be as important as determining the encounter rates of RH/S. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

NOTE ON COMBINATIONS: Most of the Alternative Set 1 action alternatives could be implemented individually or collectively. However, 1c (weekly VTRs for all MSB permits) would encompass 1bMack and 1bLong so these would not be selected together. The 48-hr mackerel pre-trip notification (1d48) and 72-hr mackerel pre-trip notification (1d72) would also be mutually exclusive – only one would be chosen if either. The VMS reporting alternatives (1f's and 1g's) would need the respective 1e's (that require VMS) for each fishery as a prerequisite before requiring VMS reporting.

1a. No-action

If this alternative is selected, then no measures from Alternative Set 1 would be implemented and the existing reporting measures (as described in section 5.1) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

1bMack. Institute weekly vessel trip reporting (VTR) for mackerel permits.

Summary of Biological Impact Analysis

To the degree that more rapid VTR reporting could be used to cross check dealer data to ensure that fishery closures occur appropriately, there could be potentially low positive impacts. Such closures could be related to directed fishery closures or mortality cap closures for non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

The number of total mackerel permits can vary from month to month. Of the 1,974 vessels that had mackerel permits in November 2011, 67 did not also have a weekly VTR reporting requirement from another permit (herring or NE multispecies). Thus, about 67 vessels would ultimately be subject to additional reporting requirements because of this measure. Those 67 vessels must currently submit VTR reports monthly. This alternative would result in 40 (52 (weeks) -12 (months) = 40) additional VTR submissions per year for permit holders that don't currently submit weekly VTRs. This would result in additional mailing costs of $19.36 per year (40 x $ 0.44 postage) per permitted vessel.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

1bLong. Institute weekly vessel trip reporting (VTR) for longfin squid/Butterfish permits.

Summary of Biological Impact Analysis

To the degree that more rapid VTR reporting could be used to cross check dealer data to ensure that fishery closures occur appropriately, there could be potentially low positive impacts. Such closures could be related to directed fishery closures or mortality cap closures for non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

The number of incidental squid/butterfish permits can vary from month to month. Of the 1,891 vessels that had longfin squid//Butterfish Moratorium permits or squid/butterfish incidental permits in November 2011, 74 did not also have a weekly VTR reporting requirement from another permit (herring or NE multispecies). Thus, about 74 vessels would ultimately be subject to additional reporting requirements because of this measure. Those 74 vessels must currently submit VTR reports monthly. This alternative would result in 40 (52 (weeks) -12 (months) = 40) additional VTR submissions per year for permit holders that don't currently submit weekly VTRs, resulting in additional mailing costs of $19.36 per year (40 x $ 0.44 postage) per permitted vessel. For informational purposes, about 9 of the 351 longfin squid//Butterfish moratorium permits do not currently have a weekly VTR reporting requirement from another permit (herring or NE multispecies).

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>1c</u>. Institute weekly vessel trip reporting (VTR) for all MSB permits (Mackerel, longfin squid//Butterfish, *Illex*) so as to facilitate quota monitoring (directed landings and/or incidental mortality cap if applicable) and cross checking with other data sources.

<u>Summary of Biological Impact Analysis</u>

To the degree that more rapid VTR reporting could be used to cross check dealer data to ensure that fishery closures occur appropriately, there could be potentially low positive impacts. Such closures could be related to directed fishery closures or mortality cap closures for non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

The number of total mackerel permits and the number of squid/butterfish incidental permits can vary from month to month. Of the 2,622 vessels that have MSB permits in November 2011, 121 did not also have a weekly VTR reporting requirement from another permit (herring or NE multispecies). Thus about 121 vessels would ultimately be subject to additional reporting requirements because of this measure. This alternative would result in 40 (52 (weeks) -12 (months) = 40) additional VTR submissions per year for permit holders that don't currently submit weekly VTRs, resulting in additional mailing costs of $19.36 per year (40 x $ 0.44 postage) per permit holder. The 121 vessels encompass the same affected vessels from 1bMack and 1bLong above (there is also some overlap between 1bMack and 1bLong).

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1. One specific advantage of this alternative compared to 1b and 1c is that there would be uniformity of reporting in the MSB FMP and with other Northeast Region fisheries.

<u>1d48</u>. Require 48 hour pre-trip notification to NMFS to retain/possess/transfer more than 20,000 pounds of mackerel so as to facilitate observer placement.

This would be used to facilitate observer placement. If vessels did not notify they would not be able to land more than an incidental catch (20,000 pounds).

<u>Summary of Biological Impact Analysis</u>

To the degree that better observer data leads to more effective reduction of incidentally-caught species, and to the degree that this alternative leads to better observer data collection, this alternative could lead to positive impacts for non-target species. If a mortality cap on RH/S is implemented, obtaining a complete list of trips to sample becomes very important to ensure that unbiased estimates can be estimated.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

This is similar to a 72-hour trip notification requirement in the longfin squid fishery that became effective in 2011. Fishermen have reported that the 72-hour notification sometimes means they are unable to target fleeting aggregations of longfin squid because they are not able to put to sea on short notice, especially if they are selected to take an observer (if they are not selected then they often obtain a waiver sooner than 72 hours).

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

1d72. Require 72 hour pre-trip notification to NMFS to retain/possess/transfer more than 20,000 pounds of mackerel so as to facilitate observer placement.

This would be used to facilitate observer placement. If vessels did not notify they would not be able to land more than incidental catch (20,000 pounds).

Summary of Biological Impact Analysis

To the degree that better observer data leads to more effective reduction of incidentally-caught species, and to the degree that this alternative leads to better observer data collection, this alternative could lead to positive impacts for non-target species. If a mortality cap on RH/S is implemented, obtaining a complete list of trips to sample becomes very important to ensure that unbiased estimates can be estimated.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

This is similar to a 72-hour trip notification requirement in the longfin squid fishery that became effective in 2011. Fishermen have reported that the 72-hour notification sometimes means they are unable to target fleeting aggregations of longfin squid because they are not able to put to sea on short notice, especially if they are selected to take an observer (if they are not selected then they often obtain a waiver sooner than 72 hours).

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>1eMack</u>. Require VMS for limited access mackerel vessels.

Vessel Monitoring Systems are currently utilized in many New England fisheries. They are generally used to facilitate compliance and enforcement of area-based management measures as well as catch monitoring by means of a satellite connection between shore and a fixed electronic unit installed on vessels.

<u>Summary of Biological Impact Analysis</u>

If area-based management alternatives are eventually selected for purposes of reducing catch of RH/S, VMS can be a useful tool for compliance/enforcement of area-based management. If port-side sampling requirements are eventually selected for purposes of monitoring landings of RH/S, VMS could also be used for compliance/enforcement if catch reporting via VMS is also required (see 1fMack and 1gMack below).

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

Of the approximately 2,200 vessels that had open access mackerel permits at some point in 2011, 684 were not also required to have VMS. While not all of these vessels will qualify for mackerel limited access (being implemented currently), 684 would be an upper bound on how many vessels could have to buy new VMS units. Amendment 11 estimated that around 400 vessels might qualify for limited access. If one maintains the ratio of open access boats (684/2,200 = 31%) that would need VMS for the 400 likely qualifiers for mackerel limited access, 31% of 400 equals 124 vessels that would actually need new VMS units. Since limited access qualifiers, being more active participants, may be more likely to have other permits that require VMS, the likely range is from somewhat lower than 124 up to 684. Until the final number of qualifiers is determined it is not possible to further quantify the number of vessels that may require VMS units under this provision. The costs to equip a vessel with a VMS are approximately $1,700-$3,300, with operating costs for the unit of approximately $40-$100 per month. In addition, the vessel would need a constant power source such as a generator, or access to dockside energy, which would add to the costs.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>1eLong</u>. Require VMS for longfin squid/butterfish moratorium vessels (see 1f and 1g below).

Vessel Monitoring Systems are currently utilized in many New England fisheries. They are generally used to facilitate compliance and enforcement of area-based management measures as well as catch monitoring by means of a satellite connection between shore and a fixed electronic unit installed on vessels.

Summary of Biological Impact Analysis

If area-based management alternatives are eventually selected for purposes of reducing catch of RH/S, VMS can be a useful tool for compliance/enforcement of area-based management. If port-side sampling requirements are eventually selected for purposes of monitoring landings of RH/S, VMS could also be used for compliance/enforcement if catch reporting via VMS is also required (see 1fLong and 1gLong below).

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Of the 351 vessels that had longfin squid//butterfish moratorium permits in 2011, 7 were not also required to have VMS because of other permits and would have to equip their vessel with VMS under this provision. The costs to equip a vessel with a VMS are approximately $1,700-$3,300, with operating costs for the unit of approximately $40-$100 per month. In addition, the vessel would need a constant power source such as a generator, or access to dockside energy, which would add to the costs.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

1fMack. Require daily VMS reporting of catch by limited access mackerel vessels so as to facilitate monitoring (directed and/or incidental catch) and cross checking with other data sources. Requiring VMS (see 1eMack above) and requiring trip declarations (would be a prerequisite for this alternative.

Summary of Biological Impact Analysis

If area-based management alternatives are eventually selected for purposes of reducing catch of RH/S, VMS catch reporting can be a useful tool for compliance/enforcement of area-based management.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

This alternative could only be selected if 1eMack was also selected. VMS costs are discussed under the 1eMack alternative. The cost of transmitting a catch report via VMS is $0.60 per transmission.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

1fLong. Require daily VMS reporting of catch by longfin squid moratorium permits so as to facilitate monitoring (directed and/or incidental catch) and cross checking with other data sources. Requiring VMS (see 1eLong above) and requiring trip declarations would be a prerequisite for this alternative.

Summary of Biological Impact Analysis

If area-based management alternatives are eventually selected for purposes of reducing catch of RH/S, VMS catch reporting can be a useful tool for compliance/enforcement of area-based management.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

This alternative could only be selected if 1eLong was also selected. VMS costs are discussed under the 1eLong alternative. The cost of transmitting a catch report via VMS is $0.60 per transmission.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

1gMack. Require 6 hour pre-landing notification via VMS to land more than 20,000 pounds of mackerel, which could facilitate quota monitoring, enforcement, and/or portside monitoring.

This would be used to facilitate catch monitoring (directed or incidental catch), cross checking with other data sources, and portside monitoring (if applicable).

Summary of Biological Impact Analysis

Pre-landing notifications could facilitate enforcement of landings limits, proper landings reporting, and port-side monitoring.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

This alternative could only be selected if 1eMack was also selected. VMS costs are discussed under the 1eMack alternative. The cost of transmitting a catch report via VMS is $0.60 per transmission.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

1gLong. Require 6 hour pre-landing notification via VMS to land more than 2,500 pounds of longfin squid, which could facilitate quota monitoring, enforcement, and/or portside monitoring.

This would be used to facilitate catch monitoring (directed or incidental catch), cross checking with other data sources, and portside monitoring (if applicable).

Summary of Biological Impact Analysis

Pre-landing notifications could facilitate enforcement of landings limits, proper landings reporting, and port-side monitoring.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

This alternative could only be selected if 1eLong was also selected. VMS costs are discussed under the 1eLong alternative. The cost of transmitting a catch report via VMS is $0.60 per transmission.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

2.1.2 Alternative Set 2 – Additional Dealer Reporting Measures

Background/Statement of Problem/Need for Action:

The current suite of reporting and monitoring requirements may be insufficient to precisely estimate RH/S incidental catch. Also, practices on how landing weights are determined are not standardized.

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates. While some of the focus may appear to be on mackerel and/or longfin squid general reporting compared to just RH/S in those fisheries, because extrapolations are often made based on total landings, accurate monitoring of the target species can be as important as determining the encounter rates of RH/S. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

NOTE ON COMBINATIONS: Most of the Alternative Set 2 action alternatives could be implemented individually or collectively. However, 2c and 2d (weighing mackerel) would be mutually exclusive – only one would be chosen if either. Likewise, 2e and 2f (weighing longfin squid) would be mutually exclusive – only one would be chosen if either. 2g (dealers can use volume to weight conversions) would modify 2c, 2d, 2e, or 2f so 2g could only be chosen if at least one of those four alternatives was also chosen.

2a. No-action

If this alternative is selected, then no measures from Alternative Set 2 would be implemented and the existing reporting measures (as described in section 5.2) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

2b. Require federally permitted MSB dealers to obtain vessel representative confirmation of SAFIS transaction records for mackerel landings over 20,000 lb, *Illex* landings over 10,000 lb, and longfin squid landings over 2,500 lb.

This would be accomplished by vessels via Fish Online, an existing internet-based program that currently allows vessels to voluntarily check their landings records. Dealers would have to confirm with vessels that a vessel representative had checked Fish Online to confirm landings.

Summary of Biological Impact Analysis

Accurate landings data is important to ensure that quotas are not exceeded. To the extent that landings data informs incidental catch mortality caps, accurate landings data can also be important for managing catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Since internet access is pervasive in the Mid-Atlantic and New England, either vessel owners or their representative should be able to make an internet-based confirmation of dealer transactions records without substantial cost. Improving records could benefit fishermen if additional qualifications are ever considered for holding MSB permits.

2c. Require that federally permitted SMB dealers weigh all landings related to mackerel transactions over 20,000 pounds. If dealers do not sort by species, they would need to document in dealer applications how they estimate relative compositions of a mixed catch.

Summary of Biological Impact Analysis

Accurate landings data is important to ensure that directed fishery quotas are not exceeded. To the extent that directed landings informs incidental catch mortality caps (often substantially), accurate directed landings data can be important for managing catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be low. Other dealers use volume to weight conversions and could have to purchase scales. Purchasing a truck or hopper scale can range up to $100,000 per installation or $50,000 per installation respectively while smaller scales could be bought for several hundred dollars with a wide range in between. Smaller scales could slow down processing however.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

2d. Require that federally permitted SMB dealers weigh all landings related to mackerel transactions over 20,000 pounds. If dealers do not sort by species, they would need to document with each transaction how they estimated the relative composition of a mixed catch.

Summary of Biological Impact Analysis

Accurate landings data is important to ensure that directed fishery quotas are not exceeded. To the extent that directed landings informs incidental catch mortality caps (often substantially), accurate directed landings data can be important for managing catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be low. Other dealers use volume to weight conversions and could have to purchase scales. Purchasing a truck or hopper scale can range up to $100,000 per installation or $50,000 per installation respectively while smaller scales could be bought for several hundred dollars with a wide range in between. Smaller scales could slow down processing however.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

2e. Require that federally permitted SMB dealers weigh all landings related to longfin squid transactions over 2,500 pounds. If dealers do not sort by species, they would need to document in dealer applications how they estimate relative compositions of a mixed catch.

Summary of Biological Impact Analysis

Accurate landings data is important to ensure that directed fishery quotas are not exceeded. To the extent that directed landings informs incidental catch mortality caps (often substantially), accurate directed landings data can be important for managing catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be low. Other dealers use volume to weight conversions and could have to purchase scales. Purchasing a truck or hopper scale can range up to $100,000 per installation or $50,000 per installation respectively while smaller scales could be bought for several hundred dollars with a wide range in between. Smaller scales could slow down processing however.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

2f. Require that federally permitted SMB dealers weigh all landings related to longfin squid transactions over 2,500 pounds. If dealers do not sort by species, they would need to document with each transaction how they estimate relative compositions of a mixed catch.

Summary of Biological Impact Analysis

Accurate landings data is important to ensure that directed fishery quotas are not exceeded. To the extent that directed landings informs incidental catch mortality caps (often substantially), accurate directed landings data can be important for managing catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be low. Other dealers use volume to weight conversions and could have to purchase scales. Purchasing a truck or hopper scale can range up to $100,000 per installation or $50,000 per installation respectively while smaller scales could be bought for several hundred dollars with a wide range in between. Smaller scales could slow down processing however.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

2g. If any options 2c-2f were chosen, allow dealers to use volume to weight conversions if they cannot weigh landings – they would need to identify their conversion methods in their dealer application and explain why they cannot weigh all landings.

Summary of Biological Impact Analysis

Accurate landings data is important to ensure that directed fishery quotas are not exceeded. To the extent that directed landings informs incidental catch mortality caps (often substantially), accurate directed landings data can be important for managing catch of non-target species including RH/S. Volume to weight conversions may not be as accurate as simple weighing and this option could essentially make 2c-2f equivalent to the status quo because dealers would no longer have a requirement to weigh all landings.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact. This alternative would only be selected if 2c-2f were chosen. Determining volume to weight ratios would be less expensive than purchasing scales for those dealers that would need to do this, so compared to if 2c-2f were chosen alone, impacts would be expected to be positive. However to the extent that not getting accurate measurements interfered with sustainable management, there could be long-term negative impacts.

2.1.3 Alternative Set 3: Additional At-Sea Observation Optimization Measures

Background/Statement of Problem/Need for Action:

The current suite of observer monitoring requirements may be insufficient to precisely estimate RH/S incidental catch.

The measures in this Alternative Set would (alone and/or in combination with other alternatives) facilitate more accurate monitoring by observers with the overall goal of improving the precision of RH/S incidental catch estimates. Each alternative addresses an aspect of observer coverage that potentially could be improved to ultimately lead to better RH/S estimates. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

NOTE ON COMBINATIONS: Many of the Alternative Set 3 action alternatives could be implemented individually or collectively. However, 3h (trip termination after 1 slipped haul) and 3i (trip termination after 2 slipped hauls) would be mutually exclusive – only one would be chosen if either. Likewise, 3k (fishery-wide slippage cap at 5 mackerel slippage events) and 3l (fishery-wide slippage cap at 10 mackerel slippage events) would be mutually exclusive – only one would be chosen if either. 3m (fishery-wide slippage cap at 5 longfin slippage events) and 3n (fishery-wide slippage cap at 10 longfin slippage events) are also mutually exclusive – only one would be chosen if either. 3p would replace fishery-wide slippage caps with vessel slippage caps and it would be expected that either 3p could be chosen or 3k-3n could be chosen (if any). Also, if 3j (slippage prohibition with exceptions) was chosen then 3f or 3g could not be selected (3f and 3g require all catch to be brought aboard but 3j provides some exceptions).

If alternatives 3f – 3p are selected for mackerel, they would also require the selection of Alternative 1d48 (48-hr pre-trip notification) or 1d72 (72-hr pre-trip notification). There is already a pre-trip notification requirement in effect for longfin squid moratorium permit holders.

3a. No-action

If this alternative is selected, then no measures from Alternative Set 3 would be implemented and the existing monitoring measures (as described in section 5.3) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

3b. Require the following reasonable assistance measures: provision of a safe sampling station; help with measuring decks, codends, and holding bins; help with bycatch collection; and help with basket sample collection by crew on vessels with mackerel limited access and/or longfin squid/Butterfish moratorium permits.

Summary of Biological Impact Analysis

Such assistance could help improve observer data by allowing the observer to focus on technical aspects of observing such as species identification, weighing, measuring, etc. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Most vessels do most of these things already so impacts would be low.

Summary of Socio-Economic Impact Analysis

Impacts should be minimal as most vessels provide such assistance voluntarily.

3c. Require vessel operators to provide observers notice when pumping/haul-back occurs on vessels with mackerel limited access and/or longfin squid moratorium permits.

Summary of Biological Impact Analysis

Such notification could help improve observer data by making sure the observer is aware of all sampling opportunities. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Most vessels do most of these things already so impacts would be low.

Summary of Socio-Economic Impact Analysis

Impacts should be minimal as most vessels provide such assistance voluntarily.

3d. When observers are deployed on trips involving more than one vessel, observers would be required on any vessel taking on fish wherever/whenever possible on vessels with mackerel limited access and/or longfin squid moratorium permits.

Summary of Biological Impact Analysis

If vessels are working in pairs conducting pair trawling and both vessels are receiving fish, having observers on both vessels ensures that all catch from the pair trawling trip is observed. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. The observer program usually does this already so impacts would be low.

Summary of Socio-Economic Impact Analysis

This is generally occurring already (pers com Amy VanAtten). To the extent that it is not, NMFS would have to spend additional funds on observers, or if industry funding is approved in this amendment pair-trawl vessels would always have to arrange for two observers.

3e. On vessels with mackerel limited access and/or longfin squid moratorium permits, require slippage reports - "Released Catch Affidavits" from captains on observed trips if they slip a haul.

Slippage is an important concept in this amendment and is defined as:

Unobserved catch, i.e., catch that is discarded prior to being observed, sorted, sampled, and/or brought on board the fishing vessel. Slippage can include the release of fish from a codend or seine prior to completion of pumping or the release of an entire catch or bag while the catch is still in the water.

> • Fish that cannot be pumped and that remain in the net at the end of pumping operations are considered to be operational discards and not slipped catch. Observer protocols include documenting fish that remain in the net in a discard log before they are released, and existing regulations require vessel operators to assist the observer in this process. Management measures are under consideration in this amendment to address this issue and improve the observers' ability to inspect nets after pumping to document operational discards.
>
> • Discards that occur at-sea after catch brought on board and sorted are also not considered slipped catch.

Summary of Biological Impact Analysis

This alternative would be used to improve the quality of data collected by observers by developing a better understanding of slippage events. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since there no direct incentive not to slip impacts should be low. If a "trip termination because of slippage" alternative was selected (see below), the slippage reports could also be used by enforcement to determine if vessels had terminated appropriately after reaching the trigger number of slippage events.

Summary of Socio-Economic Impact Analysis

Minimal impacts would be expected. Vessel captains would have to fill out a form explaining the reason for any slipped hauls.

<u>3f</u>. Prohibit vessels with Mackerel limited access permits that have notified for a mackerel trip and are carrying an observer from releasing any discards before they have been brought aboard for sampling by the observer.

<u>Summary of Biological Impact Analysis</u>

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

Some fishing time may be lost because nets have to be fully brought aboard after each haul. Also, this alternative could create safety problems if a vessel attempts to bring aboard a catch and/or net in dangerous conditions. The observer program reports that most vessels are already doing this a majority of the time on a voluntary basis (pers com Amy VanAtten).

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>3g</u>. Prohibit vessels with longfin squid moratorium permits that have notified for a longfin squid trip and are carrying an observer from releasing any discards before they have been brought aboard for sampling by the observer.

<u>Summary of Biological Impact Analysis</u>

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

Some fishing time may be lost because nets have to be fully brought aboard after each haul. Also, this alternative could create safety problems if a vessel attempts to bring aboard a catch and/or net in dangerous conditions. The observer program reports that most vessels are already doing this a majority of the time on a voluntary basis.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

3h. On vessels with mackerel limited access and/or longfin squid moratorium permits, require trip termination following 1 slipped haul on an observed trip so as to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip any hauls on an observed trip so that data can be obtained on the composition of all catches. It would apply to vessels that had notified for a mackerel or longfin squid trip.

Summary of Biological Impact Analysis

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

It is difficult to predict the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the diversity of trips types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify revenue impacts related to this alternative.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>3i</u>. On vessels with mackerel limited access and/or longfin squid moratorium permits, require trip termination following 2 slipped hauls on an observed trip so as to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip 2 hauls on an observed trip so that data can be obtained on the composition of all catches. It would apply to vessels that had notified for a mackerel or longfin squid trip.

<u>Summary of Biological Impact Analysis</u>

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

It is difficult to predict the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the diversity of trips types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify revenue impacts related to this alternative. Negative socioeconomic impacts would presumably be less than with 3h where just a single slippage event causes a trip termination.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>3j</u>. With the exceptions noted below, mackerel limited access and/or longfin squid moratorium permitted vessels that have notified the observer program of their intent to land 2,500 pounds of longfin squid or 20,000 pounds of mackerel and have been selected to carry an observer would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Vessels would be prohibited from releasing fish from the net (slippage), transferring fish to another vessel (that is not carrying a NMFS-approved observer), or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the observer.

Exceptions:
1) pumping the catch could compromise the safety of the vessel/crew
2) mechanical failure precludes bringing some or all of the catch aboard the vessel; or
3) spiny dogfish have clogged the pump and consequently prevent pumping of the rest of the catch.

If a net is released, including the exemptions above, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. Released Catch Affidavits must be submitted within 48 hours of completion of the trip.

<u>Summary of Biological Impact Analysis</u>

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

Vessel captains would have to fill out a form explaining the reason for any slipped hauls. Since there are no termination provisions in this particular alternative, there should be minimal impacts.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>3k</u>. Related to 3j, for mackerel limited access permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>5 slippage events</u> (adjustable via specifications) occur in any given year for notified and observed mackerel trips then subsequent slippage events on any notified and observed Mackerel trip would result in trip termination for the rest of that year. The goal is to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip a haul once 5 slippage events have occurred overall in a year by vessels declaring mackerel trips. The goal is to minimize unnecessary slippage events.

<u>Summary of Biological Impact Analysis</u>

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

It is difficult to predict the socio-economic impacts because participants are likely to have a wide variety of responses. If less than 5 slippage events occur the impacts may be minimal. Once terminations are triggered, some vessels may just not slip where they would have previously, and the only extra cost is sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>3l</u>. Related to 3j, for mackerel limited access permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>10 slippage events</u> (adjustable via specifications) occur in any given year for notified and observed mackerel trips then subsequent slippage events on any notified and observed Mackerel trip would result in trip termination for the rest of that year. The goal is to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip a haul once 10 slippage events have occurred overall in a year by vessels declaring mackerel trips. The goal is to minimize unnecessary slippage events.

<u>Summary of Biological Impact Analysis</u>

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

It is difficult to predict the socio-economic impacts because participants are likely to have a wide variety of responses. If less than 10 slippage events occur the impacts may be minimal. Once terminations are triggered, some vessels may just not slip where they would have previously, and the only extra cost is sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. Negative socioeconomic impacts would presumably be less than with 3k where 5 slippage events triggers trip terminations upon additional slippages.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

3m. Related to 3j, for longfin squid moratorium permitted vessels, NMFS would track the number of slippage events. Once a cap of 5 slippage events (adjustable via specifications) occur in any given trimester for notified and observed longfin squid trips then subsequent slippage events on any notified and observed longfin squid trip would result in trip termination for the rest of that trimester. The goal is to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip a haul once 5 slippage events have occurred overall in a trimester by vessels declaring longfin squid trips. The goal is to minimize unnecessary slippage events.

Summary of Biological Impact Analysis

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

It is difficult to predict the socio-economic impacts because participants are likely to have a wide variety of responses. If less than 5 slippage events occur per trimester the impacts may be minimal. Once terminations are triggered, some vessels may just not slip where they would have previously, and the only extra cost is sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>3n</u>. Related to 3j, for longfin squid moratorium permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>10 slippage events</u> (adjustable via specifications) occur in any given trimester for notified and observed longfin squid trips then subsequent slippage events on any notified and observed longfin squid trip would result in trip termination for the rest of that trimester. The goal is to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip a haul once 10 slippage events have occurred overall in a trimester by vessels declaring longfin squid trips. The goal is to minimize unnecessary slippage events.

<u>Summary of Biological Impact Analysis</u>

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

It is difficult to predict the socio-economic impacts because participants are likely to have a wide variety of responses. If less than 10 slippage events occur per trimester the impacts may be minimal. Once terminations are triggered, some vessels may just not slip where they would have previously, and the only extra cost is sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. Negative socioeconomic impacts would presumably be less than with 3m where 5 slippage events per trimester triggers trip terminations upon additional slippages.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

3o. For mackerel and/or longfin squid permitted vessels, if a trip is terminated within 24 hours because of any of the anti-slippage provisions (3g, 3h, 3k-3n), then the relevant vessel would have to take an observer on its next trip.

This would reduce a vessel's incentive to slip a haul early in a trip in order to cause a trip termination and thereby avoid having an observer on board for an extended trip.

Summary of Biological Impact Analysis

This alternative would seek to discourage observer avoidance strategies so that data can be obtained on the composition of typical trips. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Vessels may experience reduced revenue and/or higher costs due to waiting for another observer or due to paying for another observer if an industry-funded observer program is in place.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

3p. Allow mackerel and/or longfin squid permitted vessels to be assigned an annual quota (set during specifications) of slippage events related to 3j, specified annually. Once their slippage quota was reached, vessels would have to terminate an observed trip as well as upon any slippage event on subsequent observed trips for the remainder of the calendar year.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip a haul once a certain number of slippage events have occurred annually by that same vessel. While this is more intensive to track (by vessel versus by fleet), the advantage is that one vessel is not penalized for another vessel's slippage event.

Summary of Biological Impact Analysis

If vessels being observed can release incidental catch without it being recorded, observer data will be biased. Avoiding such events would improve the observer data and any analysis or management measures that depend on observer data, including reducing incidental catch of non-target species including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

This alternative would allow the Council to consider implementing slippage triggers for trip termination upon additional slippage events at the individual vessel level. The advantage of having the slippage quota be vessel based is that vessels have a direct incentive to minimize unnecessary slippage events to save their slippage quota for when they really need it (e.g. due to safety issues) and thereby avoid situations where subsequent slippage events result in forced trip terminations. Trip terminations could still occur however.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

2.1.4 Alternative Set 4 - Port-side and Other Sampling/Monitoring Measures

Background/Statement of Problem/Need for Action:

The current suite of reporting and monitoring requirements are insufficient to precisely estimate RH/S incidental catch.

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates.

From a practical standpoint, it is more efficient to subsample the landings of river herring and other non-target species when a mackerel vessel reaches the dock than when it is at sea. Discards that occur at sea of non-target species are easier to monitor than are the landed fractions that go into the hold due to the large volumes that go into the hold. Dockside sampling could have higher sampling rates to better characterize the species in retained catch and an entire catch could be evaluated in one day or less as opposed to having a person at sea for multiple days. This option does not mean that at sea monitors are unnecessary – they are essential to monitor discards. However, since most RH/S are retained (esp. for mackerel trips), portside sampling could increase sampling coverage from current levels with lower costs than at-sea observers. For longfin squid trips the preceding discussion probably does not apply because most RH/S are discarded so they are not available dockside.

Several other sampling/monitoring alternatives are also included in the Alternative Set as described below including alternatives to require volumetric hold certification of Tier 3 mackerel limited access permits and longfin squid moratorium permit holders. While in Amendment 11 the fish hold certification was primarily for purposes of capacity control (not allowing vessels to reconfigure to have substantially larger fish holds), in this Amendment the measure is being considered for purposes of facilitating rapid catch weight estimates based on vessel volume for portside sampling, observer data hail weight estimates, and vessels' VTR kept-weight estimates. There is also an ongoing voluntary project by industry to use fleet communication to avoid river herring hotspots. Since this project uses extensive post-side sampling it was included in this Alternative Set – the relevant alternative in this document just commits the Council to consider the project's results once completed to determine potential management implications. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

NOTE ON COMBINATIONS: All of the action alternatives in this Alternative Set could be implemented singly or in combination with any other alternative(s) in this Alternative Set.

<u>4a</u>. No-action

If this alternative is selected, then no measures from Alternative Set 4 would be implemented and the existing monitoring measures (as described in section 5.4) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

<u>4b</u>. Require industry-funded 3rd party port-side landings sampling program (including total weight documentation) for mackerel landings over 20,000 pounds. Required coverage levels would be specified annually during specifications. NEFSC would accredit samplers and manage the program/data. Vessels would contract directly with providers and pay providers directly. If selected, vessels would have to wait until their sampler arrived unless a waiver is obtained from the observer program.

<u>Summary of Biological Impact Analysis</u>

To the degree that better non-target landings data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Non-target species would also benefit if the costs of monitoring generally discouraged effort which would reduce interactions.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

Dockside monitors for groundfish are paid $50-$70/hr and each trip would only require 1 sampling event compared to the $800/day of at-sea samplers (plus $400 in administrative costs). Different sized vessels would have different costs for offload monitoring due to different hold sizes and processor offload speeds, but a 6-14 hour offload from a 3-5 day trip would costs $300-$980 for dockside monitoring versus $3,600-$6,000 for observer costs. If the Council required 25%, 50%, 75%, or 100% of trips to be monitored then participants would have to pay for approximately that percentage of their trips to be monitored unless additional funds are available. Revenue information for different mackerel vessels/trips is available in Alternative Set 5 below.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

4c. Require industry-funded 3rd party port-side landings sampling program (including total weight documentation) for longfin squid landings over 2,500 pounds. Required coverage levels would be specified annually during specifications. NEFSC would accredit samplers and manage the program/data. Vessels would contract directly with providers and pay provider directly. If selected, vessels would have to wait until their sampler arrived unless a waiver is obtained from the observer program.

Summary of Biological Impact Analysis

To the degree that better non-target landings data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. However, since most RH/S caught on longfin squid trips are discarded rather than retained, portside sampling is probably would not be an effective way to obtain RH/S catch information. Non-target species would benefit if the costs of monitoring generally discouraged effort which would reduce interactions.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Dockside monitors for groundfish are paid $50-$70/hr and each trip would only require 1 sampling event compared to the $800/day of at-sea samplers (plus $400 in administrative costs). Different sized vessels would have different costs for offload monitoring due to different hold sizes and processor offload speeds, but a 6-14 hour offload from a 3-5 day trip would costs $300-$980 for dockside monitoring versus $3,600-$6,000 for observer costs. If the Council required 25%, 50%, 75%, or 100% of trips to be monitored then participants would have to pay for approximately that percentage of their trips to be monitored unless additional funds are available. Revenue information for different mackerel vessels/trips is available in Alternative Set 5.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

4d. Require volumetric vessel-hold certification for Tier 3 limited access mackerel permits and specify a volume to weight conversion.

Summary of Biological Impact Analysis

This alternative could facilitate rapid catch weight estimates based on vessel volume for portside sampling, observer data hail weight estimates, and vessels' VTR kept-weight estimates.
To the degree that better non-target landings data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Informal contacts by council staff with several marine surveyors during the Amendment 11 development process revealed that a fish hold measurement could run approximately $13.30-$40 per foot of vessel length, which could range from as low as $1,000 for a 75 foot vessel to as high as $6,000 for a 150 foot vessel, not including travel expenses. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessels operating costs. Industry members have communicated to Council staff that, while some smaller vessels are configured in a way that could facilitate hold certifications (the refrigerated seawater or "tank" boats), many vessels that participate in a "fresh" product fishery are not configured in a way that facilitates a certification of a fixed hold capacity.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

4e. Require volumetric vessel-hold certification for longfin squid moratorium permits and specify a volume to weight conversion.

Summary of Biological Impact Analysis

This alternative could facilitate rapid catch weight estimates based on vessel volume for portside sampling, observer data hail weight estimates, and vessels' VTR kept-weight estimates.
To the degree that better non-target landings data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

Informal contacts by council staff with several marine surveyors revealed that a fish hold measurement could run approximately $13.30-$40 per foot of vessel length, which could range from as low as $1,000 for a 75 foot vessel to as high as $6,000 for a 150 foot vessel, not including travel expenses. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessels operating costs. Industry members have communicated to Council staff that, while some longfin squid vessels are configured in a way that could facilitate hold certifications (the refrigerated seawater or "tank" boats), many vessels that participate in a "fresh" product fishery are not configured in a way that facilitates a certification of a fixed hold capacity.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

4f. Within 6 months of the completion of the Sustainable Fisheries Coalition bycatch avoidance project (expected late 2012), the Council will meet to formally review the results and consider the appropriateness of developing a framework adjustment to implement any additional incidental catch avoidance strategies that are suggested by the results of the Sustainable Fisheries Coalition bycatch avoidance project.

This would commit the Council to consider the findings from this project as they could apply to reducing the catch of RH/S in pelagic fisheries. Full details on this project are included in Appendix 7, but generally the project is testing if oceanographic and fishery data can be used to help industry avoid potential RH/S hotspots. Implementing measures similar to this project (i.e. making participation mandatory) would be a frameworkable action.

Summary of Biological Impact Analysis

Minimal immediate impacts would be expected. This would ensure that the Council considers the findings from this project as they could apply to reducing the catch of river herrings and/or shads in pelagic fisheries. Impacts would not be known until completion of the Sustainable Fisheries Coalition bycatch avoidance project and alternatives were developed, which would be subsequently analyzed .

Summary of Socio-Economic Impact Analysis

There are no costs associated with considering the results of the Sustainable Fisheries Coalition bycatch avoidance project. If the project revealed a way for industry to cooperatively and voluntarily avoid RH/S such work could lead to a cost-efficient way to reduce RH/S interactions.

2.1.5 Alternative Set 5 – At-Sea Observer Coverage Requirements

<u>Background/Statement of Problem/Need for Action:</u>

The current suite of reporting and monitoring requirements is insufficient to precisely estimate RH/S incidental catch.

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates. The focus of these alternatives is on increasing the observer coverage rates of mackerel and longfin squid trips. Implementation of mandatory coverage would require a trip notification provision to be implemented as well (see Alternative Set 1). NMFS has strongly communicated that the at-sea portion of any additional observer coverage would have to be paid for by industry. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

NOTE ON C.V.s (coefficient of variation): A C.V. of 0.30 means that the true value has approximately a 95% probability of being within ± 60% of the estimate. A C.V. of 0.20 means that the true value has approximately a 95% probability of being within ± 40% of the estimate (both assuming a normal distribution of data). Also, since some sources of uncertainty are not integrated into the C.V. calculations, the C.V.s generated by the science center are lower (look better) than they really are. As described in Section 5 of the DEIS, since obtaining a given C.V. can require very different coverage levels from year to year, and the inter-annual variability in the data drives the precision, it may be quite difficult to consistently obtain precise catch estimates via observer data when the coverage levels are determined from prior years' data (as occurred with the SBRM).

NOTE ON COMBINATIONS: Only one of the 5b (observer coverage for mackerel mid-water trawl) alternatives could be chosen. Likewise, only one of the 5c (observer coverage for mackerel small mesh bottom trawl) and one of the 5d (observer coverage for longfin squid small mesh bottom trawl) alternatives could be chosen. One alternative from each of these could be selected (a total of three). 5e1 and 5e2 (strata-fleet alternatives for mid-water trawl) are mutually exclusive as are 5e3 and 5e4 (strata-fleet alternatives for small mesh bottom trawl) but one alternative from the first pair could be chosen with one from the second pair. If any of the 5e alternatives were chosen, they would not be combinable with any of the 5b, 5c, or 5d alternatives (coverage could be based on a set percentage of trips or a set target coefficients of variation (C.V.s) but not both). 5f, 5g, and 5h provide for industry funding and review of the increased observer coverage levels proposed in 5b-5e so they could be added on to any of the other action alternatives.

If any measure in this Alternative Set is selected for mackerel, the Council would also need to select Alternative 1d48 (48-hr pre-trip notification) or 1d72 (72-hr pre-trip notification). There is already a pre-trip notification requirement in effect for longfin squid moratorium permit holders.

5a. No-action

If this alternative is selected, then no measures from Alternative Set 5 would be implemented and the existing observer measures (as described in section 5.5) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

5b. Mackerel Mid-Water Trawl (MWT)

There is currently no pool of observer coverage for general mid-water trawl vessels and the only coverage of this fleet occurs when herring-directed activity happens to catch mackerel (the observer program actually selects against declared herring trips that state their primary target is mackerel). The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation.

> **5b1. Require 25% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5b2. Require 50% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5b3. Require 75% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5b4. Require 100% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

Summary of Biological Impact Analysis

Coverage of this fishery has historically been low, leading to low precision of RH/S catch estimates. Higher coverage would lead to better precision. To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since mackerel trips do not comprise all MWT activity, one can not specify the precision for RH/S catches in MWT gear if only mackerel trips increase observer coverage. Details on expected precision if all MWT activity achieved the above coverage levels can be found in Section 7. Non-target species would also benefit if the costs of coverage generally discouraged effort which would reduce interactions.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

NMFS has strongly communicated that the at-sea portion of any additional observer coverage would have to be paid for by industry. The cost to vessels of at-sea observers would be about $800 per day at sea while NMFS incurs about $400/day in administrative costs. Since different vessels have different average trip lengths and trip length varies by trip it is not possible to describe the impact on any given vessel. However, cost data collected through the observer program was used to estimate the increase in daily trip costs that $800/day would cause for mackerel trips:

-23% for single MWT mackerel trips ($3,494 to $4,294)
-31% for paired MWT mackerel trips ($2,602 to $3,402)

The average trip cost values cited in this analysis include variable costs such as fuel, oil, ice, food, fishing supplies, vessel/gear damages, and water but does not include crew shares/wages, dockage fees, or boat mortgage payments. Trip costs were estimated based on 2010 observer data. These are the larger, higher-volume vessels – smaller vessels that start off with lower costs would see a higher percentage increase.

While the per trip costs are most relevant to vessels, total costs can also be considered. Since coverage in this alternative would be related to 20,000 pound mackerel trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on midwater trawl trips that kept 20,000 pounds or more of mackerel. These trips averaged 643 sea days each year ranging from 272 in 2010 to 926 in 2006. If 25%, 50%, 75%, or 100% of the average seadays (643) were observed it would require 161, 322, 482, and 643 days respectivly. Given the low levels of current coverage and an uncertain future funding situation, most if not nearly all of these would or could have to be industry funded (see 5f below) if mandated. Multiplying these days by $800/day results in at-sea costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.13 million, $0.26 million, $0.39 million, and $0.51 million per year respectivly. Multiplying these days by $400/day results in administrative costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.06 million, $0.13 million, $0.19 million, and $0.26 million per year respectivly.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>5c</u>. Mackerel Small Mesh Bottom Trawl (SMBT)

A very small percentage of mackerel trips are observed overall. The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation. Analysis in the document relates these coverage levels to potential ranges of uncertainty that would result from such coverage levels.

> **5c1. Require 25% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5c2. Require 50% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5c3. Require 75% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5c4. Require 100% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

<u>Summary of Biological Impact Analysis</u>

Coverage of this fishery has historically been low, leading to low precision of RH/S catch estimates. Higher coverage would lead to better precision. To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since mackerel trips comprise a small part of SMBT activity, one can not specify the precision for RH/S catches in SMBT gear if only mackerel trips increase observer coverage. Details on expected precision if all SMBT activity achieved the above coverage levels can be found in Section 7. Non-target species would also benefit if the costs of coverage generally discouraged effort which would reduce interactions.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

NMFS has strongly communicated that the at-sea portion of any additional observer coverage would have to be paid for by industry. The cost to vessels of at-sea observers would be about $800 per day at sea while NMFS incurs about $400/day in administrative costs. Since different vessels have different average trip lengths and trip length varies by trip it is not possible to describe the impact on any given vessel. However, cost data collected through the observer program was used to estimate the increase in daily trip costs that $800/day would cause for mackerel trips:

-49% for higher volume SMBT mackerel trips ($1,639 to $2,439)

The average trip cost values cited in this analysis include variable costs such as fuel, oil, ice, food, fishing supplies, vessel/gear damages, and water but does not include crew shares/wages, dockage fees, or boat mortgage payments. Trip costs were estimated based on 2010 observer data. These are the larger, higher-volume vessels – smaller vessels that start off with lower costs would see a higher percentage increase.

While the per trip costs are most relevant to vessels, total costs can also be considered. Since coverage in this alternative would be related to 20,000 pound mackerel trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on SMBT trips that kept 20,000 pounds or more of mackerel. These trips averaged 172 sea days each year ranging from 113 in 2009 to 286 in 2006. If 25%, 50%, 75%, or 100% of the average seadays (172) were observed it would require 43, 86, 129, and 172 days respectivly. Given the low levels of current coverage and an uncertain future funding situation, most if not nearly all of these would or could have to be industry funded (see 5f below) if mandated. Multiplying these days by $800/day results in at-sea costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.03 million ($30,000), $0.07 million, $0.10 million, and $0.14 million per year respectivly. Multiplying these days by $400/day results in administrative costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.02 million, $0.03 million, $0.05 million, and $0.07 million per year respectivly.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

5d. Longfin Squid Small Mesh Bottom Trawl (SMBT)

While coverage has increased in 2011 related to the implementation of the butterfish mortality cap on the longfin squid fishery, a small percentage of longfin squid trips have been observed historically. The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation. Analysis in the document relates these coverage levels to potential ranges of uncertainty that would result from such coverage levels.

5d1. Require 25% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d2. Require 50% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d3. Require 75% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d4. Require 100% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

Summary of Biological Impact Analysis

Coverage of this fishery has historically been low, leading to low precision of RH/S catch estimates. Higher coverage would lead to better precision. To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since longfin squid trips do not comprise all SMBT activity, one can not specify the precision for RH/S catches in SMBT gear if only longfin squid trips increase observer coverage. Details on expected precision if all SMBT activity achieved the above coverage levels can be found in Section 7. Non-target species would also benefit if the costs of coverage generally discouraged effort which would reduce interactions.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

NMFS has strongly communicated that the at-sea portion of any additional observer coverage would have to be paid for by industry. The cost to vessels of at-sea observers would be about $800 per day at sea while NMFS incurs about $400/day in administrative costs. Since different vessels have different average trip lengths and trip length varies by trip it is not possible to describe the impact on any given vessel. However, cost data collected through the observer program was used to estimate the increase in daily trip costs that $800/day would cause for mackerel trips:

-85% for higher volume SMBT longfin squid trips ($939 to $1,739)
-189% for lower volume SMBT longfin squid trips ($424 to $1,224)

The average trip cost values cited in this analysis include variable costs such as fuel, oil, ice, food, fishing supplies, vessel/gear damages, and water but does not include crew shares/wages, dockage fees, or boat mortgage payments. Trip costs were estimated based on 2010 observer data.

While the per trip costs are most relevant to vessels, total costs can also be considered. Since coverage in this alternative would be related to 2,500 pound longfin squid trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on SMBT trips that kept 2,500 pounds of more of longfin squid. These trips averaged 5,357 sea days each year ranging from 3,932 in 2010 to 6,743 in 2006. If 25%, 50%, 75%, or 100% of the average seadays (5,357) were observed it would require 1339, 2678, 4017, and 5,357 sea days respectivly. Given the low levels of current coverage and an uncertain funding situation, most if not nearly all of these might have to be industry funded (see 5f below) if mandated. About 10% of 2,500 pound longfin squid trips were observed in 2011, so up to 10% of these might be funded but such funding is not guaranteed. Multiplying these days by $800/day results in at-sea costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $1.1 million, $2.1 million, $3.2 million, and $4.3 million per year respectivly. Multiplying these days by $400/day results in administrative costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.5 million, $1.1 million, $1.6 million, and $2.1 million per year respectivly. However, there may be returns to scale in the sense that at higher coverage levels NMFS marginal costs may become less than $400/day.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

5e. Strata-Fleet-Based Alternatives

Analysis performed for the amendment and detailed in Section 7 suggests that around 65% coverage could result in a 0.3 C.V. goal and about 90% coverage could result in a 0.2 C.V. goal for Mid-Atlantic MWT for alewife and blueback. Also, for small mesh bottom trawl, around 40% coverage could result in a 0.3 C.V. goal and about 60% coverage could result in a 0.2 C.V. goal for alewife and blueback. This was determined by averaging the required sea days from 2009-2010 for these goals, and then comparing those averages with total average days at sea for relevant trips from VTR data, 2009-2010. However it is emphasized that from year to year it will be very hard to hit a particular C.V. target due to the inherent variability from year to year in both the directed fisheries involved and their incidental catch of river herrings. Since one cannot predict which years will require the highest coverage, some years would likely be over covered and some years would be under covered if coverage rates are determined by the previous year's data.

Note: This alternative has a major implementation issue in that NMFS has said it will not approve increased observer coverage that is not funded by industry but the MAFMC cannot compel all fisheries by gear type to pay for observer coverage (only its own).

The following sub-alternatives would require coverage levels that would be expected to result in the specified C.V. levels for river herrings. Shad were not included because very high coverage levels would be required to achieve the respective C.V.s due to lower encounter rates.

> **5e1. Require NMFS to allocate sea days such that Mid-Atlantic alewife and blueback catch C.V.s for MWT would each be expected to be at or below 0.30.**
>
> **5e2. Require NMFS to allocate sea days such that Mid-Atlantic alewife and blueback catch C.V.s for MWT would each be expected to be at or below 0.20.**
>
> **5e3. Require NMFS to allocate sea days such that alewife and blueback catch C.V.s for SMBT would each be expected to be at or below 0.30.**
>
> **5e4. Require NMFS to allocate sea days such that alewife and blueback catch C.V.s for SMBT would each be expected to be at or below 0.20.**

Summary of Biological Impact Analysis

To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Non-target species would also benefit if the costs of coverage generally discouraged effort which would reduce interactions.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

The approximate cost for an observer is $800/day. In addition to the costs borne by vessels, NMFS has estimated that it incurs approximately $400/day in administrative costs related to each additional day at sea.

Compared to the approximate sea days provided in 2010, achieving a 0.3 C.V. for both blueback herring and alewife in the Mid-Atlantic for MWT would require 476-232 extra sea days (costing about $0.2-$0.4 million) and achieving a 0.2 C.V. for both blueback herring and alewife in the Mid-Atlantic for MWT would require 686-344 extra sea days (costing about $0.3-$0.5 million), with at sea costs being $800/day. Administrative costs to NMFS would equal an additional 50% of the at-sea costs ($400/day). The range is related to the fact that C.V.s vary from year to year related to variation in the underlying data.

Compared to the approximate sea days provided in 2010, achieving a 0.3 C.V. for both blueback herring and alewife in the SMBT (Mid-Atlantic and New England) would require 1,410-2,478 extra sea days (costing about $1.1-$2.0 million) and achieving a 0.2 C.V. for both blueback herring and alewife in the Mid-Atlantic for MWT would require 2,850-3,757 extra sea days (costing about $2.3-$3.0 million), with at sea costs being $800/day. Administrative costs to NMFS would equal an additional 50% of the at-sea costs ($400/day). The range is related to the fact that C.V.s vary from year to year related to variation in the underlying data.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

5f. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

Summary of Biological Impact Analysis

Biological impacts should be independent of who pays for data.

Summary of Socio-Economic Impact Analysis

See 5b-5e above.

5g. Phase-in industry funding over 4 years such that to achieve the target coverage selected in 4b-4e above, NMFS would pay for 100%, 75%, 50%, then 25% of the at-sea portion of the specified observer coverage (NOTE: NMFS has indicated this is not feasible from a funding point of view).

Summary of Biological Impact Analysis

Biological impacts should be independent of who pays for data.

Summary of Socio-Economic Impact Analysis

Alternatives 5b-5e above compare the cost of observer coverage relative to different coverage levels and precision targets. In the short term cost-sharing with NMFS would make the economic impacts less but would not have an impact on the long term. For this alternative, if NMFS paid 100% of the observer coverage there would be minimal socio-economic impacts. For the phase in years, the impacts per trip would be the same as described above, but the number of trips for which industry would have to pay for observers would be less, at least initially.

5h. Require reevaluation of coverage requirement after 2 years to determine if incidental catch rates justify continued expense of continued high coverage rates.

Summary of Biological Impact Analysis

This should not have any impacts other than allowing more rapid future management responses.

Summary of Socio-Economic Impact Analysis

This should not have any impacts other than allowing more rapid future management responses.

2.1.6 Alternative Set 6 - Mortality Caps

Background/Statement of Problem/Need for Action:

There are currently no limits on incidental catch of RH/S in the mackerel and/or longfin squid fisheries other than state landing requirements.

The alternatives would seek to directly limit the mortality of the relevant RH/S species in the mackerel and longfin squid fisheries. While the actual mortality cap quantities would be determined during the specifications process just as annual ACLs/AMs are set, this document explores a range of options so that likely impacts may be evaluated. The range of mortality cap quantities would be evaluated in an environmental assessment during the specifications process (though without comprehensive RH/S assessments it is not possible to determine if any particular quantity of RH/S catch is sustainable). The following values are primarily provided to give the reader a sense of impacts from a range of mortality caps that will be investigated in greater depth during the specifications process. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

NOTE ON COMBINATIONS: All of the action alternatives in this Alternative Set could be implemented singly or in combination with any other alternative(s) in this Alternative Set.

6a. No-action

If this alternative is selected, then no measures from Alternative Set 6 would be implemented and the existing state management measures (as described in section 5.9) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

6b. Implement a mortality cap for river herrings for the mackerel fishery whereby the mackerel fishery would close once it is determined that it created a certain level of river herring mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for river herring would be to base it on the range of estimated river herring mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic mid-water trawl (MWT) fishing in Quarter 1, which is largely but not completely mackerel fishing, accounted for 35% of total river herring mortality 2005-2010. MWT fishing in Quarter 1 is mixed, with mackerel comprising over 50 % of the landings, but herring making up a large amount of landings in January (see Figure 21A of Appendix 2). The table below describes total ocean and quarter 1 mid-water trawl mortalities in the leftmost columns.

Table 1. Example River Herring Caps For Mackerel

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Water Trawl Quarter 1 mortality (mt) (35% of total) = Mortality Cap Possibility	Mackerel would close at these landings (mt) with high ratio, 0.86%	Mackerel would close at these landings (mt) with mean ratio, 0.45%	Mackerel would close at these landings (mt) with low ratio, 0.02%
2006	245	86	9,975	19,063	428,908
2007	664	232	27,029	51,656	1,162,263
2008	672	235	27,333	52,237	1,175,335
2009	361	126	14,679	28,053	631,190
2010	244	85	9,911	18,940	426,160

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 50% or at least 100,000 pounds of mackerel (encompasses almost all landings) results in annual river herring mortality ratios from 0.02% in 2007 to .86% in 2009 with a mean of 0.45. If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the mackerel fishery was shut down by the river herring mortality cap is illustrated in the rightmost 3 columns depending of the ratio of river herring. The main point is that whether mackerel would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of river herring was, and what the mackerel availability was. In the above table the range of caps is just a percentage of the observed catch over the years 2006-2010. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all.

Summary of Biological Impact Analysis

If a cap was set low enough to shut the directed fishery down, there would be some benefits to RH/S. However, since the linkage between incidental catch of RH/S and RH/S stock status and productivity is not known, the impacts are not quantifiable. Smaller caps and earlier closures should lead to relatively higher benefits.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

If a low cap is chosen and a high ratio is observed, the directed fishery would close due to the cap before it reached the directed fishery quota. This would result in revenue losses to fishery participants that would be dependent on the exact level of the cap and bycatch ratio, and prices for the directed species that “is left in the water” because of the cap closure. The ranges described in the above table would suggest potentially forgone revenue as high as about $8 million or as low as zero dollars at 2010 ex-vessel prices depending on the above factors and based on the proposed 2012 quota.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

6c. Implement a mortality cap for shads for the mackerel fishery whereby the mackerel fishery would close once it is determined that it created a certain level of shad mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for shad would be to base it on the range of estimated shad mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic mid-water trawl fishing in Quarter 1, which is largely but not completely mackerel fishing, accounted for 12% of total shad mortality 2005-2010. The table below describes total ocean and quarter 1 mid-water trawl mortalities in the leftmost columns (2006 omitted because of lack of shad records).

Table 2. Example Shad Caps For Mackerel

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Water Trawl Quarter 1 mortality (mt) (12% of total) = Mortality Cap Possibility	Mackerel would close at these landings (mt) with high ratio, 0.05%	Mackerel would close at these landings (mt) with mean ratio, 0.03%	Mackerel would close at these landings (mt) with low ratio, 0.004%
2007	60	7	14,364	23,940	179,550
2008	60	7	14,450	24,084	180,630
2009	70	8	16,903	28,172	211,290
2010	47	6	11,338	18,896	141,720

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 50% or at least 100,000 pounds of mackerel (encompasses almost all landings) results in annual shad mortality ratios from 0.004% in 2009 to 0.05% in 2007 with a mean of 0.03. If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the mackerel fishery was shut down by the shad mortality cap is illustrated in the rightmost 3 columns depending of the ratio of shad. The main point is that whether mackerel would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of shad was, and what the mackerel availability was. In the above table the range of caps is just a percentage of the observed catch over the years 2006-2010. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all.

Summary of Biological Impact Analysis

If a cap was set low enough to shut the directed fishery down, there would be some benefits to RH/S. However, since the linkage between incidental catch of RH/S and RH/S stock status and productivity is not known, the impacts are not quantifiable. Smaller caps and earlier closures should lead to relatively higher benefits.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

If a low cap is chosen and a high ratio is observed, the directed fishery would close due to the cap before it reached the directed fishery quota. This would result in revenue losses to fishery participants that would be dependent on the exact level of the cap and bycatch ratio, and prices for the directed species that "is left in the water" because of the cap closure. The ranges described in the above table would suggest potentially forgone revenue as high as about $7 million or as low as zero dollars at 2010 ex-vessel prices depending on the above factors and based on the proposed 2012 quota.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>6d</u>. Implement a mortality cap for <u>river herrings</u> for the <u>longfin squid</u> fishery whereby the longfin squid fishery would close once it is determined that it created a certain level of river herring mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for river herring would be to base it on the range of estimated river herring mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic small mesh bottom trawl accounted for 5% of total river herring mortality. While Mid-Atlantic small mesh bottom trawl encompasses a variety of fisheries besides longfin squid (including Atlantic herring), some of the New England small mesh bottom trawl mortality is probably related to longfin squid fishing so using the full Mid-Atlantic value is probably reasonable. The table below describes total ocean and 2.5% of total mortalities in the leftmost columns.

Table 3. Example River Herring Caps For Longfin Squid

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Atlantic Small Mesh Bottom Trawl mortality (mt) (5% of total) = Mortality Cap Possibility	Longfin squid would close at these landings (mt) with high ratio, 0.17%	Longfin squid would close at these landings (mt) with mean ratio, 0.06%
2006	245	12	7,233	20,424
2007	664	33	19,534	55,346
2008	672	34	19,754	55,968
2009	361	18	10,608	30,057
2010	244	12	7,162	20,293

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 2,500 pounds longfin squid (encompasses almost all landings) results in annual river herring mortality ratios from almost zero in 2007 to .17% in 2009 with a mean of 0.06%. If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the longfin squid fishery was shut down by the river herring mortality cap is illustrated on the rightmost 2 columns depending of the ratio of river herring. The main point is that whether longfin squid would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of river herring was, and what the longfin squid availability was. In the above table the range of caps is just a percentage of the observed catch over the years 2006-2010. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all.

Summary of Biological Impact Analysis

If a cap was set low enough to shut the directed fishery down, there would be some benefits to RH/S. However, since the linkage between incidental catch of RH/S and RH/S stock status and productivity is not known, the impacts are not quantifiable. Smaller caps and earlier closures should lead to relatively higher benefits.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

If a low cap is chosen and a high ratio is observed, the directed fishery would close due to the cap before it reached the directed fishery quota. This would result in revenue losses to fishery participants that would be dependent on the exact level of the cap and bycatch ratio, and prices for the directed species that "is left in the water" because of the cap closure. The ranges described in the above table would suggest potentially forgone revenue as high as about $35 million or as low as zero dollars at 2010 ex-vessel prices depending on the above factors and based on the proposed 2012 quota.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>6e</u>. Implement a mortality cap for <u>shads</u> for the <u>longfin squid</u> fishery whereby the longfin squid fishery would close once it is determined that it created a certain level of shad mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for shad would be to base it on the range of estimated shad mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic small mesh bottom trawl accounted for 11.5% of total shad mortality. While Mid-Atlantic small mesh bottom trawl encompasses a variety of fisheries besides longfin squid (including Atlantic herring), some of the New England small mesh bottom trawl mortality is probably related to longfin squid fishing so using the full Mid-Atlantic value is probably reasonable. The table below describes total ocean and 11.5% of total mortalities in the leftmost columns.

Table 4. Example Shad Caps For Longfin Squid

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Atlantic Small Mesh Bottom Trawl mortality (mt) (11.5% of total) = Mortality Cap Possibility	Longfin squid would close at these landings (mt) with high ratio, 0.21%	Longfin squid would close at these landings (mt) with mean ratio, 0.10%	Longfin squid would close at these landings (mt) with low ratio, 0.03%
2006	47	5	2,587	5,433	18,109
2007	60	7	3,278	6,883	22,943
2008	60	7	3,297	6,924	23,081
2009	70	8	3,857	8,099	26,998
2010	47	5	2,587	5,433	18,109

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 2,500 pounds longfin squid (encompasses almost all landings) results in annual shad mortality ratios from almost 0.03% in 2009 to 0.21% in 2010 with a mean of 0.10%. If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the longfin squid fishery was shut down by the shad mortality cap is illustrated in the rightmost 2 columns depending of the ratio of shad. The main point is that whether longfin squid would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of shad was, and what the longfin squid availability was. In the above table the range of caps is just a percentage of the observed catch over the years 2006-2010. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all.

Summary of Biological Impact Analysis

If a cap was set low enough to shut the directed fishery down, there would be some benefits to RH/S. However, since the linkage between incidental catch of RH/S and RH/S stock status and productivity is not known, the impacts are not quantifiable. Smaller caps and earlier closures should lead to relatively higher benefits.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

If a low cap is chosen and a high ratio is observed, the directed fishery would close due to the cap before it reached the directed fishery quota. This would result in revenue losses to fishery participants that would be dependent on the exact level of the cap and bycatch ratio, and prices for the directed species that "is left in the water" because of the cap closure. The ranges described in the above table would suggest potentially forgone revenue as high as about $45 million or as low as zero dollars at 2010 ex-vessel prices depending on the above factors and based on the proposed 2012 quota.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

6f. Add mortality caps to list of measures that can be frameworked.

Summary of Biological Impact Analysis

Allowing a cap to be considered via a framework should not have any impacts other than allowing more rapid management responses in the future.

Summary of Socio-Economic Impact Analysis

Allowing a cap to be considered via a framework should not have any impacts other than allowing more rapid management responses in the future.

2.1.7 Alternative Set 7 – Restrictions in areas of high RH/S catch

Background/Statement of Problem/Need for Action:

There are currently no limits on incidental catch of RH/S in the mackerel and/or longfin squid fisheries other than state landing requirements

The Council originally hoped to include some alternatives that would restrict fishing in relatively small areas that appeared to be "hotspots" for RH/S catch. The Amendment's Fishery Management Action Team's found that small-area management is unlikely to be successful (see Appendices 1 & 2). Because the Council instructed the FMAT to generate area-based alternatives that would be likely to provide protection to RH/S, the FMAT generated several alternatives that are area based but the FMAT also acknowledged that such large-scale closures would effectively close the fisheries for many participants.

Council staff attempted to perform additional smaller-scale examinations of the data (for example around Hudson canyon) and while at such small scales there were too few observations to draw conclusions, even at small scales incidental catch events usually exhibited strong spatial-temporal variability.

The FMAT analysis suggests that because of the spatial and temporal variability of observed (Northeast Fishery Observer Program or "NEFOP") RH/S catch, the same kind of variability in mackerel and longfin squid effort and catch, and the same kind of variability in RH/S NEFSC trawl survey catches, that very large areas would be required to ensure that management was not just redistributing effort, possibly in a way that even increased RH/S catch. For this reason Council staff used the FMAT GIS analysis (See appendices 1 and 2) to construct areas for mackerel and longfin squid based on the mid-water and small-mesh bottom trawl fleet effort data and RH/S catch data. The table below is designed to help illustrate how even if you reduce catch rates of one species, for example blueback, but reduce catch rates of the directed species (for example mackerel) even more, it can be possible to do more harm than good if the fleet increases effort to maintain the same amount of harvest. Larger areas would not allow such redistribution of effort however. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

Table 5. Direct-Incidental Impact Schematic

Effects on RH catch of moving effort assuming effort changes to maintain constant mackerel catch if CPUE changes

		Mackerel		
	CPUE Changes	neutral	a little lower	a lot lower
Blueback	neutral	0	bad	bad
	a little lower	good	0	bad
	a lot lower	good	good	0

NOTE ON COMBINATIONS: 7bMack and 7cMack are mutually exclusive – the Council could close the area to directed fishing (7bMack) or require observers (7cMack) but not both. Likewise 7bLong and 7cLong are mutually exclusive – the Council could close the area to directed fishing (7bLong) or require observers (7cLong) but not both. One of the mackerel alternatives (either 7bMack or 7cMack) could be combined with one of the longfin squid alternatives (either 7bLong or 7cLong) however. 7d could be added to any 7b or 7c alternative to make those provisions only applicable after a cap-based trigger was reached. The Council would have to specify in this case that the Alternative Set 6 cap trigger was only a trigger for Alternative Set 7 rather than a stand-alone cap measure. 7e could be chosen in addition to any other alternative in this Alternative Set.

Given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery.

The enforceability of area-based management alternatives could be facilitated by the selection of the vessel monitoring system (VMS) requirement in Alternative Set 1 (alternatives 1eMack or 1eLong).

The selection of alternatives that include observer coverage requirements (7cMack and 7cLong) would require the selection of observer program notification alternatives for limited access mackerel permits in Alternative Set 1(1d48 and 1d72).

7a. No-action

If this alternative is selected, then no measures from Alternative Set 7 would be implemented and the existing state management measures (as described in section 5.9) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

<u>7bMack</u>. Closed Area - Prohibit retention of more than 20,000 pounds of mackerel in RH/S Mackerel Management Area (applies in quarter 1 only – see map below) for vessels with federal mackerel permits.

<u>Summary of Biological Impact Analysis</u>

Given the RH/S Mackerel Management Area encompasses most quarter-one mid-water trawl effort as well as most quarter-one observer data observations of RH/S catch, which are estimated to account for 35% of total RH/S catch, it is likely that effectively closing this area to mackerel fishing would create some positive impacts for mackerel as well as RH/S and other non-target species, but it is not possible to quantify the effect (if any) on RH/S stocks of catching one amount of RH/S versus some other amount due to the paucity of assessment information.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

As described in the table below, about 85% of mackerel revenues with an assigned area (2/3 to ¾ of total landings) from 2006-2010 came from within the RH/S Mackerel Management Area. While vessels would compensate as best they could so impacts are difficult to further quantify, vessels that typically rely on mackerel would likely suffer economically.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

Table 6. Distribution of Mackerel Revenues in and out of RH/S Area

	Outside Mackerel Value ($)	Inside Mackerel Value ($)
2006	3,149,111	17,323,851
2007	946,926	2,666,001
2008	553,705	3,200,344
2009	681,665	6,655,122
2010	471,663	2,920,919
Total	5,803,070	32,766,237
%	15%	85%

Source: Unpublished VTR Data

<u>7bLong</u>. Closed Area - Prohibit retention of more than 2,500 pounds longfin squid in RH/S Longfin Squid Management Area (applies year-round – see maps below) for vessels with federal longfin squid moratorium permits.

<u>Summary of Biological Impact Analysis</u>

Given the RH/S Longfin Squid Management Area encompasses most small mesh bottom trawl effort, which is responsible for 24% of RH/S catch, it is likely that effectively closing this area to longfin squid fishing would create some positive impacts for longfin squid as well as non-target species such as RH/S, but it is not possible to quantify the effect (if any) on RH/S stocks of catching one amount of RH/S versus some other amount due to the paucity of assessment information. However, examination of targeting information in the observer data suggests that RH/S encounters in SMBT fisheries are more associated with targeting of Alt Herring so impacts may not be large from restrictions only on SMBT longfin squid fishing.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

As described in the table below, about 71% of longfin squid kept catch (VTR data) from 2006-2010 came from within the RH/S longfin squid Management Area. While vessels would compensate as best they could so impacts are difficult to further quantify, vessels that typically rely on longfin squid would likely suffer economically.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

Table 7. Distribution of longfin squid VTR catches in and out of RH/S Area.

	Outside Loligo Pounds	Inside Loligo Pounds
2006	7,139,722	30,323,237
2007	16,516,551	12,991,085
2008	6,692,942	20,772,623
2009	4,352,451	17,991,543
2010	4,050,619	12,510,747
Total	38,752,285	94,589,235
%	29%	71%

Source: Unpublished VTR Data

<u>7cMack.</u> Require observers in RH/S Mackerel Management Area (applies in quarter 1 only – see map below) for vessels with federal mackerel permits to retain 20,000 pounds or more of mackerel. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

<u>Summary of Biological Impact Analysis</u>

To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. To the degree that fishermen did not fish because of the requirement there could be benefits to the managed species as well as non-target species and protected resources. To the extent that fishermen transferred effort there could be unknown impacts on other managed species, non-target species, habitat, and protected resources.

<u>Summary of Socio-Economic Impact Analysis</u>

Impacts are mixed with an uncertain net impact.

The cost of observers relative to vessel revenues and existing costs is described in Alternative Set 5.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

<u>7cLong.</u> Require observers in RH/S longfin squid Management Area (applies year round) for vessels with federal longfin squid permits to possess 2,500 pounds or more of longfin squid. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

<u>Summary of Biological Impact Analysis</u>

To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. To the degree that fishermen did not fish because of the requirement there could be benefits to the managed species as well as non-target species, habitat, and protected resources. To the extent that fishermen transferred effort there could be unknown impacts on other managed species, non-target species, habitat, and protected resources.

Summary of Socio-Economic Impact Analysis

Impacts are mixed with an uncertain net impact.

The cost of observers relative to vessel revenues and existing costs is described in Alternative Set 5.

While there are human community costs associated with this alternative, there also could be human community benefits as described in Section 2.1.

7d. Make above requirement(s) in effect only when a mortality cap "trigger" is reached. Operation of a "trigger" would be identical to the operation of a mortality cap (see Alternative Set 6 above) but the consequence of hitting the cap would be implementing 7b and/or 7c above if this alternative is selected in conjunction with 7b and/or 7c above. Trigger levels would be specified annually via specifications.

This option would use a mortality cap but instead of shutting down the fishery either the closed area or 100% observer coverage requirements in this Alternative Set would go into force. This alternative could only be selected in conjunction with 7b and/or 7c above.

Summary of Biological Impact Analysis

To the degree that a mortality cap gave fishermen incentive to avoid RH/S there could be positive impacts to RH/S. Once a cap was reached, then the same impacts as discussed above with 7b and/or 7c would be applicable but to a lesser degree since they would not be in force for the full year.

Summary of Socio-Economic Impact Analysis

To the degree that a mortality cap gave fishermen the opportunity to avoid RH/S and avoid more onerous requirements such as 7b or 7c above, a mortality cap trigger could have a positive impact compared to 7b or 7c alone. Once a cap was reached, then the same impacts as discussed above with 7b and/or 7c would be applicable but to a lesser degree since they would not be in force for the full year.

7e. Stipulate that any areas designated in Amendment 14 would be considered for updating every other year in specifications considering the most recent data available when specifications are developed.

Summary of Biological Impact Analysis

7e should not have any impacts other than facilitating future management responses.

Summary of Socio-Economic Impact Analysis

7e should not have any impacts other than facilitating future management responses.

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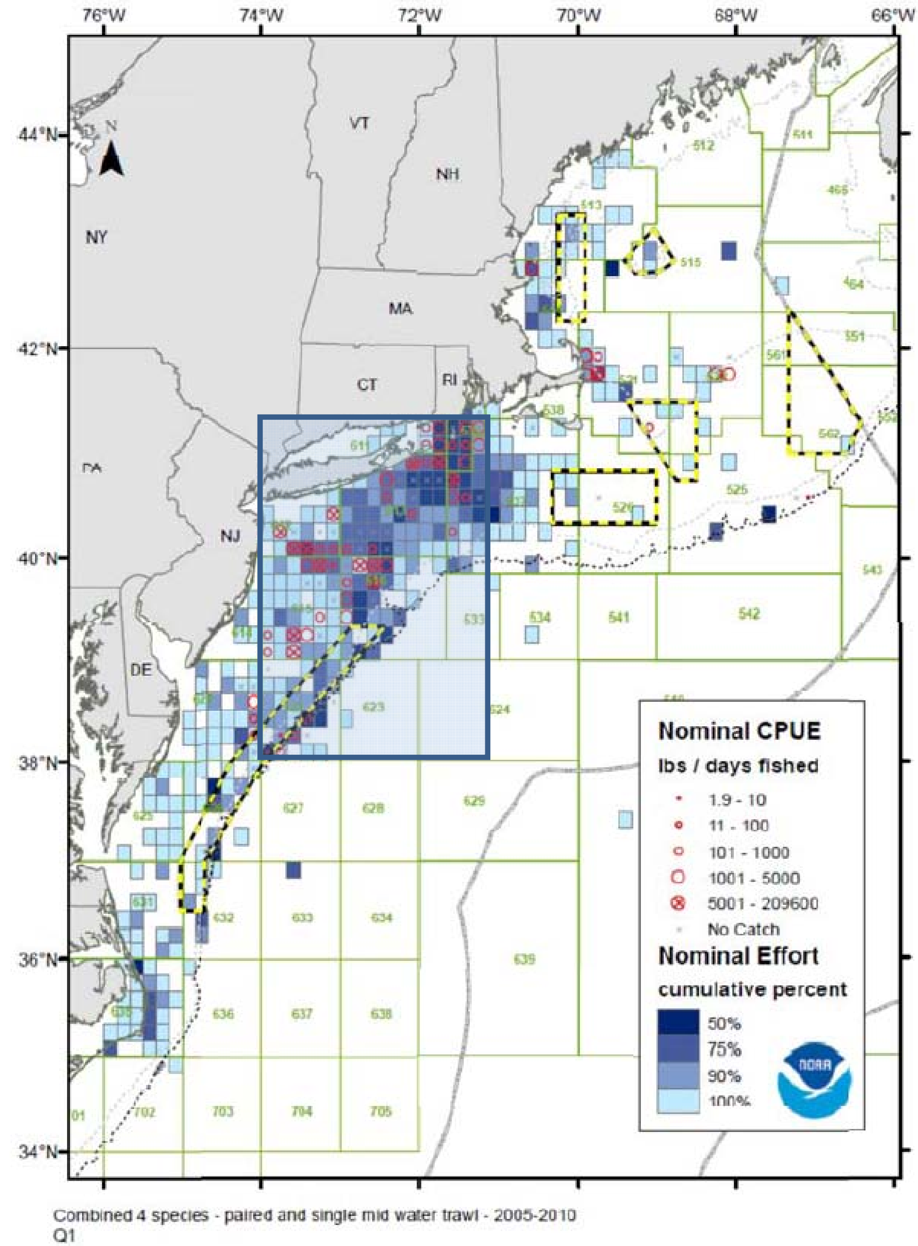
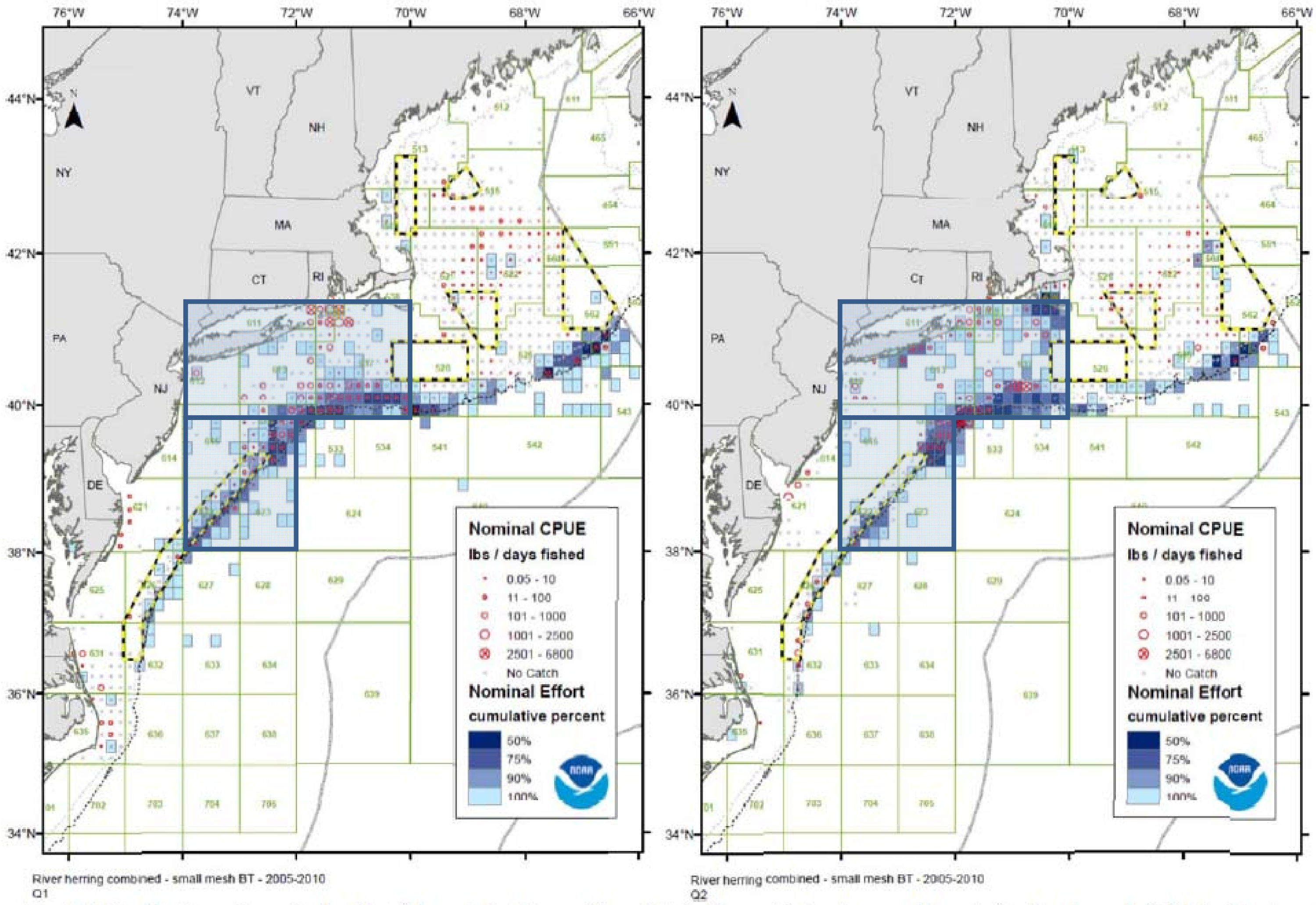
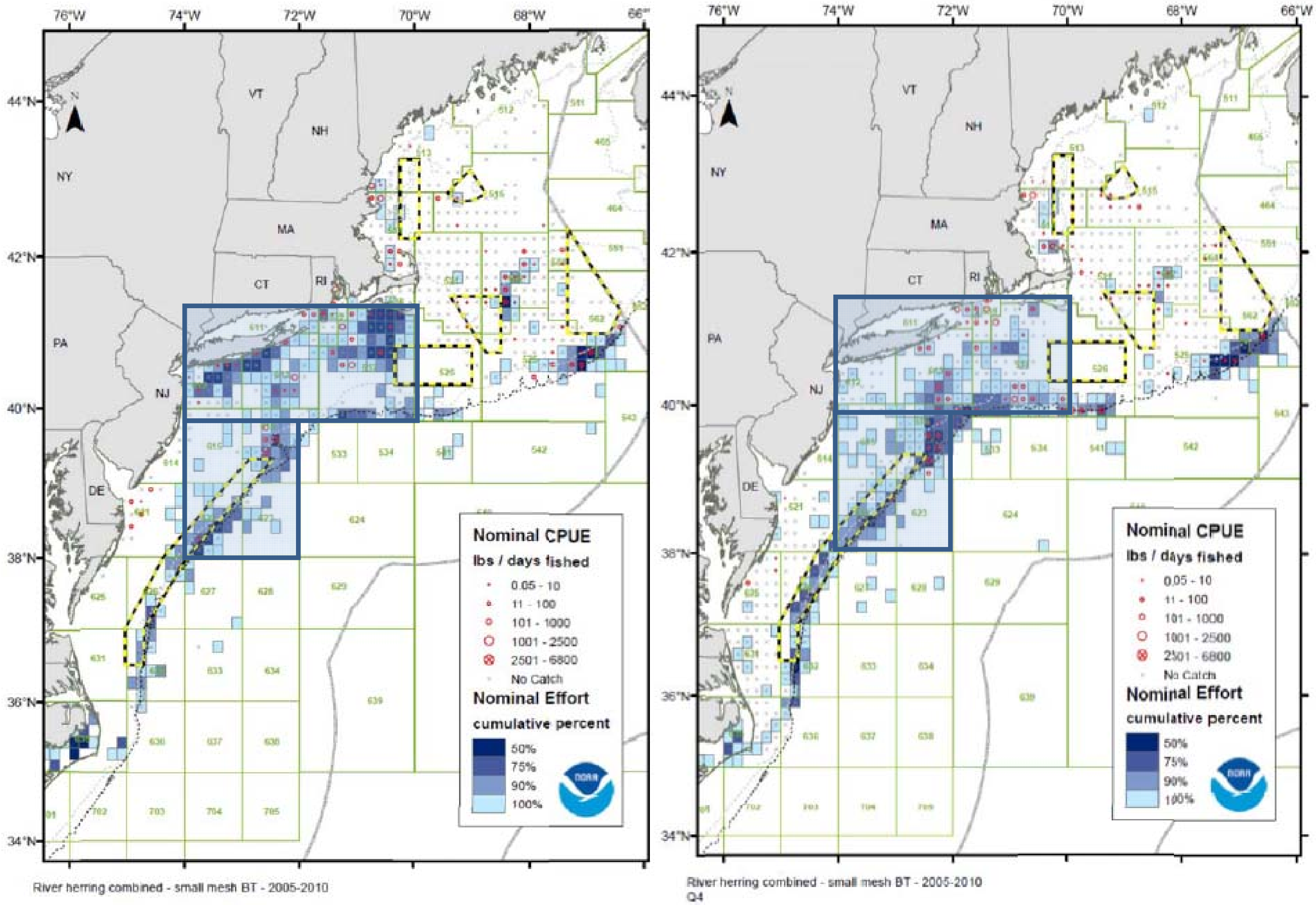


Figure 1. RH/S Mackerel Management Area (would apply in Quarter 1 only) over Quarter 1 MWT effort and RH/S Catch



Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 1 (left) and 2 (right) for 2005-2010.

Figure 2. RH/S Longfin squid Management Area over small mesh bottom effort and RH/S Catch (Quarters 1 and 2)



Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 3 (left) and 4 (right) for 2005-2010.

Figure 3. RH/S Longfin squid Management Area over small mesh bottom effort and RH/S Catch (Quarters 3 and 4)

2.1.8 Alternative Set 8 – Hotspot Restrictions

Background/Statement of Problem/Need for Action:

There are currently no limits on incidental catch of RH/S in the mackerel and/or longfin squid fisheries other than state landing requirements

The Council originally hoped to include some alternatives that would restrict fishing in relatively small areas that appeared to be "hotspots" for RH/S catch. The Amendment's Fishery Management Action Team's found that small-area management is unlikely to be successful (see Appendices 1 & 2). However, the New England Fishery Management Council's Amendment 5 to the Atlantic Herring FMP is considering small area "hotspot" alternatives. While Amendment 5 concluded that low positive impacts would result from the hotspot alternatives, it also noted that bycatch rates could increase outside of the hotspot areas which would seem to mirror the conclusions of the FMAT for Amendment 14 regarding the problems with small area management.

Regardless, to allow for potential coordination between this Amendment and Amendment 5 to the Atl. Herring FMP, the hotspot alternatives have been included as alternatives that would apply to mackerel and/or longfin squid fishing. Also, Since Atlantic herring and mackerel are often targeted by the same vessels and are sometimes targeted together at the same time, it makes sense to consider these alternatives even though they were based on observer data from "herring trips" as defined below.

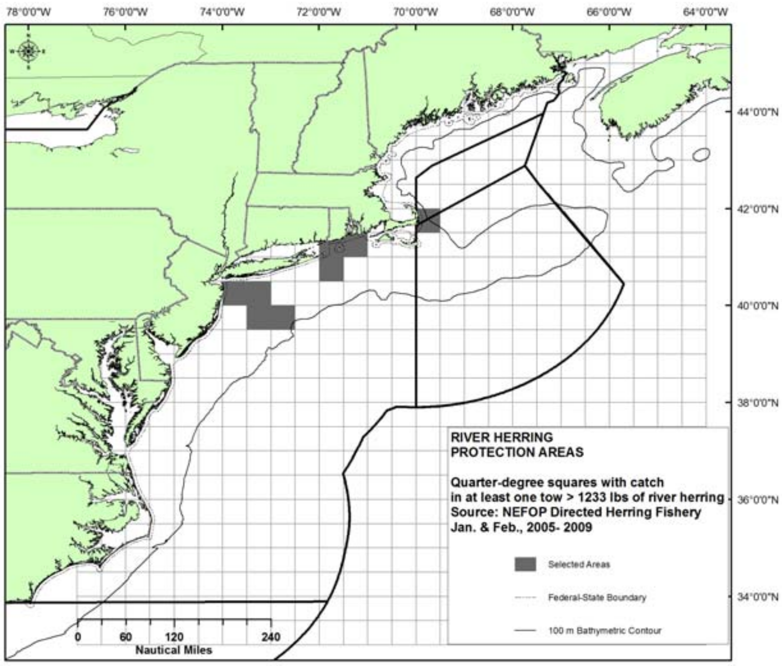
The smallest areas are termed "River Herring Protection Areas." These Protection Areas were identified bimonthly as the quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring during the respective 2-month period. The protection areas include just the portion of the monitoring/avoidance areas (described below) that have the highest river herring catches on Atlantic herring trips as defined above. Since the raw observer data were pooled across years, the threshold was only one tow, and the results are only from Herring Trips, they do not reflect how much total river herring was caught in the Protection Area versus other areas in a given year.

Slightly larger areas are termed "River Herring Monitoring/Avoidance Areas." These Monitoring/Avoidance Areas were identified bimonthly as the quarter degree squares with at least one observed tow of river herring catch greater than 40 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring during the respective 2-month period. They include all of the area identified in the protection areas as well is areas where a more modest amount of river herring was caught. Since the raw observer data were pooled across years, the threshold was only one tow, and the results are only from Herring Trips, they do not reflect how much total river herring was caught in the Monitoring/Avoidance Areas versus other areas in a given year.

These protection and monitoring/avoidance areas are mapped below by their respective bi-monthly periods. Since seeing them on the same page clarifies the differences among the areas, they are illustrated together below (where applicable). Management measures that could apply to these areas follow the maps.

Figure 4. <u>January – February Herring Areas</u>

<u>Protection Area (highest catch records from Monitoring/Avoidance Area)</u>



<u>Monitoring/Avoidance Area</u>

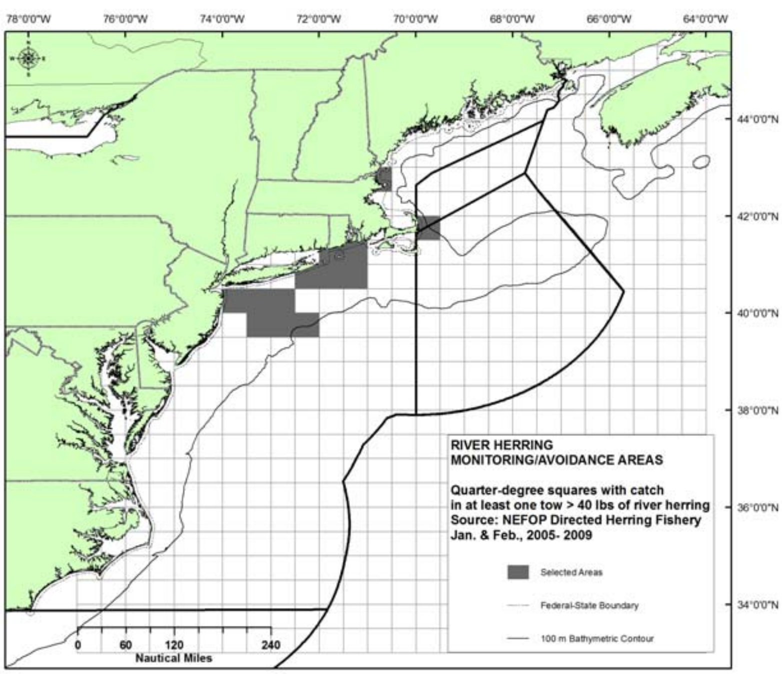
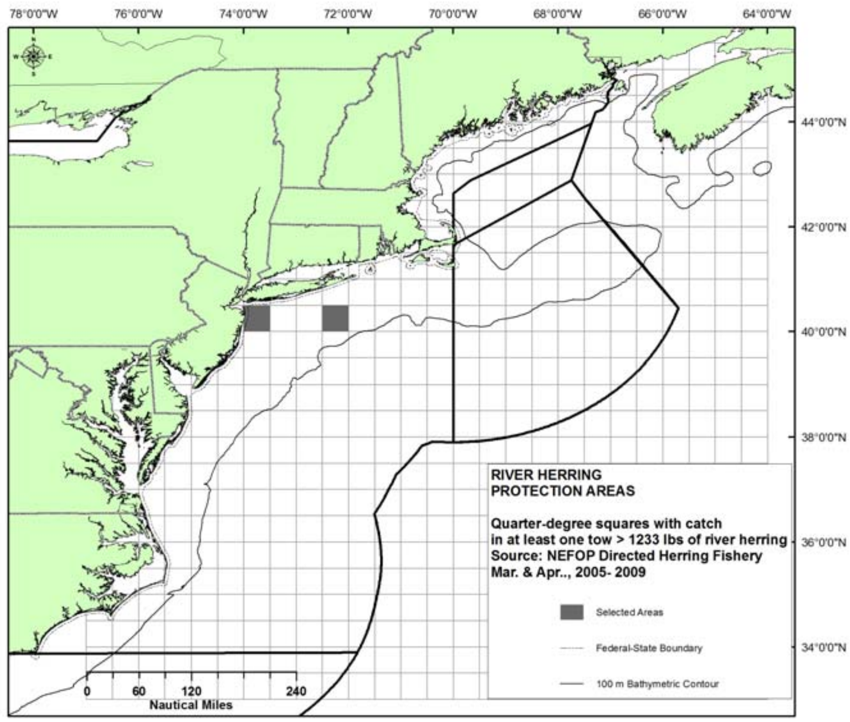


Figure 5. **March – April** Herring Areas

Protection Area (highest catch records from Monitoring/Avoidance Area)



Monitoring/Avoidance Area

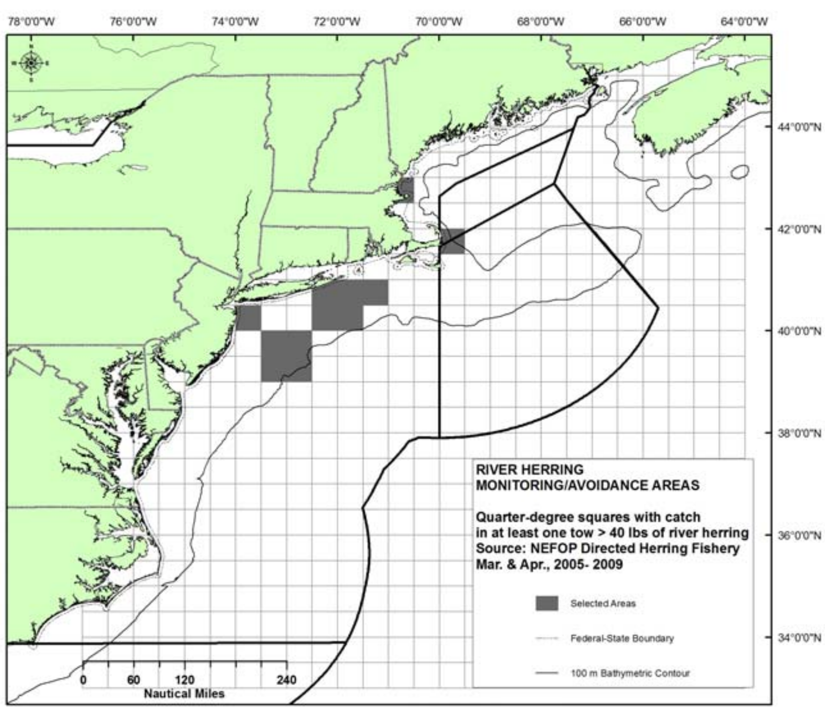


Figure 6.**May – June** Herring Areas

<u>Protection Area</u>

None proposed – there were no qualifying observer records (quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring).

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<u>Monitoring/Avoidance Area</u>

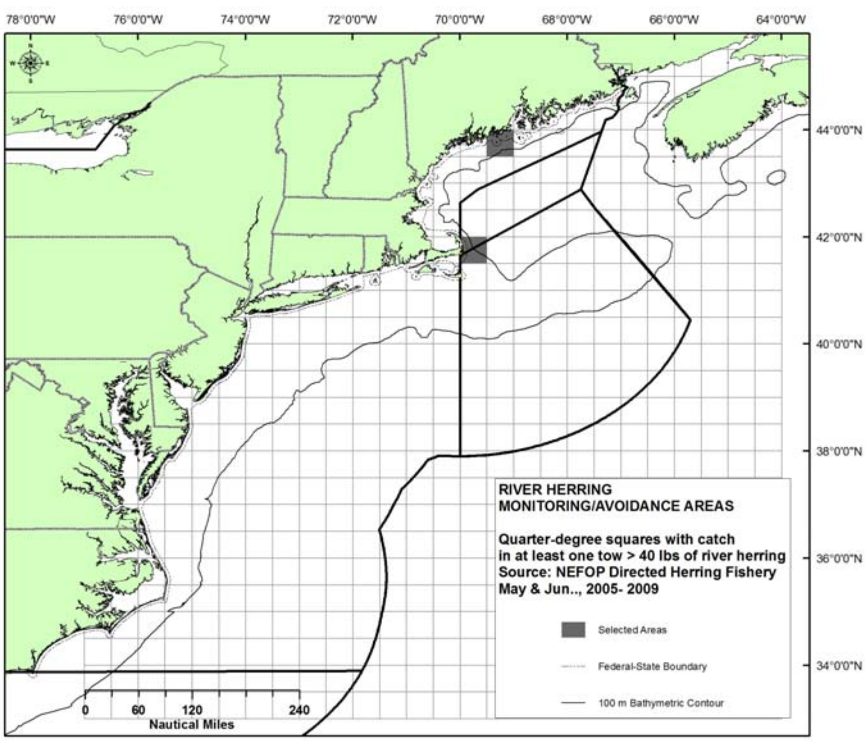

Figure 7. July – August **Herring Areas**

Protection Area

None proposed – there were no qualifying observer records (quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring).

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Monitoring/Avoidance Area

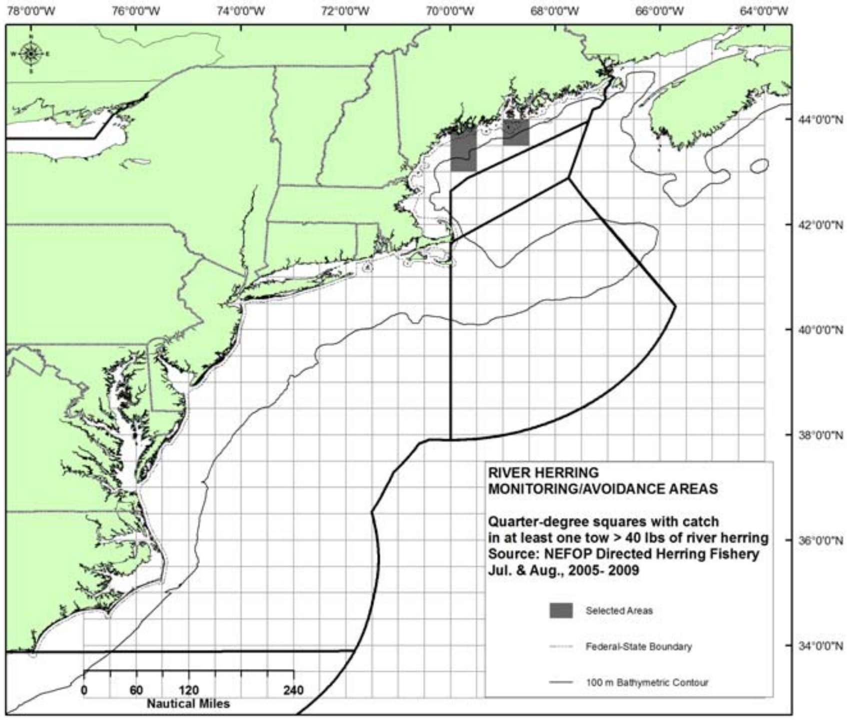
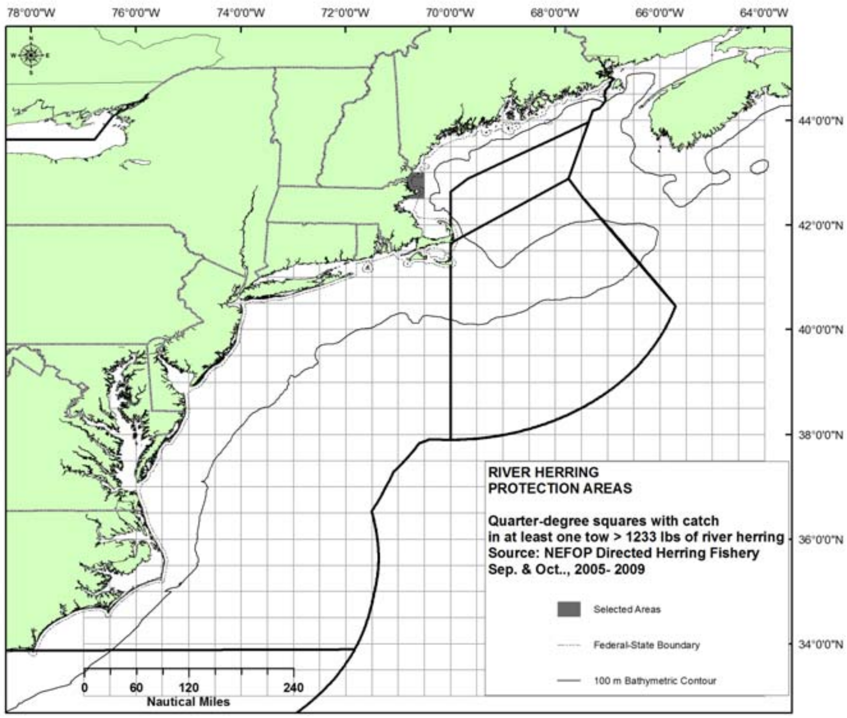


Figure 8.<u>September – October **Herring Areas**</u>

<u>Protection Area (highest catch records from Monitoring/Avoidance Area)</u>



<u>Monitoring/Avoidance Area</u>

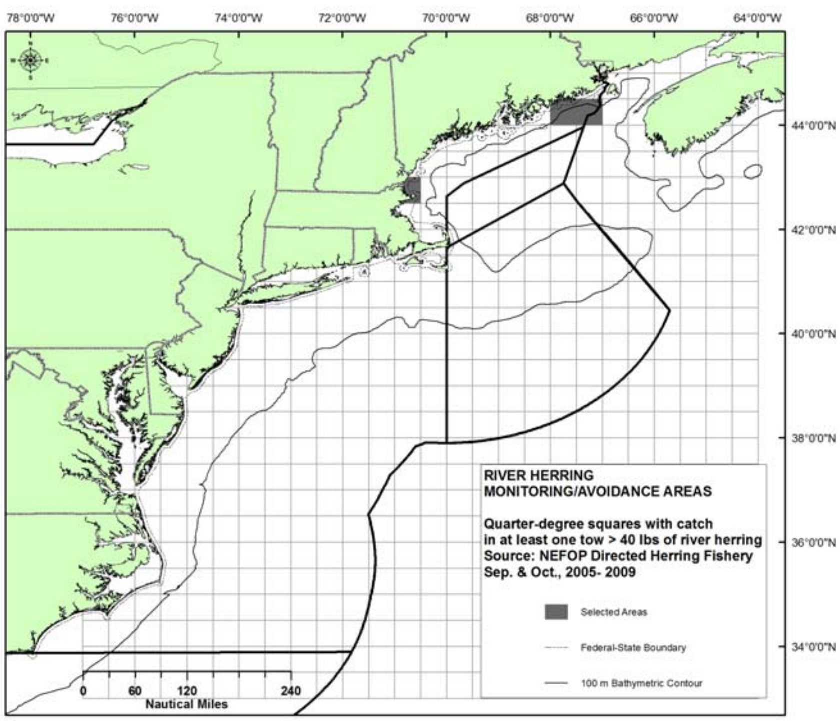
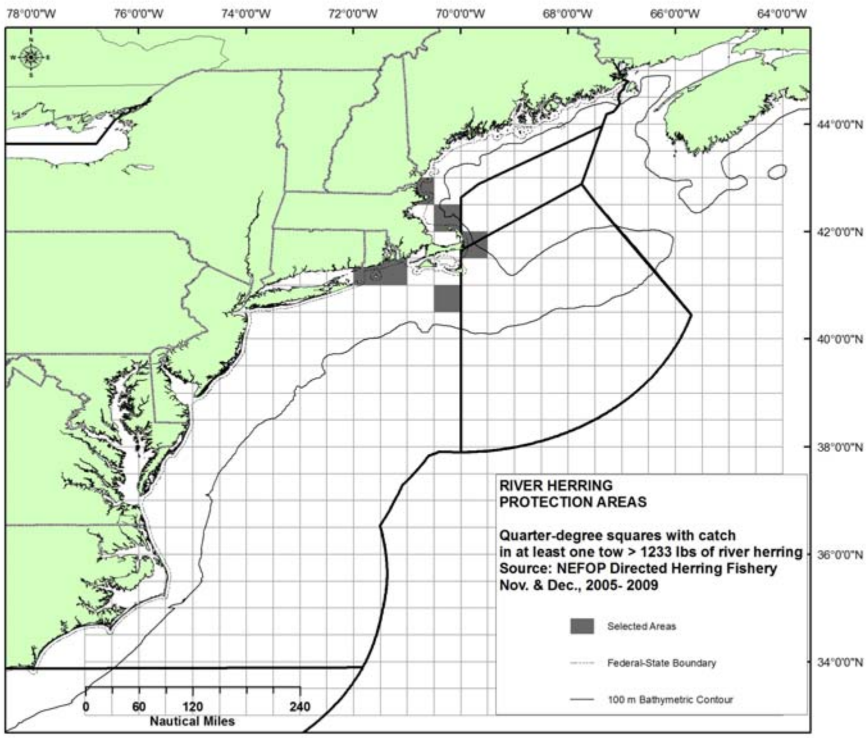
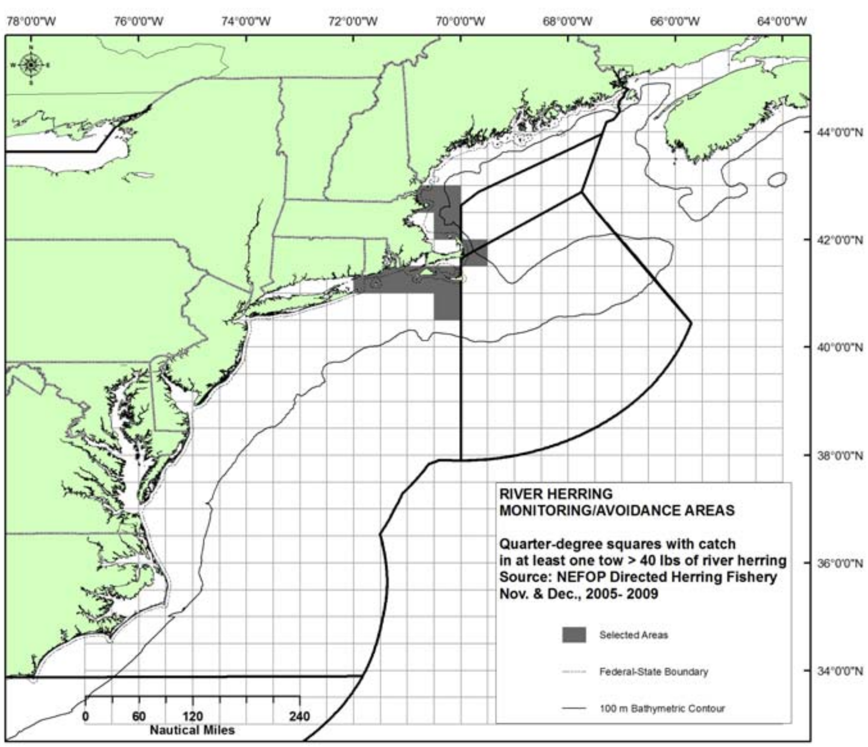


Figure 9.<u>November – December **Herring Areas**</u>

Protection Area (highest catch records from Monitoring/Avoidance Area)



Monitoring/Avoidance Area



Management Measures

For the areas described above a variety of management measures are being considered. A summary of the key biological and human community impacts (detailed in section 7) follows. Related to the FMAT findings that small, inter-annually fixed "hotspot" closures are unlikely to be effective, the impacts for all of the alternatives are the same and are described after all of the potential alternatives are described.

NOTE ON COMBINATIONS: All of the action alternatives in the set could be adopted individually or together. 8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen.

Given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery.

The enforceability of area-based management alternatives could be facilitated by the selection of the vessel monitoring system (VMS) requirement in Alternative Set 1 (alternatives 1eMack or 1eLong).

The selection of alternatives that include observer coverage requirements (8cMack and 8cLong) would require the selection of observer program notification alternatives for limited access mackerel permits in Alternative Set 1(1d48 and 1d72).

If an overall observer coverage requirement in Alternative Set 5 was selected but did not result in a trip covered by an alternative in this Alternative Set having an observer, this Alternative Set would effectively require additional coverage.

8a. No-action

If this alternative is selected, then no measures from Alternative Set 8 would be implemented and the existing state management measures (as described in section 5.9) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

NOTE: Due to their similar likely impacts, all impacts for the action alternatives in this Alternative Set are summarized below 8f.

8b. Make implementing the hotspot requirements of NEFMC's Amendment 5 to the Atlantic Herring Plan for Mackerel/longfin squid vessels frameworkable.

The Council would make the hotspot requirements considered below frameworkable under a subsequent action. Biological and Socioeconomic considerations would be reevaluated when the framework was developed.

8cMack. For Atlantic mackerel permitted vessels, more than an incidental level of fish (20,000 pounds mackerel) may not be retained/transferred/ possessed if any fishing occurs in a River Herring Monitoring/Avoidance Area without a NMFS-approved observer at any point during the trip. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries).

8cLong. For longfin squid permitted vessels, more than an incidental level of fish (2,500 pounds longfin squid) may not be retained/transferred/ possessed if any fishing occurs in a River Herring Monitoring/Avoidance Area without a NMFS-approved observer at any point during the trip. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries).

8dMack. If a mackerel-permitted vessel is fishing in any River Herring Monitoring/Avoidance Areas identified in this alternative with an observer onboard, vessels would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Unless specific conditions are met (see below), vessels would be prohibited from releasing fish from the net, transferring fish to another vessel that is not carrying a NMFS-approved observer, or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the NMFS-approved observer.

• Vessels may make short test tows in the area to check the abundance of target and incidental catch species without pumping the fish on board if the net is reset without releasing the contents of the test tow. In this circumstance, catch from the test tow would remain in the net and would be available to the observer to sample when the subsequent tow is pumped out.

• Fish that have not been pumped aboard may be released if the vessel operator finds that:
1. pumping the catch could compromise the safety of the vessel;
2. mechanical failure precludes bringing some or all of the catch aboard the vessel; or
3. spiny dogfish have clogged the pump and consequently prevent pumping of the rest of the catch.

• If the net is released for any of the reasons stated above, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. The Released Catch Affidavit must be submitted within 48 hours of completion of the fishing trip.

• Following the release of the net for one of the three exemptions specified above, the vessel would be required to exit the River Herring Monitoring/Avoidance Area. The vessel may continue to fish but may not fish in the River Herring Monitoring/Avoidance Areas for the remainder of the trip.

8dLong. If a longfin squid-permitted vessel is fishing in a River Herring Monitoring/Avoidance Areas identified in this alternative with an observer onboard, vessels would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Unless specific conditions are met (see below), vessels would be prohibited from releasing fish from the net, transferring fish to another vessel that is not carrying a NMFS-approved observer, or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the NMFS-approved observer.

• Vessels may make short test tows in the area to check the abundance of target and incidental catch species without pumping the fish on board if the net is reset without releasing the contents of the test tow. In this circumstance, catch from the test tow would remain in the net and would be available to the observer to sample when the subsequent tow is pumped out.

• Fish that have not been pumped aboard may be released if the vessel operator finds that:
1. pumping the catch could compromise the safety of the vessel;
2. mechanical failure precludes bringing some or all of the catch aboard the vessel; or
3. spiny dogfish have clogged the pump and consequently prevent pumping of the rest of the catch.

• If the net is released for any of the reasons stated above, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. The Released Catch Affidavit must be submitted within 48 hours of completion of the fishing trip.

• Following the release of the net for one of the three exemptions specified above, the vessel would be required to exit the River Herring Monitoring/Avoidance Area. The vessel may continue to fish but may not fish in the River Herring Monitoring/Avoidance Areas for the remainder of the trip.

<u>8eMack</u>. Vessels possessing a federal mackerel permit would not be able to retain, possess or transfer more than an incidental level of fish (20,000 pounds mackerel) while in a River Herring <u>Protection Area</u> unless no mesh smaller than 5.5 inches is onboard the vessel.

<u>8eLong</u>. Vessels possessing a federal moratorium longfin squid permit would not be able to retain, possess or transfer more than an incidental level of fish (2,500 pounds longfin squid) while in a River Herring <u>Protection Area</u> unless no mesh smaller than 5.5 inches is onboard the vessel.

<u>8f</u>. Make the above measures 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong only effective if/when they are effective for Atlantic Herring vessels, including if they become effective in the middle of a season because a catch-cap based trigger is reached by the Atlantic Herring fleet under a trigger established by Amendment 5 to the Atlantic Herring FMP.

<u>Summary of Biological Impact Analysis</u>

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to these alternatives, it would not be expected that over time the new areas would be substantially different than the old areas in terms of non-target impacts (including RH/S) given the wide and variable distribution of most non-target species including RH/S. RH/S catch may decreased inside the hotspot but increased outside the hotspot. This is consistent with the findings of the FMAT analyses detailed in Appendices 1 and 2.

<u>Summary of Socio-Economic Impact Analysis</u>

A low negative impact would be expected compared to the no-action alternative. Given the complexity of fishermen's responses to regulations and given the protection areas are relatively small, the effects may not be substantial for most fishermen in most years compared to the no-action alternative (they will fish other areas around the hotspots). However, near-shore fishermen near the closed areas may be disproportionately impacted by closures around their home port.

2.1.9 Alternative Set 9 – Addition of RH/S as "Stocks in the Fishery" in the MSB FMP

Background/Statement of Problem/Need for Action:

The current overall framework for RH/S management may be insufficient to address the management needs of RH/S.

The Magnuson Stevens Act describes various “National Standards” for fishery management plans. National Standard One (NS1) states: “Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.” NMFS has published detailed guidance for NS1, available at: http://www.nmfs.noaa.gov/msa2007/catchlimits.htm. While Council’s are provided considerable flexibility, the guidance describes which stocks should be “in the Fishery” and describes the requirements for those stocks deemed by a Council to be “in the Fishery.” The NS1 guidance is described in more detail in Section 5.

The impacts for all of the RH/S species are essentially the same so they are discussed together. While there may be differences of degrees, since these fish occupy similar habitats and trophic niches, and face similar challenges, the differences do not warrant a discussion for each species separately. Thus, when RH/S is used it means one, several, or all four of the relevant species. A summary of the key biological and human community impacts (detailed in section 7) follows for each alternative.

NOTE ON COMBINATIONS: All of the action alternatives in the set could be adopted individually or together.

9a. No-action

Under the no-action alternative, primary RH/S management would continue to rest with the states as coordinated through the ASMFC as described in section 5.9. The states would continue to address catch in state waters and address habitat improvements through collaborative work with NOAA, U.S. F&W Service, and private partners. From the Council perspective, RH/S would continue to be managed as a bycatch species, with bycatch to be minimized to the extent practicable. The Council could also continue to consider discretionary measures designed to reduce retained incidental catch (bycatch is defined as discards in the MSA) as it is doing in Amendment 14.

If this alternative is selected, then no measures from Alternative Set 9 would be implemented and the existing state management measures (as described in section 5.9) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below.

9b. Add blueback herring as a stock in the MSB FMP.

9c. Add alewife as a stock in the MSB FMP.

9d. Add American shad as a stock in the MSB FMP.

9e. Add hickory shad as a stock in the MSB FMP.

The Council could add none, one, or any combination of these species as "stocks" in the fishery. Selecting any of the action alternatives would result in the Council immediately beginning another amendment to add all of the provisions 1-15 above to the FMP for any species that is added. Such a process would likely take another 1-2 years to complete, with the development of ACLs/AMs (or ACL alternatives) and essential fish habitat designations taking the most time and being the most substantive of those provisions.

If an assessment was available and if it contained accepted reference points, any need for rebuilding that was indicated by those reference points could also lead to major actions.

Since RH/S are already managed by the ASMFC, and since substantial catches of RH/S take place in state waters, the plan would likely have to be a joint plan with the ASMFC. It is possible that the Council could attempt to defer primary management of catches (ACLs) to the ASMFC as discussed below.

Once the species were added through the follow-up amendment, NMFS would begin conducting habitat consultations for any identified EFH for federal and/or federally permitted actions (i.e. non-fishing impacts). An evaluation of fishing activities impacts on RH/S habitat and consideration of measures to minimize such impacts would also take place, possibly in the follow-up amendment or possibly afterward through another action.

In the amendment to implement the MSA provisions for a "stock in the fishery," the Council would have to decide whether to implement standard ACLs with accountability measures or make the case that an alternative equivalent could function as an ACL (this applies to any RH/S species that were added). In the first case, the Council's SSC would have to provide an Acceptable Biological Catch (ABC) (regardless of whether information was available on sustainable catch levels), which would be the ACL, and then all sources of mortality would have to be accounted for and controlled to ensure that the ACL was not exceeded. Such controls could involve RH/S retention limits, retention prohibitions, and or measures to reduce discards from relevant gear types such that ACLs would not be exceeded.

In the second case, the Council would have to make the case that alternative management measures are taking the place of an ACL, in the way that the North Pacific Fishery Management Council has made the case that Salmon moratoria in certain federal waters plus Alaska's escapement-based management measures effectively create a justifiable alternative approach to Council-derived ACLs/AMs. Their argument hinges on the fact that the State of Alaska monitors catch in all of the salmon fisheries and manages salmon holistically by incorporating all the sources of fishing mortality on a particular stock or stock complex in calculating the escapement goal range. As explained above, overfishing is prevented by in-season monitoring and data collection that indicates when an escapement goal is not being met. When the data indicate low run strength due to natural fluctuations in salmon abundance, Alaska Department of Fish & Game closes the fishery to ensure the escapement goal range is reached. Biological escapement goal (BEG) means the escapement that provides the greatest potential for maximum sustained yield. BEG is the primary management objective for escapement (NPFMC 2011).

In order to pursue a similar path a be consistent with the MSA, it would appear that the Council would have to make that argument that the States were pursuing management based on biologically-based escapement goals and that those goals had taken all sources of mortality into account, including ocean-intercept fishing mortality. This may be problematic especially in states with moratoriums because they do not know the status of their runs (most) – if they do not know the status of their runs it would seem to be difficult to make the case that whatever at-sea mortality occurs has been accounted for and that taking everything into consideration a sustainable outcome would result.

The two ACL/AM approaches described above would be options for the Council to explore if it decided to move forward with adding any RH/S species as stocks in the MSB FMP.

Note: Due to the difficulty in identifying the two river herrings and the two shads in landings data it is assumed that for ACL/AM purposes that they could be addressed together (i.e. a river herring ACL and a shad ACL).

Summary of Biological Impact Analysis (9b-9e)

Impacts to RH/S would be expected to be positive for all relevant RH/S species and in approximately the same fashion. It is not possible to develop all of the measures (especially EFH and ACLs) that would be necessary for the FMP not to be deficient if any RH/S species were officially added as stocks in the fishery in this document. Instead, selection of an Alternative Set 9 action alternative would “kick off” another Amendment to fully add stocks to the MSB FMP in a manner that would keep the plan in compliance with the Magnuson Stevens Act. The only substantial negative impact would be costs for management and whether those costs could be justified by the potential benefits. Accordingly, the focus here is on the potential benefits so that managers can weigh the trade-offs between potential benefits and the additional costs of adding stocks as managed resources in the MSB FMP.

Impacts Specific for RH/S if They Were Added as Stocks in the Fishery, Compared to the No-Action Alternative

Impacts to RH/S would be expected to be positive for all relevant RH/S species and in approximately the same fashion given their similar life histories and place in the ecosystem. However, quantification is very difficult given the myriad challenges facing RH/S stocks. The only substantial negative impact would be costs for management and whether those costs could be justified by the potential benefits. Accordingly, the focus here is on the potential benefits so that managers can weigh the trade-offs between potential benefits and the additional costs of adding stocks as managed resources in the MSB FMP.

1. There would be additional federal support of RH/S management (assessments, FMP and specifications review, etc.) and additional coordination of conservation activities.

Right now there is some federal involvement by U.S. Fish and Wildlife Service, NMFS Northeast Region Protected Resource Branch staff, NMFS Northeast Fisheries Science Center staff, and Council staff (quasi-federal) in RH/S management. However, these staffers do not have RH/S as a primary responsibility or focus. For example, there is no RH/S coordinator at the NMFS Northeast Regional Office or a fishery management council RH/S coordinator, as there is for directly managed resources. There is direct involvement by a lead Atlantic States Marine Fisheries Commission (ASMFC) staffer but without dedicated leads at other agencies coordination can be difficult (and the ASMFC staffer also coordinates American Eel, Atlantic Striped Bass, and Sturgeon). If RH/S were added as managed species into the MSB FMP, it may add staff with RH/S responsibilities (at NMFS or at the Council) or at the least existing staff would have RH/S responsibilities added to their primary activities. So for example, there would be a NMFS Northeast Region plan coordinator for RH/S, a Council plan coordinator for RH/S, a NMFS Northeast Fisheries Science Center assessment lead, etc., even if it primarily involves a reassignment of duties among current staff. As part of coordination responsibilities the Council coordinator and NMFS coordinator would each likely become more involved in a wide range of RH/S conservation activities especially in terms of how fishing interacts with the variety of challenges facing RH/S stocks.

These staffers would also become responsible for several annual/cyclic activities. First, they would conduct annual fishery descriptions and fishery reviews as part of specifications. Second, they would become more directly involved in assessments since NMFS strives to complete successful assessments for managed species in order to improve is Fish Stock Sustainability Index score, the primary measure of how well NMFS is performing it's duties (http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm). Adding these stocks into the FMP would not guarantee that reference points/stock determination criteria would be available (reference points are generally not available for even the existing species in this plan due to high levels of scientific uncertainty) but at least additional resources would likely be expended on RH/S assessment (though they may just be diverted from other species due to the current budget environment). If an assessment successfully generated reference points and status determination criteria then rebuilding requirements would be instituted if a stock was found to be overfished.

As part of specifications the Council's SSC would also review RH/S status and make Acceptable Biological Catch recommendations. If ACLs were instituted (see below) they would provide ACL recommendations but even if ACLs were not instituted (see additional discussion below) the Council would need a functional equivalent for incidental catch in its other managed fisheries and the SSC would likely provide relevant recommendations. Related to incidental catch management, another annual activity would be integrating RH/S considerations into bycatch reporting and observer prioritization. While NMFS has been diverting resources from other small mesh fisheries to mackerel in the last year to better characterize RH/S interactions, as a stock in the fishery NMFS would have to directly describe its plans for RH/S bycatch monitoring, and the Council would presumably have a stronger case arguing for more coverage for a managed species than it currently can make in terms of making a case for more resources about a non-target species.

Adding RH/S as stocks in the fishery would also change the nature of management actions that are available to the Council. Currently the Council is limited to addressing catch in its other managed fisheries. If RH/S were stocks in the fishery, as managed stocks the Council could implement restrictions on other fisheries that interact with RH/S. As an example, currently the Summer Flounder-Scup-Black Sea Bass FMP restricts all bottom trawling in areas where survey data has shown scup to aggregate. If RH/S were managed species the Council could implement broader restrictions on fishing activities beyond its other managed species if necessary and/or appropriate to conserve RH/S.

2. EFH would be designated for RH/S.

Designating EFH for RH/S would increase NMFS's ability to conserve habitats used by these anadromous species, especially freshwater habitats used for spawning and as juvenile nursery areas that are most affected by a wide range of human activities.

Currently, acting under the authority of the MSA, there is a mandatory requirement that NMFS must issue EFH conservation recommendations to federal agencies for activities proposed, funded, permitted, or undertaken by those agencies. Designation of EFH for RH/S would greatly expand the geographic boundaries where mandatory consultations would be required including most coastal rivers and their watersheds on the Atlantic coast. With such designation comes the authority to more aggressively regulate the adverse impacts of non-fishing activities on riverine and estuarine habitats for these species. However, the agency may lack the resources to effectively implement the necessary actions, similar to the Agency's funding issues with Atlantic salmon (see below).

Since A) states are already independently acting to improve riverine habitats B) NOAA has ongoing consultations with upstream dam removal/riverine habitat improvement projects, and C) NMFS has already been successful mitigating impacts to some habitats (tidal riverine waters) used by RH/S because they are forage species for other federally-managed fish species (e.g., bluefish), and are, therefore, considered a component of EFH for these predatory species, it is unclear exactly what the marginal added function of NOAA EFH efforts would be.

NMFS also already prescribes mandatory measures necessary to provide safe, timely and effective passage around hydropower facilities (upstream and downstream) under Section 18 of the Federal Power Act. However, this authority is only applicable to those hydropower facilities licensed by the Federal Energy Regulatory Commission and most FERC licenses are issued for a period of 30 + years.

Freshwater habitats used by RH/S also already benefit indirectly from EFH conservation measures that are proposed for Atlantic salmon because salmon and RH/S share many of the same habitats. However, the indirect benefits of Atlantic salmon EFH conservation are limited to those areas within New England where Atlantic salmon EFH rivers are located and are greatly constrained by funding limitations. The U.S. Fish and Wildlife Service is also engaged in riverine habitat issues but their focus is primarily on dam passage issues.

In summary, designation of EFH for RH/S would greatly expand the geographic boundaries where mandatory consultations would be required for activities that may impact RH/S habitat but it is unclear what tangible benefits would accrue beyond those already being pursued by the states, NMFS, and other federal agencies.

3. ACLs and AMs would likely be implemented.

Compared to the no-action alternative, if ACLs/AMs were established there would be better accounting of RH/S catch. If overfishing limits are identified (none exist now) then high quality catch data can be used to prevent overfishing, which would be a positive impact for any RH/S species that had ACLs/AMs. Adding ACLs/AMs also has some costs, primarily the costs of reporting and monitoring. However, regardless of the ACL/AM question additional reporting and monitoring provisions are being considered for RH/S.

One question that has surfaced repeatedly has been “Could the Council add river herring or shad as stocks in the fishery but use the ACL/AM flexibility provisions of the NS1 guidance to defer to ASMFC for primary management?” The NPFMC is considering such a path for salmon and deferring to Alaska. This could theoretically allow the designation of EFH and result in greater federal resources without having to deal with ACLs for the currently data-poor RH/S stocks. There are several key issues however, which become evident when reviewing analysis for updating the NPFMC's salmon plan (http://www.fakr.noaa.gov/npfmc/), where Alaska has primary authority even though it is a federally managed species. First, Alaska has a long history of well-documented successful/sustainable management with salmon. Second, the salmon situation is different in that RH/S landings, and certainly discards, appear not nearly as well documented (especially at the species level) as salmon landings and discards. Existing or pending ASMFC moratoriums will likely address most of the landings control but not discards and some states may still allow relatively uncontrolled landings of RH/S that are caught incidentally in federal waters. For these reasons it currently seems likely that ACLs and AMs would be needed, i.e. it would be difficult to argue that the state management would effectively account for all catch. This is at least the viewpoint of the Amendment 14 FMAT and NOAA GC, though the Council looks forward to getting additional perspectives on this topic during the public input process.

The ACL flexibility guidelines also still require consistency with Magnuson (alternatives to ACLs/AMs would have to essentially achieve the same results). So even if primary management could be ceded to the ASMFC, the Council’s suite of management measures would still have to function as ACLs/AMs. Thus the Council would still have to implement hard caps on its other managed species to control overall catch (this is the case with Salmon in the North Pacific’s groundfish fishery).

Also if ASMFC had primary responsibility, the Council would have to limit incidental catch in its directed fisheries based on the best available science about what catch level is consistent with sustainability and/or rebuilding as well as accounting upfront for whatever catch (landings and/or discards) occurs in state waters. Thus while there might not be ACLs/AMs on paper, the caps on incidental catch in Council-managed fisheries would need to have the same function as ACLs/AMs in order to be consistent with the Magnuson Act and the National Standard One final rule guidelines. Again however, this is the viewpoint of the Amendment 14 FMAT and NOAA GC and the Council looks forward to getting additional perspectives on this topic during the public input process.

If the Council added RH/S as a stock in the fishery and just the provisions deferring primary management to the ASMFC were disapproved by NMFS or struck down in subsequent legal action then the standard ACL provisions would presumably apply. If such events took place, or if the Council decided to just outright add one or more RH/S stocks into the fishery then ACLs and AMs would be required, along with all the other requirements of fishery management plans (EFH, rebuilding when appropriate, etc.) as detailed in section 5.9.

While ASMFC/Council coordination for RH/S issues has been extensive in the last 2 years the ramifications of ACLs would likely lead to additional collaboration. The Council would either have a joint or complementary plan with the Commission and ACLs or other catch quotas for federal management would be based on ABCs provided by its SSC and would have to account for any state fishing mortality beyond the control of the Council. While the Council would not be able to totally control all mortality because of state fisheries and discards in state waters, mortality in federal waters would be limited. If an Acceptable Biological Catch (ABC) provided by the Council's SSC was greater than anticipated state mortality then the difference could be utilized as federal water mortality.

Alternative Set 9 Summary and Conclusion

The two key questions that will have to be answered by the Council are: 1) Is the current management framework is sufficient to conserve RH/S stocks; **and** 2) Can federal management by the Council improve management of RH/S enough to justify the management cost burden. It is not clear that Council involvement would be sufficient to conserve RH/S stocks given the varied challenges faced by RH/S stocks. It also may be true that the Council could achieve much of what it would do for RH/S informally outside of federal FMP management. However, adding RH/S stocks into an FMP would likely bring additional resources to bear and at least result in additional efforts and coordination between ASMFC, NMFS, the Council, the states, and other management partners for whichever stocks were chosen if any. The future efforts of these organizations are difficult to predict, but it is reasonable to conclude that there would be some gains for RH/S species through future actions if they are listed as stocks in the MSB fishery, as described above. However, the uncertainty regarding the current factors causing RH/S populations to remain in a depressed state means that it is difficult to identify specific causes and link remedies to specific outcomes. Given this, the extent of benefits from adding RH/S as stocks in the fishery is very difficult to quantify even though impacts are likely to be positive.

Given RH/S share similar life histories each would benefit to some degree if any were chosen, but each species would benefit most if it itself was chosen due to the catch control, EFH conservation, and general management coordination that would result.

Summary of Socio-Economic Impact Analysis (9b-9e)

Impacts are mixed with an uncertain net impact.

On one hand, if additional incidental catch reduction was required as a result of adding this species as a stock in the fishery there could be negative economic impacts to the MSB or other fisheries. Such actions and their impacts would be analyzed separately in other specifications, frameworks, or amendments. This document considers a number of different measures to reduce incidental catch of RH/S, and the reader can look to Sections 7.6-7.8 for analyses of how some types of RH/S catch reduction measures can impact human communities. Revenue losses (or potentially forgone revenue) from such measures range from very low in the case of a cap that does not constrain the fishery to near elimination of the mackerel and longfin squid fisheries in the case of the broadest area closures (they have had a combined value in the $18-$36 million dollar range in the last 5 years). It is also possible that the Council could select some of these measures to reduce incidental catch in mackerel/longfin squid fisheries, but may still have to implement further measures to reduce RH/S catch through this or its other FMPs for other fisheries.

On the other hand, it is also possible that benefits could accrue in the future if adding these species as federally managed species assisted in conserving these stocks and potentially redeveloping directed fisheries (which is uncertain). While historical high levels of landings may have been unsustainably high , RH/S fisheries had combined landings in the 20,000 mt to 30,000 mt range throughout the 1950s and 1960s ranging from Maine to South Carolina. While there are some issues (climate, stream flow, non-point run-off, etc.) that the Council may have minimal impact upon, to the degree that enhanced conservation efforts can assist recovery, then positive human community impacts are possible in terms of both additional commercial and additional recreational fishing opportunities that could result from rebuilt RH/S stocks. Recreational benefits could be direct (catching RH/S) or indirect in that RH/S are forage species for higher trophic level predators such as striped bass so higher RH/S populations could indirectly help striped bass populations.

River Herring and Shad runs also are or have been important culturally for communities (just Google “Shad Festival” or “Herring Festival”) and even recently have supported some subsistence fishing (e.g. Mashpee Wampanoag Indian Tribe on Cape Cod, Massachusetts (ASMFC 2011). There also are other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully) that could increase in value from successful management. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large.

If limiting RH/S catch, EFH designation and protection, and increased federal-state cooperation through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

2.2 Summary Tables

Overview of Measures Table: Table 8 provides a concise general summary of the measures and their anticipated effects. An initial cumulative effects assessment (CEA) was conducted for this draft document in Section 8. Once final preferred measures are selected a table will be added to this executive summary with a cumulative effects summary.

For all Alternative Sets (1-9) and all valued ecosystem components (VECs), the first alternative ("a") equals no-action, which is what is predicted to happen with the status quo management measures. Subsequent alternatives are the action alternatives and diverge from the status quo management measures as described in Section 5. The impact analysis focuses on the valued ecosystem components (VECs) that were identified for Amendment 14 and described in detail in Section 6.0 of this document. These VECs include:

1. Managed Resources
   - Atlantic mackerel stock
   - *Illex* stock
   - Longfin squid stock
   - Atlantic butterfish stock
2. Non-target species
   -Non-Target species include river herrings (blueback and alewife) and shads (American and hickory), collectively referred to as RH/S. Given the lack of information on how these species travel and mix in the ocean, different impacts are generally not discernible between these species but are noted where appropriate (for example in caps that are placed on particular species)
3. Habitat including EFH for the managed resources and non-target species
4. Endangered and other protected resources
5. Human Communities

While in previous MSB FMP EISs the impacts from all alternatives are grouped together for each VEC, with the large number of alternatives in this amendment (more than 80), the result would that one would start with managed resources, have 80+ associated impacts, then have 80+ impacts for non-target species, and so on with the other VECs. This format seemed to lead to a disconnect in evaluating each alternative in terms of its overall positive and negative impacts across different VECs. As a result, the impact analysis in this EIS proceeds alternative by alternative with impacts for each VEC described for a given alternative before moving on to the next alternative's impacts.

Subsequently summarizing impacts by VEC was stymied by the number of possible action alternative combinations that could result from final Council action (more than millions). Any summary would hinge on the particular combination of alternatives selected by the Council, and no preferred alternatives have been identified by the Council at this point. The Final EIS will have that information however and will detail the combined effects of the Council's preferred alternatives. This will also facilitate creation of a summary by VEC for the preferred alternatives chosen by the Council.

In these tables, a variety of terms (e.g. positive or negative) have specific meanings for each VEC and are described below. These are the same as are used in the impact analysis section, Section 7.

Managed Species, Non-Target Species, Protected Species:

Note: Often impacts are indirect in that an action may change overall effort, which would decrease impacts if effort goes down or increase impacts if effort goes up.

Neutral/minimal: actions that are expected to have no discernible impact on stock/population size. The table below uses just "minimal" to save space.
Positive: actions that increase stock/population size
Negative: actions that decrease stock/population size

Habitat:

Note: Often impacts are indirect in that an action may change overall effort, which would decrease impacts if effort goes down or increase impacts if effort goes up.

Neutral/minimal: actions that are expected to have no discernible impact on habitat. The table below uses just "minimal" to save space.
Positive: actions that improve the quality or reduce disturbance of habitat
Negative: actions that degrade the quality or increase disturbance of habitat

Human Communities:

Neutral/minimal: actions that are expected to have no discernible impact on human communities. The table below uses just "minimal" to save space.
Positive: actions that increase revenue and well-being of fishermen and/or associated businesses
Negative: actions that decrease revenue and well-being of fishermen, associated businesses, or other interested parties.
Mixed: The action would create benefits for some and costs for others. Generally there are costs to MSB fishery participants but potential benefits to other fishermen (commercial or recreational) or other interested parties who value MSB or RH/S resources. Since the linkages between catches in MSB fisheries and RH/S resources is not known, it is generally uncertain regarding which would be greater, costs to current MSB participants or benefits to other interested parties.

Impact Qualifiers:

The following qualifiers are also used in the impact analysis:

Low (as in *low* positive or *low* negative): to a lesser or small degree
High (as in *high* positive or *high* negative) to a greater or large degree
Potentially: A relatively higher degree of uncertainty is associated with the impact. Often this qualifier is used when an action may lead to better data, but future actions would have to actually use that data in decision making in order for there to be a concrete benefit.

If impacts are expected to be isolated to a particular species, usually either mackerel, longfin squid, *Illex* squid, butterfish, or river herrings and shads (RH/S) then this fact will be noted as well.

To some the extent the operation of the MSB fisheries may currently be negatively affecting the directed fisheries, RH/S stocks, other non-target species, habitat, and protected resources compared to if there was no fishery. However the fisheries exist currently, so their continued operation under "no-action" would result in similar impacts as occur presently. As such, all comparisons in Table 8 are in reference to changes from the no-action alternative but Section 7 also discusses how the no-action alternative may compare to the action alternatives.

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Table 8. Alternative Impact Summary Table

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
1a No Action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
1bMack mackerel weekly VTRs	Potentially Low Positive - better monitoring	Potentially Low Positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
1bLong longfin weekly VTRs	Potentially Low Positive - better monitoring	Potentially Low Positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
1c MSB weekly VTRs	Potentially Low Positive - better monitoring	Potentially Low Positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
1d48 48hr notice for mackerel trips	Potentially Low Positive - better observer placement	Positive - better observer placement	Minimal - no substantial change in effort expected	Potentially Positive - better observer placement	Mixed (positive and negative impacts for different interests)
1d72 72hr notice for mackerel trips	Potentially Low Positive - better observer placement	Positive - better observer placement	Minimal - no substantial change in effort expected	Potentially Positive - better observer placement	Mixed (positive and negative impacts for different interests)
1eMack VMS for mackerel vessels	Potentially Low Positive - better monitoring	Potentially Positive - better monitoring	Minimal - no substantial change in effort expected	Potentially Positive - supports area closures	Mixed (positive and negative impacts for different interests)
1eLong VMS for longfin vessels	Potentially Low Positive - better monitoring	Potentially Positive - better monitoring	Minimal - no substantial change in effort expected	Potentially Positive - supports area closures	Mixed (positive and negative impacts for different interests)
1fMack VMS reporting for mackerel	Potentially Low Positive - better monitoring	Potentially Low Positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
1fLong VMS reporting for longfin	Potentially Low Positive - better monitoring	Potentially Low Positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
1gMack 6hr pre-land VMS for mackerel	Potentially Low Positive - better monitoring	Potentially Positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
1gLong 6hr pre-land VMS for longfin	Potentially Low Positive - better monitoring	Potentially Positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
2a No Action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
2b Vessel SAFIS Confirmation	Low positive - better record keeping	Low positive - better record keeping	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Potentially Low Positive - better record keeping
2c mackerel catch weighing with annual sorting documentation	Low positive - better monitoring	Low positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
2d mackerel catch weighing with sort doc for each transaction	Low positive - better monitoring	Low positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
2e longfin catch weighing with annual sort doc	Low positive - better monitoring	Low positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
2f longfin catch weighing with sort doc for each transaction	Low positive - better monitoring	Low positive - better monitoring	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
2g Allow volume to weight conversions	Neutral - equivalent to status quo	Neutral - equivalent to status quo	Neutral - equivalent to status quo	Neutral - equivalent to status quo	Neutral - equivalent to status quo

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
3a No action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
3B reasonable assistance	Low Positive - improves observer data	Low Positive - improves observer data	Minimal - no substantial change in effort expected	Low Positive - improves observer data	Minimal
3c pump/haul notice	Low Positive - improves observer data	Low Positive - improves observer data	Minimal - no substantial change in effort expected	Low Positive - improves observer data	Minimal
3d paired observers	Low Positive - improves observer data	Low Positive - improves observer data	Minimal - no substantial change in effort expected	Low Positive - improves observer data	Minimal
3e slippage reports	Low Positive - improves observer data	Low Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Minimal
3f no discards before sampling mackerel	Low Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3g no discards before sampling longfin	Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3h 1 slip termination	Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3i 2 slip termination	Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3j Closed Area 1 Rules	Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3k 5 annual mackerel slips then trip termination for if more	Low Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3l 10 annual mackerel slips then trip termination for if more	Low Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts (cont)				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
3m 5 trimester longfin slips then trip termination for if more	Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3n 10 trimester longfin slips then trip termination for if more	Positive - improves observer data	Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3o repeat observers for canceled trips	Low Positive - improves observer data	Low Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
3p individual vessel slippage quota	Potential Positive - improves observer data	Potential Positive - improves observer data	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
4a No Action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
4b port-side sampling for mackerel landings	Minimal - landings already well monitored	Positive - better landings data for non-targets	Minimal - fishery mostly uses MWT	Potentially positive - may lower effort.	Mixed (positive and negative impacts for different interests)
4c portside sampling for longfin landings	Minimal - landings already well monitored	Minimal - much non-target catch is discarded at set	Potentially positive - may lower effort.	Potentially positive - may lower effort.	Mixed (positive and negative impacts for different interests)
4d Tier 3 mackerel hold certification	Minimal - landings already well monitored	Potentially low Positive - better data for non-targets	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
4e longfin hold certification	Minimal - landings already well monitored	Potentially positive - better data for non-targets	Minimal - no substantial change in effort expected	Minimal - no substantial change in effort expected	Mixed (positive and negative impacts for different interests)
4f Sust. Fish. Coalition frameworkable	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
5a No action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
5b Observer coverage for mackerel MWT	Potentially low positive - better discard data	Positive - better incidental catch data	Minimal - fishery mostly uses MWT	Minimal (positive if industry has to pay which would decrease effort)	Mixed (positive and negative impacts for different interests)
5c Observer coverage for mackerel SMBT	Potentially low positive - better discard data	Positive - better incidental catch data	Minimal (positive if industry has to pay which would decrease effort)	Minimal (positive if industry has to pay which would decrease effort)	Mixed (positive and negative impacts for different interests)
5d Observer coverage for longfin SMBT	Positive - better discard catch data	Positive - better incidental catch data	Minimal (positive if industry has to pay which would decrease effort)	Minimal (positive if industry has to pay which would decrease effort)	Mixed (positive and negative impacts for different interests)
5e Strata-Fleet-Based Alternatives	Positive - better discard catch data	Positive - better incidental catch data	Minimal (positive if industry has to pay which would decrease effort)	Minimal (positive if industry has to pay which would decrease effort)	Mixed (positive and negative impacts for different interests)
5f Industry Funding	Minimal but tied to 5b-5e above.	Minimal but tied to 5b-5e above.	Minimal but tied to 5b-5e above.	Minimal but tied to 5b-5e above.	Mixed (positive and negative impacts for different interests)
5g phased industry funding	Minimal but tied to 5b-5e above.	Minimal but tied to 5b-5e above.	Minimal but tied to 5b-5e above.	Minimal but tied to 5b-5e above.	Mixed (positive and negative impacts for different interests)
5h 2-year coverage re-evaluation	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
6a No Action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
6b Mackerel River Herring Cap	Potentially low positive - lower catch	Potentially positive - lower catch depending on cap amount	Minimal - fishery mostly uses MWT	Potentially positive - lower effort depending on cap amount	Mixed (positive and negative impacts for different interests)
6c Mackerel Shad Cap	Potentially low positive - lower catch	Potentially positive - lower catch depending on cap amount	Minimal - fishery mostly uses MWT	Potentially positive - lower effort depending on cap amount	Mixed (positive and negative impacts for different interests)
6d Longfin River Herring Cap	Potentially positive - lower catch (butterfish)	Potentially positive - lower catch depending on cap amount	Potentially positive - lower effort depending on cap amount	Potentially positive - lower effort depending on cap amount	Mixed (positive and negative impacts for different interests)
6e longfin shad cap	Potentially positive - lower catch (butterfish)	Potentially positive - lower catch depending on cap amount	Potentially positive - lower effort depending on cap amount	Potentially positive - lower effort depending on cap amount	Mixed (positive and negative impacts for different interests)
6f Make Caps Frame-workable	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
7a No Action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
7bMack Closed Area Mackerel	Potentially low positive - lower catch	Positive - lower effort/catch	Minimal - fishery mostly uses MWT	Positive - would reduce effort	Mixed (positive and negative impacts for different interests)
7bLong Closed Area Longfin	Potentially low positive - lower catch	Low Positive - lower effort/catch	Positive - would reduce effort	Positive - would reduce effort	Mixed (positive and negative impacts for different interests)
7cMack observer area mackerel	Potentially low positive - lower catch	Potentially positive (better observer data and/or lower effort)	Minimal - fishery mostly uses MWT	Positive - would reduce effort	Mixed (positive and negative impacts for different interests)
7cLong observer area longfin	Potentially low positive - lower catch	Potentially low positive (better observer data and/or lower effort)	Positive - would reduce effort	Positive - would reduce effort	Mixed (positive and negative impacts for different interests)
7d trigger option	Tied to 7b-7c. Would reduce impacts (positive or negative) because those measures would only be in place for part of year after trigger was reached.	Tied to 7b-7c. Would reduce impacts (positive or negative) because those measures would only be in place for part of year after trigger was reached.	Tied to 7b-7c. Would reduce impacts (positive or negative) because those measures would only be in place for part of year after trigger was reached.	Tied to 7b-7c. Would reduce impacts (positive or negative) because those measures would only be in place for part of year after trigger was reached.	Tied to 7b-7c. Would reduce impacts (positive or negative) because those measures would only be in place for part of year after trigger was reached.
7e Area Updating	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts				
	Managed resource	Non-target species Esp. RH/S	Habitat including EFH	Protected Resources	Human Communities
8a No action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
8b make hotspots frame- workable	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action	Minimal - allows future action
8cMack Observers in Monitoring/ Avoidance Area	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Low negative - possible costs to fishery without any conservation benefits
8cLong Observers in Monitoring/ Avoidance Area	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Low negative - possible costs to fishery without any conservation benefits
8dMack Closed Area 1 rules w/exit for slipping	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Low negative - possible costs to fishery without any conservation benefits
8dLong Closed Area 1 rules w/exit for slipping	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Low negative - possible costs to fishery without any conservation benefits
8eMack closure in protection area	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Low negative - possible costs to fishery without any conservation benefits
8eLong closure in protection area	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Low negative - possible costs to fishery without any conservation benefits
8f Tie alternative implemen-tation to Atl Herring	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Minimal - hotspots are too small given geo-temporal variability of fish and fishing	Low negative - possible costs to fishery without any conservation benefits

Note: The FMAT analysis (see Appendices 1 & 2) found that the small-area based “hotspot” alternatives considered in this Alternative Set are likely to just redistribute effort and that given the widespread distribution of RH/S the end result could be to increase impacts on RH/S just as easily as reducing impacts on RH/S and that one would not be able to predict the actual outcome.

(continued)

Management Measures	Valued Ecosystem Component (VEC) Impacts					
	Currently Managed resources	RH/S	Other non-target species	Habitat including EFH	Other (non-RH) Protected Resources	Human Communities
9a No Action	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo	Neutral - Status Quo
9b Add blueback herring as a managed stock in the MSB FMP	Minimal	Positive related to a variety of related conservation measures	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Positive because EFH would be designated and conserved.	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Mixed (positive and negative impacts for different interests)
9c Add alewife as a managed stock in the MSB FMP	Minimal	Positive related to a variety of related conservation measures	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Positive because EFH would be designated and conserved.	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Mixed (positive and negative impacts for different interests)
9d Add American Shad as a managed stock in the MSB FMP	Minimal	Positive related to a variety of related conservation measures	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Positive because EFH would be designated and conserved.	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Mixed (positive and negative impacts for different interests)
9e Add hickory shad as a managed stock in the MSB FMP	Minimal	Positive related to a variety of related conservation measures	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Positive because EFH would be designated and conserved.	Minimal but if future effort reductions were needed related to RH/S closures could be positive	Mixed (positive and negative impacts for different interests)

2.3 Initial Areas of Controversy

Many measures considered in this document have been controversial at least at some point in the development of the Amendment. The controversy generally hinges on three primary factors. They are: 1) the relatively high potential cost of some of the alternatives (especially industry-funded observer coverage [Set 5], mortality caps [Set 6] and large-scale area-based restrictions [Set 7]); 2) the concern by some segments of the public about the impacts of large scale trawling on river herring and shad populations; and 3) the lack of firm science (i.e. high uncertainty) about either the coast-wide populations of river herring and shad or about the impact on those populations from at-sea trawling versus other sources of mortality (natural or human-caused).

2.4 Considered but Rejected Management Actions

1. The Council decided not to add a provision for annual forage set-asides for mackerel, squids, and butterfish. Instead, the Council noted that the recent Omnibus Annual Catch Limit Amendment already allows harvest reductions due to forage concerns and concluded that formal set-asides would be better considered after the Council develops ecosystem level goals and objectives that are informed by the ongoing work of the ecosystem subcommittee of the Scientific and Statistical Committee.

2. The Council considered including consideration of catch shares for the squid fisheries during the scoping process but concluded that it would be more effective to focus Amendment 14 on river herring and shad issues. Also, there was strong public comment against including squid catch shares at the current time.

3. The Council considered requiring 6 hour pre-landing notification via phone to land more than 20,000 pounds of mackerel so as to facilitate quota monitoring. This was removed because NMFS is trying to phase out phone notifications of this kind.

4. The Council considered requiring 6 hour pre-landing notification via phone to land more than 2,500 pounds of longfin squid so as to facilitate quota monitoring. This was removed because NMFS is trying to phase out phone notifications of this kind.

5. The Council considered requiring daily electronic reporting by MSB-permitted dealers so as to facilitate quota monitoring (directed and/or incidental catch) and cross checking with other data sources. This was removed because other options seemed equally effective and the infrastructure for 24hr reporting is burdensome for both NMFS and dealers.

6. The Council considered requiring 48 hour electronic reporting by MSB-permitted dealers so as to facilitate quota monitoring (directed and/or incidental catch) and cross checking with other data sources. This was removed because other options seemed equally effective and the infrastructure for 48hr reporting is burdensome for both NMFS and dealers.

7. The Council considered requiring 72 hour electronic reporting by MSB-permitted dealers so as to facilitate quota monitoring (directed and/or incidental catch) and cross checking with other data sources. This was removed because other options seemed equally effective and the infrastructure for 42hr reporting is burdensome for both NMFS and dealers.

8. The Council considered requiring trip termination following 3 slipped hauls on an observed trip so as to minimize slippage events. The goal is to minimize slippage events. This was removed because other options seemed equally effective (termination after 1 or 2 hauls) and having 3 slipped hauls on one trip would be a rare event.

9. The Council considered using mesh changes to reduce the incidental catch of river herrings and shads but concluded such measures were not feasible due to the lack of trawl mesh selectivity for mackerel, river herrings, and shads. Selectivity information would be necessary to evaluate both potential benefits to river herrings and shads and potential costs to the relevant directed fisheries.

10. Some measures under consideration address slippage where the contents of a net on an observed haul on an observed trip are released in the water. In these cases the observer cannot sample the released catch. Some alternatives considered requiring ¼ of the catch to be pumped on board but these were rejected because a) catch may be patchy and only sampling ¼ of the net

11. To obtain information on fish that may remain in the net, the Council conserved alternatives that would require nets to be periodically brought aboard after pumping for sampling. These alternatives were rejected because the observer program had already begun such sampling at higher rates than those considered in the document. An alternative was also added to prohibit any discarding of un-sampled fish, even operational discards.

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2.5 Regulatory Basis for the Amendment

Amendment 14 was developed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the National Environmental Policy Act (NEPA), the former being the primary domestic legislation governing fisheries management in the U.S. Exclusive Economic Zone (EEZ). The MSA requires Councils to minimize bycatch to the extent practicable (Section 301 – National Standard 9) and provides discretionary authority to "include management measures in the plan to conserve…non-target species…considering the variety of ecological factors affecting fishery populations" (Section 303(b)(12). How these provisions apply to RH/S catch in the mackerel and Longfin Squid fisheries is the primary concern of Am14 (see purposes A and B above). The MSA also provides for Councils to submit new fishery management plans for fish stocks, including anadromous species (see purpose C above).

NEPA requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Specifically, all federal agencies are to prepare detailed statements assessing the environmental impact of and alternatives to major federal actions significantly affecting the environment. These statements are commonly referred to as environmental impact statements (EISs). This document constitutes the EIS for the management measures currently under consideration and was prepared by the Council in consultation with the National Marine Fisheries Service (NMFS).

This document also addresses the requirements of the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), the Regulatory Flexibility Act (RFA), the Administrative Procedure Act (APA), the Paperwork Reduction Act (PRA), the Coastal Zone Management Act (CZMA), the Information Quality Act (IQA), and Executive Orders 13132 (Federalism), 12898 (Environmental Justice), 12866 (Regulatory Planning), and 13158 (Marine Protected Areas). These other applicable laws and Executive Orders help ensure that in developing an FMP and/or FMP amendment, the Council considers the full range of alternatives and their expected impacts on the marine environment, living marine resources, and the affected human environment. This integrated document contains all required elements for these laws and executive orders including MSA and NEPA, and the information to ensure consistency with the applicable laws and executive orders.

3.0 LIST OF ACRONYMS AND ABBREVIATIONS

AA	Assistant Administrator
ABC	Allowable Biological Catch
ACFCMA	Atlantic Coastal Fisheries Cooperative Management Act
ACL	Annual Catch Limit
ACT	Annual Catch Target
AFS	American Fisheries Society
AM	Accountability Measure
APA	Administrative Procedures Act
AR	auto-regressive
ASMFC	Atlantic States Marine Fisheries Commission or Commission
ATGTRP	Atlantic Trawl Gear Take Reduction Plan
ATGTRT	Atlantic Trawl Gear Take Reduction Team
B	Biomass
BMSY	Biomass Associated with Maximum Sustainable Yield
BRP	Biological reference points
CAFSAC	Canadian Atlantic Fisheries Scientific Advisory Committee
CD	Confidential data
CDP	Census Designated Place
CEA	Cumulative Effects Assessment
CEQ	Council on Environmental Quality
CETAP	Cetacean and Turtle Assessment Program
CFR	Code of Federal Regulations
CI	Confidential Information
CPR	Cardiopulmonary Resuscitation
CPUE	Catch Per Unit Effort
C.V.	coefficient of variation
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAP	Domestic Annual Processing
DMF	Department of Maine Fisheries
DOC	Department of Commerce
DOL	Department of Labor
DPS	Distinct Population Segment
DEIS	Draft Environmental Impact Statement
DSEIS	Draft Supplementary Environmental Impact Statement
DWF	Department of Wildlife and Fisheries
EA	Environmental Assessment
EAP	Emergency Action Plan
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ELMR	Estuarine Living Marine Resources
EO	Executive Order

EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
F	Fishing Mortality Rate
FAO	U.N. Food and Agriculture Organization
FDEP	Florida Department of Environmental Protection
FLSA	Fair Labor Standards Act
FMAT	Fishery Management Action Team
FMAX	Threshold Fishing Mortality Rate
FMP	Fishery Management Plan
FMSY	Fishing Mortality Associated with MSY
FR	Federal Register
FEIS	Final Environmental Impact Statement
FSEIS	Final Supplementary Environmental Impact Statement
FTARGET	Target Fishing Mortality Rate
FWS	U.S. Fish and Wildlife Service
GAMS	general additive models
GB	George's Bank
GC	General Counsel or General Category (Scallop)
GOM	Gulf of Maine
GRA	Gear Restricted Area
GTE	Greater than or equal to
HAPC	Habitat Area of Particular Concern
HPTRP	Harbor Porpoise Take Reduction Plan
IAEA	International Atomic Energy Agency
ICES	International Council for the Exploration of the Sea
ICNAF	International Convention of the Northwest Atlantic Fisheries
IMPLAN	IMpact Analysis for PLANning
IRFA	Initial Regulatory Flexibility Analysis
IOY	Initial Optimum Yield
IQA	Information Quality Act
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual Transferrable Quota
IUCN	International Union for Conservation of Nature
JV	Joint Venture
LNG	Liquefied Natural Gas
LOF	List of Fisheries
LTPC	Long-term Potential Catch
LWTRP	Large Whale Take Reduction Plan
M	Natural Mortality Rate
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Statistical Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSB	Mackerel, Squid, and Butterfish
MSY	Maximum Sustainable Yield
MT (or mt)	metric tons

MWT	Mid Water Trawl
NAFO	Northwest Atlantic Fisheries Organization
NAO	National Oceanic and Atmospheric Administration Order
NASUS	National Academy of Sciences of the United States
NE	New England
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fishery Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NIOZ	Royal Netherlands Institute for Sea Research
NK	Not classified
NLDC	New London Development Corporation
NMFS	National Marine Fisheries Service (NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOS	National Ocean Service
NSF	National Science Foundation
OBSCON	Observer Contract
OSP	optimum sustainable population
OTA	Office of Technology Assessment
OY	Optimal Yield
PBR	Potential Biological Removal
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
RFA	Regulatory Flexibility Act
RFF	reasonably foreseeable future
RFFA	Reasonably Foreseeable Future Actions
RH/S	River Herring and Shad
RIR	Regulatory Impact Review
ROV	Remotely Operated Vehicle
RSA	Research Set-Aside
RV	Research Vessel
SA	South Atlantic
SAFE	Stock Assessment and Fishery Evaluation
SAFIS	Standard Atlantic Fisheries Information System
SAFMC	South Atlantic Fishery Management Council
SAR	Stock Assessment Report
SARC	Stock Assessment Review Committee
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SBA	Small Business Administration
SBRM	Standardized Bycatch Reporting Methodology
SD	Standard Deviation
SEFSC	Southeast Fisheries Science Center
SDEIS	Supplement to the Draft Environmental Impact Statement
SF	Sustainable Fisheries

SMB	Squid, Mackerel, and Butterfish (used when referring to Committee)
SMBT	Small Mesh Bottom Trawl
SP	Species
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
STACRES	Standing Committee on Research and Statistics
STAT	Statistical
TAL	Total Allowable Landings
TALFF	Total allowable level of foreign fishing
TEWG	Turtle Expert Working Group
TL	Total Length
TRP	Take Reduction Plan
TRT	Take Reduction Team
URI	University of Rhode Island
US	United States
USA	United States of America
USCG	United States Coast Guard
USDC	U.S. Department of Commerce
USDI	U.S. Department of the Interior
USGS	Untied Stated Geological Survey
USSR	Union of Soviet Socialist Republics
VEC	Valued Ecosystem Component
VMS	Vessel Monitoring System
VPA	Virtual Population Analysis
VTR	Vessel Trip Report
WNA	Western North Atlantic
WP	Working Paper
WWF	World Wildlife Federation
ZMRG	Zero Mortality Rate Goal

4.0 INTRODUCTION AND BACKGROUND

4.1 PROBLEMS/NEEDS FOR ACTION AND CORRESPONDING PURPOSES AND BACKGROUND

Table 9 summarizes the Problems/Needs for Action and corresponding purposes. The "Problem/Need for Action" describes 'Why is the Council taking a given action?' For each Problem/Need for Action there is a "Corresponding Purpose," which is how the Council proposes to address the Problem/Need for Action. Additional details on the purposes are provided after the table. The alternatives described in this document provide a reasonable range of specific tools to implement the purpose, i.e. solve the problem.

Table 9. Summary of the problems/needs for actions and purposes.

SUMMARY OF THE PURPOSE AND NEED FOR THE ACTION		
	PROBLEM/NEED FOR ACTION	CORRESPONDING PURPOSE
Purpose A	There is insufficient Monitoring of RH/S catch	Implement Effective RH/S Monitoring
Purpose B	Incidental catches may be negatively impacting RH/S	Reduce RH/S Bycatch and/or Catch
Purpose C	Insufficient management framework for RH/S	Consider RH/S NS1 Stock Issues

4.1.A Purpose A - Implement Effective RH/S Monitoring

While current levels of monitoring, especially at-sea observer coverage, document that RH/S are caught in the mackerel and longfin squid fisheries, the current relatively low monitoring levels do not allow for management to precisely understand how much RH/S different fisheries are catching. This makes it difficult to determine what, if any actions would be appropriate by the Council. Accordingly, this Amendment considers a variety of alternatives to improve monitoring.

The state of knowledge regarding incidental RH/S catch given the current information is contained in Appendix 2. Given the purpose of Amendment 14, new analyses for Amendment 14 centered on River Herrings and Shads. The methods, detailed in Appendix 2, utilized ratios of observed caught RH/S to total observed fish kept (fish to be landed). These ratios were then applied to landings by year/area/quarter/gear/mesh strata to estimate RH/S catch for each strata. A similar procedure has become standard to estimate discards, but in that case only discards are used to establish the ratio. These strata were used to eliminate the ambiguity (e.g. double counting trips that land multiple species or missing directed effort that failed to catch the intended target) that results from attempting to sort observer data by "directed trips" and is further discussed in Appendix 3, which describes the FMAT's recommendations upon reviewing the analysis. The detailed results of these analyses are also provided in Appendix 2 and summarized in Section 6.3.

Readers who participated in the process may note that the total catch estimates in Appendix 2 differ from some preliminary calculations discussed in early technical meetings. The differences are accounted for by three additional stratifications in the final analysis: 1) single and pair trawl estimates were combined in the early versions and estimated separately in the final analysis; and 2) bottom trawl estimates were combined in the early versions and estimated separately by mesh size in the final analysis; and 3) gillnet estimates were combined in the early versions and estimated separately by mesh size in the final analysis. The stratifications are described in detail in Appendix 2 but the general idea is that activity by like groups of gears should be estimated together, and there were differential catch rates between the selected stratifications.

4.1.B Purpose B: Reduce RH/S Bycatch and/or Catch

While acknowledging substantial uncertainty, the figures used by the council to develop Amendment 14 (see Appendix 2) are based on 2006-2010 data. The resulting estimates indicate that on average, about 960,000 pounds of river herrings and about 120,000 pounds of shads were caught in ocean intercept fisheries during each of those years. Ocean-intercept fish often are juveniles, so, if you assume five fish per pound, these numbers translate into around 5 million river herrings and 600,000 shads being caught each year on average. The data suggest that the mackerel and longfin squid fisheries account for a portion of this total catch and that the mackerel fishery may have substantial encounters with river herrings in some years.

Since there are no coast-wide stock assessments for river herrings or shads, it is not possible to determine if these catch levels are, or are not, detrimental to river herring or shad stocks. There also are concerns that single large catches of river herrings and shad could severely impact individual river runs, but very little is known about the mixing of fish runs at sea. Lack of comprehensive assessments make it difficult to even ascertain the status of RH/S stocks. However, a variety of indicators suggests many river runs have been in decline, probably for a variety of reasons.

Regardless of the status of RH/S stocks, National Standard 9 of the MSA requires that conservation and management measures, to the extent practicable, minimize bycatch (defined as discards), and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Both NMFS online guide to the 1996 Amendments to the MSA (available at: http://www.nmfs.noaa.gov/sfa/sfaguide/) and responses to comments in the National Standard Guidelines Final Rule published in the Federal Register in 1998 (available at: http://www.epa.gov/fedrgstr/EPA-GENERAL/1998/May/Day-01/g11471.htm) note that there is legislative history suggesting that for the sole purpose of bycatch/bycatch mortality minimization, this provision was intended so that Councils make reasonable efforts to reduce discards, but was neither intended to ban a type of fishing gear nor to ban a type of fishing or impose costs on fishermen and processors that cannot be reasonably met.

The meaning of “practicable” was also discussed in Conservation Law Foundation v. Evans, 360 F.3d 21, 27-28 (1st Cir. 2004). The court stated:

> *…the plaintiffs essentially call for an interpretation of the statute that equates "practicability" with "possibility," requiring NMFS to implement virtually any measure that addresses EFH and bycatch concerns so long as it is feasible. Although the distinction between the two may sometimes be fine, there is indeed a distinction. The closer one gets to the plaintiffs' interpretation, the less weighing and balancing is permitted. We think by using the term "practicable" Congress intended rather to allow for the application of agency expertise and discretion in determining how best to manage fishery resources.*

NMFS has provided additional information on “practicable” in relation to bycatch:

> *What does "to the extent practicable mean"? From a National perspective, there is too much bycatch mortality in a fishery if a reduction in bycatch mortality would increase the overall net benefit of that fishery to the Nation through alternative uses of the bycatch species. In this case, a reduction in bycatch mortality is practicable and the excess bycatch mortality is a wasteful use of living marine resources. In many cases, it may be possible but not practicable to eliminate all bycatch and bycatch mortality (NMFS 2008).*

While neither NMFS nor the Courts appear to have provided perfect clarity on how much bycatch reduction should take place, it seems clear that the biological and economic benefits and costs should be weighed. Unfortunately, it is difficult to precisely quantify many of the biological and economic benefits and costs of measures proposed in this Amendment with available scientific information. However, from a qualitative perspective, the reader will find impact information in Section 7 (also summarized in the Executive Summary).

The Magnuson-Stevens Fishery Conservation and Management Act also provides discretionary authority to “include management measures in the plan to conserve…non-target species…considering the variety of ecological factors affecting fishery populations” (Section 303(b)(12)). This would appear to provide Councils with considerable discretion to address catch of non-target species regardless of catch disposition (retained or discarded). Given the ecological forage role of RH/S these discretionary provisions would appear to be well suited for the present actions under consideration. Presumably similar evaluations of what is “practicable” would affect decision making given the discretionary nature of these provisions.

Related to the mandate to reduce bycatch and discretionary authority to conserve non-target species, this Amendment considers a variety of alternatives to reduce bycatch and/or catch of RH/S. This Amendment is not the first action taken to reduce bycatch in the MSB fisheries - Amendment 10 implemented measures to reduce bycatch/discarding of target and non-target species (especially butterfish) in the longfin squid fishery and bring the FMP into compliance with MSA bycatch requirements. These measures included an increased mesh size (from 1.875 inches to 2.125 inches) and a cap that closes the longfin squid fishery if a certain amount of butterfish is caught.

Amendment 14 continues the Council's required efforts to minimize bycatch to the extent practicable and also considers discretionary provisions to reduce catch of RH/S regardless of the final disposition (discarded or retained) of that catch. Once the Council has fully reviewed public comment on the amendment and this DEIS then the Council will determine if there are practicable measures that can be implemented.

4.1.C PURPOSE C: Consider adding RH/S as "stocks in the fishery" in the MSB FMP

Currently the Atlantic States Marine Fisheries Commission (ASMFC) has the primary management role for RH/S. The ASMFC serves as a deliberative body, coordinating the conservation and management of the Atlantic States' shared near shore fishery resources for sustainable use. Through Amendment 2 to the ASMFC's Fishery Management Plan for Shad and River Herring, all states except those with approved sustainable fishery plans have closed their commercial and recreational river herring fisheries. The same will be true for shads (American and hickory) by January 1, 2013.

While these measures should reduce fishing pressure on RH/S, as described in Section 4, RH/S stocks face many challenges throughout their range and lifecycle, including historical overfishing, habitat degradation and blockages, and incidental catch in state and ocean fisheries. There is public concern that the existing management framework for managing RH/S may be insufficient and accordingly <u>this amendment considers the additional benefits and costs that could result from adding RH/S species as "stocks in the fishery" to the MSB FMP</u>.

While Council's are provided considerable flexibility, NMFS guidance describes which stocks should be "in the fishery" and describes the requirements for those stocks deemed by a Council to be "in the fishery." The NS1 guidance and requirements of FMPs is described in more detail in Section 5 but some important provisions that apply to any "in the fishery" managed stock include essential fish habitat designations and consultations, federally coordinated assessments, annual catch limits, accountability measures, status determinations, rebuilding (if necessary), additional observer coverage considerations, and coordination between management partners.

4.2 HISTORY OF FMP DEVELOPMENT

Management of the Atlantic mackerel, longfin squid and *Illex* squid, and butterfish fisheries began through the implementation of three separate FMPs (one each for mackerel, squid, and butterfish) in 1978. The plans were merged in 1983. Over the years a wide variety of management issues have been addressed including rebuilding, habitat conservation, bycatch minimization, and limited entry. The original plans, amendments and frameworks that affected management of these fisheries are summarized below.

Table 10. History of FMP Development

History of the Atlantic Mackerel, Squid and Butterfish FMP		
Year	**Document**	**Management Action**
1978-1980	Original FMPs (3) and individual amendments	Established and continued management of Atlantic mackerel, squid, and butterfish fisheries
1983	Merged FMP	Consolidated management of Atlantic mackerel, squid, and butterfish fisheries under a single FMP
1984	Amendment 1	Implemented squid OY adjustment mechanism
		Revised Atlantic mackerel mortality rate
1986	Amendment 2	Equated fishing year with calendar year
		Revised squid bycatch TALFF allowances
		Implemented framework adjustment process
		Converted expiration of fishing permits from indefinite to annual
1991	Amendment 3	Established overfishing definitions for all four species
1991	Amendment 4	Limited the activity of directed foreign fishing and joint venture transfers to foreign vessels
		Allowed for specification of OY for Atlantic mackerel for up to three years
1996	Amendment 5	Adjusted longfin squid MSY; established 1 7/8" minimum mesh size
		Eliminated directed foreign fisheries for longfin squid, *Illex*, and butterfish
		Instituted a dealer and vessel reporting system; Instituted operator permitting
		Implemented a limited access system for longfin squid, *Illex* and butterfish
		Expanded management unit to include all Atlantic mackerel, longfin squid, *Illex*, and butterfish under U.S. jurisdiction.
1997	Amendment 6	Established directed fishery closure at 95% of DAH for longfin squid, *Illex* and butterfish with post-closure trip limits for each species

		Established a mechanism for seasonal management of the *Illex* fishery to improve the yield-per recruit
		Revised the overfishing definitions for longfin squid, *Illex* and butterfish
1997	Amendment 7	Established consistency among FMPs in the NE region of the U.S. relative to vessel permitting, replacement and upgrade criteria
1998	Amendment 8	Brought the FMP into compliance with new and revised National Standards and other required provisions of the Sustainable Fisheries Act.
		Added a framework adjustment procedure.
2001	Framework 1	Established research set-asides (RSAs).
2002	Framework 2	Established that previous year specifications apply when specifications for the management unit are not published prior to the start of the fishing year (excluding TALFF specifications)
		Extended the *Illex* moratorium for one year; Established *Illex* seasonal exemption from longfin squid minimum mesh;
		Specified the longfin squid control rule; Allowed longfin squid specs to be set for up to 3 years
2003	Framework 3	Extended the moratorium on entry to the *Illex* fishery for an additional year
2004	Framework 4	Extended the moratorium on entry to the *Illex* fishery for an additional 5 years
2008	Amendment 12	Standardized Bycatch Reporting Methodology
2009	Amendment 9	Extended the moratorium on entry into the *Illex* fishery, without a sunset provision
		Adopted biological reference points for longfin squid recommended by the stock assessment review committee (SARC).
		Designated EFH for longfin squid eggs based on available information
		Prohibited bottom trawling by MSB-permitted vessels in Lydonia and Oceanographer Canyons
		Authorized specifications to be set for all four MSB species for up to 3 years
2010	Amendment 10	Implemented a butterfish rebuilding program.
		Increased the longfin squid minimum mesh in Trimesters 1 and 3.
		Implemented a 72-hour trip notification requirement for the longfin squid fishery.
2011	Amendment 14	Mackerel limited access
		EFH Updates
		Commercial/Recreational Mackerel Allocation
2011	Amendment	Annual Catch Limit and Accountability Measure Omnibus Amendment

	13	
2011	Amendment 11	Limited Access in the Atl mackerel fishery; EHF updates, Rec/Com allocation. Currently being implemented.

4.3 FMP GENERAL MANAGEMENT OBJECTIVES/GOALS

The objectives, as described in the FMP as currently amended, are listed below.

1. Enhance the probability of successful (i.e., the historical average) recruitment to the fisheries.
2. Promote the growth of the U.S. commercial fishery, including the fishery for export.
3. Provide the greatest degree of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this FMP.
4. Provide marine recreational fishing opportunities, recognizing the contribution of recreational fishing to the national economy.
5. Increase understanding of the conditions of the stocks and fisheries.
6. Minimize harvesting conflicts among U.S. commercial, U.S. recreational, and foreign fishermen.

4.4 MANAGEMENT UNIT/SCOPE

The management unit is currently all northwest Atlantic mackerel (*Scomber scombrus*), longfin squid, *Illex illecebrosus*, and butterfish (*Peprilus triacanthus*) under U.S. jurisdiction though an alternative in the amendment could effectively extend the management unit to include RH/Ss.

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5.0 MANAGEMENT MEASURES AND ALTERNATIVES

Throughout this document the reader will note that the focus of the alternatives is on the Atlantic mackerel and longfin squid fisheries. This is intentional because those are the MSB fisheries that appear to have at least somewhat substantial RH/S interactions. Butterfish is primarily an incidental catch fishery and the *Illex* fishery appears to rarely interact with RH/S (see table 21). All of the alternatives are geared to RH/S issues, whether in regards to monitoring, catch reduction, or general management.

A variety of alternatives were considered but rejected by the Council for a variety of reasons. A summary of those alternatives and an explanation of why they were rejected follows immediately below:

Considered but Rejected Management Actions

1. The Council decided not to add a provision for annual forage set-asides for mackerel, squids, and butterfish. Instead, the Council noted that the recent Omnibus Annual Catch Limit Amendment already allows harvest reductions due to forage concerns and concluded that formal set-asides would be better considered after the Council develops ecosystem level goals and objectives that are informed by the ongoing work of the ecosystem subcommittee of the Scientific and Statistical Committee.

2. The Council considered including consideration of catch shares for the squid fisheries during the scoping process but concluded that it would be more effective to focus Amendment 14 on river herring and shad issues. Also, there was strong public comment against including squid catch shares at the current time.

3. The Council considered requiring a 6 hour pre-landing notification via phone to land more than 20,000 pounds of mackerel so as to facilitate quota monitoring. This was removed because NMFS is trying to phase out phone notifications of this kind.

4. The Council considered requiring a 6 hour pre-landing notification via phone to land more than 2,500 pounds of longfin squid so as to facilitate quota monitoring. This was removed because NMFS is trying to phase out phone notifications of this kind.

5. The Council considered requiring daily electronic reporting by MSB-permitted dealers so as to facilitate quota monitoring (directed and/or incidental catch) and cross checking with other data sources. This was removed because other options seemed equally effective and the infrastructure for 24hr reporting is burdensome for both NMFS and dealers.

6. The Council considered requiring 48 hour electronic reporting by MSB-permitted dealers so as to facilitate quota monitoring (directed and/or incidental catch) and cross checking with other data sources. This was removed because other options seemed equally effective and the infrastructure for 48hr reporting is burdensome for both NMFS and dealers.

7. The Council considered requiring 72 hour electronic reporting by MSB-permitted dealers so as to facilitate quota monitoring (directed and/or incidental catch) and cross checking with other data sources. This was removed because other options seemed equally effective and the infrastructure for 72hr reporting is burdensome for both NMFS and dealers.

8. The Council considered requiring trip termination following 3 slipped hauls on an observed trip so as to minimize slippage events. The goal is to minimize slippage events. This was removed because other options seemed equally effective (termination after 1 or 2 hauls) and having 3 slipped hauls on one trip would be a rare event.

9. The Council considered using mesh changes to reduce the incidental catch of river herrings and shads but concluded such measures were not feasible due to the lack of trawl mesh selectivity for mackerel, river herrings, and shads. Selectivity information would be necessary to evaluate both potential benefits to river herrings and shads and potential costs to the relevant directed fisheries.

10. Some measures under consideration address slippage where the contents of a net on an observed haul on an observed trip are released in the water. In these cases the observer cannot sample the released catch. Some alternatives considered requiring ¼ of the catch to be pumped on board but these were rejected because catch may be patchy so sampling from ¼ of the net may not provide reliable information.

11. To obtain information on fish that may remain in the net, the Council considered alternatives that would require nets to be periodically brought aboard after pumping for sampling. These alternatives were rejected because the observer program had already begun such sampling at higher rates than those considered in the document. An alternative was also added to prohibit any discarding of un-sampled fish, even operational discards.

NOTE ON COMBINATIONS WITHIN AND BETWEEN ALTERNATIVE SETS:

There are over 80 alternatives in this document. This means that there are millions of different possible combinations. At the beginning of each Alternative Set, it is noted which alternatives may, and which alternatives may not be, grouped together within the Alternative Set. Between Alternative Sets, alternatives generally may be combined without problem. The only broad exception to this rule is that it would appear unlikely that alternatives from both of the area-based alternatives (Sets 7 and 8) would be chosen together.

5.1 Alternative Set 1: Additional Vessel Reporting Measures

5.1.1 Statement of Problem/Need for Action

Relatively low levels of catch monitoring have resulted in relatively high uncertainty about incidental catch of RH/S in Mid-Atlantic and New England fisheries. The Council is therefore considering actions to decrease uncertainty so as to improve the management of incidental RH/S catches. Some of these measures include changes to vessel reporting and these are included in this Alternative Set. These changes are intended to improve either the quality of data maintained by NMFS, the timeliness of that data, or both. Since dealer data is the primary monitoring tool for MSB quota management, the proposed vessel monitoring changes would mostly be useful for purposes of cross checking and correcting errors that occur when data is entered into the dealer weighout databases.

5.1.2 General Rationale & Background

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates. Some of the focus may appear to be on mackerel and/or longfin squid general reporting compared to just RH/S in those fisheries. However, because extrapolations of RH/S catch are often made based on total landings, accurate monitoring of the target species is important when determining total catch of RH/S.

Current Reporting Requirements

The current suite of reporting requirements for MSB fisheries is further described under the No-action alternative below. But a general reporting summary is provided here as an introduction. The Northeast Region has two main types of reporting requirements for vessels, Vessel Trip Reporting (VTR) and Vessel Monitoring Systems (VMS). VTRs include such information as: Vessel identification; date fished; location fished; gear used, number of crew; total number of hauls; average tow duration; weight of species caught; and dealer information. All permits require VTR submissions, but at different time scales. VTRs are required to be submitted on a monthly basis for MSB permits but most MSB-permitted vessels must already submit VTRs on a weekly basis because of requirements for other permits (Atlantic herring or NE multispecies). NMFS has been moving many of the region's fisheries toward weekly vessel trip reporting (VTR) to improve monitoring and monitoring timeliness.

VMS is used to collect near-real time vessel location information, and is often required for permits for fisheries that have area-based management components. Generally electronic VMS units are installed on vessels and automatically report vessel location to NMFS at least hourly. Several fisheries also require catch reporting via VMS. The herring fishery requires daily VMS catch reporting, and the multispecies fishery requires VMS catch reports at the close of each trip. The FAO has an informative primer on the use of VMS for the Monitoring, Control and Surveillance of fishing vessels here:

http://www.fao.org/docrep/003/w9633e/w9633e06.htm#TopOfPage. VMS units are not currently required for any MSB fisheries, although many MSB permitted vessels have VMS units due to requirements for other permits.

While landings information submitted weekly by dealers is the primary tool for MSB fishery quota monitoring, both VTR and VMS data have the potential to be used by managers for cross checking dealer data when monitoring quotas and making incidental catch extrapolations. Alternatives in this set may appear to focus on mackerel and/or longfin squid general reporting compared to just RH/S in those fisheries. However, because extrapolations are often made based on total landings, accurate monitoring of the target species can be as important as determining the encounter rates of RH/S. This is because when estimations of non-target catch (including discards) such as RH/S are made with observer data, they are usually made based on the ratio of RH/S to total retained catch applied to landings data. For example, if it was found that in observer data, 1 pound of RH/S was caught for every 100 pounds of fish landed by mackerel vessels, and those same vessels landed 1,000,000 pounds of fish, one could estimate that 10,000 pounds of RH/S were caught. While small differences in the total landings number will not affect the estimate substantially, it is still important for both the ratio and the total landings number to be as accurate as feasibly possible.

The Northeast Fishery Observer Program also collects information on discarded and unusual catches via on-board monitors (called "observers") placed by NMFS. Currently in MSB fisheries, just the longfin squid fishery has a requirement to provide 72-hour pre-trip notifications so that observers may be more efficiently allocated in that fishery. Additional details on existing observer-related provisions may be found below in section 5.3.3.

The current way vessel data is collected for MSB fisheries may be insufficient for a variety of reasons. The action alternatives discuss these reasons below since each addresses particular potential deficiencies.

5.1.3 Management Alternatives

NOTE ON COMBINATIONS: Most of the Alternative Set 1 action alternatives could be implemented individually or collectively. However, 1c (weekly VTRs for all MSB permits) would encompass 1bMack and 1bLong so these would not be selected together. The 48-hr mackerel pre-trip notification (1d48) and 72-hr mackerel pre-trip notification (1d72) would also be mutually exclusive – only one would be chosen if either. The VMS reporting alternatives (1f's and 1g's) would need the respective 1e's (that require VMS) for each fishery as a prerequisite before requiring VMS reporting.

Note: Since some of the alternatives below are very similar, they are grouped together for purposes of description.

1a. No-action

The current monitoring requirements would remain in effect, and these are described below for MSB permits.

The owner or operator of any vessel issued a valid permit or eligible to renew a limited access permit must maintain on board the vessel, and submit, an accurate fishing “Vessel Trip Report” log for each fishing trip, regardless of species fished for or taken, on forms supplied by or approved by the Regional Administrator. If no fishing trip is made during a month, a report stating so must be submitted for each month. If authorized in writing by the Regional Administrator, a vessel owner or operator may submit reports electronically, for example by using a VMS or other media. At least the following information and any other information required by the Regional Administrator must be provided: Vessel name; USCG documentation number (or state registration number, if undocumented); permit number; date/time sailed; date/time landed; trip type; number of crew; number of anglers (if a charter or party boat); gear fished; quantity and size of gear; mesh/ring size; chart area fished; average depth; latitude/longitude (or loran station and bearings); total hauls per area fished; average tow time duration; hail weight, in pounds (or count of individual fish, if a party or charter vessel), by species, of all species, or parts of species; dealer permit number; dealer name; date sold, port and state landed; and vessel operator's name, signature, and the operator's permit number (if applicable).

VTRs must be filled out with all required information, except for information not yet ascertainable, prior to entering port. Information that may be considered unascertainable prior to entering port includes dealer name, dealer permit number, and date sold. Log reports must be completed as soon as the information becomes available. Upon the request of an authorized officer or an employee of NMFS designated by the Regional Administrator to make such inspections, all persons required to submit reports under this part must make immediately available for inspection copies of reports, and all records upon which those reports are or will be based, that are required to be submitted or kept under this part. Copies of fishing log reports must be kept on board the vessel and available for review for at least 1 year, and must be retained for a total of 3 years after the date the fish were last possessed, landed, and sold.

VTRs for MSB permits are currently required on a monthly basis, and must be postmarked or received by NMFS within 15 days after the end of the reporting month. If no fishing trip is made during a particular month for such a vessel, a report stating so must be submitted, as instructed by the Regional Administrator. Once the mackerel limited access system becomes operational, Tier 3 Limited Access mackerel permits’ VTRs will be required on a weekly basis, and must be postmarked or received by midnight of the first Tuesday following the end of the reporting week. If no fishing trip is made during a reporting week for such a vessel, a report stating so must be submitted and received by NMFS by midnight of the first Tuesday following the end of the reporting week.

VMS is not required for MSB permits but most MSB permits do have VMS requirements because of permits in other fisheries. A description of the proposed VMS monitoring, which is identical to current measures in place for other fisheries is described in the relevant action alternatives below.

For only longfin squid/butterfish moratorium permits, there is currently a 72-hour pre-trip notification in order to facilitate the placement of observers. While vessels do not have to wait 72 hours if they are not selected to take an observer, they must wait up to 72 hours from the time of notification for an observer if they are selected to take an observer. The majority of trips do not take observers and are cleared to leave within 24 hours of notification.

Currently there is no way for the observer program to identify mackerel trips for observer placement purposes. Observers are carried on board some trips that catch mackerel incidental to their placement on other vessels, primarily directed herring trips, but there is no systematic way to place observers on trips targeting mackerel.

1bMack. Institute weekly vessel trip reporting (VTR) for mackerel permits.

1bLong. Institute weekly vessel trip reporting (VTR) for longfin squid/Butterfish permits.

1c. Institute weekly vessel trip reporting (VTR) for all MSB permits (Mackerel, longfin squid//Butterfish, *Illex*) so as to facilitate quota monitoring (directed landings and/or incidental mortality cap if applicable) and cross checking with other data sources.

With monthly reporting, data is not collected in a timely-enough manner to be feasibly used for quota monitoring. Weekly reporting would match the dealer reporting timeframe and increase the feasibility of using VTR data to cross-check dealer data. These three alternatives differ only in the permit categories that would be affected, as described in the alternatives themselves.

The basic VTR requirements would remain the same as described in the no-action alternative but the timing would change. Instead of the current monthly reporting for all but Tier 3 mackerel permits, the following timing requirement would be implemented:

VTRs must be postmarked or received by midnight of the first Tuesday following the end of the reporting week (each reporting week begins at 12:00am Sunday morning and ends 11:59pm Saturday night). If no fishing trip is made during a reporting week, a report stating so must be submitted and received by NMFS by midnight of the first Tuesday following the end of the reporting week. The date when fish are offloaded will establish the reporting week that the VTR must be submitted to NMFS. Any fishing activity during a particular reporting week (*i.e.,* starting a trip, landing, or offloading catch) will constitute fishing during that reporting week and will eliminate the need to submit a negative fishing report to NMFS for that reporting week. For example, if a vessel begins a fishing trip on Wednesday, but returns to port and offloads its catch on the following Thursday (*i.e.,* after a trip lasting 8 days), the VTR for the fishing trip would need to be submitted by midnight Tuesday of the third week, but a negative report (*i.e.,* a "did not fish" report) would not be required for either earlier week.

<u>1d48</u>. Require 48 hour pre-trip notification to NMFS to retain/possess/transfer more than 20,000 pounds of mackerel so as to facilitate observer placement.

<u>1d72</u>. Require 72 hour pre-trip notification to NMFS to retain/possess/transfer more than 20,000 pounds of mackerel so as to facilitate observer placement.

These notifications would be used to facilitate observer placement in a systematic fashion contingent upon funding. If vessels did not notify they would not be able to land more than incidental catch (20,000 pounds). These two alternatives differ only in how much lead time a vessel must provide before intending to depart. Currently the longfin squid fishery has a 72-hour requirement. The 72 hours was implemented in order to give observers sufficient time to be deployed to vessels. Some longfin squid vessels have reported this timeframe is difficult for business planning purposes and that a 48 hour timeframe would be better. Some other Northeast permits do have a 48-hour requirement currently.

<u>Notification Mechanism</u>

Mackerel permit holders would have to notify the Northeast Fishery Observer Program (NEFOP) at least 72 or 48 hours, but no more than 10 days, prior to any trip on which you intend to land over 20,000 lb of mackerel. This requirement would be in effect for the entire fishing year. Notification could be made using any of the following methods:

1) ONLINE via the Pre-Trip Notification System (PTNS - preferred method): The PTNS is accessible at https://fish.nefsc.noaa.gov/PTNS/.
2) EMAIL: Vessels could also submit a trip notification by email to NEFSC.PTNS@noaa.gov.
3) TELEPHONE: Vessels could also call 1-855-FISHES1 (1-855-347-4371).

<u>1eMack</u>. Require VMS for limited access mackerel vessels.

<u>1eLong</u>. Require VMS for longfin squid/butterfish moratorium vessels (see 1f and 1g below).

There is currently no VMS requirement for mackerel or longfin squid/butterfish moratorium vessels. If area-based management measures are implemented via this amendment then having VMS for compliance/enforcement could be useful.

Vessel Monitoring Systems are currently utilized in many New England fisheries. They are generally used to facilitate compliance and enforcement of area-based management measures as well as catch monitoring by means of a satellite connection between shore and a fixed electronic unit installed on vessels. Vessels that do not currently have VMS units would have to purchase and install electronic VMS units (see section 7 for costs and number of vessels impacted).

Vessels would be required to declare into the fishery for trips targeting mackerel and/or longfin squid. The VMS would ping NMFS w/ location information at least every hour, 24 hr a day, throughout the year (herring also does every one hour). Vessels with more stringent requirements (more frequent communication) would still be bound by those requirements.

Vessels would have to provide documentation to the Regional Administrator at the time of application or reapplication for a mackerel or longfin squid/butterfish limited access permit that the vessel has an operational VMS unit installed on board that meets the minimum performance criteria. Vessels would have to confirm the VMS unit's operation and communications service to NMFS by calling the Office of Law Enforcement (OLE) to ensure that position reports are automatically sent to and received by NMFS OLE. NMFS does not regard the fishing vessel as meeting the VMS requirements until automatic position reports and a manual declaration are received.

<u>1fMack</u>. Require daily VMS reporting of catch by limited access mackerel vessels so as to facilitate monitoring (directed and/or incidental catch) and cross checking with other data sources. Requiring VMS (see 1eMack above) and requiring trip declarations (would be a prerequisite for this alternative.

<u>1fLong</u>. Require daily VMS reporting of catch by longfin squid moratorium permits so as to facilitate monitoring (directed and/or incidental catch) and cross checking with other data sources. Requiring VMS (see 1eLong above) and requiring trip declarations would be a prerequisite for this alternative.

Landings information submitted weekly by dealers is the primary tool for MSB fishery quota monitoring. Data collected from one Sunday-Saturday period must be reported by the following Tuesday. So landings on a Saturday must be reported 3 days later and landings on a Sunday must be reported 9 days later. Due to the high-volume nature of the Atlantic herring fishery, quota monitoring was difficult with these timeframes so it implemented daily VMS reporting of catch for Atlantic Herring (by 9am for the previous days catch). Given the overlap between the Atlantic herring and mackerel fisheries, requiring VMS for mackerel vessels would make reporting requirements consistent for vessels that participate in these fisheries. Daily VMS reporting would also decrease the probability of future quota overages caused by the time-lag in reporting, However, there have not been recent quota monitoring problems with the mackerel and/or longfin squid fisheries. If these alternatives were implemented, the following provisions would apply:

The owner or operator of a vessel issued a limited access permit to fish for mackerel and/or longfin squid would have to report catches (retained and discarded) of mackerel and/or longfin squid daily via VMS when on a declared trip, unless exempted by the Regional Administrator. The report would have to include at least the following information, and any other information required by the Regional Administrator: Fishing Vessel Trip Report serial number; month and day fish was caught; pounds retained; and pounds discarded. Daily VMS catch reports would have to be submitted in 24-hr intervals for each day and must be submitted by 0900 hr of the following day. Reports would be required even if fish caught that day has not yet been landed. This reporting would not exempt the owner or operator from other applicable reporting requirements. The owner or operator would have to submit a catch report via VMS each day when on a declared trip, regardless of how much fish is caught (including days when no mackerel and/or longfin squid are caught), unless exempted from this requirement by the Regional Administrator.

While there are no alternatives for area-based reporting of catch, which is what VMS is most useful for, VMS reporting does provide more rapid information about fish soon to be landed. This makes quota overages due to time-lags in reporting of landings less likely. Since incidental catch caps are often extrapolated from landings information, VMS reporting could be useful for either directed fishery quota monitoring or indirectly for an incidental catch cap.

1gMack. Require 6 hour pre-landing notification via VMS to land more than 20,000 pounds of mackerel, which could facilitate quota monitoring, enforcement, and/or portside monitoring.

1gLong. Require 6 hour pre-landing notification via VMS to land more than 2,500 pounds of longfin squid, which could facilitate quota monitoring, enforcement, and/or portside monitoring.

Pre landing notifications would be used to facilitate catch monitoring (directed or incidental catch), enforcement, cross checking with other data sources, and portside monitoring (if applicable). There are currently no such notifications. However, there are no problems currently reported with quota monitoring with these species. Thus, the primary rationale for such alternatives would be for enforcement purposes (if NOAA enforcement knows when all landings are occurring it can better allocate resources to validate catch reports). Such notifications could also be used to facilitate the placement of port-side monitors considered in Alternative Set 4 below. If these alternatives were implemented, the following provisions would apply:

Vessels with mackerel and/or longfin squid limited access permits would have to report through VMS their intention to land more than 20,000 pound of mackerel and/or 2,500 pounds of longfin squid (these are the incidental trips limits for these species). Notification would have to be made no less than 6 hr prior to crossing the VMS Demarcation Line on the way back to port, and would have to include the estimated time of arrival in port, the port at which the catch will be landed, and the dealer(s) where offloads will occur. If the harvest ends less than 6 hr prior to landing, then the notification must be submitted immediately upon the conclusion of fishing activities.

5.2 Alternative Set 2: Additional Dealer Reporting Measures

5.2.1 Statement of Problem/Need for Action

The way that dealers report landings has contributed to relatively high uncertainty about incidental catch of RH/S in Mid-Atlantic and New England fisheries for two primary reasons. First, RH/S are often not reported in mixed landings of mackerel and Atlantic herring when the RH/S constitute a small percentage of the total landings. Second, it is not always clear how the quantities of fish reported are derived. Since extrapolations of incidental catch are often based on total landings estimates (see 5.1.2), accurate monitoring of target species can also be important for determining encounter rates for non-target species.

In addition, general dealer reporting errors can be difficult to locate and correct because vessels generally do not confirm dealer data entries, though they can request and/or access their landings records. Fishermen report that when they request their dealer landings history there are frequently major errors (NMFS will investigate and if appropriate correct such errors).

5.2.2 General Rationale & Background

2b seeks to establish a mechanism where vessels could easily confirm what dealers entered via an internet connection to address the general dealer reporting error issue described above.

2c-2f would create a system that would at least gather information about how dealers are establishing landings composition and weights and could require all fish to be actually weighed. These would address the primary issues described above that contribute to relatively high uncertainty about incidental catch of RH/S in Mid-Atlantic and New England fisheries.

Since there is no current standard for reporting weights, it is difficult to ascertain the prevalence of current procedures for determining weights. Staff discussions with MSB Advisory Panel members suggest that the majority of dealers are currently weighing a majority of their MSB landings, often with state-certified scales. However, there are some instances, especially with mackerel, where product may de-watered (or partially de-watered) and shipped by truck before it is weighed. In such instances the receiver may report back a weight, or weights may be estimated based on the size of the shipping containers or truck volume.

5.2.3 Management Alternatives

NOTE ON COMBINATIONS: Most of the Alternative Set 2 action alternatives could be implemented individually or collectively. However, 2c and 2d (weighing mackerel) would be mutually exclusive – only one would be chosen if either. Likewise, 2e and 2f (weighing longfin squid) would be mutually exclusive – only one would be chosen if either. 2g (dealers can use volume to weight conversions) would modify 2c, 2d, 2e, or 2f so 2g could only be chosen if at least one of those four alternatives was also chosen.

Note: Since some of the alternatives below are very similar, they are grouped together for purposes of description.

2a. No-action

The current dealer reporting requirements would remain in place. Dealers, including at-sea processors, must submit, for each transaction, an electronic dealer report each week. Reports are due by midnight (Eastern Time) each Tuesday for the week that ended the previous Saturday at midnight. Reports must include the correct vessel name and Federal permit number of each vessel that harvested any fish received along with the correct weight units for purchased fish. Dealers must also report the VTR serial number used by each vessel that harvested fish (VTRs are currently the only cross check for dealer information on MSB landings). Dealers are required to submit a report even if there is no activity during a week. As described above, it is believed that most dealers already weigh most mackerel and longfin squid catches.

2b. Require federally permitted MSB dealers to obtain vessel representative confirmation of SAFIS transaction records for mackerel landings over 20,000 lb, *Illex* landings over 10,000 lb, and longfin squid landings over 2,500 lb.

This would be accomplished via Fish Online, an existing internet-based program that currently allows vessels to voluntarily check their landings records. The purpose would be to catch errors at the first point of entry in the data system. Alternative 2b would require vessel owners/operators to review and validate all catch information reported for their vessels in Fish-on-Line (FOL) on a weekly basis, including VMS, VTR, and dealer data. If data issues are noted by the vessel owner/operator they would indicate a data issue and provide comments describing the issue, this would create an issue report to NMFS in FOL. NMFS would follow up on all issue reports to resolve discrepancies by working with vessel operators and dealers to correct data submissions. If no data issues are noted the vessel's owner/operator would indicate such. Since dealers have to report the previous week's landings on Tuesdays, vessel representatives would need to confirm the reports submitted by one Tuesday by 11:59pm on the following Friday, providing three business days to make such confirmations. Dealers would have to record a confirmation from vessel representatives that a vessel representative had used Fish Online to confirm that their landings had been entered appropriately.

<u>2c</u>. Require that federally permitted SMB dealers <u>weigh</u> all landings related to mackerel transactions over 20,000 pounds. If dealers do not sort by species, they would need to <u>document in dealer applications</u> how they estimate relative compositions of a mixed catch.

<u>2d</u>. Require that federally permitted SMB dealers <u>weigh</u> all landings related to mackerel transactions over 20,000 pounds. If dealers do not sort by species, they would need to <u>document with each transaction</u> how they estimated the relative composition of a mixed catch.

This alternative would only apply to mackerel landings over 20,000 lb. Most dealers already weigh most of their mackerel landings by packing mackerel into boxes in weighed quantities. These alternatives are geared to apparently infrequent occasions where large quantities of mackerel are shipped without accurate weighing and would require applicable dealers that do not already have access to scales to purchase scales or pay for weighing by third parties.

The cost of scales can vary dramatically. The use of an already existing truck scale can cost as little as $10, but the distance to reach one may make their use impracticable. Installation of a truck scale in an easily-accessible port can cost more than $100,000, depending on the area in which the scale will be placed. Not all dealers use trucks in the transport of fish however, and water weight can impact the accuracy of measurements. Floor scales handling up to 20,000 pounds cost $3,000-$5,000 while floor scales that can weigh up to 100,000 pounds cost $13,000-$17,000. Hopper scales can have multiple or single hoppers, and weigh fish as they flow through the scale. For precise estimates the water needs to be completely separated from the fish before use. Hopper scale costs can range from $20,000 to $50,000 per scale, and newer models are now being produced that can be used on vessels at sea. Smaller scales costing several hundred dollars may be purchased but may mean that additional time is required to process a product.

In addition, if dealers do not sort by species, these alternatives would require dealers to document how they estimate the relative composition of a mixed catch in order to report the amount of each species bought from vessels on either their annual dealer application (2c), or with each transaction (2d). These alternatives don’t obligate dealers to always sort fish, they just obligate dealers to describe how they estimate species composition.

2e. Require that federally permitted SMB dealers weigh all landings related to longfin squid transactions over 2,500 pounds. If dealers do not sort by species, they would need to document in dealer applications how they estimate relative compositions of a mixed catch.

2f. Require that federally permitted SMB dealers weigh all landings related to longfin squid transactions over 2,500 pounds. If dealers do not sort by species, they would need to document with each transaction how they estimate relative compositions of a mixed catch.

This alternative would only apply to longfin squid landings over 2,500 lb. Since there is no current standard for reporting weights, it is difficult to ascertain the prevalence of current procedures for determining weights. Staff discussions with MSB Advisory Panel members suggest that the majority of dealers are currently weighing a majority of their MSB landings, often with state-certified scales. As such, this alternative would require as a legal requirement the existing general sorting and weighing practices.

2g. If any options 2c-2f were chosen, allow dealers to use volume to weight conversions if they cannot weigh landings – they would need to identify their conversion methods in their dealer application and explain why they cannot weigh all landings.

Under the no-action, dealers can choose to actually weigh their fish, or use some other method, such as volumetrics, to determine reported weights. Selecting this option would mean that, for 2c-2f, dealers could weigh fish or use volume to weight conversions. So either the weight or volume would have to be measured. Dealers would also have to document in their annual dealer application how they estimated the weights with volumetric measurements if the fish were not actually weighted. This could be as simple as identifying their assumed weight per volume of fish and how they estimate volume. While this alternative will not necessarily improve the data on landed fish, it would at least develop complete data on how weights are being estimated so that the Council could use that information in the future to decide if additional reporting measures were appropriate.

5.3 Alternative Set 3: At-Sea Observation Optimization Measures

5.3.1 Statement of Problem/Need for Action

In addition to relatively low levels of at-sea catch monitoring, several issues have potentially resulted in the data that is collected being less than optimal (though still the best available).

5.3.2 General Rationale & Background

NEFOP data is primarily used to estimate discards, but is also used in some cases to estimate total catch, as with the case of the butterfish mortality cap for the longfin squid fishery. Since annual catch limits include all catch including discards, it is important to get good information on discards to minimize the chances of closing fisheries too early or too late.

The alternatives in this set seek to make sure the data coming out of the Northeast Fishery Observer Program (NEFOP) are as representative and as indicative of fishery activities as possible, especially addressing and minimizing circumstances where vessels open nets in the water before observers have a chance to sample the contents of the net. Slippage is an important concept in this Alternative Set, and within this amendment is defined as:

Unobserved catch, i.e., catch that is discarded prior to being observed, sorted, sampled, and/or brought on board the fishing vessel. Slippage can include the release of fish from a codend or seine prior to completion of pumping or the release of an entire catch or bag while the catch is still in the water.

- Fish that cannot be pumped and that remain in the net at the end of pumping operations are considered to be operational discards and not slipped catch. Observer protocols include documenting fish that remain in the net in a discard log before they are released, and existing regulations require vessel operators to assist the observer in this process. Management measures are under consideration in this amendment to address this issue and improve the observers' ability to inspect nets after pumping to document operational discards.

- Discards that occur at-sea after catch brought on board and sorted are also not considered slipped catch.

From 2006-2010 approximately 9% (383 of 4186 or 77 per year) of hauls on observed longfin squid trips (trips that caught 50% or more longfin squid or at least 10,000 pounds longfin squid) and 26% (73 of 277 or 15 per year) of hauls on observed mackerel trips (trips that caught 50% or more mackerel or at least 100,000 pounds mackerel) had some unobserved catch. Catch may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, or haul slipped (dumped) in the water. The above numbers would thus be an upper bound on slippage events. While more detailed information on slippage for the mackerel and longfin squid fisheries is not available, analysis for the Atlantic herring fishery suggest that only a very small amount of slippage occurs outside of dogfish. However, since incidental catch events of RH/S can be infrequent but substantial events, even a few slipped hauls could have the potential to substantially affect any analysis of the data or extrapolations made from the data. Therefore, alternatives to minimize slippage were included in the amendment.

5.3.3 Management Alternatives

NOTE ON COMBINATIONS: Many of the Alternative Set 3 action alternatives could be implemented individually or collectively. However, 3h (trip termination after 1 slipped haul) and 3i (trip termination after 2 slipped hauls) would be mutually exclusive – only one would be chosen if either. Likewise, 3k (fishery-wide slippage cap at 5 mackerel slippage events) and 3l (fishery-wide slippage cap at 10 mackerel slippage events) would be mutually exclusive – only one would be chosen if either. 3m (fishery-wide slippage cap at 5 longfin slippage events) and 3n (fishery-wide slippage cap at 10 longfin slippage events) are also mutually exclusive – only one would be chosen if either. 3p would replace fishery-wide slippage caps with vessel slippage caps and it would be expected that either 3p could be chosen or 3k-3n could be chosen (if any). Also, if 3j (slippage prohibition with exceptions) was chosen then 3f or 3g could not be selected (3f and 3g require all catch to be brought aboard but 3j provides some exceptions).

If alternatives 3f – 3p are selected for mackerel, they would also require the selection of Alternative 1d48 (48-hr pre-trip notification) or 1d72 (72-hr pre-trip notification). There is already a pre-trip notification requirement in effect for longfin squid moratorium permit holders.

Note: Since some of the alternatives below are very similar, they are grouped together for purposes of description.

3a. No-action

The current requirements for vessels related to observers would continue to remain in effect. An owner or operator of a vessel on which a NMFS-approved sea sampler/observer is embarked must (§ 648.11(d)):

(1) Provide accommodations and food that are equivalent to those provided to the crew.

(2) Allow the sea sampler/observer access to and use of the vessel's communications equipment and personnel upon request for the transmission and receipt of messages related to the sea sampler's/observer's duties.

(3) Provide true vessel locations, by latitude and longitude or loran coordinates, as requested by the observer/sea sampler, and allow the sea sampler/observer access to and use of the vessel's navigation equipment and personnel upon request to determine the vessel's position.

(4) Notify the sea sampler/observer in a timely fashion of when fishing operations are to begin and end.

(5) Allow for the embarking and debarking of the sea sampler/observer, as specified by the Regional Administrator, ensuring that transfers of observers/sea samplers at sea are accomplished in a safe manner, via small boat or raft, during daylight hours as weather and sea conditions allow, and with the agreement of the sea samplers/ observers involved.

(6) Allow the sea sampler/observer free and unobstructed access to the vessel's bridge, working decks, holding bins, weight scales, holds, and any other space used to hold, process, weigh, or store fish.

(7) Allow the sea sampler/observer to inspect and copy any the vessel's log, communications log, and records associated with the catch and distribution of fish for that trip.

When two boats are fishing cooperatively NMFS attempts to place observers on both vessels rather than just one but this does not always happen.

Slippage events are not currently required to be documented by any MSB permits although the observer program has had observers collecting more detailed information about slippage events since 2010. There are currently no requirements or disincentives for MSB-permitted vessels to avoid slipping hauls.

3b. Require the following reasonable assistance measures: provision of a safe sampling station; help with measuring decks, codends, and holding bins; help with bycatch collection; and help with basket sample collection by crew on vessels with mackerel limited access and/or longfin squid/Butterfish moratorium permits.

Such assistance could help improve observer data by allowing the observer to focus on technical aspects of observing such as species identification, weighing, measuring, etc. While the observer program reports that many vessels provide this kind of assistance when possible already, codifying this would provide the observer program with additional leverage if cooperation problems occur on particular vessels. This language mirrors the measures proposed in Amendment 5 to the Atlantic Herring FMP. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both.

3c. Require vessel operators to provide observers notice when pumping/haul-back occurs on vessels with mackerel limited access and/or longfin squid moratorium permits.

Such notification could help improve observer data by making sure the observer is aware of all sampling opportunities. While the observer program reports that many vessels provide this kind of assistance when possible already, and vessels must provide information about when fishing activity begins and ends, clarifying notifications include pumping and haul-back would provide the observer program with additional leverage if cooperation problems occur on particular vessels regarding sampling. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both.

3d. When observers are deployed on trips involving more than one vessel, observers would be required on any vessel taking on fish wherever/whenever possible on vessels with mackerel limited access and/or longfin squid moratorium permits.

If vessels are working in pairs conducting pair trawling and both vessels are receiving fish, having observers on both vessels ensures that all catch from the pair trawling trip is observed. The observer program generally does this already but this would just provide additional policy direction that the Council deems it less than optimal for only half of a pair-trawl operation to be observed when both vessels are receiving fish. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both.

3e. On vessels with mackerel limited access and/or longfin squid moratorium permits, require slippage reports - "Released Catch Affidavits" from captains on observed trips if they slip a haul.

Selected alone, this alternative provides another account of slippage but does not do anything to deter slippage. This alternative would be used to augment and cross check the data collected by observers to develop a better understanding of slippage events. If a net is released, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. Released Catch Affidavits must be submitted within 48 hours of completion of the trip. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both.

3f. Prohibit vessels with Mackerel limited access permits that have notified for a mackerel trip and are carrying an observer from releasing any discards before they have been brought aboard for sampling by the observer.

3g. Prohibit vessels with longfin squid moratorium permits that have notified for a longfin squid trip and are carrying an observer from releasing any discards before they have been brought aboard for sampling by the observer.

3f and 3g would be used to improve the quality of data collected by observers by requiring all fish that will be discarded be brought aboard for sampling in order to develop complete information about incidentally-caught species in the mackerel fishery (3f) or longfin squid fishery (3g).

3h. On vessels with mackerel limited access and/or longfin squid moratorium permits, require trip termination following 1 slipped haul on an observed trip so as to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip any hauls on an observed trip so that data can be obtained on the composition of all catches. It would apply to vessels that had notified for a mackerel and/or longfin squid trip (longfin squid trips most already notify and notification for mackerel trips is considered in Alternative Set 1).

3i. On vessels with mackerel limited access and/or longfin squid moratorium permits, require trip termination following 2 slipped hauls on an observed trip so as to minimize slippage events.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip 2 hauls on an observed trip so that data can be obtained on the composition of all catches. It would apply to vessels that had notified for a mackerel and/or longfin squid trip (longfin squid trips most already notify and notification for mackerel trips is considered in Alternative Set 1).

3j. With the exceptions noted below, mackerel limited access and/or longfin squid moratorium permitted vessels that have notified the observer program of their intent to land 2,500 pounds of longfin squid or 20,000 pounds of mackerel and have been selected to carry an observer would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Vessels would be prohibited from releasing fish from the net (slippage), transferring fish to another vessel (that is not carrying a NMFS-approved observer), or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the observer.

Exceptions:
1) pumping the catch could compromise the safety of the vessel/crew
2) mechanical failure precludes bringing some or all of the catch aboard the vessel; or
3) spiny dogfish have clogged the pump and consequently prevent pumping of the rest of the catch.

If a net is released, including the exemptions above, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. Released Catch Affidavits must be submitted within 48 hours of completion of the trip.

This alternative would seek to minimize slippage (gaining observer catch data) and also gain information on any slippage events that do occur by requiring "Released Catch Affidavits. This alternative is different from 3e in that 3e only requires affidavits but 3j prohibits slippage except for the exceptions. This alternative is different from 3f and 3g in that 3f and 3g do not provide for the exceptions specified in 3j. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both.

<u>3k</u>. Related to 3j, for mackerel limited access permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>5 slippage events</u> (adjustable via specifications) occur in any given year for notified and observed mackerel trips then subsequent slippage events on any notified and observed Mackerel trip would result in trip termination for the rest of that year. The goal is to minimize slippage events.

<u>3l</u>. Related to 3j, for mackerel limited access permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>10 slippage events</u> (adjustable via specifications) occur in any given year for notified and observed mackerel trips then subsequent slippage events on any notified and observed Mackerel trip would result in trip termination for the rest of that year. The goal is to minimize slippage events.

<u>3m</u>. Related to 3j, for longfin squid moratorium permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>5 slippage events</u> (adjustable via specifications) occur in any given trimester for notified and observed longfin squid trips then subsequent slippage events on any notified and observed longfin squid trip would result in trip termination for the rest of that trimester. The goal is to minimize slippage events.

<u>3n</u>. Related to 3j, for longfin squid moratorium permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>10 slippage events</u> (adjustable via specifications) occur in any given trimester for notified and observed longfin squid trips then subsequent slippage events on any notified and observed longfin squid trip would result in trip termination for the rest of that trimester. The goal is to minimize slippage events.

3k, 3l, 3m, and 3n could only be selected if 3j was also selected. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both. For the respective permitted vessels, these alternatives would require any vessel to terminate a trip if it slipped a catch after the slippage cap for that vessel permit type had been exceeded. So for example, under 3k, if mackerel limited access permits had slipped 5 or more times so far in the year on notified mackerel trips, any subsequent slippage during a notified and observed trip by another mackerel limited access permitted vessel would force a trip termination for that vessel, even if that particular vessel had never slipped a haul before.

3o. For mackerel and/or longfin squid permitted vessels, if a trip is terminated within 24 hours because of any of the anti-slippage provisions (3g, 3h, 3k-3n), then the relevant vessel would have to take an observer on its next trip.

This would reduce a vessel's incentive to slip a haul early in a trip in order to cause a trip termination and thereby avoid having an observer on board for an extended trip. Especially if a vessel has to pay for observers by the day, there could be an incentive to cut a trip short if there is an observer onboard. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both.

3p. Allow mackerel and/or longfin squid permitted vessels to be assigned an annual quota (set during specifications) of slippage events related to 3j, specified annually. Once their slippage quota was reached, vessels would have to terminate an observed trip as well as upon any slippage event on subsequent observed trips for the remainder of the calendar year.

This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip a haul once a certain number of slippage events have occurred annually by that same vessel. While this is more intensive to track (by vessel versus by fleet), the advantage over fleet-based slippage caps (see above) is that one vessel is not penalized for another vessel's slippage event. This alternative could be selected for vessels with limited access mackerel permits, longfin squid/Butterfish moratorium permits, or both.

This alternative would be in place of the fleet-wide caps and the vessel caps would be specified at a later date. As such, potential benefits would occur in the future (versus 3k-3n which would be implemented sooner if selected) and be dependent on what level the cap was set at.

5.4 Alternative Set 4 - Port-side, 3rd Party, and Other Sampling/Monitoring Measure

5.4.1 Statement of Problem/Need for Action

Relatively low levels of catch monitoring have resulted in relatively high uncertainty about incidental catch of river herrings and shads in Mid-Atlantic and New England fisheries.

5.4.2 General Rationale & Background

From a practical standpoint, it is more efficient to subsample the landings of river herring and other non-target species when a vessel targeting mackerel reaches the dock than when it is at sea. Discards that occur at sea of non-target species are easier to monitor than are the landed fractions that go into the hold due to the large volumes that go into the hold. Dockside sampling could utilize higher sampling rates to better characterize the species in retained catches and an entire catch could be evaluated in one day or less as opposed to having a person at sea for multiple days. This option does not mean that at-sea monitors are unnecessary – they are essential to monitor discarding at sea. However, since most RH/S are retained (esp. for mackerel trips), portside sampling could increase sampling coverage from current levels at a lower cost than additional at-sea observers. For longfin squid trips the preceding discussion probably does not apply because most RH/S are discarded so they are not available dockside.

Several other sampling/monitoring alternatives are also included in the Alternative Set as described below including alternatives to require volumetric hold certification of Tier 3 mackerel limited access permits and longfin squid moratorium permit holders. While in Amendment 11 the fish hold certification was primarily for purposes of capacity control (not allowing vessels to reconfigure to have substantially larger fish holds), in this Amendment the measure is being considered for purposes of facilitating rapid catch weight estimates based on vessel volume for portside sampling, observer data hail weight estimates, and vessels' VTR kept-weight estimates. There is also an ongoing voluntary project by industry to use fleet communication to avoid river herring hotspots. Since this project uses extensive post-side sampling a related alternative is included in this Alternative Set – the relevant alternative in this document just commits the Council to consider the project's results once completed in order to determine potential management implications.

5.4.3 Management Alternatives

NOTE ON COMBINATIONS: All of the action alternatives in this Alternative Set could be implemented singly or in combination with any other alternative(s) in this Alternative Set.

Note: Since some of the alternatives below are very similar, they are grouped together for purposes of description.

4a. No-action

No-action - Port Sampling

There are no current requirements for port-side sampling of MSB trips to determine incidental landings of RH/S or other species. NMFS port agents do currently work cooperatively with dealers to obtain biological samples needed for assessments but this is much smaller scale sampling than would be necessary to obtain estimates about the relative proportion of different species in a mixed catch. The states of Maine and Massachusetts have been conducting their own port-side sampling projects but state resource issues mean that their continued operation is uncertain. These state programs have been focused on herring but due to the overlap in the herring and mackerel fisheries also sample trips with mackerel.

While dealers are supposed to report all landings at the species level, to some degree RH/S can mix into Atl. Mackerel and especially Atlantic herring catches due to the similar body size and shape and high-volume nature of these fisheries.

No-action – Vessel Hold Requirements

There are no existing vessel hold requirements for Tier 3 mackerel permit holders or longfin squid/butterfish moratorium permit holders. Currently there are certified fish hold requirements being implemented through Amendment 11 to the MSB FMP for those vessels that qualify for Tier 1 and Tier 2 mackerel limited access permits. If a vessel is issued a Tier 1 or Tier 2 limited access mackerel permit, it must submit a fish hold volume certification by December 31, 2012. If an applicant submits a vessel replacement application prior to that date, he/she must submit a hold certification with the application. Amendment 11 to the MSB FMP specified that applicable vessels would be required to obtain a fish hold measurement from an individual credentialed as a Certified Marine Surveyor with a fishing specialty by the National Association of Marine Surveyors (NAMS) or from an individual credentialed as an Accredited Marine Surveyor with a fishing specialty by the Society of Accredited Marine Surveyors (SAMS). However, recent developments have suggested that this provision will likely be revisited because it appears likely that other professionals such as marine architects could be qualified in an equal or superior fashion.

Amendment 11 also implemented rules that any increase in hold size for Tier 1 and/or Tier 2 vessels could only be increased once and may not exceed 10 percent of the vessel's baseline hold specification. Vessels with MSB permits do have other vessel baseline restrictions to control capacity increases based on length, tonnage, and horsepower but the purposes of the vessel hold measurement requirements in this Amendment are not for capacity control but for facilitating catch measurements.

<u>No-action – Sustainable Fisheries Coalition Project</u>

Currently vessels may voluntarily participate in the Sustainable Fisheries Coalition project, which is described in Alternative 4f below. The Sustainable Fisheries Coalition is an organization of the Atlantic herring and mackerel mid-water trawl and purse seine fleet operating from Maine through New Jersey. Vessels that are members of the Sustainable Fisheries Coalition account for the majority of Atlantic herring and mackerel landings in the U.S.

<u>4b</u>. Require industry-funded 3rd party port-side landings sampling program (including total weight documentation) for mackerel landings over 20,000 pounds. Required coverage levels would be specified annually during specifications. NEFSC would accredit samplers and manage the program/data. Vessels would contract directly with providers and pay providers directly. If selected, vessels would have to wait until their sampler arrived unless a waiver is obtained from the observer program.

<u>4c</u>. Require industry-funded 3rd party port-side landings sampling program (including total weight documentation) for longfin squid landings over 2,500 pounds. Required coverage levels would be specified annually during specifications. NEFSC would accredit samplers and manage the program/data. Vessels would contract directly with providers and pay provider directly. If selected, vessels would have to wait until their sampler arrived unless a waiver is obtained from the observer program.

For either 4b or 4c, implementation details are described below (these provisions are identical to those currently in effect for Northeast multispecies fishing). Dockside monitors for groundfish are paid $50-$70/hr. Different sized vessels would have different costs for offload monitoring due to different hold sizes and processor offload speeds, but a 6-14 hour offload would cost $300-$980 for dockside monitoring. Discussions with MSB Advisory Panel members suggested that 6-14 hours would be typical offload time for high volume trips but trips around the thresholds of 20,000 pounds of mackerel or 2,500 pounds of longfin squid would take much shorter and cost less to monitor.

Vessels would be required to contact the Northeast Fisheries Observer Program (NEFOP) at least 6 hours prior to landing (some notification requirement options are detailed in Alternative Set 1 – but others may be developed during specifications). NEFOP would notify the vessel whether they are selected to secure a portside monitor. If a vessel is selected, a vessel representative would be responsible for contacting an approved portside monitoring vendor. If a trip is not selected for portside monitoring, NEFOP will issue a waiver.

Target coverage levels would be set annually during the specifications process. NEFOP would randomly select trips for coverage (i.e., no priority would be given to trips to specific areas, trips with at-sea observers, etc.).

In addition, the Council or Regional Administrator could adjust any aspects of the operation standards/procedures for the portside monitoring program through specifications.

Standards for Approval/Certification of Portside Monitoring Service Providers

The following standards would be used by NMFS to evaluate service providers employed by Mackerel and longfin squid vessels to comply with the portside reporting requirements outlined in this section. NMFS will certify/approve service providers and associated portside monitors as eligible to provide sector monitoring services based upon criteria specified below and can decertify/disapprove service providers and/or individual monitors if such criteria are no longer being met. NMFS will publish a list of approved service providers consistent with the APA.

The following standards and criteria for approval can be further modified by a future Council action. Portside monitoring program service providers must apply for certification/approval from NMFS. NMFS shall approve or disapprove a service provider based upon the completeness of the application and a determination of the applicant's ability to perform the duties and responsibilities of a portside monitoring service provider, as further defined below. As part of that application, potential service providers must include the following information:

- Identification of corporate structure, including the names and duties of controlling interests in the company such as owners, board members, authorized agents, and staff; and articles of incorporation, or a partnership agreement, as appropriate.
- Contact information for official correspondence and communication with any other office.
- A statement, signed under penalty of perjury, from each owner, board member, and officer that they are free from a conflict of interest with fishing-related parties including, but not limited to, vessels, dealers, shipping companies, sectors, sector managers, advocacy groups, or research institutions and will not accept, directly or indirectly, any gratuity, gift, favor, entertainment, loan, or anything of monetary value from such parties.
- A statement, signed under penalty of perjury, from each owner, board member, and officer describing any criminal convictions, Federal contracts they have had, and the performance rating they received on the contract, and previous decertification action while working as an observer or observer service provider.
- A description of any prior experience the applicant may have in placing individuals in remote field and/or marine work environments. This includes, but is not limited to, recruiting, hiring, deployment, and personnel administration.
- A description of the applicant's ability to carry out the responsibilities and duties of a portside monitoring service provider and the arrangements to be used.
- Evidence of adequate insurance to cover injury, liability, and accidental death for portside monitors (including during training). Workers' Compensation and Maritime Employer's Liability insurance must be provided to cover the portside monitors; vessel owner; and service provider. Service providers shall provide copies of the insurance policies to

portside monitors to display to the vessel owner, operator, or vessel manager, when requested.
- Service providers shall provide benefits and personnel services in accordance with the terms of each monitor's contract or employment status.
- Proof that the service provider's portside monitors have passed an adequate training course that is consistent with the curriculum used in the current NEFOP training course, unless otherwise specified by NMFS.
- An Emergency Action Plan (EAP) describing the provider's response to an emergency with a portside monitors, including, but not limited to, personal injury, death, harassment, or intimidation.
- Evidence that the company is in good financial standing.

Monitoring service providers must be able to document compliance with the following criteria and requirements:
- A comprehensive plan to deploy NMFS-certified portside monitors according to a prescribed coverage level (or level of precision for catch estimation), as specified by NMFS, including all of the necessary vessel reporting/notice requirements to facilitate such deployment, including the following requirements:
    - A service provider must be available to industry 24 hours per day, 7 days per week, with the telephone system monitored a minimum of four times daily to ensure rapid response to industry requests.
    - A service provider must be able to deploy portside monitors to all ports in which service is required by this section.
    - A service provider must report portside monitor deployments to NMFS in a timely manner to determine whether the predetermined coverage levels are being achieved.
    - A service provider must assign portside monitors in a fair and equitable manner without regard to any preference by representatives of vessels other than when the service is needed and the availability of approved/certified monitors.
    - A service provider's portside monitor assignment must be representative of fishing activities for a given port and must be able to monitor fishing activity throughout the fishing year.
- The service provider must ensure that portside monitors remain available to NMFS, including NMFS Office for Law Enforcement, for debriefing for at least 2 weeks following any monitored offload.
- The service provider must report possible portside monitor harassment; discrimination; concerns about vessel safety or marine casualty; injury; and any information, allegations, or reports regarding portside monitor conflict of interest or breach of the standards of behavior to NMFS, as specified by NMFS.
- Service providers must submit to NMFS, if requested, a copy of each signed and valid contract (including all attachments, appendices, addendums, and exhibits incorporated into the contract) between the service provider and those entities requiring services (i.e., participating vessels) and between the service provider and specific portside monitors.
- Service providers must submit to NMFS, if requested, copies of any information developed and used by the service providers distributed to vessels, such as informational pamphlets, payment notification, description of duties, etc.

- A service provider may refuse to deploy a portside monitor on a requesting fishing vessel for any reason including, but not limited to, the following:
    - If the service provider does not have an available portside monitor prior to a vessel's intended date/time of landing.
    - If the service provider is not given adequate notice of vessel landing from the participating vessels, as specified by the service provider.
    - If the service provider has determined that the requesting vessel is inadequate or unsafe pursuant to the reasons described at § 600.746.
    - For any other reason, including failure to pay for previous deployments of portside monitors.
- A service provider must not have a direct or indirect interest in a fishery managed under Federal regulations, including, but not limited to, fishing vessels, dealers, shipping companies, Northeast multispecies sectors, advocacy groups, or research institutions and may not solicit or accept, directly or indirectly, any gratuity, gift, favor, entertainment, loan, or anything of monetary value from anyone who conducts fishing or fishing-related activities that are regulated by NMFS, or who has interests that may be substantially affected by the performance or nonperformance of the official duties of service providers. This does not apply to corporations providing reporting, dockside, and/or at-sea monitoring services to participants of another fishery managed under Federal regulations.
- A system to record, retain, and distribute the following information to NMFS, as requested, for a period specified by NMFS:
    - Portside monitor deployment levels, including the number of refusals and reasons for such refusals
    - Incident/non-compliance reports (e.g., failure to offload catch)
    - Hail reports, landings records, and other associated communications with vessels
- A means to protect the confidentiality and privacy of data submitted by vessels, as required by the Magnuson-Stevens Act.
- A service provider must be able to supply portside monitors with sufficient safety and data-gathering equipment, as specified by NMFS.

Standards for Approval/Certification of Individual Portside Monitors

For an individual to be certified as a portside monitor, the service provider must demonstrate that each potential monitor meets the following criteria:

- A high school diploma or legal equivalent.
- Successful completion of all NMFS-required training and briefings before deployment.
- Physical capacity for carrying out the responsibilities of a portside monitor pursuant to standards established by NMFS such as being certified by a physician to be physically fit to work as a portside monitor. The physician must understand the monitor's job and working conditions, including the possibility that a monitor may be required to climb a ladder to inspect fish holds and/or trucks.
- Absence of fisheries-related convictions based upon a thorough background check
- Independence from fishing-related parties including, but not limited to, vessels, dealers, shipping companies, sectors, sector managers, advocacy groups, or research institutions to prevent conflicts of interest

Note: Due to their similarities 4d and 4e are described together.

4d. Require volumetric vessel-hold certification for Tier 3 limited access mackerel permits and specify a volume to weight conversion.

4e. Require volumetric vessel-hold certification for longfin squid moratorium permits and specify a volume to weight conversion.

These alternatives could facilitate rapid catch weight estimates based on vessel volume for portside sampling, observer data hail weight estimates, and vessels' VTR kept-weight estimates. Amendment 11 to the MSB FMP specified that applicable vessels would be required to obtain a fish hold measurement from an individual credentialed as a Certified Marine Surveyor with a fishing specialty by the National Association of Marine Surveyors (NAMS) or from an individual credentialed as an Accredited Marine Surveyor with a fishing specialty by the Society of Accredited Marine Surveyors (SAMS). For the time being the same credentials are proposed for this amendment. However, recent developments have suggested that this provision will likely be revisited and it is possible that other professionals such as marine architects could be qualified in an equal or superior fashion. There would be no upgrade restrictions associated with these measures. This means that, unlike Tier 1 and 2 limited access mackerel permit holders, there would be no limitation on vessel upgrades related to the vessel hold certification for Tier 3 limited access mackerel permit holders and longfin squid moratorium permit holders. Put another way, the vessel hold certification for Tier 3 limited access mackerel permit holders and longfin squid moratorium permit holders would not restrict the transfer of these permits to a vessel with a larger fish hold volume.

4f. Within 6 months of the completion of the Sustainable Fisheries Coalition bycatch avoidance project (expected late 2012), the Council will meet to formally review the results and consider the appropriateness of developing a framework adjustment to implement any additional incidental catch avoidance strategies that are suggested by the results of the Sustainable Fisheries Coalition bycatch avoidance project.

This would commit the Council to consider the findings from this project as they could apply to reducing the catch of RH/S in pelagic fisheries. Full details on this project are included in Appendix 7, but generally the project is testing if oceanographic and fishery data can be used to help industry avoid potential RH/S hotspots. Implementing measures similar to this project (i.e. making participation mandatory) would be a frameworkable action.

5.5 Alternative Set 5 - At-Sea Observer Coverage Requirements

5.5.1 Statement of Problem/Need for Action

Relatively low levels of catch monitoring have resulted in relatively high uncertainty about incidental catch of river herrings and shads in Mid-Atlantic and New England fisheries. NMFS has strongly communicated that the at-sea portion of any additional observer coverage would have to be paid for by industry.

5.5.2 General Rationale & Background

Currently, observer coverage is allocated by methods outlined in the Standardized Bycatch Reporting Methodology (SBRM). The Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment to the fishery management plans of the Northeast region was implemented in February 2008 to address the requirements of the Magnuson-Stevens Fishery Conservation and Management Act to include standardized bycatch reporting methodology in all FMPs of the New England Fishery Management Council and Mid-Atlantic Fishery Management Council. On September 15, 2011, upon the order of the U.S. Court of Appeals for the District of Columbia Circuit, the U.S. District Court for the District of Columbia, in the case of Oceana, Inc. v. Locke (Civil Action No. 08-318), vacated the Northeast Region Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment and remanded the case to NMFS for further proceedings consistent with the D.C. Circuit Court's decision.

To comply with the ruling, NMFS announced on December 29, 2011 (76 FR 81844) that the Northeast Region SBRM Omnibus Amendment is vacated and all regulations implemented by the SBRM Omnibus Amendment final rule (73 FR 4736, January 28, 2008) are removed. This action removed the SBRM section at § 648.18 and removes SBRM-related items from the lists of measures that can be changed through the FMP framework adjustment and/or annual specification process for the Atlantic mackerel, squid, and butterfish; Atlantic surfclam and ocean quahog; Northeast multispecies, monkfish; summer flounder; scup; black sea bass; bluefish; Atlantic herring; spiny dogfish; deep-sea red crab; and tilefish fisheries. This action also makes changes to the regulations regarding observer service provider approval and responsibilities and observer certification. The SBRM Omnibus Amendment had authorized the development of an industry-funded observer program in any fishery, and the final rule modified regulatory language in these sections to apply broadly to any such program. This action revises that regulatory language to refer specifically to the industry-funded observer program in the scallop fishery, which existed prior to the adoption of the SBRM Omnibus Amendment.

Overall, though the SBRM has been vacated by court order, it is still the method that was used to make current observer allocations. NMFS and the New England and Mid-Atlantic Fishery Management Councils are developing a new omnibus amendment to bring Northeast fishery management plans into compliance with Magnuson-Stevens Act requirements for a standardized bycatch reporting methodology. A SBRM Fishery Management Action Team has been constituted to develop the new omnibus amendment and will begin work in 2012.

The SBRM can be viewed as the combination of sampling design, data collection procedures and analyses used to estimate bycatch and allocate observer coverage in multiple fisheries. The SBRM provides a structured approach for evaluating the efficacy of the allocation of observer coverage (sea days) to multiple fisheries (52 fleets) to monitor a large number of species (15 SBRM species groups) under the 13 different fishery management plans, the Marine Mammal Protection Act, and the Endangered Species Act. The SBRM is not intended to be the definitive document on the estimation methods nor is it a compendium of discard rates and total discards (Wigley et al. 2007). Instead, the SBRM is intended to support the application of multiple bycatch estimation methods that can be used in specific stock assessments. The SBRM provides a general structure for defining fisheries into homogeneous groups and allocating observer coverage based on prior information and the expected improvement in overall performance of the program. The general structure helps identify gaps in existing coverage, similarities among groups that allow for realistic imputation, and the tradeoffs associated with coverage levels for different species. The SBRM allows for continuous improvement in allocation as new information on the results of the previous year's data is obtained.

Since RH/S are not federally-managed species, they have not been part of SBRM analyses. However, recently the science center has shifted funding, where possible, to mid-water trawl fleets in order to get better data on RH/S catch. Considerable uncertainty in RH/S catch remains, especially in pair-trawling that targets mackerel and in bottom-trawling primarily because of the rare-event nature of large incidental RH/S catches.

This Alternative Set proposes higher levels of at-sea monitoring than are currently utilized. NMFS has indicated that additional observer coverage would have to be funded by industry. Initially alternatives were developed by fishery but even if management measures must be implemented by fishery, the analysis is best conducted by fleet (year/area/quarter/gear/mesh) because that is how the observer program allocates at-sea observer sea days and because of the mixed nature of MSB fisheries. 5b-5d are based on a fishery-specific approach while 5e approaches the issue from a SBRM fleet perspective. Because of the SBRM approach in 5e, it is the only alternative subset for which one can easily calculate what number of sea days would be required for a given target coefficient of variation (a measure of precision) in an upcoming year. That said, because of the inter-annual variability in catch and effort, using the prior year's information to predict what observer coverage level is necessary (as is the case with SBRM-type approaches) may not provide consistent results.

Observer program notification (see Alternative Set 1) would be a prerequisite for any of the alternatives in this set.

5.5.3 Management Alternatives

NOTE ON COMBINATIONS: Only one of the 5b (observer coverage for mackerel mid-water trawl) alternatives could be chosen. Likewise, only one of the 5c (observer coverage for mackerel small mesh bottom trawl) and one of the 5d (observer coverage for longfin squid small mesh bottom trawl) alternatives could be chosen. One alternative from each of these could be selected (a total of three). 5e1 and 5e2 (strata-fleet alternatives for mid-water trawl) are mutually exclusive as are 5e3 and 5e4 (strata-fleet alternatives for small mesh bottom trawl) but one alternative from the first pair could be chosen with one from the second pair. If any of the 5e alternatives were chosen, they would not be combinable with any of the 5b, 5c, or 5d alternatives (coverage could be based on a set percentage of trips or a set target coefficients of variation (C.V.s) but not both). 5f, 5g, and 5h provide for industry funding and review of the increased observer coverage levels proposed in 5b-5e so they could be added on to any of the other action alternatives.

If any measure in this Alternative Set is selected for mackerel, the Council would also need to select Alternative 1d48 (48-hr pre-trip notification) or 1d72 (72-hr pre-trip notification). There is already a pre-trip notification requirement in effect for longfin squid moratorium permit holders.

Note: Since some of the alternatives below are very similar, they are grouped together for purposes of description.

Alternatives 5b, 5c, and 5d would require various levels of overage of trips for certain trips types, either mackerel or longfin squid. While this kind of alternative is relatively easy to implement if a trip notification is required (an option in Alternative Set 1), it does not guarantee a given level of precision. Precision depends on a variety of factors including the year to very variability seen in the data. Also, estimates of discards or incidental catch from observer data are made based on time/area/gear units, not fishery ("mackerel" or "longfin squid"). Since the mackerel and longfin squid fisheries comprise only a portion of mid-water trawls and small mesh bottom trawl activity, requiring a portion of mackerel trips or longfin squid trips be observed is not going to result in that level of coverage for a specified time/area/gear unit due to other fishing activities. Given the relatively low levels of coverage in the mackerel and longfin squid fisheries however, any of the action alternatives would increase coverage and lead to better precision. One cannot be sure how much however because of the issues described above. In alternatives 5b, 5c, and 5d below the C.V. rates are those if the entire time/area/gear unit had that level of coverage. The sea days associated with the fishery coverage levels are those from recent VTR data in the mackerel and longfin squid fisheries, since those are the fisheries under consideration that are under control of the Council.

Alternative 5e would require NMFS to develop coverage levels based on C.V.s expected for river herring at the time/area/gear unit that is used in estimating discards and incidental catch for the two fisheries that account for most river herring catch, mid-water trawl and small mesh bottom trawl. However, since the Council can only require the fisheries it manages to pay for observer coverage, and fisheries outside of the Council's control use the relevant gear types, and NMFS has said that any increase in observer coverage would have to be industry funded to be approvable, Alternative 5e would be very difficult to implement, as described below.

5a. No-action

Since the SBRM has been vacated by court order, it is not certain how observer coverage will be allocated in the immediate future. However, given legislative mandates and funding requirements of NMFS, it is likely that without additional action, the recent low levels of coverage for mackerel and longfin squid fishing will continue. From 2006-2010 approximately 6.5% of mackerel and 3.5% of longfin squid catches by weight were observed (see Section 6.3 for more details). Observer coverage sea-days are allocated by area-quarter-gear strata and these fishery coverage percentages resulted from allocations to small mesh gear trips rather than allocations to these fisheries (see Appendix 2 for details). For Mid-Atlantic mid-water trawl (the primary area and gear for mackerel) and Mid-Atlantic bottom trawl (the primary area and gear for longfin squid) this has resulted in annual coefficients of variation (C.V.s) for individual RH/S species' catch estimates usually being above 0.5 and often above 1.0 (see Appendix 2). These values indicate very high uncertainty in the associated estimates. If you consider the C.V. as a percentage and double it, this provides approximately the 95% confidence interval for normally distributed data. So a C.V. of 0.5 (or 50%) means that the 95% confidence interval is approximately plus or minus 100% of the estimate.

5b. Mackerel Mid-Water Trawl (MWT)

There is currently no pool of observer coverage for general mid-water trawl vessels and the only coverage of this fleet occurs when herring-directed activity happens to catch mackerel (the observer program actually selects against declared herring trips that state their primary target is mackerel). The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation.

> **5b1. Require 25% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

> **5b2. Require 50% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

> **5b3. Require 75% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

5b4. Require 100% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.

The following figures illustrate the C.V.'s that would have been expected in 2009 and 2010 for different fleets with different percentages of coverages of trips for mid-water trawls for blueback herring and alewife. Shad catches are low so C.V.s are very high even at high levels of coverage and their curves are not shown. As an illustration of how to read the figures, if you start at the 0.5 mark on the horizontal axis of any of the figures (indicates 50% coverage), and draw a straight line up, the place where it intersects a curve will tell you the expected C.V. for the relevant species (blueback or alewife) and relevant fleet by looking left from the intersection point to the C.V.s on the vertical axis. Overall and as would be expected, as the percentage of covered trips increases, the C.V. falls and precision increases. For example, on figure 10, it is estimated that if a 50% trip coverage rate had been achieved, it would have resulted in approximate C.V.s for estimates of incidental catch of blueback herring of 0.3 in Mid-Atlantic paired midwater trawls, of 0.7 in Mid-Atlantic single midwater trawls, of 0.3 in New England paired midwater trawls, and of 0.4 in New England single midwater trawls. On the same figure, it is estimated that if a 75% trip coverage rate had been achieved, it would have resulted in approximate C.V.s for estimates of incidental catch of blueback herring of 0.2 in Mid-Atlantic paired midwater trawls, of 0.5 in Mid-Atlantic single midwater trawls, of 0.2 in New England paired midwater trawls, and of 0.3 in New England single midwater trawls. The reader will note that the predicted C.V.s from some coverage levels over 100% are still greater than 0 (100% would entail a census with a C.V. of zero). This is due to the low numbers of trips with mid-water gear and suggests that to get low C.V.s coverage rates near 100% are necessary.

Figure 10. Blueback MWT 2009

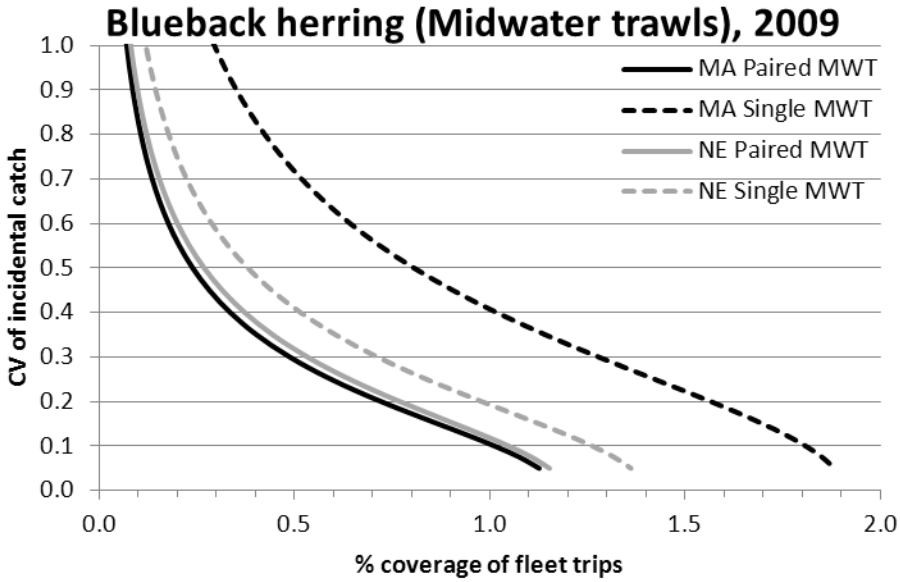


Figure 11. Blueback MWT 2010

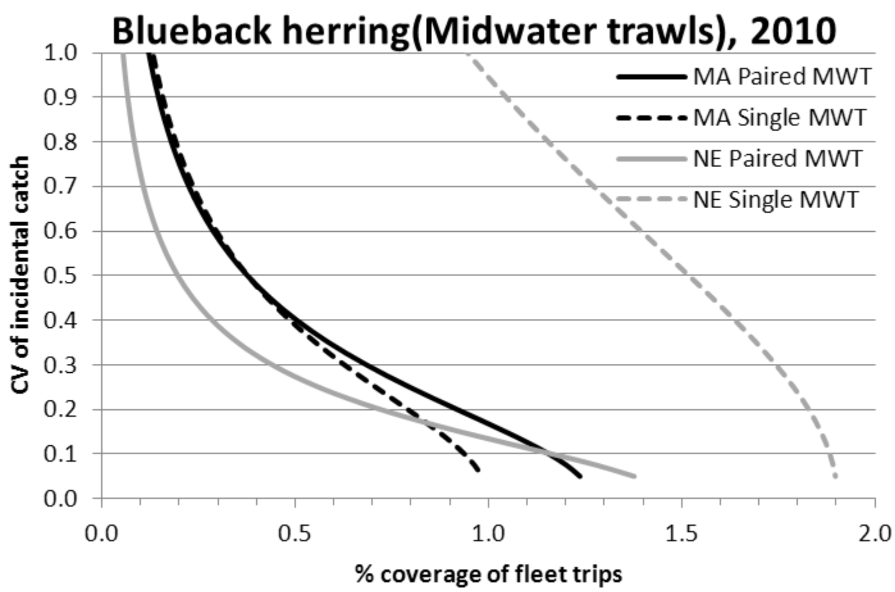


Figure 12. Alewife MWT 2009

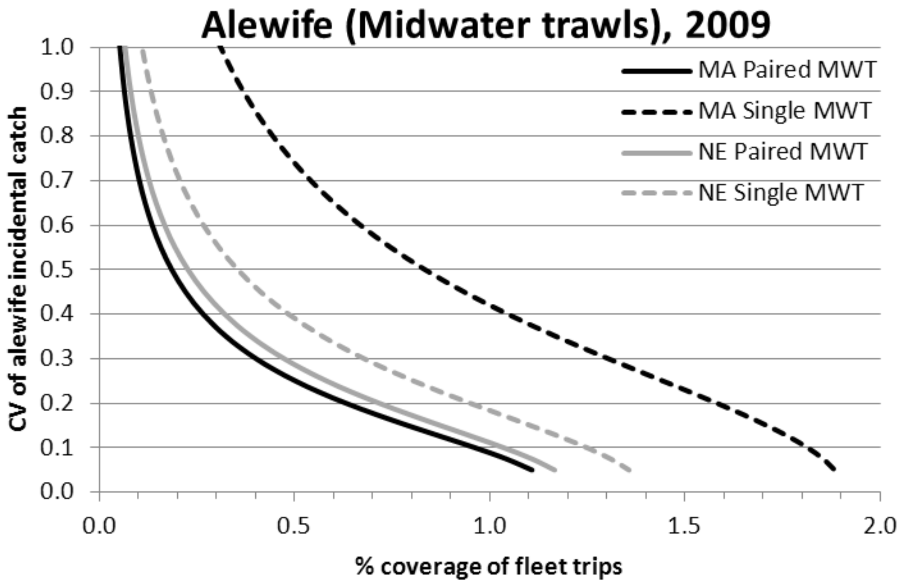
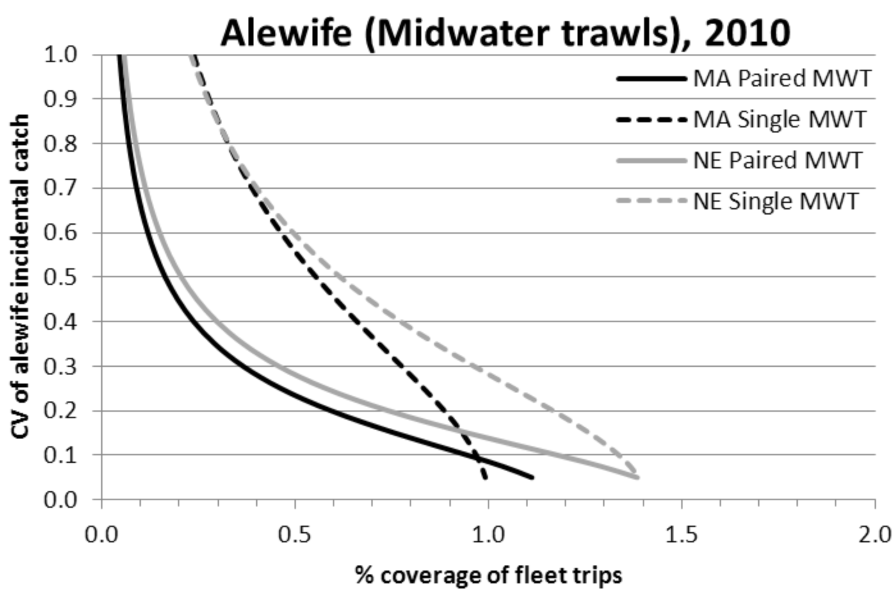


Figure 13. Alewife MWT 2010



While these CV and trip coverage associations are for mid-water trawls and not mackerel trips specifically, they represent the standard methodology used to estimate discards and/or catch (and the associated precision) from observer and landings data. If all other fisheries besides mackerel using these gears also implemented the same percentage coverage, then the described C.V.s may be achieved. However, the Mid-Atlantic Council can only regulate its own fisheries so it is not possible to describe the C.V.s for these gear types that would result from the various percentage coverage levels for mid-water trawl mackerel trips.

Since coverage in this alternative would be related to 20,000 pound mackerel trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on midwater trawl trips that kept 20,000 pounds or more of mackerel. These trips averaged 643 sea days each year ranging from 272 in 2010 to 926 in 2006. If 25%, 50%, 75%, or 100% of the average seadays were observed it would require 161, 322, 482, and 643 days respectivly. Given the low levels of current coverage and an uncertain funding situation, most if not nearly all of these would or could have to be industry funded (see 5f below) if mandated.

Key things to notice are 1) the variability from one year to the next and 2) the variability between fleets (a given percentage coverage results in one C.V. for one fleet and another C.V. for a different fleet). In other words, obtaining a given level of precision (C.V.) in RH/S incidental catch estimates for this gear type will probably require markedly different coverage levels from year to year due to inter-annual variability in the catches. Since the inter-annual variability cannot totally be predicted, it is not really possible to predict the exact C.V.s that any given level of coverage will result in, especially for mackerel fishery requirements given it represents only a portion of mid-water trawl activity.

5c. Mackerel Small Mesh Bottom Trawl (SMBT)

A very small percentage of mackerel trips are observed overall. The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation. Analysis in the document relates these coverage levels to potential ranges of uncertainty that would result from such coverage levels.

> **5c1. Require 25% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5c2. Require 50% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5c3. Require 75% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**
>
> **5c4. Require 100% of SMBT (<3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

The following figures illustrate the C.V.'s that would have been expected in 2009 and 2010 for different fleets with different percentages of coverages of trips for small mesh bottom trawls for blueback herring and alewife. Shad catches are low so C.V.s are very high even at high levels of coverage and their curves are not shown. As an illustration of how to read the figures, if you start at the 0.5 mark on the horizontal axis of any of the figures (indicates 50% coverage), and draw a straight line up, the place where it intersects a curve will tell you the expected C.V. for the relevant species (blueback or alewife) and relevant fleet by looking left from the intersection point to the C.V.s on the vertical axis. Overall and as would be expected, as the percentage of covered trips increases, the C.V. falls and precision increases. For example, on figure 14, it is estimated that if a 50% trip coverage rate had been achieved, it would have resulted in approximate C.V.s for estimates of incidental catch of blueback herring of 0.1 in Mid-Atlantic small mesh bottom trawls, and of 0.2 in New England small mesh bottom trawls. On the same figure, it is estimated that if a 75% trip coverage rate had been achieved, it would have resulted in approximate C.V.s for estimates of incidental catch of blueback herring of 0.075 in Mid-Atlantic small mesh bottom trawls, and of 0.15 in New England small mesh bottom trawls.

Figure 14. Blueback SMBT 2009

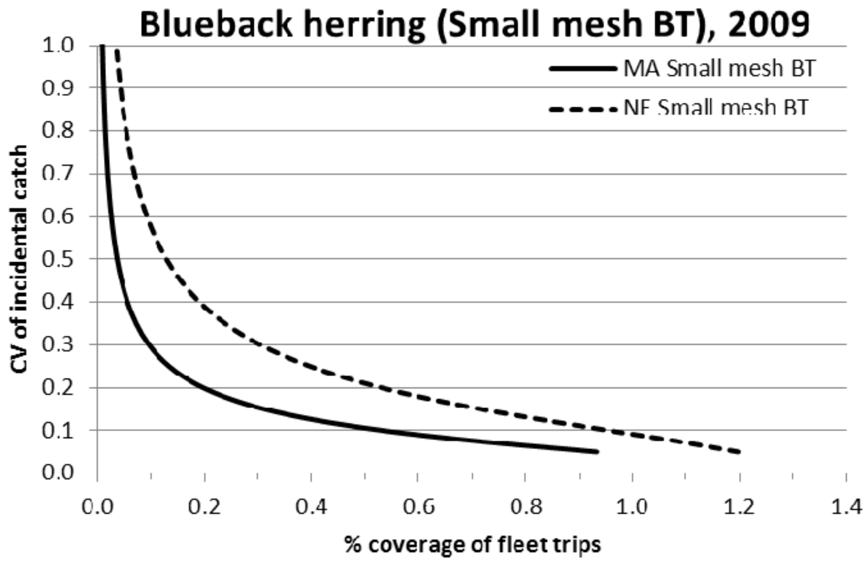


Figure 15. Blueback SMBT 2010

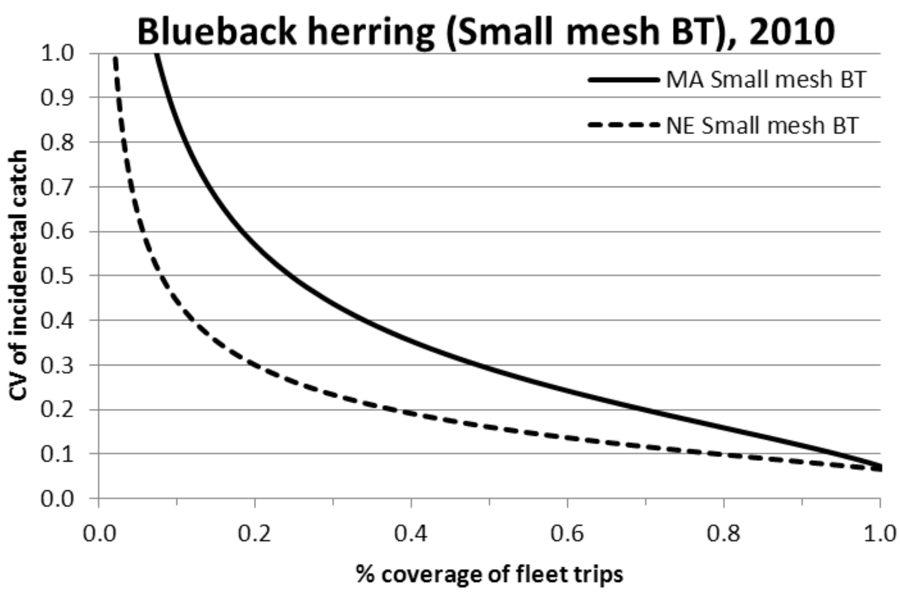


Figure 16. Alewife SMBT 2009

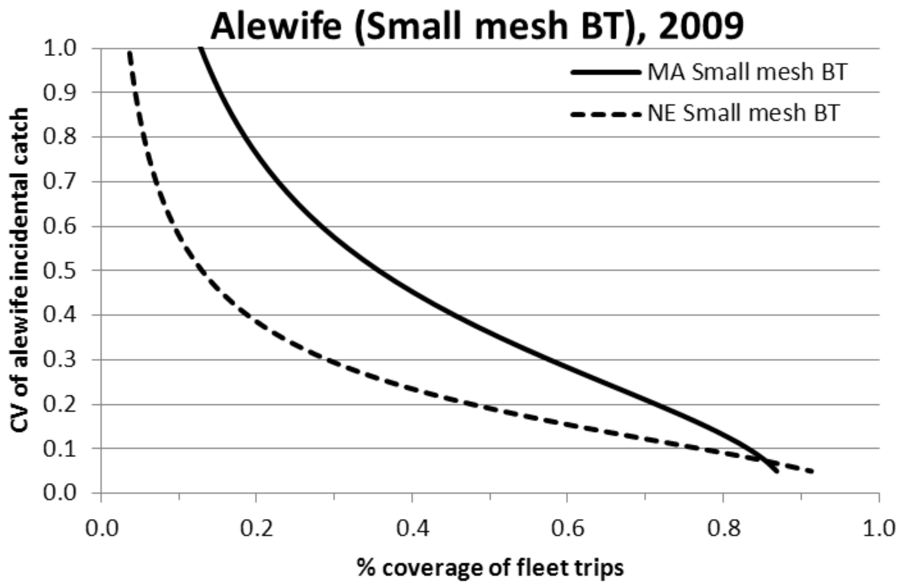
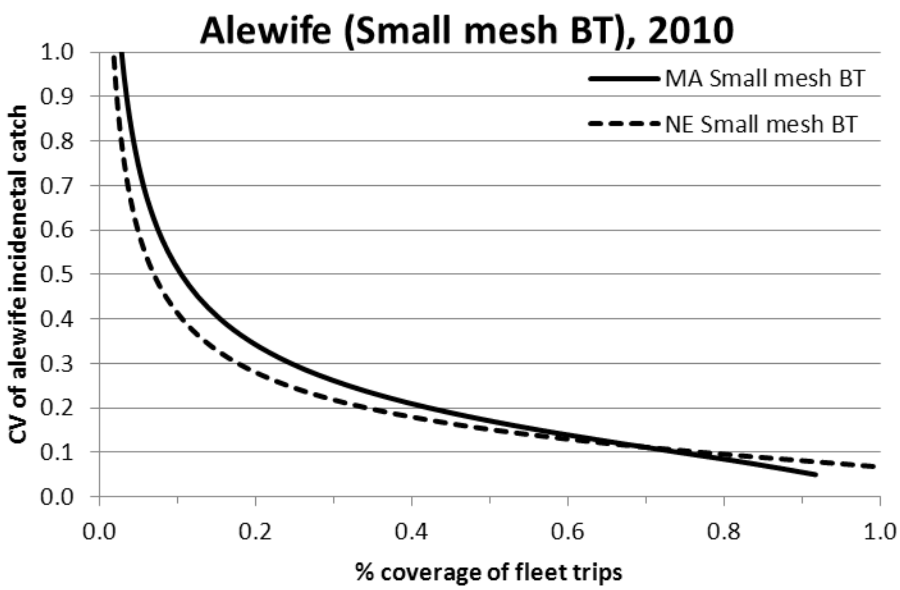


Figure 17. Alewife SMBT 2010



While these CV and trip coverage associations are for small mesh bottom trawls and not mackerel trips specifically, they represent the standard methodology used to estimate discards and/or catch (and the associated precision) from observer and landings data. If all other fisheries besides mackerel using these gears also implemented the same percentage coverage, then the described C.V.s may be achieved. However, the Mid-Atlantic Council can only regulate its own fisheries so it is not possible to describe the C.V.s for these gear types that would result from the various percentage coverage levels for small-mesh bottom trawl mackerel trips.

Since coverage in this alternative would be related to 20,000 pound mackerel trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on small mesh bottom trawl trips that kept 20,000 pounds or more of mackerel. These trips averaged 172 sea days each year ranging from 113 in 2009 to 286 in 2006. If 25%, 50%, 75%, or 100% of the average seadays were observed it would require 43, 86, 129, and 172 days respectivly. Given the low levels of current coverage and an uncertain funding situation, most if not nearly all of these would have to be industry funded (see 5f below) if mandated.

Key things to notice are 1) the variability from one year to the next and 2) the variability between fleets (a given percentage coverage results in one C.V. for one fleet and another C.V. for a different fleet). In other words, obtaining a given level of precision (C.V.) in RH/S incidental catch estimates for this gear type will probably require markedly different coverage levels from year to year due to inter-annual variability in the catches. Since the inter-annual variability cannot totally be predicted, it is not really possible to predict the exact C.V.s that any given level of coverage will result in, especially for mackerel fishery requirements given it represents only a small portion of small-mesh bottom-trawl activity.

5d. Longfin Squid Small Mesh Bottom Trawl (SMBT)

While coverage has increased in 2011 related to the implementation of the butterfish mortality cap on the longfin squid fishery, a small percentage of longfin squid trips have been observed historically. The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation. Analysis in the document relates these coverage levels to potential ranges of uncertainty that would result from such coverage levels.

5d1. Require 25% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d2. Require 50% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d3. Require 75% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d4. Require 100% of SMBT (<3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

C.V. and percent coverage relationships for small mesh bottom trawl are illustrated in the previous alternative.

The above figures illustrate the C.V.'s that would have been expected in 2009 and 2010 for different fleets with different percentages of coverages of trips for small mesh bottom trawls for blueback herring and alewife. Shad catches are low so C.V.s are very high even at high levels of coverage and their curves are not shown. As an illustration of how to read the figures, if you start at the 0.5 mark on the horizontal axis of any of the figures (indicates 50% coverage), and draw a straight line up, the place where it intersects a curve will tell you the expected C.V. for the relevant species (blueback or alewife) and relevant fleet by looking left from the intersection point to the C.V.s on the vertical axis. Overall and as would be expected, as the percentage of covered trips increases, the C.V. falls and precision increases. For example, on figure 14, it is estimated that if a 50% trip coverage rate had been achieved, it would have resulted in approximate C.V.s for estimates of incidental catch of blueback herring of 0.1 in Mid-Atlantic small mesh bottom trawls, and of 0.2 in New England small mesh bottom trawls. On the same figure, it is estimated that if a 75% trip coverage rate had been achieved, it would have resulted in approximate C.V.s for estimates of incidental catch of blueback herring of 0.075 in Mid-Atlantic small mesh bottom trawls, and of 0.15 in New England small mesh bottom trawls.

While these CV and trip coverage associations are for small mesh bottom trawls and not longfin squid trips specifically, they represent the standard methodology used to estimate discards and/or catch (and the associated precision) from observer and landings data. If all other fisheries besides longfin squid using these gears also implemented the same percentage coverage, then the described C.V.s may be achieved. However, the Mid-Atlantic Council can only regulate its own fisheries so it is not possible to describe the C.V.s for these gear types that would result from the various percentage coverage levels for small-mesh bottom trawl longfin squid trips.

Since coverage in this alternative would be related to 2,500 pound longfin squid trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on small mesh bottom trawl trips that kept 2,500 pounds or more of longfin squid. These trips averaged 5,357 sea days each year ranging from 3,932 in 2010 to 6,743 in 2006. If 25%, 50%, 75%, or 100% of the average seadays were observed it would require 1339, 2678, 4017, and 5,357 sea days respectivly. Given the low levels of current coverage and an uncertain funding situation, most if not nearly all of these might have to be industry funded (see 5f below) if mandated. About 10% of 2,500 pound longfin squid trips were observed in 2011, so up to 10% of these might be funded but such funding is not guaranteed.

Key things to notice are 1) the variability from one year to the next and 2) the variability between fleets (a given percentage coverage results in one C.V. for one fleet and another C.V. for a different fleet). In other words, obtaining a given level of precision (C.V.) in RH/S incidental catch estimates for this gear type will probably require markedly different coverage levels from year to year due to inter-annual variability in the catches. Since the inter-annual variability cannot totally be predicted, it is not really possible to predict the exact C.V.s that any given level of coverage will result in, especially for mackerel fishery requirements given it represents only a portion of small-mesh activity.

5e. Strata-Fleet-Based Alternatives

On a fleet level, catch estimates of river herrings are often imprecise. The following sub-alternatives would require coverage levels that would be expected to result in the specified C.V. levels for river herrings. Shad were not included because very high coverage levels would be required to achieve the respective C.V.s.

5e1. Require NMFS to allocate sea days such that Mid-Atlantic alewife and blueback catch C.V.s for MWT would each be expected to be at or below 0.30.

5e2. Require NMFS to allocate sea days such that Mid-Atlantic alewife and blueback catch C.V.s for MWT would each be expected to be at or below 0.20.

5e3. Require NMFS to allocate sea days such that alewife and blueback catch C.V.s for SMBT would each be expected to be at or below 0.30.

5e4. Require NMFS to allocate sea days such that alewife and blueback catch C.V.s for SMBT would each be expected to be at or below 0.20.

These alternatives would require NMFS to allocate sea days to achieve the specified river herring C.V.s. Based on the same analysis as above (in 5b-5c), the sea days required are described in the table below. These are the sea days related to the trips in the figures from those alternatives. Since sea day requirement estimates are based on prior year performance, the requirements for 2009 and 2010 are both provided and they illustrate how different numbers of sea days are required each year to attain a given C.V. The approximate number of executed sea days for each grouping in 2010 is also provided. The difference between the executed number and the required number would be the extra days required. Since the alternatives require C.V.s for both species, the higher value for either blueback herring or alewife was used.

Table 11. Sea days associated with Alt. 5e C.V. targets.

	Mid-Atlantic MWT (CV = 0.3)	Mid-Atlantic MWT (CV = 0.2)	SMBT (CV = 0.3)	SMBT (CV = 0.2)
Required Sea Days (2009)	541	751	3610	4889
Required Sea Days (2010)	308	409	2542	3982
Approx Days Provided in 2010	76		1132	

Since the trip coverage to achieve a given C.V. fluctuates from year-to-year, one can never really guarantee a given C.V. will be reached. It may be quite difficult to consistently obtain precise catch estimates via observer data when the coverage levels are determined from prior years' data for species that are not encountered that often in large quantities. However, the numbers in the table above suggest that around 65% coverage could result in a 0.3 C.V. goal and about 90% coverage could result in a 0.2 C.V. goal for Mid-Atlantic MWT and that for small mesh bottom trawl, around 40% coverage could result in a 0.3 C.V. goal and about 60% coverage could result in a 0.2 C.V. goal. This was determined by averaging the required sea days from 2009-2010, and then comparing those averages with total average days at sea for relevant trips from VTR data, 2009-2011. However it is emphasized that from year to year it will be very hard to hit a particular C.V. target due to the inherent variability from year to year in both the directed fisheries involved and their incidental catch of river herrings. Since one cannot predict which years will require the highest coverage, some years would likely be over covered and some years would be under covered if coverage rates are determined by the previous year's data. The monetary costs associated with these coverage levels are described in Section 7.

It is important to note that though the percent of coverage needed for small mesh bottom trawl may be lower than mid-water trawl for a given C.V., because of the much greater size of the small mesh bottom trawl fishery fleet (vessels and trips), a much higher number of sea days is required to achieve a given C.V. for small mesh bottom trawl.

A key issue with implementation of this alternative is that while the alternative is based on gear types which is how discard and incidental catch estimates based on observer coverage are binned to get total estimates, the MAFMC can really only compel the fisheries it manages to carry and pay for observers. Since NMFS has indicated that it will only approve additional observer coverage on fisheries if it is funded by industry, and the MAFMC cannot compel fisheries out of its control to carry and pay for observers, there is a procedural tension inherent in this alternative.

What could occur if this alternative is selected, is that NMFS would use its observer allocation procedures to allocate the approximate level of coverage in Mid-Atlantic fisheries that would be needed as part of achieving the overall C.V. targets. So if this alternative was recommended, New England fisheries that use the relevant gear types would not be affected so the C.V. targets would not actually be reached but they would be improved related to increases in Mid-Atlantic fisheries. If New England approved measures consistent with these C.V. targets (including industry funding), the tension would be resolved however as all of the major fisheries with substantial RH incidental catch would be covered.

5f. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

NMFS has repeatedly stated that additional federal funding for observers is not available. This option would require that observer coverage on limited access mackerel and/or longfin squid moratorium vessels be funded by Federal resources, whenever they are available. To the extent that Federal resources are not available to fund observer coverage at levels consistent with the Amendment 14 provisions, vessels would be responsible for covering costs associated with contracting service providers for the additional observer coverage.

Non-government service providers could be used for sea sampling in the event that Federal funds are not sufficient to provide the desired level of coverage.

Vessel owners, operators, and/or representatives would be required to provide notice to NMFS and request an observer through the pre-trip notification system, consistent with the notification provisions described in this document.

If observer coverage must be procured through an independent service provider, NMFS would notify the vessel owner, operator, and/or representative of the requirement within 24 hours of the vessels' notification to NMFS of the prospective trip. The vessel would be prohibited from fishing for, taking, possessing, or landing more than an incidental catch without carrying an observer for that trip unless the vessel has been issued a waiver. Any requirement to carry an observer on a particular trip may be waived by NMFS. All waivers for observer coverage will be issued to the vessel by VMS, fax, or email so as to have on-board verification of the waiver (see more information about waivers below).

Observer Service Provider Certification, Approval, Responsibilities
Regulations specifying the use of observer service providers are provided in 50 CFR 648.11(h) and (i) – Observer service provider approval and responsibilities and Observer certification and would apply to service providers for sea sampling if/when Federally-funded observers cannot be made available. These provisions are consistent with those for service providers in other Federal fisheries in the Northeast region (ex., sea scallops). NMFS could also authorize states as service providers if NMFS and the respective state have a memorandum of agreement regarding the collection and handling of data.

If this amendment requires the industry to pay for observer sea days that cannot be funded using Federal resources, the vessel owner/operator/manager would be required to arrange for carrying an observer from one of the service providers approved by NMFS (50 CFR 648.11(h) and (i)). The owner/operator/manager of a vessel selected to carry an observer must contact the observer service provider and must provide at least 48 hours' notice in advance of the fishing trip for the provider to arrange for observer deployment for the specified trip. A list of approved service providers will be published on the NMFS/NEFOP website. If a certified observer cannot be procured within 48 hours of the advanced notification due to the unavailability of an observer, the vessel owner/operator/manager may request a waiver from NMFS/NEFOP from the requirement for observer coverage on that trip, but only if all of the available service providers have been contacted in an attempt to secure observer coverage, and no observer is available. In this case, if appropriate, a waiver is to be issued by NMFS within 24 hours.

5g. Phase-in industry funding over 4 years such that to achieve the target coverage selected in 4b-4e above, NMFS would pay for 100%, 75%, 50%, then 25% of the at-sea portion of the specified observer coverage (NOTE: NMFS has indicated this is not feasible from a funding point of view).

This alternative could be selected in addition to 5f to phase-in industry funding over a 4 year period. NMFS would be likely to reject this alternative because of budget constraints.

5h. Require reevaluation of coverage requirement after 2 years to determine if incidental catch rates justify continued expense of continued high coverage rates.

This alternative is self-explanatory.

5.6 Alternative Set 6 - Mortality Caps

5.6.1 Statement of Problem/Need for Action

Catch of RH/S in the MSB fisheries may be negatively impacting RH/S populations. Estimates of current RH/S catches are summarized in Section 6.3 and detailed in Appendix 2. Due to the lack of comprehensive assessments for RH/S it is not possible to determine if current catch levels are, or are not, negatively impacting RH/S stocks.

5.6.3 General Rationale & Background

A cap on a certain fleet/fishery can keep mortality for the fleet/fishery at a certain level. If imprecision of catch estimates is high, the real catch may be substantially above or below any amount attained under a cap. Given the lack of reference points it would be difficult to establish an appropriate cap amount that is meaningfully tied to some impact on RH/S. One would either have to independently figure out how much overall RH catch one wanted and then allocate a portion of that to a cap or one could just look at what various fisheries have caught, and use that information to come up with an amount for a fishery-specific cap. For the mortality cap alternatives, the SMB Monitoring Committee would draft a range of caps for consideration through specifications. They would likely be based on some fraction of total estimated catch of RH/S as estimated in the appendices of this amendment. If an assessment of RH/S provided information on sustainable harvest that information could be used as well. Precision would likely be quite low under the status quo observer/monitoring regime.

A cap would operate much like the butterfish cap currently operates in the longfin squid fishery. As with the butterfish cap, the exact monitoring and extrapolation methodology would be developed during implementation and presented to the Council for comments before the cap became operational. However, the incidental catch ratio would be based on the ratio of RH/S to total retained catch, as appropriate depending on which, if any, action alternatives were chosen. This ratio comes from observer data in the butterfish cap and in the context of this amendment could come from observer data or potentially also port-side sampling data if implemented in this amendment. Then for a given fishery (mackerel or squid) as defined by trips over the incidental landings limit, the ratio is applied to all landings (from dealer data) by that fishery to extrapolate a total RH/S catch estimate. Technical details may be found in Wigley et al. (2007), with the modification of using "kept+discards" in the numerator rather than just discards since the focus is on total catch. Once the estimate reaches a closure threshold identified by the Council in the specifications process, then landings above an incidental nature (also specified during specifications) would be prohibited. The incidental catch cap would operate in parallel to monitoring for the directed fishery such that reaching either the closure threshold for the directed fishery or the incidental catch cap threshold would close the directed fishery.

It would probably make most sense to have a fleet-area cap (e.g., midwater trawls in Mid-Atlantic) rather than using the regulatory definition of a "Mackerel" or "Herring" trip to define vessels that are subject to the cap. In other words, the greatest amount of impact on RH/S incidental catch reduction would come from the implementation of a joint cap on both the herring & mackerel fleets. If one instituted just a cap on the mackerel fleets, one of two things could happen if the mackerel fishery was closed due to reaching the cap:

One possibility is that the mackerel fishery closes and the exact same fleet continues fishing in the exact same place (Mid-Atlantic Q1) and just retains the Atlantic herring catches and discards mackerel. Since catch per unit effort of the combined species would go down, overall effort could go up, possibly increasing RH/S catch.

Another possibility is that Q1 catches of mackerel and Atlantic herring in the Mid-Atlantic are so mixed that closing mackerel would effectively close herring.

Fleet-area caps are not currently feasible because herring is managed by the New England Fishery Management Council and its Amendment 5 to the Atlantic Herring FMP does not have complementary caps for the herring fishery. Amendment 5 does contain provisions for a cap to be added later and it is possible that the Mid-Atlantic Fishery Management Council could work with the New England Fishery Management Council to implement a joint cap at a later date.

For all of the mortality caps, once the cap or some fraction of the cap is reached (set in specifications) then the fishery would be closed (i.e., all possession would be prohibited) or an incidental trip limit would go into effect (also set in specifications).

5.6.4 Management Alternatives

NOTE ON COMBINATIONS: All of the action alternatives in this Alternative Set could be implemented singly or in combination with any other alternative(s) in this Alternative Set.

Note: Since some of the alternatives below are very similar, they are grouped together for purposes of description.

6a. No-action

Under the no-action alternative, there would be no mortality caps for RH/S in the mackerel and/or longfin squid fisheries. State management of RH/S would continue (see 5.9.2) for state catches. The New England and Mid-Atlantic Fishery Management Council's would continue to consider ways to reduce RH/S catch in their at-sea fisheries (and may implement other conservation measures in this amendment or Amendment 5 to the Atl Herring FMP) but there would be no hard caps on RH/S catch in the mackerel and/or longfin squid fisheries. The longfin squid fishery is currently subject to a mortality cap for butterfish, further described in section 6.7.4 and documents linked to from that section.

6b. Implement a mortality cap for river herrings for the mackerel fishery whereby the mackerel fishery would close once it is determined that it created a certain level of river herring mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

Annual cap amounts would be evaluated and set during the specifications process (though without comprehensive RH/S assessments it is not possible to determine if any particular quantity of RH/S catch is sustainable). The specifications process would also set the percentage that a cap closed at to avoid overages (probably 80% to 90%) as well as any incidental trips limits after a closure (probably 0 - 20,000 pounds – 20,000 pounds is the current post-closure incidental trip limit).

One way to assign mortality caps for river herring (and one which illustrates the potential effects or a range of cap levels) would be to base it on the range of estimated river herring mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic mid-water trawl (MWT) fishing in Quarter 1, which is largely but not completely mackerel fishing, accounted for 35% of total river herring mortality 2005-2010. MWT fishing in Quarter 1 is mixed, with mackerel comprising over 50% of the landings, but herring making up a large amount of landings in January (see Figure 21A of Appendix 2). The table below describes total ocean and Quarter 1 mid-water trawl mortalities.

Table 12. Example River Herring Caps for Mackerel

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Water Trawl Quarter 1 mortality (mt) (35% of total) = Mortality Cap Possibility	Mackerel would close at these landings (mt) with high ratio, 0.86%	Mackerel would close at these landings (mt) with mean ratio, 0.45%	Mackerel would close at these landings (mt) with low ratio, 0.02%
2006	245	86	9,975	19,063	428,908
2007	664	232	27,029	51,656	1,162,263
2008	672	235	27,333	52,237	1,175,335
2009	361	126	14,679	28,053	631,190
2010	244	85	9,911	18,940	426,160

Using the ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 50% or at least 100,000 pounds of mackerel (encompasses almost all landings) results in annual river herring mortality ratios from 0.02% in 2007 to .86% in 2009 with a mean of 0.45. The 50%/100,000 filter was used because it has been the way directed mackerel trips have been identified in recent specifications analyses and because this definition encompasses almost all landings. The exact definition of a mackerel trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the mackerel fishery was shut down by the river herring mortality cap is illustrated on the three rightmost columns in the above table (these can be compared to recent mackerel landings detailed in Section 6.7.1). A high ratio means that more river herring were caught and a low ratio means that less river herring were caught. The examples in the above table come for observed data 2006-2010. The main point is that whether mackerel would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of river herring was, and what the mackerel availability was. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all. If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season.

For example in the above table, in 2010 it was estimated that Quarter 1 MWT river herring mortality was 85mt. If an 85mt cap was used, and the fishery experienced a high river herring incidental catch ratio of 0.86%, the cap would be used up when mackerel trips had caught about 9,911 mt of fish. If lower ratios were observed, then more fish could be caught by the mackerel fishery before it was closed by a cap. Likewise, if the cap was set higher, then more fish could be caught by the mackerel fishery before it was closed by a cap.

<u>6c</u>. Implement a mortality cap for <u>shads</u> for the <u>mackerel</u> fishery whereby the mackerel fishery would close once it is determined that it created a certain level of shad mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

Annual cap amounts would be evaluated and set during the specifications process. The specifications process would also set the percentage that a cap closed at to avoid overages (probably 80% to 90%) as well as any incidental trips limits after a closure (probably 0 - 20,000 pounds – 20,000 pounds is the current post-closure incidental trip limit).

One way to assign mortality caps for shad (and one which illustrates the potential effects or a range of cap levels) would be to base it on the range of estimated shad mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic mid-water trawl fishing in Quarter 1, which is largely but not completely mackerel fishing, accounted for 12% of total shad mortality 2005-2010. The table below describes total ocean and quarter 1 mid-water trawl mortalities in the leftmost columns (2006 omitted because of lack of shad records).

Table 13. Example Shad Caps for Mackerel

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Water Trawl Quarter 1 mortality (mt) (12% of total) = Mortality Cap Possibility	Mackerel would close at these landings (mt) with high ratio, 0.05%	Mackerel would close at these landings (mt) with mean ratio, 0.03%	Mackerel would close at these landings (mt) with low ratio, 0.004%
2007	60	7	14,364	23,940	179,550
2008	60	7	14,450	24,084	180,630
2009	70	8	16,903	28,172	211,290
2010	47	6	11,338	18,896	141,720

Using the ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 50% or at least 100,000 pounds of mackerel (encompasses almost all landings) results in annual shad mortality ratios from 0.004% in 2009 to 0.05% in 2007 with a mean of 0.03. The 50%/100,000 filter was used because it has been the way directed mackerel trips have been identified in recent specifications analyses and because this definition encompasses almost all landings. The exact definition of a mackerel trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the mackerel fishery was shut down by the shad mortality cap is illustrated on the rightmost three columns in the above table (these can be compared to recent mackerel landings detailed in Section 6.7.1). A high ratio means that more shad were caught and a low ratio means that less shad were caught. The examples in the above table come for observed data 2006-2010. The main point is that whether mackerel would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of shad was, and what the mackerel availability was. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all. If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season.

For example in the above table, in 2010 it was estimated that quarter 1 MWT shad mortality was 6mt. If an 6mt cap was used, and the fishery experienced a high shad incidental catch ratio of 0.05%, the cap would be used up when mackerel trips had caught about 11,338 mt of fish. If lower ratios were observed, then more fish could be caught by the mackerel fishery before it was closed by a cap. Likewise, if the cap was set higher, then more fish could be caught by the mackerel fishery before it was closed by a cap.

6d. Implement a mortality cap for river herrings for the longfin squid fishery whereby the longfin squid fishery would close once it is determined that it created a certain level of river herring mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

Annual cap amounts would be evaluated and set during the specifications process. The specifications process would also set the percentage that a cap closed at to avoid overages (probably 80% to 90%) as well as any incidental trips limits after a closure (probably 2,500 pounds, the current incidental trip limit). Since the longfin squid fishery operates by four-month trimesters, the Council could choose to allocate a cap by trimesters as well, and this would be evaluated during specifications.

One way to assign mortality caps for river herring (and one which illustrates the potential effects or a range of cap levels) would be to base it on the range of estimated river herring mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic small mesh bottom trawl accounted for 5% of total river herring mortality. While Mid-Atlantic small mesh bottom trawl encompasses a variety of fisheries besides longfin squid (including Atlantic herring), some of the New England small mesh bottom trawl mortality is probably related to longfin squid fishing so using the full Mid-Atlantic value is probably reasonable. The table below describes total ocean and 5% of total mortalities in the leftmost columns.

Table 14. Example River Herring Caps for Longfin

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Atlantic Small Mesh Bottom Trawl mortality (mt) (5% of total) = Mortality Cap Possibility	Longfin squid would close at these landings (mt) with high ratio, 0.17%	Longfin squid would close at these landings (mt) with mean ratio, 0.06%
2006	245	12	7,233	20,424
2007	664	33	19,534	55,346
2008	672	34	19,754	55,968
2009	361	18	10,608	30,057
2010	244	12	7,162	20,293

Using the ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 2,500 pounds longfin squid results in annual river herring mortality ratios from almost zero in 2007 to .17% in 2009 with a mean of 0.06%. The 2,500 pound filter was used because it has been the way directed longfin squid trips have been identified in the butterfish cap for the longfin squid fishery and because is encompasses almost all longfin squid landings. The exact definition of a longfin squid trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the longfin squid fishery was shut down by the river herring mortality cap is illustrated on the rightmost columns in the above table (these can be compared to recent longfin squid landings detailed in Section 6.7.4). A high ratio means that more river herring were caught and a low ratio means that less river herring were caught. The examples in the above table come for observed data 2006-2010. The main point is that whether longfin squid would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of river herring was, and what the longfin squid availability was. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all. If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season.

For example in the above table, in 2010 it was estimated that Mid-Atlantic small mesh bottom trawl river herring mortality was 12mt. If a 12mt cap was used, and the fishery experienced a high river herring incidental catch ratio of 0.17%, the cap would be used up when longfin squid trips had caught about 7,162 mt of fish. If lower ratios were observed, then more fish could be caught by the longfin squid fishery before it was closed by a cap. Likewise, if the cap was set higher, then more fish could be caught by the longfin squid fishery before it was closed by a cap.

<u>6e</u>. Implement a mortality cap for <u>shads</u> for the <u>longfin squid</u> fishery whereby the longfin squid fishery would close once it is determined that it created a certain level of shad mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

Annual cap amounts would be evaluated and set during the specifications process. The specifications process would also set the percentage that a cap closed at to avoid overages (probably 80% to 90%) as well as any incidental trips limits after a closure (probably 2,500 pounds, the current incidental trip limit). Since the longfin squid fishery operates by four-month trimesters, the Council could choose to allocate a cap by trimesters as well, and this would be evaluated during specifications.

One way to assign mortality caps for shad (and one which illustrates the potential effects or a range of cap levels) would be to base it on the range of estimated shad mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic small mesh bottom trawl accounted for 11.5% of total shad mortality. While Mid-Atlantic small mesh bottom trawl encompasses a variety of fisheries besides longfin squid (including Atlantic herring), some of the New England small mesh bottom trawl mortality is probably related to longfin squid fishing so using the full Mid-Atlantic value is probably reasonable. The table below describes total ocean and 11.5% of total mortalities in the leftmost columns.

Table 15. Example Shad Caps for Longfin

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Atlantic Small Mesh Bottom Trawl mortality (mt) (11.5% of total) = Mortality Cap Possibility	Longfin squid would close at these landings (mt) with high ratio, 0.21%	Longfin squid would close at these landings (mt) with mean ratio, 0.10%	Longfin squid would close at these landings (mt) with low ratio, 0.03%
2006	47	5	2,587	5,433	18,109
2007	60	7	3,278	6,883	22,943
2008	60	7	3,297	6,924	23,081
2009	70	8	3,857	8,099	26,998
2010	47	5	2,587	5,433	18,109

Using the ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 2,500 pounds longfin squid results in annual shad mortality ratios from almost 0.03% in 2009 to 0.21% in 2010 with a mean of 0.10%. The 2,500 pound filter was used because it has been the way directed longfin squid trips have been identified in the butterfish cap for the longfin squid fishery and because is encompasses almost all longfin squid landings. The exact definition of a longfin squid trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the longfin squid fishery was shut down by the shad mortality cap is illustrated on the rightmost columns in the above table (these can be compared to recent longfin squid landings detailed in Section 6.7.4). A high ratio means that more shad were caught and a low ratio means that less shad were caught. The examples in the above table come for observed data 2006-2010. The main point is that whether longfin squid would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of shad was, and what the longfin squid availability was. Since the realized ratio can vary substantially from year to year, it is not possible to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all.   If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season.

For example in the above table, in 2010 it was estimated that Mid-Atlantic small mesh bottom trawl shad mortality was 5mt. If a 5mt cap was used, and the fishery experienced a high shad incidental catch ratio of 0.21%, the cap would be used up when longfin squid trips had caught about 2,587 mt of fish. If lower ratios were observed, then more fish could be caught by the longfin squid fishery before it was closed by a cap. Likewise, if the cap was set higher, then more fish could be caught by the longfin squid fishery before it was closed by a cap.

6f. Add mortality caps to list of measures that can be frameworked.

This alternative would allow the kinds of mortality caps considered in this document to be re-considered and implemented at a future time via a streamlined framework amendment process. Such an action would be justifiable because it would be part of an existing overall strategy to reduce RH/S catches.

5.7 Alternative Set 7 – Restrictions in areas of high RH/S catch

5.7.1 Statement of Problem/Need for Action

Catch of RH/S in the mackerel and longfin squid fisheries may be negatively impacting RH/S populations. There are state possession limits and landings requirements but there are currently no limits on incidental catch of RH/S in Federal fisheries. National Standard 9 mandates that the Council reduce discards to the extent practicable and MSA provides discretionary authority for the Council to reduce incidental retained catch of non-target RH/S catch in the mackerel and longfin squid fisheries (see Section 4). Area-based restrictions could be a way of reducing RH/S catch in these fisheries.

5.7.2 General Rationale & Background

The Council originally hoped to include some alternatives that would restrict fishing in relatively small areas that appeared to be "hotspots" for RH/S catch. Based on NMFS NEFSC analysis the Amendment's Fishery Management Action Team's found that because of the wide and variable distribution of RH/S, small-area management is unlikely to be successful (Appendices 1-2 and summary of RH/S catch analysis in Section 6.3). Because the Council instructed the FMAT to generate area-based alternatives that would be likely to provide protection to RH/S, the FMAT generated several area alternatives that cover very large areas, but acknowledged that such large-scale area restrictions could, in some alternatives, effectively close the fisheries for many participants. Council staff attempted to perform additional smaller-scale examinations of the data (for example around Hudson Canyon) but at such small scales there are too few observations to draw meaningful conclusions about the potential of small-scale area restrictions for reducing RH/S encounters.

Staff also investigated if small areas in federal waters but near major river mouths might be an appropriate strategy. However, little is known about fine scale migration patterns once RH/S are in the ocean and there is no evidence that there are staging aggregations (schools of RH/S near river mouths) in federal waters that would lend themselves to such approaches (pers com K. Taylor, ASMFC, W. Laney, USFWS).

The FMAT analysis suggests that because of the spatial and temporal variability of observed (Northeast Fishery Observer Program or "NEFOP") RH/S catch, the same kind of variability in mackerel and longfin squid effort and catch, and the same kind of variability in RH/S NEFSC trawl survey catches, that very large areas would be required to ensure that management was not just redistributing effort, possibly in a way that even increased RH/S catch. For this reason Council staff used the FMAT GIS analysis (Appendix 2) to construct areas for mackerel and longfin squid based on the mid-water and small-mesh bottom trawl fleet effort data and RH/S catch data. The table below is designed to help illustrate how even if you reduce catch rates of one species, for example blueback, but reduce catch rates of the directed species (for example mackerel) even more, it can be possible to do more harm than good if the fleet increases effort to maintain the same amount of harvest. For example if blueback catches were "a little lower" but mackerel catches were “a lot lower” and the fleet increased effort in response, a large increase in effort could result in higher total blueback catches even if the rate of blueback catches declined somewhat. Since the relative changes in catch rates are not possible to predict currently, one cannot predict the impact on RH/S catches of small area closures for directed mackerel and/or longfin squid fisheries.

Table 16. Direct-Incidental Impact Schematic

Effects on RH catch of moving effort assuming effort changes to maintain constant mackerel catch if CPUE changes

		Mackerel		
	CPUE Changes	neutral	a little lower	a lot lower
Blueback	neutral	0	bad	bad
	a little lower	good	0	bad
	a lot lower	good	good	0

So the question then becomes can one quantify what would happen to the target and incidental catch species if effort is shifted because of a closed area. The results of analyses to-date (spatial-temporal effort variability, spatial-temporal directed catch variability, spatial-temporal RH/S catch variability (observer data), and spatial-temporal catch variability of RH/S in the NEFSC spring and fall bottom trawl surveys) all suggest that it is not currently possible to determine whether any small closed area would lead to LESS, the SAME, OR MORE RH/S catch. To implement area-based management, a very large area would need to be used, and it would need to also encompass different areas seasonally to incorporate the herring fishery to be effective, to know that positive impacts resulted for RH/S (probably not practicable if also trying to maintain some portion of a directed fishery).

At one point in amendment development council technical staff considered recommending to the Council that these area-based measures be removed from the document. However, this recommendation was ultimately not made analyzing these measures does help illustrate the difficulties of dealing with RH/S encounters with an area-based approach.

To create easy to understand and reasonably enforceable areas, simple rectangles were used. In application, the closures would only apply in federal waters within those rectangles.

5.7.3 Management Alternatives

NOTE ON COMBINATIONS: 7bMack and 7cMack are mutually exclusive – the Council could close the area to directed fishing (7bMack) or require observers (7cMack) but not both. Likewise 7bLong and 7cLong are mutually exclusive – the Council could close the area to directed fishing (7bLong) or require observers (7cLong) but not both. One of the mackerel alternatives (either 7bMack or 7cMack) could be combined with one of the longfin squid alternatives (either 7bLong or 7cLong) however. 7d could be added to any 7b or 7c alternative to make those provisions only applicable after a cap-based trigger was reached. The Council would have to specify in this case that the Alternative Set 6 cap trigger was only a trigger for Alternative Set 7 rather than a stand-alone cap measure. 7e could be chosen in addition to any other alternative in this Alternative Set.

Given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery.

The enforceability of area-based management alternatives could be facilitated by the selection of the vessel monitoring system (VMS) requirement in Alternative Set 1 (alternatives 1eMack or 1eLong).

The selection of alternatives that include observer coverage requirements (7cMack and 7cLong) would require the selection of observer program notification alternatives for limited access mackerel permits in Alternative Set 1(1d48 and 1d72).

7a. No-action

Under the no-action alternative, there would be no area-based restrictions on the mackerel and/or longfin squid fisheries that are designed to reduce catch of RH/S. State management of RH/S would continue (see 5.9.2) for state catches. The New England and Mid-Atlantic Fishery Management Council's would continue to consider ways to reduce RH/S catch in their at-sea fisheries (and may implement other conservation measures in this amendment or Amendment 5 to the Atl Herring FMP) but there would be no area-based restrictions on the mackerel and/or longfin squid fisheries that are designed to reduce catch of RH/S. There are other area-based closures for bottom trawling already in effect (e.g. black and yellow dashed areas on figures 18-20) related to bycatch, habitat, or other issues and these restrictions would remain in effect. Details and charts for existing area-based restrictions may be found at: http://www.nero.noaa.gov/nero/fishermen/charts.html. Some alternatives in the set would require additional observer coverage but under the no-action alternative the current observer coverage levels would continue (see 5.5.2 and 5.5.3).

7bMack. Closed Area - Prohibit retention of more than 20,000 pounds of mackerel in RH/S Mackerel Management Area (applies in quarter 1 only – see map below) for vessels with federal mackerel permits.

The RH/S Mackerel Management Area (see figure below) encompasses most quarter-one mid-water trawl effort as well as most quarter-one observer data observations of RH/S catch, which are estimated to account for 35% of total RH/S catch (See Appendix 2). This alternative would close this area to directed mackerel fishing.

7bLong. Closed Area - Prohibit retention of more than 2,500 pounds longfin squid in RH/S Longfin Squid Management Area (applies year-round – see maps below) for vessels with federal longfin squid moratorium permits.

The RH/S Longfin Squid Management Area encompasses most small mesh bottom trawl effort, which is responsible for 24% of RH/S catch (see Appendix 2). This alternative would close this area to directed longfin squid fishing.

7cMack. Require observers in RH/S Mackerel Management Area (applies in quarter 1 only – see map below) for vessels with federal mackerel permits to retain 20,000 pounds or more of mackerel. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

The RH/S Mackerel Management Area (see figure below) encompasses most quarter-one mid-water trawl effort as well as most quarter-one observer data observations of RH/S catch, which are estimated to account for 35% of total RH/S catch. This alternative would close this area to directed mackerel fishing unless vessels paid to take an observer along if federal funding for an observer was not available. See alternative 5f for funding/operational details.

If an overall observer coverage requirement in Alternative Set 5 was selected but did not result in a trip covered by an alternative in this Alternative Set having an observer, this Alternative Set would effectively require additional coverage.

7cLong. Require observers in RH/S longfin squid Management Area (applies year round) for vessels with federal longfin squid permits to possess 2,500 pounds or more of longfin squid. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

The RH/S Longfin Squid Management Area encompasses most small mesh bottom trawl effort, which is responsible for 24% of RH/S catch. This alternative would close this area to directed longfin squid fishing unless vessels paid to take an observer along if federal funding for an observer was not available. See alternative 5f for funding/operational details.

If an overall observer coverage requirement in Alternative Set 5 was selected but did not result in a trip covered by an alternative in this Alternative Set having an observer, this Alternative Set would effectively require additional coverage.

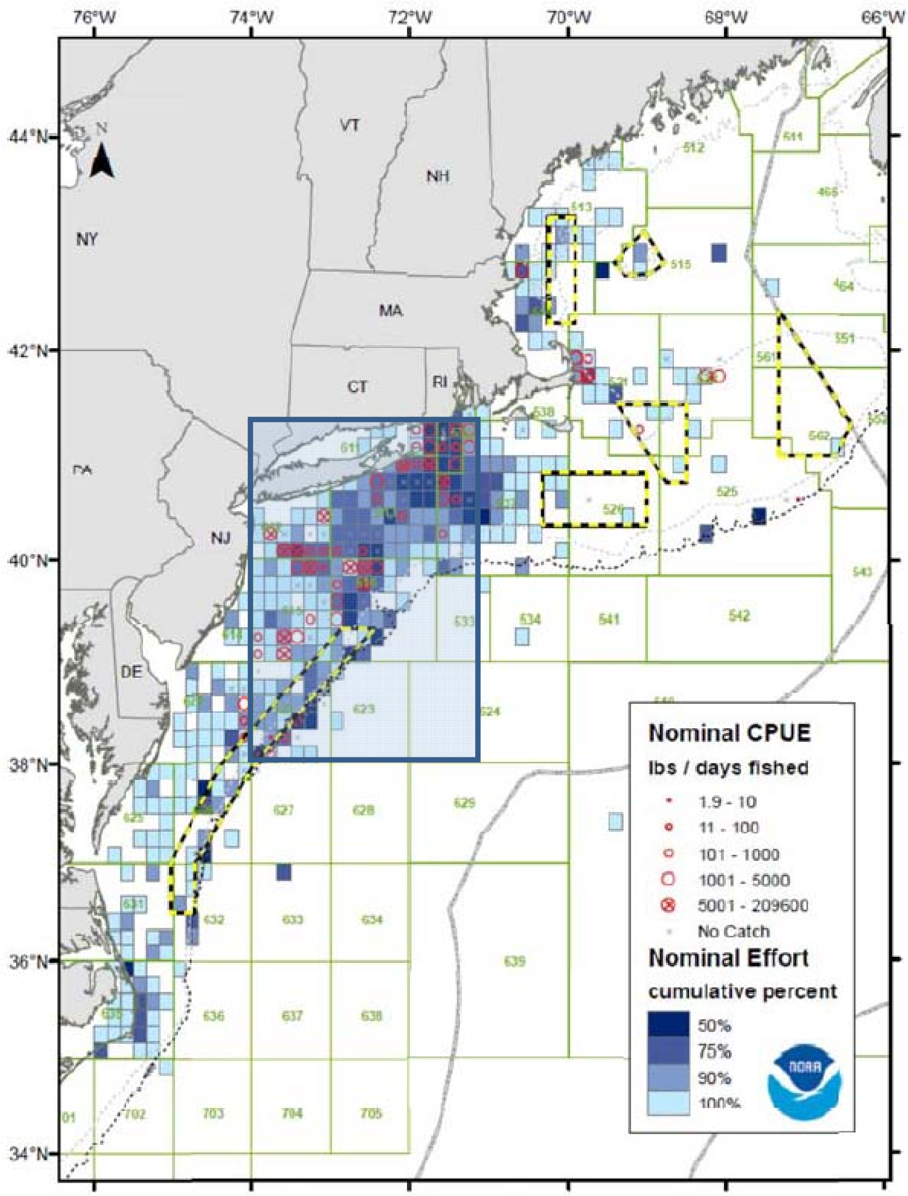
7d. Make above requirement(s) in effect only when a mortality cap "trigger" is reached. Operation of a "trigger" would be identical to the operation of a mortality cap (see Alternative Set 6 above) but the consequence of hitting the cap would be implementing 7b and/or 7c above if this alternative is selected in conjunction with 7b and/or 7c above. Trigger levels would be specified annually via specifications.

This option would use a mortality cap but instead of shutting down the fishery either the closed area or 100% observer coverage requirements in this Alternative Set would go into force. This alternative could only be selected in conjunction with 7b and/or 7c above. Alternative Set 6 above describes how a mortality cap would work.

7e. Stipulate that any areas designated in Amendment 14 would be considered for updating every other year in specifications considering the most recent data available when specifications are developed.

This alternative would commit the Council to re-evaluate the designated areas every other year during the specifications process. The impacts of any potential revised areas will be evaluated in the NEPA documentation for the annual specifications that considered the changes

Figure 18. RH/S Mackerel Management Area



Combined 4 species - paired and single mid water trawl - 2005-2010
Q1

Figure 19. RH/S longfin squid Management Area over small mesh bottom effort and RH/S Catch (Quarters 1 and 2)

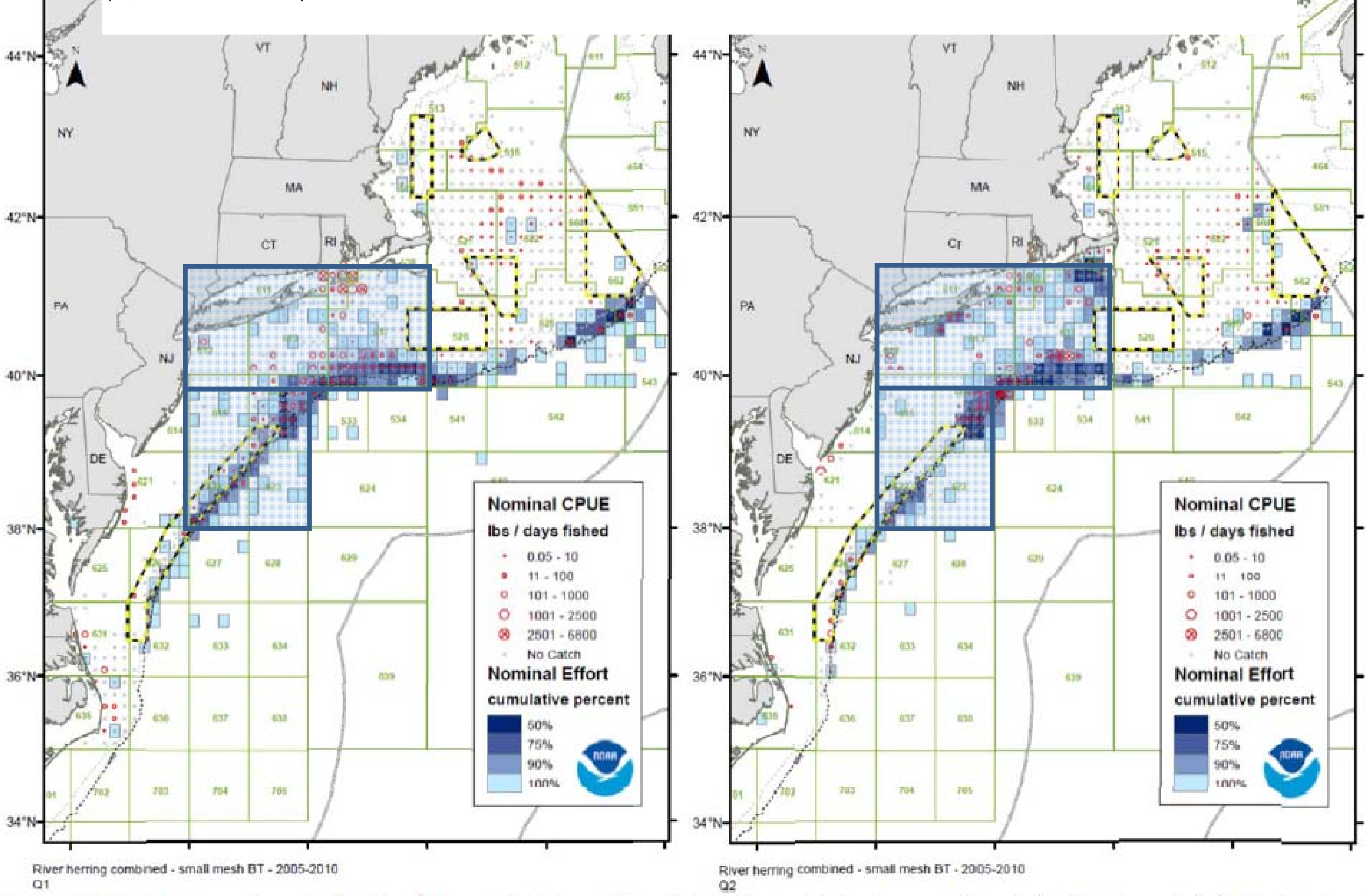


Figure 33. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 1 (left) and 2 (right) for 2005-2010.

Figure 20. RH/S Longfin Squid Management Area over small mesh bottom effort and RH/S Catch (Quarters 3 and 4)

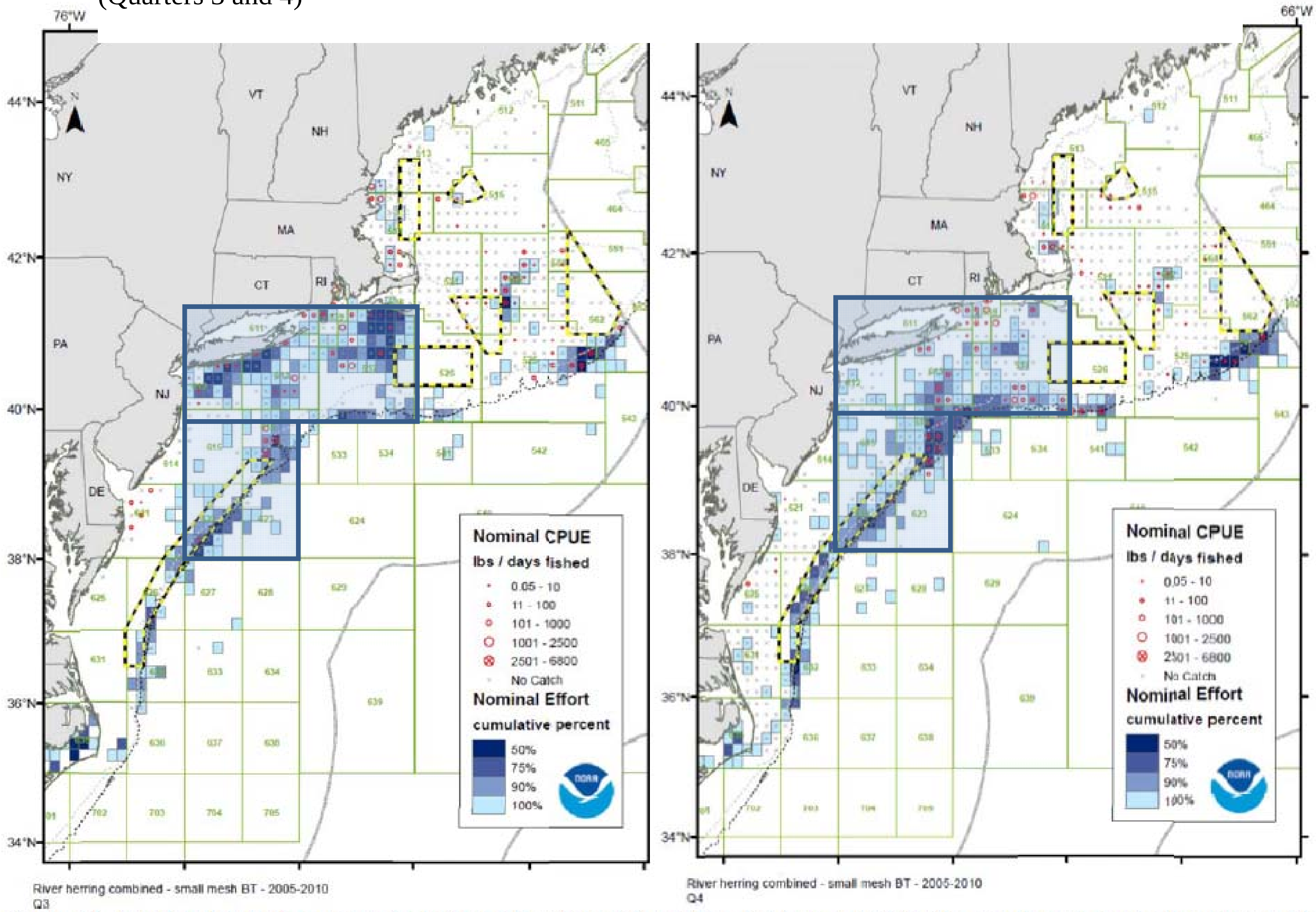


Figure 34. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 3 (left) and 4 (right) for 2005-2010.

5.8 Alternative Set 8 – Hotspot Restrictions

5.8.1 Statement of Problem/Need for Action

There are currently no limits on incidental catch of RH/S in the mackerel and/or longfin squid fisheries other than state landing requirements

5.8.2 General Rationale & Background

The New England Fishery Management Council developed a variety of "Hotspot" alternatives in Amendment 5 to the Atlantic Herring Plan. All of the areas contemplated are relatively small and consider different restrictions within the hotspots. Since Atlantic herring and mackerel are often targeted by the same vessels and are sometimes targeted together at the same time, it makes sense to consider these alternatives even though they were based on observer data from "herring trips" as defined below. This would help ensure consistency among vessels targeting mackerel and Atl. herring.

The smallest areas are termed "River Herring **Protection Areas**." These Protection Areas were identified bimonthly as the quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring during the respective 2-month period. The protection areas include just the portion of the monitoring/avoidance areas (described below) that have the highest river herring catches on Atlantic herring trips as defined above. Since the raw observer data were pooled across years, the threshold was only one tow, and the results are only from Herring Trips, they do not reflect how much total river herring was caught in the Protection Area versus other areas in a given year.

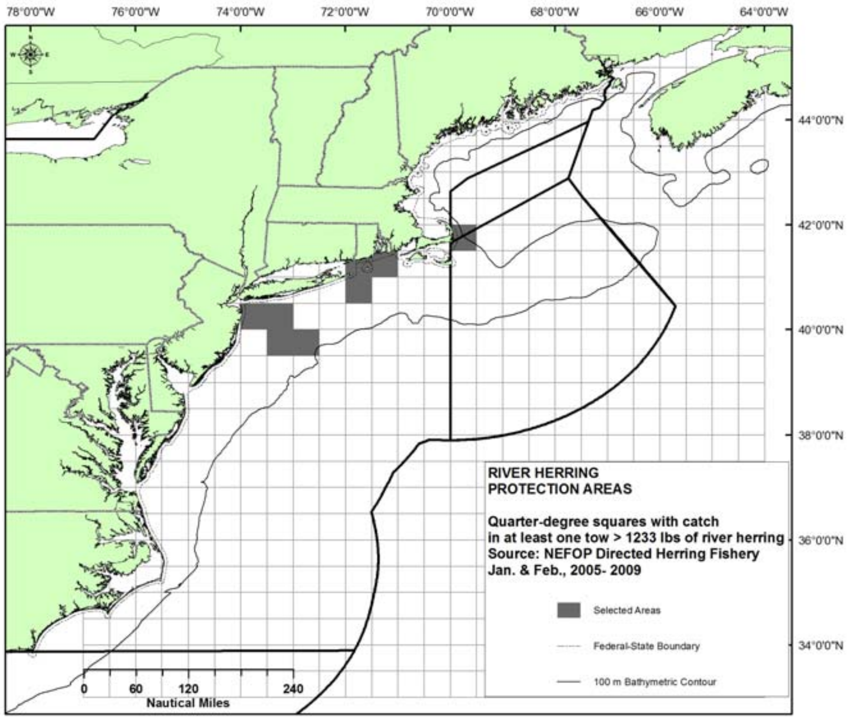
Slightly larger areas are termed "River Herring **Monitoring/Avoidance Areas**." These Monitoring/Avoidance Areas were identified bimonthly as the quarter degree squares with at least one observed tow of river herring catch greater than 40 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring during the respective 2-month period. They include all of the area identified in the protection areas as well is areas where a more modest amount of river herring was caught. Since the raw observer data were pooled across years, the threshold was only one tow, and the results are only from Herring Trips, they do not reflect how much total river herring was caught in the Monitoring/Avoidance Areas versus other areas in a given year.

These protection and monitoring/avoidance areas are mapped below by their respective bi-monthly periods. Since seeing them on the same page clarifies the differences among the areas, they are illustrated together below (where applicable). Management measures that could apply to these areas follow the maps.

5.8.3 Management Alternatives

Figure 21. January – February Herring Area

Protection Area (highest catch records from Monitoring/Avoidance Area)



Monitoring/Avoidance Area

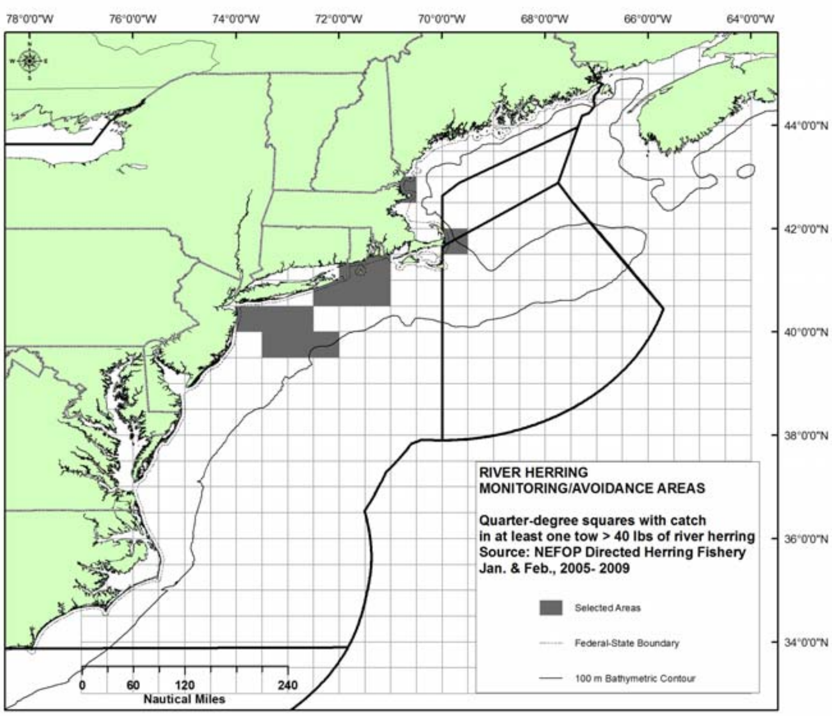
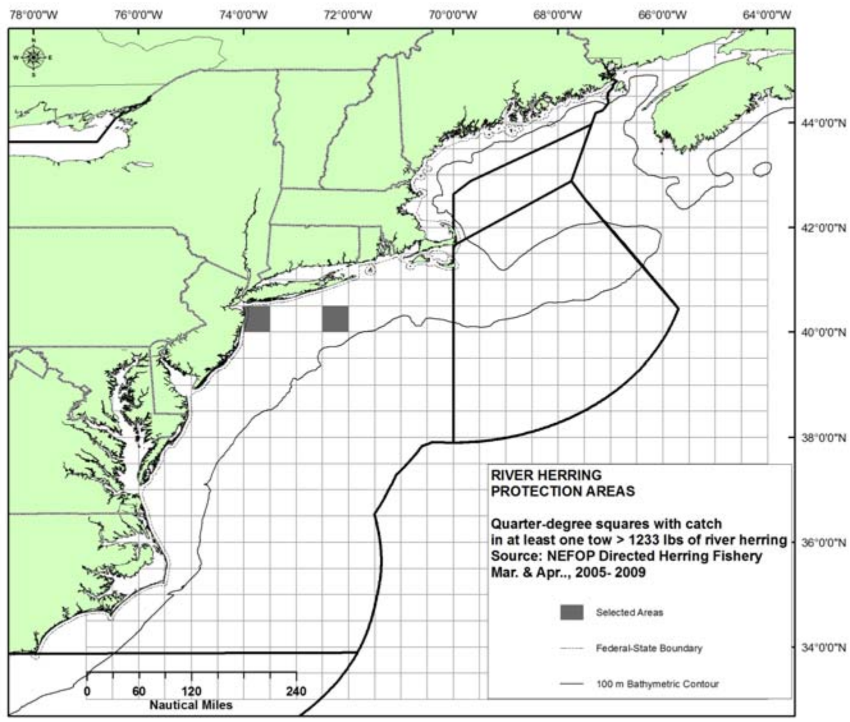


Figure 22. March – April Herring Area

Protection Area (highest catch records from Monitoring/Avoidance Area)



Monitoring/Avoidance Area

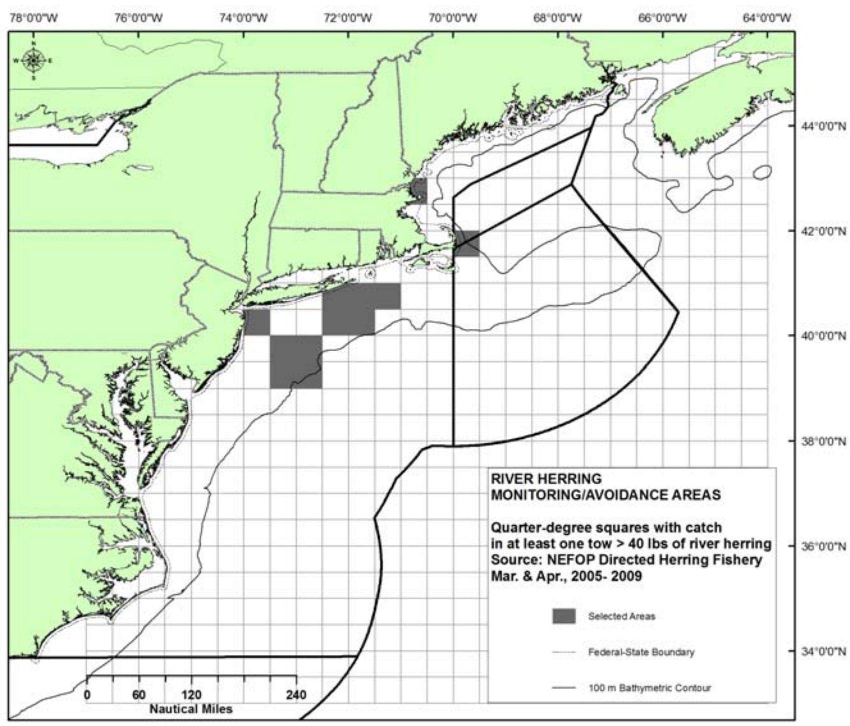


Figure 23. May – June Herring Area

Protection Area

None proposed – there were no qualifying observer records (quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring).

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Monitoring/Avoidance Area

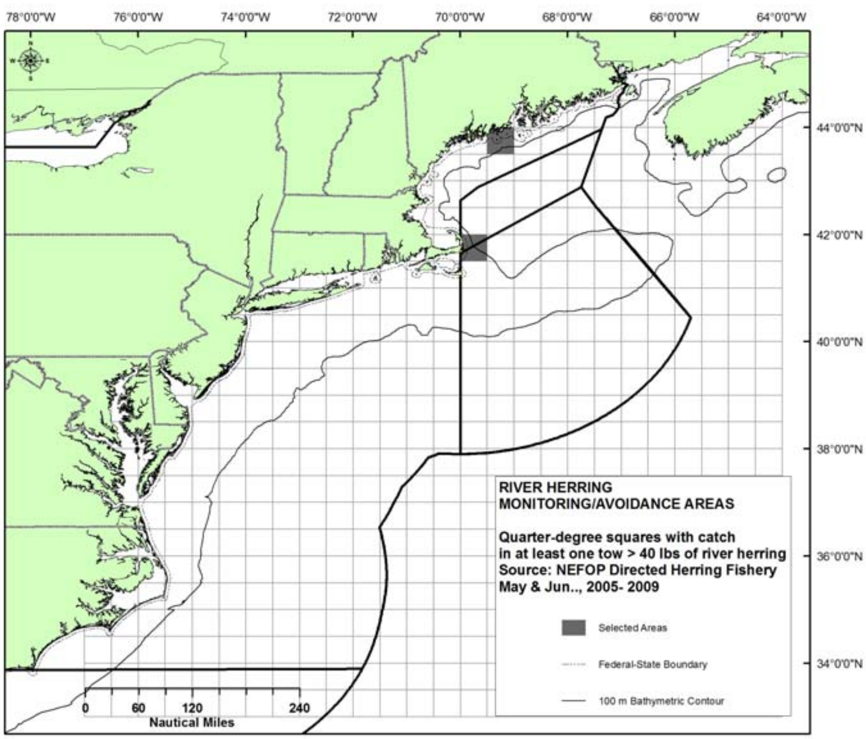

Figure 24. July – August Herring Area

Protection Area

None proposed – there were no qualifying observer records (quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring).

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Monitoring/Avoidance Area

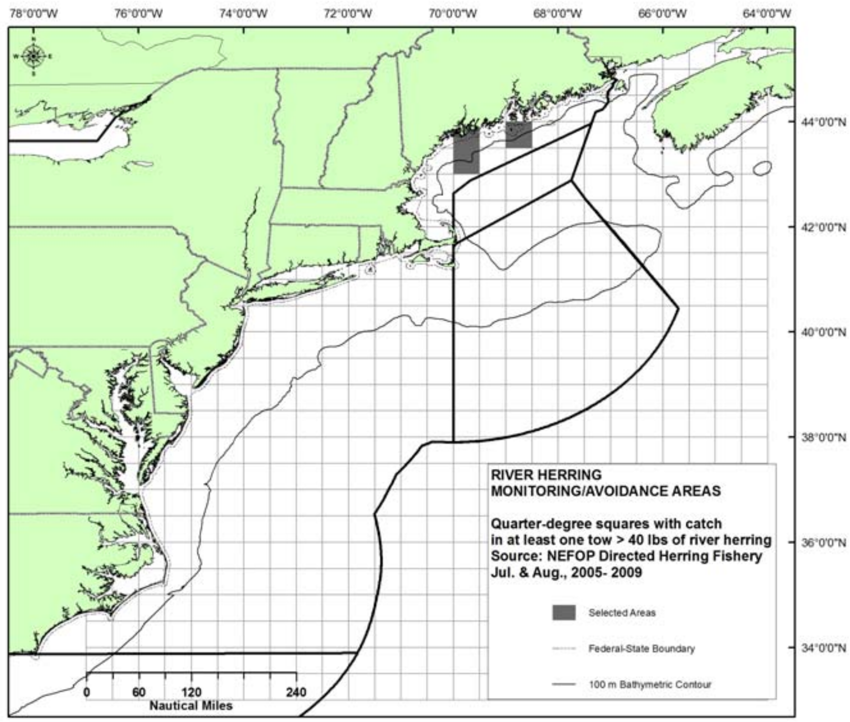
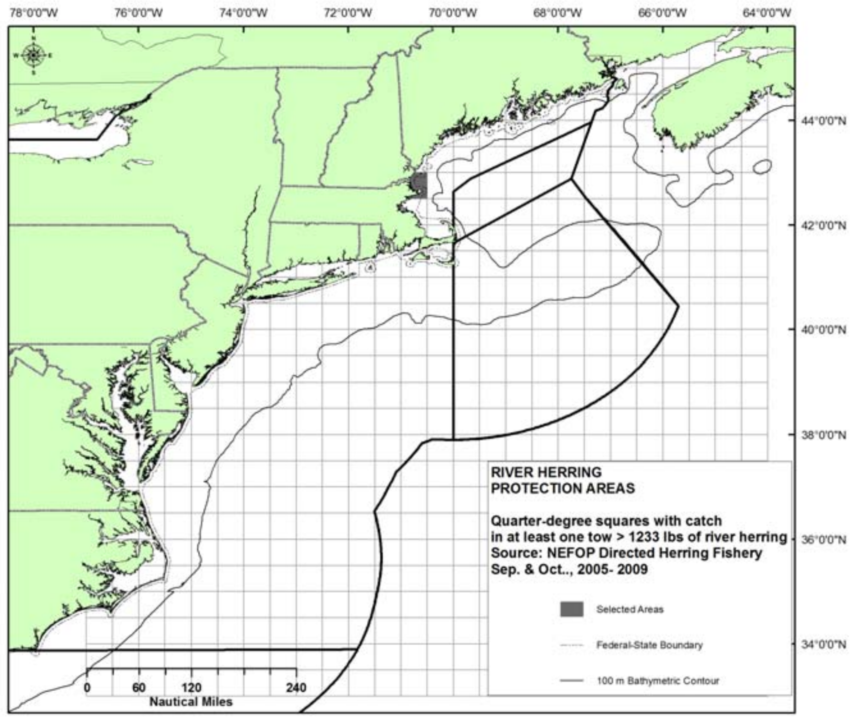


Figure 25. September – October Herring Area

Protection Area (highest catch records from Monitoring/Avoidance Area)



Monitoring/Avoidance Area

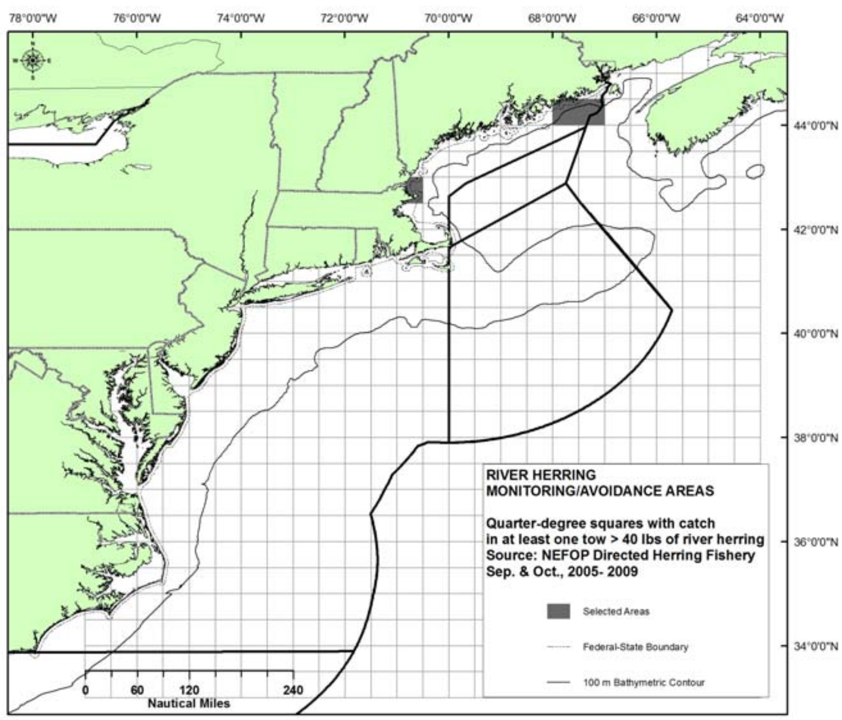
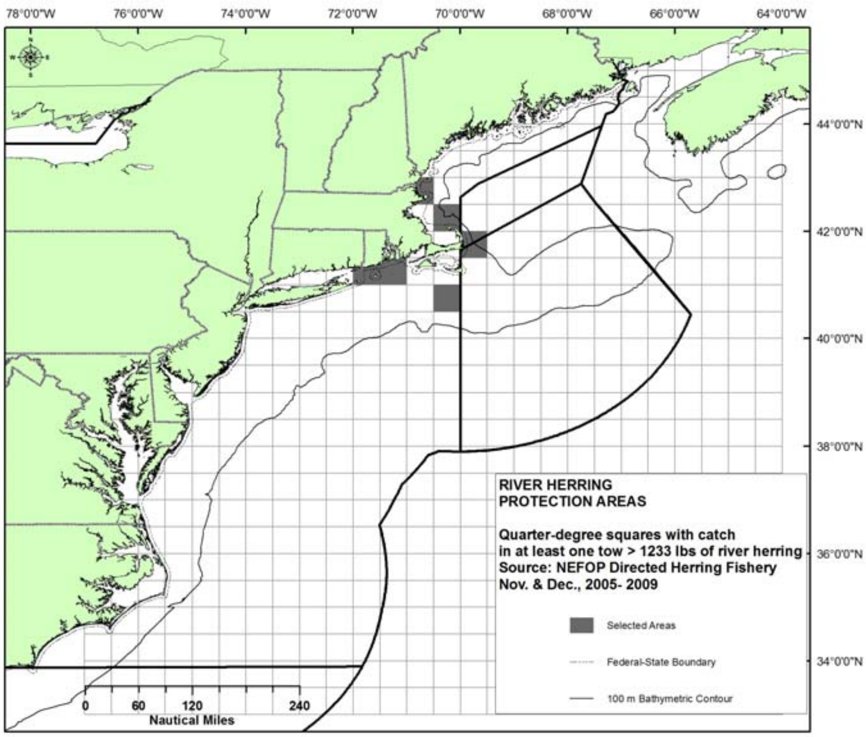
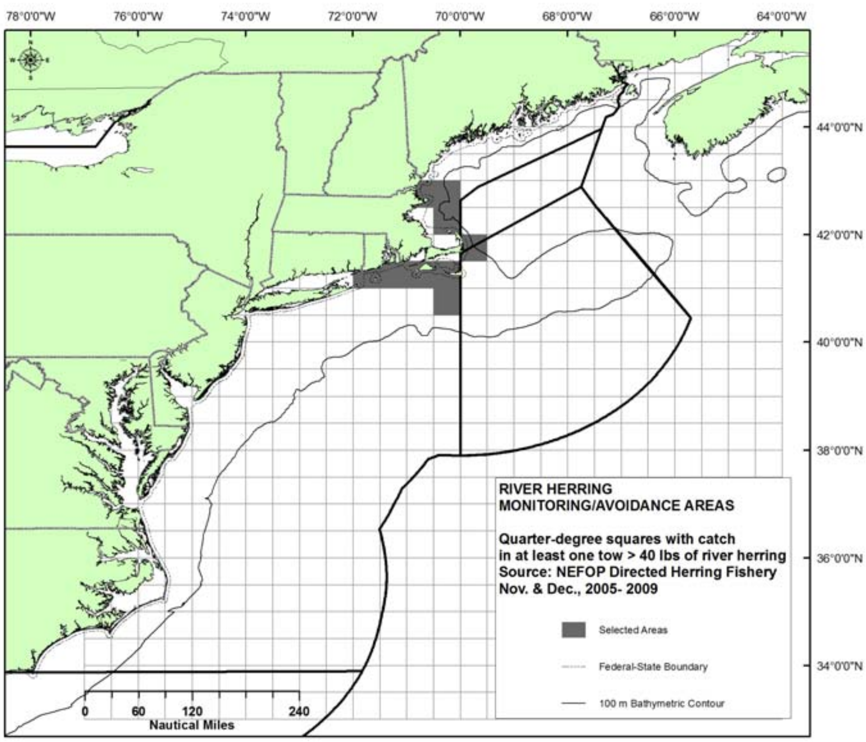


Figure 26. November – December Herring Area

Protection Area (highest catch records from Monitoring/Avoidance Area)



Monitoring/Avoidance Area



Management Measures

NOTE ON COMBINATIONS: All of the action alternatives in the set could be adopted individually or together. 8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen.

Given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery.

The enforceability of area-based management alternatives could be facilitated by the selection of the vessel monitoring system (VMS) requirement in Alternative Set 1 (alternatives 1eMack or 1eLong).

The selection of alternatives that include observer coverage requirements (8cMack and 8cLong) would require the selection of observer program notification alternatives for limited access mackerel permits in Alternative Set 1(1d48 and 1d72).

If an overall observer coverage requirement in Alternative Set 5 was selected but did not result in a trip covered by an alternative in this Alternative Set having an observer, this Alternative Set would effectively require additional coverage.

8a. No-action

Under the no-action alternative, there would be no area-based restrictions on the mackerel and/or longfin squid fisheries that are designed to reduce catch of RH/S. State management of RH/S would continue (see 5.9.2) for state catches. The New England and Mid-Atlantic Fishery Management Council's would continue to consider ways to reduce RH/S catch in their at-sea fisheries (and may implement other conservation measures in this amendment or Amendment 5 to the Atl Herring FMP) but there would be no area-based restrictions on the mackerel and/or longfin squid fisheries that are designed to reduce catch of RH/S. There are other area-based closures for bottom trawling already in effect (e.g. black and yellow dashed areas on figures 18-20) related to bycatch, habitat, or other issues and these restrictions would remain in effect. Details and charts for existing area-based restrictions may be found at: http://www.nero.noaa.gov/nero/fishermen/charts.html. Some alternatives in the set would require additional observer coverage but under the no-action alternative the current observer coverage levels would continue (see 5.5.2 and 5.5.3).

8b. Make implementing the hotspot requirements of NEFMC's Amendment 5 to the Atlantic Herring Plan for Mackerel/longfin squid vessels frameworkable.

The Council would make the hotspot requirements considered below frameworkable under a subsequent action. Biological and Socioeconomic considerations would be reevaluated when the framework was developed.

8cMack. For Atlantic mackerel permitted vessels, more than an incidental level of fish (20,000 pounds mackerel) may not be retained/transferred/ possessed if any fishing occurs in a River Herring Monitoring/Avoidance Area without a NMFS-approved observer at any point during the trip. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries).

8cMack would prohibit directed mackerel fishing in a River Herring Monitoring/Avoidance Area without a NMFS-approved and possibly industry funded (if necessary) observer at any point during the trip. See alternative 5f for funding/operational details.

8cLong. For longfin squid permitted vessels, more than an incidental level of fish (2,500 pounds longfin squid) may not be retained/transferred/ possessed if any fishing occurs in a River Herring Monitoring/Avoidance Area without a NMFS-approved observer at any point during the trip. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries).

8cLong would prohibit directed longfin squid fishing in a River Herring Monitoring/Avoidance Area without a NMFS-approved and possibly industry funded (if necessary) observer at any point during the trip. See alternative 5f for funding/operational details.

8dMack. If a mackerel-permitted vessel is fishing in any River Herring Monitoring/Avoidance Areas identified in this alternative with an observer onboard, vessels would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Unless specific conditions are met (see below), vessels would be prohibited from releasing fish from the net, transferring fish to another vessel that is not carrying a NMFS-approved observer, or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the NMFS-approved observer.

• Vessels may make short test tows in the area to check the abundance of target and incidental catch species without pumping the fish on board if the net is reset without releasing the contents of the test tow. In this circumstance, catch from the test tow would remain in the net and would be available to the observer to sample when the subsequent tow is pumped out.

• Fish that have not been pumped aboard may be released if the vessel operator finds that:
1. pumping the catch could compromise the safety of the vessel;
2. mechanical failure precludes bringing some or all of the catch aboard the vessel; or
3. spiny dogfish have clogged the pump and consequently prevent pumping of the rest of the catch.

• If the net is released for any of the reasons stated above, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. The Released Catch Affidavit must be submitted within 48 hours of completion of the fishing trip.

• Following the release of the net for one of the three exemptions specified above, the vessel would be required to exit the River Herring Monitoring/Avoidance Area. The vessel may continue to fish but may not fish in the River Herring Monitoring/Avoidance Areas for the remainder of the trip.

8dLong. If a longfin squid-permitted vessel is fishing in a River Herring Monitoring/Avoidance Areas identified in this alternative with an observer onboard, vessels would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Unless specific conditions are met (see below), vessels would be prohibited from releasing fish from the net, transferring fish to another vessel that is not carrying a NMFS-approved observer, or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the NMFS-approved observer.

• Vessels may make short test tows in the area to check the abundance of target and incidental catch species without pumping the fish on board if the net is reset without releasing the contents of the test tow. In this circumstance, catch from the test tow would remain in the net and would be available to the observer to sample when the subsequent tow is pumped out.

• Fish that have not been pumped aboard may be released if the vessel operator finds that:
1. pumping the catch could compromise the safety of the vessel;
2. mechanical failure precludes bringing some or all of the catch aboard the vessel; or
3. spiny dogfish have clogged the pump and consequently prevent pumping of the rest of the catch.

• If the net is released for any of the reasons stated above, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. The Released Catch Affidavit must be submitted within 48 hours of completion of the fishing trip.

• Following the release of the net for one of the three exemptions specified above, the vessel would be required to exit the River Herring Monitoring/Avoidance Area. The vessel may continue to fish but may not fish in the River Herring Monitoring/Avoidance Areas for the remainder of the trip.

8eMack. Vessels possessing a federal mackerel permit would not be able to retain, possess or transfer more than an incidental level of fish (20,000 pounds mackerel) while in a River Herring Protection Area unless no mesh smaller than 5.5 inches is onboard the vessel.

8eMack would prohibit directed mackerel fishing in a River Herring Protection Area unless no mesh smaller than 5.5 inches was onboard the vessel. 5.5 inches was chosen because based on the analysis in this document (see Appendix 2), substantial incidental catch of RH/S appears unlikely at mesh sizes of 5.5 inches or greater.

8eLong. Vessels possessing a federal moratorium longfin squid permit would not be able to retain, possess or transfer more than an incidental level of fish (2,500 pounds longfin squid) while in a River Herring Protection Area unless no mesh smaller than 5.5 inches is onboard the vessel.

8eLong would prohibit directed longfin squid fishing in a River Herring Protection Area unless no mesh smaller than 5.5 inches was onboard the vessel. 5.5 inches was chosen because based on the analysis in this document (see Appendix 2), substantial incidental catch of RH/S appears unlikely at mesh sizes of 5.5 inches or greater.

8f. Make the above measures 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong only effective if/when they are effective for Atlantic Herring vessels, including if they become effective in the middle of a season because a catch-cap based trigger is reached by the Atlantic Herring fleet under a trigger established by Amendment 5 to the Atlantic Herring FMP.

These same measures are being considered in Amendment 5 to the Atlantic Herring fishery management plan for the Atlantic herring fishery. Given the overlap in the Atlantic mackerel and Atlantic herring fisheries, and given the hotspots in this Alternative Set are focused on RH incidental catch on herring trips, it primarily makes sense for the hotspot provisions to apply if they also apply to Atlantic herring fishing. 8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would thus only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen.

5.9 <u>Alternative Set 9</u> - Add RH/S Stocks as "Stocks in the Fishery" within the MSB FMP

5.9.1 Statement of Problem/Need for Action

The overall existing federal/state/regional management framework may be insufficient to adequately conserve RH/S stocks (see Section 6.2 for a summary of RH/S stock statuses). Adding RH/S stocks as "stocks in the fishery" in the MSB FMP would not fix every problem but would bring some additional resources to bear on RH/S problems, though that may mean that other management priorities receive less resources.

Note: It is not possible to develop all of the measures (especially essential fish habitat or EFH) that would be necessary for the FMP not to be deficient if any RH/S species were officially added as stocks in the fishery in this document. Instead, selection of an Alternative Set 9 action alternative would "kick off" another Amendment to fully add stocks to the MSB FMP in a manner that would keep the plan in compliance with the Magnuson Stevens Act. The Act's required provisions for management plans are included below.

5.9.2 General Rationale & Background

<u>Current Management</u>

The Atlantic States Marine Fisheries Commission (Commission) manages RH/S with its Interstate Fishery Management Plan for Shad and River Herring (FMP) under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). Shad and river herring management authority lies with the coastal states and is coordinated through the Commission. Responsibility for compatible management action in the Exclusive Economic Zone (EEZ) from 3-200 miles from shore lies with the Secretary of Commerce through ACFCMA in the absence of a federal fishery management plan. Comprehensive assessments are not currently available for RH/S but most indications point to depressed runs in most river systems.

The ASMFC implemented river herring moratoria for all states on Jan 1, 2012 except those states (e.g. Maine which landed over 1,000,000 pounds of river herring in 2010) that have approved sustainable fishing plans. The ASMFC will have implemented shad moratoria for all states by Jan 1, 2013 except those states have approved sustainable fishing plans. Ocean shad fisheries have been phased out for all states but some in-river fisheries still exits.

The ASMFC defines a sustainable fishery as "a commercial and/or recreational fishery that will not diminish the potential future stock reproduction and recruitment." Submitted plans must clearly demonstrate that the state's or jurisdiction's fisheries meet this definition of sustainability through the development of sustainability targets which must be achieved and maintained. All river systems are allowed to maintain a catch and release recreational fishery. States and jurisdictions are also required to identify local significant threats to shad critical habitat and develop a plan for mitigation and restoration. Recommendations for river herring habitat improvement have also been approved by the ASMFC.

Approved sustainable fishing plans vary by state and are available by contacting the ASMFC (asmfc.org), but the main point is that by 2013, any state landings of RH/S should be sustainable (ASMFC 2011).

Habitat restoration efforts have focused on improved fish passages around dams and dam removal with 100s of projects completed in that last 25 years. Each project opens up varying additional river miles to anadromous fish passage and spawning (Pers Com Kate Taylor, ASMFC). These are often joint state-federal projects with cooperation between the states, NOAA, U.S. Fish and Wildlife (U.S. F&WS), and private organizations such as American Rivers. Hundreds of millions of dollars have been spent on such activities over the last 25 years (pers com, Larry Miller, U.S. F&WS). Additional information on current RH/S stock status is available in Section 6.2 and detailed information on the RH/S stocks and fisheries is available in the ASMFC's annual RH/S status update, available at: http://www.asmfc.org/shadRiverHerring.htm.

While states cannot make regulations in federal waters (beyond three miles), state requirements can have impacts on federal vessels since vessels must transit state waters to land their fish. It is not entirely clear how impending state moratoria will impact federal vessels since some are just coming online and they may differ between the states. However, some states like Virginia are prohibiting all possession of any river herring in addition. This means that a vessel with incidental river herring catch onboard from fishing in federal waters would be in violation once it entered state waters. Other states, may prohibit retention of river herring caught in state waters but allow transiting. Once the Final EIS is written there should be additional clarity on the various state regulations for 2012.

Magnuson Stevens Act

The Magnuson Stevens Act (MSA) states the following regarding Council responsibilities: "…Each Council shall…for each fishery under its authority that requires conservation and management, prepare and submit to the Secretary (A) a fishery management plan…"

Regarding Councils' authorities, MSA states: "The Mid-Atlantic Fishery Management Council shall consist of the States of New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, and North Carolina and shall have authority over the fisheries in the Atlantic Ocean seaward of such States…"

NMFS has published guidelines (available at: http://www.nmfs.noaa.gov/msa2007/catchlimits.htm) in the Federal Register regarding MSA's National Standard 1 (NS1) which states: "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry."

The NS1 Final Rule states: "The relevant Council determines which specific target stocks and/or non-target stocks to include in a fishery." Regarding non-target species like RH/S, the rule states "They may or may not be retained for sale or personal use. Non-target species may be included in a fishery and, if so, they should be identified at the stock level." The rule also describes a concept called ecosystem component species but it is not clear what obligations that would trigger other than standard MSA provisions to reduce bycatch under National Standard 9. Regardless, guidance that ecosystem component species should "Not be likely to become subject to overfishing or overfished… in the absence of conservation and management measures" and "Not generally be retained for sale or personal use" would seem to preclude designation of RH/S as ecosystem component species.

Given the preceding paragraph, it would seem to be at the discretion of the Council whether to adopt RH/S as "stocks" in the fishery within the MSB FMP. Doing so essentially would add RH/S as managed resources just like the squids, mackerel, and butterfish and would trigger requirements including status determination criteria, ACLs/AMs, EFH designations, and rebuilding if necessary.

Given that the Atlantic States Marine Fisheries Commission (ASMFC) already has a plan to manage RH/S, it would appear viable to either continue to address the RH/S incidental catch that occurs in the Councils' existing managed fisheries cooperatively with the ASMFC or to add one or more of the RH/S species to the MSB FMP depending on the Council's judgment about which route will provide for optimal management.

One question that has surfaced repeatedly has been could the Council add river herring or shad as stocks in the fishery but use the ACL/AM flexibility provisions of the NS1 guidance to defer to ASMFC for primary management as the NPFMC is considering for salmon and deferring to Alaska? This could theoretically allow the designation of EFH and result in greater federal resources without having to deal with ACLs for these currently data-poor stocks. There are several key issues however, which become evident when reviewing analysis for updating the NPFMC's salmon plan (http://www.fakr.noaa.gov/npfmc/), where Alaska has primary authority even though it is a federally managed species. First, Alaska has a long history of well-documented successful/sustainable management with salmon. Second, the salmon situation is different in that RH/S landings, and certainly discards, appear not nearly as well documented (especially at the species level) as salmon. Existing or pending ASMFC moratoriums will likely address most of the landings control, but not address discarding in state or Federal fisheries. For these reasons it currently seems likely that the establishment ACLs and AMs would be necessary. This is at least the viewpoint of the Amendment 14 FMAT and NOAA GC, though the Council looks forward to getting additional perspectives on this topic during the public input process.

The ACL flexibility guidelines also still require consistency with Magnuson (alternatives to ACLs/AMs would have to essentially achieve the same results). So even if primary management could be ceded to the ASMFC, the Council's suite of management measures would still have to function as ACLs/AMs. Thus the Council would still have to implement hard caps on its other managed species to control overall catch. Further, even if ASMFC had primary responsibility, the Council would still have to limit incidental catch in its directed fisheries based on the best available science about what catch level is consistent with sustainability and/or rebuilding as well as accounting upfront for whatever catch (landings and/or discards) occurs in state waters. Thus while there might not be ACLs/AMs on paper, the caps on incidental catch in Council-managed fisheries would need to have the same function as ACLs/AMs in order to be consistent with the Magnuson Act and the National Standard One final rule guidelines. Again however, this is the viewpoint of the Amendment 14 FMAT and NOAA GC and the Council looks forward to getting additional perspectives on this topic during the public input process.

If RH/S were added to the MSB FMP, the Magnuson Act states that fishery management plans shall:

(1) contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are--

> (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery;
> (B) described in this subsection or subsection (b), or both; and
> (C) consistent with the national standards, the other provisions of this Act, regulations

implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

(2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

(3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

(4) assess and specify--

(A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3),

(B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and

(C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

(5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, charter fishing, and fish processing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, economic information necessary to meet the requirements of this Act, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

(6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

(7) describe and identify essential fish habitat (EFH) for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for—

(A) participants in the fisheries and fishing communities affected by the plan or amendment;

(B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and

(C) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery;

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority--

(A) minimize bycatch; and

(B) minimize the mortality of bycatch which cannot be avoided;

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery, including its economic impact, and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;

(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate, taking into consideration the economic impact of the harvest restrictions or recovery benefits on the fishery participants in each sector, any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery and;

(15) establish a mechanism for specifying annual catch limits (ACLs) in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability (AMs).

5.9.3 Management Alternatives

NOTE ON COMBINATIONS: All of the action alternatives in the set could be adopted individually or together.

9a. No-action

Under the no-action alternative, primary RH/S management would continue to rest with the states as coordinated through the ASMFC as described above in section 5.9.2. The states would continue to address catch in state waters and address habitat improvements through collaborative work with NOAA, U.S. F&W Service, and private partners. From the Council perspective, RH/S would continue to be managed as a bycatch species, with bycatch to be minimized to the extent practicable. The Council could also continue to consider discretionary measures designed to reduce retained incidental catch (bycatch is defined as discards in the MSA) as it is doing in Amendment 14.

9b. Add blueback herring as a stock in the MSB FMP.

9c. Add alewife as a stock in the MSB FMP.

9d. Add American shad as a stock in the MSB FMP.

9e. Add hickory shad as a stock in the MSB FMP.

The Council could add none, one, or any combination of these species as "stocks" in the fishery. Selecting any of the action alternatives would result in the Council immediately beginning another amendment to add all of the provisions 1-15 above to the FMP for any species that is added. Such a process would likely take another 1-2 years to complete, with the development of ACLs/AMs (or ACL alternatives) and essential fish habitat designations taking the most time and being the most substantive of those provisions.

If an assessment was available and if it contained accepted reference points, any need for rebuilding that was indicated by those reference points could also lead to major actions.

Since RH/S are already managed by the ASMFC, and since substantial catches of RH/S take place in state waters, the plan would likely have to be a joint plan with the ASMFC. It is possible that the Council could attempt to defer primary management of catches (ACLs) to the ASMFC as discussed below.

Once the species were added through the follow-up amendment, NMFS would begin conducting habitat consultations for any identified EFH for federal and/or federally permitted actions (i.e. non-fishing impacts). An evaluation of fishing activities impacts on RH/S habitat and consideration of measures to minimize such impacts would also take place, possibly in the follow-up amendment or possibly afterward through another action.

In the amendment to implement the MSA provisions for a "stock in the fishery," the Council would have to decide whether to implement standard ACLs with accountability measures or make the case that an alternative equivalent could function as an ACL (this applies to any RH/S species that were added). In the first case, the Council's SSC would have to provide an Acceptable Biological Catch (ABC) (regardless of whether information was available on sustainable catch levels), which would be the ACL, and then all sources of mortality would have to be accounted for and controlled to ensure that the ACL was not exceeded. Such controls could involve RH/S retention limits, retention prohibitions, and or measures to reduce discards from relevant gear types such that ACLs would not be exceeded.

In the second case, the Council would have to make the case that alternative management measures are taking the place of an ACL, in the way that the North Pacific Fishery Management Council has made the case that Salmon moratoria in certain federal waters plus Alaska's escapement-based management measures effectively create a justifiable alternative approach to Council-derived ACLs/AMs. Their argument hinges on the fact that the State of Alaska monitors catch in all of the salmon fisheries and manages salmon holistically by incorporating all the sources of fishing mortality on a particular stock or stock complex in calculating the escapement goal range. As explained above, overfishing is prevented by in-season monitoring and data collection that indicates when an escapement goal is not being met. When the data indicate low run strength due to natural fluctuations in salmon abundance, Alaska Department of Fish & Game closes the fishery to ensure the escapement goal range is reached. Biological escapement goal (BEG) means the escapement that provides the greatest potential for maximum sustained yield. BEG is the primary management objective for escapement (NPFMC 2011).

In order to pursue a similar path a be consistent with the MSA, it would appear that the Council would have to make that argument that the States were pursuing management based on biologically-based escapement goals and that those goals had taken all sources of mortality into account, including ocean-intercept fishing mortality. This may be problematic especially in states with moratoriums because they do not know the status of their runs (most) – if they do not know the status of their runs it would seem to be difficult to make the case that whatever at-sea mortality occurs has been accounted for and that taking everything into consideration a sustainable outcome would result.

The two ACL/AM approaches described above would be options for the Council to explore if it decided to move forward with adding any RH/S species as stocks in the MSB FMP.

Note: Due to the difficulty in identifying the two river herrings and the two shads in landings data it is assumed that for ACL/AM purposes that they could be addressed together (i.e. a river herring ACL and a shad ACL).

6.0 Description of the Affected Environment

This section identifies and describes the *valued ecosystem components* (VECs) (Beanlands and Duinker 1984) likely to be affected by the actions proposed in this document. The VECs comprise the affected environment within which the proposed actions will take place. The VECs are identified and described here as a means of establishing a baseline for the impact analysis that will be presented in section 7's "Analysis of Impacts." The significance of the various impacts of the proposed actions on the VECs will also be assessed from a cumulative effects perspective. The range of VECs is described in this section is limited to those for which a reasonable likelihood of meaningful impacts could potentially be expected (CEQ 1997). These VECs are listed below.

1. Managed resources (Atlantic mackerel, longfin squid and *Illex* squid and butterfish)
2. Non-target species
3. Habitat including EFH for the managed resources and non-target species
4. Endangered and other protected resources
5. Human communities

The physical environment is described next, to establish the context for the VECs, and will be followed by the description of the actual VECs. Appendix D of the 2012 Specifications Environmental Assessment (http://www.mafmc.org/fmp/msb_files/msbSpecs2012.htm) also contains a variety of ecosystem factors considered by the Council.

6.1 Physical Environment

Climate, physiographic, and hydrographic differences separate the Atlantic ocean from Maine to Florida into two distinct areas, the New England-Middle Atlantic Area and the South Atlantic Area, with the natural division occurring at Cape Hatteras, though the division is probably better thought of as a mixing zone rather than as a definitive boundary. The MSB fisheries are prosecuted in the New England-Middle Atlantic Area. The New England-Middle Atlantic area is fairly uniform physically and is influenced by many large coastal rivers and estuarine areas (Freeman and Walford 1974 a-d, 1976 a and b). In the New England-Middle Atlantic area, the continental shelf (characterized by water less than 650 ft in depth) extends seaward approximately 120 miles off Cape Cod, narrows gradually to 70 miles off New Jersey, and is 20 miles wide at Cape Hatteras. Surface circulation is generally southwesterly on the continental shelf during all seasons of the year, although this may be interrupted by coastal indrafting and some reversal of flow at the northern and southern extremities of the area. Water temperatures range from less than 33 ^{o}F in the New York Bight in February to over 80 ^{o}F off Cape Hatteras in August.

Within the New England-Middle Atlantic Area, the principal area within which the MSB fisheries are prosecuted is the Northeast Shelf Ecosystem which includes the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream (Figure 27). A number of distinct subsystems comprise the region. The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and fast-moving currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to

Cape Hatteras, NC.

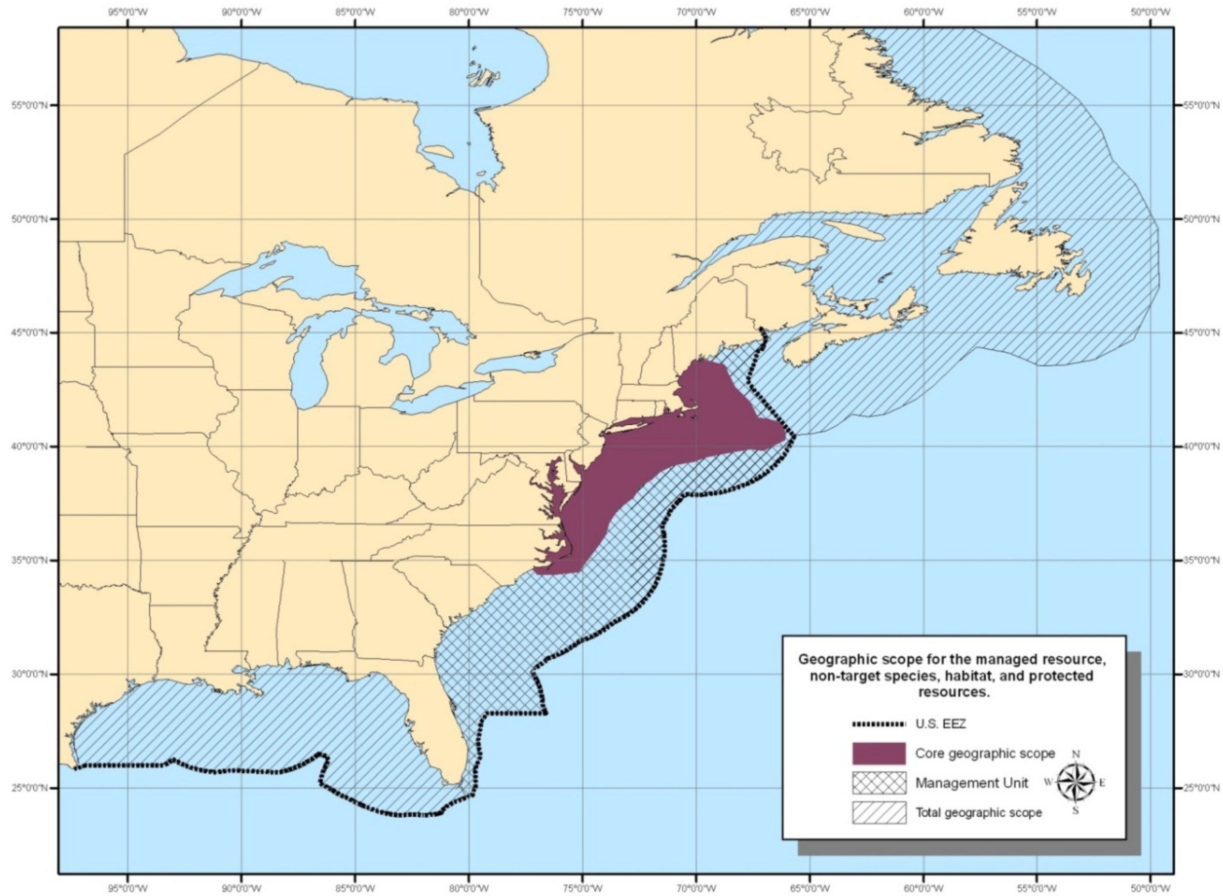


Figure 27. Geographic scope of the mackerel, squid and butterfish fisheries.

Figures 1 describes the geographic scope of the MSB fisheries. Almost all of the MSB catch and related effort occurs within the solid shaded "core geographic scope." Previous public comment has requested that the Council include mention that numerous old dump sites for municipal, industrial, and military waste exist in the management area, specifically the "106-Mile Dump Site" formerly utilized east of Delaware's ocean coastline, beyond the Continental Shelf. Detailed information on the 106-Mile Dump Site can be found in the 1995 EPA report to Congress on the 106-Mile Dump Site available by searching for "106 Mile Dump Site at http://www.epa.gov/history/. The available research generally concluded that sewage sludge did not reach important areas for commercial fisheries and that the 106-Mile Dump Site was not the prime source of the generally low chemical contamination in tilefish, the primary commercially important finfish species resident in the shelf/slope areas adjacent to the 106-Mile Dump Site (EPA 1995).

6.2 Biology of the Managed Resources

6.2.1 Atlantic mackerel (mackerel)

Atlantic mackerel is a pelagic, schooling species distributed between Labrador (Newfoundland, Canada) (Parsons 1970) and North Carolina (Anderson 1976a). Sette (1943; 1950) identified two distinct groups consisting of a northern contingent and a southern contingent. The two contingents overwinter primarily along the continental shelf between the Middle Atlantic and Nova Scotia, although it has been suggested that overwintering occurs as far north as Newfoundland. With the advent of warming shelf water in the spring, the two contingents begin migration, with the northern contingent moving along the coast of Newfoundland and historically into the Gulf of St. Lawrence for spawning from the end of May to Mid-August (Berrien 1982). The southern contingent spawns in the Mid-Atlantic and Gulf of Maine from mid-April to June (Berrien 1982) then moves north to the Gulf of Maine and Nova Scotia. In late fall, migration turns south and fish return to the over-wintering grounds. *Some of the Council's advisers who mackerel fish have questioned if the historical patterns described above are being maintained currently.* Biochemical studies (Mackay 1967) have not established that genetic differences exist between the two groups and precise estimates of the relative contributions of the two groups cannot be made (ICNAF 1975). Atlantic mackerel in the northwest Atlantic are assessed as a unit stock and are considered one stock for fishery management purposes.

Mackerel are 0.1" long at hatching, grow to about 2" in two months, and reach a length of 8" in December, near the end of their first year of growth (Anderson and Paciorkowski 1978). During their second year of growth they reach about 10" in December, and by the end of their fifth year they grow to an average length of 13" FL. Fish that are 10-13 years old reach a length of 15-16" (Grosslein and Azarovitz 1982). MacKay (1973) and Dery and Anderson (1983) have found an inverse relationship between growth and year class size. All Atlantic mackerel are sexually mature by age 3, while about 50% of the age 2 fish are mature. Average size at maturity is about 10.5-11" FL (Grosslein and Azarovitz 1982). The maximum age observed is 17 years (Pentilla and Anderson 1976).

Atlantic mackerel are opportunistic feeders that can ingest prey either by individual selection of organisms or by passive filter feeding (Pepin *et al.* 1988). Larvae feed primarily on zooplankton. Juveniles eat mostly small crustaceans such as copepods, amphipods, mysid shrimp and decapod larvae. They also feed on small pelagic molluscs (*Spiratella* and *Clione*) when available. Adults feed on the same food as juveniles but diets also include a wider assortment of organisms and larger prey items. For example, euphausiid, pandalid and crangonid shrimp are common prey; chaetognaths, larvaceans, pelagic polychaetes and larvae of many marine species have been identified in mackerel stomachs. Immature mackerel begin feeding in the spring; older fish feed until gonadal development begins, stop feeding until spent and then resume prey consumption (Berrien 1982).

Atlantic mackerel are an important prey species and are known to be preyed upon by many pelagic and demersal fish species, as well as by marine mammals and seabirds (Smith and Gaskin 1974; Payne and Selzer 1983; Overholtz and Waring 1991; Montevecchi and Myers 1995; Scott and Tibbo 1968; Maurer and Bowman 1975; Stillwell and Kohler 1982, 1985; Bowman and Michaels 1984). The recent TRAC estimated mortality for a subset of key finfish predators (www.mar.dfo-mpo.gc.ca/science/trac/tsr.html) but estimates for marine mammals and seabirds are not available.

Stock Status

The mackerel stock was most recently assessed via a Transboundary Resource Assessment Committee in 2010 (TRAC 2010), which analyzed data though 2008 (www.mar.dfo-mpo.gc.ca/science/trac/tsr.html). A number of different models and model formulations were evaluated. Given the uncertainty in the assessment results, the TRAC agreed that short term projections and characterization of stock status relative to estimated reference points would not be an appropriate basis for management advice at this time. Given current indications of reduced productivity and lack of older fish in the survey and catch, the TRAC recommended that annual total catches not exceed the average total landings (80,000 mt) over the last three years (2006-2008) until such time that new information suggests that a different amount is appropriate. SSB outputs from the final TRAC model are included below in Figure 28 but were considered useful only for the purposes of indicating likely trends.

While NMFS' official "status of stocks" document technically list mackerel as "not overfished" and "not experiencing overfishing" the results of the 2010 TRAC suggest their true status is unknown with respect to being overfished or not and with respect to experiencing overfishing or not, especially since the 2010 TRAC identified technical issues with the preceding assessment. Efforts are ongoing to determine if a switch to "unknown status" would be more appropriate.

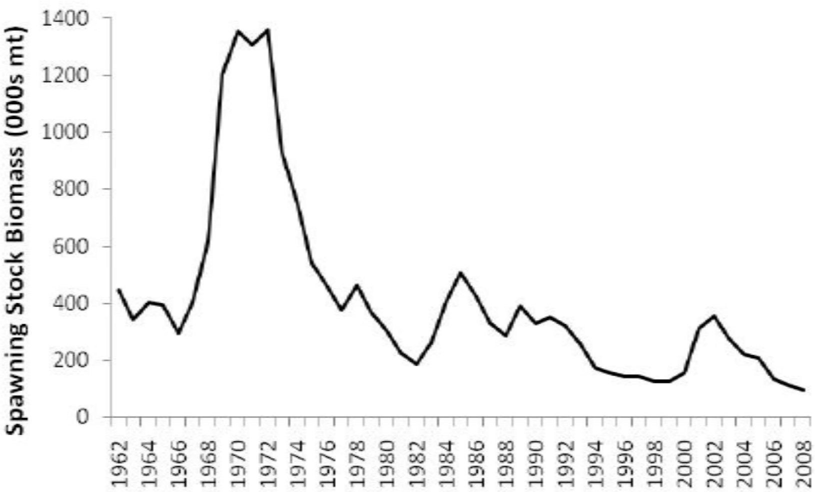


Figure 28.   2010 Mackerel TRAC SSB final model output.

NEFSC Spring Survey indices (Geometric Mean) through 2011 (a special request was made for Spring 2011 mackerel data due to concerns about low 2011 catch) for mackerel are included below. Taking the Geometric mean of a given year's values for individual hauls dampens the impact of individual large hauls and was the way the survey data was used in the 2010 TRAC assessment. It is important to note that the 2009-2011 values are adjusted from the raw data of the new Bigelow survey ship based on the calibration study between the Bigelow and its predecessor the Albatross. The calibration factor for this species is one factor for all sizes, and the next assessment may investigate whether size-specific calibration factors are more appropriate. Additional calibration information may be found at: http://www.nefsc.noaa.gov/publications/crd/crd1005/index.html (Miller et al 2010).

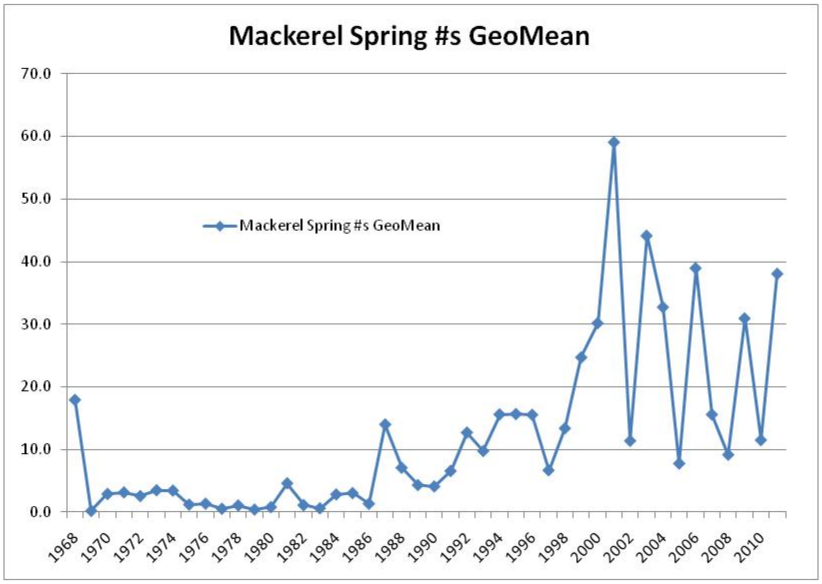


Figure 29. Spring NEFSC Survey Mackerel Indices 1968-2011. Geometric Mean, Numbers per Tow

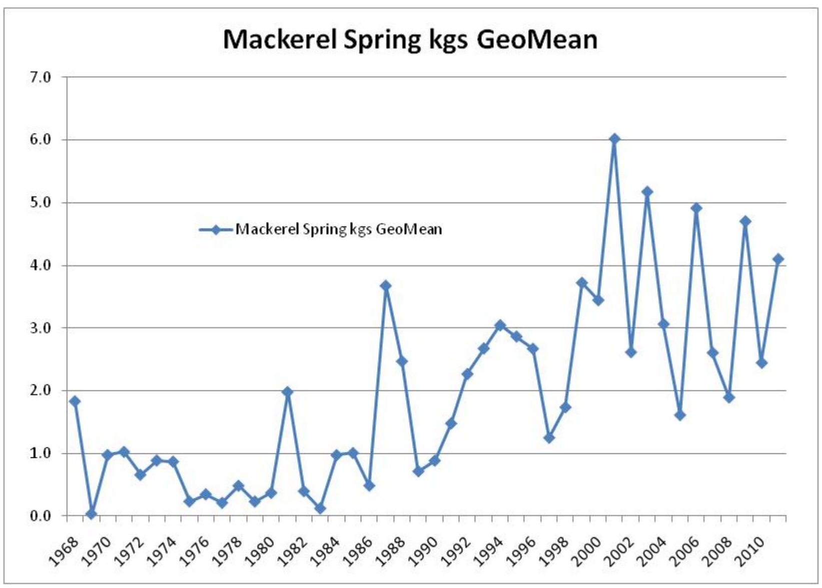


Figure 30. Spring Survey Mackerel Indices 1968-2011. Geometric Mean, kg per Tow

6.2.2 *Illex illecebrosus*

Illex is not a primary concern of this Amendment so only stock status information is provided for reference. Additional details may be found in the specifications environmental assessment which can be downloaded here: http://www.mafmc.org/fmp/msb_files/msbSpecs2012.htm.

Stock Status

The *Illex* stock was most recently assessed at SARC 42 (2006). SARC 42 was publically available in 2006 and included data through 2004. It was not possible to evaluate current stock status because there are no reliable current estimates of stock biomass or fishing mortality rate. The short lifespan of *Illex* greatly complicates assessing the stock with the available survey and assessment resources. In-season assessment and management would be the optimal way to manage any short-lived squid fishery but sufficient resources are not currently available.
NEFSC indices for fall surveys (when *Illex* are available) are included below. It is important to note that the 2009 and 2010 values are adjusted from the raw data of the new Bigelow survey ship based on the calibration study between the Bigelow and its predecessor the Albatross. The calibration factor for this species is one factor for all sizes, and the next assessment may investigate whether size-specific calibration factors are more appropriate.

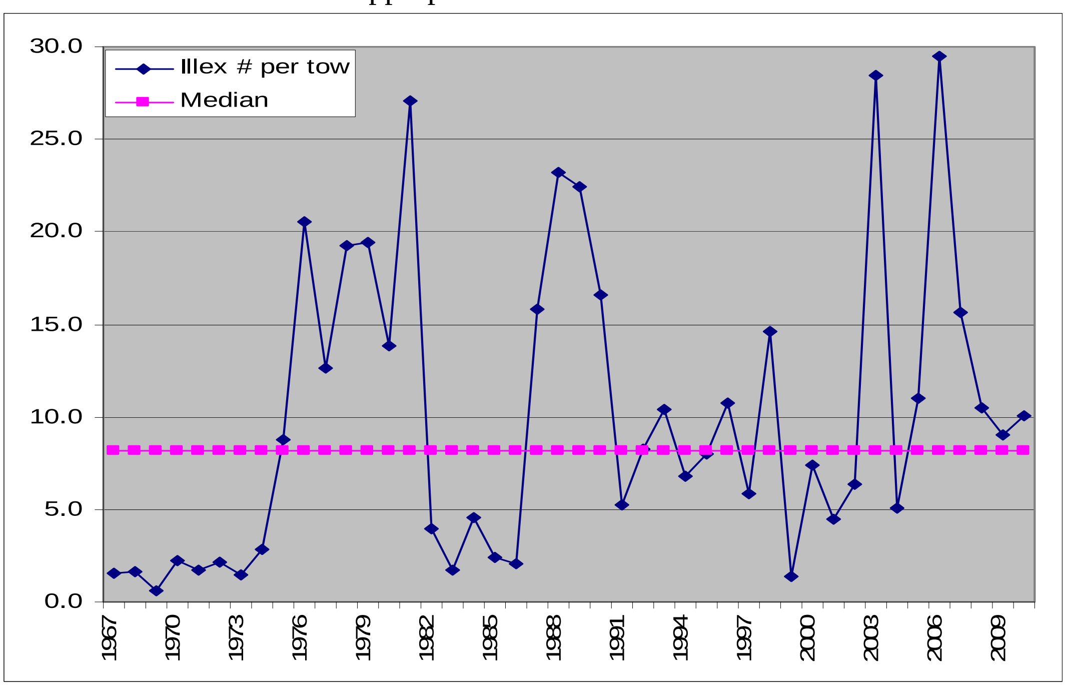


Figure 31. Fall NEFSC Trawl Survey - *Illex* Mean #/tow.

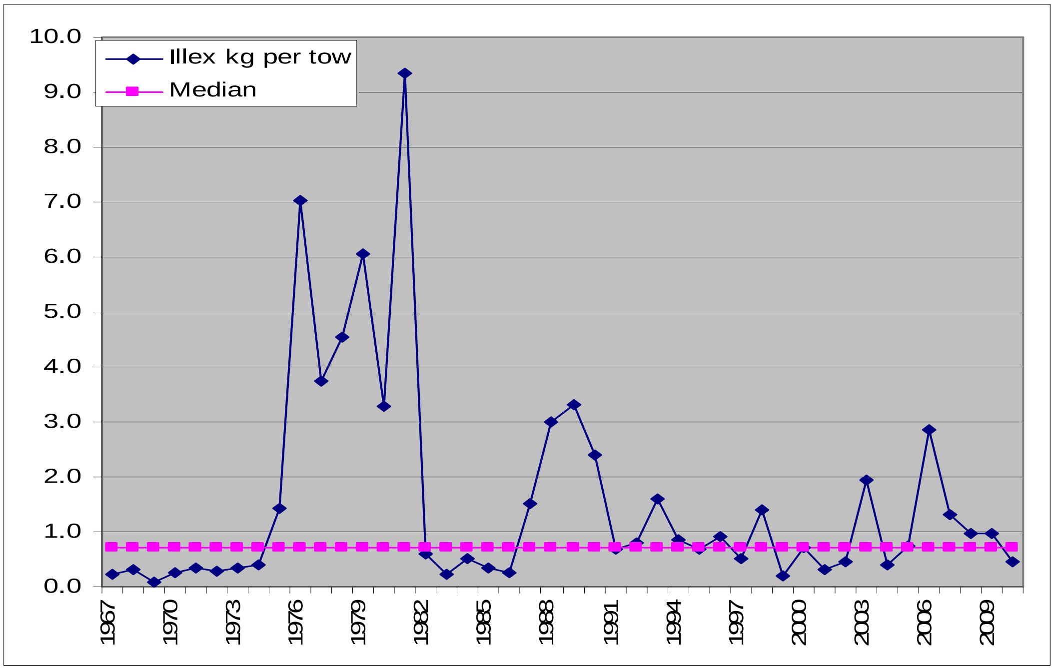


Figure 32. Fall NEFSC Trawl Survey - *Illex* Mean kg/tow.

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6.2.3 Butterfish

Butterfish is not a primary concern of this Amendment so only stock status information is provided for reference. Additional details may be found in the specifications environmental assessment which can be downloaded here: http://www.mafmc.org/fmp/msb_files/msbSpecs2012.htm.

Stock Status

The butterfish stock was most recently assessed at SARC 49 (2010) using data through 2008. The SARC review panel did not accept the adequacy of the redefined BRPs or the BRPs used for stock status determination in the 2004 butterfish assessment. The review panel questioned the application of MSY theory to a short-lived recruitment-dominated population, particularly the use of equilibrium methods when trends in the data suggest the stock is declining even with low fishing mortality. It was agreed that overfishing was not likely occurring. The review panel concluded that the decline in the butterfish stock appears to be driven by environmental processes and low recruitment. Determination of an overfished versus not overfished condition was not resolved at the meeting, which left the overfished status of butterfish unknown. Final model outputs for biomass, recruitment, and fishing mortality were only accepted in terms of reflecting the appropriate trend (downward).

While NMFS' official "status of stocks" document technically lists butterfish as "overfished" and "not experiencing overfishing" the results of the 2010 assessment suggest their true status is unknown with respect to being overfished or not and unknown with respect to experiencing overfishing or not because of butterfish's short lifespan and because of the concerns raised by the review panel regarding the 2004 assessment's conclusions. Efforts are ongoing to determine if a switch to "unknown status" would be more appropriate.

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6.2.4 Longfin Squid

Longfin squid are distributed primarily in continental shelf waters located between Newfoundland and the Gulf of Venezuela (Cohen 1976; Dawe et al. 1990). In the northwest Atlantic Ocean, longfin squid are most abundant in the waters between Georges Bank and Cape Hatteras, NC where the species is commercially exploited. The stock area extends from the Gulf of Maine to southern Florida. However, the southern limit of the species' distribution in US waters is unknown due to an overlap in geographic distribution with the congener, *Loligo* pleii, which cannot be visually distinguished from longfin squid using gross morphology (Cohen 1976). A recent genetics study indicates that the population inhabiting the waters between Cape Cod Bay, MA and Cape Hatteras, NC is likely a single stock (Shaw et al. 2010). Distribution varies seasonally. North of Cape Hatteras, squid migrate offshore during late autumn to overwinter in warmer waters along the shelf edge and slope, and then return inshore during the spring where they remain until late autumn (Jacobson 2005).

Natural mortality rates are very high, especially after spawning. The species is migrates long distances during its short lifespan; inshore during spring and offshore during late fall. Recruitment occurs throughout the year with seasonal peaks in overlapping "micro-cohorts" which have rapid and different growth rates (Brodziak and Macy 1996; Macy and Brodziak 2001). As a result, seasonally stable biomass estimates may mask substantial population turnover (Guerra et al. 2010). Recruitment of longfin squid is largely driven by environmental factors (Dawe et al. 2007). For most squid species, temperature plays a large role in migrations and distribution, growth, and spawning (Boyle and Rodhouse 2005). For longfin squid, individuals hatched in warmer waters during the summer grow more rapidly than those hatched in winter and males grow faster and attain larger sizes than females (Brodziak and Macy 1996).

Statolith ageing studies of longfin squid have indicated a life span of less than one year (Macy 1992, Brodziak and Macy 1996). Consequently, all recent stock assessments for longfin squid have been conducted under the assumption that the species has a semelparous (i.e., annual) life-cycle and has the capacity to spawn throughout the year (NMFS 1994), as now appears typical of pelagic squid species studied throughout the world (Jereb *et a*l. 1991).

Longfin squid eggs are usually attached to a preexisting cluster of newly spawned eggs (clusters are initiated on rocks, sand, and seaweeds). The female lays between 20 and 30 of these capsules, each containing 150 to 200 large (about 0.05"), oval eggs, for a total of 3,000 to 6,000 eggs. These clusters of demersal eggs, with as many as 175 capsules per cluster, are found in shallow waters (10-100') and may often be found washed ashore on beaches (Jacobson 2005, Grosslein and Azarovitz 1982).

The diet of longfin squid changes with increasing size; small immature individuals feed on small invertebrates and planktonic organisms (Vovk 1972a, Tibbetts 1977) while larger individuals feed on crustaceans and small fish (Vinogradov and Noskov 1979). Cannibalism is observed in individuals larger than 2 in (5 cm) (Whitacker 1978). Maurer and Bowman (1985) demonstrated seasonal and inshore/offshore differences in diet: in the spring in offshore waters, the diet was composed of crustaceans (mainly euphausiids) and fish; in the fall in inshore waters, the diet was composed almost exclusively of fish; and in the fall in offshore waters, the diet was composed of fish and squid.

Longfin squid are an important prey species and are known to be preyed upon by many pelagic and demersal fish species, as well as by marine mammals, seabirds, and *Illex* squid (Lange and Sissenwine

1980, Vovk and Khvichiya 1980, Summers 1983, Waring *et al.* 1990, Overholtz and Waring 1991, Gannon *et al.* 1997, Maurer 1975, Langton and Bowman 1977, Gosner 1978, Lange 1980, Vinogradov 1984).

<u>Stock Status</u>

Based on a new proposed biomass reference point from the 2010 assessment (NEFSC 2011), the longfin inshore squid stock was not overfished in 2009, but overfishing status was not determined because no overfishing threshold was recommended. The 2010 longfin squid assessment (NEFSC 2010) essentially found that the longfin squid stock appears to have successfully supported the range of observed catches (9,600 mt - 26,100 mt) during 1976-2009, as well as relatively high levels of finfish predation during 1977-1984 and 1999-2009. Finfish predation appeared relatively low 1978-1998. Catch divided by biomass was used to evaluate exploitation and the highest exploitation index occurred related to a catch of 23,400mt which was the basis for this year's ABC. This was an important finding for management purposes given all of the squid in a squid as0sessment are dead before the assessment is completed, never-mind when management might actually seek to use the results. In-season assessment and management would be the optimal way to manage any short-lived squid fishery but sufficient resources are not currently available.

A new BMSY target of 50% of K (0.50*(76,329/0.90) = 42,405 mt) was recommended. The biomass (B) threshold is 50% of BMSY (= 21,203 mt). The biomass estimate, which is based on the two-year average of catchability-adjusted spring and fall survey biomass during 2008-2009, was 54,442 mt (80% CI = 38,452-71,783 mt). This is greater than the BTHRESHOLD and the BMSY target. The stock exhibits very large fluctuations in abundance from variation in reproductive success and recruitment, expressed as large inter-annual changes (2-3 fold) in survey biomass.

A new threshold reference point for fishing mortality was not recommended in the 2010 assessment because there was no clear statistical relationship between longfin squid catch and annual biomass estimates during 1975-2009. Furthermore, annual catches were low relative to annual estimates of minimum consumption by a subset of fish predators. The 2009 exploitation index of 0.176 (catch divided by the average 2008-2009 spring and fall survey biomasses) was slightly below the 1987-2008 median of 0.237 (80% CI = 0.124-0.232). Relevant NEFSC trawl indices are provided in figure 38 though figure 43. 2009 and 2010 values have been calibrated "back" to Albatross units to facilitate comparison with a length-specific calibration factor developed in the recent assessment.

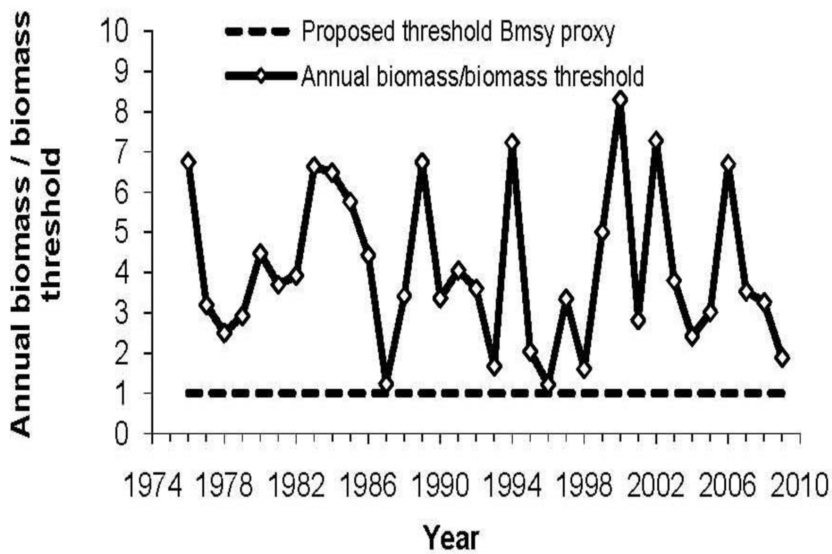

Figure 33. 2010 Assessment Figure B6 - Annual Biomass in Relation to the Proposed Biomass Threshold (which is ½ of the target) - Shown Here as a Relative Value

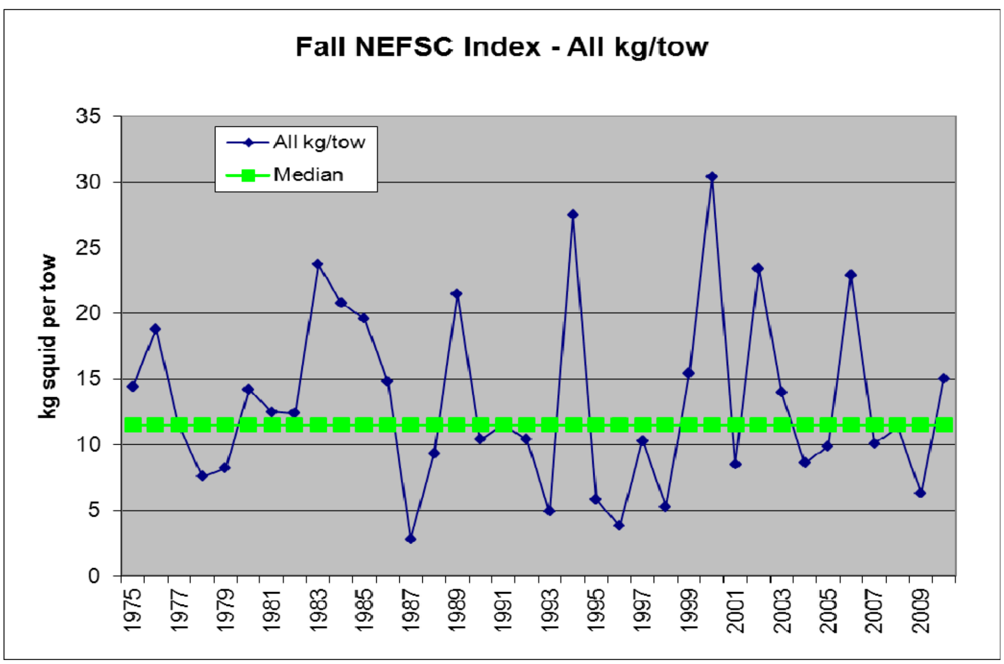

Figure 34. Fall NEFSC Trawl Survey – Longfin Squid Mean kg/tow All Sizes.

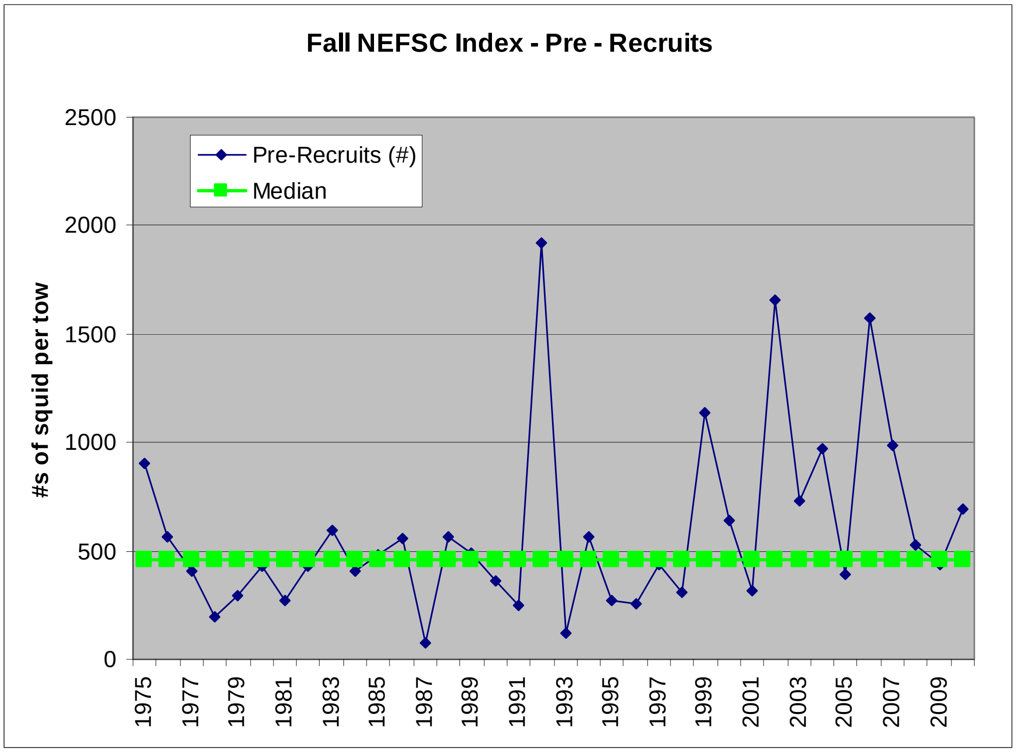

Figure 35. Fall NEFSC Trawl Survey – Longfin Squid Mean #/tow Pre-recruits.

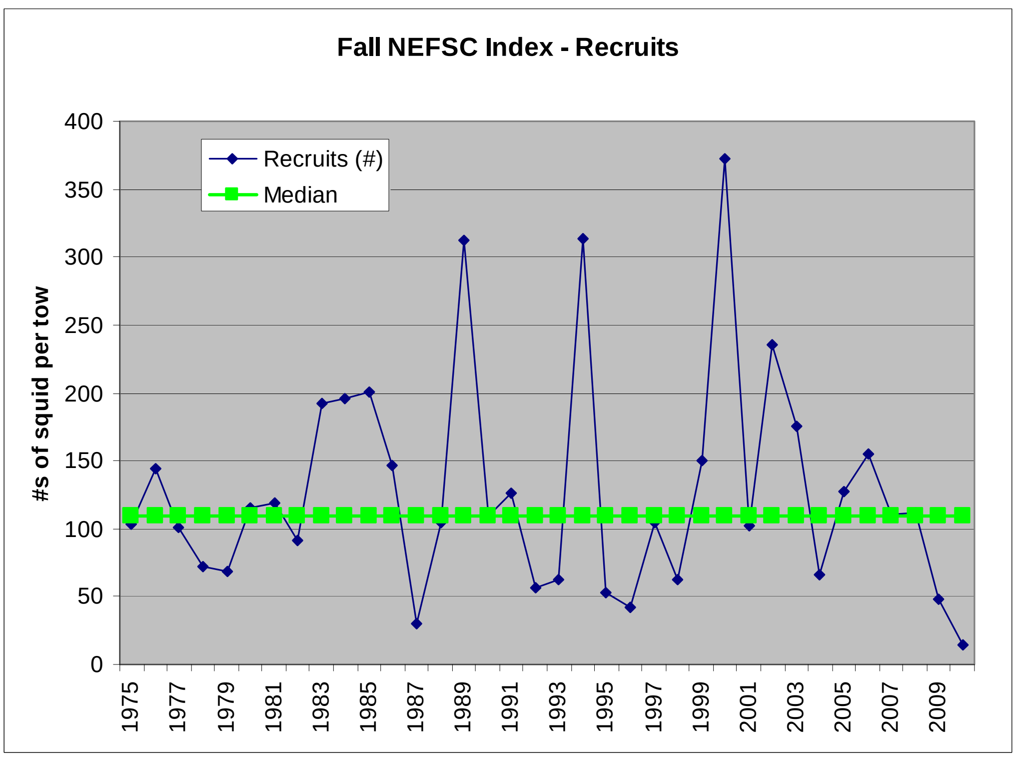

Figure 36. Fall NEFSC Trawl Survey – Longfin Squid Mean #/tow Recruits.

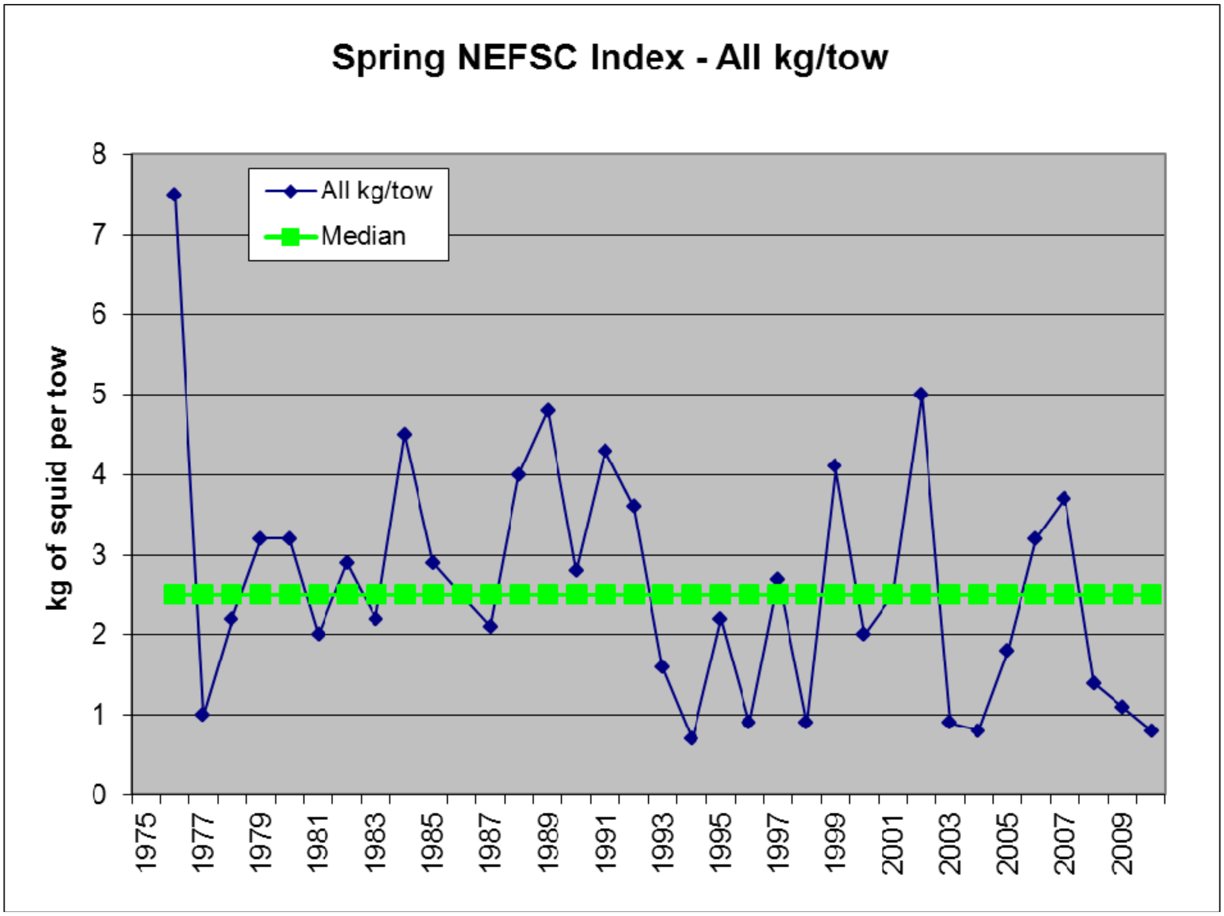

Figure 37. Spring NEFSC Trawl Survey – Longfin Squid Mean kg/tow All Sizes.

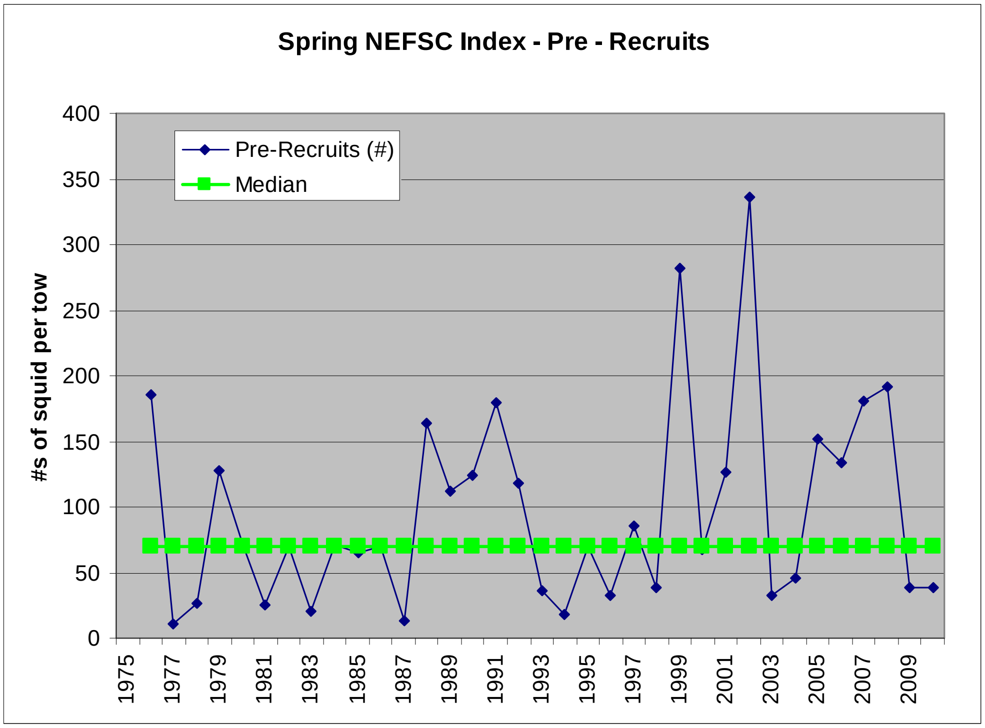

Figure 38. Spring NEFSC Trawl Survey – Longfin Squid Mean #/tow Pre-recruits.

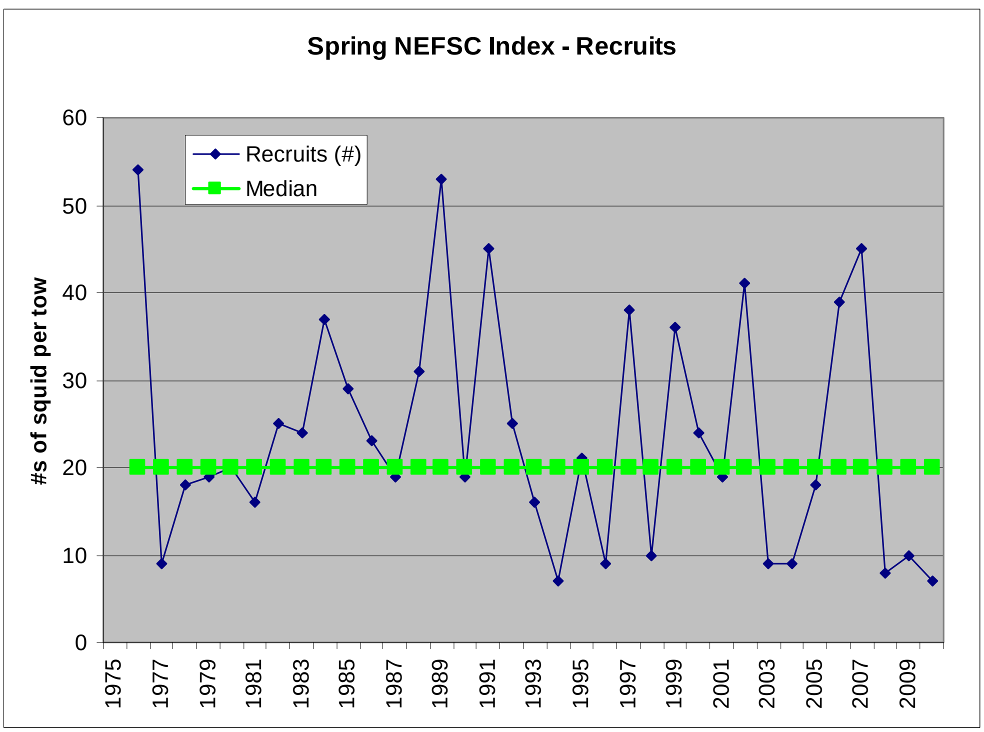

Figure 39. Spring NEFSC Trawl Survey – Longfin Squid mean #/tow Recruits.

6.2.5 River Herrings (blueback herring and alewife)

Life history and stock status are summarized below. Additional details may be found in the ASMFC's 2009 Amendment 2 to the Interstate Fishery Management Plan (IFMP) for Shad and River Herring (River Herring Management) available at http://www.asmfc.org/shadRiverHerring.htm (the text below is adapted from that document).

Alewife and blueback herring (collectively known as river herring) are anadromous fishes, spending most of their lives in ocean waters, migrating to their natal freshwater areas in the spring months to spawn. Alewife are most abundant in the Mid-Atlantic and northeastern states.
Blueback herring are found from Nova Scotia to northern Florida and are most abundant in waters from the Chesapeake Bay south (Scott and Scott 1988). Alewife generally spawn earlier than blueback herring in areas where both species occur. Alewife spawn in rivers, creeks, lakes and ponds, over rocks, detritus, submerged aquatic vegetation and sand. Blueback herring generally prefer to spawn over sand or gravel in swift-flowing areas of rivers and tributaries. In more southerly areas where both species exist, blueback herring utilize flooded back swamps, oxbows and stream edges for spawning. For both species, adults return to the ocean after spawning. Juveniles use the rivers and estuaries as nursery areas and migrate to the ocean as water temperatures decline in the fall. River herring reach sexual maturity at 3-6 years of age. Post-spawning mortality is highest in the states south of North Carolina as most populations are considered to be semelparous (i.e., spawn once and die). Little information is available on the life history of river herring once the juveniles emigrate to the ocean and until they return as mature adults to the freshwater areas to spawn, though Appendix 1 describes the distribution of river herring catch in the Northeast Fisheries Science Center (NEFSC) bottom trawl survey data, which takes place in ocean waters. Migration patterns are charted in tables 19 and 20.

Stock Status

The following summary is also adapted from Amendment 2 to the RH/S IFMP. Many populations of river herrings have faced anthropogenic threats since colonial times, including fishing (commercial and recreational) and both habitat loss and degradation (e.g., dam construction, siltation, pollution). Stock assessments have identified that many populations of river herring along the Atlantic coast are in decline or are at depressed but stable levels (NC DMF 2006; Crecco and Gibson 1990); however, lack of fishery-dependent and independent data make it difficult to ascertain the status of river herring stocks coast-wide. Based on available landings records from the National Marine Fisheries Service (NMFS), commercial landings dropped from 13.7 million pounds in 1985 to under a million pounds in 2007, which represents a decline of 93%. A new river herring stock assessment is currently underway and scheduled to be completed in early 2012. Preliminary indications are that many populations remain depressed though recent Northeast Fisheries Science Center (NEFSC) bottom trawl survey data do suggest possible recent improvement from a coast-wide perspective for both species (see Appendix 1). Both blueback herring and alewife are currently candidate species for ESA listing, with a decision due by NMFS on August 5, 2012 (see Section 6.5.6).

Table 17. Blueback Herring Migration Patterns (SA = Some activity; PA = Peak Activity)

		January		February		March		April		May		June		July		August		September		October		November		December	
		1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30
Maine	adult immigration							SA	SA	SA	SA	PA	PA	PA	SA										
	adult emmigration											SA	SA	PA	PA	PA	SA								
	spawning									SA	PA	PA	PA	SA											
	incubation										SA	PA	PA	SA											
	juvenile freshwater residence										SA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	SA			
	juvenile emigration													SA	SA	PA	PA	PA	PA	PA	PA	SA	SA		
New Hampshire	adult immigration								SA	PA	PA	SA													
	adult emmigration									SA	PA	PA	SA	SA											
	spawning									PA	PA	SA													
	incubation									SA	PA	PA	SA												
	juvenile freshwater residence										SA	PA	PA	PA	PA	PA	SA	SA	SA	SA	SA				
	juvenile emigration													SA	SA	SA	SA	SA	SA	SA	SA				
Massachusetts	adult immigration								SA	SA	PA	PA	SA	SA											
	adult emigration										SA	PA	PA	SA	SA										
	spawning									SA	PA	PA	SA	SA											
	incubation									SA	SA	PA	PA	PA	SA										
	juvenile freshwater residence									SA	PA	PA	PA	PA	PA	PA	SA	SA	SA	SA	SA	SA			
	juvenile emigration													SA	SA	SA	PA	PA	PA	SA	SA	SA	SA		
Rhode Island	adult immigration							SA	PA	PA															
	adult emmigration																								
	spawning																								
	incubation																								
	juvenile freshwater residence																								
	juvenile emigration																								
Connecticut	adult immigration							SA	SA	PA	PA	SA	SA												
	adult emmigration										SA	SA	PA	PA	SA										
	spawning									SA	PA	PA	SA												
	incubation									SA	PA	PA	SA	SA											
	juvenile freshwater residence											SA	SA	PA	PA	PA	PA	PA	PA	SA	SA	SA			
	juvenile emigration													SA	SA	PA	PA	PA	PA	PA	SA	SA			
New York	adult immigration							SA	PA	PA	SA	SA													
	adult emmigration								SA	PA	SA	SA	SA												
	spawning							SA	PA	PA	PA	SA	SA												
	incubation							SA	PA	PA	PA	SA	SA												
	juvenile freshwater residence							SA	SA	PA	PA	PA	PA	PA	PA	PA	SA	SA	SA						
	juvenile emigration													SA	SA	SA	SA	SA	SA	SA	SA				
New Jersey	adult immigration			SA	SA	SA	SA	PA	PA	PA	PA	SA													
	adult emmigration							SA	SA	SA	SA	SA													
	spawning							SA	PA	PA	PA	SA													
	incubation							SA	PA	PA	PA	SA													
	juvenile freshwater residence											SA	SA	PA	PA	PA	PA	SA	SA	SA	SA				
	juvenile emigration													SA	SA	SA	SA	SA	SA	SA	SA				

Source: ASMFC

Table 18. Alewife Migration Patterns (SA = Some activity; PA = Peak Activity)

		January		February		March		April		May		June		July		August		September		October		November		December	
		1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30
Maine	adult immigration					SA	SA	SA	PA	PA	PA	PA	SA												
	adult emmigration										SA	SA	PA	PA	SA	SA	SA	SA	SA	SA	SA	SA			
	spawning								SA	SA	PA	PA	PA	SA											
	incubation								SA	SA	PA	PA	PA	SA											
	juvenile freshwater residence								SA	SA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	SA	SA		
	juvenile emigration													SA	SA	PA	PA	PA	PA	PA	PA	SA	SA	SA	
New Hampshire	adult immigration									SA	PA	PA	SA	SA											
	adult emmigration										SA	PA	PA	SA											
	spawning									SA	PA	PA	PA	SA											
	incubation										SA	PA	PA	SA											
	juvenile freshwater residence										SA	PA	PA	PA	PA	PA	SA	SA	SA	SA	SA				
	juvenile emigration															SA	SA	SA	SA	SA	SA				
Massachusetts	adult immigration					SA	SA	PA	PA	PA	SA														
	adult emigration								SA	SA	PA	PA	SA	SA											
	spawning						SA	SA	PA	PA	SA	SA													
	incubation							SA	PA	PA	PA	SA													
	juvenile freshwater residence							SA	SA	PA	PA	PA	PA	PA	PA	PA	SA	SA	SA	SA	SA	SA	SA		
	juvenile emigration												SA	PA	PA	SA	SA	PA	PA	PA	PA	SA	SA	SA	
Rhode Island	adult immigration					SA	SA	PA	PA	PA	SA														
	adult emmigration							SA	PA	PA	SA	SA	SA												
	spawning						SA	PA	PA	PA	SA														
	incubation						SA	PA	PA	PA	PA	SA													
	juvenile freshwater residence								SA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	SA	SA	SA	SA		
	juvenile emigration											SA	SA	SA	SA	SA	SA	SA	PA	PA	PA	SA	SA		
Connecticut	adult immigration				SA	SA	PA	PA	PA	SA															
	adult emmigration				SA	SA	SA	PA	PA	SA															
	spawning				SA	SA	SA	SA	SA	SA															
	incubation					SA	PA																		
	juvenile freshwater residence							SA	SA	PA	PA	SA	SA	SA	SA	SA	SA	SA	SA	SA					
	juvenile emigration									SA	PA	PA	SA	SA	SA	SA	SA	SA	SA	SA					
New York	adult immigration						SA	PA	PA	PA	SA														
	adult emmigration							SA	SA	PA	SA	SA													
	spawning							SA	PA	PA	PA	SA													
	incubation							SA	PA	PA	PA	SA													
	juvenile freshwater residence							SA	SA	PA	PA	PA	PA	PA	PA	PA	SA	SA	SA						
	juvenile emigration													SA	SA	SA	SA	SA	SA	SA	SA				
New Jersey	adult immigration			SA	SA	SA	SA	PA	PA	PA	PA	SA													
	adult emmigration							SA	SA	SA	SA	SA													
	spawning							SA	PA	PA	PA	SA													
	incubation							SA	PA	PA	PA	SA													
	juvenile freshwater residence											SA	SA	PA	PA	PA	PA	SA	SA	SA	SA	SA			
	juvenile emigration													SA	SA	SA	SA	SA	SA	SA	SA	SA			

Source: ASMFC

6.2.6 Shads (American and hickory)

Life history and stock status are summarized below. Additional details may be found in the ASMFC's 2010 Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (American Shad Management) available at http://www.asmfc.org/shadRiverHerring.htm (the text below is adopted from that document).

The American shad is the largest North American member of the shad and herring family, and historically occurred in all major rivers from Maine through the east coast of Florida. The management units for American shad under this Fishery Management Plan Amendment include all migratory American shad stocks of the Atlantic coast of the United States.

American shad are a migratory anadromous fish that spend most of their life at sea along the Atlantic coast and enter freshwater as adults in the spring to spawn. Most young emigrate from their natal rivers during their first year of life. American shad stocks are river-specific; that is, each major tributary along the Atlantic coast appears to have a discrete spawning stock. In addition to ocean waters, habitats used by American shad include adult spawning sites in coastal tributaries and larval and juvenile nursery areas in the freshwater portions of the rivers and their associated bays and estuaries. American shad migration patterns are charted in table 19.

Less information is available specifically for hickory shad. Although the distribution and movements of hickory shad are essentially unknown after they return to the ocean, due to harvest along the southern New England coast in the summer and fall it is assumed that they also follow a migratory pattern similar to American shad (ASMFC 2010).

Stock Status

No assessments are available for Hickory Shad but many runs are likely below historical levels for reasons similar to those discussed below for Atlantic Shad. In 2007, the American Shad Stock Assessment Subcommittee (SASC) completed an American shad stock assessment report, which was accepted by the Peer Review Panel (PRP) and the Shad and River Herring Management Board in August 2007 (available at http://www.asmfc.org/shadRiverHerring.htm). The 2007 American shad stock assessment found that stocks were at all-time lows and did not appear to be recovering to acceptable levels. It identified the primary causes for the continued stock declines as a combination of excessive total mortality, habitat loss and degradation, and migration and habitat access impediments. Although improvement has been seen in a few stocks, many remain severely depressed compared to their historic levels. Northeast Fisheries Science Center (NEFSC) bottom trawl survey data do suggest possible recent improvement from a coast-wide perspective for both species (see Appendix 1). While river herrings are candidate species for ESA listing shads are not.

Table 19. Shad Migration Patterns (SA = Some activity; PA = Peak Activity)

		January		February		March		April		May		June		July		August		September		October		November		December	
		1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30	1-15	16-30
Maine	adult immigration						SA	SA	SA	PA	PA	PA	PA	PA	PA	SA									
	adult emmigration												SA	SA	PA	PA	SA								
	spawning										SA	SA	PA	PA	PA	SA									
	incubation										SA	SA	PA	PA	PA	SA									
	juvenile freshwater residence											SA	PA	PA	PA	PA	PA	PA	PA	PA	SA	SA			
	juvenile emigration													SA	SA	SA	PA	PA	PA	PA	SA	SA			
New Hampshire	adult immigration									SA	PA	PA	SA												
	adult emmigration																								
	spawning																								
	incubation																								
	juvenile freshwater residence											PA	PA	PA	PA	SA	SA	SA	SA	SA	SA				
	juvenile emigration															SA	SA	SA	SA	SA	SA				
Massachusetts	adult immigration								SA	SA	PA	PA	PA	SA	SA										
	adult emmigration									SA	PA	PA	PA	SA	SA										
	spawning									SA	PA	PA	PA	SA	SA										
	incubation									SA	SA	PA	PA	PA	SA										
	juvenile freshwater residence										SA	PA	PA	PA	PA	PA	PA	SA	SA	SA					
	juvenile emigration													SA	SA	SA	PA	PA	SA	SA	SA				
Rhode Island	adult immigration							SA	SA	PA	PA	PA	SA												
	adult emmigration									SA	SA	PA	PA	SA	SA										
	spawning									SA	SA	PA	PA	PA	SA										
	incubation									SA	SA	PA	PA	PA	SA										
	juvenile freshwater residence										SA	SA	SA	PA	PA	PA	PA	PA	PA	SA	SA	SA	SA		
	juvenile emigration													SA	SA	SA	SA	SA	PA	PA	PA	SA	SA		
Connecticut	adult immigration							SA	SA	PA	PA	SA	SA												
	adult emmigration										SA	SA	PA	PA	SA										
	spawning									SA	PA	PA	SA												
	incubation									SA	PA	PA	SA	SA											
	juvenile freshwater residence											SA	SA	PA	PA	PA	PA	PA	PA	SA	SA	SA			
	juvenile emigration													SA	SA	SA	SA	PA	PA	PA	SA	SA			
New York	adult immigration							SA	PA	PA	SA	SA													
	adult emmigration								SA	PA	PA	SA													
	spawning								SA	PA	PA	SA													
	incubation								SA	PA	PA	SA													
	juvenile freshwater residence										PA	PA	PA	PA	PA	PA	SA	SA	SA	SA					
	juvenile emigration													SA	SA	SA	SA	SA	SA	SA	SA				
New Jersey	adult immigration			SA	SA	SA	SA	PA	PA	PA	PA	SA													
	adult emmigration							SA	SA	SA	SA	SA													
	spawning						SA	SA	PA	PA	PA	SA													
	incubation						SA	SA	PA	PA	PA	SA													
	juvenile freshwater residence											SA	SA	PA	PA	PA	PA	SA	SA	SA	SA	SA			
	juvenile emigration													SA	SA	SA	SA	SA	SA	SA	SA	SA			

Source: ASMFC

6.2.7 Atlantic Herring

Given the mixed nature of the MSB fleets and their co-catch of Atlantic Herring as described elsewhere in this document (see Appendix 2), a brief summary of the status of the Atlantic Herring resource and fishery is provided below. This summary is adapted from the Atlantic Herring Fishery Management Plan's Amendment 5 DEIS, which is available in its entirety at: http://www.nefmc.org/herring/index.html.

The NEFMC manages herring under the Atlantic Herring FMP. Currently, the Atlantic Herring resource is managed as a single coastal stock complex, although three spawning stock components occupy three fairly distinct locations in the Gulf of Maine region in the Gulf of Maine region: the southwest Nova Scotia-Bay of Fundy, the coastal waters of the Gulf of Maine, and Georges Bank. In general, Gulf of Maine herring migrate from summer feeding grounds along the Maine coast and on Georges Bank to southern New England and Mid-Atlantic areas during winter, with larger individuals tending to migrate farther distances. Tagging experiments provide evidence of intermixing of Gulf of Maine, Georges Bank, and Scotian Shelf herring during different phases of the annual migration.

During at least some part of the year, Atlantic herring are widely distributed in continental shelf waters of the Northeast Atlantic, from Labrador to Cape Hatteras. Herring can be found in every major estuary from the northern Gulf of Maine to the Chesapeake Bay. They are most abundant north of Cape Cod and become increasingly scarce south of New Jersey (Kelly and Moring 1986) with the largest and oldest fish found in the southern most portion of the range (Munro 2002). Adult Atlantic herring are found in shallow inshore waters, 20 meters deep, to offshore waters up to 200 meters deep (NEFMC 1999; Munro 2002), but seldom migrate to depths more than 50 fathoms (300 ft or 91.4 meters) (Kelly and Moring 1986). They prefer water temperatures of 5 – 9 degrees C (Munro 2002; Zinkevich 1967), but may overwinter at temperatures as low as 0o C (Reid et al. 1999).

Stock Status

Currently, the stock complex is not overfished and overfishing is not occurring. MSY reference points for the herring complex were re-estimated during the most recent assessment (TRAC 2009). Results from a Fox surplus production model were FMSY = 0.27 and BMSY = 670,600 mt. The Gulf of Maine-Georges Bank herring complex began to recover during the late 1980s and current total biomass (age 2+) is now comparable to the mid-1970s, just before the collapse. Biomass increased from a low of about 112,000 mt in 1982 to about 854,000 mt in 2000, and declined slightly to about 652,000 mt in 2008, which was just below BMSY (670,600 mt). Fishing mortality has remained relatively low since the early 1990s and averaged 0.17 during 1998-2008, which is below FMSY (0.27).

6.3 Non-Target Species (Fish)

Past Analyses

Discarding or “bycatch” has been addressed generally in a number of previous actions, most recently Amendment 10 to the MSB FMP. Discarding across the MSB fisheries is described in the annual specifications from a “directed trip” point of view. The trip definitions used are described below (there is no identifiable directed butterfish fishery):

Mackerel: Directed mackerel trips are defined as all trips that had at least 50% mackerel by weight and all trips over 100,000 pounds of mackerel regardless of the ratio of other species. This definition results in capturing 97.4% of all mackerel landings in the dealer weighout database 2006-2010. The other trips with lower mackerel landings landed a variety of species, mostly Atlantic herring, silver hake, longfin squid, and scup. The set of trips in the observer database with the same mackerel criteria included 12 on average for each year 2006- 2010 (61 total with 73 unobserved hauls and 204 observed hauls). The observed mackerel caught on these trips accounted for approximately 6.5% of the total mackerel caught.

Illex: Directed *Illex* trips are defined All trips that had at least 50% *Illex* by weight. This definition results in capturing 99.6% of all *Illex* landings in the dealer weighout database 2006-2010 and was applied to the observer database to examine discards in the *Illex* fishery. The resulting set of trips in the observer database included 18 on average for each year 2006-2010 (91 total – 2010 had a relatively high number of observed trips). These 91 trips made 962 hauls of which 94% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water, etc. Readers will note the high FISH, NK numbers in the associated table. This was caused by one haul in 2009 that was too big to bring aboard a vessel and some had to be dumped (installed net sensors failed). While it had to be recorded as FISH, NK, the observer's log suggests that it was mostly squid ("Unknown as to how much was released, but observer saw a swordfish come out along with the squid."). Also, of the 75,042 pounds that did come aboard from this haul, the observer recorded only 42 pounds of *Illex* discarded and no other species observed. The observed *Illex* caught on these trips accounted for approximately 11.0 % of the total *Illex* caught.

Longfin Squid: All trips that had at least 50% longfin squid by weight and all trips that had at least 10,000 pounds of longfin squid regardless of the ratio to other species. This definition results in capturing almost 91% of all longfin squid landings in the dealer weighout database. This definition was applied to the observer database to examine discards in the longfin squid fishery. The resulting set of trips in the observer database included 83 on average for each year 2006-2010 (413 total – 2009 and 2010 had relatively high numbers of observed trips). These 413 trips made 4186 hauls of which 91% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water, etc. The observed longfin squid caught on these trips accounted for approximately 3.5% of the total longfin squid caught.

Using the ratios of incidentally caught species to retained directed species, and average landings of the target species, one can make a rough calculation of the annual catch of the relevant non-target species, described in the tables below.

This document includes a technically superior incidental catch estimation methodology for RH/S described below. However, since the tables generated for the specifications list the major incidental species they are provided below for reference. Also, the lack of substantial RH/S catch in the *Illex* fishery is a primary reason why this Amendment focused on the mackerel and longfin squid fisheries. This finding was reinforced by the new analysis, as described below.

Table 20. Key Species Observed Taken and Discarded in Directed Trips for Mackerel, Based on Unpublished NMFS Northeast Fisheries Observer Program Data and Unpublished Dealer Weighout Data from 2006-2010. (see text for criteria). There Are 2204.6 Pounds in One Metric Ton.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For every metric ton of mackerel caught, pounds of given species caught.	For every metric ton of mackerel caught, pounds of given species discarded.	D:K Ratio (Ratio of species discarded to Mackerel Kept)	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Rough Annual Catch (pounds) based on 5-year (2006-2010) average of mackerel catch (29,200 mt)
Directed Mackerel Trip Bycatch and Discards								
DOGFISH SPINY	153,250	143,036	16.1	15.0	0.0068	47%	93%	468,934
HERRING, ATLANTIC	7,300,067	71,601	765.0	7.5	0.0034	23%	1%	22,337,625
SCUP	41,899	41,848	4.4	4.4	0.0020	14%	100%	128,206
FISH, NK	18,800	18,800	2.0	2.0	0.0009	6%	100%	57,527
MACKEREL, ATLANTIC	21,037,906	18,575	2,204.6	1.9	0.0009	6%	0%	NA
HERRING (NK)	2,859	2,859	0.3	0.3	0.0001	1%	100%	8,748
BUTTERFISH	13,151	2,821	1.4	0.3	0.0001	1%	21%	40,240
BASS, STRIPED	1,605	1,605	0.2	0.2	0.0001	1%	100%	4,911
SQUID (ILLEX)	2,709	1,148	0.3	0.1	0.0001	0%	42%	8,290
HAKE, SILVER	16,433	1,032	1.7	0.1	0.0000	0%	6%	50,284
SHAD, AMERICAN	3,502	702	0.4	0.1	0.0000	0%	20%	10,717
HERRING, BLUE BACK	97,416	644	10.2	0.1	0.0000	0%	1%	298,084
DOGFISH (NK)	500	500	0.1	0.1	0.0000	0%	100%	1,530
SEA BASS, BLACK	638	469	0.1	0.0	0.0000	0%	74%	1,952
SEA ROBIN, NORTHERN	330	312	0.0	0.0	0.0000	0%	95%	1,010
ALEWIFE	22,152	305	2.3	0.0	0.0000	0%	1%	67,783

Table 21. Key Species Observed Taken and Discarded in Directed Trips for *Illex*, Based on Unpublished NMFS Northeast Fisheries Observer Program Data and Unpublished Dealer Weighout Data from 2006-2010. (see text for criteria). There Are 2204.6 Pounds in One Metric Ton.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For every metric ton of Illex caught, pounds of given species caught.	For every metric ton of Illex caught, pounds of given species discarded.	D:K Ratio (Ratio of species discarded to Illex Kept)	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Rough Annual Catch (pounds) based on 5-year average of Illex landings (15,314 mt)
Directed Illex Trip Bycatch and Discards								
SQUID (ILLEX)	18,560,449	263,257	2,204.6	31	0.0144	64.1%	1%	NA
BUTTERFISH	51,629	37,497	6.1	4	0.0020	9.1%	73%	93,913
FISH, NK	25,994	25,994	3.1	3	0.0014	6.3%	100%	47,282
HAKE, SPOTTED	14,161	14,010	1.7	2	0.0008	3.4%	99%	25,759
DORY, BUCKLER (JOHN)	15,346	10,986	1.8	1	0.0006	2.7%	72%	27,915
HERRING (NK)	10,852	10,852	1.3	1	0.0006	2.6%	100%	19,739
DOGFISH SPINY	9,343	9,341	1.1	1	0.0005	2.3%	100%	16,994
MACKEREL, CHUB	10,226	8,243	1.2	1	0.0005	2.0%	81%	18,602
SQUID (LOLIGO)	75,449	6,648	9.0	1	0.0004	1.6%	9%	137,241
HAKE, SILVER	3,875	3,848	0.5	0	0.0002	0.9%	99%	7,049
SQUID, NK	3,612	3,612	0.4	0	0.0002	0.9%	100%	6,570
BEARDFISH	3,257	3,242	0.4	0	0.0002	0.8%	100%	5,924
HAKE, RED	2,825	2,825	0.3	0	0.0002	0.7%	100%	5,139
DOGFISH SMOOTH	1,257	1,257	0.1	0	0.0001	0.3%	100%	2,287
FLOUNDER, FOURSPOT	1,150	1,150	0.1	0	0.0001	0.3%	100%	2,092
WHITING, BLACK	1,036	1,036	0.1	0	0.0001	0.3%	100%	1,884
ANGLER	1,131	820	0.1	0	0.0000	0.2%	72%	2,057
SHAD, AMERICAN	779	636	0.1	0	0.0000	0.2%	82%	1,417
HADDOCK	582	582	0.1	0	0.0000	0.1%	100%	1,058
ROSEFISH,BLACK BELLY	504	490	0.1	0	0.0000	0.1%	97%	917
REDFISH	454	454	0.1	0	0.0000	0.1%	100%	826

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Table 22. Key Species Observed Taken and Discarded in Directed Trips for Longfin Squid, Based on Unpublished NMFS Northeast Fisheries Observer Program Data and Unpublished Dealer Weighout Data from 2006-2010. (see text for criteria). There Are 2204.6 Pounds in One Metric Ton.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	For every metric ton of Loligo caught, pounds of given species caught.	For every metric ton of Loligo caught, pounds of given species discarded.	D:K Ratio (Ratio of species discarded to Loligo Kept)	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Rough Annual Catch (pounds) based on 5-year average of Loligo catch (11634 mt)
Directed Loligo Trip Bycatch and Discards								
BUTTERFISH	524,478	490,523	260.3	243.4	0.11	0.17	0.94	3,027,814
DOGFISH SPINY	327,240	326,342	162.4	161.9	0.07	0.11	1.00	1,889,160
SQUID (ILLEX)	651,634	254,007	323.4	126.0	0.06	0.09	0.39	3,761,885
HAKE, SILVER	310,387	240,680	154.0	119.4	0.06	0.08	0.78	1,791,865
HAKE, SPOTTED	227,516	221,705	112.9	110.0	0.05	0.08	0.97	1,313,452
SCUP	225,359	147,507	111.8	73.2	0.03	0.05	0.65	1,301,001
HAKE, RED	151,091	141,791	75.0	70.4	0.03	0.05	0.94	872,248
SKATE, LITTLE	129,078	128,741	64.1	63.9	0.03	0.04	1.00	745,167
FLOUNDER, FOURSPOT	90,270	90,101	44.8	44.7	0.02	0.03	1.00	521,128
SQUID (LOLIGO)	4,442,800	86,808	2204.6	43.1	0.02	0.03	0.02	NA
MACKEREL, ATLANTIC	301,008	75,364	149.4	37.4	0.02	0.03	0.25	1,737,723
FLOUNDER, SUMMER	99,681	50,938	49.5	25.3	0.01	0.02	0.51	575,461
SCALLOP, SEA	55,802	47,427	27.7	23.5	0.01	0.02	0.85	322,145
DOGFISH SMOOTH	48,695	44,503	24.2	22.1	0.01	0.02	0.91	281,118
SEA WEEDS	37,692	37,692	18.7	18.7	0.01	0.01	1.00	217,594
CRAB, LADY	36,931	36,931	18.3	18.3	0.01	0.01	1.00	213,200
BASS, STRIPED	32,826	31,097	16.3	15.4	0.01	0.01	0.95	189,504
HERRING, ATLANTIC	30,188	30,188	15.0	15.0	0.01	0.01	1.00	174,274
SKATE, BIG	27,459	27,057	13.6	13.4	0.01	0.01	0.99	158,519
SKATE, NK	25,968	25,873	12.9	12.8	0.01	0.01	1.00	149,915
FLOUNDER, WINTER	23,383	23,059	11.6	11.4	0.01	0.01	0.99	134,993
HERRING (NK)	20,892	20,882	10.4	10.4	0.00	0.01	1.00	120,610
ANGLER	44,126	18,540	21.9	9.2	0.00	0.01	0.42	254,740
BLUEFISH	43,050	18,402	21.4	9.1	0.00	0.01	0.43	248,530
DORY, BUCKLER (JOHN)	33,895	14,465	16.8	7.2	0.00	0.01	0.43	195,678
SKATE, BARNDOOR	12,720	12,660	6.3	6.3	0.00	0.00	1.00	73,434
SEA BASS, BLACK	18,185	12,433	9.0	6.2	0.00	0.00	0.68	104,984
HAKE, WHITE	13,360	12,255	6.6	6.1	0.00	0.00	0.92	77,125
LOBSTER	15,560	12,093	7.7	6.0	0.00	0.00	0.78	89,830
FISH, NK	6,076	6,033	3.0	3.0	0.00	0.00	0.99	35,078
TAUTOG	6,047	5,617	3.0	2.8	0.00	0.00	0.93	34,910
SHAD, AMERICAN	5,501	5,431	2.7	2.7	0.00	0.00	0.99	31,758
HADDOCK	3,897	3,883	1.9	1.9	0.00	0.00	1.00	22,495
HERRING, BLUE BACK	2,911	2,911	1.4	1.4	0.00	0.00	1.00	16,806
FLOUNDER, YELLOWTAIL	2,244	1,506	1.1	0.7	0.00	0.00	0.67	12,952
ALEWIFE	2,356	1,276	1.2	0.6	0.00	0.00	0.54	13,600
SHAD, HICKORY	1,007	915	0.5	0.5	0.00	0.00	0.91	5,811

Current Analyses

Given the purpose of Amendment 14, new analyses for Amendment 14 centered on River Herrings and Shads. The methods, detailed in Appendix 2, utilized ratios of observed caught RH/S to total observed fish kept (fish to be landed). These ratios were then applied to landings by year/area/quarter/gear/mesh strata to estimate RH/S catch for each strata. A similar procedure has become standard to estimate discards, but in that case only discards are used to establish the ratio. These strata were used to eliminate the ambiguity (e.g. double counting trips that land multiple species or missing directed effort that failed to catch the intended target) that results from attempting to sort observer data by "directed trips" and is further discussed in Appendix 3, which describes the FMAT's recommendations upon reviewing the analysis. The detailed results of these analyses are provided in Appendix 2, but as a summary table A1 from that Appendix is reproduced here for convenience:

Table 23. RH/S Catch Estimates and C.V.s. Midwater trawl starts in 2005.

	Alewife		American shad		Blueback herring		Herring NK		Hickory Shad	
Year	Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV
1989	20.35	0.49	58.92	0.60	19.60	0.39	7.08	1.03	0.00	
1990	55.31	0.68	25.81	0.34	78.94	0.44	331.34	0.72	0.00	
1991	68.24	0.48	104.27	0.25	115.41	0.37	110.46	0.48	39.35	0.00
1992	30.56	0.36	79.80	0.29	458.17	0.44	387.54	0.39	0.00	
1993	40.47	0.51	50.96	0.52	210.56	0.40	18.60	0.46	0.00	
1994	5.45	0.30	70.31	0.67	40.16	0.33	9.79	0.59	0.24	0.31
1995	6.36	0.48	17.17	0.41	213.50	0.43	51.89	1.44	0.02	1.42
1996	482.01	1.07	39.99	0.38	1803.43	2.10	28.68	0.43	26.64	0.82
1997	41.25	1.01	37.00	0.67	982.04	0.65	67.60	4.25	18.27	0.90
1998	80.88	1.47	55.31	0.43	49.32	1.27	0.42	0.65	39.19	1.45
1999	3.86	0.96	15.72	0.41	206.66	0.59	128.81	1.26	56.79	0.58
2000	28.37	0.67	74.39	1.82	55.46	0.37	21.96	0.53	0.06	0.80
2001	93.02	1.05	61.92	0.42	120.13	0.47	2.10	0.42	80.62	0.38
2002	2.72	3.86	24.07	0.41	173.23	0.31	76.51	1.85	1.41	1.05
2003	248.43	1.46	21.37	0.91	332.48	0.56	15.31	1.21	14.30	0.89
2004	99.74	0.93	18.16	0.35	81.54	0.47	176.74	0.74	35.03	0.78
2005	347.43	0.42	78.24	0.32	220.04	0.38	7.18	0.60	19.41	0.38
2006	57.61	0.91	29.29	4.37	187.48	0.67	232.02	1.16	13.35	0.81
2007	484.02	0.79	55.08	0.45	180.13	1.47	105.31	2.08	4.77	0.98
2008	145.03	0.43	52.38	0.32	526.59	0.57	327.99	0.40	7.83	0.65
2009	158.66	0.26	59.54	0.45	202.02	0.30	180.05	0.91	10.89	0.83
2010	118.50	0.20	46.12	0.17	125.02	0.20	86.50	0.32	1.12	0.65

As would hopefully be the case, the past and current analyses appear generally consistent to the degree that they can be compared. For example, in the new analyses the total catch of river herrings from 2005-2010 was 2,753 mt, with 32% or 881 mt caught in the Mid-Atlantic in quarter 1 by mid-water trawl vessels, which should be the mackerel fleet/fishery. 881 mt over 6 years is an average of 147 mt per year. This is pretty close to the 166 mt annual average estimated in specifications. The new analysis is substantially superior however in that like vessels are grouped together and then landings from those similar vessels are used to generate estimates using the RH/S catch rates from those same kinds of grouped vessels.

When discards are subtracted from the incidental catch estimates, the amount of "kept catch" of Atlantic Herring, for 2005-2010, closely matches the landings values in the dealer database, generally validating the incidental catch estimation method. Comparisons for river herring and shad do not match in a similar fashion - this is not surprising given the reported discrepancies in reporting of landings of the four species.

Appendices 1 and 2 contain substantial discussion of estimated RH/S catch and will be referred to when discussing impacts of alternatives. For purposes of additional summary, key strata in terms of RH/S landings are listed below from Appendix 2:

Table 4 of Working Paper II summarizes estimated shad catch, by stratum, as a proportion of the total incidental catch during 2005-2010.

The overall shad catches by gear type are as follows: Midwater Trawl (MWT): 42%; Large Mesh (5.5-8.0 in.) Gillnet: 27%; Small Mesh Bottom Trawl (SMBT): 26%.

The overall shad catches by area are as follows: Mid-Atlantic (M-A): 31%; New England (NE) 69%.

The overall shad catches by key quarter, area, and gear strata are as follows: Quarter 4 NE MWT: 13%; Q1 M-A MWT: 12%; Q3 NE MWT: 8%; Q3 NE Gillnet: (8%)Q4 NE Gillnet: (8%) (50% of total catch came from these 6 strata).

Table 5 of Working Paper II summarizes estimated river herring incidental catch, by stratum, as a proportion of the total incidental catch during 2005-2010.

The overall river herring catches by gear group are as follows: Midwater Trawl (MWT): 76%; Small Mesh (<= 3.5 in.) Bottom Trawl (SMBT): 24%.

The overall river herring catches by area are as follows: Mid-Atlantic (M-A): 44%; New England (NE) 56%.

The overall river herring catches by key quarter, area, and gear strata are as follows: Quarter 1 (Q1) M-A MWT: 35%; Q4 NE MWT: 16%; Q2 NE MWT: 11%; Q1 NE SMBT: 7%; Q3 NE MWT: 6%; Q3 NE SMBT: 5% (80% of total catch came from these 6 strata).

The key summary findings the FMAT concluded from these analyses are included in Appendix 3 and included the following points:

Lack of status information: Catch of river herring appears higher than shad but given the lack of coast-wide productivity and biological reference points for these stocks, it is not possible to quantify the impacts of these incidental catches on stock status. This makes the impact analysis of alternatives extremely uncertain.

Overlap in managed/directed fisheries: Analysis of Atlantic herring and Atlantic mackerel landings suggests strong overlap between the two in terms of gear/mesh/area, especially in Q1 in the Mid-Atlantic.

Spatial-Temporal RH/S catch variability (observer data): GIS analyses of effort and incidental catch rates of river herring and shad combined, by gear group, suggest that while there are some areas that appear to have high catch rates of RH/S and low effort, incidental catch rates were generally highest in the areas where fishing effort was highest. The GIS analyses also indicated that areas with high incidental catch rates during one time period may not show the same pattern in another time period.

Spatial-Temporal Effort and Directed Catch Variability: Analysis of the spatial distribution of effort by paired midwater trawls showed substantial variation among years. Analysis of the spatial distribution of mackerel catches also showed substantial variation when looking at one month to the next or the same month across years.

Spatial-Temporal catch variability in the Northeast Science Center Bottom Trawl RH/S: The results of earlier analyses showing substantial year-to-year variability in trawl survey catches of RH/S were noted. The sizes and locations of standard deviational ellipses that defined the core distributions of each species indicated a high degree of inter-annual variability during both spring and fall.

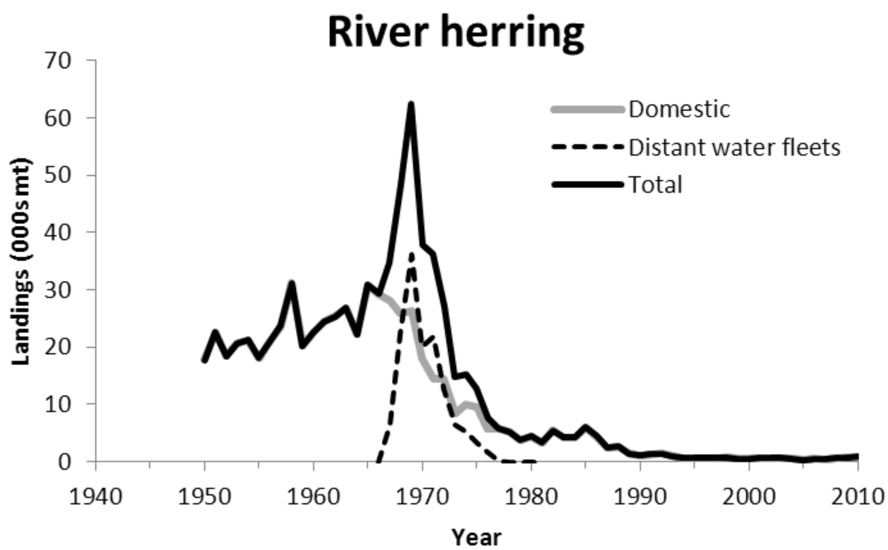
Comparison of incidentally-caught RH/S with landings

For 2005-2010, the ocean-intercept fisheries caught, on average, 63 mt of shad accordingly to the analysis described above. Shad landings provided by ASMFC over the same time period averaged 581 mt so ocean-intercept fisheries would appear to have represented a relatively low part of overall fishing mortality. The numbers in the analysis described above are best conceptualized as catch in ocean-intercept fisheries, which is why landings (much of which is riverine) can be so much higher.

For 2005-2010, the ocean-intercept fisheries caught, on average, 459 mt of river herring according to the analysis described above. River herring landings provided by ASMFC over the same time period averaged 601 mt so ocean-intercept fisheries would appear to have more relevance to river herring fishing mortality than shad fishing mortality. However, given the lack of reference points for any of the RH/S species, it is not possible to determine what effect, if any, these catch and/or landings quantities may be having on RH/S stocks.

For a historical perspective, the following figures provide river herring and shad landings over time per information provided by the ASMFC.

Figure 40. River Herring Landings



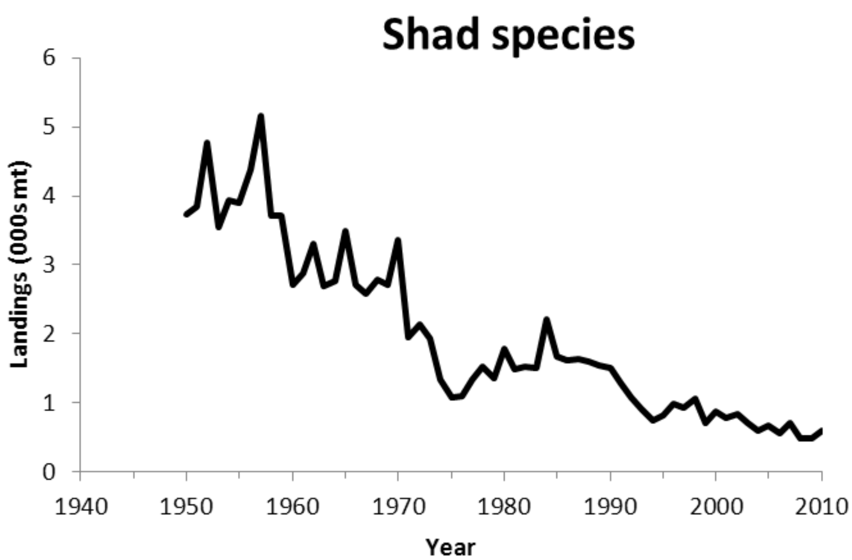


Figure 41. Shad Landings

<u>RH/S Catch in the *Illex* and Longfin Squid Fisheries</u>

The current analyses (Appendix 2) found that small mesh bottom otter trawling in the Mid-Atlantic in quarter 3 appears to account for a very small portion of river herring and shad catch (2.0 % and 4.5%, respectively), confirming preliminary findings that the *Illex* fishery does not appear to substantially catch

RH/S. The *Illex* fishery operates almost exclusively with small mesh bottom otter trawling in the Mid-Atlantic during June-Oct (mainly quarter 3). This is also consistent with the small mesh bottom trawl GIS analysis which shows that catch rates of all four species are very low offshore during quarter 3 (Figure 34 in Appendix 2).

The story for longfin squid is more complex. The longfin squid fishery occurs in New England and Mid-Atlantic waters; inshore during May-Oct and offshore during Nov-April (see Amendment 10 to the MSB FMP). In addition to the longfin squid fishery, other bottom trawl fisheries included in the "small-mesh" bottom trawl incidental catch category include Atlantic herring, whiting, and Atlantic mackerel. Across regions, small mesh bottom trawls accounted for about 25% of either river herring or shad catches. Working paper II (Appendix II) found that during 2005-2010, Mid-Atlantic small mesh bottom trawls accounted for 6% of river herring and 12% of shad catches. Working paper II also found that during 2005-2010, New-England small mesh bottom trawl accounted for 18% of river herring and 14% of shad catches.

However, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

Most shad catch for observed bottom small mesh (codend or liner less than 3.5 inches) was not associated with a targeted species so a similar analysis is not feasible but shad incidental catches appear low as described above.

6.4 Habitat (Including Essential Fish Habitat (EFH))

Pursuant to the Magnuson Stevens Act / EFH Provisions (50 CFR Part 600.815 (a)(1)), an FMP must describe EFH by life history stage for each of the managed species in the plan. This information was previously described in Amendment 8 to the MSB FMP and is being updated via Amendment 11 to the MSB FMP. EFH for the managed resource is described using fundamental information on habitat requirements by life history stage that is summarized in a series of documents produced by NMFS and available at: http://www.nefsc.noaa.gov/nefsc/habitat/efh/. This series of documents, as well as additional reports and publications, are used to provide the best available information on life history characteristics, habitat requirements, as well as ecological relationships. Matrices of habitat parameters (i.e. temperature, salinity, light, etc.) for eggs/larvae and juveniles/adults were developed in the mackerel, longfin squid and *Illex* squid and butterfish EFH background documents described above. Amendment 8 to the MSB FMP identified and described essential fish habitat for mackerel, longfin squid (except for eggs), *Illex*, and butterfish, summarized below. Amendment 9 to the MSB FMP identified and described essential fish habitat for longfin squid eggs. There are maps that show areas within which the text descriptions apply, and the maps for all four species are available in Amendment 8, except for longfin squid egg EFH, which is in Amendment 9. Amendment 11 (estimated implementation in late 2011) will update all of the EFH designations for MSB species. While not final, the new proposed EFH designations may be found here (search for Amendment 11 in the July 2011 actions): http://www.nero.noaa.gov/nero/regs/com.html. The current EFH textual descriptions are not repeated in this document as they are the exact same as were described in the 2011 specifications environmental assessment and can be accessed at http://www.nero.noaa.gov/nero/regs/com.html (February 2011 MSB EA/RIR/IRFA).

The source documents cited above for RH/S and Atlantic herring may be consulted for additional habitat information for those species.

For reference purposes, there are two primary gear types in use in the mackerel and longfin squid fisheries, mid-water trawl and bottom-otter trawl. Mid water trawling, as the name suggests, would not be expected to have substantial contact with the bottom. Bottom-otter trawls on the other hand are fished on the bottom. Habitat disturbance depends on how heavily or lightly the gear is fished on the bottom and can occur from the metal doors that spread the net along the bottom or from the net itself or attachments to the net (for example chaff guards) that make contact with the bottom.

6.5 Endangered and Protected Species

There are numerous species which inhabit the environment within the management unit of this FMP that are afforded protection under the Endangered Species Act (ESA) of 1973 (i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA). Eleven are classified as endangered or threatened under the ESA, while the rest are protected by the provisions of the MMPA. The subset of these species that are known to have interacted with the MSB fisheries is provided in this document section. The Council has determined that the following list of species protected either by the Endangered Species Act of 1973 (ESA), the Marine Mammal Protection Act of 1972 (MMPA), or the Migratory Bird Treaty Act of 1918 may be found in the environment utilized by Atlantic mackerel, squid and butterfish fisheries:

This list also includes three candidate fish species and one proposed fish species (species being considered for listing as an endangered or threatened species), as identified under the ESA.

Candidate species are those petitioned species that are actively being considered for listing as endangered or threatened under the ESA, as well as those species for which NMFS has initiated an ESA status review that it has announced in the *Federal Register*. Cusk, alewife, and blueback herring are candidate species known to occur within the action area of the MSB fisheries and have documented interactions with types of gear used in MSB fisheries. Sturgeon is a proposed species that is known to occur within the action area of the MSB fisheries and have documented interactions with types of gear used in MSB fisheries.

Candidate species receive no substantive or procedural protection under the ESA; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed project. The Protected Resources Division of the NMFS Northeast Regional Office has initiated review of recent stock assessments, bycatch information, and other information for these candidate species which will be incorporated in the status review reports for both candidate species. The results of those efforts are needed to accurately characterize recent interactions between fisheries and the candidate species in the context of stock sizes. Any conservation measures deemed appropriate for these species will follow the information from these reviews. Please note that the conference provisions apply only if a candidate species is proposed for listing (and thus, becomes a proposed species) (see 50 CFR 402.10)."

* = Known to have interacted with MSB fisheries

Cetaceans

Species	Status
North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Beaked whales (*Ziphius and Mesoplodon spp*.)	Protected
*Risso's dolphin (*Grampus griseus*)	Protected
*Pilot whale (*Globicephala spp*.)	Protected
*White-sided dolphin (*Lagenorhynchus acutus*)	Protected
*Common dolphin (*Delphinus delphis*)	Protected
Spotted and striped dolphins (*Stenella spp*.)	Protected
*Bottlenose dolphin (*Tursiops truncatus*)	Protected

Sea Turtles

Species	Status
*Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
*Loggerhead sea turtle (*Caretta caretta*)	Threatened

Fish

Species	Status
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Atlantic sturgeon (Acipenser oxyrinchus)*	
Gulf of Maine DPS	Threatened
New York Bight DPS	Endangered
Chesapeake Bay DPS	Endangered
Carolina DPS	Endangered
South Atlantic DPS	Endangered
Cusk (*Brosme brosme*)	Candidate
Alewife (*Alosa pseudoharengus*)	Candidate
Blueback herring (*Alosa aestivalis*)	Candidate

Birds

Species	Status
*Northern Gannet (*Morus bassanus*)	Protected

Protected Species Interactions with the Managed Resources – Includes Fishery Classification under Section 118 of Marine Mammal Protection Act

Species	Status
Common dolphin (*Delphinus delphis*)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened

Under section 118 of the MMPA, the NMFS must publish and annually update the List of Fisheries (LOF), which places all U.S. commercial fisheries in one of three categories based on the level of incidental serious injury and mortality of marine mammals in each fishery (arranging them according to a two tiered classification system). The categorization of a fishery in the LOF determines whether participants in that fishery may be required to comply with certain provisions of the MMPA, such as registration, NEFOP observer coverage, and take reduction plan requirements. The classification criteria consists of a two tiered, stock-specific approach that first addresses the total impact of all fisheries on each marine mammal stock (Tier 1) and then addresses the impact of the individual fisheries on each stock (Tier 2). If the total annual mortality and serious injury of all fisheries that interact with a stock is less than 10% of the Potential Biological Removal (PBR) for the stock then the stock is designated as Tier 1 and all fisheries interacting with this stock would be placed in Category III. Otherwise, these fisheries are subject to categorization under Tier 2. PBR is the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The current (2011) list of fisheries is available at: http://www.nmfs.noaa.gov/pr/interactions/lof/.

Under Tier 2, individual fisheries are subject to the following categorization:

Category I. Annual mortality and serious injury of a stock in a given fishery is greater than or equal to 50% of the PBR level;

Category II. Annual mortality and serious injury of a stock in a given fishery is greater than one percent and less than 50% of the PBR level; or

Category III. Annual mortality and serious injury of a stock in a given fishery is less than one percent of the PBR level.

In Category I, there is documented information indicating a "frequent" incidental mortality and injury of marine mammals in the fishery. In Category II, there is documented information indicating an "occasional" incidental mortality and injury of marine mammals in the fishery. In Category III, there is information indicating no more than a "remote likelihood" of an incidental taking of a marine mammal in the fishery or, in the absence of information indicating the frequency of incidental taking of marine mammals, other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, and species and distribution of marine mammals in the area suggest there is no more than a remote likelihood of an incidental take in the fishery. "Remote likelihood" means that annual mortality and serious injury of a stock in a given fishery is less than or equal to 10% of the PBR level or, which it is highly unlikely that any marine mammal will be incidentally taken by a randomly selected vessel in the fishery during a 20-day period or, in the absence of reliable information it is at the discretion of the Assistant Administrator (AA) for Fisheries to determine whether the incidental injury or mortality qualifies (or not) for a specific category.

Marine Mammal Stock Assessment Reports:

As required by the Marine Mammal Protection Act (MMPA), NMFS has incorporated earlier public comments into revisions of marine mammal stock assessment reports (SARs). These reports contain information regarding the distribution and abundance of the stock, population growth rates and trends, the stock's Potential Biological Removal level, estimates of annual human-caused mortality and serious injury from all sources, descriptions of the fisheries with which the stock interacts, and the status of the stock. The MMPA requires these assessments to be reviewed at least annually for strategic stocks and stocks for which significant new information is available, and at least once every 3 years for non-strategic stocks. The most recent SARs are available at: http://www.nmfs.noaa.gov/pr/sars/.

NMFS elevated the (mid-water) MSB fishery to Category I in the 2001 LOF but it was reduced to a Category II fishery in 2007 (see discussion below describing the Atlantic Trawl Gear Take Reduction Plan). The reduction in interactions documented between the MSB fisheries and several species/stocks of marine mammals compared to previous years led to the re-classification. No classification changes have occurred since 2007

6.5.1 Description of species that are known to interact with MSB fisheries

The following is a description of species that are protected under the MMPA and, as discussed above, have had documented interactions with fishing gears used to harvest species managed under this FMP (i.e. may interact with the Atlantic Mackerel Squid and Butterfish fisheries):

Common dolphin (PBR = 1000, all fisheries annual take 2004-2008 = 167)

The common dolphin may be one of the most widely distributed species of cetaceans, as it is found worldwide in temperate, tropical, and subtropical seas. They are widespread from Cape Hatteras northeast to Georges Bank (35 to 42 North latitude) in outer continental shelf waters from mid-January to May (Hain et al. 1981; CETAP 1982; Payne et al. 1984). See Waring *et al*. 2010 (http://www.nefsc.noaa.gov/publications/tm/tm219/) for more life history information.

The following information was taken from the most recent Stock Assessment Report for the species (Waring *et al*. 2010) Total numbers of common dolphins off the USA or Canadian Atlantic coast are unknown, although several estimates from selected regions of the habitat do exist for selected time periods. However, the most recent SAR considers the best abundance estimate for common dolphins to be 120,743 animals (C.V.=0.23). This is the sum of the estimates from two 2004 U.S. Atlantic surveys, where the estimate for the northern U.S. Atlantic is 90,547 (C.V.=0.24) and 30,196 (C.V.=0.54) for the southern U.S. Atlantic. This joint estimate is considered best because together these two surveys have the most complete coverage of the species' habitat. The minimum population size is 99,975. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.5 because the C.V. of the average mortality estimate is less than 0.3 (Wade and Angliss 1997). PBR for the western North Atlantic common dolphin is 1000.

Fishery Interactions - The following information was taken from the latest stock assessment for common dolphin contained in Waring *et al.* (2010) which summarizes incidental mortality of this species through 2007. Annual averages are presented below – details on encounters may be reviewed in Waring *et al* (2010).

<u>*Illex* Squid</u> - No incidental takes of common dolphins have been observed in the *Illex* fishery.

<u>Longfin squid</u> - Historically, in the Southern New England/Mid-Atlantic fishery all incidental takes attributed to this fishery were observed during the first quarter of the year (Jan-Mar), exclusively in the offshore fishery. The estimated fishery-related mortality of common dolphins attributable to the fall/winter offshore fishery was 0 for 1997 and 1998 and 49 in 1999 (C.V.=0.97). Presently, since 1999, this fishery is included in both the Northeast and Mid-Atlantic bottom trawl fisheries. For the Mid-Atlantic bottom trawl fishery the mean estimated annual mortality of common dolphin was 121 (C.V.=0.13) during the five year period 2004-2008. The portion of estimated common dolphin mortality attributable to the directed longfin squid fishery is unknown. For the Northeast bottom trawl fishery the mean estimated annual mortality of common dolphin was 25 (C.V.=0.13) during the five year period 2004-2008. The portion attributable to the directed longfin squid fishery is unknown.

<u>Atlantic Mackerel</u> - Historically, the estimated fishery-related mortality attributed to this fishery was 161 (C.V.=0.49) animals in 1997 and 0 in 1998 and 1999. After 1999, this fishery included as a component of the Mid-Atlantic bottom trawl and mid-water trawl fisheries. As noted above, the mean estimated annual mortality of common dolphin during the five year period 2004-2008 in the Mid-Atlantic bottom trawl fishery was 121 animals (C.V.=0.13). For the Mid-Atlantic mid-water trawl fishery the mean estimated annual mortality of common dolphin was 1 (C.V.=0.7) during the five year period 2004-2008. The portion of the estimated common dolphin mortality in the Mid-Atlantic bottom and mid-water trawl fisheries attributable to the directed Atlantic mackerel fishery is unknown.

A U.S. joint venture (JV) fishery was conducted in the Mid-Atlantic region from February-May 1998. NMFS maintained 100% observer coverage on the foreign JV vessels where 152 transfers from the U.S. vessels were observed. Seventeen incidental takes of common dolphin were observed in the 1998 JV mackerel fishery.

Atlantic white-sided dolphin (*Lagenorhynchus acutus*) (PBR = 509, all fisheries annual take 2004-2008 = 266)

Atlantic white-sided dolphins are found in temperate and sub-polar waters of the North Atlantic, primarily in continental shelf waters to the 100m depth contour. The species inhabits waters from central West Greenland to North Carolina (about 35° N) and perhaps as far east as 43° W (Evans 1987). Distribution of sightings, strandings and incidental takes suggest the possible existence of three stocks units: Gulf of Maine, Gulf of St. Lawrence and Labrador Sea stocks (Palka et al. 1997). Virginia and North Carolina observations appear to represent the southern extent of the species range. See Waring *et al*. 2010 (http://www.nefsc.noaa.gov/publications/tm/tm219/) for more life history information.

The total number of white-sided dolphins along the eastern USA and Canadian Atlantic coast is unknown, although the best available current abundance estimate for white-sided dolphins for the Gulf of Maine stock is 63,368 (C.V.=0.27) as estimated from 2002 – 2006 aerial and shipboard line-transect surveys. This is considered the best estimate of abundance because this survey is recent and provided the most complete coverage of the known habitat. The minimum population size is 50,883. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.5 because the C.V. of the average annual mortality estimate is less than 0.3. PBR for the western North Atlantic stock of white-sided dolphin is 509.

Fishery Interactions

The following information was taken from the latest stock assessment for white-sided dolphin contained in Waring *et al* (2010) which summarized incidental mortality of this species through 2008. Annual averages are presented below – details on encounters may be reviewed in Waring *et al* (2010).

<u>*Illex* squid</u> - Historically, no white-sided dolphin takes have been observed taken incidental to *Illex* squid fishing operations.

<u>Longfin squid</u> - According to Waring *et al*. (2010), no white-sided dolphin takes have been observed taken incidental to longfin squid fishing operations since 1996.

<u>Atlantic mackerel</u> - NMFS NEFOP observers in the Atlantic foreign mackerel fishery reported 44 takes of Atlantic white-sided dolphins incidental to fishing activities in the continental shelf and continental slope waters between March 1977 and December 1991. This total includes 9 documented takes by U.S. vessels involved in joint-venture fishing operations in which U.S. captains transfer their catches to foreign processing vessels. No incidental takes of white-sided dolphin were observed in the Atlantic mackerel JV fishery when it was observed in 1998.

<u>Northeast Mid-water Trawl Fishery (Including Pair Trawl)</u>

The two most commonly targeted fish in this fishery are herring (94% of vessel trip report (VTR) records) and mackerel (0.4%). The average annual estimated fishery-related mortality during 2004-2008 was 2 (C.V. = 1.03).

<u>Mid-Atlantic Mid-water Trawl Fishery (Including Pair Trawl)</u>

The observer coverage in this fishery was highest after 2003, although a few trips in other years were observed. The average annual estimated fishery-related mortality during 2004-2008 was 27 (C.V. = .50).

<u>Mid-Atlantic Bottom Trawl Fishery</u>

The average annual estimated fishery-related mortality during 2004-2008 was 25 (0.10).

Long-finned (*Globicephala melas*) and short-finned (*Globicephala macrorhynchus*) pilot whales (PBR = 265, all fisheries annual take 2004-2008 = 166)

There are two species of pilot whales in the Western Atlantic - the Atlantic (or long-finned) pilot whale, *Globicephala melas*, and the short-finned pilot whale, *G. macrorhynchus*. These species are difficult to identify to the species level at sea; therefore, the descriptive material below refers to *Globicephala* sp., and is identified as such. The species boundary is considered to be in the New Jersey to Cape Hatteras area. Sightings north of this are likely *G. melas*.

Pilot whales (*Globicephala* sp.) are distributed principally along the continental shelf edge in the winter and early spring off the northeast USA coast, (CETAP 1982; Payne and Heinemann 1993). In late spring, pilot whales move onto Georges Bank and into the Gulf of Maine and more northern waters, and remain in these areas through late autumn (CETAP 1982; Payne and Heinemann 1993). In general, pilot whales occupy areas of high relief or submerged banks. They are also associated with the Gulf Stream north wall and thermal fronts along the continental shelf edge (Waring *et al.* 1992; Waring *et al.* 2002). Pilot whales have a propensity to mass strand throughout their range, but the role of human activity in these events is unknown.
See Waring *et al*. 2010 (http://www.nefsc.noaa.gov/publications/tm/tm219/) for more life history information.

The total number of pilot whales off the eastern USA and Canadian Atlantic coast is unknown, although the minimum population size for *Globicephala sp*. is 26,523. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.5 because the C.V. of the average mortality estimate is less than 0.3 (Wade and Angliss 1997) and because this stock is of unknown status. PBR for the western North Atlantic *Globicephala sp*. is 265 (93 for long-finned and 172 for short-finned).

Fishery Interactions

The following information was taken from the latest stock assessment for pilot whales contained in Waring *et al.* (2010) which summarizes incidental mortality of these species through 2008. Mortality estimates within the Atlantic mackerel, squid and butterfish complex were made by sub-fishery prior to 2000. After that, each sub-fishery was re-categorized into bottom otter trawl or mid-water fishery categories. Annual averages are presented below – details on encounters may be reviewed in Waring *et al* (2010).

<u>*Illex* Squid - </u>The estimated fishery-related mortality of pilot whales attributable to this fishery was: 45 in 1996 (C.V.=1.27), 0 in 1997, 85 in 1998 (C.V.=0.65), and 0 in 1999. After 1999, this fishery has been included in the Mid-Atlantic bottom trawl fishery (see below).

<u>Longfin squid - </u>Only one pilot whale incidental take has been observed in longfin squid fishing operations 1996-1999. The one take was observed in 1999 in the offshore fishery. No pilot whale takes have been observed in the inshore fishery. The estimated fishery-related mortality of pilot whales attributable to the fall/winter offshore fishery was 0 between 1996 and 1998 and 49 in 1999 (C.V.=0.97). Since 1999, this fishery has been categorized in the Mid-Atlantic bottom trawl fishery (see below).

Atlantic Mackerel - No incidental takes of pilot whales have been observed in the mackerel fishery. The former distant water fleet fishery has been non-existent since 1977. There is also a mackerel trawl fishery in the Gulf of Maine that generally occurs during the summer and fall months (May-December). There have been no observed incidental takes of pilot whales reported for the Gulf of Maine fishery.

Mid-Atlantic Bottom Trawl

The average annual estimated fishery-related mortality during 2004-2008 was 34 (0.13).

Northeast Bottom Trawl

The average annual estimated fishery-related mortality during 2004-2008 was 15 animals (C.V.=0.13).

Mid-Atlantic Mid-Water Trawl – Including Pair Trawl

The average annual estimated fishery-related mortality during 2004-2008 was 2.4 (0.99).

Northeast Mid-Water Trawl – Including Pair Trawl

The average annual estimated fishery-related mortality during 2004-2008 was 4.3 (C.V.=0.51).

Risso's dolphin (*Grampus griseus*) (PBR = 124, all fisheries annual take 2004-2008 = 21)

Risso's dolphins are distributed worldwide in tropical and temperate seas, and in the Northwest Atlantic occur from Florida to eastern Newfoundland. Off the northeast U.S. coast, Risso's dolphins are distributed along the continental shelf edge from Cape Hatteras northward to Georges Bank during spring, summer, and autumn. In winter, the range is in the Mid-Atlantic Bight and extends outward into oceanic waters. The Gulf of Mexico and Atlantic stocks are currently being treated as two separate stocks though in 2006 a rehabilitated adult male Risso’s dolphin stranded and released in the Gulf of Mexico off Florida was tracked via satellite to waters off Delaware. The minimum population estimate for the western North Atlantic Risso’s dolphin is 12,920. See Waring *et al*. 2010 (http://www.nefsc.noaa.gov/publications/tm/tm219/) for more life history information.

Fishery Interactions

NMFS foreign-fishery observers reported four deaths of Risso's dolphins incidental to squid and mackerel fishing activities in the continental shelf and continental slope waters between March 1977 and December 1991. In the pelagic pair trawl fishery, one mortality was observed in 1992.

Mid-Atlantic Mid-water Trawl

A Risso’s dolphin mortality was observed in this fishery for the first time in 2008. No bycatch estimate has been generated.

Bottlenose dolphin (*Tursiops truncatus*) Offshore Form (not updated in 2010 so information below is from Waring et al 2008). (PBR = 566, all fisheries take is unknown)

There are two morphologically and genetically distinct bottlenose dolphin morphotypes (Duffield et al. 1983; Duffield 1986) described as the coastal and offshore forms. Both inhabit waters in the western North Atlantic Ocean (Hersh and Duffield 1990; Mead and Potter 1995; Curry and Smith 1997) along the U.S. Atlantic coast. The two morphotypes are genetically distinct based upon both mitochondrial and nuclear markers (Hoelzel et al. 1998). The offshore form is distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic Ocean; however the offshore morphotype has been documented to occur relatively close to shore over the continental shelf south of Cape Hatteras, NC.

<u>Fisheries Information</u>

Total estimated mean annual fishery-related mortality for this stock during 2001-2006 is unknown, however mortalities of offshore bottlenose dolphins were observed during this period in the Northeast Sink Gillnet and Mid-Atlantic Gillnet commercial fisheries.

<u>Earlier Interactions</u>

Thirty-two bottlenose dolphin mortalities were observed in the pelagic pair trawl fishery between 1991 and 1995. Estimated annual fishery-related mortality (C.V. in parentheses) was 13 dolphins in 1991 (0.52), 73 in 1992 (0.49), 85 in 1993 (0.41), 4 in 1994 (0.40) and 17 in 1995 (0.26).

Although there were reports of bottlenose dolphin mortalities in the foreign squid mackerel butterfish fishery during 1977-1988, there were no fishery-related mortalities of bottlenose dolphins reported in the self-reported fisheries information from the mackerel trawl fishery during 1990-1992.

One bottlenose dolphin mortality was documented in the North Atlantic bottom trawl in 1991 and the total estimated mortality in this fishery in

6.5.2 Atlantic Trawl Gear Take Reduction Plan

In September 2006, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) convened the Atlantic Trawl Gear Take Reduction Team (ATGTRT) under the Marine Mammal Protection Act (MMPA). The ATGTRT was convened to address incidental mortality and serious injury of long-finned pilot whales (*Globicephala melas*), short-finned pilot whales (*Globicephala macrorhynchus*), common dolphins (*Delphinus delphis*), and Atlantic white-sided dolphins (*Lagenorhynchus acutus*) in several trawl gear fisheries operating in the Atlantic Ocean. These marine mammal species are known to interact with the Mid-Atlantic Mid-Water Trawl, the Mid-Atlantic Bottom Trawl, Northeast Mid-Water Trawl and the Northeast Bottom Trawl fisheries.

Section 118 of the MMPA establishes a method for managing incidental interactions between marine mammals and commercial fisheries. Under section 118, Take Reduction Plans (TRPs) are developed to identify actions necessary to conserve and protect strategic marine mammal stocks[1] that interact with Category I and II fisheries.[2] The immediate goal of a TRP is to reduce, within six months of implementation, the incidental serious injury or mortality of marine mammals from commercial fishing to levels less than PBR. The long-term goal is to reduce, within five years of its implementation, the incidental serious injury and mortality of marine mammals from commercial fishing operations to insignificant levels approaching a zero serious injury and mortality rate, taking into account the economics of the fishery, the availability of existing technology, and existing state or regional fishery management plans.

Take Reduction Teams (TRTs) consisting of representatives from the fishing industry, fishery management councils, state and federal resource management agencies, the scientific community and conservation organizations develops the TRP while NMFS is responsible for its implementation. After a TRP is finalized, the TRT and NMFS meet periodically to monitor implementation of the plan and update as necessary. Take reduction plans must recommend regulatory or voluntary measures for the reduction of incidental mortality and serious injury; and recommend dates for achieving the specific objectives of the plan.

Presently, none of these marine mammal stocks under consideration by the ATGTRT are classified as a strategic stock nor do they currently interact with a Category I fishery.
At its first meeting the ATGTRT raised several issues critical to the take reduction planning process and the development of an ATGTRP. The ATGTRT requested clarification of the requirements under the MMPA for development of a take reduction plan for marine mammal stocks that are non-strategic and that do not interact with Category I fisheries. Specifically, the ATGTRT wanted to know if the 11 month timeline specified in the MMPA for the development of a TRP and the 5 year timeline for reaching ZMRG apply under the specific circumstances of the ATGTRT. The ATGTRT also requested that NMFS conduct a Tier Analysis for the 2007 annual List of Fisheries to verify whether the Squid, Mackerel Butterfish Fishery (Mid-Atlantic Midwater Trawl Fishery) should remain as a Category I fishery or be reclassified as a Category II fishery.

NOAA GC provided detailed legal guidance regarding the TRP timeline and requirements for development of a TRP for marine mammal stocks that are non-strategic in response to questions raised by the ATGTRT. In short, NOAA’s GC legal guidance stated that neither the 11 month timeline for the development of a TRP nor the 5 year goal for reaching ZMRG apply to non-strategic stocks that do not interact with Category I fisheries.

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[1] The MMPA defines the term “strategic stock” to mean a marine mammal stock (A) for which the level of direct human-caused mortality exceeds the potential biological removal level; (B) …..is declining and is likely to be listed as a threatened species under the Endangered Species Act (ESA) of 1973 within the foreseeable future; or (C) ….is listed as a threatened or endangered species under the ESA or is designated as a depleted stock under this Act. The term “potential biological removal level” means the maximum number of animals, not including natural mortalities that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

[2] NMFS must publish, at least annually, a List of Fisheries (LOF) that classifies U.S. commercial fisheries into one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals in each fishery:

- Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing;
- Category II designates fisheries with occasional serious injuries and mortalities;
- Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

The ATGTRT agreed that while a ATGTRP may not be required at this time[3], efforts should be made to identify and conduct research necessary to identify measures to reduce serious injury and mortality of marine mammals in Atlantic trawl fisheries and, ultimately, to achieve the MMPA's ZMRG through a trawl take reduction research plan. This information is captured in the Atlantic Trawl Gear Take Reduction Strategy (ATGTRS).[4]

In addition, the ATGTRT recommended that certain voluntary measures be implemented immediately for the Atlantic trawl fisheries in defined areas. NMFS funded outreach placards highlighting these voluntary measures. The placards were designed in collaboration with Garden State Seafood Association, who is also a member of the ATGTRT.

The ATGTRT recommended that two plans be developed to achieve the overall goal of the Take Reduction Strategy to reduce the incidental take of marine mammals in Atlantic trawl fisheries. These include an Education and Outreach Plan and a Research Plan as part of an overall take reduction strategy. The ATGTRT established two sub-groups to develop the Education and Outreach and Research Plans. The Education and Outreach Plan identifies activities that promote the exchange of information necessary to reduce the bycatch of marine mammals in Atlantic trawl fisheries. The Research Plan identifies information and research needs necessary to improve our understanding of the factors resulting in the bycatch in Atlantic trawl fisheries. The results of the identified research will be used to direct additional research and/or identify measures to reduce the serious injury and mortality of short- and long-finned pilot whales, Atlantic white-sided dolphins, and common dolphins in trawl fisheries to levels approaching the ZMRG. The Atlantic Trawl Gear Take Reduction Strategy is available at: http://www.nero.noaa.gov/prot_res/atgtrp/.

Pinnipeds

Harbor seals have the most extensive distribution of the four species of seal expected to occur in the area. Harbor seals sighting have occurred far south as 30° N (Katona et al. 1993, Waring et al. 2011). Gray seals are the second most common seal species in U.S. EEZ waters. They occur primarily in waters off of New England (Katona et al. 1993; Waring et al. 2011). Pupping for both species occurs in both U.S. and Canadian waters of the western North Atlantic. Although there are at least three gray seal pupping colonies in U.S., the majority of harbor seal pupping likely occurs in U.S. waters and the majority of gray seal pupping likely occurs in Canadian waters. Observations of harp and hooded seals are less common in U.S. EEZ waters. Both species form aggregations for pupping and breeding off eastern Canada in the late winter/early spring. They then travel to more northern latitudes for molting and summer feeding (Waring et al. 2006). Both species have a seasonal presence in U.S. waters from Maine to New Jersey, based on sightings, stranding, and fishery bycatch information (Waring et al. 2011).

[3] At the April 2007 meeting, the ATGTRT tabled the discussion of the NOAA GC's legal guidance without reaching consensus, with some members questioning the conclusions reached by NOAA GC. The ATGTRT agreed to focus on areas of consensus; specifically the need to identify and implement research and education and outreach initiatives to reduce serious injury and mortality of marine mammals in Atlantic trawl fisheries and ultimately to achieve the MMPA goal of reducing marine takes to Zero Mortality Rate Goal (ZMRG).

[4] The Atlantic Trawl Gear Take Reduction Strategy (ATGTRS) identifies informational and research tasks as well as education and outreach needs the ATGTRT believes are necessary to provide the basis for achieving the ultimate MMPA goal of achieving ZMRG. The ATGTRS has identified several potential voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals. The tasks identified by this ATGTRS are necessary to make reasoned management decisions that could provide the basis for any future take reduction plan should it be determined that a TRP is needed.

6.5.3 Description of Turtle Species with Documented Interactions with the MSB Fisheries

The October 2010 Biological Opinion for the MSB (http://www.nero.noaa.gov/prot_res/section7/NMFS-signedBOs/SMB%20BIOP%202010.pdf) fisheries contains detailed information on sea-turtle interactions. This document updates information on sea turtle interactions with trawl gear in the MSB fisheries. Summary information is provided below and the full document above may be consulted for details.

The primary species likely to be adversely affected by the MSB fishery would be loggerhead sea turtles, as they are the most abundant species occurring in U.S. Atlantic waters. Sea sampling and observer data indicate that fewer interactions occur between fisheries that capture MSB and leatherback, Kemp's ridley, and green sea turtles. The primary area of impact of the directed commercial fishery for MSB on sea turtles is likely bottom otter trawls in waters of the Mid-Atlantic from Virginia through New York, from late spring through fall (peak longfin squid abundance July-October). In New England, interactions with trawl gear may occur in summer through early fall (peak squid abundance August -September), although given the level of effort, the probability of interactions is much lower than in the Mid-Atlantic.

There have been 9 observed sea turtle takes in the MSB fishery during the past 11 years (using top species landed). All sea turtle takes have occurred in bottom otter trawl gear participating in the squid fishery. Based on data collected by observers for the reported sea turtle captures in or retention in MSB trawl gear, the NEFSC estimated loggerhead bycatch in the MSB trawl fishery between 2000-2004 (Murray 2008) was 62 animals annually. NMFS estimates 2 leatherback, 2 green, and 2 Kemp's ridley turtles are taken each year based on the very low encounter rates for these species and/or unidentified turtles.

On July 12, 2007, NMFS and USFWS (Services) received a petition from Center for Biological Diversity and Turtle Island Restoration Network to list the ''North Pacific populations of loggerhead sea turtle'' as an endangered species under the ESA. In addition, on November 15, 2007, the Services received a petition from Center for Biological Diversity and Oceana to list the ''Western North Atlantic populations of loggerhead sea turtle'' as an endangered species under the ESA. NMFS published notices in the *Federal Register*, concluding that the petitions presented substantial scientific information indicating that the petitioned actions may be warranted (72 FR 64585, November 16, 2007; 73 FR 11849; March 5, 2008). In 2008, a Biological Review Team (BRT) was established to assess the global population structure to determine whether DPSs exist and, if so, the status of each DPS. The BRT identified nine loggerhead DPSs, distributed globally (Conant et al. 2009). On March 16, 2010, the Services announced 12-month findings on the petitions to list the North Pacific populations and the Northwest Atlantic populations of the loggerhead sea turtle as DPSs with endangered status and published a proposed rule to designate nine loggerhead DPSs worldwide, seven as endangered (North Pacific Ocean DPS, South Pacific Ocean DPS, Northwest Atlantic Ocean DPS, Northeast Atlantic Ocean DPS, Mediterranean Sea DPS, North Indian Ocean DPS, and Southeast Indo-Pacific Ocean DPS) and two as threatened (Southwest Indian Ocean DPS and South Atlantic Ocean DPS).

On September 22, 2011, NMFS and USFWS issued a final rule (76 FR 58868), determining that the loggerhead sea turtle is composed of nine DPSs (as defined in Conant et al., 2009) that constitute species that may be listed as threatened or endangered under the ESA. Five DPSs were listed as endangered (North Pacific Ocean, South Pacific Ocean, North Indian Ocean, Northeast Atlantic Ocean, and Mediterranean Sea), and four DPSs were listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean). Note that the Northwest Atlantic Ocean (NWA) DPS and the Southeast Indo-Pacific Ocean DPS were original proposed as endangered. The NWA DPS was determined to be threatened based on review of nesting data available after the proposed rule was published, information provided in public comments on the proposed rule, and further discussions within the agencies. The two primary factors considered were population abundance and population trend. NMFS and USFWS found that an endangered status for the NWA DPS was not warranted given the large size of the nesting population, the overall nesting population remains widespread, the trend for the nesting population appears to be stabilizing, and substantial conservation efforts are underway to address threats.

The September 2011 final rule also noted that critical habitat for the two DPSs occurring within the U.S. (NWA DPS and North Pacific DPS) will be designated in a future rulemaking. Information from the public related to the identification of critical habitat, essential physical or biological features for this species, and other relevant impacts of a critical habitat designation was solicited.

This proposed action only occurs in the Atlantic Ocean. As noted in Conant et al. (2009), the range of the four DPSs occurring in the Atlantic Ocean are as follows: NWA DPS – north of the equator, south of 60° N latitude, and west of 40° W longitude; Northeast Atlantic Ocean (NEA) DPS – north of the equator, south of 60° N latitude, east of 40° W longitude, and west of 5° 36' W longitude; South Atlantic DPS – south of the equator, north of 60° S latitude, west of 20° E longitude, and east of 60° W longitude; Mediterranean DPS – the Mediterranean Sea east of 5° 36' W longitude. These boundaries were determined based on oceanographic features, loggerhead sightings, thermal tolerance, fishery bycatch data, and information on loggerhead distribution from satellite telemetry and flipper tagging studies. Sea turtles from the NEA DPS are not expected to be present over the North American continental shelf in U.S. coastal waters, where the proposed action occurs (P. Dutton, NMFS, personal communication, 2011). Previous literature (Bowen et al. 2004) has suggested that there is the potential, albeit small, for some juveniles from the Mediterranean DPS to be present in U.S. Atlantic coastal foraging grounds.

These data should be interpreted with caution however, as they may be representing a shared common haplotype and lack of representative sampling at Eastern Atlantic rookeries. Given that updated, more refined analyses are ongoing and the occurrence of Mediterranean DPS juveniles in U.S. coastal waters is rare and uncertain, if even occurring at all, for the purposes of this assessment we are making the determination that the Mediterranean DPS is not likely to be present in the action area. Sea turtles of the South Atlantic DPS do not inhabit the action area of this subject fishery (Conant et al. 2009). As such, the remainder of this assessment will only focus on the NWA DPS of loggerhead sea turtles, listed as threatened.

6.5.4 Birds

Northern Gannet (*Morus bassanus*)

The Northern gannet is a migratory seabird federally protected in the U.S. and Canada. Gannets spend the boreal summer along coastal Canada and the winter along the U.S. East Coast continental shelf waters. North American breeding colonies exist at 6 main sites in the Gulf of St. Lawrence and along the Atlantic coast of Newfoundland. During the nesting season, March – November, birds forage throughout the North Atlantic from the Bay of Fundy, off the coasts of Newfoundland, Labrador and Greenland and throughout the Gulf of St. Lawrence. Dispersal from breeding sites begins in September, where gannets migrate south along the Northeast Atlantic coast and are considered common winter residents off most Northeast coastal states. Primary prey of the Northern gannet include herring, mackerel and squids.

North American breeding population has been increasing since the early 1970's and in 2000 the population was estimated at 144,596 individuals. Northern gannets were not listed as a species of conservation concern by the USFWS in 2008.

Northern gannet Fishery Interactions:

Illex squid: No interactions observed for 2004 – 2008.

Longfin squid: For 2004 to 2008, one Northern Gannet take was observed in March of 2004.

Atlantic mackerel: For 2004 to 2008 a total of 62 Northern Gannets have been observed (2004, n = 17; 2005, n = 1; 2006, n = 2; 2007, n = 30; 2008, n = 12).

Butterfish: Given recent restrictions on butterfish landings it is difficult to even define a directed butterfish fishery – landings are generally incidental to other fishing.

6.5.5 Atlantic Sturgeon

A status review for Atlantic sturgeon was completed in 2007 which indicated that five distinct population segments (DPS) of Atlantic sturgeon exist in the United States (ASSRT 2007). On October 6, 2010, NMFS proposed listing these five DPSs of Atlantic sturgeon along the U.S. East Coast as either threatened or endangered species (75 FR 61872 and 75 FR 61904). Final listing rules were published on February 6th, 2012 (77 FR 5880 and 75 FR 5914). The GOM DPS of Atlantic sturgeon has been listed as threatened, and the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon have been listed as endangered. Atlantic sturgeon from any of the five DPSs could occur in areas where the MSB fisheries operate.

Atlantic sturgeon is an anadromous species that spawns in relatively low salinity, river environments, but spends most of its life in the marine and estuarine environments from Labrador, Canada to the Saint Johns River, Florida (Holland and Yelverton 1973, Dovel and Berggen 1983, Waldman et al. 1996, Kynard and Horgan 2002, Dadswell 2006, ASSRT 2007). Tracking and tagging studies have shown that subadult and adult Atlantic sturgeon that originate from different rivers mix within the marine environment, utilizing ocean and estuarine waters for life functions such as foraging and overwintering (Stein et al. 2004a, Dadswell 2006, ASSRT 2007, Laney et al. 2007, Dunton et al. 2010). Fishery-dependent data as well as fishery-independent data demonstrate that Atlantic sturgeon use relatively shallow inshore areas of the continental shelf; primarily waters less than 50 m (Stein et al. 2004b, ASMFC 2007, Dunton et al. 2010). The data also suggest regional differences in Atlantic sturgeon depth distribution with sturgeon observed in waters primarily less than 20 m in the Mid-Atlantic Bight and in deeper waters in the Gulf of Maine (Stein et al. 2004b, ASMFC 2007, Dunton et al. 2010). Information on population sizes for each Atlantic sturgeon DPS is very limited. Based on the best available information, NMFS has concluded that bycatch, vessel strikes, water quality and water availability, dams, lack of regulatory mechanisms for protecting the fish, and dredging are the most significant threats to Atlantic sturgeon.

Comprehensive information on current abundance of Atlantic sturgeon is lacking for all of the spawning rivers (ASSRT 2007). Based on data through 1998, an estimate of 863 spawning adults per year was developed for the Hudson River (Kahnle et al. 2007), and an estimate of 343 spawning adults per year is available for the Altamaha River, GA, based on data collected in 2004-2005 (Schueller and Peterson 2006). Data collected from the Hudson River and Altamaha River studies cannot be used to estimate the total number of adults in either subpopulation, since mature Atlantic sturgeon may not spawn every year, and it is unclear to what extent mature fish in a non-spawning condition occur on the spawning grounds.

Nevertheless, since the Hudson and Altamaha Rivers are presumed to have the healthiest Atlantic sturgeon subpopulations within the United States, other U.S. subpopulations are predicted to have fewer spawning adults than either the Hudson or the Altamaha (ASSRT 2007). It is also important to note that the estimates above represent only a fraction of the total population size as spawning adults comprise only a portion of the total population (e.g., this estimate does not include subadults and early life stages).

Atlantic sturgeon are known to be captured in sink gillnet, drift gillnet, and otter trawl gear (Stein et al. 2004a, ASMFC TC 2007). Of these gear types, sink gillnet gear poses the greatest known risk of mortality for sturgeon bycatch (ASMFC TC 2007). Sturgeon deaths were rarely reported in the otter trawl observer dataset (ASMFC TC 2007). However, the level of mortality after release from the gear is unknown (Stein et al. 2004a).

In a review of the Northeast Fishery Observer Program (NEFOP) database for 2001-2006, bycatch rates were calculated using observed Atlantic sturgeon bycatch to fishing effort to estimate total commercial fishery bycatch of Atlantic sturgeon. This review indicated sturgeon bycatch occurred in statistical areas abutting the coast from Massachusetts (statistical area 514) to North Carolina (statistical area 635) (ASMFC TC 2007). Based on the available data, participants in an ASMFC bycatch workshop concluded that sturgeon encounters tended to occur in waters less than 50 m throughout the year, although seasonal patterns exist (ASMFC TC 2007). The ASMFC analysis determined that an average of 650 Atlantic sturgeon mortalities occurred per year (during 2001 to 2006) in sink gillnet fisheries. Stein et al. (2004a), based on a review of the NMFS Observer Database from 1989-2000, found clinal variation in the bycatch rate of sturgeon in sink gillnet gear with lowest rates occurring off of Maine and highest rates off of North Carolina in all months.

There was an average of 114 estimated encounters and 11 estimated Atlantic sturgeon mortalities in small-mesh otter trawl from 2006-2010. Interactions are at the lowest levels in Quarter 1 (January – March) and Quarter 3 (July-September) for small-mesh otter trawl. This is likely due to both how the fisheries that use small-mesh otter are prosecuted and the biology of the target species. Atlantic sturgeons are the least active during their overwintering period, which includes Quarter 1.

In an updated, preliminary analysis, the Northeast Fisheries Science Center (NEFSC) used data from the NEFOP database to provide updated estimates for the 2006 to 2010 timeframe by fishery management plan. Data were limited by observer coverage to waters outside the coastal boundary (fzone>0) and north of Cape Hatteras, NC. Sturgeon included in the data set were those identified by federal observers as Atlantic sturgeon, as well as those categorized as unknown sturgeon. Limited data collected in the At-Sea Monitoring Program were not included, although preliminary views suggest the incidence of sturgeon encounters was low. The analysis estimates that between 2006 and 2010, a total of 15,587 lb of Atlantic sturgeon was taken in bottom otter trawl (7,740 lb) and sink gillnet (7,848 lb) gear. The analysis found that 10.7% (828.1 lb) of the weight of sturgeon takes in bottom otter trawl gear could be attributed to the MSB fisheries; this equates to 5.3% of the weight of sturgeon mortalities in both gear types.

These updated data and new analysis support the earlier conclusion that the MSB fisheries may interact with Atlantic sturgeon. Since the Atlantic sturgeon DPSs have been listed as endangered and threatened under the ESA, the ESA Section 7 consultation for the MSB fisheries has been reinitiated, and additional evaluation will be included in the resulting Biological Opinion to describe any impacts of the fisheries on Atlantic sturgeon and define any measures needed to mitigate those impacts, if necessary. It is anticipated that any measures, terms and conditions included in an updated Biological Opinion will further reduce already low impacts to the species.

6.5.6 Description of Candidate Species for Listing Under the ESA

Cusk

Cusk are not expected to be impacted by actions in this amendment, but more information may be found at: http://www.nmfs.noaa.gov/pr/species/fish/cusk.htm.

Alewife and Blueback Herring

On August 5, the Natural Resources Defense Council submitted a petition to NOAA requesting that the agency consider river herrings, alewife and blueback herring, for listing. Within 12 months of receipt of this petition, NOAA is required to make a determination of whether alewife and blueback herring should be listed as endangered or threatened, or not at all.

Both alewife and blueback herring are found in coastal waters and rivers from Canada to North Carolina, although blueback herring's range extends farther south to Florida. Both species are managed by the Atlantic States Marine Fisheries Commission.

Blueback herring and alewife are both now considered candidate species under the Endangered Species Act. NOAA has determined that a petition to list alewife and blueback herring, collectively referred to as river herring, under the Endangered Species Act presents enough scientific and commercial information to merit further review. As a result, the agency will conduct a formal review of river herring population status and trends. A decision regarding whether listing is warranted is due on August 5, 2012.

The Atlantic States Marine Fisheries Commission has been conducting a stock assessment for river herring since 2008, covering over 50 river specific stocks throughout the species US range. This represents a significant effort on behalf of the Commission and the coastal states from Maine to Florida. NOAA recognizes this extensive effort to compile the most current information on the status of these stocks throughout their range in the United States and intends to work cooperatively with the Commission to utilize this information in the ongoing review of the status of these two keystone species.

NOAA will also consider information contained in the petition, published literature, and other information about the historic and current range of river herring, their physical and biological habitat requirements, population status and trends, and threats. If NOAA determines that a listing is appropriate, the agency will publish a proposed rule and take public comment before publishing a final decision. However, if NOAA determines that that listing these species is not appropriate, the process ends.

6.6 Fishery, Port, and Community Description (Human Communities)

Detailed information about landings, revenues, gear, permits, area fished, recreational catch, etc. for mackerel, *Illex*, butterfish, and longfin squid is described in section 6.6. Detailed information on the Atlantic herring fishery is available in Amendment 5's DEIS, available here: http://www.nefmc.org/herring/index.html. Basic community profiles for all Mid-Atlantic and New-England Ports are available at: http://www.nefsc.noaa.gov/read/socialsci/community_profiles/. These profiles generally contain landings information through 2006. The table below provides an update for the importance of mackerel, longfin squid, and Atlantic herring (species most impacted by this Amendment) for all ports where cumulative ex-vessel revenues 2007-2010 totaled more than $50,000 and the proportion of revenues from mackerel, longfin squid, and Atlantic herring combined accounted for at least 5% of all revenues. New Bedford is also included because even though the percentage is small, the value of Atl Herring, Atl Mackerel, and longfin squid is still relatively large (the value of scallops dominates in New Bedford). This identifies the ports most dependent on the fisheries that may be impacted by the actions considered in this document.

Table 24. MSB Ports

PORTNAME	Total Ex-Vessel Value of All Landings in Port (2007-2010)	Percent of Value from Atl Herring	Percent of Value from Mackerel	Percent of Value from Loligo	Percent of Value from Atl Herring, Mackerel, Loligo Combined
PROSPECT, MAINE	$330,577	92%	0%	0%	92%
NORTH KINGSTOWN, RHODE ISLAND	$42,493,380	4%	14%	27%	45%
ROCKLAND, MAINE	$35,664,669	36%	0%	0%	36%
POINT JUDITH, RHODE ISLAND	$137,980,732	1%	0%	22%	24%
HAMPTON BAYS, NEW YORK	$20,374,542	0%	0%	22%	22%
OTHER BARNSTABLE, MASSACHUSETTS	$6,490,882	0%	0%	22%	22%
SHINNECOCK, NEW YORK	$2,591,042	0%	0%	21%	21%
FALL RIVER, MASSACHUSETTS	$13,294,843	9%	10%	0%	19%
MONTAUK, NEW YORK	$64,864,533	0%	0%	19%	19%
PROSPECT HARBOR, MAINE	$9,405,037	18%	0%	0%	18%
NEW YORK CITY, NEW YORK	$971,180	0%	1%	17%	17%
GREENPORT, NEW YORK	$1,538,865	0%	0%	15%	15%
GLOUCESTER, MASSACHUSETTS	$207,497,454	12%	3%	0%	15%
NIANTIC, CONNECTICUT	$1,006,529	0%	1%	13%	14%
PORTLAND, MAINE	$84,423,991	14%	0%	0%	14%
WOODS HOLE, MASSACHUSETTS	$2,756,724	0%	0%	12%	12%
POINT LOOKOUT, NEW YORK	$10,002,397	0%	0%	11%	11%
EAST HAVEN, CONNECTICUT	$2,562,075	0%	0%	8%	8%
FREEPORT, NEW YORK	$1,637,244	0%	0%	7%	7%
NEWPORT, RHODE ISLAND	$33,081,171	2%	0%	5%	7%
BELFORD, NEW JERSEY	$10,984,338	0%	0%	5%	6%
CAPE MAY, NEW JERSEY	$266,247,723	1%	2%	3%	5%
OTHER NEWPORT, RHODE ISLAND	$794,742	0%	0%	5%	5%
HYANNISPORT, MASSACHUSETTS	$8,718,830	0%	0%	5%	5%
NEW BEDFORD, MASSACHUSETTS	$1,057,316,970	1%	1%	0%	2%

Source: NMFS Dealer Weighout Database Unpublished Data

The Council employed a new procedure for gathering information from its Squid-Mackerel-Butterfish Advisory Panel during the 2012 specifications setting process. The Advisory Panel created a "Fishery Performance Report" for each species based on the advisors' personal and professional industry experiences as well as reactions to an "informational document" for each species created by Council staff. The Fishery Performance Reports, while not reviewed by NMFS technical staff in the same fashion as this environmental assessment, may be of additional interest to the reader and may be found here: http://www.mafmc.org/meeting_materials/SSC/2011-05/SSC_2011-05.htm. The staff informational document, while also not reviewed and containing some preliminary information, was constructed using the same basic analytical techniques as this document and also may be of interest to readers looking for additional descriptive fishery information (available via same link as above).

6.7 Fishery and Socioeconomic Description

6.7.1 Atlantic mackerel (mackerel)

Historical Commercial Fishery

The modern northwest mackerel fishery began with the arrival of the European distant-water fleets (DWF) in the early 1960's. Total international commercial landings (NAFO Subareas 2-6,) peaked at 437,000 mt in 1973 and then declined sharply to 77,000 by 1977 (Overholtz 1989). The MSA established control of the portion of the mackerel fishery occurring in US waters (NAFO Subareas 5-6) under the auspices of the Council. Reported foreign landings in US waters declined from an unregulated level of 385,000 mt in 1972 to less than 400 mt from 1978-1980 under the MSFCMA (the foreign mackerel fishery was restricted by NOAA Foreign Fishing regulations to certain areas or "windows." Under the MSB FMP foreign mackerel catches were permitted to increase gradually to 15,000 mt in 1984 and then to a peak of almost 43,000 mt in 1988 before being phased out again (Figure 42).

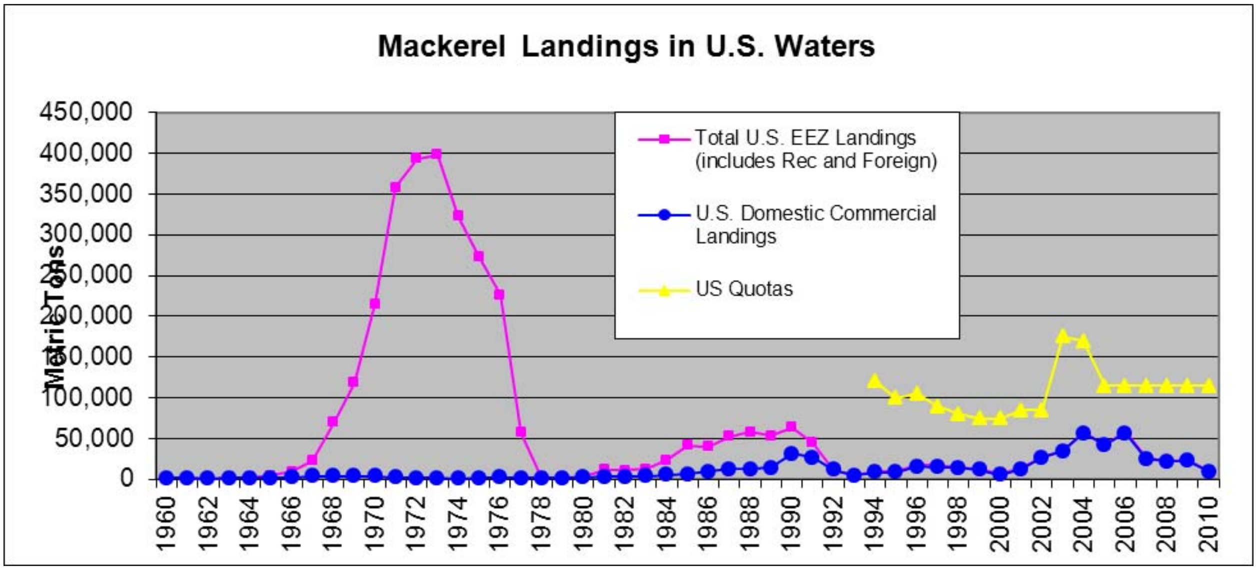


Figure 42. Historical Alt. Mackerel Landings in the U.S. EEZ.

US commercial landings of mackerel increased steadily from roughly 3000 mt in the early 1980s to greater than 31,000 mt by 1990. US mackerel landings declined to relatively low levels 1992-2000 before increasing in the early 2000's. The most recent years have seen a significant drop-off in harvest. Price (nominal) has fluctuated without trend since 1982 and averaged $323/mt in 2010.

Analysis of NMFS weighout data is used to chart annual estimates for U.S. mackerel landings (mt), ex-vessel value ($), and nominal (not inflation adjusted) prices 1982-2010 ($/mt) in the figures below.

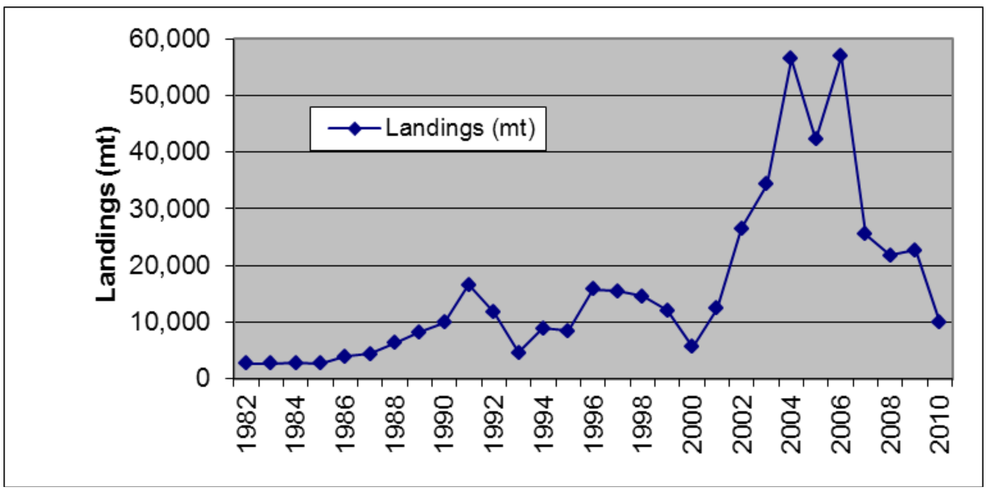


Figure 43. U.S. Mackerel Landings.
Source: Unpublished NMFS dealer reports

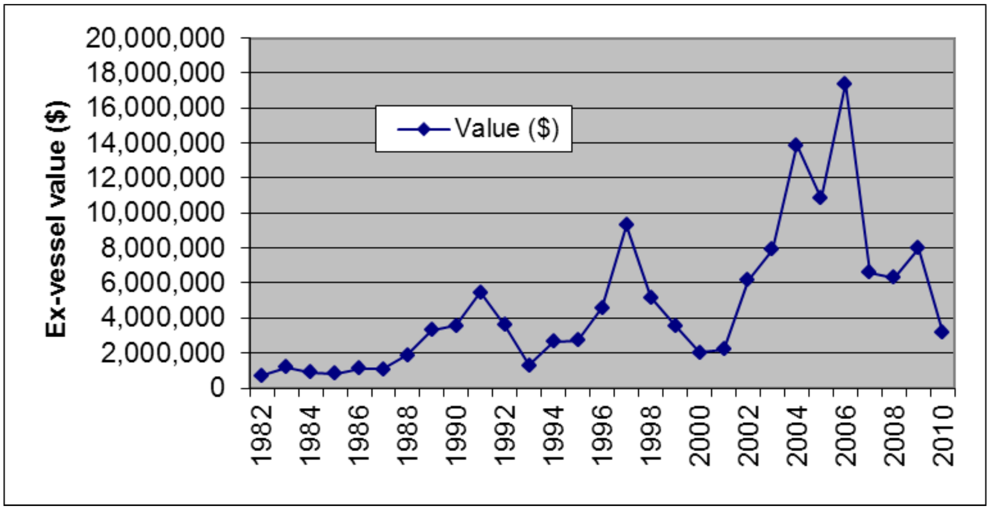


Figure 44. U.S. Mackerel Ex-vessel Revenues.
Source: Unpublished NMFS dealer reports

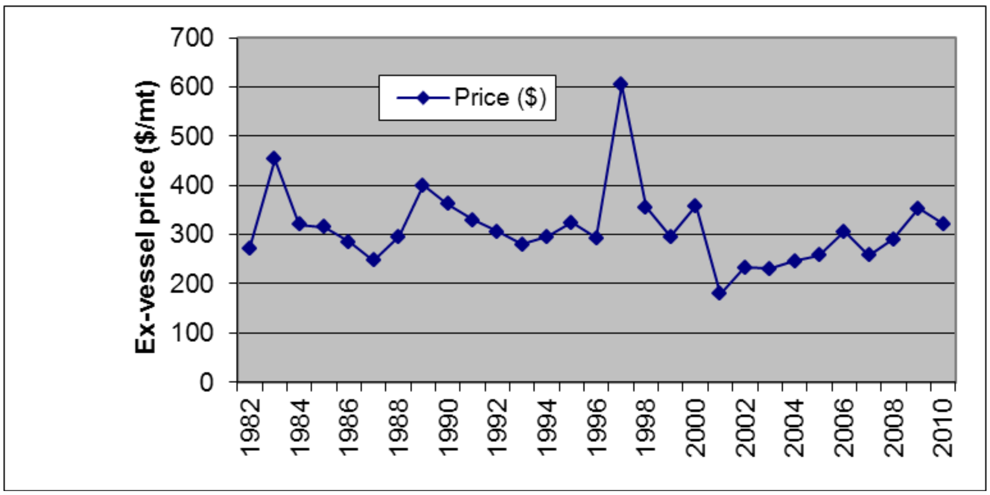


Figure 45. U.S. Mackerel Ex-Vessel Prices.
Source: Unpublished NMFS dealer reports

Specification Performance

The principle measure used to manage mackerel is monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 90% of the DAH is landed. Mandatory reporting for mackerel was fully instituted in 1997 so specification performance since 1997 is most relevant. Table 25 lists the performance of the mackerel fishery (commercial and recreational together) compared to its DAH. There have been no quota overages.

Table 25. Mackerel DAH Performance. (mt)

Year	Harvest (mt) (Commercial and Recreational)	Quota (mt)	Percent of Quota Landed
1997	17,140	90,000	19%
1998	15,215	80,000	19%
1999	13,366	75,000	18%
2000	7,097	75,000	9%
2001	13,876	85,000	16%
2002	27,824	85,000	33%
2003	35,068	175,000	20%
2004	55,520	170,000	33%
2005	43,220	115,000	38%
2006	58,493	115,000	51%
2007	26,431	115,000	23%
2008	22,439	115,000	20%
2009	23,382	115,000	20%
2010	10,669	115,000	9%

Source: Unpublished NMFS dealer reports

Commercial Fishery and Community Analysis

The following tables describe, for mackerel in 2010, the total landings, value, numbers of vessels making landings, numbers of trips landing mackerel, price per metric ton (Table 26), landings by state (Table 27), landings by month (Table 28), landings by gear (Table 29), numbers of permitted and active vessels by state (Table 30), numbers of uncanceled permits over time (Figure 46), numbers of permitted and active dealers by state (Table 31), and landings by NMFS federal permit category (Table 32). Previous Specification EA's have included port information but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 26. 2010 Total Mackerel Landings, Value, Active Vessels, Trips, and Price.

(Based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NERO Permits or Hull Numbers landing over 1,000 pounds annually for “Vessels” and 100 pounds on a trip for “Trips” are considered. Since some state records do not include permit/hull information, the vessel and trip numbers are somewhat underestimated but account for the vast majority of landings.)

	Landings (mt)	Value ($)	Vessels	Trips	$/mt
Mackerel	9,891	3,195,962	74	588	$323

Source: Unpublished NMFS dealer reports

Table 27. Mackerel Landings (mt) by State in 2010.

State	Landings (mt)	Pct_of_Total
Massachusetts	5,514	56%
New Jersey	2,128	22%
Rhode Island	1,976	20%
Maine	161	2%
New York	51	1%
Connecticut	31	0%
North Carolina	21	0%
Virginia	9	0%
Maryland	0	0%
New Hampshire	0	0%
Total	9,891	100%

Source: Unpublished NMFS dealer reports

Table 28. Mackerel Landings (mt) by Month in 2010.

MONTH	Landings (mt)	Pct of Total
January	5,635	57%
February	2,655	27%
March	1,188	12%
April	165	2%
May	105	1%
June	57	1%
July	10	0%
August	4	0%
September	6	0%
October	54	1%
November	2	0%
December	10	0%
Total	9,891	100%

Source: Unpublished NMFS dealer reports

Table 29. Mackerel Landings (mt) by Gear Category in 2010.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,MIDWATER PAIRED	4,149	42%
TRAWL,OTTER,BOTTOM,FISH	2,744	28%
TRAWL,OTTER,MIDWATER	1,992	20%
Other	1,006	10%
Total	9,891	100%

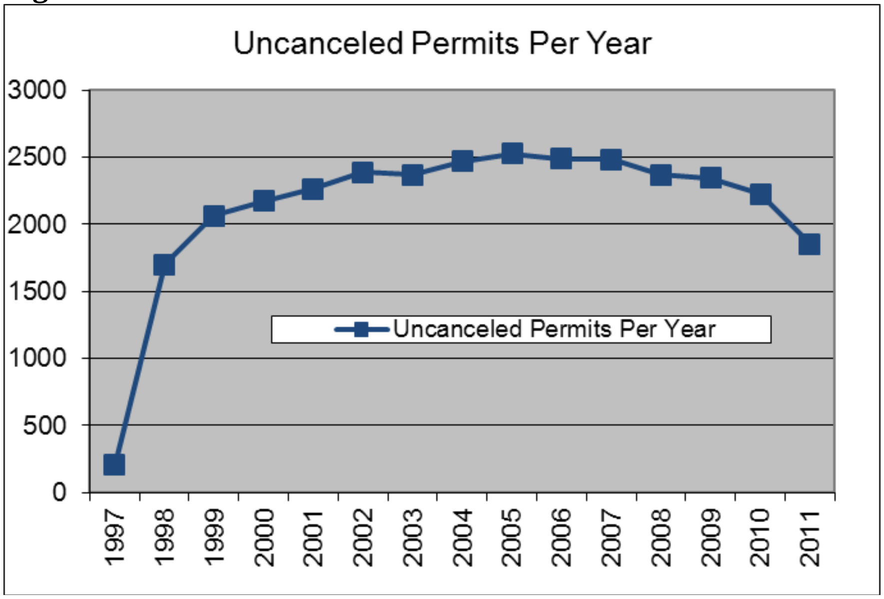
Source: Unpublished NMFS dealer reports

Table 30. Mackerel Vessel Permit Holders and Active Permit Holders in 2010 by Homeport State (HPST).

HPST	Permitted Vessels	Active Vessels
MA	891	52
NJ	294	37
ME	253	5
NY	230	34
RI	142	41
NH	95	11
VA	94	6
NC	91	10
CT	37	6
MD	30	2
Other	44	2
Total	2201	206

Source: unpublished NMFS permit and dealer data.

Figure 46. Uncanceled Mackerel Permits Per Year



Source: Unpublished NMFS dealer reports

Table 31. Mackerel, Squid, and Butterfish Dealer Permit Holders and Those that Made Mackerel Purchases in 2010 by State.

State	Permitted Dealers	Active Dealers
MA	109	27
NY	87	17
RI	39	12
NC	24	9
ME	19	7
VA	17	5
NJ	39	4
NH	8	3
CT	6	2
MD	8	2
Other	10	0
Total	366	88

Source: unpublished NMFS permit and dealer reports.

Table 32. Mackerel Landings by Permit Category for the Period 2001-2010.

Year	Atlantic Mackerel Permit		Party/Charter		No Permit/ Unknown		Total	
	mt	%	mt	%	mt	%	mt	Quota
2001	12,063	98%	0	0%	277	2%	12,340	85,000
2002	25,887	98%	0	0%	643	2%	26,530	85,000
2003	33,969	99%	0	0%	329	1%	34,298	175,000
2004	56,100	99%	0	0%	339	1%	56,439	170,000
2005	42,122	100%	0	0%	148	0%	42,270	115,000
2006	56,705	100%	0	0%	155	0%	56,860	115,000
2007	24,898	97%	0	0%	649	3%	25,546	115,000
2008	21,312	98%	0	0%	422	2%	21,734	115,000
2009	22,508	99%	0	0%	127	1%	22,635	115,000
2010	9,769	99%	0	0%	122	1%	9,891	115,000

Source: unpublished NMFS permit and dealer reports.

Description of Areas Fished in VTR Reports

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for mackerel in 2010 by NMFS three digit statistical area (see Figure 47) are given in Table 33.

Table 33. Statistical Areas from Which 1% or More of Mackerel Were Kept in 2010 According to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
612	5759.73	59%
622	1260.21	13%
621	1130.75	12%
615	399.21	4%
616	383.22	4%
613	292.74	3%
625	118.25	1%

Source: Unpublished NMFS VTR reports.

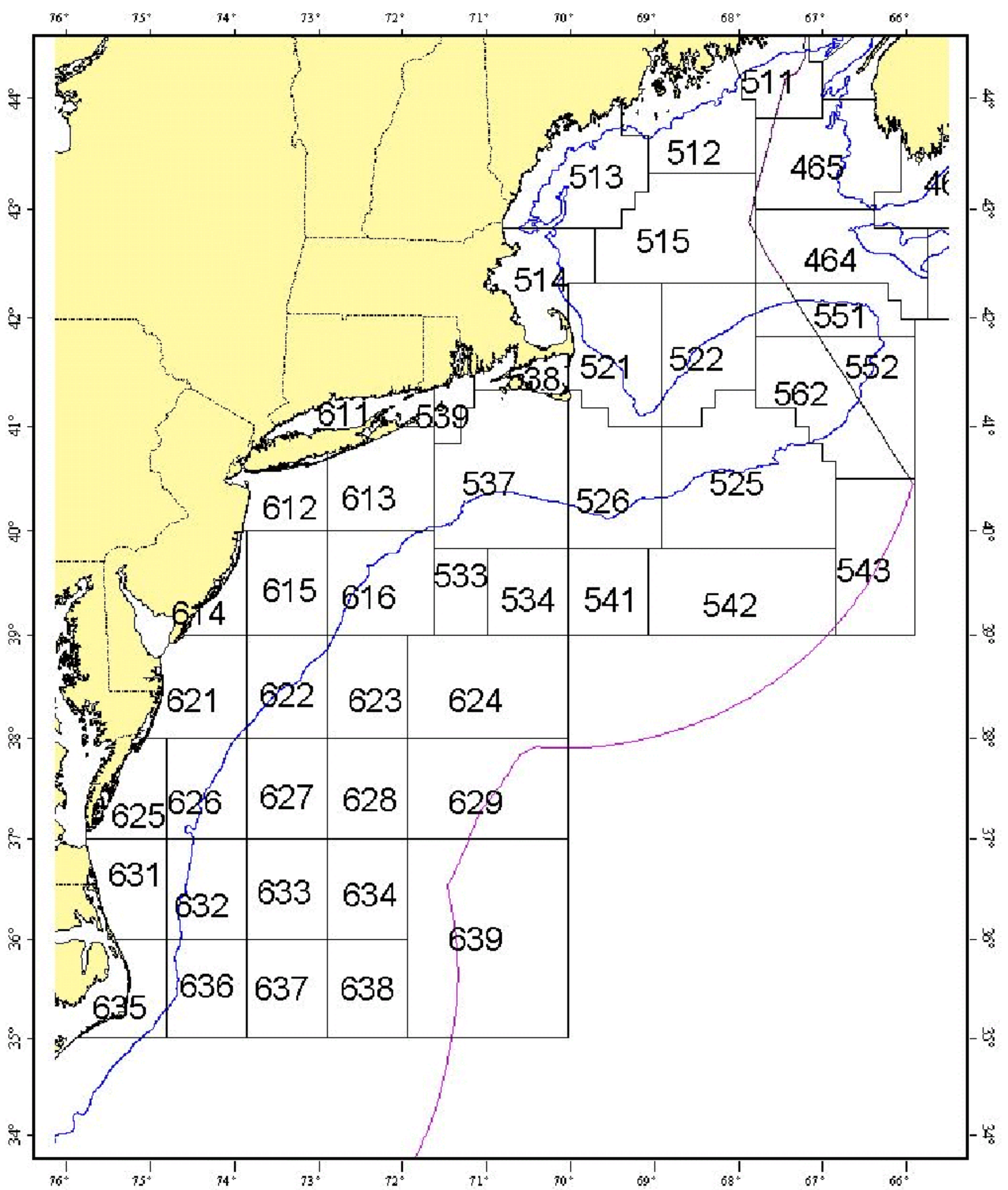


Figure 47. NMFS Statistical Areas

Current Market Overview for Mackerel

The Management Plan for mackerel, squid, and butterfish Fisheries requires that specific evaluations be made in the specification setting process before harvest rights are granted to foreign interests in the form of TALFF or joint venture allocations. The Council has concluded in recent years that conditions in the world market for mackerel have changed only slightly from year to year.

World Production and Prices

According to the FAO, world landings of mackerel dramatically increased in the 1960s, peaked at 1,092,759 mt in 1975, and have been between 550,000 mt and 850,000 mt since 1977. (Figure 48) (http://www.fao.org/fishery/statistics/). Prices for imported and exported U.S. mackerel, likely good indications of prices on the world market, averaged $1,118 per mt in 2010 for exports and 3,204 per mt in 2010 for imports (NMFS 2010; *http://www.st.nmfs.noaa.gov/st1/trade/documents/TRADE2010.pdf*).

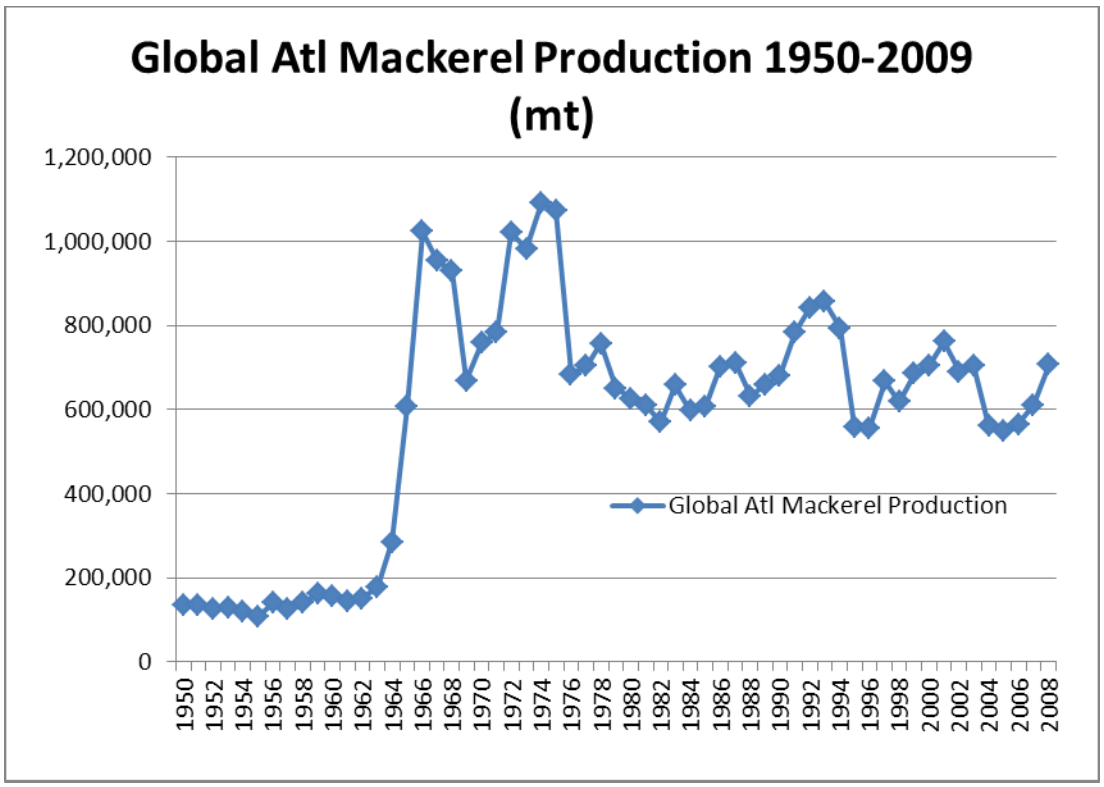


Figure 48. World production of Mackerel, 1950-2008 based on FAO (2010).

Future Supplies of and Demand for Mackerel

Mackerel produced in the US is a substitute for European produced mackerel. The quantity of European mackerel supplied to the market declined in 2006 and 2007 [Chetrick 2006: http://www.fas.usda.gov/info/fasworldwide/2006/10-2006/EUMackerel.pdf]. As a result, the quantity of US mackerel demanded increased. In addition to the price of European mackerel, there are many factors which affect the worldwide demand for mackerel, including income, tastes, and the price of substitute goods. There has also been controversy in 2011 regarding high levels of mackerel fishing by Iceland and the Faroe Islands in areas that have not recently produced mackerel.

US Exports of Mackerel

In 2010, US exports of all mackerel products (fresh, frozen, and prepared/preserved) totaled 10,340 mt, valued at $11.6 million.

Recreational Fishery

Mackerel are seasonally important to the recreational fisheries of the Mid-Atlantic and New England regions. They may be available to recreational anglers in the Mid-Atlantic primarily during the spring migration although this fishery has not been as robust in recent years. Historically, mackerel first appear off Virginia in March and gradually move northward. Christensen *et al.* 1979 found mackerel to be available to the recreational fishery from Delaware to New York for about three weeks (generally from early April to early May). As a result, the annual recreational catch of mackerel appears to be sensitive to changes in their migration and subsequent distribution pattern (Overholtz *et al.* 1989).

Recreational landings of mackerel for the last 10 years (since 2001), as estimated from the NMFS Marine Recreational Fishery Statistics Survey (MRFSS), are given in Table 34 and Table 35. In recent years, recreational mackerel harvest has varied from roughly 1,633 mt in 1997 to 530 in 2004. The highest landings occur from Massachusetts to Maine. Most mackerel are taken from boats. Also, over the same time period approximately 10% of all mackerel caught (by number) were released.

Estimates for mackerel recreational harvest are relatively uncertain due to low encounter rates. From 2001-2010 annual estimates had an average Proportional Standard Error (PSE) of 16%. Based on how PSEs are calculated, this means that on average we were approximately 95% sure that the real number for weight of mackerel harvest was within 32% (+ or -) of our estimate (best was ± 20%, worst was ± 47%). Breakouts by state or mode would have greater uncertainty. In addition, the uncertainty is even higher in reality because of sampling problems with MRFSS. The Marine Recreational Information Program (MRIP) is trying to figure out by just how much and to implement improved procedures – see countmyfish.noaa.gov. MRIP will be generating new less-biased estimates soon but they were not available at the time this document was developed.

Table 34. Recreational Harvest (rounded to nearest metric ton) of Mackerel by State, 2001-2010.

Year	ME	MD	MA	NH	NJ	NY	NC	RI	VA	DE	CT	Annual Total
2001	287	22	885	224	78	18	0	7	2	13	0	1,536
2002	387	2	728	65	60	0	0	47	0	3	1	1,294
2003	123	0	510	79	29	19	0	8	1	0	0	770
2004	207	0	291	27	2	0	0	0	0	3	0	530
2005	181	0	768	74	10	0	0	0	0	0	0	1,033
2006	109	0	1,488	31	0	0	0	1	0	0	3	1,633
2007	280	0	561	43	0	0	0	0	0	0	0	884
2008	148	0	413	129	0	0	0	0	0	0	0	691
2009	320	0	155	272	0	0	0	0	0	0	0	747
2010	250	0	465	62	0	0	0	0	0	0	0	778

Source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division.

Table 35. Recreational Harvest (rounded to nearest metric ton) of Mackerel by Mode and Total, 2000-2010.

Year	PARTY-CHARTER	PRIVATE or RENTAL	SHORE	Annual Total
2001	164	1,290	82	1,536
2002	23	1,172	98	1,294
2003	53	594	123	770
2004	21	395	115	530
2005	25	994	14	1,033
2006	11	1,560	62	1,633
2007	20	801	63	884
2008	9	646	35	691
2009	171	435	141	747
2010	26	610	142	778

Source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division.

6.7.2 *Illex illecebrosus*

<u>Historical Commercial Fishery</u>

Foreign fishing fleets became interested in exploitation of the neritic squid stocks of the Northwest Atlantic Ocean when the USSR first reported squid bycatches in the mid-1960's. By 1972, foreign fishing fleets reported landing 17,200 thousand mt of *Illex* from Cape Hatteras to the Gulf of Maine (Figure 49). During the period 1973-1982, foreign landings of *Illex* in US waters averaged about 18,000 mt, while US fisherman averaged only slightly more than 1,100 mt per year. Foreign landings from 1983-1986 were part of the US joint venture fishery which ended in 1987 (NMFS 1994a). The domestic fishery for *Illex* increased fitfully during the 1980's as foreign fishing was eliminated in the US EEZ. *Illex* landings are heavily influenced by year-to-year availability and world-market activity. Price (nominal) has increased fitfully since 1982 and averaged $525/mt in 2010.

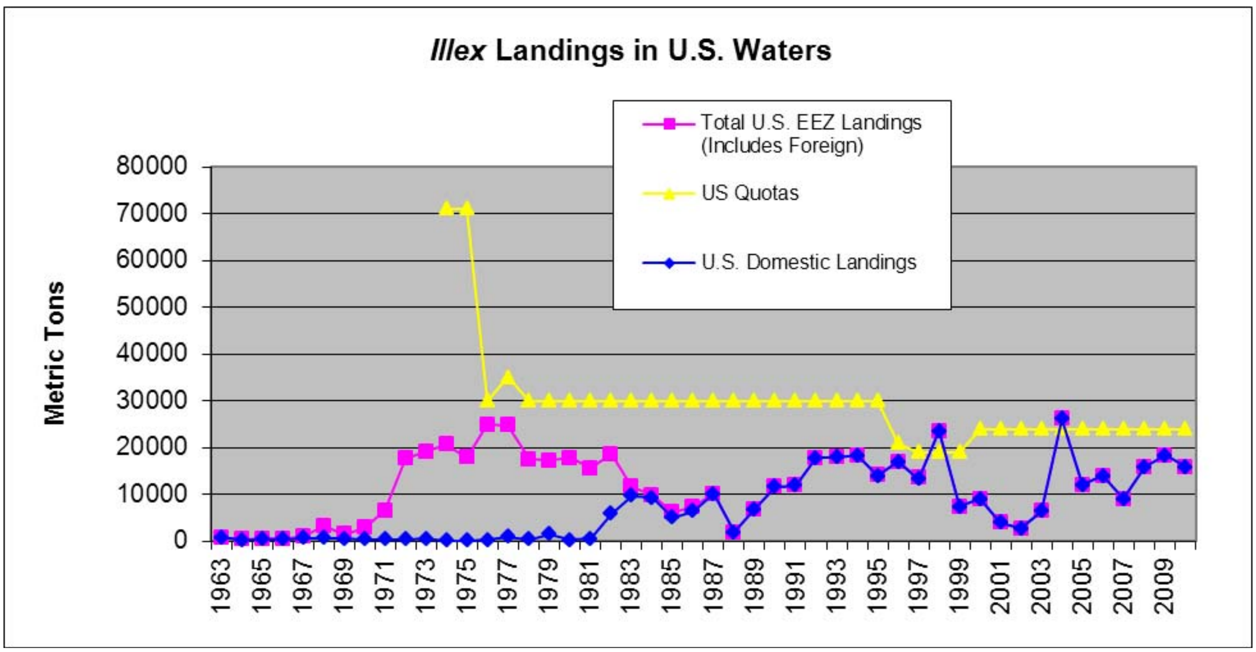


Figure 49. Historical *Illex* Landings in the U.S. EEZ.

Analysis of NMFS dealer weighout data 1982-2010 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and nominal prices ($/mt) in the figures below.

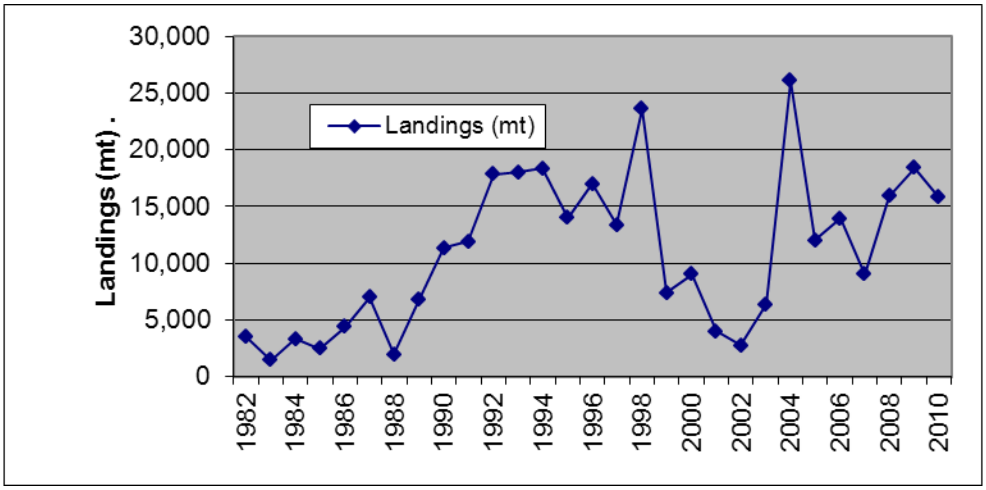


Figure 50. U.S. *Illex* Landings.
Source: Unpublished NMFS dealer reports

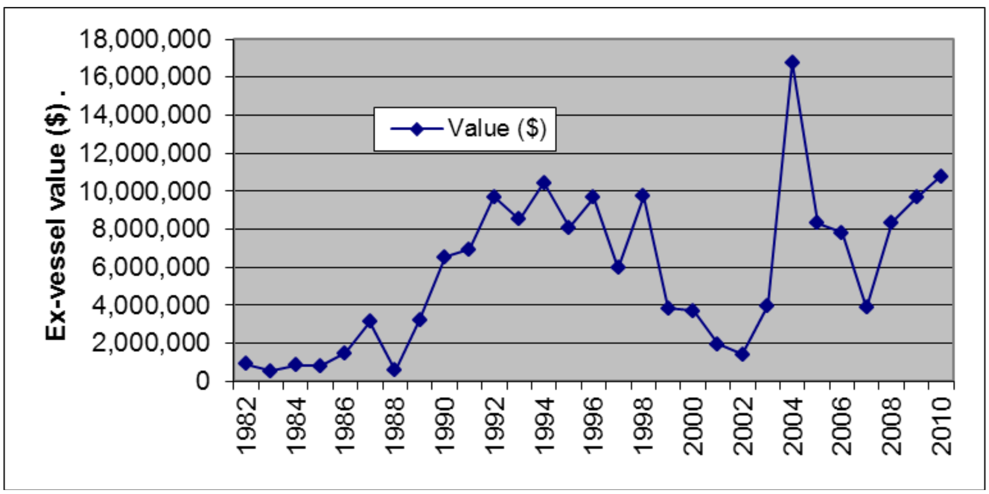


Figure 51. U.S. *Illex* Ex-vessel Revenues.
Source: Unpublished NMFS dealer reports

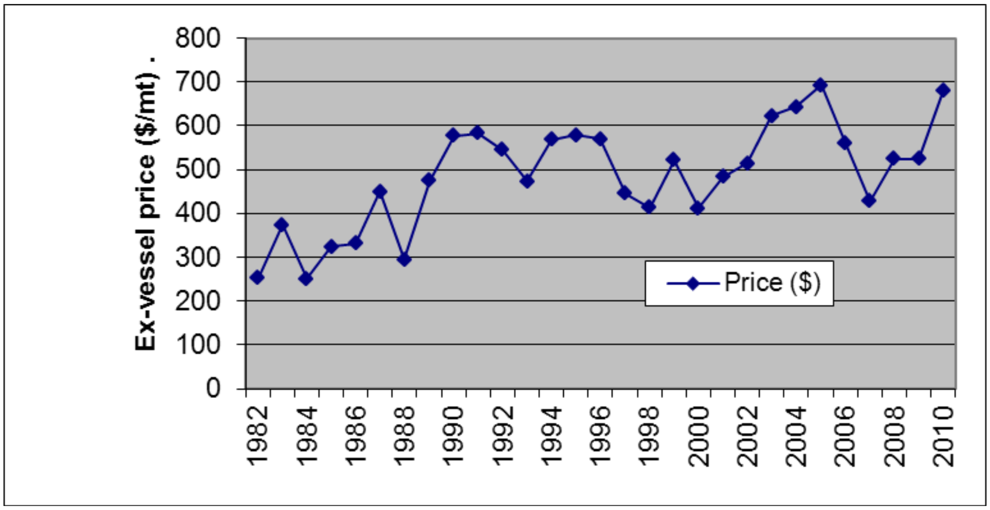


Figure 52. U.S. *Illex* Ex-vessel Prices.
Source: Unpublished NMFS dealer reports

<u>Specification Performance</u>

The principle measure used to manage *Illex* is monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 95% of the DAH is landed. Mandatory reporting for *Illex* was fully instituted in 1997 so specification performance since 1997 is most relevant. Table 36 lists the performance of the *Illex* fishery compared to its DAH. There was an overage in 1 of the last 10 years (a 9% overage in 2004) and 2 of the last 12 years (the 9% overage and a 24% overage in 1998). NMFS is continually augmenting its projecting procedures so presumably future overages would be even less likely.

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Table 36. *Illex* DAH Performance. (mt)

Year	Landings	Quota	Percent of Quota Landed
1997	13,629	19,000	72%
1998	23,597	19,000	124%
1999	7,388	19,000	39%
2000	9,011	24,000	38%
2001	4,009	24,000	17%
2002	2,750	24,000	11%
2003	6,389	24,000	27%
2004	26,097	24,000	109%
2005	12,011	24,000	50%
2006	13,944	24,000	58%
2007	9,022	24,000	38%
2008	15,900	24,000	66%
2009	18,418	24,000	77%
2010	15,825	24,000	66%

Source: Unpublished NMFS dealer reports

Commercial Fishery and Community Analysis

The following tables describe, for *Illex* in 2010, the total landings, value, numbers of vessels making landings, numbers of trips landing *Illex* (Table 37), landings by state (Table 38), landings by month (Table 39), landings by gear (Table 40), numbers of permitted and active vessels by state (Table 41), numbers of permitted and active dealers by state (Table 42), and landings by NMFS federal permit category (Table 43). Previous Specification EA's have included port information but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 37. Total Landings and Value of *Illex* During 2010.
(Based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NERO Permits or Hull Numbers landing over 1,000 pounds annually for "Vessels" and 100 pounds on a trip for "Trips" are considered. Since some state records do not include permit/hull information, the vessel and trip numbers are somewhat underestimated but account for the vast majority of landings.)

	Landings (mt)	Value ($)	Vessels	Trips	$/mt
Illex	15,825	10,758,235	24	248	$680

Source: Unpublished NMFS dealer reports

Table 38. *Illex* Landings (mt) by State in 2010.

State	Landings_mt	Pct_of_Total
New Jersey	9,224	58%
Rhode Island	5,639	36%
North Carolina	521	3%
Virginia	435	3%
Other	5	0%
Total	15,825	100%

Source: Unpublished NMFS dealer reports

Table 39. *Illex* Squid Landings (mt) by Month in 2010.

MONTH	Landings (mt)	Pct of Total
January	1	0%
February	0	0%
March	0	0%
April	0	0%
May	264	2%
June	4,841	31%
July	6,164	39%
August	3,597	23%
September	620	4%
October	275	2%
November	22	0%
December	40	0%
Total	15,825	100%

Source: Unpublished NMFS dealer reports

Table 40. *Illex* Landings (mt) by Gear Category in 2010.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	11,066	70%
TRAWL,OTTER,MIDWATER	4,232	27%
TRAWL,OTTER,BOTTOM,OTHER	520	3%
Other	7	0%
Total	15,825	100%

Source: Unpublished NMFS vessel trip reports

Table 41. *Illex* Moratorium Vessel Permit Holders and Active Vessels in 2010 by Homeport State (HPST).

HPST	Permitted Vessels	Active Vessels
NJ	28	11
MA	12	3
RI	11	6
NC	7	5
NY	6	1
Other	12	0
Total	76	26

Source: Unpublished NMFS dealer reports.

Table 42. Mackerel, Squid, Butterfish Dealer Permit Holders and Permitted Dealers Who Bought *Illex* in 2010 by State.

State	Permitted Dealers	Active Dealers
NC+VA	41	12
MA	109	6
RI	39	5
NY+NJ	126	6
Others	51	0

Source: Unpublished NMFS dealer reports

Table 43. *Illex* Landings by Permit Category for the Period 2000-2010.

Year	Illex Moratorium Permit		Party/ Charter		Incidental		No Permit/ Unknown		Total	
	mt	%	mt	%	mt	%	mt	%	mt	Quota
2001	3,922	98%	0	0%	0	0%	86	2%	4,009	24,000
2002	2,743	100%	0	0%	2	0%	5	0%	2,750	24,000
2003	6,389	100%	0	0%	0	0%	2	0%	6,391	24,000
2004	25,046	99%	0	0%	140	1%	237	1%	25,422	24,000
2005	11,146	95%	0	0%	23	0%	548	5%	11,717	24,000
2006	13,778	100%	0	0%	52	0%	7	0%	13,837	24,000
2007	9,019	100%	0	0%	1	0%	2	0%	9,022	24,000
2008	15,863	100%	0	0%	1	0%	36	0%	15,900	24,000
2009	18,409	100%	0	0%	9	0%	0	0%	18,419	24,000
2010	15,818	100%	0	0%	1	0%	6	0%	15,825	24,000

Source: Unpublished NMFS dealer reports

<u>Description of the Areas Fished in VTR Reports</u>

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for *Illex* in 2010 by NMFS three digit statistical area (see Figure 47) are given in Table 44.

Table 44. Statistical Areas from Which 1% or More of *Illex* Were Kept in 2010 According to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
622	10444.06	68%
632	1748.89	11%
626	1187.52	8%
628	752.52	5%
537	393.77	3%
616	325.39	2%
615	171.91	1%

Source: Unpublished NMFS VTR reports.

6.7.3 Atlantic butterfish

Historical Commercial Fishery

Atlantic butterfish were landed exclusively by US fishermen from the late 1800's (when formal record keeping began) until 1962 (Murawski and Waring 1979). Reported landings averaged about 3,000 mt from 1920-1962 (Waring 1975). Beginning in 1963, vessels from Japan, Poland and the USSR began to exploit butterfish along the edge of the continental shelf during the late-autumn through early spring. Reported foreign catches of butterfish increased from 750 mt in 1965 to 15,000 mt in 1969, and then to about 32,000 mt in 1973. With the advent of extended jurisdiction in US waters, reported foreign catches declined sharply from 14,000 mt in 1976 to 2,000 mt in 1978 (Figure 53). Foreign landings were completely phased out by 1987.

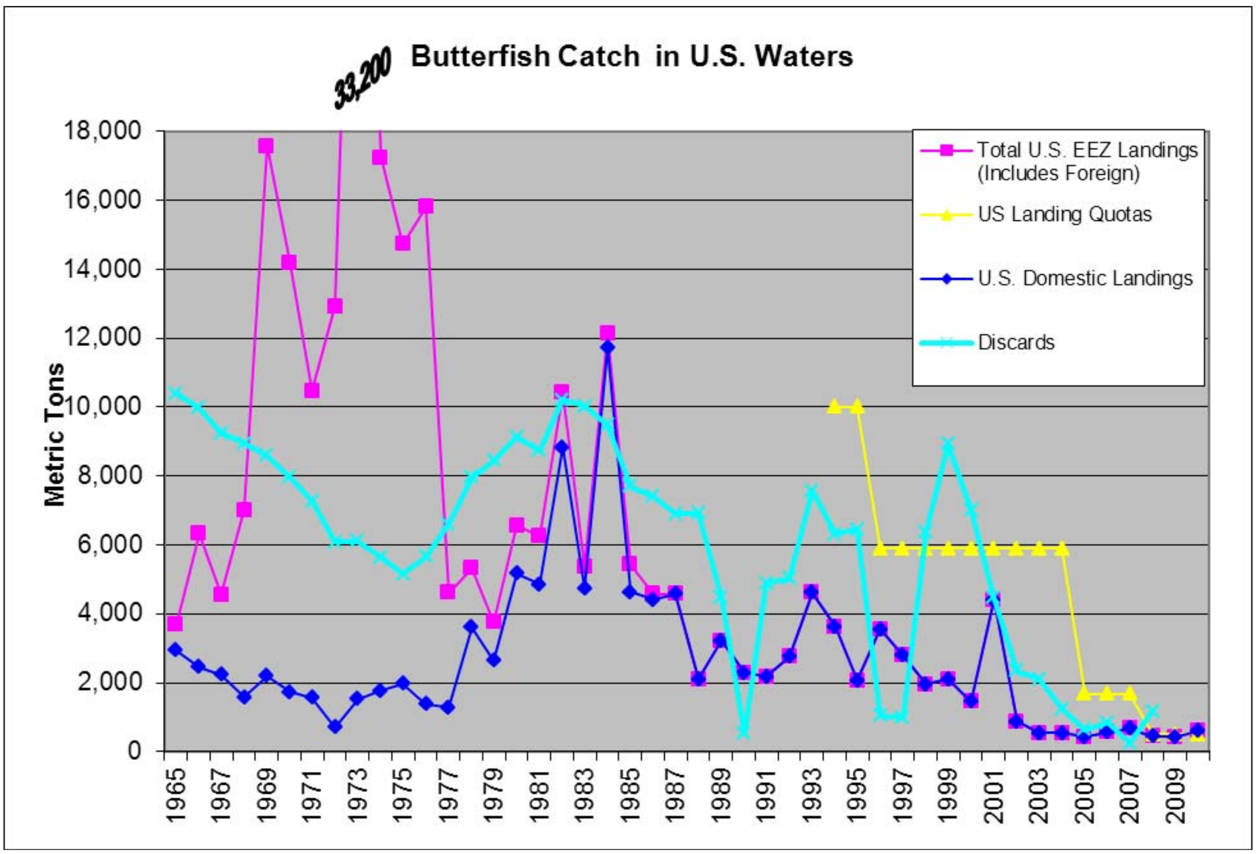

Figure 53. Historical Butterfish Landings in the U.S. EEZ.

During the period 1965-1976, US Atlantic butterfish landings averaged 2,051 mt. From 1977-1987, average US landings doubled to 5,252 mt, with a historical peak of slightly less than 12,000 mt landed in 1984. Since then US landings have declined sharply. Low abundance and reductions in Japanese demand for butterfish has probably had a negative effect on butterfish landings. Price (nominal) has increased fitfully since 1982 and averaged $1,404/mt in 2010. Analysis of NMFS weighout data 1982-2010 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) in the figures below.

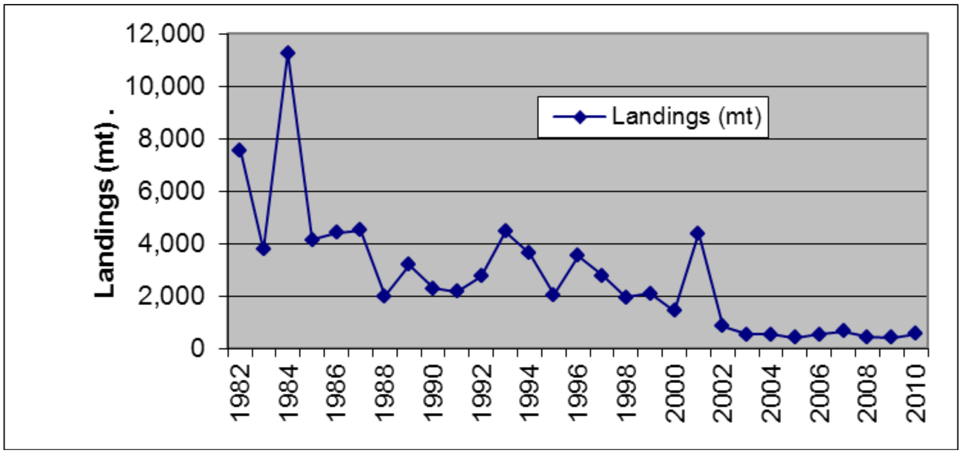

Figure 54. U.S. Butterfish Landings.
Source: Unpublished NMFS dealer reports

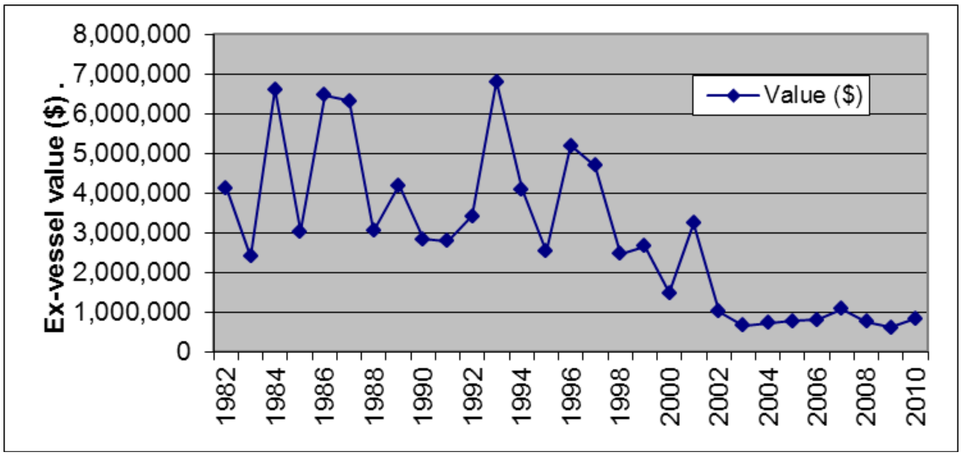

Figure 55. U.S. Butterfish Ex-vessel Revenues.
Source: Unpublished NMFS dealer reports

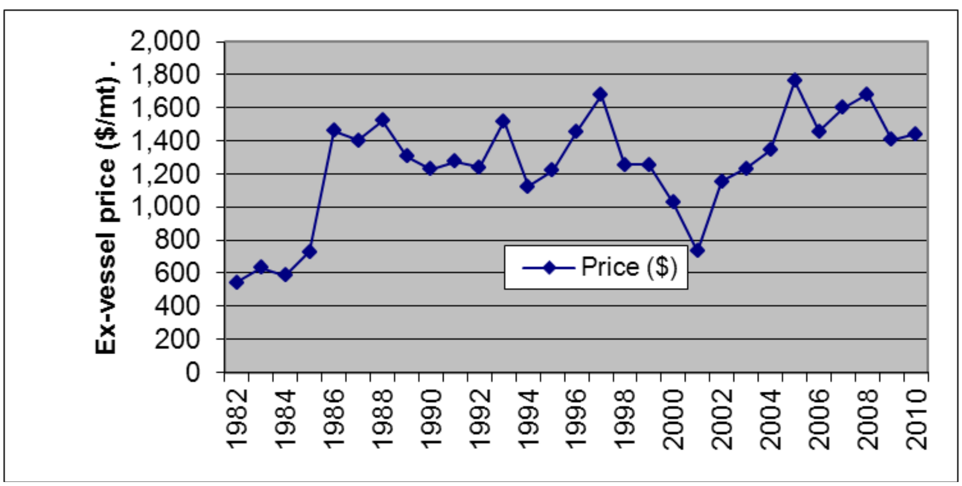

Figure 56. U.S. Butterfish Ex-vessel Prices.
Source: Unpublished NMFS dealer reports

Specification Performance

The principle measure used to manage butterfish landings is monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 80% of the DAH is landed. Mandatory reporting for butterfish was fully instituted in 1997 so performance since 1997 is most relevant. Table 45 lists the performance of the butterfish fishery compared to its DAH. There had been no overages before 2010. There were closures in 2008 and 2009 but the closure threshold and the trip limits performed as designed and prevented an overage. It is unclear why there was an overage in 2010 but prospects for 2012 are discussed in the impacts section.

Table 45. Butterfish DAH Performance (mt)

Year	Harvest (only commercial)	Quota	Percent of Quota Landed
1997	2,795	5,900	47%
1998	1,966	5,900	33%
1999	2,110	5,900	36%
2000	1,449	5,900	25%
2001	4,404	5,897	75%
2002	872	5,900	15%
2003	536	5,900	9%
2004	537	5,900	9%
2005	428	1,681	25%
2006	554	1,681	33%
2007	678	1,681	40%
2008	451	500	90%
2009	435	500	87%
2010	603	500	121%

Source: Unpublished NMFS dealer reports

Commercial Fishery and Community Analysis

The following tables describe, for butterfish in 2010, the total landings, value, numbers of vessels making landings, numbers of trips landing butterfish (Table 46), landings by state (Table 47), landings by month (Table 48), landings by gear (Table 49), landings by port (Table 50), numbers of permitted vessels by state (Table 51), numbers of permitted dealers by state (Table 52), and landings by NMFS federal permit category (Table 53). Previous Specification EA's have included additional port information (dependence) but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 46. Total Landings and Value of Butterfish During 2010.
(Based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NERO Permits or Hull Numbers landing over 1,000 pounds annually for “Vessels” and 100 pounds on a trip for “Trips” are considered. Since some state records do not include permit/hull information, the vessel and trip numbers are somewhat underestimated but account for the vast majority of landings.)

	Landings (mt)	Value ($)	Vessels	Trips	$/mt
Butterfish	603	865,703	131	2,567	$1,435

Source: Unpublished NMFS dealer reports

Table 47. Butterfish Landings (mt) by State in 2010.

State	Landings_mt	Pct_of_Total
Rhode Island	254	42%
New York	184	30%
Massachusetts	79	13%
Connecticut	59	10%
New Jersey	20	3%
Virginia	5	1%
New Hampshire	2	0%
Maryland	1	0%
Delaware	0	0%
Maine	0	0%
Total	603	100%

Source: Unpublished NMFS dealer reports.

Table 48. Butterfish Landings (mt) by Month in 2010.

MONTH	Landings mt	Pct of Total
January	34	6%
February	19	3%
March	25	4%
April	49	8%
May	84	14%
June	94	16%
July	66	11%
August	74	12%
September	44	7%
October	58	10%
November	39	6%
December	19	3%
Total	603	100%

Source: Unpublished NMFS dealer reports

Table 49. Butterfish Landings (mt) by Gear Category in 2010.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	408	68%
UNKNOWN	119	20%
Other	76	13%
Total	603	100%

Source: Unpublished NMFS dealer data.

Table 50. Butterfish Landings by Port in 2010.

name	ST_Name	Landings_mt	Pct_of_Total
POINT JUDITH	RHODE ISLAND	190	31%
MONTAUK	NEW YORK	131	22%
NEW BEDFORD	MASSACHUSETTS	54	9%
STONINGTON	CONNECTICUT	44	7%
NEWPORT	RHODE ISLAND	32	5%
LITTLE COMPTON	RHODE ISLAND	28	5%
HAMPTON BAYS	NEW YORK	24	4%
AMAGANSETT	NEW YORK	11	2%
Other	Various	90	15%
Total	Total	603	100%

Source: Unpublished NMFS dealer reports

Table 51. Longfin Squid/Butterfish Moratorium Vessel Permit Holders in 2010 by Homeport State (HPST) and How Many of Those Vessels Were Active.

HPST	Permitted Vessels	Active Vessels
MA	96	16
NJ	84	31
NY	54	39
RI	51	44
NC	22	4
ME	17	.
VA	13	.
CT	7	5
MD	2	2
NH	2	.
PA	2	.
WV	1	1
Total	351	142

Source: Unpublished NMFS dealer reports and NMFS permit database data

Table 52. Mackerel, Squid, Butterfish Dealer Permit Holders and How Many Were Active (bought butterfish) in 2010 by State.

State	Permitted Dealers	Active Dealers
NY	87	32
RI	39	17
MA	109	12
VA	17	7
NJ	39	6
Others	75	5

Source: Unpublished NMFS dealer reports and NMFS permit database data

Table 53. Butterfish Landings by Permit Category for the Period 2001-2010.

Year	Loligo/Butterfish Moratorium Permit		Party/Charter		Incidental		No Permit/ Unknown		**Total**	
	mt	%	mt	%	mt	%	mt	%	mt	Quota
2001	3,991	91%	0	0%	52	1%	360	8%	4,403	5,900
2002	653	75%	0	0%	39	4%	180	21%	872	5,897
2003	367	69%	0	0%	17	3%	151	28%	536	5,900
2004	329	61%	0	0%	22	4%	186	35%	537	5,900
2005	265	62%	0	0%	13	3%	150	35%	428	5,900
2006	386	70%	0	0%	36	7%	131	24%	554	1,681
2007	535	79%	0	0%	43	6%	99	15%	678	1,681
2008	350	78%	0	0%	32	7%	69	15%	451	500
2009	345	79%	0	0%	41	9%	49	11%	435	500
2010	454	75%	0	0%	67	11%	82	14%	602	500

Source: Unpublished NMFS dealer reports and NMFS permit database data

Description of the Areas Fished in VTR Reports

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for butterfish in 2010 by NMFS three digit statistical area (see Figure 47 except as noted in table below) are given in Table 54.

Table 54. Statistical Areas from Which 1% or More of Butterfish were Kept in 2010 According to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
537	126.917	26%
539	65.393	13%
611	54.078	11%
616	36.06	7%
613	28.928	6%
562	27.249	6%
525	25.546	5%
522	20.464	4%
148	16.927	3%
612	12.249	2%
514	11.496	2%
538	10.073	2%
622	6.35	1%
166	5.659	1%
121	5.302	1%

Source: Unpublished NMFS VTR reports

6.7.4 Longfin Squid

Historical Commercial Fishery

United States fishermen have been landing squid along the Northeastern coast of the US since the 1880's (Kolator and Long 1978). The early domestic fishery utilized fish traps and otter trawls but was of relatively minor importance to the US fishery due to low market demand. The squid taken were used primarily for bait (Lux et al. 1974). However, squid have long been a popular food fish in various foreign markets and therefore a target of the foreign fishing fleets throughout the world, including both coasts of North America (Okutani 1977). USSR vessels first reported incidental catches of squid off the Northeastern coast of the United States in 1964. Fishing effort directed at the squids began in 1968 by USSR and Japanese vessels. By 1972, Spain, Portugal and Poland had also entered the fishery. Reported foreign landings of longfin squid increased from 2000 mt in 1964 to a peak of 36,500 mt in 1973. Foreign longfin squid landings averaged 29,000 mt for the period 1972-1975 (Figure 57).

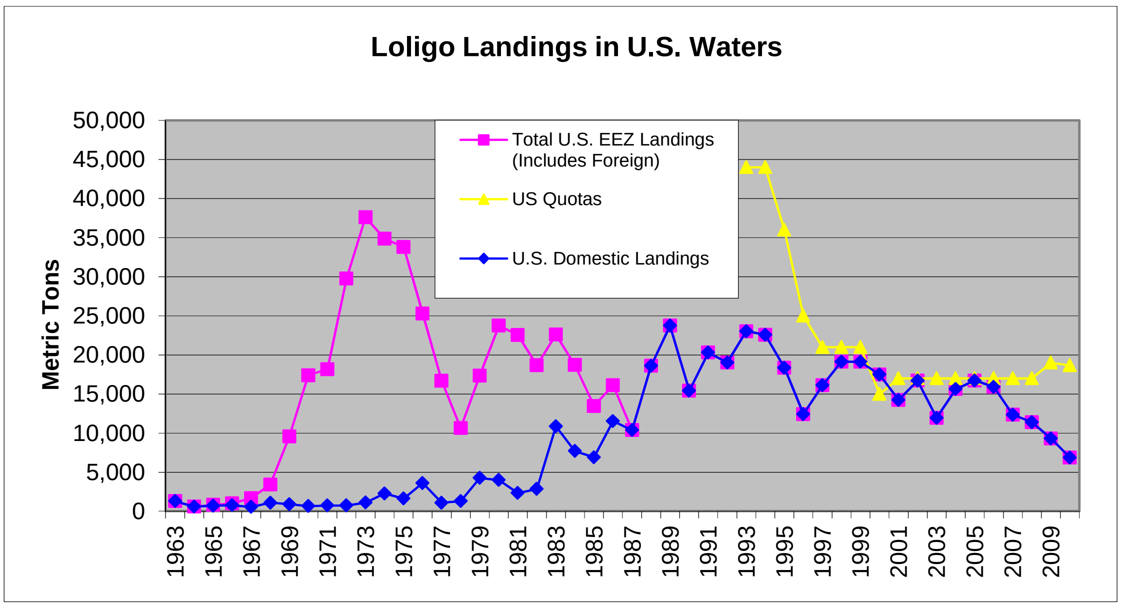

Figure 57. Historical Longfin Squid Landings in the U.S. EEZ.

Foreign fishing for longfin squid began to be regulated with the advent of extended fishery jurisdiction in the US in 1977. Initially, US regulations restricted foreign vessels fishing for squid (and other species) to certain areas and times (the so-called foreign fishing "windows"), primarily to reduce spatial conflicts with domestic fixed gear fishermen and minimize bycatch of non-target species. The result of these restrictions was an immediate reduction in the foreign catch of longfin squid from 21,000 mt in 1976 to 9,355 mt in 1978.

By 1982, foreign longfin squid landings had again risen above 20,000 mt. At this time, US management of the squid resources focused on the Americanization of these fisheries. This process began with the development of joint ventures between US fishermen and foreign concerns. Domestic annual harvest (DAH) was increased from 7,000 mt in the 1982-83 fishing year to 22,000 mt for 1983-84. Foreign allocations were reduced from 20,350 mt during 1982-83 to 5,550 mt during 1983-84 (Lange 1985). The foreign catch of longfin squid fell below

5,000 mt by 1986, to 2 mt in 1987 and finally to zero in 1990. Price (nominal) has increased fitfully since 1982 and averaged $1,968/mt in 2010.

The development and expansion of the US squid fishery was slow to occur for several reasons. First, the domestic market demand for squid in the US had traditionally been limited to the bait market. Secondly, the US fishing industry lacked both the catching and processing technology necessary to exploit squid in offshore waters. In the late 19th and early 20th centuries, squid were taken primarily by pound nets. Even though bottom otter trawls eventually replaced pound nets as the primary gear used to capture squid during this century, the US industry did not develop the appropriate technology to catch and process squid in offshore waters until the 1980's. Analysis of NMFS weighout data 1982-2010 is used to chart annual averages for U.S. landings (mt), ex-vessel value ($), and prices ($/mt) in the figures below.

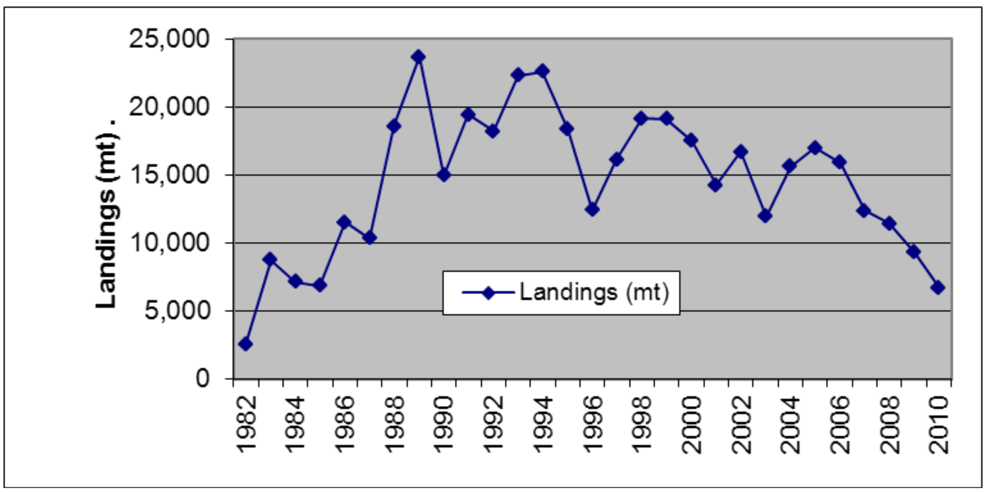

Figure 58. U.S. Longfin Squid Landings.
Source: Unpublished NMFS dealer reports

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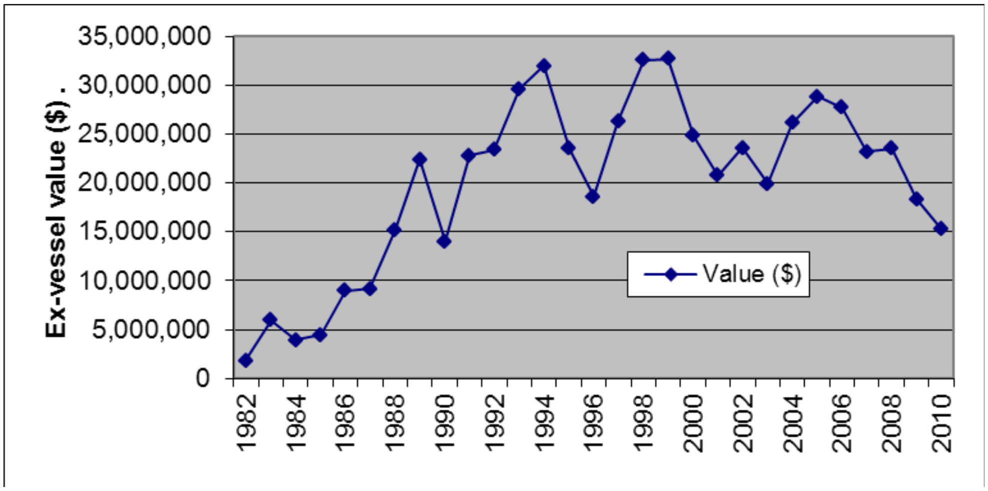

Figure 59. U.S. Longfin Squid Ex-vessel Revenues.
Source: Unpublished NMFS dealer reports

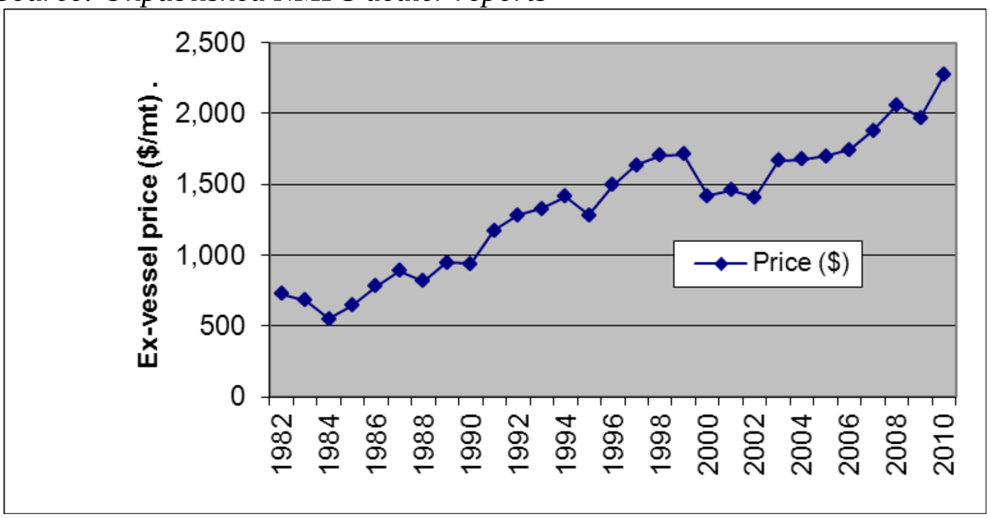

Figure 60. U.S. Longfin Squid Ex-vessel Prices.
Source: Unpublished NMFS dealer reports

Specification Performance

The principle measure used to manage longfin squid is Trimester quota monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 90% of the Trimester quotas are reached in Trimesters 1 and 2 and when 95% of the annual DAH is reached in Trimester 3. Mandatory reporting for longfin squid was fully instituted in 1997 so performance since 1997 is most relevant. Table 55 lists the performance of the longfin squid fishery compared to its DAH. There has been one overage in the last 12 years, a 17% overage in 2000. NMFS is continually augmenting its quota projecting procedures so presumably future overages would be even less likely. There are occasional overages of the trimester quotas, but these are typically minor and should minimal effects since Trimester 1 and 2 overages are applied to Trimester 3.

As described in the alternatives, the longfin squid DAH is currently divided up into trimesters and has been since 2007. 2000 also had Trimester management while 2001-2006 had quarterly management. Each seasonal time period closes at a threshold of the seasonal allocation, which can result in seasonal closures. The seasonal closures that have occurred are **2000**: March 25-Apr 30; Jul 1-Aug 31; Sep 7-Dec 31; **2001**: May 29-Jun 30; **2002**: May 28-Jun30, Aug 16-Sep 30, Nov 2 -Dec 11, Dec 24-Dec31; **2003**: Mar 25-Mar 31; **2004**: Mar 5- Mar 31; **2005**: Feb 20-Mar 31, April 25-Jun 30, Dec 18-Dec 31; **2006**: Feb 13-Mar 31, April 21-April 26, May 23-June 30, Sept 2-Sept 30; **2007**: April 13-April 30; **2008**: July 17 - Aug 31; **2009**: Aug 6 - Aug 31; **2010**: No closures.

Table 55. Longfin Squid DAH Performance (mt)

Year	Harvest (Commercial and Recreational)	Quota	Percent of Quota Landed
1997	16,113	21,000	77%
1998	19,123	21,000	91%
1999	19,109	21,000	91%
2000	17,475	15,000	117%
2001	14,238	17,000	84%
2002	16,703	17,000	98%
2003	11,935	17,000	70%
2004	15,628	17,000	92%
2005	16,716	17,000	98%
2006	15,907	17,000	94%
2007	12,343	17,000	73%
2008	11,385	17,000	67%
2009	9,307	19,000	49%
2010	6,855	18,667	37%

Source: Unpublished NMFS dealer reports

Commercial Fishery and Community Analysis

The following tables describe, for longfin squid in 2010, the total landings, value, numbers of vessels making landings, numbers of trips landing longfin squid (Table 56), landings by state (Table 57), landings by month (Table 58), landings by gear (Table 59), landings by port (Table 60), numbers of permitted and active vessels by state (Table 61), numbers of permitted and active dealers by state (Table 62), and landings by NMFS federal permit category (Table 63). Previous Specification EA's have included additional port information (dependence) but because of confidentiality concerns such tables are not able to include much relevant information and have been deleted.

Table 56. Total Landings and Value Longfin Squid During 2010.
(Based on unpublished NMFS dealer reports. For Vessels and Trips, only landing records with recorded NERO Permits or Hull Numbers landing over 1,000 pounds annually for "Vessels" and 100 pounds on a trip for "Trips" are considered. Since some state records do not include permit/hull information, the vessel and trip numbers are somewhat underestimated but account for the vast majority of landings.)

	Landings (mt)	Value ($)	Vessels	Trips	$/mt
Longfin squid	6,855	15,675,661	197	4,479	$2,287

Source: Unpublished NMFS dealer reports

Table 57. Longfin Squid Landings (mt) by State in 2010.

State	Landings_mt	Pct_of_Total
Rhode Island	3,342	49%
New York	1,769	26%
New Jersey	713	10%
Massachusetts	701	10%
Connecticut	303	4%
Virginia	25	0%
Maryland	1	0%
Maine	0	0%
Total	6,855	100%

Source: Unpublished NMFS dealer reports

Table 58. Longfin Squid Landings (mt) by Month in 2010.

MONTH	Landings_mt	Pct_of_Total
January	544	8%
February	345	5%
March	296	4%
April	278	4%
May	790	12%
June	543	8%
July	644	9%
August	280	4%
September	730	11%
October	1,075	16%
November	738	11%
December	590	9%
Totals	6,855	100%

Source: Unpublished NMFS dealer reports

Table 59. Longfin squid Landings (mt) by Gear Category in 2010.

GEAR_NAME	Landings (mt)	Pct of Total
TRAWL,OTTER,BOTTOM,FISH	5,359	78%
UNKNOWN	1,043	15%
TRAWL,OTTER,MIDWATER	215	3%
Other	237	3%
Totals	6,855	100%

Source: Unpublished NMFS dealer reports

Table 60. Longfin Squid Landings by Port in 2010.

Port	State	Landings mt	Pct of Total
POINT JUDITH	RHODE ISLAND	2,713	40%
MONTAUK	NEW YORK	1,109	16%
NORTH KINGSTOWN	RHODE ISLAND	591	9%
CAPE MAY	NEW JERSEY	530	8%
NEW BEDFORD	MASSACHUSETTS	373	5%
HAMPTON BAYS	NEW YORK	351	5%
OTHER BARNSTABLE	MASSACHUSETTS	200	3%
STONINGTON	CONNECTICUT	177	3%
POINT LOOKOUT	NEW YORK	174	3%
POINT PLEASANT	NEW JERSEY	109	2%
BELFORD	NEW JERSEY	74	1%
Others	NA	455	7%
Total	NA	6,855	100%

Source: Unpublished NMFS dealer reports

Table 61. Longfin Squid-Butterfish Moratorium Vessel Permit Holders in 2010 by Homeport State (HPST) and How Many of Those Vessels Were Active (landed longfin squid)

HPST	Permitted Vessels	Active Vessels
MA	96	22
NJ	84	46
NY	54	43
RI	51	44
NC	22	8
ME	17	0
VA	13	1
CT	7	6
MD	2	2
NH	2	0
PA	2	0
WV	1	1
Total	351	173

Source: Unpublished NMFS dealer reports

Table 62. Mackerel, Squid, Butterfish Dealer Permit Holders by State and How Many Were Active (bought longfin squid) in 2010 by State.

State	Permitted Dealers	Active Dealers
NY	87	36
RI	39	19
MA	109	15
NJ	39	9
VA	17	5
CT	6	2
MD	8	2
ME	19	2
NC	24	0
Others	18	0
Total	366	90

Source: Unpublished NMFS dealer reports

Table 63. Longfin Squid Landings by Permit Category for the Period 2000-2010.

Year	Loligo/Butterfish Moratorium Permit		Party/Charter		Incidental		No Permit/ Unknown		Total	
	mt	%	mt	%	mt	%	mt	%	mt	Quota
2001	13,423	94%	0	0%	170	1%	640	4%	14,232	17,000
2002	15,275	91%	4	0%	408	2%	1,016	6%	16,703	17,000
2003	10,988	92%	0	0%	98	1%	850	7%	11,935	17,000
2004	14,183	91%	1	0%	163	1%	1,281	8%	15,628	17,000
2005	15,068	90%	0	0%	73	0%	1,562	9%	16,703	17,000
2006	14,318	90%	0	0%	294	2%	1,295	8%	15,907	17,000
2007	11,360	92%	0	0%	230	2%	753	6%	12,343	17,000
2008	10,833	95%	0	0%	319	3%	233	2%	11,385	17,000
2009	8,719	94%	0	0%	266	3%	322	3%	9,307	19,000
2010	6,392	93%	1	0%	253	4%	207	3%	6,853	18,667

Source: Unpublished NMFS dealer reports and Permit database

Description of Areas Fished in VTR Reports

Vessel Trip Reports (VTRs) represent captains' estimates of kept weight of fish/squid. VTR reports, which are a subset of the landings data, provide the approximate location of kept fish/squid. VTR reports for longfin squid in 2010 by NMFS three digit statistical area (see Figure 47 except as noted in table below) are given in Table 64.

Table 64. Statistical Areas From Which 1% or More of Longfin Squid Were Kept in 2010 According to VTR Reports.

Stat Area	Landings (mt)	Percentage from Area
616	2,470	33%
622	1,040	14%
537	595	8%
613	466	6%
612	465	6%
525	339	5%
539	333	4%
632	275	4%
611	226	3%
562	209	3%
538	197	3%
626	173	2%
121	86	1%

Source: Unpublished NMFS VTR reports

Butterfish Catch/Mortality Cap

Beginning in 2011 the longfin squid fishery was subject to closure if it caught too much butterfish (amounts are set annually - 1,436 mt in 2011), with the cap divided up such that closures could occur in Trimesters 1 (Jan-Apr) and 3 (Sept-Dec). The cap is important for the longfin squid fishery because changes in the butterfish specifications, and the resulting cap amount, can have effects related to the "shadow value" of butterfish for the longfin squid fishery (longfin Squid and butterfish are often caught together). Because of the butterfish cap, a constraint on total butterfish catch may limit production in the squid fishery, so butterfish takes on a "shadow value" in terms of the indirect impact on the longfin squid fishery. While the exact relationship between butterfish and longfin squid catches is unknown ahead of time for any given year, the "shadow value" of butterfish could be quite large; that is, the longfin squid fishery may recognize large increases in landings/revenues/profits from relatively small increases in the butterfish specifications (and vice-versa with decreases).

There was not a closure in Trimester 1 of 2011. As of December 1, 2011 the cap had not yet caused any closures of the longfin squid fishery and had utilized 56% of the total annual cap. The longfin squid fishery will close if 90% of the annual cap is utilized. Given the average 2011 rates of squid and butterfish catch, a cap closure probably will not occur in 2011 but the final result will depend on the observed catch rates in the final months of 2011. The cap operates in near real-time so operation in 2012 will depend on the total and relative amounts of longfin squid and butterfish caught in 2012. Additional details on the cap may be found here: http://www.nero.noaa.gov/nero/regs/frdoc/11/11SMB2011ButterfishSpecsRevisedCAP.pdf.

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7.0 Analysis of the Impacts of the Alternatives

For all Alternative Sets (1-9) and all valued ecosystem components (VECs), the first alternative ("a") equals no-action, which is what is predicted to happen with the status quo management measures. Subsequent alternatives are the action alternatives and diverge from the status quo management measures as described in Section 5. The impact analysis focuses on the valued ecosystem components (VECs) that were identified for Amendment 14 and described in detail in Section 6.0 of this document. These VECs include:

1. Managed Resources
   - Atlantic mackerel stock
   - *Illex* stock
   - Longfin squid stock
   - Atlantic butterfish stock
2. Non-target species
   - -Non-Target species include river herrings (blueback and alewife) and shads (American and hickory), collectively referred to as RH/S. Given the lack of information on how these species travel and mix in the ocean, different impacts are generally not discernible between these species but are noted where appropriate (for example in caps that are placed on particular species)
3. Habitat including EFH for the managed resources and non-target species
4. Endangered and other protected resources
5. Human Communities

While in previous MSB FMP EISs the impacts from all alternatives are grouped together for each VEC, with the large number of alternatives in this amendment (more than 80), the result would that one would start with managed resources, have 80+ associated impacts, then have 80+ impacts for non-target species, and so on with the other VECs. This format seemed to lead to a disconnect in evaluating each alternative in terms of its overall positive and negative impacts across different VECs. As a result, the impact analysis in this EIS proceeds alternative by alternative with impacts for each VEC described for a given alternative before moving on to the next alternative's impacts.

Subsequently summarizing impacts by VEC was stymied by the number of possible action alternative combinations that could result from final Council action (more than millions). Any summary would hinge on the particular combination of alternatives selected by the Council, and no preferred alternatives have been identified by the Council at this point. The Final EIS will have that information however and will detail the combined effects of the Council's preferred alternatives. This will also facilitate creation of a summary by VEC for the preferred alternatives chosen by the Council.

In this section, a variety of terms (e.g. positive or negative) have specific meanings for each VEC and are described below.

Managed Species, Non-Target Species, Protected Species:

Note: Often impacts are indirect in that an action may change overall effort, which would decrease impacts if effort goes down or increase impacts if effort goes up.

Neutral/minimal: actions that are expected to have no discernible impact on stock/population size.
Positive: actions that increase stock/population size
Negative: actions that decrease stock/population size

Habitat:

Note: Often impacts are indirect in that an action may change overall effort, which would decrease impacts if effort goes down or increase impacts if effort goes up.

Neutral/minimal: actions that are expected to have no discernible impact on habitat
Positive: actions that improve the quality or reduce disturbance of habitat
Negative: actions that degrade the quality or increase disturbance of habitat

Human Communities:

Neutral/minimal: actions that are expected to have no discernible impact on human communities
Positive: actions that increase revenue and well-being of fishermen and/or associated businesses
Negative: actions that decrease revenue and well-being of fishermen, associated businesses, or other interested parties.
Mixed: The action would create benefits for some and costs for others. Generally there are costs to MSB fishery participants but potential benefits to other fishermen (commercial or recreational) or other interested parties who value MSB or RH/S resources. Since the linkages between catches in MSB fisheries and RH/S resources is not known, it is generally uncertain regarding which would be greater, costs to current MSB participants or benefits to other interested parties.

Impact Qualifiers:

The following qualifiers are also used in the impact analysis:

Low (as in *low* positive or *low* negative): to a lesser or small degree
High (as in *high* positive or *high* negative) to a greater or large degree
Potentially: A relatively higher degree of uncertainty is associated with the impact. Often this qualifier is used when an action may lead to better data, but future actions would have to actually use that data in decision making in order for there to be a concrete benefit.

If impacts are expected to be isolated to a particular species, usually either mackerel, longfin squid, *Illex* squid, butterfish, or river herrings and shads (RH/S) then this fact will be noted as well.

All comparisons are in reference to changes from the no-action alternative or relative to other alternatives in the document. To some extent, the operation of the MSB fisheries is currently negatively affecting the target stocks, RH/S stocks, other non-target species, habitat, and protected resources compared to if there was no fishery. Thus, the theoretical "lost opportunities" of not taking action compared to taking action are also described under impacts for the "no-action" alternative within each Alternative Set.

7.1 Alternative Set 1: Additional Vessel Reporting Measures

Statement of Problem/Need for Action:

Relatively low levels of catch monitoring have resulted in relatively high uncertainty about incidental catch of RH/S in Mid-Atlantic and New England fisheries, especially mid-water trawl (MWT) and small mesh bottom trawl (SMBT), both of which are used in the MSB fisheries. The Council is therefore considering actions to decrease uncertainty so as to improve the management of incidental RH/S catches.

Background:

The measures in Alternative Set 1 would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates. While some of the focus may appear to be on mackerel and/or longfin squid general reporting compared to just RH/S in those fisheries, because extrapolations are often made based on total landings, accurate monitoring of the target species can be as important as determining the encounter rates of RH/S. This is because when estimations of non-target catch (including discards) such as RH/S are made with observer data, they are made based on the ratio of RH/S to total retained catch applied to landings data. For example, if it was found that in observer data, 1 pound of RH/S was caught for every 100 pounds of fish landed by mackerel vessels, and those same vessels landed 1,000,000 pounds of fish, one could estimate that 10,000 pounds of RH/S were caught. While small differences in the total landings number will not affect the estimate substantially, it is still important for both the ratio ***and*** the total landings number to be as accurate as feasibly possible.

NOTE ON COMBINATIONS: Most of the Alternative Set 1 action alternatives could be implemented individually or collectively. However, 1c (weekly VTRs for all MSB permits) would encompass 1bMack and 1bLong so these would not be selected together. The 48-hr mackerel pre-trip notification (1d48) and 72-hr mackerel pre-trip notification (1d72) would also be mutually exclusive – only one would be chosen if either. The VMS reporting alternatives (1f's and 1g's) would need the respective 1e's (that require VMS) for each fishery as a prerequisite before requiring VMS reporting.

1a. No-action

If this alternative is selected, then no measures from Alternative Set 1 would be implemented and the existing reporting measures (as described in section 5.1) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 1 would somewhat improve reporting timeliness and accuracy, provide for better observer placement on directed mackerel trips, and potentially facilitate dockside monitoring and/or enforcement, there would be some foregone benefits if the no-action alternative is chosen. However, since the current reporting requirements are anticipated to be sufficient for quota monitoring of the managed species (there are no reported problems with current quota monitoring), it is not anticipated there would be any substantial impacts on the managed resources. Dealer data is currently used to monitor MSB quotas, but due to the timeliness of dealer data (weekly) and VTR data (monthly), cross-checking data can take quite a long time. Implementing the no-action alternative compared to the other alternatives would forgo the benefit of being able to cross-check and reconcile data on a more real-time basis if weekly VTR reporting was implemented.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A negative impact would be expected compared to the action alternatives. Observer data is the primary source of data for discards, which are often non-target species. Since alternatives in Alternative Set 1 would provide for better observer placement there would be some foregone benefits to non-target species if the no-action alternative is chosen since better non-target catch information could lead to better management decisions. Alternatives in Alternative Set 1 could also potentially facilitate dockside monitoring (via VMS landings notifications), which could improve knowledge about retained non-target catch. Also, while monitoring of the managed species has not been a problem, to the degree that managed species catch is used in extrapolations for non-target species catch (see background above), more timely and accurate reporting of managed resources can also have an indirect benefit for non-target species and these indirect benefits would be forgone by selection of the no-action alternative.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the action alternatives. The action alternatives in Alternative Set 1 would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes in gear interactions with habitat, over time.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the action alternatives. The action alternatives in Alternative Set 1 would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes rates of encounters with protected species, over time.

5. Human Communities

The impacts of the no-action alternative in comparison to the other alternatives for human communities appear mixed with uncertain net impacts. On one hand the costs to fishery participants of the additional reporting requirements would be avoided, which is a positive impact. These costs include additional VTR mailings, departure delays related to waiting for observers following pre-trip notifications, VMS costs, and the time taken to complete these requirements.

On the other hand, to the extent that Alternative Set 1 alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits.

These could include lost commercial revenues, lost recreational opportunities, lost cultural values for RH/S, and/or other lost non-market existence values (i.e. value related to the knowledge that these species are being conserved successfully) resulting from diminished stocks compared to optimally productive stocks. Due to the uncertainty about how the mackerel and longfin squid fisheries are impacting either the managed species or RH/S, these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>1bMack</u>. Institute weekly vessel trip reporting (VTR) for mackerel permits.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate mackerel quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes in the precision of quota monitoring if this alternative is selected. In situations where NMFS might have otherwise over-projected landings and issued a premature fishery closure, more frequent VTR reporting could allow additional landings, but not more than should be sustainable for each target fishery because overall landings are limited by a hard quota. In situations where NMFS might have otherwise under-projected landings and issued a closure for the fishery after the closure threshold had truly been reached, more frequent VTR reporting would avoid exceeding catch limits (by closing fisheries earlier). Since there is overlap in permits (some vessels have permits for all MSB species), there could also be some similar benefits to the other managed species because any mackerel-permitted vessel would have to report weekly even if targeting and catching other species.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially low positive impact would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring (direct or incidental) compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes in the precision of quota monitoring if this alternative is selected. Any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes rates of encounters with non-target species, over time.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes in gear interactions with habitat, over time.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes rates of encounters with protected species, over time.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. The number of total mackerel permits can vary from month to month. Of the 1,974 vessels that had mackerel permits in November 2011, 67 did not also have a weekly VTR reporting requirement from another permit (herring or NE multispecies). Thus, about 67 vessels would ultimately be subject to additional reporting requirements because of this measure. Those 67 vessels must currently submit VTR reports monthly. This alternative would result in 40 (52 (weeks) -12 (months) = 40) additional VTR submissions per year for permit holders that don't currently submit weekly VTRs. This would result in additional mailing costs of $19.36 per year (40 x $ 0.44 postage) per permitted vessel. Since VTRs must be filled out currently, the only additional time cost is the time cost of making a separate mailing which is minimal. Also, in situations where NMFS might have otherwise under-projected landings and issued a closure for the fishery after the closure threshold had truly been reached, more frequent VTR reporting would avoid exceeding catch limits (by closing fisheries), which could lower short-term revenues.

On the other hand, in situations where NMFS might have otherwise over-projected landings and issued a premature fishery closure, more frequent reporting could allow additional landings and revenues but not more than should be sustainable for each target fishery because overall landings are limited by a hard quota.

Also, to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, increased recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable, but since benefits to other VECs are low or minimal, the associated human community benefits should also be low or minimal as well.

1bLong. Institute weekly vessel trip reporting (VTR) for longfin squid/Butterfish permits.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate longfin squid quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes in the precision of quota monitoring if this alternative is selected. In situations where NMFS might have otherwise over-projected landings and issues a premature fishery closure, more frequent VTR reporting could allow additional landings, but not more than should be sustainable for each target fishery because overall landings are limited by a hard quota. In situations where NMFS might have otherwise under-projected landings and issue a closure for the fishery after the closure threshold had truly been reached, more frequent VTR reporting would avoid exceeding catch limits (by closing fisheries earlier). Since there is overlap in permits (some vessels have permits for all MSB species), there could also be some similar benefits to the other managed species because any longfin squid/Butterfish -permitted vessel would have to report weekly even if targeting and catching other species.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially low positive impact would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring (direct or incidental) compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes in the precision of quota monitoring if this alternative is selected. Any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes rates of encounters with non-target species, over time.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes in gear interactions with habitat, over time.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes rates of encounters with protected species, over time.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. The number of incidental squid/butterfish permits can vary from month to month. Of the 1,891 vessels that had longfin squid /Butterfish Moratorium permits or squid/butterfish incidental permits in November 2011, 74 did not also have a weekly VTR reporting requirement from another permit (herring or NE multispecies). Thus, about 74 vessels would ultimately be subject to additional reporting requirements because of this measure. Those 74 vessels must currently submit VTR reports monthly. This alternative would result in 40 (52 (weeks) -12 (months) = 40) additional VTR submissions per year for permit holders that don't currently submit weekly VTRs, resulting in additional mailing costs of $19.36 per year (40 x $ 0.44 postage) per permitted vessel. Since VTRs must be filled out currently, the only additional time cost is the time cost of making a separate mailing which is minimal. For informational purposes, about 9 of the 351 longfin squid /Butterfish moratorium permits do not currently have a weekly VTR reporting requirement from another permit (herring or NE multispecies). Also, in situations where NMFS might have otherwise under-projected landings, better reporting would avoid exceeding catch limits (by closing fisheries), lowering short-term revenues.

On the other hand, in situations where NMFS might have otherwise over-projected landings, better reporting could allow additional landings but not more than should be sustainable for the fishery. Also, to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable, but since benefits to other VECs are low or minimal, the associated human community benefits should also be low or minimal as well.

1c. Institute weekly vessel trip reporting (VTR) for all MSB permits (Mackerel, longfin squid//Butterfish, *Illex*) so as to facilitate quota monitoring (directed landings and/or incidental mortality cap if applicable) and cross checking with other data sources.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate MSB quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes in the precision of quota monitoring if this alternative is selected. In situations where NMFS might have otherwise over-projected landings and issued a premature fishery closure, more frequent VTR reporting could allow additional landings, but not more than should be sustainable for each target fishery because overall landings are limited by a hard quota. In situations where NMFS might have otherwise under-projected landings and issued a closure for the fishery after the closure threshold had truly been reached, more frequent VTR reporting would avoid exceeding catch limits (by closing fisheries earlier).

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially low positive impact would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring (direct or incidental) compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes in the precision of quota monitoring if this alternative is selected. Any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes rates of encounters with non-target species, over time.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes in gear interactions with habitat, over time.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. This action alternative would somewhat provide for more timely and accurate quota monitoring compared to the no-action alternative. NMFS makes projections in order to close fisheries so having the timeliest and most accurate data reduces uncertainty about closing fisheries at the appropriate time. However, NMFS has not had major problems tracking and projecting MSB quotas in recent years so there should not be large changes, and any changes could slightly either lengthen a season or shorten a season in any given year, probably leading to only minimal changes in effort, and thus minimal changes rates of encounters with protected species, over time.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. Of the 2,622 vessels that have MSB permits in November 2011, 121 did not also have a weekly VTR reporting requirement from another permit (herring or NE multispecies). Thus about 121 vessels would ultimately be subject to additional reporting requirements because of this measure. This alternative would result in 40 (52 (weeks) -12 (months) = 40) additional VTR submissions per year for permit holders that don't currently submit weekly VTRs, resulting in additional mailing costs of $19.36 per year (40 x $ 0.44 postage) per permit holder. The 121 vessels encompass the same affected vessels from 1bMack and 1bLong above (there is some overlap between 1bMack and 1bLong). Since VTRs must be filled out currently, the only additional time cost is the time cost of making a separate mailing which is minimal. Also, in situations where NMFS might have otherwise under-projected landings, better reporting would avoid exceeding catch limits (by closing fisheries), lowering short-term revenues.

On the other hand, in situations where NMFS might have otherwise over-projected landings, better reporting could allow additional landings but not more than should be sustainable for the fishery. Also, to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable, but since benefits to other VECs are low or minimal, the associated human community benefits should also be low or minimal as well.

This alternative, which would institute weekly VTR reporting for all MSB permits rather than just one or two categories of permits (see 1bMack or 1bLong above), also has a benefit of simplifying reporting requirements because reporting would be more consistent across fisheries within the MSB FMP as well as across other FMPs (e.g. herring and Northeast multispecies) in the region.

<u>1d48</u>. Require 48 hour pre-trip notification to NMFS to retain/possess/transfer more than 20,000 pounds of mackerel.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative of no notification requirements. Pre-trip notifications can lead to more systematic placement of observers, leading to better observer data that more accurately represents a particular fleet's catches. To the degree that better observer data leads to more effective monitoring of discards of the managed species there may be some positive impacts to the managed species compared to the no-action alternative. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low. It is not expected that there would be any substantial biological differences between 48 and 72 hour notifications.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. Pre-trip notifications can lead to more systematic placement of observers, leading to better observer data that more accurately represents a particular fleet's catches. To the degree that better observer data leads to more effective management/reduction of incidentally-caught species (including RH/S), this alternative could lead to positive impacts for non-target species compared to the no-action alternative. If a mortality cap on RH/S is implemented, obtaining a complete list of trips to sample becomes very important to ensure that NMFS is able to generate unbiased catch estimates.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. More accurately targeting directed mackerel trips for observer coverage should not lead to any changes in fishing effort.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. Pre-trip notifications can lead to more systematic placement of observers, leading to better observer data that more accurately represents a particular fleet's catches. To the degree that better observer data leads to more effective management/reduction of protected resource interactions in the future, this alternative could lead to positive impacts for protected resources compared to the no-action alternative.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. This is similar to a 72-hour trip notification requirement in the longfin squid fishery that became effective in

2011. Fishermen have reported that the 72-hour notification sometimes means they are unable to target fleeting aggregations of longfin squid because they are not able to put to sea on short notice, especially if they are selected to take an observer (if they are not selected then they often obtain a waiver sooner than 72 hours). Fishermen have reported to Mid-Atlantic Council staff that a 24-hour notice would be best and that a 48 hour notice, while better than 72 hours, would still make it difficult for them to react to rapidly changing environmental and weather conditions. Therefore, compared to Alternative 1d72, this alternative may have a slightly less negative impact on human communities. It is estimated that notifying the observer program would take about 5 minutes per notification.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

1d72. Require 72 hour pre-trip notification to NMFS to retain/possess/transfer more than 20,000 pounds of mackerel so as to facilitate observer placement.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative of no notification requirements. Pre-trip notifications can lead to more systematic placement of observers, leading to better observer data that more accurately represents a particular fleet's catches. To the degree that better observer data leads to more effective monitoring of discards of the managed species there may be some positive impacts to the managed species compared to the no-action alternative. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low. It is not expected that there would be any substantial biological differences between 48 and 72 hour notifications.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. Pre-trip notifications can lead to more systematic placement of observers, leading to better observer data that more accurately represents a particular fleet's catches. To the degree that better observer data leads to more effective management/reduction of incidentally-caught species (including RH/S), this alternative could lead to positive impacts for non-target species compared to the no-action alternative. If a mortality cap on RH/S is implemented, obtaining a complete list of trips to sample becomes very important to ensure that NMFS is able to generate unbiased catch estimates.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. More accurately targeting directed mackerel trips for observer coverage should not lead to any changes in fishing effort.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. Pre-trip notifications can lead to more systematic placement of observers, leading to better observer data that more accurately represents a particular fleet's catches. To the degree that better observer data leads to more effective management/reduction of protected resource interactions in the future, this alternative could lead to positive impacts for protected resources compared to the no-action alternative.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. This is similar to a 72-hour trip notification requirement in the longfin squid fishery that became effective in 2011. Fishermen have reported that the 72-hour notification sometimes means they are unable to target fleeting aggregations of longfin squid because they are not able to put to sea on short notice, especially if they are selected to take an observer (if they are not selected then they often obtain a waiver sooner than 72 hours). Fishermen have reported to Mid-Atlantic Council staff that a 24-hour notice would be best and that a 48 hour notice, while better than 72 hours, would still make it difficult for them to react to rapidly changing environmental and weather conditions. Therefore, compared to alternative 1d48, this alternative may have slightly more negative impacts on human communities. It is estimated that notifying the observer program would take about 5 minutes per notification.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>1eMack</u>. Require VMS for limited access mackerel vessels.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. VMS is particularly useful to monitor area-based management measures but area-based measures are not currently or proposed to be used for management of the managed species. Requiring a VMS unit is helpful for enforcement purposes, but if implemented without any of the other alternatives proposed in this action, would not be likely to have any substantial impacts to the managed resources compared to the no-action alternative. Alternative Sets 7 and 8 involve area-based management measures related to RH/S catch, which could reduce effort and catch of mackerel, so to some degree VMS could indirectly facilitate a positive impact for the managed species. However, there is no information to suggest that current mackerel catches are causing sustainability problems. Alternative 1fMack involves catch reporting through VMS and additional impacts are discussed below for that alternative related to improved catch monitoring.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. No direct impacts compared to the no-action alternative would be expected (including for RH/S) just by having VMS operating on a vessel. However, if area based management is selected in this amendment (Alternative Sets 7 and 8), VMS could be useful as a complementary compliance/enforcement tool, and area-based closures could reduce mackerel catch and effort and thus reduce non-target impacts. VMS also can be used as a tool for fleet communication to voluntarily avoid localized RH/S aggregations. In addition, alternative 1fMack involves catch reporting through VMS and additional impacts are discussed below for that alternative related to improved catch monitoring.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Selected alone, requiring a VMS unit for all limited access mackerel vessels is unlikely to change fishing effort. Therefore, no substantial impacts are expected compared to the no-action alternative. Even if VMS is used in conjunction with area-based closures that reduce overall effort, since the majority of mackerel landings are made with mid-water gear that should have minimal impact on the bottom, minimal habitat impacts would be expected.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. No direct protected resources impacts compared to the no-action alternative would be expected just by having VMS operating on a vessel. However, if area based management is selected in this amendment (Alternative Sets 7 and 8), VMS could be useful as a complementary compliance/enforcement tool, and area-based closures could reduce mackerel catch and effort and thus reduce protected resource impacts. VMS also can be used as a tool for fleet communication to voluntarily avoid localized protected resource aggregations.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. Of the approximately 2,200 vessels that had open access mackerel permits at some point in 2011, 684 were not also required to have VMS related to permit requirements for other northeast region fisheries. While not all of these vessels will qualify for mackerel limited access (being implemented currently), 684 is a reasonable estimate for the upper bound on how many vessels could have to buy new VMS units. Amendment 11 estimated that around 400 vessels might qualify for limited access. If one maintains the ratio of open access boats (684/2,200 = 31%) that would need VMS for the 400 likely qualifiers for mackerel limited access, 31% of 400 equals 124 vessels that would actually need new VMS units. Since limited access qualifiers, being more active participants, may be more likely to have other permits that require VMS, the likely number may be somewhat lower than 124. Until the final number of qualifiers is determined it is not possible to further quantify the number of vessels that may require VMS units under this provision. The costs to equip a vessel with a VMS are approximately $1,700-$3,300, with operating costs for the unit of approximately $40-$100 per month. In addition, the vessel would need a constant power source such as a generator, or access to dockside energy, which would add to the costs. In summary, requiring a VMS for mackerel limited access vessels will likely have a negative impact on human communities compared to the no-action alternative.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>1eLong</u>. Require VMS for longfin squid/butterfish moratorium vessels (see 1f and 1g below).

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. VMS is particularly useful to monitor area-based management measures but area-based measures are not currently or proposed to be used for management of the managed species. Requiring a VMS unit is helpful for enforcement purposes, but if implemented without any of the other alternatives proposed in this action, would not be likely to have any impacts to the managed resources compared to the no-action alternative. Alternative Sets 7 and 8 involve area-based management measures related to RH/S catch, and could reduce effort and catch of longfin squid (and butterfish indirectly), so to some degree VMS could indirectly facilitate a positive impact for longfin squid and butterfish. However, there is no information to suggest that current longfin squid or butterfish catches are causing sustainability problems. Alternative 1fLong involves catch reporting through VMS and additional impacts are discussed below for that alternative related to improved catch monitoring.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. No direct impacts compared to the no-action alternative would be expected (including for RH/S) just by having VMS operating on a vessel. However, if area based management is selected in this amendment (Alternative Sets 7 and 8), VMS could be useful as a complementary compliance/enforcement tool, and area-based closures could reduce longfin squid and/or butterfish catch and effort. VMS also can be used as a tool for fleet communication to voluntarily avoid localized RH/S aggregations. In addition, alternative 1fLong involves catch reporting through VMS and additional impacts are discussed below for that alternative related to improved catch monitoring.

3. Habitat Impacts Including EFH

A potentially positive impact would be expected compared to the no-action alternative. Selected alone, requiring a VMS unit for all limited access longfin squid/butterfish moratorium vessels is unlikely to change fishing effort. However, if area based management is selected in this amendment (Alternative Sets 7 and 8), VMS could be useful as a complementary compliance/enforcement tool, and area-based closures could reduce longfin squid effort which would lead to positive habitat impacts.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. No direct protected resources impacts compared to the no-action alternative would be expected just by having VMS operating on a vessel. However, if area based management is selected in this amendment (Alternative Sets 7 and 8), VMS could be useful as a complementary compliance/enforcement tool, and area-based closures could reduce longfin squid catch and effort and thus reduce protected resource impacts. VMS also can be used as a tool for fleet communication to voluntarily avoid localized protected resource aggregations.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. Of the 351 vessels that had longfin squid /butterfish moratorium permits in 2011, only 7 were not also required to have VMS related to permit requirements for other northeast region fisheries and would have to equip their vessel with VMS under this provision. The costs to equip a vessel with a VMS are approximately $1,700-$3,300, with operating costs for the unit of approximately $40-$100 per month. In addition, the vessel would need a constant power source such as a generator, or access to dockside energy, which would add to the costs. In summary, requiring a VMS for limited access longfin squid/butterfish moratorium vessels will likely have a negative impact on human communities compared to the no-action alternative.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>1fMack</u>. Require daily VMS reporting of catch by limited access mackerel vessels so as to facilitate monitoring (directed and/or incidental catch) and cross checking with other data sources. Requiring VMS (see 1eMack above) and requiring trip declarations (would be a prerequisite for this alternative.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. To the degree that more rapid reporting could be used to cross check dealer data to ensure that fishery closures (managed species) occur appropriately, there could be positive benefits to mackerel compared to the no-action alternative but such benefits are likely low because dealer data is the primary data source for landings tracking and there is no history of overages.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially low positive impact would be expected compared to the no-action alternative. To the degree that more rapid reporting could be used to cross check dealer data to ensure that fishery closures (due to incidental catch of non-target species (including for RH/S)) occur appropriately, there could be positive benefits compared to the no-action alternative but such benefits are likely low because dealer data is the primary data source for landings tracking and there is no history of overages.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring VMS catch reporting for all limited access mackerel vessels is unlikely to change fishing effort. Therefore, no substantial impacts are expected compared to the no-action alternative, especially since the majority of mackerel landings are made with mid-water gear which should have minimal impact on the bottom.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternatives. Requiring VMS catch reporting for all limited access mackerel vessels is unlikely to change fishing effort. Therefore, no substantial impacts are expected compared to the no-action alternative.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. The cost of transmitting a catch report via VMS is $0.60 per transmission. There is a wide range of fishing activity toward mackerel so multiplying average days fished by $0.60 per day would not be illustrative for many vessels. Most vessels impacted by this provision would know how many days they fished for mackerel in a year so they can just multiply $0.60 by days they would be likely to declare into mackerel fishing to determine an annual impact on their business. For example, if a vessel were to declare into the mackerel fishery for 100 days in a year, then they would have $60 in annual costs associated with this provision. Also, each VMS report is estimated to take 5 minutes to complete.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

1fLong. Require daily VMS reporting of catch by longfin squid moratorium permits so as to facilitate monitoring (directed and/or incidental catch) and cross checking with other data sources. Requiring VMS (see 1eLong above) and requiring trip declarations would be a prerequisite for this alternative.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. To the degree that more rapid reporting could be used to cross check dealer data to ensure that fishery closures (managed species) occur appropriately, there could be positive benefits to longfin squid compared to the no-action alternative but such benefits are likely low because dealer data is the primary data source for landings tracking and there is no history of recent annual overages in this fishery (the annual quota is divided into 3 seasonal trimesters and there have been some relatively small seasonal overages).

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially low positive impact would be expected compared to the no-action alternative. To the degree that more rapid reporting could be used to cross check dealer data to ensure that fishery closures (due to incidental catch of non-target species(including for RH/S)) occur appropriately, there could be positive benefits compared to the no-action alternative but such benefits are likely low because dealer data is the primary data source for landings tracking and there is no history of overages. Area based monitoring for RH/S is proposed in other alternatives in this action (Alternative Set 7), and VMS is useful for enforcement of area-based management.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring VMS catch reporting for all limited access longfin squid/butterfish moratorium vessels is unlikely to change fishing effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring VMS catch reporting for all limited access longfin squid/butterfish moratorium vessels is unlikely to change fishing effort. Therefore, no substantial impacts are expected compared to the no-action alternative.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. The cost of transmitting a catch report via VMS is $0.60 per transmission. There is a wide range of fishing activity toward longfin squid so multiplying average days fished by $0.60 per day would not be illustrative for many vessels. Most vessels impacted by this provision would know how many days they fished for mackerel in a year so they can just multiply $0.60 by days they would be likely to declare into mackerel fishing to determine an annual impact on their business. For example, if a vessel were to declare into the longfin squid fishery for 100 days in a year, then they would have $60 in annual costs associated with this provision. Also, each VMS report is estimated to take 5 minutes to complete.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>1gMack</u>. Require 6 hour pre-landing notification via VMS to land more than 20,000 pounds of mackerel, which could facilitate quota monitoring, enforcement, and/or portside monitoring.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative (where none is required because there is no VMS). VMS pre-landing notifications could facilitate enforcement of landings limits and landings reporting. Impacts are low compared to the no-action alternative because there are no known substantial issues with mackerel landing limits or mackerel reporting requirements being violated.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. Pre-landings notifications could facilitate port-side sampling (see Alternative Set 4). Port side sampling could lead to better information on non-target interactions (including for RH/S) which could lead to better management of non-target species compared to the no-action alternative.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring a 6 hour pre-landing notification would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Compared to the no-action alternative, requiring a 6 hour pre-landing notification would not be expected to substantially change effort so minimal impacts would be expected compared to the no-action alternative.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. The cost of transmitting a catch report via VMS is $0.60 per transmission. There is a wide range of fishing activity toward mackerel so multiplying average trips fished by $0.60 per trip would not be illustrative for many vessels. Most vessels impacted by this provision would know how many trips they fished for mackerel in a year so they can just multiply $0.60 by trips they would be likely to land mackerel to estimate an annual impact on their business. For example, if a vessel were to land over 20,000 pounds of mackerel for 50 trips in a year, then they would have $30 in annual costs associated with this provision. Also, each VMS report is estimated to take 5 minutes to complete.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>1gLong</u>. Require 6 hour pre-landing notification via VMS to land more than 2,500 pounds of longfin squid, which could facilitate quota monitoring, enforcement, and/or portside monitoring.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. VMS pre-landing notifications could facilitate enforcement of landings limits and landings reporting. Impacts are low compared to the no-action alternative because there are no known substantial issues with longfin squid landing limits or longfin squid reporting requirements being violated.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. Pre-landings notifications could facilitate port-side sampling (see Alternative Set 4). Port side sampling could lead to better information on non-target interactions (including for RH/S) which could lead to better management of non-target species compared to the no-action alternative.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring a 6 hour pre-landing notification would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Compared to the no-action alternative, requiring a 6 hour pre-landing notification would not be expected to substantially change effort so minimal impacts would be expected compared to the no-action alternative.

5. Human Communities

The impacts for human communities appear mixed with uncertain net impacts compared to the no-action alternative. On one hand costs to fishery participants would increase. The cost of transmitting a catch report via VMS is $0.60 per transmission. There is a wide range of fishing activity toward longfin squid so multiplying average trips fished by $0.60 per trip would not be illustrative for many vessels. Most vessels impacted by this provision would know how many trips they fished for longfin squid in a year so they can just multiply $0.60 by trips they would be likely to land longfin squid to estimate an annual impact on their business. For example, if a vessel were to land over 2,500 pounds of longfin squid for 50 trips in a year, then they would have $30 in annual costs associated with this provision. Also, each VMS report is estimated to take 5 minutes to complete.

On the other hand to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative compared to the no-action alternative might result in benefits related to higher future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

Alternative Set 1 Summary - Additional Vessel Reporting Measures

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

All of the action alternatives are expected to have some low incremental managed-resource benefits related to better monitoring and observer placement.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

All of the action alternatives are expected to have some low incremental non-target benefits related to better monitoring and observer placement. Requiring pre-departure notice for mackerel trips (1d48 and 1d72) may be relatively more important in order to generally facilitate effective observer deployment and data collection.

3. Habitat Impacts Including EFH

None of the action alternatives are expected to impact habitat.

4. Protected Resources

Most of the alternatives are not expected to substantially impact protected resources. Requiring pre-departure notice for mackerel trips (1d48 and 1d72) may be relatively more important in order to generally facilitate effective observer deployment and data collection.

5. Human Communities

Human community impacts are mixed depending on which interest group is considered. Commercial fishing interests would incur relatively low costs related to most of the alternatives being considered. For vessels that do not have VMS units (a minority of the fleet) those costs are moderate related to alternatives that would require VMS (1eMack and 1eLong). The interested public would benefit to a modest degree primarily to the extent that better monitoring could lead to better RH/S management.

7.2 Alternative Set 2 – Additional Dealer Reporting Measures

<u>Statement of Problem/Need for Action:</u>

The current suite of reporting and monitoring requirements may be insufficient to precisely estimate RH/S incidental catch. Also, practices on how landing weights are determined are not standardized.

<u>Background:</u>

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates. While some of the focus may appear to be on mackerel and/or longfin squid general reporting compared to just RH/S in those fisheries, because extrapolations are often made based on total landings, accurate monitoring of the target species can be as important as determining the encounter rates of RH/S.

NOTE ON COMBINATIONS: Most of the Alternative Set 2 action alternatives could be implemented individually or collectively. However, 2c and 2d (weighing mackerel) would be mutually exclusive – only one would be chosen if either. Likewise, 2e and 2f (weighing longfin squid) would be mutually exclusive – only one would be chosen if either. 2g (dealers can use volume to weight conversions) would modify 2c, 2d, 2e, or 2f so 2g could only be chosen if at least one of those four alternatives was also chosen.

<u>2a</u>. No-action

If this alternative is selected, then no measures from Alternative Set 2 would be implemented and the existing reporting measures (as described in section 5.2) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 2 would somewhat improve monitoring of the managed resources there would be some foregone benefits if the no-action alternative is chosen. Given there are no major reported issues with current landings monitoring of the managed species, impacts would be expected to be low.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 2 would improve monitoring of landed species, there would be some foregone benefits to non-target species (including for RH/S) if the no-action alternative is chosen because less information of the landings of those species would be available for future management decisions.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the action alternatives. Dealer reporting is not expected to impact habitat in any substantial way.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the action alternatives. Dealer reporting is not expected to impact protected resources in any substantial way.

5. Human Communities

The impacts of the no-action alternative in comparison to the other alternatives for human communities appear mixed with uncertain net impacts. On one hand the costs to fishery participants of the additional reporting requirements would be avoided, which is a positive impact. These costs include the time for vessels to confirm landings, and scales for those dealers that do not currently have scales to weigh mackerel or squid.

On the other hand, to the extent that Alternative Set 2 alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits.

These could include lost commercial revenues, lost recreational opportunities, lost cultural values for RH/S, and/or other lost non-market existence values (i.e. value related to the knowledge that these species are being conserved successfully) resulting from diminished stocks compared to optimally productive stocks. Due to the uncertainty about how the mackerel and longfin squid fisheries are impacting either the managed species or RH/S, these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>2b</u>. Require federally permitted MSB dealers to obtain vessel representative confirmation of SAFIS transaction records for mackerel landings over 20,000 lb, *Illex* landings over 10,000 lb, and longfin squid landings over 2,500 lb.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded and errors do exist in the dealer database. Given there are no major reported issues with current monitoring of the managed species, impacts would be expected to be low.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded and errors do exist in the dealer database. To the extent that landings data informs incidental catch mortality caps, accurate landings data can also be important for managing catch of non-target species (including for RH/S).

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring landings data confirmations would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring landings data confirmations would not be expected to substantially change effort.

5. Human Communities

Potentially low positive impacts would be expected compared to the no-action alternative. Since internet access is pervasive in the Mid-Atlantic and New England, either vessel owners or their representative should be able to make an internet-based confirmation of dealer transactions records without substantial cost. Ensuring dealer records are accurate could help vessels if dealer records are used in the future for access controls/requalification. It is estimated that the online checking process would take about 5-10 minutes for each vessel per week and about 15 minutes per week for dealers to confirm and report that vessels had checked their landings. Some industry members have voiced concern that this puts vessels in a potentially awkward position of checking up on their customers, which could make business relationships more difficult to build and maintain.

2c. Require that federally permitted SMB dealers weigh all landings related to mackerel transactions over 20,000 pounds. If dealers do not sort by species, they would need to document in dealer applications how they estimate relative compositions of a mixed catch.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded but there is no indication that any quota overages have occurred recently. If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded. To the extent that landings data informs incidental catch mortality caps, accurate landings data can also be important for managing catch of non-target species (including for RH/S. If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be minimal. While a complete survey of all dealers is not available, discussions with NMFS port agents and MSB Advisory Panel members suggest that around half of the 107 dealers who purchased at least 10,000 pounds of mackerel or longfin squid 2006-2010 currently weigh their purchases, including many of the highest volume dealers. So around 54 dealers with substantial purchases would need to alter their practices, including potentially purchasing scales. Smaller dealers also are mixed in terms of weighing MSB purchases, but at smaller quantities relatively inexpensive scales should suffice.

The cost of scales can vary dramatically. The use of an already existing truck scale can cost as little as $10, but the distance to reach one may make their use impracticable. Installation of a truck scale in an easily-accessible port can cost more than $100,000, depending on the area in which the scale will be placed. Not all dealers use trucks in the transport of fish however, and water weight can impact the accuracy of measurements. Floor scales handling up to 20,000 pounds cost $3,000-$5,000 while floor scales that can weigh up to 100,000 pounds cost $13,000-$17,000. Hopper scales can have multiple or single hoppers, and weigh fish as they flow through the scale. For precise estimates the water needs to be completely separated from the fish before use. Hopper scale costs can range from $20,000 to $50,000 per scale, and newer models are now being produced that can be used on vessels at sea. Smaller scales costing several hundred dollars may be purchased but may mean that additional time is required to batch-weigh a product.

Requiring dealers to documents how they estimate the relative compositions of a mixed catch in the annual dealer application should have minimal impacts.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>2d</u>. Require that federally permitted SMB dealers <u>weigh</u> all landings related to mackerel transactions over 20,000 pounds. If dealers do not sort by species, they would need to <u>document with each transaction</u> how they estimated the relative composition of a mixed catch.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded but there is no indication that any quota overages have occurred recently. If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded. To the extent that landings data informs incidental catch mortality caps, accurate landings data can also be important for managing catch of non-target species (including for RH/S). If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be minimal. While a complete survey of all dealers is not available, discussions with NMFS port agents and MSB Advisory Panel members suggest that around half of the 107 dealers who purchased at least 10,000 pound of mackerel or longfin squid 2006-2010 currently weigh their purchases, including many of the highest volume dealers. So around 54 dealers with substantial purchases would need to alter their practices, including potentially purchasing scales. Smaller dealers also are mixed in terms of weighing MSB purchases, but at smaller quantities relatively inexpensive scales should suffice.

The cost of scales can vary dramatically. The use of an already existing truck scale can cost as little as $10, but the distance to reach one may make their use impracticable. Installation of a truck scale in an easily-accessible port can cost more than $100,000, depending on the area in which the scale will be placed. Not all dealers use trucks in the transport of fish however, and water weight can impact the accuracy of measurements. Floor scales handling up to 20,000 pounds cost $3,000-$5,000 while floor scales that can weigh up to 100,000 pounds cost $13,000-$17,000. Hopper scales can have multiple or single hoppers, and weigh fish as they flow through the scale. For precise estimates the water needs to be completely separated from the fish before use. Hopper scale costs can range from $20,000 to $50,000 per scale, and newer models are now being produced that can be used on vessels at sea. Smaller scales costing several hundred dollars may be purchased but may mean that additional time is required to batch-weigh a product.

This alternative would also require documenting how the relative composition of a mixed catch is determined for each transaction, which could require 2-3 minutes for each transaction. From 2006-2010, 25 dealers averaged 14 mackerel transactions a year over 20,000 pounds, though some made only a few and others made much more than the average.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>2e</u>. Require that federally permitted SMB dealers <u>weigh</u> all landings related to longfin squid transactions over 2,500 pounds. If dealers do not sort by species, they would need to <u>document in dealer applications</u> how they estimate relative compositions of a mixed catch.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded but there is no indication that any quota overages have occurred recently. If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded. To the extent that landings data informs incidental catch mortality caps, accurate landings data can also be important for managing catch of non-target species (including for RH/S). If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be minimal. While a complete survey of all dealers is not available, discussions with NMFS port agents and MSB Advisory Panel members suggest that around half of the 107 dealers who purchased at least 10,000 pound of mackerel or longfin squid 2006-2010 currently weigh their purchases, including many of the highest volume dealers. So around 54 dealers with substantial purchases would need to alter their practices, including potentially purchasing scales. Smaller dealers also are mixed in terms of weighing MSB purchases, but at smaller quantities relatively inexpensive scales should suffice.

The cost of scales can vary dramatically. The use of an already existing truck scale can cost as little as $10, but the distance to reach one may make their use impracticable. Installation of a truck scale in an easily-accessible port can cost more than $100,000, depending on the area in which the scale will be placed. Not all dealers use trucks in the transport of fish however, and water weight can impact the accuracy of measurements. Floor scales handling up to 20,000 pounds cost $3,000-$5,000 while floor scales that can weigh up to 100,000 pounds cost $13,000-$17,000. Hopper scales can have multiple or single hoppers, and weigh fish as they flow through the scale. For precise estimates the water needs to be completely separated from the fish before use. Hopper scale costs can range from $20,000 to $50,000 per scale, and newer models are now being produced that can be used on vessels at sea. Smaller scales costing several hundred dollars may be purchased but may mean that additional time is required to batch-weigh a product.

Requiring dealers to documents how they estimate the relative compositions of a mixed catch in the annual dealer application should have minimal impacts.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>2f</u>. Require that federally permitted SMB dealers <u>weigh</u> all landings related to longfin squid transactions over 2,500 pounds. If dealers do not sort by species, they would need to <u>document with each transaction</u> how they estimate relative compositions of a mixed catch.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded but there is no indication that any quota overages have occurred recently. If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. Accurate landings data is important to ensure that quotas are not exceeded. To the extent that landings data informs incidental catch mortality caps, accurate landings data can also be important for managing catch of non-target species (including for RH/S). If dealers estimate the relative compositions of mixed catches consistently throughout the year then annual documentation of their methods should provide good information on their procedures. If dealers estimate the relative compositions of mixed catches differently throughout the year then transaction by transaction documentation of their methods would provide good information on their procedures. Getting good information of these procedures would help evaluate the accuracy of landings data (for managed or non-target species).

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring dealers to weigh all catches would not be expected to substantially change effort.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. Economic impacts would likely be varied among dealers. Some dealers currently weigh all landings in some manner and impacts for them would be minimal. While a complete survey of all dealers is not available, discussions with NMFS port agents and MSB Advisory Panel members suggest that around half of the 107 dealers who purchased at least 10,000 pound of mackerel or longfin squid 2006-2010 currently weigh their purchases, including many of the highest volume dealers. So around 54 dealers with substantial purchases would need to alter their practices, including potentially purchasing scales. Smaller dealers also are mixed in terms of weighing MSB purchases, but at smaller quantities relatively inexpensive scales should suffice.

The cost of scales can vary dramatically. The use of an already existing truck scale can cost as little as $10, but the distance to reach one may make their use impracticable. Installation of a truck scale in an easily-accessible port can cost more than $100,000, depending on the area in which the scale will be placed. Not all dealers use trucks in the transport of fish however, and water weight can impact the accuracy of measurements. Floor scales handling up to 20,000 pounds cost $3,000-$5,000 while floor scales that can weigh up to 100,000 pounds cost $13,000-$17,000. Hopper scales can have multiple or single hoppers, and weigh fish as they flow through the scale. For precise estimates the water needs to be completely separated from the fish before use. Hopper scale costs can range from $20,000 to $50,000 per scale, and newer models are now being produced that can be used on vessels at sea. Smaller scales costing several hundred dollars may be purchased but may mean that additional time is required to batch-weigh a product.

This alternative would also require documenting how the relative composition of a mixed catch is determined for each transaction, which could require 2-3 minutes for each transaction. From 2006-2010, 68 dealers averaged 25 longfin squid transactions over 2,500 pounds a year, though some made only a few and others made much more than the average.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>2g</u>. If any options 2c-2f were chosen, allow dealers to use volume to weight conversions if they cannot weigh landings – they would need to identify their conversion methods in their dealer application and explain why they cannot weigh all landings.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Accurate monitoring is important to ensure quotas are not exceeded (directed or incidental) and avoid overfishing. Volume to weight conversions can be very accurate but are probably less accurate then weighing all fish. This alternative would only be selected if at least one alternative from 2c-2f were also chosen. Selecting this alternative in addition to 2c-2f likely renders each of those alternatives equivalent to the status quo, since dealers are probably unlikely to change the way they operate without a requirement to do so. The only required change would be the requirements to describe/document how dealers determine compositions of mixed landings. The impacts of documenting how dealers describe/document mixed landings compositions are discussed under each alternative 2c-2f above.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Accurate monitoring is important to ensure quotas are not exceeded (directed or incidental (including for RH/S)) and avoid overfishing. Volume to weight conversions can be very accurate but are probably less accurate then weighing all fish. This alternative would only be selected if at least one alternative from 2c-2f were also chosen. Selecting this alternative in addition to 2c-2f likely renders each of those alternatives equivalent to the status quo, since dealers are probably unlikely to change the way they operate without a requirement to do so. The only required change would be the requirements to describe/document how dealers determine compositions of mixed landings. The impacts of documenting how dealers describe/document mixed landings compositions are discussed under each alternative 2c-2f above.

3. Habitat Impacts Including EFH

Selecting this alternative in addition to 2c-2f likely renders each of those alternatives equivalent to the status quo, since dealers are probably unlikely to change the way they operate without a requirement to do so. The only required change would be the requirements to describe/document how dealers determine compositions of mixed landings. The impacts of documenting how dealers describe/document mixed landings compositions are discussed under each alternative 2c-2f above.

4. Protected Resources

Selecting this alternative in addition to 2c-2f likely renders each of those alternatives equivalent to the status quo, since dealers are probably unlikely to change the way they operate without a requirement to do so. The only required change would be the requirements to describe/document how dealers determine compositions of mixed landings. The impacts of documenting how dealers describe/document mixed landings compositions are discussed under each alternative 2c-2f above.

5. Human Communities

Selecting this alternative in addition to 2c-2f likely renders each of those alternatives equivalent to the status quo, since dealers are probably unlikely to change the way they operate without a requirement to do so. The only required change would be the requirements to describe/document how dealers determine compositions of mixed landings. The impacts of documenting how dealers describe/document mixed landings compositions are discussed under each alternative 2c-2f above.

Alternative Set 2 Summary - Additional Dealer Reporting Measures

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

All of the action alternatives are expected to have some low incremental managed-resource benefits related to better monitoring with the exception of 2g. 2g would essentially provide a loophole for weighing all catch, which is what is primarily considered in this Alternative Set.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

All of the action alternatives are expected to have some low incremental non-target benefits related to better monitoring with the exception of 2g. 2g would essentially provide a loophole for weighing all catch, which is what is primarily considered in this Alternative Set.

3. Habitat Impacts Including EFH

None of the action alternatives are expected to impact habitat.

4. Protected Resources

None of the action alternatives are expected to impact protected resources.

5. Human Communities

Human community impacts are mixed depending on which interest group is considered. Commercial dealers could incur moderate-to-higher additional costs if they needed to buy high volume scales to meet the "weigh all fish" requirements considered in this alternative set. Many dealers already weigh all of their catch however. The interested public would benefit to a modest degree primarily to the extent that better monitoring could lead to better RH/S management.

7.3 Alternative Set 3: Additional At-Sea Observation Optimization Measures

Statement of Problem/Need for Action:

The current suite of observer monitoring requirements may be insufficient to precisely estimate RH/S incidental catch.

Background:

The measures in this Alternative Set would (alone and/or in combination with other alternatives) facilitate more accurate monitoring by observers with the overall goal of improving the precision of RH/S incidental catch estimates. Each alternative addresses an aspect of observer coverage that potentially could be improved to ultimately lead to better RH/S estimates. Many of the alternatives deal with slippage, which is defined and described in Section 5.3.2.

NOTE ON COMBINATIONS: Many of the Alternative Set 3 action alternatives could be implemented individually or collectively. However, 3h (trip termination after 1 slipped haul) and 3i (trip termination after 2 slipped hauls) would be mutually exclusive – only one would be chosen if either. Likewise, 3k (fishery-wide slippage cap at 5 mackerel slippage events) and 3l (fishery-wide slippage cap at 10 mackerel slippage events) would be mutually exclusive – only one would be chosen if either. 3m (fishery-wide slippage cap at 5 longfin slippage events) and 3n (fishery-wide slippage cap at 10 longfin slippage events) are also mutually exclusive – only one would be chosen if either. 3p would replace fishery-wide slippage caps with vessel slippage caps and it would be expected that either 3p could be chosen or 3k-3n could be chosen (if any). Also, if 3j (slippage prohibition with exceptions) was chosen then 3f or 3g could not be selected (3f and 3g require all catch to be brought aboard but 3j provides some exceptions).

If alternatives 3f – 3p are selected for mackerel, they would also require the selection of Alternative 1d48 (48-hr pre-trip notification) or 1d72 (72-hr pre-trip notification). There is already a pre-trip notification requirement in effect for longfin squid moratorium permit holders.

Several alternatives in this Alternative set deal with slippage. As described in Section 5.3, even infrequent slippage has the potential to bias observer data in that the observed data would represent a subset of actual fishing behavior that does not include the discards related to slippage. From 2006-2010 approximately 9% (383 of 4186 or 77 per year) of hauls on observed longfin squid trips (trips that caught 50% or more longfin squid or at least 10,000 pounds longfin squid) and 26% (73 of 277 or 15 per year) of hauls on observed mackerel trips (trips that caught 50% or more mackerel or at least 100,000 pounds mackerel) had some unobserved catch. Catch may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, or haul slipped (dumped) in the water. The above numbers would thus be an upper bound on slippage events.

3a. No-action

If this alternative is selected, then no measures from Alternative Set 3 would be implemented and the existing monitoring measures (as described in section 5.3) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 3 (assisting observers, haul-back notice, dual coverage on pair trawl operations, and minimizing slippage) could improve monitoring of discards of the managed resources there would be some foregone benefits if the no-action alternative is chosen, especially for butterfish since discards account for a large portion of butterfish mortality. To some degree observer assistance, haul-back notice, and dual coverage on pair trawl operations already occur so the forgone benefits (better observer data) related to any one of those may be small but collectively such measures could provide higher benefits, but if the no-action is selected, those benefits would be forgone.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 3 (assisting observers, dual coverage on pair trawl operations, and minimizing slippage) would improve at-sea monitoring, there would be foregone benefits to non-target species including RH/S if the no-action alternative is chosen because less information on the catch and discards of those species would be available for future management decisions. To some degree observer assistance, haul-back notice, and dual coverage on pair trawl operations already occur so the forgone benefits (better observer data) related to any one of those may be small but collectively such measures could provide higher benefits, but if the no-action is selected, those benefits would be forgone.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the action alternatives. At-sea observing is not expected to impact habitat in any substantial way.

4. Protected Resources

A low negative impact would be expected compared to the action alternatives. While at-sea observing is important for determining protected resources interactions, the action alternatives being considered are mostly specific to improving data collection on RH/S and should not substantively impact protected resources. Some benefits from generally assisting observers

(observers could focus on technical aspects of documenting protected resource interactions) might be foregone but to some degree observer assistance, haul-back notice, and dual coverage on pair trawl operations already occur so the forgone benefits (better observer data) would be low, especially since the measures are not geared toward protected resources.

5. Human Communities

The impacts of the no-action alternative in comparison to the other alternatives for human communities appear mixed with uncertain net impacts. On one hand the costs to fishery participants of the additional monitoring requirements would be avoided, which is a positive impact. These avoided costs include the time required for vessel representatives to assist observers (3b, 3c), time required to complete slippage/released catch affidavits and possible postage cost for submitting the affidavits to NMFS (3e, 3j), revenue loss associated with trip termination due to slippage events (3h, 3i, 3k-3p), and the potential safety issues that may occur if vessels haul catch aboard in unsafe conditions rather than slip a catch related to safety concerns (3f-3p). Since to some degree observer assistance, haul-back notice, and dual coverage on pair trawl operations already occur, costs related to these measures should be low.

On the other hand, to the extent that Alternative Set 3 alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits.

These could include lost commercial revenues, lost recreational opportunities, lost cultural values for RH/S, and/or other lost non-market existence values (i.e. value related to the knowledge that these species are being conserved successfully) resulting from diminished stocks compared to optimally productive stocks. Due to the uncertainty about how the mackerel and longfin squid fisheries are impacting either the managed species or RH/S, these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

3b. Require the following reasonable assistance measures: provision of a safe sampling station; help with measuring decks, codends, and holding bins; help with bycatch collection; and help with basket sample collection by crew on vessels with mackerel limited access and/or longfin squid/Butterfish moratorium permits.

Note: Vessel crews often assist with these tasks already.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Such assistance could help improve observer data by allowing the observer to focus on technical aspects of observing such as species identification, weighing, measuring, etc. To the degree that such data is used to better minimize and/or account for discards (good accounting for discards can help avoid overfishing), there could be positive impacts to the managed species. Impacts are low because many vessels already provide this kind of assistance, but codifying this requirement will help observers with vessels that are not as cooperative.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. Such assistance could help improve observer data by allowing the observer to focus on technical aspects of observing such as species identification, weighing, measuring, etc. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Impacts are low because many vessels already provide this kind of assistance, but codifying this requirement will help observers with vessels that are not as cooperative.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring vessels to provide the specified assistance would not be expected to substantially change effort.

4. Protected Resources

A low positive impact would be expected compared to the no-action alternative. Such assistance could help improve observer data by allowing the observer to focus on technical aspects of observing such as species identification, weighing, measuring, etc. Impacts are low because many vessels already provide this kind of assistance, but codifying this requirement will help observers with vessels that are not as cooperative.

5. Human Communities

Neutral or minimal impacts would be expected compared to the no-action alternative. Many vessels provide this kind of assistance already and it would not be expected to be a major impact for those that do not. It is expected minimal crew time would be involved.

3c. Require vessel operators to provide observers notice when pumping/haul-back occurs on vessels with mackerel limited access and/or longfin squid moratorium permits.

Note: Vessel crews often assist with these tasks already.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Such assistance in not missing hauls ensures that all catch from an observed trip is observed and sampled to determine discards. To the degree that such data is used to better minimize and/or account for discards (good accounting for discards can help avoid overfishing), there could be positive impacts to the managed species. Impacts are low because many vessels already provide this kind of assistance, but codifying this requirement will help observers with vessels that are not as cooperative.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. Such assistance in not missing hauls ensures that all catch from an observed trip is observed and sampled to determine non-target interactions. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Impacts are low because many vessels already provide this kind of assistance, but codifying this requirement will help observers with vessels that are not as cooperative.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Ensuring that observers do not miss hauls is unlikely to change effort levels.

4. Protected Resources

A low positive impact would be expected compared to the no-action alternative. Such assistance in not missing hauls ensures that all catch from an observed trip is observed and sampled to determine protected resource interactions. To the degree that such data is used to better minimize protected resource interactions, there could be positive impacts. Impacts are low because many vessels already provide this kind of assistance, but codifying this requirement will help observers with vessels that are not as cooperative.

5. Human Communities

Neutral or minimal impacts would be expected compared to the no-action alternative. Many vessels provide this kind of assistance already and it would not be expected to be a major impact for those that do not. It is expected minimal crew time would be involved.

3d. When observers are deployed on trips involving more than one vessel, observers would be required on any vessel taking on fish wherever/whenever possible on vessels with mackerel limited access and/or longfin squid moratorium permits.

Note: The observer program usually does this already.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. Not missing hauls ensures that all catch from an observed trip is observed and sampled to determine discards. To the degree that such data is used to better minimize and/or account for discards (good accounting for discards can help avoid overfishing), there could be positive impacts to the managed species. Impacts are low because the observer program usually does this already.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. If vessels are working in pairs conducting pair trawling and both vessels are receiving fish, having observers on both vessels ensures that all catch from the pair trawling trip is observed and sampled to determine non-target interactions. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. While the observer program typically assigns two observers to pair trawling operations (pers Com Amy VanAtten), this alternative provides the observer program with an additional incentive to do so. Impacts are low because the observer program usually does this already.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring the observer program to deploy observes on both vessels during pair trawl operations whenever possible would not be expected to substantially change effort.

4. Protected Resources

A low positive impact would be expected compared to the no-action alternative. If vessels are working in pairs conducting pair trawling and both vessels are receiving fish, having observers on both vessels ensures that all catch from the pair trawling trip is observed and sampled to determine protected resource interactions. To the degree that such data is used to better minimize interactions, there could be positive impacts. Impacts are low because the observer program usually does this already.

5. Human Communities

Neutral or minimal impacts would be expected compared to the no-action alternative. Many paired vessels take observers out on both vessels already and this alternative does not have any observer funding requirements.

3e. On vessels with mackerel limited access and/or longfin squid moratorium permits, require slippage reports - "Released Catch Affidavits" from captains on observed trips if they slip a haul.

Selected alone, this alternative provides another account of slippage but does not do anything to deter slippage. This alternative would be used to augment and cross check the data collected by observers to develop a better understanding of slippage events.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. This alternative would be used to improve the quality of data collected by observers by developing a better understanding of slippage events. To the degree that such data is used in the future to reduce slippage and gain better information on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. This alternative would be used to improve the quality of data collected by observers by developing a better understanding of slippage events. To the degree that such data is used in the future to reduce slippage and gain better information on non-target interactions (including for RH/S), there could be positive impacts to the non-target species if interactions are later reduced based on that information.

If a "trip termination because of slippage" alternative was selected (see below), the slippage reports could also be used by enforcement to determine if vessels had terminated appropriately after reaching the trigger number of slippage events. Minimizing slippage should result in better data for non-target species.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Ensuring that observers do not miss hauls is unlikely to change effort levels.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. There is no indication that protected resource interactions are being missed because of discards that are not brought aboard a vessel but theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions.

5. Human Communities

Neutral or minimal impacts would be expected compared to the no-action alternative. Vessel captains would have to fill out a form explaining the reason for any slipped hauls, which appear to be relatively infrequent compared to the total number of observed hauls. The slipped haul form should take around 5 minutes to complete for each slippage event.

3f. Prohibit vessels with Mackerel limited access permits that have notified for a mackerel trip and are carrying an observer from releasing any discards before they have been brought aboard for sampling by the observer.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. To the degree that such data is used in the future to gain better information on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since discards of managed species on mackerel trips is not a major issue, impacts should be low. While many vessels already do this, codifying this requirement will help observers with vessels that are not as cooperative.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would be used to improve the quality of data collected by observers by requiring all fish that will be discarded be brought aboard for sampling first to develop complete information about incidentally-caught species in the mackerel fishery. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. While many vessels already do this, codifying this requirement will help observers with vessels that are not as cooperative. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Prohibiting discarding before observation would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Prohibiting discarding before observation would not be expected to substantially change effort and there is no indication that protected resource interactions are being missed because of discards that are not brought aboard a vessel but theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. Some fishing time may be lost because nets have to be fully brought aboard after each haul. Also, this alternative could create safety problems if a vessel attempts to bring aboard a catch and/or net in dangerous conditions. The observer program reports that most vessels are already bringing all hauls aboard for sampling a majority of the time on a voluntary basis however.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

3g. Prohibit vessels with longfin squid moratorium permits that have notified for a longfin squid trip and are carrying an observer from releasing any discards before they have been brought aboard for sampling by the observer.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A positive impact would be expected compared to the no-action alternative. To the degree that such data is used in the future to gain better information on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards are a major portion of butterfish mortality better discard information has a strong potential to improve data and management.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would be used to improve the quality of data collected by observers by requiring all fish that will be discarded be brought aboard for sampling first to develop complete information about incidentally-caught species in the longfin squid fishery. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. While many vessels already do this, codifying this requirement will help observers with vessels that are not as cooperative. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Prohibiting discarding before observation would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Prohibiting discarding before observation would not be expected to substantially change effort and there is no indication that protected resource interactions are currently being missed because of discards that are not brought aboard a vessel but theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. Some fishing time may be lost because nets have to be fully brought aboard after each haul. Also, this alternative could create safety problems if a vessel attempts to bring aboard a catch and/or net in dangerous conditions. The observer program reports that most vessels are already bringing all hauls aboard for sampling a majority of the time on a voluntary basis however.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>3h</u>. On vessels with mackerel limited access and/or longfin squid moratorium permits, require trip termination following 1 slipped haul on an observed trip so as to minimize slippage events.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A positive impact would be expected compared to the no-action alternative. To the degree that this alternative minimizes slippage and increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards are a major portion of butterfish mortality, better discard information has a strong potential to improve data and management.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip any hauls on an observed trip so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Even if some trip terminations occur, it is not expected that these would substantially change overall fishery effort especially since fishery participants may compensate by scheduling additional trips later. It would not matter if trips were terminated because of 1 or 2 slipped hauls because effort would not be expected to substantially change in either case so there are no habitat impacts.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Even if some trip terminations occur, it is not expected that these would substantially change overall fishery effort especially since fishery participants may compensate by scheduling additional trips later. It would not matter if trips were terminated because of 1 or 2 slipped hauls because effort would not be expected to substantially change in either case so there are no protected resources impacts. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. It is difficult to quantify the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is time for extra sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. However, analysis described above concluded that the mackerel fishery averages 15 hauls a year with unobserved catch, which could theoretically trigger trip terminations. The same analysis found that the longfin squid fishery averaged 77 hauls per year with unobserved catch, which could trigger trip terminations. Due to the nature of the analysis these numbers would be upper bounds. Compared to 3i, this alternative would be expected to be more negative since 1 slipped haul would result in trip termination rather than 2 slipped hauls.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

3i. On vessels with mackerel limited access and/or longfin squid moratorium permits, require trip termination following 2 slipped hauls on an observed trip so as to minimize slippage events.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A positive impact would be expected compared to the no-action alternative. To the degree that this alternative minimizes slippage and increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards are a major portion of butterfish mortality, better discard information has a strong potential to improve data and management.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events by requiring a vessel to terminate a trip if they slip any hauls on an observed trip so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Even if some trip terminations occur, it is not expected that these would substantially change overall fishery effort especially since fishery participants may compensate by scheduling additional trips later. It would not matter if trips were terminated because of 1 or 2 slipped hauls because effort would not be expected to substantially change in either case so there are no habitat impacts.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Even if some trip terminations occur, it is not expected that these would substantially change overall fishery effort especially since fishery participants may compensate by scheduling additional trips later. It would not matter if trips were terminated because of 1 or 2 slipped hauls because effort would not be expected to substantially change in either case so there are no protected resource impacts. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. It is difficult to quantify the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is time for extra sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. However, analysis described above concluded that the mackerel fishery averages 15 hauls a year with unobserved catch, which could theoretically trigger trip terminations. The same analysis found that the longfin squid fishery averaged 77 hauls per year with unobserved catch, which could trigger trip terminations. Due to the nature of the analysis these numbers would be upper bounds. Compared to 3h, this alternative would be expected to be less negative since 2 slipped hauls would result in trip termination rather than 1 slipped haul.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>3j</u>. With the exceptions noted below, mackerel limited access and/or longfin squid moratorium permitted vessels that have notified the observer program of their intent to land 2,500 pounds of longfin squid or 20,000 pounds of mackerel and have been selected to carry an observer would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Vessels would be prohibited from releasing fish from the net (slippage), transferring fish to another vessel (that is not carrying a NMFS-approved observer), or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the observer.

Exceptions:
1) pumping the catch could compromise the safety of the vessel/crew
2) mechanical failure precludes bringing some or all of the catch aboard the vessel; or
3) spiny dogfish have clogged the pump and consequently prevent pumping of the rest of the catch.

If a net is released, including the exemptions above, the vessel operator would be required to complete and sign a Released Catch Affidavit providing information about where, when, and why the net was released, as well as a good-faith estimate of the total weight of fish caught on the tow and weight of fish released. Released Catch Affidavits must be submitted within 48 hours of completion of the trip.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A positive impact would be expected compared to the no-action alternative. To the degree that this alternative minimizes slippage and increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards are a major portion of butterfish mortality better discard information has a strong potential to improve data and management.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Prohibiting discarding before observation or requiring released catch affidavits would not be expected to substantially change effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Prohibiting discarding before observation would not be expected to substantially change effort and there is no indication that protected resource interactions are currently being missed because of discards that are not brought aboard a vessel. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a low negative impact would be expected compared to the no-action alternative. Vessel captains would have to fill out a form explaining the reason for any slipped hauls, which should take less than 5 minutes. Also, if slipping has been occurring frequently on observed trips for reasons other than the exceptions above then fishing time could be lost while net contents are brought aboard. Analysis described above concluded that the mackerel fishery averages 15 hauls a year with unobserved catch, which could theoretically trigger trip terminations. The same analysis found that the longfin squid fishery averaged 77 hauls per year with unobserved catch, which could trigger trip terminations. Due to the nature of the analysis these numbers would be upper bounds.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>3k</u>. Related to 3j, for mackerel limited access permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>5 slippage events</u> (adjustable via specifications) occur in any given year for notified and observed mackerel trips then subsequent slippage events on any notified and observed Mackerel trip would result in trip termination for the rest of that year. The goal is to minimize slippage events.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. To the degree that this alternative minimizes slippage and increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Impacts would be greater than 3l which has a higher cap before terminations are triggered. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. It is difficult to quantify the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is time for extra sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. Analysis described above concluded that the mackerel fishery averages 15 hauls a year with unobserved catch, which could theoretically trigger trip terminations. Due to the nature of the analysis this number would be an upper bounds.

Compared to 3l, this alternative would be expected to be more negative since fewer slipped hauls could occur before additional slippages would result in future trip terminations. Note: once the slippage cap was achieved, any vessel with an additional slippage would have to terminate even if it had never slipped before in that year.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>3l</u>. Related to 3j, for mackerel limited access permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>10 slippage events</u> (adjustable via specifications) occur in any given year for notified and observed mackerel trips then subsequent slippage events on any notified and observed Mackerel trip would result in trip termination for the rest of that year. The goal is to minimize slippage events.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. To the degree that this alternative minimizes slippage and increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low. Since this alternative would be less restrictive than 3k, benefits would be less as well.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Impacts would be less than 3k which has a lower cap before terminations are triggered. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls. S Since this alternative would be less restrictive than 3k, benefits would be less as well.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. It is difficult to quantify the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is time for extra sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. Analysis described above concluded that the mackerel fishery averages 15 hauls a year with unobserved catch, which could theoretically trigger trip terminations. Due to the nature of the analysis this number would be an upper bounds.

Compared to 3k, this alternative would be expected to be less negative since more slipped hauls could occur before additional slippages would result in future trip terminations. Note: once the slippage cap was achieved, any vessel with an additional slippage would have to terminate even if it had never slipped before in that year.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>3m</u>. Related to 3j, for longfin squid moratorium permitted vessels, NMFS would track the number of slippage events. Once a cap of <u>5 slippage events</u> (adjustable via specifications) occur in any given trimester for notified and observed longfin squid trips then subsequent slippage events on any notified and observed longfin squid trip would result in trip termination for the rest of that trimester. The goal is to minimize slippage events.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A positive impact would be expected compared to the no-action alternative. To the degree that this alternative minimizes slippage and increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards in the longfin squid fishery are a major portion of butterfish mortality better discard information has a strong potential to improve data and management.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Impacts would be greater than 3n which has a higher cap before terminations are triggered. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. It is difficult to quantify the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is time for extra sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. Analysis described above concluded that the longfin squid fishery averaged 77 hauls per year with unobserved catch, which could trigger trip terminations. Due to the nature of the analysis these numbers would be upper bounds.

Compared to 3n, this alternative would be expected to be more negative since fewer slipped hauls could occur before additional slippages would result in future trip terminations. Note: once the slippage cap was achieved, any vessel with an additional slippage would have to terminate even if it had never slipped before in that trimester.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

3n. Related to 3j, for longfin squid moratorium permitted vessels, NMFS would track the number of slippage events. Once a cap of 10 slippage events (adjustable via specifications) occur in any given trimester for notified and observed longfin squid trips then subsequent slippage events on any notified and observed longfin squid trip would result in trip termination for the rest of that trimester. The goal is to minimize slippage events.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A positive impact would be expected compared to the no-action alternative. To the degree that this alternative minimizes slippage and increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards in the longfin squid fishery are a major portion of butterfish mortality better discard information has a strong potential to improve data and management. Since this alternative would be less restrictive than 3m, benefits would be less as well.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Impacts would be less than 3m which has a lower cap before terminations are triggered. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls. Since this alternative would be less restrictive than 3m, benefits would be less as well.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. This would apply if the trigger was either 5 or 10 trips. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. It is difficult to quantify the socio-economic impacts because participants are likely to have a wide variety of responses. Some vessels may just not slip where they would have previously, and the only extra cost is time for extra sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative. Analysis described above concluded that the longfin squid fishery averaged 77 hauls per year with unobserved catch, which could trigger trip terminations. Due to the nature of the analysis these numbers would be upper bounds.

Compared to 3m, this alternative would be expected to be less negative since more slipped hauls could occur before additional slippages would result in future trip terminations. Note: once the slippage cap was achieved, any vessel with an additional slippage would have to terminate even if it had never slipped before in that trimester.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

3o. For mackerel and/or longfin squid permitted vessels, if a trip is terminated within 24 hours because of any of the anti-slippage provisions (3g, 3h, 3k-3n), then the relevant vessel would have to take an observer on its next trip.

The idea behind this alternative is that vessels may seek to have trips terminated at the start of a trip to avoid having to take observers for extended trips. If such strategic behavior became widespread, it would likely bias the data compared to typical fleet behavior.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A low positive impact would be expected compared to the no-action alternative. To the degree that this alternative improves data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards in the longfin squid fishery are a major portion of butterfish mortality better discard information has a strong potential to improve data and management. The impact is low because this may be a rare circumstance.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage observer avoidance strategies so that data can be obtained on the composition of typical trips. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls. The impact is low because this may be a rare circumstance.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. . Vessels may experience reduced revenue and/or higher costs due to waiting for another observer or due to paying for another observer (about $800/day) if an industry-funded observer program is in place.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

3p. Allow mackerel and/or longfin squid permitted vessels to be assigned an annual quota (set during specifications) of slippage events related to 3j, specified annually. Once their slippage quota was reached, vessels would have to terminate an observed trip as well as upon any slippage event on subsequent observed trips for the remainder of the calendar year.

This alternative would be in place of the fleet-wide caps and the vessel caps would be specified at a later date. As such, potential benefits would occur in the future (versus 3k-3n which would be implemented sooner if selected) and be dependent on what level the cap was set at.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potential positive impact would be expected compared to the no-action alternative. To the degree that this alternative increases the quality of data on discards, there could be positive impacts to the managed species if discards are later reduced or better accounted for (good accounting for discards can help avoid overfishing) based on that information. Since both discards and uncertainty about discards are already accounted for during specifications setting, impacts should be low except for butterfish. Since discards in the longfin squid fishery are a major portion of butterfish mortality better discard information has a strong potential to improve data and management.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potential positive impact would be expected compared to the no-action alternative. This alternative would seek to discourage slippage events so that data can be obtained on the composition of all catches. To the degree that such data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since some fish that are released when slipped may survive but are unlikely to survive if hauled aboard there may be some additional mortality on a haul by haul basis. Given that many non-target species interaction events are rare and large, even infrequent slippage could confound catch estimates made without observing all hauls.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not expected that this alternative would substantially affect overall fishery effort even if it resulted in terminations of some observed trips. Theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions though this is not known to be a problem.

5. Human Communities

Compared to the no-action alternative, impacts appear mixed with uncertain net impacts.

On one hand a negative impact would be expected compared to the no-action alternative. If less than the specified slippage events occur the impacts may be minimal. Once terminations are triggered, some vessels may just not slip where they would have previously, and the only extra cost is sorting fish on deck. If slippage occurred previously because of safety issues and vessels now took higher risks to avoid trip termination then vessel/crew safety could be reduced. If vessels are forced to terminate then they would lose the value of catch they might have made on the rest of the trip. Because of the impossibility of predicting fishery participant responses, the variety of trip types, and the impossibility of predicting when a slipped haul might occur, it is not possible to further quantify socio-economic impacts related to this alternative.

A low positive impact would be expected compared to 3k-m. The advantage of having the slippage quota be vessel based is that vessels have a direct incentive to minimize unnecessary slippage events to save their slippage quota for when they really need it (e.g. due to safety issues) and thereby avoid situations where subsequent slippage events result in forced trip terminations.

On the other hand, to the extent that this alternative led to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then this alternative might result in potentially positive long-term benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>Alternative Set 3 Summary - Additional At-Sea Observation Optimization Measures</u>

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Many of the action alternatives are expected to have some low incremental managed-resource benefits related to better observer data. Since the general operation of the observers is not known to be a major problem for most of the managed species, impacts are generally low. However, since discarding of butterfish in the longfin squid fishery is a major component of fishing mortality, measures to track, eliminate, or reduce slippage in the longfin squid fishery would be expected to result in relatively greater positive impacts (3g, 3h, 3i, 3j, 3m, 3n, and 3p).

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

The alternatives that generally result in assistance for observers to get their work done effectively (3b-3d) would likely result in low incremental benefits. Since slippage has the potential to bias observer data, the alternatives that track, eliminate, or reduce slippage would be expected to have relatively greater benefits related to data quality, and the ones that most reduce slippage would be expected to have the greatest positive impacts (3f, 3g, and 3h).

3. Habitat Impacts Including EFH

None of the action alternatives are expected to impact habitat.

4. Protected Resources

The alternatives that generally result in assistance for observers to get their work done effectively (3b-3d) would likely result in low incremental benefits. Regarding the alternatives that deal with slippage, there is no indication that protected resource interactions are currently being missed because of discards that are not brought aboard a vessel but theoretically, making sure all catch is observed could lessen the chance of observers missing protected species interactions.

5. Human Communities

Human community impacts are mixed depending on which interest group is considered. For commercial fishing, the alternatives involving generally assisting observers should have minimal impacts since most do it already. Slippage restrictions could cause trip terminations resulting in lost revenue or potential safety issues if vessels bring catch aboard in dangerous conditions. The stricter the restriction on slippage the greater the potential costs. The interested public would benefit to the extent that better monitoring could lead to better RH/S management.

7.4 Alternative Set 4 - Port-side and Other Sampling/Monitoring Measures

Statement of Problem/Need for Action:

The current suite of reporting and monitoring requirements are insufficient to precisely estimate RH/S incidental catch.

Background:

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates.

From a practical standpoint, it is more efficient to subsample the landings of river herring and other non-target species when a herring/mackerel MWT vessel reaches the dock than when it is at sea. Discards that occur at sea of non-target species are easier to monitor than are the landed fractions that go into the hold due to the large volumes involved. Dockside sampling could have higher sampling rates to better characterize the species retained and an entire catch could be evaluated in one day or less as opposed to having a person at sea for multiple days. This option does not mean that at sea monitors are unnecessary – they are necessary to monitor discards. However, since most RH/S are retained (esp. for mackerel trips), portside sampling could increase sampling coverage with lower costs than at-sea observers.

The observer program has indicated that they would provide staff (1 person half to full time depending on level of sampling) to manage the selection of vessels and organization of data for port-side sampling.

NOTE ON COMBINATIONS: All of the action alternatives in this Alternative Set could be implemented singly or in combination with any other alternative(s) in this Alternative Set.

4a. No-action

If this alternative is selected, then no measures from Alternative Set 4 would be implemented and the existing monitoring measures (as described in section 5.4) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Neutral or minimal impacts would be expected compared to the action alternatives. Portside monitoring of landings is designed to better estimate low concentrations of incidentally caught and retained catch such as RH/S, and there is no indication that there are major monitoring issues with landings of any of the managed resources.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 4 would improve landings monitoring through portside sampling, and RH/S are sometimes mixed into directed species' landings, there would be foregone benefits to non-target species including RH/S if the no-action alternative is chosen because less information on the landings of those species would be available for future management decisions.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the action alternatives. Portside monitoring of landings is not expected to impact habitat in any substantial way.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the action alternatives. Portside monitoring of landings is not expected to impact protected resources in any substantial way.

5. Human Communities

The impacts of the no-action alternative in comparison to the other alternatives for human communities appear mixed with uncertain net impacts. On one hand the costs to fishery participants of paying for the additional monitoring requirements would be avoided, which is a positive impact.

On the other hand, to the extent that these alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits.

These could include lost commercial revenues, lost recreational opportunities, lost cultural values for RH/S, and/or other lost non-market existence values (i.e. value related to the knowledge that these species are being conserved successfully) resulting from diminished stocks compared to optimally productive stocks. Due to the uncertainty about how the mackerel and longfin squid fisheries are impacting either the managed species or RH/S, these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

4b. Require industry-funded 3rd party port-side landings sampling program (including total weight documentation) for mackerel landings over 20,000 pounds. Required coverage levels would be specified annually during specifications. NEFSC would accredit samplers and manage the program/data. Vessels would contract directly with providers and pay providers directly. If selected, vessels would have to wait until their sampler arrived unless a waiver is obtained from the observer program.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Neutral or minimal impacts would be expected compared to the no-action alternative. Portside monitoring of landings is designed to better estimate low concentrations of incidentally caught and retained catch such as RH/S, and there is no indication that there are major monitoring issues with landings of any of the managed resources.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Positive impacts would be expected compared to the no-action alternative. To the degree that better non-target landings data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. While requiring industry to pay for portside monitoring may discourage effort, mackerel fishing primarily takes place with mid-water gear that should not substantially impact habitat.

4. Protected Resources

Potentially positive impacts would be expected compared to the no-action alternative. Requiring industry to pay for portside monitoring may discourage overall effort, leading to less protected resource interactions.

5. Human Communities

The impacts for human communities of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts.

On one hand there are negative impacts related to costs of paying for monitoring. Dockside monitors for groundfish are paid $50-$70/hr. Different sized vessels would have different costs for offload monitoring due to different hold sizes and processor offload speeds, but a 6-14 hour offload from a 3-5 day trip would costs $300-$980 for dockside monitoring. Discussions with MSB Advisory Panel members suggested that 6-14 hours would be typical offload time for high volume trips but trips around the thresholds of 20,000 pounds of mackerel or 2,500 pounds of longfin squid would take much shorter and cost less to monitor.

This cost is low compared to at-sea sampling costs of $800/day (plus $400 in administrative costs) or $3,600-$6,000 for observer costs for a 3-5 day trip. If the Council required 25%, 50%, 75%, or 100% of trips to be monitored then participants would have to pay for approximately that percentage of their trips to be monitored unless additional funds are available. Some dockside monitoring is already being funded though academic grants but it is not certain that such funding is permanent.

Revenue information for different mackerel vessels/trips is available related to Alternative Set 5 (see Section 7.5) to compare against these costs. Unless vessels have to wait for a portside monitor, it is expected that sampling could occur while offloading is occurring and as such would not substantially change offload times.

On the other hand, to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative in comparison to the no-action alternative might result in positive benefits related to future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

4c. Require industry-funded 3rd party port-side landings sampling program (including total weight documentation) for longfin squid landings over 2,500 pounds. Required coverage levels would be specified annually during specifications. NEFSC would accredit samplers and manage the program/data. Vessels would contract directly with providers and pay provider directly. If selected, vessels would have to wait until their sampler arrived unless a waiver is obtained from the observer program.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Neutral or minimal impacts would be expected compared to the no-action alternative. Portside monitoring of landings is designed to better estimate low concentrations of incidentally caught and retained catch such as RH/S, and there is no indication that there are major monitoring issues with landings of any of the managed resources.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Neutral or minimal impacts would be expected compared to the no-action alternative. Since on longfin squid trips much non-target catch and most RH/S caught on longfin squid trips are discarded rather than retained (see table 22), portside sampling is probably would not be an effective way to obtain RH/S catch information.

Also, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

3. Habitat Impacts Including EFH

A potentially positive impact would be expected compared to the no-action alternative. Requiring industry to pay for portside monitoring may discourage effort, leading to less habitat impacts from bottom trawling.

4. Protected Resources

Potentially positive impacts would be expected compared to the no-action alternative. Requiring industry to pay for portside monitoring may discourage overall effort, leading to less protected resource interactions.

5. Human Communities

The impacts for human communities of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts.

On one hand there are negative impacts related to costs of paying for monitoring. Dockside monitors for groundfish are paid $50-$70/hr. Different sized vessels would have different costs for offload monitoring due to different hold sizes and processor offload speeds, but a 6-14 hour offload from a 3-5 day trip would costs $300-$980 for dockside monitoring. Discussions with MSB Advisory Panel members suggested that 6-14 hours would be typical offload time for high volume trips but trips around the thresholds of 20,000 pounds of mackerel or 2,500 pounds of longfin squid would take much shorter and cost less to monitor.

This cost is low compared to at-sea sampling costs of $800/day (plus $400 in administrative costs) or $3,600-$6,000 for observer costs for a 3-5 day trip. If the Council required 25%, 50%, 75%, or 100% of trips to be monitored then participants would have to pay for approximately that percentage of their trips to be monitored unless additional funds are available. Some dockside monitoring is already being funded though academic grants but it is not certain that such funding is permanent.

Revenue information for different mackerel vessels/trips is available related to Alternative Set 5 (see section 7.5) to compare against these costs. Unless vessels have to wait for a sampler, it is expected that sampling could occur while offloading is occurring and as such would not substantially change offload times.

On the other hand, to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative in comparison to the no-action alternative might result in positive benefits related to future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>4d</u>. Require volumetric vessel-hold certification for Tier 3 limited access mackerel permits and specify a volume to weight conversion.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Neutral or minimal impacts would be expected compared to the no-action alternative. Tier 3 mackerel permits are not expected to catch a major portion of the mackerel quota and there are no major problems reported with monitoring of the managed species for these vessels.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Potentially low positive impacts would be expected compared to the no-action alternative. This alternative could facilitate rapid catch weight estimates based on vessel volume for portside sampling, observer data hail weight estimates, and vessels' VTR kept-weight estimates.
To the degree that better non-target catch data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Impacts are low because Tier 3 vessels are expected to catch only a small portion of the mackerel quota.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring hold certifications would not be expected to change effort and mackerel fishing primarily takes place with mid-water gear that should not substantially impact habitat.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring hold certifications would not be expected to change effort.

5. Human Communities

The impacts for human communities of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts.

Potentially negative impacts would be expected for the vessels expected to qualify for a Tier 3 mackerel permit (around 300). Informal contacts by council staff with several marine surveyors revealed that a fish hold measurements could run approximately $13.30-$40 per foot of vessel length, which could range from as low as $1,000 for a 75 foot vessel to as high as $6,000 for a 150 foot vessel, not including travel expenses. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessels operating costs. Costs may be higher if a marine architect or naval engineer is used. Industry members have communicated to Council staff that, while some smaller vessels are configured in a way that could facilitate hold certifications (the refrigerated seawater or "tank" boats), many vessels that participate in a "fresh" product fishery are not configured in a way that facilitates a certification of a fixed hold capacity.

On the other hand, to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative in comparison to the no-action alternative might result in positive benefits related to future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

4e. Require volumetric vessel-hold certification for longfin squid moratorium permits and specify a volume to weight conversion.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Neutral or minimal impacts would be expected compared to the no-action alternative. It is not believed that major problems exist with current monitoring of the managed species' landings.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Potentially positive impacts would be expected compared to the no-action alternative. This alternative could facilitate rapid catch weight estimates based on vessel volume for portside sampling, observer data hail weight estimates, and vessels' VTR kept-weight estimates.
To the degree that better non-target catch data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring hold certifications would not be expected to change effort and mackerel fishing primarily takes place with mid-water gear that should not substantially impact habitat.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. Requiring hold certifications would not be expected to change effort.

5. Human Communities

The impacts for human communities of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts.

Potentially negative impacts would be expected for the vessels with longfin squid moratorium permits (around 380, though some of these may have to get hold certifications related to mackerel regulations currently being implemented). Informal contacts by council staff with several marine surveyors revealed that a fish hold measurements could run approximately $13.30-$40 per foot of vessel length, which could range from as low as $1,000 for a 75 foot vessel to as high as $6,000 for a 150 foot vessel, not including travel expenses. Costs may be higher if a marine architect or naval engineer is used. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessels operating costs.

Industry members have communicated to Council staff that, while some longfin squid vessels are configured in a way that could facilitate hold certifications (the refrigerated seawater or "tank" boats), many vessels that participate in a "fresh" product fishery are not configured in a way that facilitates a meaningful certification of a fixed hold capacity.

On the other hand, to the extent that this alternative leads to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of the managed resources and/or RH/S, then choosing this alternative in comparison to the no-action alternative might result in positive benefits related to future commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

4f. Within 6 months of the completion of the Sustainable Fisheries Coalition bycatch avoidance project (expected late 2012), the Council will meet to formally review the results and consider the appropriateness of developing a framework adjustment to implement any additional incidental catch avoidance strategies that are suggested by the results of the Sustainable Fisheries Coalition bycatch avoidance project.

This would commit the Council to consider the findings from this project as they could apply to reducing the catch of RH/S in pelagic fisheries. Full details on this project are included in Appendix 7, but generally the project is testing if oceanographic and fishery data can be used to help industry avoid potential RH/S hotspots. Implementing measures similar to this project (i.e. making participation mandatory) would be a frameworkable action.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

Neutral or minimal impacts would be expected compared to the no-action alternative. This alternative would only make relevant actions frameworkable and such actions would be developed and analyzed after completion of the Sustainable Fisheries Coalition bycatch avoidance project.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Neutral or minimal impacts would be expected compared to the no-action alternative. This alternative would only make relevant actions frameworkable and such actions would be developed and analyzed after completion of the Sustainable Fisheries Coalition bycatch avoidance project.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative. This alternative would only make relevant actions frameworkable and such actions would be developed and analyzed after completion of the Sustainable Fisheries Coalition bycatch avoidance project.

4. Protected Resources

Neutral or minimal impacts would be expected compared to the no-action alternative. This alternative would only make relevant actions frameworkable and such actions would be developed and analyzed after completion of the Sustainable Fisheries Coalition bycatch avoidance project.

5. Human Communities

Neutral or minimal impacts would be expected compared to the no-action alternative. This alternative would only make relevant actions frameworkable and such actions would be developed and analyzed after completion of the Sustainable Fisheries Coalition bycatch avoidance project.

Alternative Set 4 Summary - Port-side and Other Sampling/Monitoring Measures

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

All of the action alternatives are expected to have minimal impacts for managed species since it is believed that their landings are already generally well monitored.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Monitoring landings from mackerel trips (4b) would be expected to have the most benefit especially for RH/S since RH/S appear to often be retained by the mackerel fishery. Benefits are not as high with longfin squid trips (4c) since they discard more of their incidental catch. Hold certifications may help with some aspects of monitoring but may not be feasible for fresh-product boats that often reconfigure their holds.

3. Habitat Impacts Including EFH

None of the action alternatives are expected to directly impact habitat but if vessels had to pay for their monitoring that could reduce effort which would generally lower habitat impacts.

4. Protected Resources

None of the action alternatives are expected to directly impact protected resources but if vessels had to pay for their monitoring that could reduce effort which would generally lower protected resource interactions.

5. Human Communities

Human community impacts are mixed depending on which interest group is considered. Commercial participants could incur moderate to higher additional costs if they have to pay for dockside monitoring (but this is much less expensive than at-sea coverage). Hold certifications would involve low to moderate costs and would generally be a one-time or infrequent cost. The interested public would benefit to a modest degree primarily to the extent that better monitoring could lead to better RH/S management.

7.5 Alternative Set 5 – At-Sea Observer Coverage Requirements

Statement of Problem/Need for Action:

The current suite of reporting and monitoring requirements is insufficient to precisely estimate RH/S incidental catch.

Background:

The measures in this Alternative Set would (alone and/or in combination with other alternatives) increase reporting and/or monitoring with the overall goal of improving the precision of RH/S incidental catch estimates. The focus of these alternatives is on increasing the observer coverage rates of mackerel and longfin squid trips.

The average trip cost values cited in this analysis include variable costs such as fuel, oil, ice, food, fishing supplies, vessel/gear damages, and water but does not include crew shares/wages, dockage fees, or boat mortgage payments. Trip costs were estimated based on 2010 observer data. Observers ask for information on these costs and vessels were binned by gear, vessel size, and day versus multi-day vessels.

NOTE ON COMBINATIONS: Only one of the 5b (observer coverage for mackerel mid-water trawl) alternatives could be chosen. Likewise, only one of the 5c (observer coverage for mackerel small mesh bottom trawl) and one of the 5d (observer coverage for longfin squid small mesh bottom trawl) alternatives could be chosen. One alternative from each of these could be selected (a total of three). 5e1 and 5e2 (strata-fleet alternatives for mid-water trawl) are mutually exclusive as are 5e3 and 5e4 (strata-fleet alternatives for small mesh bottom trawl) but one alternative from the first pair could be chosen with one from the second pair. If any of the 5e alternatives were chosen, they would not be combinable with any of the 5b, 5c, or 5d alternatives (coverage could be based on a set percentage of trips or a set target coefficients of variation (C.V.s) but not both). 5f, 5g, and 5h provide for industry funding and review of the increased observer coverage levels proposed in 5b-5e so they could be added on to any of the other action alternatives.

If any measure in this Alternative Set is selected for mackerel, the Council would also need to select Alternative 1d48 (48-hr pre-trip notification) or 1d72 (72-hr pre-trip notification). There is already a pre-trip notification requirement in effect for longfin squid moratorium permit holders.

5a. No-action

If this alternative is selected, then no measures from Alternative Set 5 would be implemented and the existing observer measures (as described in section 5.5) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A negative impact would be expected compared to the action alternatives. Since the alternatives in Alternative Set 5 would improve monitoring of discards of the managed resources there would be some foregone benefits if the no-action alternative is chosen. Since discarding of butterfish in the longfin squid fishery is the only major concern about discarding of the managed species, the forgone benefits would be primarily limited to butterfish and the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A negative impact would be expected compared to the action alternatives. Since the alternatives in Alternative Set 5 would improve at-sea catch monitoring, and RH/S are sometimes mixed into directed species' catch, there would be foregone benefits to non-target species including RH/S if the no-action alternative is chosen because less information on the catch of those species would be available for future management decisions.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the action alternatives. At-sea monitoring of catch is not expected to impact habitat in any substantial way.

4. Protected Resources

A negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 5 would improve at-sea catch monitoring, and protected resources are sometimes encountered in the mackerel and longfin squid fisheries, there would be foregone benefits to protected resources including RH/S if the no-action alternative is chosen because less information on the catch of those species would be available for future management decisions.

5. Human Communities

The impacts of the no-action alternative in comparison to the other alternatives for human communities appear mixed with uncertain net impacts. On one hand the costs to fishery participants of paying for the additional monitoring requirements would be avoided, which is a positive impact.

On the other hand, to the extent that these alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits.

These could include lost commercial revenues, lost recreational opportunities, lost cultural values for RH/S, and/or other lost non-market existence values (i.e. value related to the knowledge that these species are being conserved successfully) resulting from diminished stocks compared to optimally productive stocks. Due to the uncertainty about how the mackerel and longfin squid fisheries are impacting either the managed species or RH/S, these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

5b. Mackerel MWT

There is currently no pool of observer coverage for general mid-water trawl vessels and the only coverage of this fleet occurs when herring-directed activity happens to catch mackerel (the observer program actually selects against declared herring trips that state their primary target is mackerel). The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation.

> **5b1. Require 25% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

> **5b2. Require 50% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

> **5b3. Require 75% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.**

5b4. Require 100% of MWT mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. Since alternatives in Alternative Set 5 would somewhat improve monitoring of discards of the managed resources there could be some benefits but given there are no major reported issues with discarding of the managed species in the mackerel fishery, impacts would be expected to be low.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. All of the proposed coverage rates are higher than current coverage rates (about 6.5 percent of mackerel catch was observed 2006-2010) and to the degree that additional data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since mackerel fishing only accounts for a portion of MWT activity, it is not possible to exactly specify how MWT incidental catch estimate precision would change for these alternatives (which are specific to mackerel not all MWT) but it would improve. See section 5.5 for additional details on how RH estimate precision levels change based on coverage levels in the MWT fisheries. Also, at a constant trip coverage level as proposed in this alternative, incremental improvements to C.V.s would fluctuate from year to year (potentially substantially) due to changes in catch characteristics and effort rates. However since this alternative would implement higher coverage rates than are used currently, precision of non-target species catch estimates would be improved compared to the no-action alternative.

Based on the C.V. analysis in section 5.5 (which is for all MWT fishing), there are diminishing returns (better precision) for additional observer coverage. Thus gains (better precision) per dollar spent are greatest for going to 25% observer coverage and least going from 75% to 100%. However, as shown in figures 10-13 in Section 5.5, there are continued gains in precision (C.V.s get lower) throughout the range of trip coverages so there are still substantial gains in precision from moving from 75% to 100% even though it is a smaller gain compared to 25% to 50% or 50% to 75%. Thus moving to 25% or 50% or 75% from the status quo results in substantial precision improvements but the marginal benefit of going to 100% is less. These continued gains are related to the patchy nature of RH catch and the relatively small overall number of MWT trips. It is important to remember that the C.V. gains described in 5.5 would only be achieved if all MWT trips were subject to these coverage requirements and the gains in a given year from one coverage level to another vary by year due to the different RH catch rates from one year to another (compare figures 10 and 11 for example). Figures 10-13 also suggest that around a 65% coverage level may be necessary to achieve a C.V. of 0.3 for MWT for RH.

Precision gains to overall RH/S catch estimates in MWT fisheries may be limited if only the mackerel fishery is required to have higher observer coverage levels.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then effort could be discouraged but impacts would still be neutral or minimal because most mackerel are caught with mid-water gear that generally does not contact the bottom.

4. Protected Resources

Neutral or minimal direct impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then overall effort could be discouraged which could lead to positive impacts compared to the no-action alternative. Higher coverage would generate better data on protected resource interactions.

5. Human Communities

The impacts of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts. On one hand the costs to fishery participants of paying for the additional monitoring requirements would be a negative impact. The cost to vessels of at-sea observers would be about $800 per day at sea. Since different vessels have different average trip lengths and trip length varies by trip it is not possible to describe the impact on any given vessel. However, the following table allows comparisons of an $800/day observer cost with 2010 trip revenue (from dealer data) and cost information (from observer data) from observed mackerel trips defined as 50% mackerel or over 100,000 pounds mackerel regardless of percentage. This trip definition accounts for nearly all mackerel landings in a given year. These trips are generally large volume trips. Smaller trips, with lower daily revenues, would likely be more impacted by observer costs. 2010 MWT observer information from these trips was binned into three categories based on vessel performance from 2006-2010: a) single MWT that had at least 3 million pounds of mackerel in any one year 2006-2010; b) paired MWT that had at least 3 million pounds of mackerel in any one year 2006-2010; and c) paired MWT that had less than 3 million pounds of mackerel in any one year 2006-2010 but more than 500,000 pounds of mackerel in one year. All pair trawl data was combined which is why the costs are the same for higher and lower volume pair trawl vessels. While it appears strange that the lower-volume paired MWT had higher revenues than the higher volume paired MWT, this is just a chance outcome related to the groupings of vessels coming from VTR data 2006-2010 and the distribution of 2010 observer coverage of those same vessels in 2010. All together these vessels account for most mackerel landings.

Table 65. Mackerel Mid-Water Trawl Costs and Revenues

	Mid-Water Trawl (MWT) (more than 3 mil pounds/ year)	Paired MWT (more than 3 mil pounds/year)	Paired MWT (less than 3 mil pounds/year)
Average Days	2	4	2
Avg Revneue/Day	8,059	14,486	16,075
Ave Cost/Day	3,494	2,602	2,602

Based on this data, adding $800/day would increase trip costs by 23% for single MWT, and 31% for paired MWT trips.

While NMFS would still cover a small percent of mackerel trips, since coverage has been so low historically, almost all of the cost of 25%, 50%, 75%, or 100% coverage for MWT mackerel trips would likely have to be borne by industry. Depending on which alternative one is considering, the observer costs would apply to 25%, 50%, 75%, or 100% of vessels trips. While over time one would expect roughly even distribution among vessels, within a year some vessels may be randomly selected more often than others and bear a disproportionate share of the increased observer costs. Also, among these vessels both costs and revenue vary so some vessels may be disproportionately affected compared to other vessels.

The approximate cost for an observer is $800/day. In addition to the costs borne by vessels if they have to pay for an observer, NMFS has estimated that it incurs approximately $400/day in administrative costs related to each additional day at sea.

While the per trip costs are most relevant to vessels, total costs can also be considered. Since coverage in this alternative would be related to 20,000 pound mackerel trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on midwater trawl trips that kept 20,000 pounds or more of mackerel. These trips averaged 643 sea days each year ranging from 272 in 2010 to 926 in 2006. If 25%, 50%, 75%, or 100% of the average seadays (643) were observed it would require 161, 322, 482, and 643 days respectivly. Given the low levels of current coverage and an uncertain future funding situation, most if not nearly all of these would or could have to be industry funded (see 5f below) if mandated. Multiplying these days by $800/day results in at-sea costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.13 million, $0.26 million, $0.39 million, and $0.51 million per year respectivly. Multiplying these days by $400/day results in administrative costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.06 million, $0.13 million, $0.19 million, and $0.26 million per year respectivly.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

5c. Mackerel SMBT

A very small percentage of mackerel trips are observed overall. The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation. Analysis in the document relates these coverage levels to potential ranges of uncertainty that would result from such coverage levels.

5c1. Require 25% of SMBT (3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.

5c2. Require 50% of SMBT (3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.

5c3. Require 75% of SMBT (3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.

5c4. Require 100% of SMBT (3.5 in) mackerel trips by federal vessels intending to retain over 20,000 pounds of mackerel to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 20,000 pounds of mackerel unless they had notified their intent to retain more than 20,000 pounds of mackerel.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. Since alternatives in Alternative Set 5 would somewhat improve monitoring of discards of the managed resources there could be some benefits but given there are no major reported issues with discarding of the managed species in the mackerel fishery, impacts would be expected to be low.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. All of the proposed coverage rates are higher than current coverage rates (about 6.5 percent of mackerel catch was observed 2006-2010) and to the degree that additional data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since mackerel fishing only accounts for a small portion of SMBT activity, it is not possible to exactly specify how SMBT incidental catch estimate precision would change for these alternatives. Precision would improve but likely only by a small degree since mackerel trips only account for a small portion of all SMBT activity. See section 5.5 for additional details on how RH estimate precision levels change based on coverage levels in the SMBT fisheries. Also, at a constant trip coverage level as proposed in this alternative, incremental improvements to C.V.s would fluctuate from year to year (potentially substantially) due to changes in catch characteristics and effort rates. However since this alternative would implement higher coverage rates than are used currently, precision of non-target species catch estimates would be improved compared to the no-action alternative.

Based on the C.V. analysis in section 5.5 (which is for all SMBT fishing), there are diminishing returns (better precision) for additional observer coverage. Thus gains (better precision) per dollar spent are greatest for going to 25% observer coverage and least going from 75% to 100%. As shown in figures 14-17 in Section 5.5, there are continued gains in precision (C.V.s get lower) throughout the range of trip coverages so there are still some gains in precision from moving from 75% to 100%. The gains from 50% to 75% are minimal in some years while substantial in others while the gains going from 75% to 100% are generally quite small. Thus moving to 25% or 50% from the status quo results in substantial precision improvements but the marginal benefit of going to 75% or 100% is much less. It is important to remember that the C.V. gains described in 5.5 would only be achieved if all SMBT trips were subject to these coverage requirements and the gains in a given year from one coverage level to another vary by year due to the different RH catch rates from one year to another (compare figures 16 and 17 for example). Figures 14-17 also suggest that around a 40% coverage level may be necessary to achieve a C.V. of 0.3 for SMBT for river herring. Precision gains to overall RH/S catch estimates in SMBT fisheries may be limited if only the mackerel fishery is required to have higher observer coverage levels.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then effort could be discouraged but impacts would still be neutral or minimal because most mackerel are caught with mid-water gear that generally does not contact the bottom.

4. Protected Resources

Neutral or minimal direct impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then overall effort could be discouraged which could lead to positive impacts compared to the no-action alternative. Higher coverage would generate better data on protected resource interactions.

5. Human Communities

The impacts of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts. On one hand the costs to fishery participants of paying for the additional monitoring requirements would be a negative impact. The cost to vessels of at-sea observers would be about $800 per day at sea. Since different vessels have different average trip lengths and trip length varies by trip it is not possible to describe the impact on any given vessel. However, the following table allows comparisons of an $800/day observer cost with 2010 trip revenue (from dealer data) and cost information (from observer data) from mackerel trips (50% mackerel or over 100,000 pounds mackerel regardless of percentage) by bottom trawlers based on 2010 observer data. These trips are generally large volume trips and smaller trips, with lower revenues, would be more impacted by observer costs. The vessels that were examined were those that either had at least one year 2006-2010 with 3 million pounds of mackerel or those with at least 500,000 pounds in any one year.

Table 66. Mackerel SMBT Costs and Revenues

	Bottom Trawl (more than 3 million pounds per year)
Average Days	8
Avg Revneue/Day	12,945
Ave Cost/Day	1,639

Based on this data, adding $800/day would increase trip costs by 49% for bottom trawlers.

While NMFS would still cover a small percent of mackerel trips, since coverage has been so low historically almost all of the costs of 25%, 50%, 75%, or 100% coverage would likely have to be borne by industry. Depending on which alternative one is considering, the observer costs would apply to 25%, 50%, 75%, or 100% of vessels trips. While over time one would expect roughly even distribution among vessels, within a year some vessels may be randomly selected more often than others and bear a disproportionate share of the increased observer costs. Also, among these vessels both costs and revenue vary so some vessels may be disproportionately affected compared to other vessels.

The approximate cost for an observer is $800/day. In addition to the costs borne by vessels if they have to pay for an observer, NMFS has estimated that it incurs approximately $400/day in administrative costs related to each additional day at sea.

While the per trip costs are most relevant to vessels, total costs can also be considered. Since coverage in this alternative would be related to 20,000 pound mackerel trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on SMBT trips that kept 20,000 pounds or more of mackerel. These trips averaged 172 sea days each year ranging from 113 in 2009 to 286 in 2006. If 25%, 50%, 75%, or 100% of the average seadays (172) were observed it would require 43, 86, 129, and 172 days respectivly. Given the low levels of current coverage and an uncertain future funding situation, most if not nearly all of these would or could have to be industry funded (see 5f below) if mandated. Multiplying these days by $800/day results in at-sea costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.03 million ($30,000), $0.07 million, $0.10 million, and $0.14 million per year respectivly. Multiplying these days by $400/day results in administrative costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.02 million, $0.03 million, $0.05 million, and $0.07 million per year respectivly.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

5d. Longfin Squid SMBT

While coverage has increased in 2011 related to the implementation of the butterfish mortality cap on the longfin squid fishery, a small percentage of longfin squid trips have been observed historically. The sub-alternatives below would require a range of percentage-based coverage levels to improve coverage from the very low levels currently occurring and improve incidental catch estimation. Analysis in the document relates these coverage levels to potential ranges of uncertainty that would result from such coverage levels.

5d1. Require 25% of SMBT (3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d2. Require 50% of SMBT (3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d3. Require 75% of SMBT (3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

5d4. Require 100% of SMBT (3.5 in) longfin squid trips by federal vessels intending to retain over 2,500 pounds of longfin squid to carry observers. The NEFSC would assign coverage based on pre-trip notifications. Vessels would not be able to retain more than 2,500 pounds of longfin squid unless they had notified their intent to retain more than 2,500 pounds of longfin squid.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A positive impact would be expected compared to the no-action alternative. Since alternatives in Alternative Set 5 would improve monitoring of discards in the longfin squid fishery, and butterfish are a major discard concern in the longfin squid fishery, there would likely be benefits for butterfish related to increased observer coverage and related improvements in information regarding butterfish discarding.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. All of the proposed coverage rates are higher than current coverage rates (about 3.5 percent of longfin squid catch was observed 2006-2010) and to the degree that additional data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. Since longfin squid fishing only accounts for a portion (though substantial) of SMBT activity, it is not possible to exactly specify how SMBT incidental catch estimate precision would change for these alternatives but it would improve. See section 5.5 for additional details on how RH estimate precision levels change based on coverage levels in the SMBT fisheries. Also, at a constant trip coverage level as proposed in this alternative, incremental improvements to C.V.s would fluctuate from year to year (potentially substantially) due to changes in catch characteristics and effort rates. However since this alternative would implement higher coverage rates than are used currently, precision of non-target species catch estimates would be improved compared to the no-action alternative.

Based on the C.V. analysis in section 5.5 (which is for all SMBT fishing), there are diminishing returns (better precision) for additional observer coverage. Thus gains (better precision) per dollar spent are greatest for going to 25% observer coverage and least going from 75% to 100%. As shown in figures 14-17 in Section 5.5, there are continued gains in precision (C.V.s get lower) throughout the range of trip coverages so there are still some gains in precision from moving from 75% to 100%. The gains from 50% to 75% are minimal in some years while substantial in others while the gains going from 75% to 100% are generally quite small. Thus moving to 25% or 50% from the status quo results in substantial precision improvements but the marginal benefit of going to 75% or 100% is much less. It is important to remember that the C.V. gains described in 5.5 would only be achieved if all SMBT trips were subject to these coverage requirements and the gains in a given year from one coverage level to another vary by year due to the different RH catch rates from one year to another (compare figures 16 and 17 for example). Figures 14-17 also suggest that around a 40% coverage level may be necessary to achieve a C.V. of 0.3 for SMBT for river herring.

Targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3). Precision gains to overall RH/S catch estimates in SMBT fisheries may be limited if only the longfin squid fishery is required to have higher observer coverage levels.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then a potentially positive impact would be expected compared to the no-action alternative because having to pay for observers could discourage effort.

4. Protected Resources

Neutral or minimal direct impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then overall effort could be discouraged which could lead to positive impacts compared to the no-action alternative. Higher coverage would generate better data on protected resource interactions.

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5. Human Communities

The impacts of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts. On one hand the costs to fishery participants of paying for the additional monitoring requirements would be a negative impact. The cost to vessels of at-sea observers would be about $800 per day at sea. Since different vessels have different average trip lengths and trip length varies by trip it is not possible to describe the impact on any given vessel. However, the following table allows comparisons of an $800/day observer cost with 2010 trip revenue (from dealer data) and cost information (from observer data) from 2010 observer data of longfin squid trips by vessels that had at least 100,000 pounds of longfin squid landings in at least one year from 2007-2010 (87% of total 2007-2010 landings) or those that had at least 20,000 pounds of longfin squid landings in at least one year 2007-2010 (9% of total landings). Since trips with 50% longfin squid also account for over 90% of longfin squid landings, these criteria was also used to identify the primary squid vessels' squid trips. Almost all of the longfin squid landings are associated with bottom trawl gear. 2007 was selected as a start year because in that year the fishery switched from quarterly quotas to trimester quotas.

Table 67. Longfin squid Trawl Costs and Revenues

Primary Vessels	100,000 + in one year 2007 - 2010
	Bottom Trawl
Average Days	2
Avg Revenue/Day	5,249
Avg cost/Day	939
Secondary Vessels	20,000 + in one year 2007-2010
	Bottom Trawl
Average Days	1
Avg Revenue/Day	1,700
Avg cost/Day	424

Based on this data, adding $800/day would increase trip costs by 85% for the primary bottom trawlers (about 98 vessels). For the secondary vessels however, adding $800/day would increase their costs by 189%.

While NMFS would still cover a small percent of longfin squid trips, since coverage has been so low historically almost all of the costs of 25%, 50%, 75%, or 100% coverage would likely have to be borne by industry. Depending on which alternative one is considering, the observer costs would apply to 25%, 50%, 75%, or 100% of vessels trips. While over time one would expect roughly even distribution among vessels, within a year some vessels may be randomly selected more often than others and bear a disproportionate share of the increased observer costs. Also, among these vessels both costs and revenue vary so some vessels may be disproportionately affected compared to other vessels.

The approximate cost for an observer is $800/day. In addition to the costs borne by vessels if they have to pay for an observer, NMFS has estimated that it incurs approximately $400/day in administrative costs related to each additional day at sea.

While the per trip costs are most relevant to vessels, total costs can also be considered. Since coverage in this alternative would be related to 2,500 pound longfin squid trips, 2006-2010 VTR data was analyzed to determine the approximate number of seadays fished on SMBT trips that kept 2,500 pounds of more of longfin squid. These trips averaged 5,357 sea days each year ranging from 3,932 in 2010 to 6,743 in 2006. If 25%, 50%, 75%, or 100% of the average seadays (5,357) were observed it would require 1339, 2678, 4017, and 5,357 sea days respectivly. Given the low levels of current coverage and an uncertain funding situation, most if not nearly all of these might have to be industry funded (see 5f below) if mandated. About 10% of 2,500 pound longfin squid trips were observed in 2011, so up to 10% of these might be funded but such funding is not guaranteed. Multiplying these days by $800/day results in at-sea costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $1.1 million, $2.1 million, $3.2 million, and $4.3 million per year respectivly. Multiplying these days by $400/day results in administrative costs for 25%, 50%, 75%, or 100% coverage of the average seadays of approximatley $0.5 million, $1.1 million, $1.6 million, and $2.1 million per year respectivly. However, there may be returns to scale in the sense that at higher coverage levels NMFS marginal costs may become less than $400/day.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

5e. Strata-Fleet-Based Alternatives

On a fleet level, catch estimates of river herrings are often imprecise. The following sub-alternatives would require coverage levels that would be expected to result in the specified C.V. levels for river herrings. Shad were not included because very high coverage levels would be required to achieve the respective C.V.s due to even less frequent encounters with shads.

5e1. Require NMFS to allocate sea days such that Mid-Atlantic alewife and blueback catch C.V.s for MWT would each be expected to be at or below 0.30.

5e2. Require NMFS to allocate sea days such that Mid-Atlantic alewife and blueback catch C.V.s for MWT would each be expected to be at or below 0.20.

5e3. Require NMFS to allocate sea days such that alewife and blueback catch C.V.s for SMBT would each be expected to be at or below 0.30.

5e4. Require NMFS to allocate sea days such that alewife and blueback catch C.V.s for SMBT would each be expected to be at or below 0.20.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative for the MWT C.V. targets related to improved monitoring of discards of the managed resources, but given there are no major reported issues with discarding of the managed species by MWT gear, impacts would be expected to be low. A positive impact would be expected compared to the no-action alternative for the SMBT C.V. targets related to improved monitoring of butterfish discards since butterfish discards are a major concern in SMBT gear, especially when that gear is used to target longfin squid.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected compared to the no-action alternative. To the degree that better (more precise) data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. A C.V. of 0.30 means that the true value has approximately a 95% probability of being within ± 60% of the estimate. A C.V. of 0.20 means that the true value has approximately a 95% probability of being within ± 40% of the estimate (both assuming a normal distribution of data). Also, since some sources of uncertainty are not integrated into the C.V. calculations, the C.V.s generated by the science center are lower (look better) than they really are. As described above, since obtaining a given C.V. can require very different coverage levels from year to year, and the inter-annual variability in the data drives the precision, it may be quite difficult to consistently obtain precise catch estimates via observer data when the coverage levels are determined from prior years' data. Since 5b, 5c, and 5d require coverage based on directed trip definitions and not all activity in MWT and SMBT fishing is associated with the MSB trip definitions considered in 5b, 5c, and 5d, the two alternatives are not directly comparable. One could require coverage levels in 5b, 5c, and 5d but still be very unsure of what the gear-based C.V. will be because of other fisheries that use the same gear (e.g. Atl herring for MWT and whiting for SMBT). However, this alternative (5e) may be thought of as more comprehensive since it encompasses all fishing activity to achieve a C.V. for a particular gear type. This raises implementation problems though, which are described below in the human community section.

3. Habitat Impacts Including EFH

Neutral or minimal impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then a potentially positive impact would be expected compared to the no-action alternative because having to pay for observers could discourage effort. These impacts would be focused on SMBT effort since MWT gear does not generally contact the bottom.

4. Protected Resources

Neutral or minimal direct impacts would be expected compared to the no-action alternative if vessels do not have to pay for observer coverage (which is considered in other alternatives). In this case overall effort should not be impacted. If vessels have to pay for observer coverage then overall effort could be discouraged which could lead to positive impacts compared to the no-action alternative. Higher coverage would generate better data on protected resource interactions.

5. Human Communities

The impacts of this alternative in comparison to the no-action alternative appear mixed with uncertain net impacts. On one hand the costs to fishery participants of paying for the additional monitoring requirements would be a negative impact. NMFS has stated that to be approved any increased observer coverage must be funded by industry. Table 11, reproduced from Section 5.5, details the sea days required for C.V. targets under consideration.

Table 11. Sea days associated with Alt. 5e C.V. targets.

	Mid-Atlantic MWT (CV = 0.3)	Mid-Atlantic MWT (CV = 0.2)	SMBT (CV = 0.3)	SMBT (CV = 0.2)
Required Sea Days (2009)	541	751	3610	4889
Required Sea Days (2010)	308	409	2542	3982
Approx Days Provided in 2010	65		1132	

As with the figures above for the fishery-trip-based coverage levels, the number can fluctuate from year so one can never really guarantee a given C.V. will be reached. It may be quite difficult to consistently obtain precise catch estimates via observer data when the coverage levels are determined from prior years' data for species that are not encountered that often in consistent quantities. However, the numbers in the table above suggest that around 65% coverage could result in a 0.3 C.V. goal and about 90% coverage could result in a 0.2 C.V. goal for Mid-Atlantic MWT and that for small mesh bottom trawl, around 40% coverage could result in a 0.3 C.V. goal and about 60% coverage could result in a 0.2 C.V. goal. This was determined by averaging the required sea days from 2009-2010, and then comparing those averages with total average days at sea for relevant trips from VTR data, 2009-2010. However it is emphasized that from year to year it will be very hard to hit a particular C.V. target due to the inherent variability from year to year in both the directed fisheries involved and their incidental catch of river herrings. Since one cannot predict which years will require the highest coverage, some years would likely be over covered and some years would be under covered if coverage rates are determined by the previous year's data.

Compared to the approximate sea days provided in 2010, achieving a 0.3 C.V. for both blueback herring and alewife in the Mid-Atlantic for MWT would require 476-232 extra sea days (costing about $0.2-$0.4 million) and achieving a 0.2 C.V. for both blueback herring and alewife in the Mid-Atlantic for MWT would require 686-344 extra sea days (costing about $0.3-$0.5 million), with at sea costs being $800/day. Administrative costs to NMFS would equal an additional 50% of the at-sea costs ($400/day). The range is related to the fact that C.V.s vary from year to year related to variation in the underlying data.

Compared to the approximate sea days provided in 2010, achieving a 0.3 C.V. for both blueback herring and alewife in the SMBT (Mid-Atlantic and New England) would require 1,410-2,478 extra sea days (costing about $1.1-$2.0 million) and achieving a 0.2 C.V. for both blueback herring and alewife in the Mid-Atlantic for MWT would require 2,850-3,757 extra sea days (costing about $2.3-$3.0 million), with at sea costs being $800/day. Administrative costs to NMFS would equal an additional 50% of the at-sea costs ($400/day). The range is related to the fact that C.V.s vary from year to year related to variation in the underlying data.

A key issue with implementation of this alternative is that while the alternative is based on gear types which is how discard and incidental catch estimates based on observer coverage are binned to get total estimates, the MAFMC can really only compel the fisheries it manages to carry and pay for observers. Since NMFS has indicated that it will only approve additional observer coverage on fisheries if it is funded by industry, and the MAFMC cannot compel fisheries out of its control to carry and pay for observers, there is a procedural tension inherent in this alternative.

What could occur if this alternative is selected, is that NMFS would use its observer allocation procedures to allocate the approximate level of coverage in the MSB fisheries (mackerel and longfin squid) that would be needed as part of achieving the overall C.V. targets. So if this alternative was recommended, New England fisheries that use the relevant gear types would not be affected so the C.V. targets would not actually be reached (but they would be improved related to increases in MSB fisheries). If New England approved measures consistent with these C.V. targets (including industry funding), the tension would be resolved however as all of the major fisheries with substantial RH incidental catch would be covered.

The impact of adding $800/day for vessel costs on mackerel and longfin squid trips has already been described in alternatives 5b-5d. As discussed above, analysis suggests that around **<u>65%</u>** coverage could result in a 0.3 C.V. goal and about **<u>90%</u>** coverage could result in a 0.2 C.V. goal for Mid-Atlantic MWT and that for small mesh bottom trawl, around **<u>40%</u>** coverage could result in a 0.3 C.V. goal and about **<u>60%</u>** coverage could result in a 0.2 C.V. goal. Analyses for alternatives 5b-5d above describe the total costs for 25%, 50%, 75%, or 100% coverage levels in MAFMC fisheries so approximate total costs for **<u>65% and 90%</u>** of MWT mackerel trips and **<u>40% and 60%</u>** of SMBT mackerel and longfin squid trips can be interpolated from the impact analysis above for 5b-5d.

As also detailed in 5b-5d and perhaps more important for understainding the impact of paying for observer cost, on a per day basis adding $800/day to the cost of a trip adds the following to the daily costs of mackerel and longfin squid trips based on 2010 observer data (which collects cost information):

-23% for single MWT mackerel trips (from $3,494 per day to $4,294)
-31% for paired MWT mackerel trips (from $2,602 per day to $3,402)
-49% for higher volume SMBT mackerel trips (from $1,639 per day to $2,439)
-85% for higher volume SMBT longfin squid trips (from $939 per day to $1,739)
-189% for lower volume SMBT longfin squid trips (from $424 per day to $1,224)

The average trip cost values cited in this analysis include variable costs such as fuel, oil, ice, food, fishing supplies, vessel/gear damages, and water but does not include crew shares/wages, dockage fees, or boat mortgage payments. Trip costs were estimated based on 2010 observer data. Observers ask for information on these costs and vessels were binned by gear, vessel size, and day/multi-day vessels.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better data, and to the extent that better data leads to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since the alternatives in this alternative set are related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternative sets that deal with management measures that may utilize better data.

<u>5f</u>. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

Since NMFS has indicated that industry funding of additional observer coverage would be a prerequisite to increasing observer coverage, the impacts of industry paying for observer coverage have been described in each of the action alternatives 5b-5e above.

<u>5g</u>. Phase-in industry funding over 4 years such that to achieve the target coverage selected in 5b-5e above, NMFS would pay for 100%, 75%, 50%, then 25% of the at-sea portion of the specified observer coverage

NMFS has indicated this is not feasible from a funding point of view. The impacts of this alternative would be the same as the accompanying observer coverage level described in 5b-5e except that costs to the fishery would be less.

If vessels have to pay for observer coverage then a negative impact would be expected compared to the no-action alternative. Alternatives 5b-5d above compare the cost of observer coverage to the revenues from different types of vessels that participate in the mackerel and longfin squid fisheries. Economic costs are discussed within those alternatives assuming that industry funding would be paying for most of the increased observer coverage. In the short term cost-sharing with NMFS would make the economic impacts less negative but would not have an impact on the long term. For this alternative, if NMFS paid 100% of the observer coverage there would be minimal socio-economic impacts in the first year. For the phase in years, the impacts per trip would be the same as described above, but the number of trips for which industry would have to pay for observers would be less initially and increase in years 2, 3,and 4 at which point NMFS would cover 25% of the costs and the fishery would have to cover 75% of the costs.

<u>5h</u>. Require reevaluation of coverage requirement after 2 years to determine if incidental catch rates justify continued expense of continued high coverage rates.

<u>Biological Impacts</u>

Impacts would be uncertain depending on the outcome of the analysis. If coverage rates were reduced there would be less information available on managed species discards, non-target species interactions, and protected resource interactions.

<u>Socio-Economic Impacts</u>

Impacts would be uncertain depending on the outcome of the analysis. If coverage rates were reduced there would be less associated costs for fishery participants.

Alternative Set 5 Summary - At-Sea Observer Coverage Requirements

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

All of the action alternatives that increase observer coverage (5b-5e) are expected to have positive impacts for butterfish due to discarding concerns that would be alleviated by higher coverage rates, especially in the longfin squid fishery. Low positive impacts would be expected for the other managed resources since discarding is not considered to be a major problem for those resources. 5f-5h are more administrative in function.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

All of the action alternatives that increase observer coverage (5b-5e) are expected to have positive impacts for non-target species due to incidental catch and discarding concerns that would be alleviated by higher coverage rates. Higher coverage rates will yield more certainty about the nature of incidental catch in the mackerel and longfin squid fisheries and so greater benefits. Positive impacts would appear higher related to mackerel observers since that fishery appears to interact with RH/S more than the longfin squid fishery. 5f-5h are more administrative in function.

3. Habitat Impacts Including EFH

None of the action alternatives are expected to directly impact habitat but if vessels had to pay for their observer coverage (which would be necessary for implementation), that could reduce effort which would generally lower habitat impacts.

4. Protected Resources

None of the action alternatives are expected to directly impact protected resources but if vessels had to pay for their observer coverage (which would be necessary for implementation), that could reduce effort which would generally lower protected resource interactions. Higher coverage would generate better data on protected resource interactions.

5. Human Communities

Human community impacts are mixed depending on which interest group is considered. Commercial participants would incur relatively high costs related to paying for observer coverage (and higher coverage results in higher costs). The interested public would benefit primarily to the extent that better monitoring could lead to better RH/S management.

7.6 Alternative Set 6 - Mortality Caps

Statement of Problem/Need for Action:

There are currently no limits on incidental catch of RH/S in the mackerel and/or longfin squid fisheries other than state landing requirements.

Background:

The alternatives would seek to directly limit the mortality of the relevant RH/S species in the mackerel and longfin squid fisheries. While the actual mortality cap quantities would be determined during the specifications process just as annual ACLs/AMs are set, this document explores a range of options so that likely impacts may be evaluated. The range of mortality cap quantities would be evaluated in an environmental assessment during the specifications process. The following values are primarily provided to give the reader a sense of impacts from a range of mortality caps that will be investigated in greater depth during the specifications process.

A cap on a certain fleet/fishery can keep mortality for the fleet/fishery at a certain level. Given the lack of reference points it would be difficult to establish an appropriate cap amount that is meaningfully tied to some impact on RH/S. One would either have to independently figure out how much overall RH catch one wanted and then allocate a portion of that to a cap or one could just look at what various strata have caught historically, and use that information to come up with an amount for a fishery-specific cap. For the mortality cap alternatives, the SMB Monitoring Committee would draft a range of caps for consideration through specifications via an accompanying Environmental Assessment. Precision would likely be quite low under the current observer/monitoring regime levels of coverage.

A cap on RH/S catch in the mackerel and/or longfin squid fishery would operate much like the butterfish cap currently operates in the longfin squid fishery. An incidental catch ratio would be determined using the best available scientific data. As with the butterfish cap, the exact monitoring and extrapolation methodology would be developed during implementation and presented to the Council for comments before the cap became operational. However, the incidental catch ratio would be based on the ratio of RH/S to total retained catch, as appropriate depending on which, if any, action alternatives were chosen. This ratio comes from observer data in the butterfish cap and in the context of this amendment could come from observer data or potentially also port-side sampling data if implemented in this amendment. Then for a given fishery (mackerel or squid) as defined by trips over the incidental landings limit, the ratio is applied to all landings (from dealer data) by that fishery to extrapolate a total RH/S catch estimate. Technical details may be found in Wigley et al. (2007), with the modification of using "kept+discards" in the numerator rather than just discards. Once the estimate reaches a closure threshold identified by the Council in the specifications process, then landings above an incidental nature (also specified during specifications) would be prohibited. The incidental catch cap would operate in parallel to monitoring for the directed fishery such that reaching either the closure threshold for the directed fishery or the incidental catch cap threshold would close the directed fishery.

It would probably make more sense to have a fleet-area cap (e.g., midwater trawls in Mid-Atlantic) rather than using the regulatory definition of a "Mackerel" or "Herring" trip to define vessels that are subject to the cap. In other words, the greatest amount of impact on RH/S incidental catch reduction would come from the implementation of a joint cap on both the herring & mackerel fleets. If one instituted just a cap on the mackerel fleets, one of two things could happen if the mackerel fishery was closed due to reaching the cap:

One possibility: the mackerel fishery closes and the exact same fleet continues fishing in the exact same place (Mid-Atlantic Q1) and just retains the Atlantic herring catches and discards mackerel (mackerel discards are addressed with a set-aside in the specifications process). Since retained catch per unit effort of the combined species would go down, overall effort could go up, possibly increasing RH/S catch.

Other possibility: Q1 catches of mackerel and Atlantic herring in the Mid-Atlantic are so mixed that closing mackerel would effectively close herring.

Amendment 5 to the Atlantic Herring FMP proposes allowing caps to be implemented via a framework or specifications and it is possible that in the future a gear/based cap could be coordinated through the NEFMC and MAFMC.

For all of the mortality caps, once the cap or some fraction of the cap is reached (set in specifications) then the fishery would be closed or an incidental trip limit would go into effect (also set in specifications).

NOTE ON COMBINATIONS: All of the action alternatives in this Alternative Set could be implemented singly or in combination with any other alternative(s) in this Alternative Set.

6a. No-action

If this alternative is selected, then no measures from Alternative Set 6 would be implemented and the existing state management measures (as described in section 5.9) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 6 could result in early closures of the fisheries for mackerel and longfin squid, such closures would lead to less mortality of those species. However, catching the full quota of the managed species is not expected to cause sustainability problems for the managed species so impacts are low. If the longfin squid fishery is closed early, there would likely be benefits to butterfish given the relatively high catch rates of butterfish in the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 6 could result in early closures of the fisheries for mackerel and longfin squid, such closures would lead to less mortality of non-target species including RH/S. However, the current impacts on RH/S of the mackerel and longfin squid fisheries are not known so impacts are not quantifiable.

3. Habitat Impacts Including EFH

A potentially negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 6 could result in early closures of the fisheries for mackerel and longfin squid, such closures could lead to less negative habitat impacts, especially related to the longfin squid fishery which primarily uses bottom otter trawl gear. Participants could redirect toward other species in the same or other areas since most participants have multiple permits, but it is not possible to predict such shifts and/or any associated habitat impacts.

4. Protected Resources

A potentially negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 6 could result in early closures of the fisheries for mackerel and longfin squid, such closures could lead to less protected resource interactions (see Section 6 for details on such interactions). Participants could redirect toward other species in the same or other areas since most participants have multiple permits, but it is not possible to predict such shifts and/or any associated protected resource impacts.

5. Human Communities

The impacts of the no-action alternative in comparison to the other alternatives for human communities appear mixed with uncertain net impacts. On one hand, fishery participants would not experience revenue loss as a result of fishery closures based on the RH/S cap, which is a positive impact.

On the other hand, to the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits related to lost commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

<u>6b</u>. Implement a mortality cap for <u>river herrings</u> for the <u>mackerel</u> fishery whereby the mackerel fishery would close once it is determined that it created a certain level of river herring mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for river herring would be to base it on the range of estimated river herring mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic mid-water trawl fishing in Quarter 1, which is largely but not completely mackerel fishing, accounted for 35% of total river herring mortality 2005-2010. The table below describes total ocean and quarter 1 mid-water trawl mortalities in the leftmost columns.

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 50% or at least 100,000 pounds of mackerel (encompasses almost all landings) results in annual river herring mortality ratios from 0.02% in 2007 to .86% in 2009 with a mean of 0.45 (% of total catch). The 50%/100,000 filter was used because it has been the way directed mackerel trips have been identified in recent specifications analyses and because this definition encompasses almost all landings. The exact definition of a mackerel trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

In the right hand columns are the landings at which point the mackerel fishery would close depending on the above range of ratios and if the cap was the quarter 1 value. For example, if a cap of 86 mt was used, the mackerel fishery would close when it landed 9,975 mt with a high ratio, 19,063 mt with the mean ratio, or 428,908 mt of fish with a low ratio. Without an assessment providing advice on overall acceptable fishing mortality, the Council would have to make a policy decision about how much incidental catch to allow in this fishery and would evaluate a range of caps, probably based on recent incidental catch estimates as done in the table below.

Table 68. Example River Herring Caps for Mackerel

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Water Trawl Quarter 1 mortality (mt) (35% of total) = Mortality Cap Possibility	Mackerel would close at these landings (mt) with high ratio, 0.86%	Mackerel would close at these landings (mt) with mean ratio, 0.45%	Mackerel would close at these landings (mt) with low ratio, 0.02%
2006	245	86	9,975	19,063	428,908
2007	664	232	27,029	51,656	1,162,263
2008	672	235	27,333	52,237	1,175,335
2009	361	126	14,679	28,053	631,190
2010	244	85	9,911	18,940	426,160

Source: Unpublished observer data and Appendix 2.

A high ratio means that more river herring were caught and a low ratio means that less river herring were caught. The examples in the above table come from observed data 2006-2010. The main point is that whether mackerel would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of river herring was, and what the mackerel availability was. Since the realized ratio can vary substantially from year to year, it is difficult to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all. If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season. Additional impact analysis would be carried out by the specifications that implemented these caps.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. If the directed fishery is closed because of an incidental mortality cap the managed species may also benefit because of reduced fishing mortality. However, given the uncertainty about MSB stock dynamics and the uncertainty about when a closure might occur it is not possible to quantify such impacts. In general, if the cap is set higher, or the ratio (catch rate of RH/S) is lower, the directed fishery will stay open longer, which will result in less positive impacts for the managed species. Conversely, if the cap is set lower, or the ratio is higher, the directed fishery will close sooner, which will result in more positive impacts for the managed species. If the cap does not result in a closure then there will be no impacts on managed resources compared to the no-action alternative. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts to the managed resource should be low compared to the no action alternative.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. If a low cap is chosen, for example 86 mt, and a high ratio (catch rate of RH/S) is observed, for example 0.86%, then the fishery would be closed at 9,975 mt total landings (of which a portion is mackerel). In some years this value may be minimally constraining but in years where mackerel were available (e.g. 2004/2006) it could be quite constraining. If mackerel closed earlier than it otherwise would there would likely be less incidental catch of river herrings (and other non-target species) but it is not possible to quantify the effect (if any) on river herring stocks of catching only 86 mt of river herring versus some other amount due to the paucity of assessment information. Given the uncertainty of cap amounts and/or encounter rates it is not possible to quantify the impacts but the lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more potentially positive impacts will occur to non-target species, including RH/S, because non-target species mortality in the directed fishery may be reduced. If there was no closure then the impacts on non-target species including RH/S would be the same as described in the no-action alternative.

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative. Since the majority of mackerel landings are made with mid-water gear, which generally does not contact the bottom, reductions in mackerel effort due to a cap closure would not be expected to have any impacts on habitat. There is some directed bottom trawling for mackerel but not enough for there to be more than minimal impacts. Depending on the final regulations, closure of the mackerel fishery due to the mortality cap would likely result in a reduction of the mackerel possession limit to the incidental level (20,000 lb), rather than a full prohibition on mackerel possession. Accordingly, any habitat benefits related to reduced effort during a closure may be offset by some smaller-scale bottom trawlers who decide to pursue mackerel under the incidental trip limits (to take advantage of the cut-off supply and possibly higher prices). Thus, overall effort that contacts the bottom may be level, suggesting a neutral and/or minimal impact to habitat compared to the no action alternative.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. If the directed fishery is closed earlier than would otherwise occur because of an incidental mortality cap, protected species benefit due to the reduction in effort. In general, the higher the cap is set, or the lower the ratio (catch rate of RH/S) is, the longer the directed fishery will stay open and less positive impacts occur for protected resources because of continued potential interactions. The lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more positive impacts for protected species will occur. If there was no closure then the impacts on protected resources would be the same as described in the no-action alternative.

5. Human Communities

A potentially high negative impact would be expected compared to the no-action alternative If a low cap is chosen, for example 85 mt, and a high ratio (catch rate of RH/S) is observed, for example 0.86%, then the fishery would be closed at 9,911 mt total catch. In recent years this value may be minimally constraining but in years where mackerel were available (e.g. 2004/2006) it could be quite constraining. If mackerel closed earlier than it otherwise would there would be associated forgone revenues, with the amount depending on the cap amount, the ratio of river herring observed caught (catch rate of RH), and the availability of mackerel. If the cap is set high enough or the ratio is low enough there would be no losses because the cap would not result in a closure of the directed fishery, and would thus not constrain fishing activity. However, relative to the 2012 proposed landings quota of 33,821 mt, if the mackerel fishery faced the relatively low cap and relatively high catch ratio described above, and was limited to 9,911 mt of catch, 23,910 mt of catch could potentially be forgone. At 2010 ex-vessel prices, 23,910 mt of mackerel would be worth $7.7 million. While the mackerel fishery has not been catching these levels in recent years (see section 6.7.1), these would be an example of potentially forgone revenues in a relatively low cap and relatively high catch ratio situation. If a cap was set lower than 85 mt, or the actual observed ratio was higher, forgone revenue could be higher as well. While a multiplier has not been calculated for mackerel to determine impacts to shore-side businesses, Amendment 10 to the MSB FMP estimated that for longfin squid, dealers lost an amount equal to 73% of the revenue lost by vessels and all shoreside business combined lost an amount equal to 3 times the amount lost by vessels.

Under recent sampling intensities, C.V.s for annual river herring estimates have been improving but at the fine scale necessary to close the directed mackerel fishery C.V.s related to a mortality cap are likely to be over 1.0 (see table A2 in Appendix 2). Given C.V.s over 0.5 translate into the value of zero being within the 95% confidence interval, it may be difficult to justify closing a fishery given the science tells us our estimates are likely very inaccurate in any given year. The estimates' uncertainty also makes it difficult for business planning purposes if highly uncertain estimates may be causing fishery closures.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

<u>6c</u>. Implement a mortality cap for <u>shads</u> for the <u>mackerel</u> fishery whereby the mackerel fishery would close once it is determined that it created a certain level of shad mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for shad would be to base it on the range of estimated river herring mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic mid-water trawl fishing in Quarter 1, which is largely but not completely mackerel fishing, accounted for 12% of total shad mortality 2005-2010. The table below describes total ocean and quarter 1 mid-water trawl mortalities in the leftmost columns (2006 omitted because of lack of shad records).

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 50% or at least 100,000 pounds of mackerel (encompasses almost all landings) results in annual shad mortality ratios from 0.004% in 2009 to 0.05% in 2007 with a mean of 0.03. The 50%/100,000 filter was used because it has been the way directed mackerel trips have been identified in recent specifications analyses and because this definition encompasses almost all landings. The exact definition of a mackerel trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

In the right hand columns are the landings at which point the mackerel fishery would close depending on the above range of ratios and if the cap was the quarter 1 value. For example, if a cap of 7mt was used, the mackerel fishery would close when it landed 14,364 mt with a high ratio, 23,940mt with the mean ratio, or 179,550 mt of fish with a low ratio. The differences in the two 7mt caps are due to rounding. Without an assessment providing advice on overall acceptable fishing mortality, the Council would have to make a policy decision about how much incidental catch to allow in this fishery and would evaluate a range of caps, probably based on recent incidental catch estimates as done in the table below.

Table 69. Example Shad Caps for Mackerel

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Water Trawl Quarter 1 mortality (mt) (12% of total) = Mortality Cap Possibility	Mackerel would close at these landings (mt) with high ratio, 0.05%	Mackerel would close at these landings (mt) with mean ratio, 0.03%	Mackerel would close at these landings (mt) with low ratio, 0.004%
2007	60	7	14,364	23,940	179,550
2008	60	7	14,450	24,084	180,630
2009	70	8	16,903	28,172	211,290
2010	47	6	11,338	18,896	141,720

Source: Unpublished observer data and Appendix 2.

A high ratio means that more shad were caught and a low ratio means that less shad were caught. The examples in the above table come from observed data 2006-2010. The main point is that whether mackerel would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of shad was, and what the mackerel availability was. Since the realized ratio can vary substantially from year to year, it is difficult to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all. If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season. Additional impact analysis would be carried out by the specifications that implemented these caps.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. If the directed fishery is closed because of an incidental mortality cap the managed species may also benefit because of reduced fishing mortality. However, given the uncertainty about MSB stock dynamics and the uncertainty about when a closure might occur it is not possible to quantify such impacts. In general, if the cap is set higher, or the ratio (catch rate of RH/S) is lower, the directed fishery will stay open longer, which will result in less positive impacts for the managed species. Conversely, if the cap is set lower, or the ratio is higher, the directed fishery will close sooner, which will result in more positive impacts for the managed species. If the cap does not result in a closure then there will be no impacts on managed resources compared to the no-action alternative. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts to the managed resource should be low compared to the no action alternative.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. If a low cap is chosen, for example 6mt, and a high ratio (catch rate of RH/S) is observed, for example 0.05%, then the fishery would be closed at 11,338 mt total landings (of which a portion is mackerel). In some years this value may be minimally constraining but in years where mackerel were available (e.g. 2004/2006) it could be quite constraining. If mackerel closed earlier than it otherwise would there would likely be less incidental catch of shads (and other non-target species) but it is not possible to quantify the effect (if any) on shad stocks of catching only 6mt of shad versus some other amount due to the paucity of assessment information. Given the uncertainty of cap amounts and/or encounter rates it is not possible to quantify the impacts but the lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more potentially positive impacts will occur to non-target species, including RH/S, because non-target species mortality in the directed fishery may be reduced. If there was no closure then the impacts on non-target species including RH/S would be the same as described in the no-action alternative.

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative. Since the majority of mackerel landings are made with mid-water gear, which generally does not contact the bottom, reductions in mackerel effort due to a cap closure would not be expected to have any impacts on habitat. There is some directed bottom trawling for mackerel but not enough for there to be more than minimal impacts. Depending on the final regulations, closure of the mackerel fishery due to the mortality cap would likely result in a reduction of the mackerel possession limit to the incidental level (20,000 lb), rather than a full prohibition on mackerel possession. Accordingly, any habitat benefits related to reduced effort during a closure may be offset by some smaller-scale bottom trawlers who decide to pursue mackerel under the incidental trip limits (to take advantage of the cut-off supply and possibly higher prices). Thus, overall effort that contacts the bottom may be level, suggesting a neutral and/or minimal impact to habitat compared to the no action alternative.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. If the directed fishery is closed earlier than would otherwise occur because of an incidental mortality cap, protected species benefit due to the reduction in effort. In general, the higher the cap is set, or the lower the ratio (catch rate of RH/S) is, the longer the directed fishery will stay open and less positive impacts occur for protected resources because of continued potential interactions. The lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more positive impacts for protected species will occur. If there was no closure then the impacts on protected resources would be the same as described in the no-action alternative.

5. Human Communities

A potentially high negative impact would be expected compared to the no-action alternative. If a low cap is chosen, for example 6mt, and a high ratio (catch rate of RH/S) is observed, for example 0.05%, then the fishery would be closed at 11,338 mt total catch. In recent years this value may be minimally constraining but in years where mackerel were available (e.g. 2004/2006) it could be quite constraining. If mackerel closed earlier than it otherwise would there would be associated forgone revenues, with the amount depending on the cap amount, the ratio of shad observed caught (catch rate of shad), and the availability of mackerel. If the cap is set high enough or the ratio is low enough there would be no losses because the cap would not result in a closure of the directed fishery, and would thus not constrain fishing activity.

However, relative to the 2012 proposed landings quota of 33,821 mt, if the mackerel fishery faced the relatively low cap and relatively high catch ratio described above, and was limited to 11,338 mt of catch, 22,483 mt of catch could potentially be forgone. At 2010 ex-vessel prices, 22,483 mt of mackerel would be worth $7.3 million. While the mackerel fishery has not been catching these levels in recent years (see section 6.7.1), these would be an example of potentially forgone revenues in a relatively low cap and relatively high catch ratio situation. If a cap was set lower than 6 mt or the actual observed ratio was higher, forgone revenue could be higher as well. While a multiplier has not been calculated for mackerel to determine impacts to shore-side businesses, Amendment 10 to the MSB FMP estimated that for longfin squid, dealers lost an amount equal to 73% of the revenue lost by vessels and all shoreside business combined lost an amount equal to 3 times the amount lost by vessels.

Under recent sampling intensities, C.V.s for annual shad estimates have been improving but at the fine scale necessary to close “the mackerel fishery” C.V.s related to a mortality cap are likely to be over 1.0 (see table A2 in Appendix 2). Given C.V.s over 0.5 translate into the value of zero being within the 95% confidence interval, it may be difficult to justify closing a fishery given the science tells us our estimates are likely very inaccurate in any given year. The low overall catch of shad and therefore low amount of a cap based on recent catch would likely greatly complicate mortality-cap based management for shad given the imprecision of catch data.

The estimates’ uncertainty also makes it difficult for business planning purposes if highly uncertain estimates may be causing fishery closures.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

<u>6d</u>. Implement a mortality cap for <u>river herrings</u> for the <u>longfin squid</u> fishery whereby the longfin squid fishery would close once it is determined that it created a certain level of river herring mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for river herring would be to base it on the range of estimated river herring mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic small mesh bottom trawl accounted for 5% of total river herring mortality. While Mid-Atlantic small mesh bottom trawl encompasses a variety of fisheries besides longfin squid (including Atlantic herring), some of the New England small mesh bottom trawl mortality is probably related to longfin squid fishing so using the full Mid-Atlantic value is probably reasonable. The table below describes total ocean and 5% of total mortalities in the leftmost columns.

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 2,500 pounds longfin squid results in annual river herring mortality ratios from almost zero in 2007 to .17% in 2009 with a mean of 0.06%. The 2,500 pound filter was used because it has been the way directed longfin squid trips have been identified in the butterfish cap for the longfin squid fishery and because is encompasses almost all longfin squid landings. The exact definition of a longfin squid trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

In the right hand columns are the landings at which point the longfin squid fishery would close depending on the above range of ratios and if the cap was the Mid-Atlantic small mesh bottom trawl portion of total ocean fishing mortality. For example, if a cap of 12mt was used, the longfin squid fishery would close when it landed 7,233 mt with a high ratio, and 20,424mt with the mean ratio (the low ratio was nearly zero so it would not lead to a constraint). Without an assessment providing advice on overall acceptable fishing mortality, the Council would have to make a policy decision about how much incidental catch to allow in this fishery and would evaluate a range of caps, probably based on recent incidental catch estimates as done in the table below.

Table 70. Example River Herring Caps for longfin squid.

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Atlantic Small Mesh Bottom Trawl mortality (mt) (5% of total) = Mortality Cap Possibility	Longfin squid would close at these landings (mt) with high ratio, 0.17%	Longfin squid would close at these landings (mt) with mean ratio, 0.06%
2006	245	12	7,233	20,424
2007	664	33	19,534	55,346
2008	672	34	19,754	55,968
2009	361	18	10,608	30,057
2010	244	12	7,162	20,293

Source: Unpublished observer data and Appendix 2.

If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the longfin squid fishery was shut down by the river herring mortality cap is illustrated on the rightmost columns in the above table (these can be compared to recent landings detailed in Section 6.6). A high ratio means that more river herring were caught and a low ratio means that less river herring were caught. The examples in the above table come from observed data 2006-2010. The main point is that whether longfin squid would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of river herring was, and what the longfin squid availability was. Since the realized ratio can vary substantially from year to year, it is difficult to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all. If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season. Additional impact analysis would be carried out by the specifications that implemented these caps.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. If the directed fishery is closed because of an incidental mortality cap the managed species may also benefit because of reduced fishing mortality. However, given the uncertainty about MSB stock dynamics and the uncertainty about when a closure might occur it is not possible to quantify such impacts. In general, if the cap is set higher, or the ratio (catch rate of RH/S) is lower, the directed fishery will stay open longer, which will result in less positive impacts for the managed species. Conversely, if the cap is set lower, or the ratio is higher, the directed fishery will close sooner, which will result in more positive impacts for the managed species. If the cap does not result in a closure then there will be no impacts on managed resources compared to the no-action alternative. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts to the managed resource should be low compared to the no action alternative. If the longfin squid fishery is closed early, there would likely be positive impacts to butterfish given the relatively high catch rates of butterfish in the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. If a low cap is chosen, for example 12mt, and a high ratio (catch rate of RH/S) is observed, for example 0.17%, then the fishery would be closed at 7,233 mt total landings (of which a portion is longfin squid), which would be constraining in most years. If longfin squid closed earlier than it otherwise would there would likely be less incidental catch of river herrings (and other non-target species) but it is not possible to quantify the effect (if any) on river herring stocks of catching only 12mt of river herring versus some other amount due to the paucity of assessment information. Given the uncertainty of cap amounts and/or encounter rates it is not possible to quantify the impacts but the lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more potentially positive impacts will occur to non-target species, including RH/S, because non-target species mortality in the directed fishery may be reduced. If there was no closure then the impacts on non-target species including RH/S would be the same as described in the no-action alternative.

However, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

3. Habitat Impacts Including EFH

A potentially positive impact would be expected compared to the no-action alternative. Since the longfin squid fishery primarily uses bottom otter trawl, if a mortality cap closed the longfin squid fishery early there should be less adverse habitat impacts, especially in the winter/spring offshore fishery that occurs in deeper water (the summer fishery mostly takes place in sandy areas that are subject to a high level of natural disturbance). If there was no closure then there would be no impacts compared to the no-action alternative.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. If the directed fishery is closed earlier than would otherwise occur because of an incidental mortality cap, protected species benefit due to the reduction in effort. In general, the higher the cap is set, or the lower the ratio (catch rate of RH/S) is, the longer the directed fishery will stay open and less positive impacts occur for protected resources because of continued potential interactions. The lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more positive impacts for protected species will occur. If there was no closure then the impacts on protected resources would be the same as described in the no-action alternative.

5. Human Communities

A potentially high negative impact would be expected compared to the no-action alternative. If a low cap is chosen, for example 12 mt, and a high ratio (catch rate of RH/S) is observed, for example 0.17%, then the fishery would be closed at 7,233 mt total catch. In years where longfin squid were available (e.g. 2004/2005) this could be quite constraining. If longfin squid closed earlier than it otherwise would there would be associated forgone revenues, with the amount depending on the cap amount, the ratio of river herring observed caught (catch rate of RH), and the availability of longfin squid. If the cap is set high enough or the ratio is low enough there would be no losses because the cap would not result in a closure of the directed fishery, and would thus not constrain fishing activity. However, relative to the 2012 proposed landings quota of 22,445 mt, if the longfin squid fishery faced the relatively low cap and relatively high catch ratio described above, and was limited to 7,233 mt of catch, 15,212 mt of catch could potentially be forgone. At 2010 ex-vessel prices, 15,212 mt of longfin squid would be worth $34.8 million. While the longfin squid fishery has not been catching these levels in recent years (see section 6.7.4), these would be an example of potentially forgone revenues in a relatively low cap and relatively high catch ratio situation. If a cap was set lower than 12 mt or the actual observed ratio was higher, forgone revenue could be higher as well. Amendment 10 to the MSB FMP estimated that for longfin squid, dealers lost an amount equal to 73% of the revenue lost by vessels and all shoreside business combined lost an amount equal to 3 times the amount lost by vessels.

Under recent sampling intensities, C.V.s for annual river herring estimates have been improving but at the fine scale necessary to close “the longfin squid fishery” C.V.s related to a mortality cap are likely to be over 1.0 (see table A2 in Appendix 2). Given C.V.s over 0.5 translate into the value of zero being within the 95% confidence interval, it may be difficult to justify closing a fishery given the science tells us our estimates are likely very inaccurate in any given year.

The estimates’ uncertainty also makes it difficult for business planning purposes if highly uncertain estimates may be causing fishery closures.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

6e. Implement a mortality cap for shads for the longfin squid fishery whereby the longfin squid fishery would close once it is determined that it created a certain level of shad mortality (that level would be determined annually by Council in specification process unless RH/S were added as stocks in the fishery in which case SSC would be involved in ABC setting for RH/S).

One way to assign mortality caps for shad would be to base it on the range of estimated shad mortality conducted by the science center/FMAT to support Am14. Mid-Atlantic small mesh bottom trawl accounted for 11.5% of total shad mortality. While Mid-Atlantic small mesh bottom trawl encompasses a variety of fisheries besides longfin squid (including Atlantic herring), some of the New England small mesh bottom trawl mortality is probably related to longfin squid fishing so using the full Mid-Atlantic value is probably reasonable. The table below describes total ocean and 11.5% of total mortalities in the leftmost columns.

Using the separate ratio method described in Wigley et al., 2007 (modified by adding kept in the numerator in addition to discards) developed for the butterfish cap and applying it to observer trips and regular trips that landed at least 2,500 pounds longfin squid results in annual shad mortality ratios from almost 0.03% in 2009 to 0.21% in 2010 with a mean of 0.10%. The 2,500 pound filter was used because it has been the way directed longfin squid trips have been identified in the butterfish cap for the longfin squid fishery and because is encompasses almost all longfin squid landings. The exact definition of a longfin squid trip would be developed in the implementation process, as has been the case with the butterfish cap for the longfin squid fishery.

In the right hand columns are the landings at which point the longfin squid fishery would close depending on the above range of ratios and if the cap the Mid-Atlantic small mesh bottom trawl portion of total ocean fishing mortality. For example, if a cap of 5mt was used, the longfin squid fishery would close when it landed 2,587 mt with a high ratio, 5,433mt with the mean ratio, or 18,109 mt of fish with a low ratio. The differences in the two 7mt caps are due to rounding. Without an assessment providing advice on overall acceptable fishing mortality, the Council would have to make a policy decision about how much incidental catch to allow in this fishery and would evaluate a range of caps, probably based on recent incidental catch estimates as done in the table below.

Table 71. Example Shad Caps for Longfin squid.

	Total Estimated Ocean Fishing Mortality (mt)	Mid-Atlantic Small Mesh Bottom Trawl mortality (mt) (11.5% of total) = Mortality Cap Possibility	Longfin squid would close at these landings (mt) with high ratio, 0.21%	Longfin squid would close at these landings (mt) with mean ratio, 0.10%	Longfin squid would close at these landings (mt) with low ratio, 0.03%
2006	47	5	2,587	5,433	18,109
2007	60	7	3,278	6,883	22,943
2008	60	7	3,297	6,924	23,081
2009	70	8	3,857	8,099	26,998
2010	47	5	2,587	5,433	18,109

Source: Unpublished observer data and Appendix 2.

If these values were used with the above range of mortality caps, the amount of total fish (the ratio is based on all fish retained) that could be harvested by trips as defined above before the longfin squid fishery was shut down by the shad mortality cap is illustrated on the rightmost columns in the above table (these can be compared to recent landings detailed in Section 6.6). A high ratio means that more shad were caught and a low ratio means that less shad were caught. The examples in the above table come for observed data 2006-2010. The main point is that whether longfin squid would close because of a cap would depend on how much the Council set the cap at in a given year, what the realized incidental catch of shad was, and what the longfin squid availability was. Since the realized ratio can vary substantially from year to year, it is difficult to predict impacts other than to acknowledge that in some years a closure could come very early and in some years a closure could not happen at all. If the ratio is very low, the fishery would be allowed to continue operating, as a closure would occur at a landings level much higher than recent quotas. If the ratio is very high, a closure could occur early in the season. Additional impact analysis would be carried out by the specifications that implemented these caps.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected compared to the no-action alternative. If the directed fishery is closed because of an incidental mortality cap the managed species may also benefit because of reduced fishing mortality. However, given the uncertainty about MSB stock dynamics and the uncertainty about when a closure might occur it is not possible to quantify such impacts. In general, if the cap is set higher, or the ratio (catch rate of RH/S) is lower, the directed fishery will stay open longer, which will result in less positive impacts for the managed species. Conversely, if the cap is set lower, or the ratio is higher, the directed fishery will close sooner, which will result in more positive impacts for the managed species. If the cap does not result in a closure then there will be no impacts on managed resources compared to the no-action alternative. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts to the managed resource should be low compared to the no action alternative. If the longfin squid fishery is closed early, there would likely be positive impacts to butterfish given the relatively high catch rates of butterfish in the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. If a low cap is chosen, for example 5mt, and a high ratio (catch rate of RH/S) is observed, for example 0.21%, then the fishery would be closed at 2,587 mt total landings (of which a portion is longfin squid), which would be very constraining in every year. If longfin squid closed earlier than it otherwise would there would likely be less incidental catch of shads (and other non-target species) but it is not possible to quantify the effect (if any) on shad stocks of catching only 5mt of shad versus some other amount due to the paucity of assessment information. Given the uncertainty of cap amounts and/or encounter rates it is not possible to quantify the impacts but the lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more potentially positive impacts will occur to non-target species, including RH/S, because non-target species mortality in the directed fishery may be reduced. If there was no closure then the impacts on non-target species including RH/S would be the same as described in the no-action alternative.

However, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

3. Habitat Impacts Including EFH

A potentially positive impact would be expected compared to the no-action alternative. Since the longfin squid fishery primarily uses bottom otter trawl, if a mortality cap closed the longfin squid fishery early there should be less adverse habitat impacts, especially in the winter/spring offshore fishery that occurs in deeper water (the summer fishery mostly takes place in sandy areas that are subject to a high level of natural disturbance). If there was no closure then there would be no impacts compared to the no-action alternative.

4. Protected Resources

A potentially positive impact would be expected compared to the no-action alternative. If the directed fishery is closed earlier than would otherwise occur because of an incidental mortality cap, protected species benefit due to the reduction in effort. In general, the higher the cap is set, or the lower the ratio (catch rate of RH/S) is, the longer the directed fishery will stay open and less positive impacts occur for protected resources because of continued potential interactions. The lower the cap is set, or the higher the ratio is, the shorter the directed fishery will stay open and more positive impacts for protected species will occur. If there was no closure then the impacts on protected resources would be the same as described in the no-action alternative.

5. Human Communities

A potentially high negative impact would be expected compared to the no-action alternative. If a low cap is chosen, for example 5mt, and a high ratio (catch rate of RH/S) is observed, for example 0.21%, then the fishery would be closed at 2,587 mt total catch, which would be very constraining in every year. If longfin squid closed earlier than it otherwise would there would be associated forgone revenues, with the amount depending on the cap amount, the ratio of shad observed caught (catch rate of shad), and the availability of longfin squid. If the cap is set high enough or the ratio is low enough there would be no losses because the cap would not result in a closure of the directed fishery, and would thus not constrain fishing activity. However, relative to the 2012 proposed landings quota of 22,445 mt, if the longfin squid fishery faced the relatively low cap and relatively high catch ratio described above, and was limited to 2,587mt of catch, 19,858mt of catch could potentially be forgone. At 2010 ex-vessel prices, 19,858mt of longfin squid would be worth $45.4 million. While the longfin squid fishery has not been catching these levels in recent years (see section 6.7.4), these would be an example of potentially forgone revenues in a relatively low cap and relatively high catch ratio situation. If a cap was set lower than 5 mt or the actual observed ratio was higher, forgone revenue could be higher as well. Amendment 10 to the MSB FMP estimated that for longfin squid, dealers lost an amount equal to 73% of the revenue lost by vessels and all shoreside business combined lost an amount equal to 3 times the amount lost by vessels.

Under recent sampling intensities, C.V.s for annual shad estimates have been improving but at the fine scale necessary to close "the longfin squid fishery" C.V.s related to a mortality cap are likely to be over 1.0 (see table A2 in Appendix 2). Given C.V.s over 0.5 translate into the value of zero being within the 95% confidence interval, it may be difficult to justify closing a fishery given the science tells us our estimates are likely very inaccurate in any given year. The low overall catch of shad and therefore low amount of a cap based on recent catch would likely greatly complicate mortality-cap based management for shad given the imprecision of catch data.

The estimates' uncertainty also makes it difficult for business planning purposes if highly uncertain estimates may be causing fishery closures.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

6f. Add mortality caps to list of measures that can be frameworked.

Biological Impacts

Allowing a cap to be considered via a framework should not have any impacts other than allowing more rapid management responses. Impacts would be analyzed at the time of framework consideration.

Socio-Economic Impacts

Allowing a cap to be considered via a framework should not have any impacts other than allowing more rapid management responses. Impacts would be analyzed at the time of framework consideration.

Alternative Set 6 Summary - Mortality Caps

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

All of the RH/S mortality cap action alternatives (except 6f which is administrative) could potentially lead to directed fishery closures that could benefit the managed species but impacts should be low since even achieving their full quota should be sustainable. Closures of the longfin squid fishery would be particularly beneficial to butterfish given the relatively high incidental catch of butterfish in the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Depending on how high the RH/S mortality caps were set, there could be less non-target interactions if closures occur under any of the action alternatives.

3. Habitat Impacts Including EFH

Depending on how high the RH/S mortality caps were set, there could be less effort and so less habitat disturbances if closures occur under any of the action alternatives, especially longfin squid closures since that fishery predominantly uses bottom trawl gear.

4. Protected Resources

Depending on how high the RH/S mortality caps were set, there could be less effort and so less protected resource interactions if closures occur under any of the action alternatives.

5. Human Communities

Human community impacts are mixed depending on which interest group is considered. Commercial participants could incur low to high costs in the form of reduced revenues depending on how high any RH/S caps were set and depending on fishery performance. The interested public would benefit to the extent that lower incidental catch helped rebuild RH/S stocks (which is highly uncertain).

7.7 Alternative Set 7 – Restrictions in areas of high RH/S catch

Statement of Problem/Need for Action:

There are currently no limits on incidental catch of RH/S in the mackerel and/or longfin squid fisheries other than state landing requirements

Background:

The Council originally hoped to include some alternatives that would restrict fishing in relatively small areas that appeared to be "hotspots" for RH/S catch. The Amendment's Fishery Management Action Team's found that small-area management is unlikely to be successful (see Appendices) because of the wide and variable distribution of RH/S and of the mackerel and longfin squid fisheries. Thus small area management may just reshuffle effort with unpredictable impacts. The table below is designed to help illustrate how even if you reduce catch rates of one species, for example blueback herring, but reduce catch rates of the directed species even more, it can be possible to do more harm than good if the fleet increases effort to maintain the same amount of harvest. For example, if catch rates of blueback herring are lowered a little and mackerel catch rates and effort are neutral, then this is "good" in that less blueback herring would probably be caught. On the other hand if blueback herring catch rates are lowered a little but mackerel catch rates a lowered a lot and effort increases a lot to make up the difference, then this could be "bad" in that even though catch ***rates*** of blueback herring may have gone down, total catch may have gone up. Thus the catch rates of both the target and non-target species are important when considering area-based management. The main point is just that with the wide and varied distribution of RH/S, and the wide and varied distribution of the target species, it appears very difficult to predict whether impacts from small area-based measures may be neutral, positive, or negative for RH/S.

Table 72. Direct-Incidental Impact Schematic

Effects on non-target catch of moving effort assuming effort changes to maintain constant mackerel catch if CPUE changes

"good" = lower overall non-taget catches; "bad" = higher overall non-target catches

	Mackerel			
	CPUE Changes	neutral	a little lower	a lot lower
Blueback	neutral	0	bad	bad
	a little lower	good	0	bad
	a lot lower	good	good	0

Because the Council instructed the FMAT to generate area-based alternatives that would be likely to provide protection to RH/S, the FMAT generated several alternatives that are area based but the FMAT also acknowledged that such large-scale closures would effectively close the fisheries for many participants. Council staff attempted to perform additional smaller-scale examinations of the data (for example around Hudson canyon) but at such small scales there are too few observations to draw strong conclusions.

The FMAT analysis suggests that because of the spatial and temporal variability of observed (Northeast Fishery Observer Program or "NEFOP") RH/S catch, the same kind of variability in mackerel and longfin squid effort and catch, and the same kind of variability in RH/S NEFSC trawl survey catches, that very large areas would be required to ensure that management was not just redistributing effort, possibly in a way that could increase RH/S catch. For this reason Council staff used the FMAT GIS analysis to construct areas for mackerel and longfin squid based on the mid-water and small-mesh bottom trawl fleet effort data and RH/S catch data.

NOTE ON COMBINATIONS: 7bMack and 7cMack are mutually exclusive – the Council could close the area to directed fishing (7bMack) or require observers (7cMack) but not both. Likewise 7bLong and 7cLong are mutually exclusive – the Council could close the area to directed fishing (7bLong) or require observers (7cLong) but not both. One of the mackerel alternatives (either 7bMack or 7cMack) could be combined with one of the longfin squid alternatives (either 7bLong or 7cLong) however. 7d could be added to any 7b or 7c alternative to make those provisions only applicable after a cap-based trigger was reached. The Council would have to specify in this case that the Alternative Set 6 cap trigger was only a trigger for Alternative Set 7 rather than a stand-alone cap measure. 7e could be chosen in addition to any other alternative in this Alternative Set.

Given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery.

The enforceability of area-based management alternatives could be facilitated by the selection of the vessel monitoring system (VMS) requirement in Alternative Set 1 (alternatives 1eMack or 1eLong).

The selection of alternatives that include observer coverage requirements (7cMack and 7cLong) would require the selection of observer program notification alternatives for limited access mackerel permits in Alternative Set 1(1d48 and 1d72).

7a. No-action

If this alternative is selected, then no measures from Alternative Set 7 would be implemented and the existing state management measures (as described in section 5.7) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 7 would likely reduce effort and catch of the managed species (mackerel and longfin squid), such alternatives would lead to less mortality of those species. However, catching the full quota of the managed species is not expected to cause sustainability problems for the managed species so impacts are low. If the longfin squid fishery is reduced, there would likely be benefits to butterfish given the relatively high catch rates of butterfish in the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 7 would likely reduce effort for the managed species (mackerel and longfin squid), such alternatives would also likely lead to less mortality of non-target species including RH/S. However, the current impacts on RH/S of the mackerel and longfin squid fisheries are not known so impacts are not quantifiable.

3. Habitat Impacts Including EFH

A potentially negative impact would be expected compared to the action alternatives. Since alternatives in Alternative Set 7 would likely reduce effort for the managed species (mackerel and longfin squid), such alternatives could also likely lead to less habitat impacts, especially related to longfin squid fishing since it uses bottom otter trawl gear. Participants could redirect toward other species in the same or other areas since most participants have multiple permits, but it is not possible to predict such shifts and/or any associated habitat impacts.

4. Protected Resources

A potentially negative impact would be expected compared to the action alternatives since alternatives in Alternative Set 7 would likely reduce effort for the managed species (mackerel and longfin squid), such alternatives could also likely lead to less protected resource interactions (see Section 6 for details on such interactions). Participants could redirect toward other species in the same or other areas since most participants have multiple permits, but it is not possible to predict such shifts and/or any associated protected resource impacts.

5. Human Communities

The impacts of the no-action alternative in comparison to the other alternatives for human communities appear mixed with uncertain net impacts. On one hand the costs to fishery participants in terms of lost fishing opportunities due to time/area closures or having to carry and pay for observers to enter the restricted areas would be avoided, which is a positive impact.

On the other hand, to the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits related to lost commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

<u>7bMack</u>. Closed Area - Prohibit retention of more than 20,000 pounds of mackerel in RH/S Mackerel Management Area (applies in Quarter 1 only – see map below) for vessels with federal mackerel permits.

Note: While the scope of this time-area closure would curtail mackerel fishing, some effort could occur/shift to areas outside the closure area and some effort could occur/shift to other time periods.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected for mackerel compared to the no-action alternative since effort and catch would likely be reduced. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts should be low.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A positive impact would be expected for non-target species including RH/S compared to the no-action alternative since effort and catch would likely be reduced. Given the RH/S Mackerel Management Area encompasses most Quarter 1 mid-water trawl effort as well as most Quarter 1 observer data observations of RH/S catch, which are estimated to account for 35% of total RH/S catch, it is likely that effectively closing this area to mackerel fishing would create some positive impacts for RH/S and other non-target species, but it is not possible to quantify the effect (if any) on RH/S stocks of catching one amount of RH/S versus some other amount due to the paucity of assessment information. In addition, effort redistribution (including shifts of effort to other fisheries in the same area) could lead to unexpected potentially negative impacts if they ultimately increase non-target species interactions. Due to the expected overall lower effort these would not be expected to change the overall positive impact.

From an information point of view, if vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative. Since the proposed RH/S area is very large and encompasses nearly the entire "footprint" of the winter-spring directed mackerel fishery, a trip limit of 20,000 lbs in Quarter 1 would essentially shut down the mackerel fishery because vessels would have to travel outside of the area to target mackerel at levels above 20,000 lb. So there would be a reduction in mackerel fishing, but since mid-water trawl gear, which accounts for most mackerel effort, and this gear type does not generally contact the bottom, there would be no benefits to benthic habitats. There is some directed bottom trawling for mackerel but not enough for there to be more than minimal impacts. Also, depending on the final regulations, closure of the mackerel fishery due to the mortality cap would likely result in a reduction of the mackerel possession limit to the incidental level (20,000 lb), rather than a full prohibition on mackerel possession. Accordingly, any habitat benefits related to reduced effort during a closure may be offset by some smaller-scale bottom trawlers who decide to pursue mackerel under the incidental trip limits (to take advantage of the cut-off supply and possibly higher prices). Thus, overall effort that contacts the bottom may be level, suggesting a neutral and/or minimal impact to habitat compared to the no action alternative.

4. Protected Resources

A positive impact would be expected for protected resources compared to the no-action alternative since effort would likely be reduced given the scope of the closed area. Reduced effort could potentially result in a reduced number of protected species interactions in the mackerel fishery.

From an information point of view, if vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

The impacts appear mixed with uncertain net impacts compared to the no-action alternative. On one hand, as described in the table below, about 85% of mackerel revenues with an assigned area (2/3 to ¾ of total landings) from 2006-2010 came from within the RH/S Mackerel Management Area. While vessels would compensate as best they could so impacts are difficult to further quantify, vessels that typically rely on mackerel would likely experience negative economic impacts due to lost fishing revenue or costs to transit the area to a non-closed area.

Table 73. Mackerel Revenues In and Out of RH/S Area

	Outside Mackerel Value ($)	Inside Mackerel Value ($)
2006	3,149,111	17,323,851
2007	946,926	2,666,001
2008	553,705	3,200,344
2009	681,665	6,655,122
2010	471,663	2,920,919
Total	5,803,070	32,766,237
%	15%	85%

Source: Unpublished VTR Data

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

7bLong. Closed Area - Prohibit retention of more than 2,500 pounds longfin squid in RH/S Longfin Squid Management Area (applies year-round – see maps below) for vessels with federal longfin squid moratorium permits.

Note: While the scope of this time-area closure would curtail longfin squid fishing, some effort could occur/shift to areas outside the closure area.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected for longfin squid compared to the no-action alternative since effort and catch would likely be reduced. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts should be low. If the longfin squid fishery is reduced, there would likely be benefits to butterfish given the relatively high catch rates of butterfish in the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A low positive impact would be expected for non-target species including RH/S compared to the no-action alternative since effort and catch would likely be reduced. Given the RH/S Longfin Squid Management Area encompasses most of the area where small mesh bottom trawl effort overlaps with RH/S catches, it is likely that effectively closing this area to longfin squid fishing would create some positive impacts for non-target species including RH/S, but it is not possible to quantify the effect (if any) on RH/S stocks of catching one amount of RH/S versus some other amount due to the paucity of assessment information.

From an information point of view, if vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

However, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications’ environmental assessment (provided above in section 6.3). This suggests impacts to non-target species may be low.

In addition, effort redistribution (including shifts of effort to other fisheries in the same area) could lead to unexpected potentially negative impacts if they ultimately increase non-target species interactions. Due to the expected overall lower effort these would not be expected to change the overall positive impact.

3. Habitat Impacts Including EFH

A low positive impact would be expected compared to the no-action alternative. The proposed closure areas for longfin squid are large enough that some overall effort reduction would occur, reducing habitat impacts, especially within the closed area. While not expected to totally offset the positive impacts, this alternative might displace some effort to the southern edge of Georges Bank. Because the directed fishery is a bottom trawl fishery, and because the bottom habitats on the outer shelf are deeper and more vulnerable to bottom contact (less natural disturbance), this alternative could potentially have negative habitat impacts outside the RH/S areas related to increases in redistributed fishing effort.

4. Protected Resources

A positive impact would be expected for protected resources compared to the no-action alternative since effort would likely be reduced given the scope of the closed area. Reduced effort would be likely to result in less protected species interaction in the longfin squid fishery.

From an information point of view, if vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

The impacts appear mixed with uncertain net impacts compared to the no-action alternative. On one hand, as described in the table below, about 71% of longfin squid kept catch (VTR data) from 2006-2010 came from within the RH/S longfin squid Management Area. While vessels would compensate as best they could so impacts are difficult to further quantify, vessels that typically rely on longfin squid would likely experience negative economic impacts due to lost fishing revenue or costs to transit the area to a non-closed area.

Table 74. Longfin squid kept VTR catch in and out of RH/S Area

	Outside Loligo Pounds	Inside Loligo Pounds
2006	7,139,722	30,323,237
2007	16,516,551	12,991,085
2008	6,692,942	20,772,623
2009	4,352,451	17,991,543
2010	4,050,619	12,510,747
Total	38,752,285	94,589,235
%	29%	71%

Source: Unpublished VTR Data

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

7cMack. Require observers in RH/S Mackerel Management Area (applies in Quarter 1 only – see map below) for vessels with federal mackerel permits to retain 20,000 pounds or more of mackerel. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected for mackerel compared to the no-action alternative since overall effort and catch would likely be reduced given the scope of the closed area and the high costs of observer coverage. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts should be low.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. To the degree that fishermen did not fish because of the cost of the requirement, there could be benefits to non-target species because of reduced fisheries interactions. In addition, effort redistribution (including shifts of effort to other fisheries in the same area) could lead to unexpected potentially negative impacts if they ultimately increase non-target species interactions. Due to the expected overall lower effort these would not be expected to change the overall positive impact.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative. There may be a reduction in mackerel fishing, but since mid-water trawl gear, which accounts for most mackerel effort, does not generally contact the bottom, there would be no benefits to benthic habitats. There is some directed bottom trawling for mackerel but not enough for there to be more than minimal impacts. These benefits may be offset by some bottom trawlers who decide to pursue mackerel under the incidental trip limits (to take advantage of the cut-off supply and possibly higher prices), but both shifts should be small and offsetting, suggesting a neutral and/or minimal impact.

4. Protected Resources

A positive impact would be expected for protected resources compared to the no-action alternative since effort would likely be reduced given the scope of the observer coverage area and the costs of observer coverage. Less effort should result in less protected species interactions.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

The impacts appear mixed with uncertain net impacts compared to the no-action alternative. On one hand there are costs of carrying observers relative to vessel revenues and existing costs. These are described in Section 7.5 in detail but carrying an observer at $800 per day increases mackerel trip costs by 23%-49%. Given the scope of the area involved, this alternative is roughly similar to requiring 100% observer coverage. If the cost of observers is too high vessels would likely shift effort to other fisheries if possible but some revenue loss is still likely if they would have preferred to mackerel fish.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since this alternative is primarily related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternatives that deal with management measures that may utilize better data.

<u>7cLong.</u> Require observers in RH/S longfin squid Management Area (applies year round) for vessels with federal longfin squid permits to possess 2,500 pounds or more of longfin squid. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries). NEFSC would accredit observers and vessels would have to contract and pay observers.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A potentially low positive impact would be expected for longfin squid compared to the no-action alternative since overall effort and catch would likely be reduced given the scope of the closed area and the high costs of observer coverage. Since taking the full quota of the directed species should not impact the sustainability of the managed resource, impacts should be low. If the longfin squid fishery is better monitored or reduced, there would likely be benefits to butterfish given the relatively high catch rates of butterfish in the longfin squid fishery.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A potentially positive impact would be expected compared to the no-action alternative. To the degree that better data is used to better minimize non-target interactions, there could be positive impacts to non-target species, including RH/S. To the degree that fishermen did not fish because of the cost of the requirement, there could be benefits to non-target species because of reduced fisheries interaction related to the lower effort. In addition, effort redistribution (including shifts of effort to other fisheries in the same area) could lead to unexpected potentially negative impacts if they ultimately increase non-target species interactions. Due to the expected overall lower effort these would not be expected to change the overall positive impact.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

However, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

3. Habitat Impacts Including EFH

A potentially low positive impact would be expected compared to the no-action alternative. To the degree that fishermen did not fish because of the requirement to carry costly observers, effort would be reduced thus reducing habitat impacts. The proposed observer coverage areas for longfin squid are large enough that some overall effort reduction would likely occur, reducing habitat impacts, especially within the observer coverage area. While not expected to totally offset the positive impacts, this alternative might displace some effort to the southern edge of Georges Bank. Because the directed fishery is a bottom trawl fishery, and because the bottom habitats on the outer shelf are deeper and more vulnerable to bottom contact (less natural disturbance), this alternative could potentially have negative habitat impacts outside the RH/S areas related to increases in redistributed fishing effort.

4. Protected Resources

A positive impact would be expected for protected resources compared to the no-action alternative since effort would likely be reduced given the scope of the observer coverage area and the costs of observer coverage. Less effort should result in less protected species interactions.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

The impacts appear mixed with uncertain net impacts compared to the no-action alternative. On one hand there are costs of carrying observers relative to vessel revenues and existing costs. These are described in Section 7.5 in detail but carrying an observer at $800 per day increases longfin squid trip costs by 85%-189%. Given the scope of the area involved, this alternative is roughly similar to requiring 100% observer coverage. If the cost of observers is too high vessels would likely shift effort to other fisheries if possible but some revenue loss is still likely if they would have preferred to fish for longfin squid.

While there are human community costs there also could be human community benefits. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S or other non-target species, then choosing this action alternative in comparison to the no-action alternative might result in additional benefits related to commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. Since this alternative is primarily related to monitoring, the direct impacts are probably small but the reader should review similar impacts for the alternatives that deal with management measures that may utilize better data.

7d. Make above requirement(s) in effect only when a mortality cap "trigger" is reached. Operation of a "trigger" would be identical to the operation of a mortality cap (see Alternative Set 6 above) but the consequence of hitting the cap would be implementing 7b and/or 7c above if this alternative is selected in conjunction with 7b and/or 7c above. Trigger levels would be specified annually via specifications.

7d would only be selected if 7bMack, 7bLong, 7cMack, or 7cLong were selected. Because under 7d those measures would only be in place for the part of the year after the cap had been achieved, 7d would reduce the biological and human community impacts described in 7bMack, 7bLong, 7cMack, or 7cLong, depending on how quickly the trigger for the fishery is attained. Those impacts are not repeated here but are described in the analysis of RH/S mortality cap in Alternative Set 6 (see Section 7.6).

7e. Stipulate that any areas designated in Amendment 14 would be considered for updating every other year in specifications considering the most recent data available when specifications are developed.

This alternative would commit the Council to re-evaluate the designated areas every other year during the specifications process. The impacts of any potential revised areas will be evaluated in the NEPA documentation for the annual specifications that considered the changes

Biological Impacts

Impacts would be uncertain depending on the outcome of the analysis.

Human Community Impacts

Impacts would be uncertain depending on the outcome of the analysis.

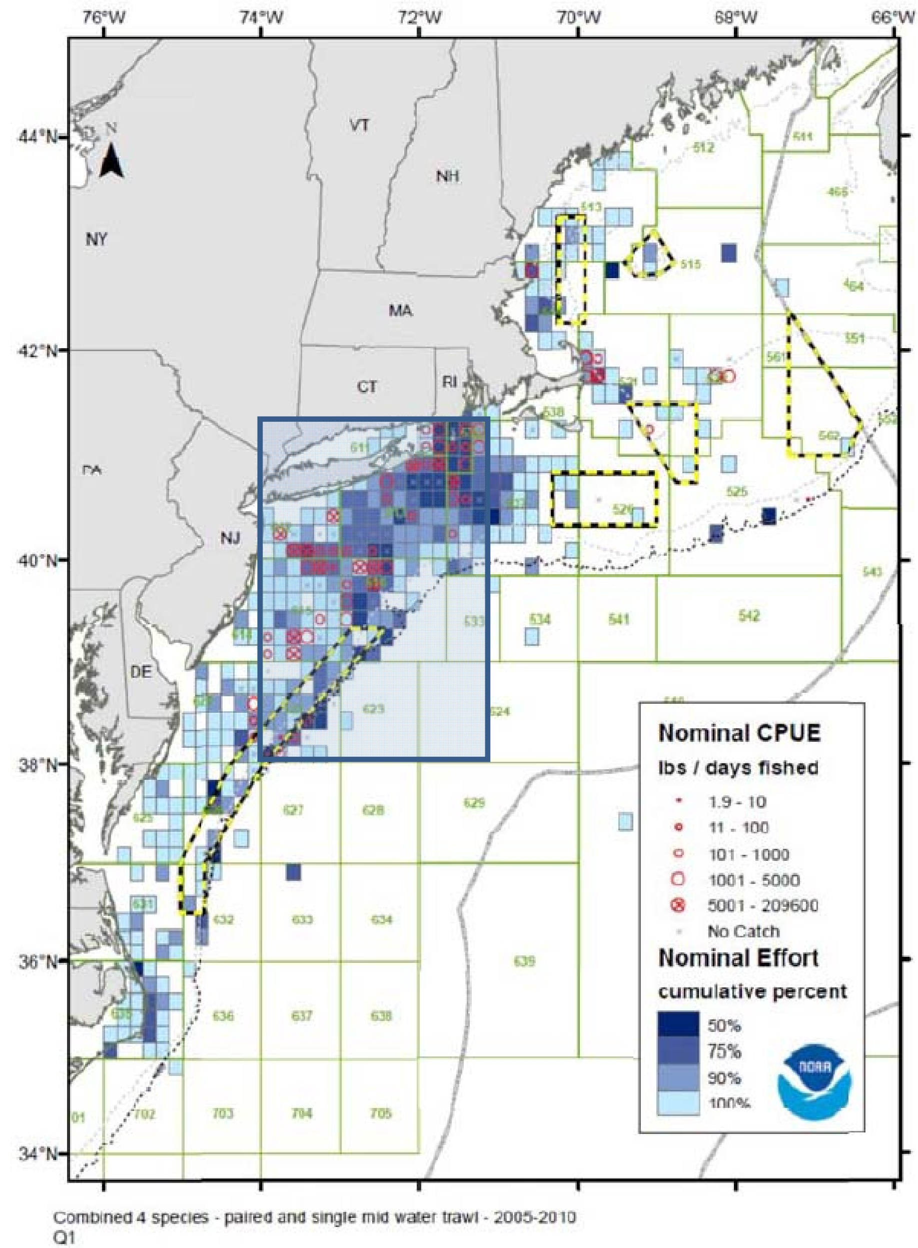
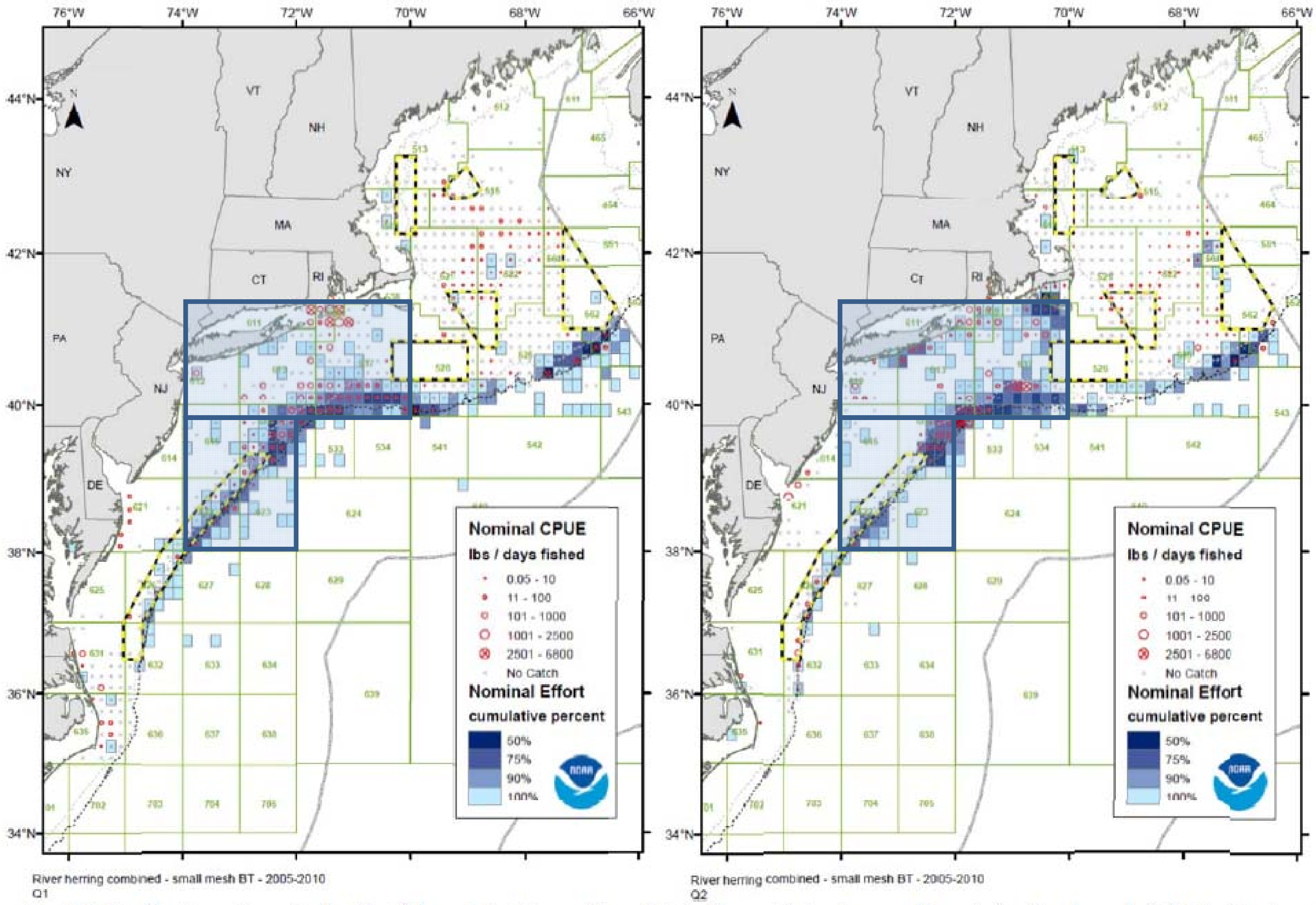
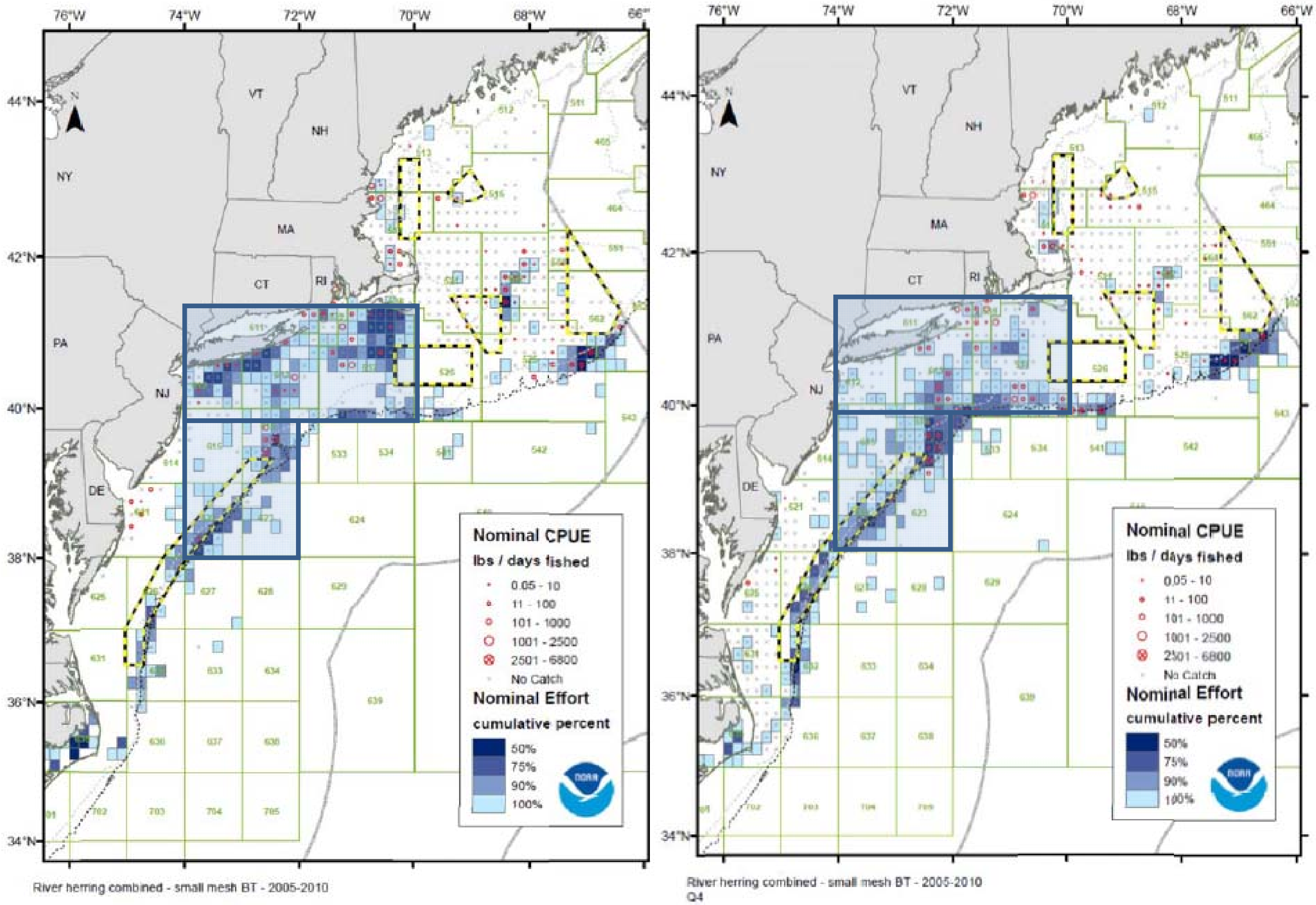


Figure 61. RH/S Mackerel Management Area (would apply in Quarter 1 only) over Quarter 1 MWT effort and RH/S Catch



Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 1 (left) and 2 (right) for 2005-2010.

Figure 62. RH/S Longfin squid Management Area over small mesh bottom effort and RH/S Catch (Quarters 1 and 2)



Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 3 (left) and 4 (right) for 2005-2010.

Figure 63. RH/S Longfin squid Management Area over small mesh bottom effort and RH/S Catch (Quarters 3 and 4)

Alternative Set 7 Summary - Restrictions in areas of high RH/S catch

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

The action alternatives that implement large-scale area closures (7bMack and 7bLong) would have low benefits to managed species because it is likely the areas would lead to reduced total catch of the managed species because of the areas' large size and likelihood of discouraging effort. However, even achieving the full quota of the managed species should not cause sustainability concerns so impacts would be low. The alternatives that require industry-funded observer coverage in these areas (7cMack and 7cLong) would do the same (the cost of observers would discourage effort) but to a lesser degree since vessels could still fish in the area with an observer.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

The action alternatives that implement large-scale area closures (7bMack and 7bLong) would have benefits to non-target species because it is likely the areas would lead to reduced total non-target catch because of the areas' large size and likelihood of discouraging effort. The alternatives that require industry-funded observer coverage in these areas (7cMack and 7cLong) would do the same (the cost of observers would discourage effort) but to a lesser degree since vessels could still fish in the area with an observer. RH/S impacts would be higher (more positive) with the mackerel measures since the mackerel fishery appears to catch more RH/S than the longfin squid fishery.

3. Habitat Impacts Including EFH

To the degree effort was reduced, habitat impacts would also be reduced, with longfin squid effort reductions being more important since they predominantly use bottom otter trawls. The closures would probably reduce effort more than the observer coverage requirements as discussed above.

4. Protected Resources

To the degree effort was reduced, protected resource impacts would also be reduced. The closures would probably reduce effort more than the observer coverage requirements as discussed above.

5. Human Communities

Human community impacts are mixed depending on which interest group is considered. Commercial participants could incur high costs for all alternatives related to forgone revenues due to large area closures and/or high observer costs. The interested public would benefit to the extent that lower incidental catch helped rebuild RH/S stocks (which is highly uncertain).

Comparison of Alternative Sets 7 and 8

As stated above, given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery. There are some hotspot areas north of Cape Cod that are not covered by Alternative Set 7's larger areas but there is relatively low mackerel and/or longfin squid activity in those areas at the relevant times of the year. Because of Alternative Set 8's small areas (hotspots) the difference in terms of impacts are not expected to be proportionally less for Set 8 compared to Set 7. Rather, Set 8 would be expected to have negligible impacts across resource types due to fishery participants' abilities to redistribute effort, which could not occur to the same degree with Set 7 given how large the areas are in Set 7.

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7.8 Alternative Set 8 – Hotspot Restrictions

The New England Fishery Management Council developed a variety of "Hotspot" alternatives in Amendment 5 to the Atlantic Herring Plan. All of the areas contemplated are relatively small and consider different restrictions within the hotspots. Since Atlantic herring and mackerel are often targeted by the same vessels and are sometimes targeted together at the same time, it makes sense to consider these alternatives even though they were based on observer data from "herring trips" as defined below.

The smallest areas are termed "River Herring Protection Areas." These Protection Areas were identified bimonthly as the quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring during the respective 2-month period. The protection areas include just the portion of the monitoring/avoidance areas (described below) that have the highest river herring catches on Atlantic herring trips as defined above. Since the raw observer data were pooled across years, the threshold was only one tow, and the results are only from Herring Trips, they do not reflect how much total river herring was caught in the Protection Area versus other areas in a given year.

Slightly larger areas are termed "River Herring Monitoring/Avoidance Areas." These Monitoring/Avoidance Areas were identified bimonthly as the quarter degree squares with at least one observed tow of river herring catch greater than 40 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring during the respective 2-month period. They include all of the area identified in the protection areas as well is areas where a more modest amount of river herring was caught. Since the raw observer data were pooled across years, the threshold was only one tow, and the results are only from Herring Trips, they do not reflect how much total river herring was caught in the Monitoring/Avoidance Areas versus other areas in a given year.

These protection and monitoring/avoidance areas are mapped below by their respective bi-monthly periods. Since seeing them on the same page clarifies the differences among the areas, they are illustrated together below (where applicable). Management measures that could apply to these areas follow the maps.

NOTE ON COMBINATIONS: All of the action alternatives in the set could be adopted individually or together. 8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen.

Given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery.

The enforceability of area-based management alternatives could be facilitated by the selection of the vessel monitoring system (VMS) requirement in Alternative Set 1 (alternatives 1eMack or 1eLong).

The selection of alternatives that include observer coverage requirements (8cMack and 8cLong) would require the selection of observer program notification alternatives for limited access mackerel permits in Alternative Set 1(1d48 and 1d72).

If an overall observer coverage requirement in Alternative Set 5 was selected but did not result in a trip covered by an alternative in this Alternative Set having an observer, this Alternative Set would effectively require additional coverage.

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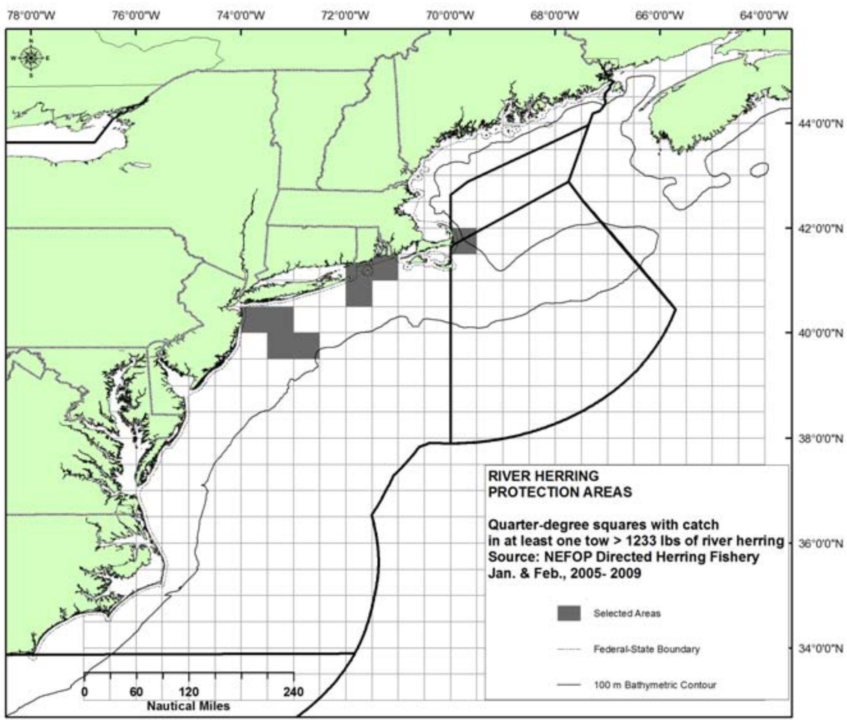
Figure 64.January – February Herring Area

Protection Area (highest catch records from Monitoring/Avoidance Area)



Monitoring/Avoidance Area

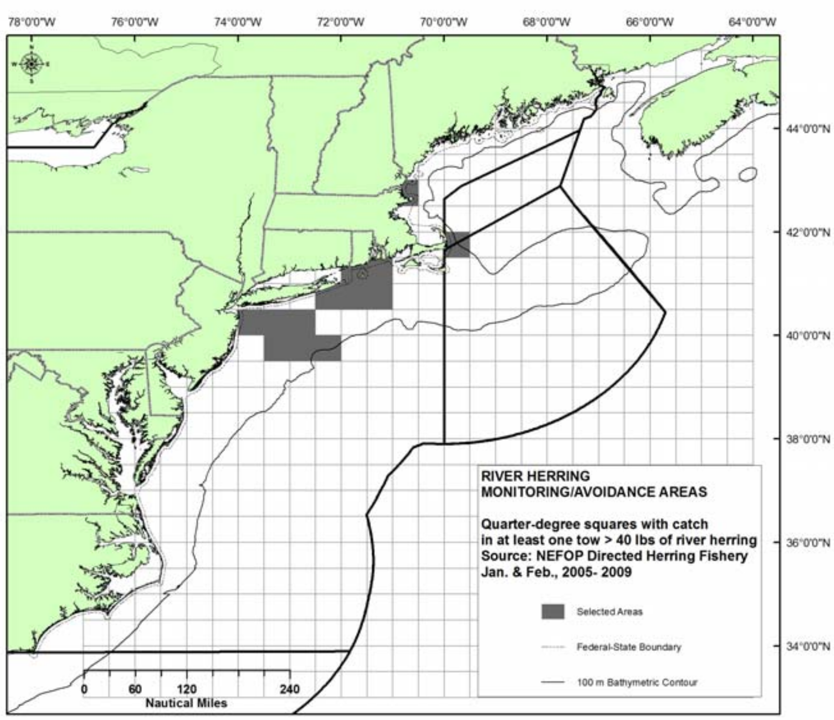
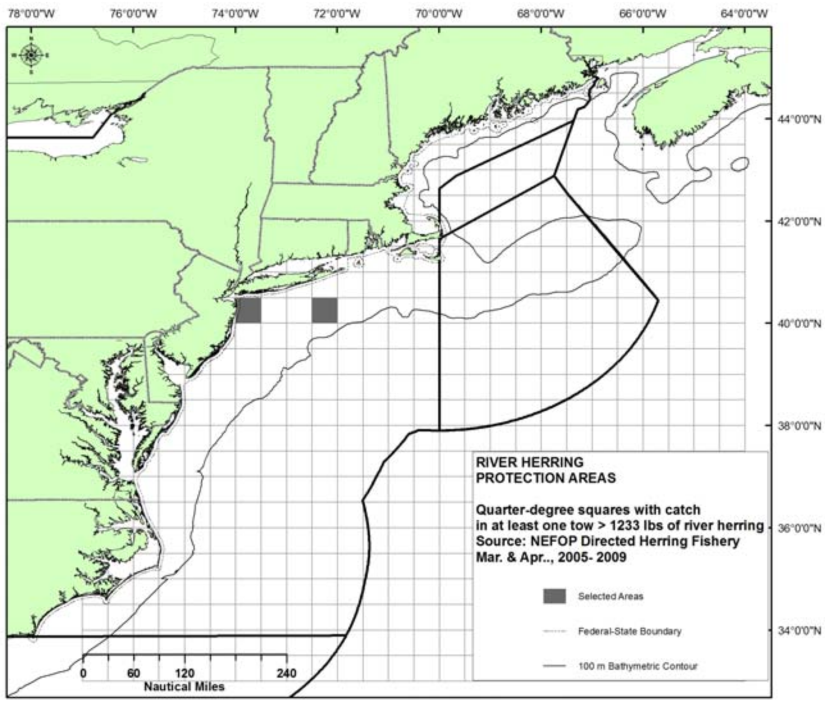


Figure 65.<u>**March – April Herring Area**</u>

<u>Protection Area (highest catch records from Monitoring/Avoidance Area)</u>



<u>Monitoring/Avoidance Area</u>

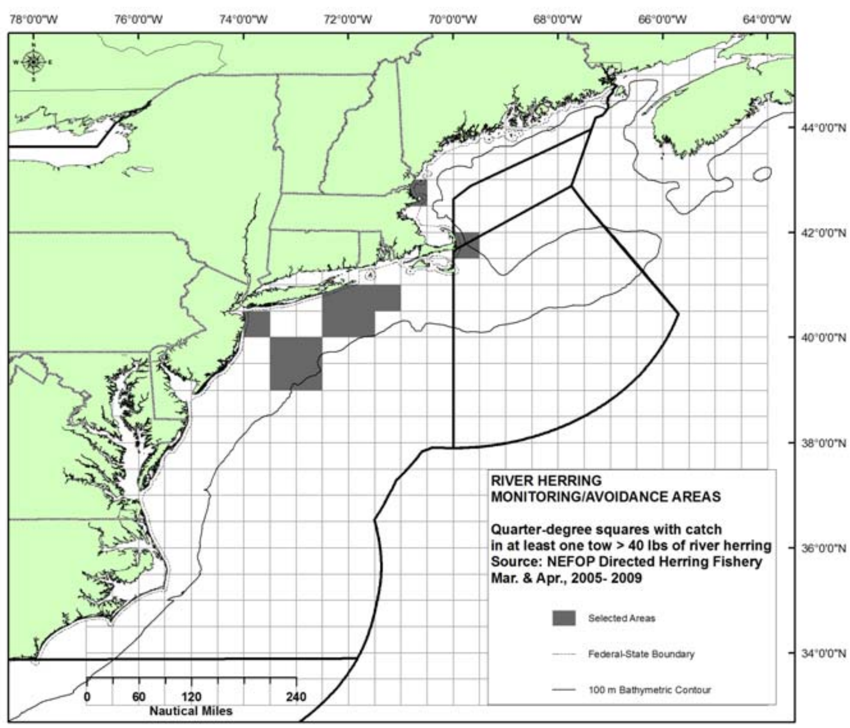


Figure 66.<u>**May – June Herring Area**</u>

<u>Protection Area</u>

None proposed – there were no qualifying observer records (quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring).

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<u>Monitoring/Avoidance Area</u>

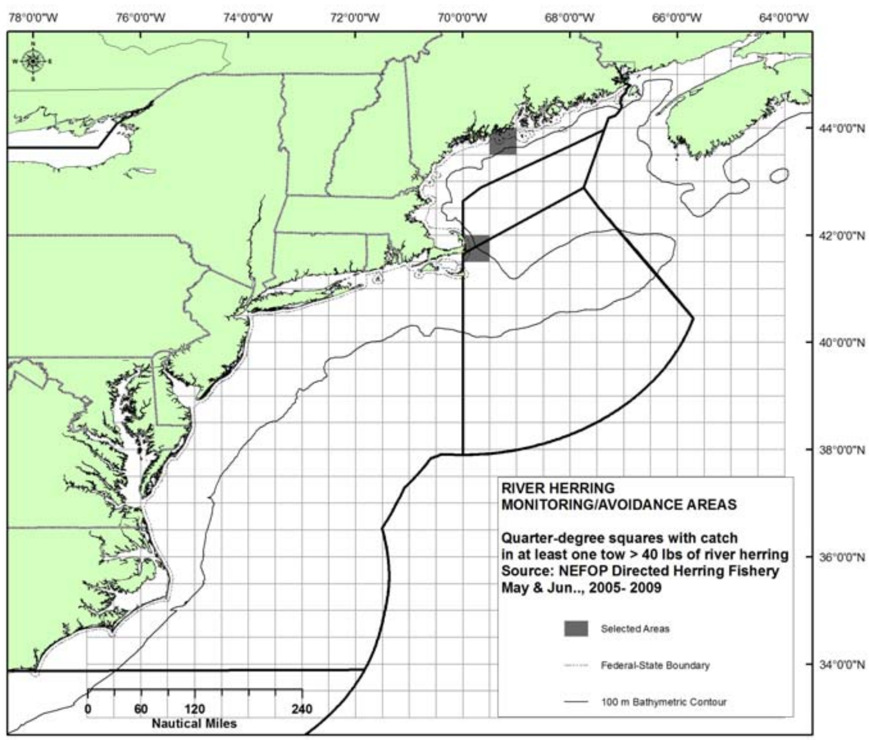

Figure 67. <u>July – August Herring Area</u>

<u>Protection Area</u>

None proposed – there were no qualifying observer records (quarter degree squares with at least one observed tow of river herring catch greater than 1,233 pounds, using 2005-2009 Northeast Fisheries Observer Program data from trips with greater than 2,000 pounds of kept Atlantic herring).

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<u>Monitoring/Avoidance Area</u>

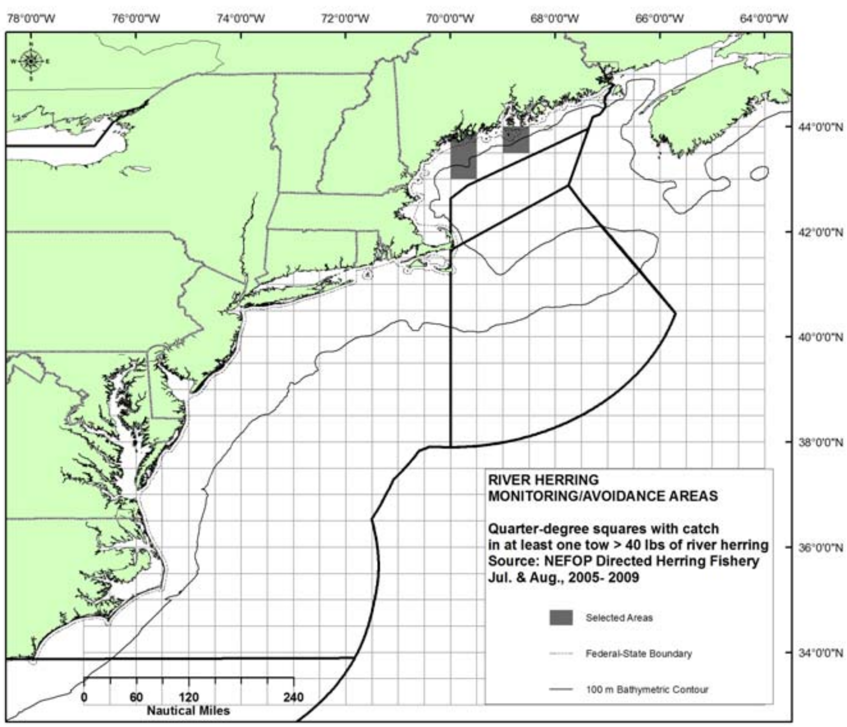
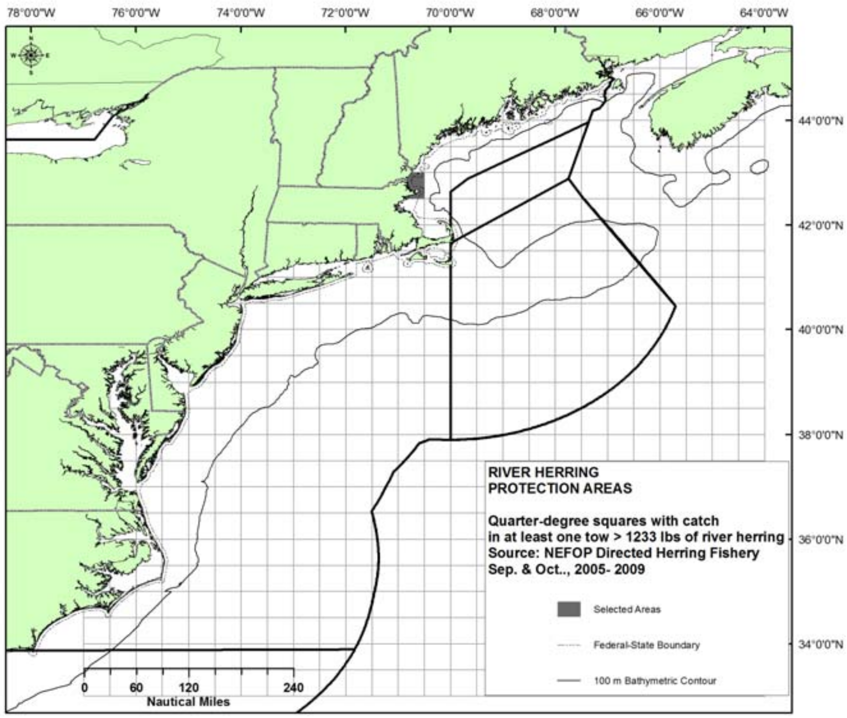


Figure 68.<u>September – October Herring Area</u>

<u>Protection Area (highest catch records from Monitoring/Avoidance Area)</u>



<u>Monitoring/Avoidance Area</u>

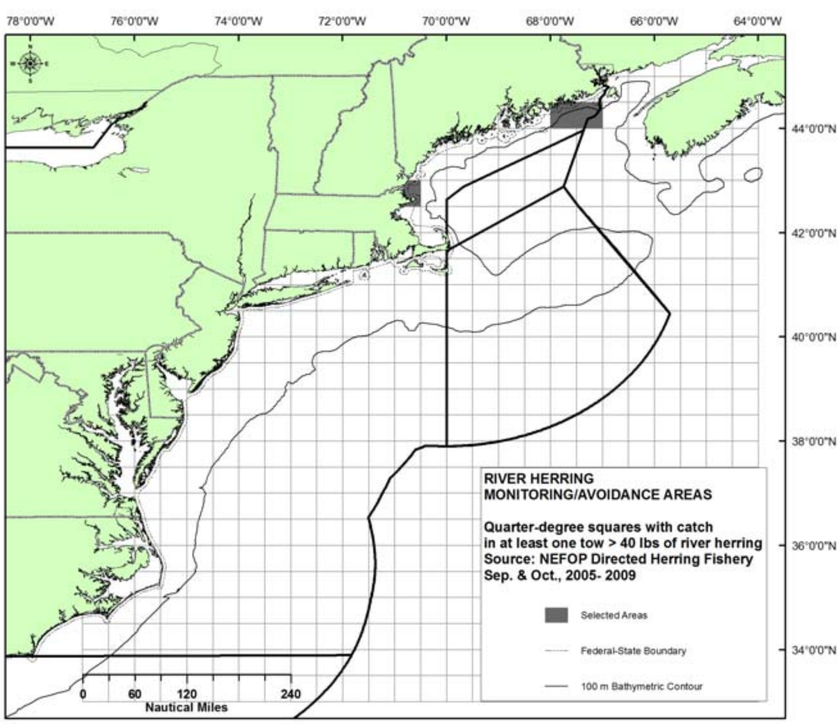
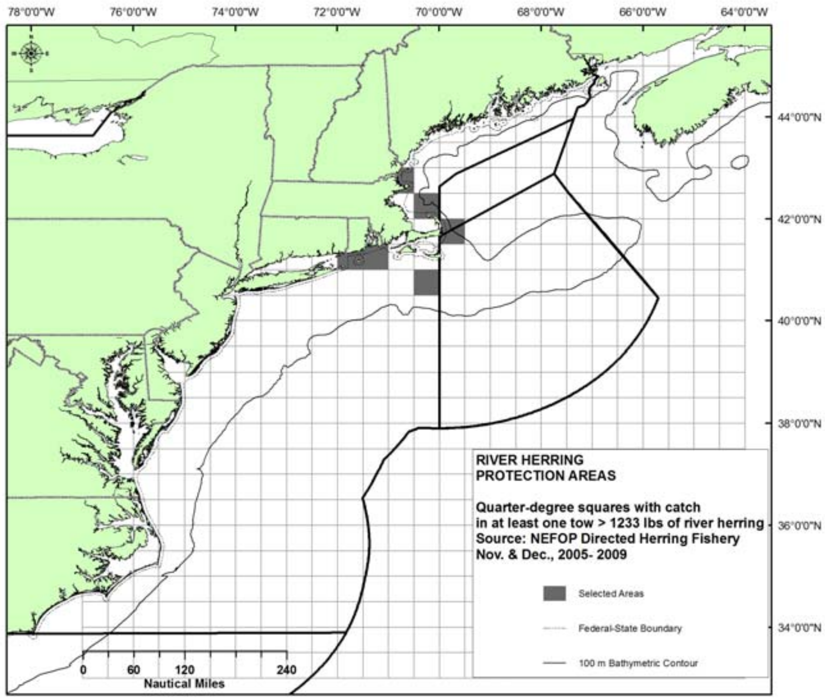
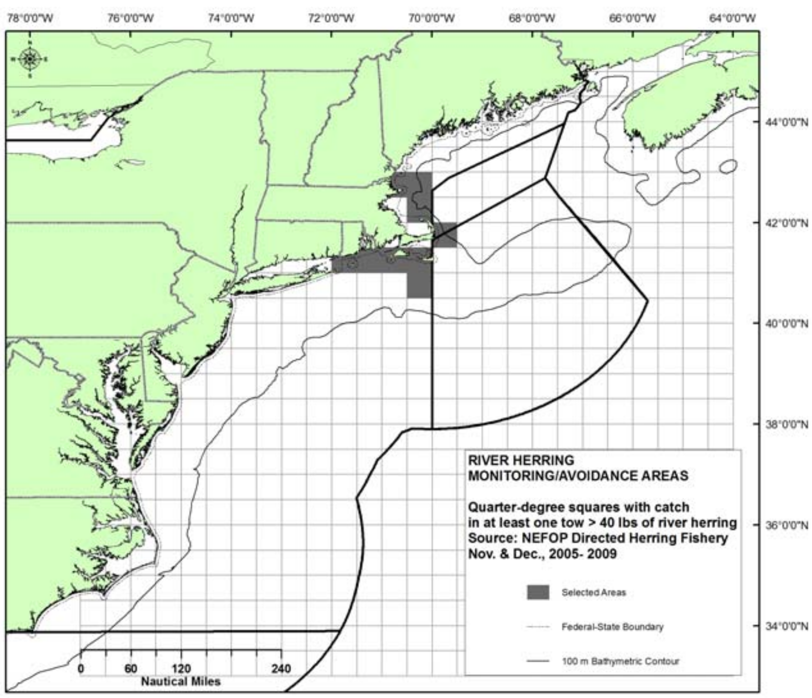


Figure 69.__**November – December Herring Area**__

<u>Protection Area (highest catch records from Monitoring/Avoidance Area)</u>



<u>Monitoring/Avoidance Area</u>



Management Measures

8a. No-action

If this alternative is selected, then no measures from Alternative Set 8 would be implemented and the existing state management measures (as described in section 5.9) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A neutral or minimal impact would be expected compared to the action alternatives. Vessels will continue to target the managed resource across all current fishing areas. While the action alternatives may cause vessels to redirect fishing effort to other locations or managed fisheries, the proposed areas are relatively small for each bimonthly area so it is not expected that catches of the managed resources would change substantially with the proposed areas in place due to the highly migratory nature of the managed species. Because the proposed areas are not likely to impact the managed resource, the impacts of maintaining the status quo will also be neutral or minimal. For options that require observer coverage in hotspots, if vessels still fish in those areas, more information would be gained so not obtaining that information would be a forgone benefit. If overall observer coverage levels are steady, closing areas results in more information outside of the areas and less information inside the areas, so the no-action results in more information inside the areas and less information outside the areas.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A neutral or minimal impact would be expected compared to the action alternatives. Vessels will continue to target the managed resource across all current fishing areas. While the action alternatives may cause vessels to redirect fishing effort to other locations or managed fisheries, the proposed areas are relatively small and the distributions of most of the non-target species that interact with the managed resources are wide and variable. Because of this, small scope seasonal closures are not expected to reduce the rate of non-targets species interactions in the proposed areas beyond the level of non-target species interactions across current fishing areas. Because the proposed areas are not likely to impact the frequency of non-target resource interactions, the impacts of maintaining the status quo will also be neutral or minimal. If the areas happened to have higher RH/S catch rates then the no action would not redirect effort away from those areas and would be a negative impact for RH/S. If the areas happened to have lower RH/S catch rates then the no action would not redirect effort away from those areas and there would be a positive impact for RH/S, but the year to year variability in RH/S movement means that there may be minimal impacts over time.

For options that require observer coverage in hotspots, if vessels still fish in those areas, more information would be gained so not obtaining that information would be a forgone benefit. If overall observer coverage levels are steady, closing areas results in more information outside of the areas and less information inside the areas, so the no-action results in more information inside the areas and less information outside the areas.

3. Habitat Impacts Including EFH

A neutral or minimal impact overall impact would be expected compared to the action alternatives. With mackerel most effort is with mid-water gear so moving effort from one location to another should not impact habitat. For longfin squid, the no-action alternative would result in no change in fishing effort across areas. The action alternatives would decrease effort inside the hotspots (a positive for habitat there) but increase effort outside the hotspots (a negative for habitat there). So the no-action alternative would result in positive impacts for habitat outside the hotspots (by not redirecting effort there) and would result in negative impacts for habitat inside the hotspots (by not redirecting effort away from there). Overall however, there is no information to suggest that there would be a net change in effort and habitat impacts, just a redistribution. And since the areas are relatively small, the redistribution of effort should be relatively small, with minimal impacts between the no action and action alternatives.

4. Protected Resources

A neutral or minimal impact would be expected compared to the action alternatives. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that the new areas would be substantially different than the old areas in terms of protected resources or protected resource interactions.

If additional information on protected resources interactions could be gained through options that increase observer coverage and sampling (CA I provisions) on trips to RH/S areas, then selecting the no action results in less available information. If overall observer coverage levels are steady, closing areas results in more information outside of the areas and less information inside the areas, so the no-action results in more information inside the areas and less information outside the areas.

Since overall effort is not expected to change given the small size of the areas, closing areas would result in a redistribution of effort, so not closing the areas (no action) means there would be more interactions inside the areas and less interactions outside the areas but probably minimal overall impacts.

5. Human Communities

There are low negative socio-economic impacts for the action alternatives that would be avoided by choosing the no-action alternative compared to the status quo. These avoided impacts include costs of observers (8c), additional operational costs to leave an area after a slippage event (8d), and additional operational costs if a vessel decided to travel to more distant areas rather than fish in one of the proposed hotspots (8c, 8d, 8e).

8b. Make implementing the hotspot requirements of NEFMC's Amendment 5 to the Atlantic Herring Plan for Mackerel/longfin squid vessels frameworkable.

The Council would make the hotspot requirements considered below frameworkable under a subsequent action. Biological and Socioeconomic considerations would be reevaluated when the framework was developed and would depend on the exact measures considered.

8cMack. For Atlantic mackerel permitted vessels, more than an incidental level of fish (20,000 pounds mackerel) may not be retained/transferred/ possessed if any fishing occurs in a River Herring Monitoring/Avoidance Area without a NMFS-approved observer at any point during the trip. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries).

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere than the Monitoring/Avoidance Area with the action alternative but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that catches of the managed resources would be substantially impacted overall, especially given the wide distribution and migratory nature of the managed species, leading to high inter-annual variability in availability. There might be lower catches inside the area if this alternative was implemented, but higher catches outside due to effort displacement for a minimal net change because the areas are relatively small, affording vessels the opportunity to shift fishing effort and maintain level catches of the managed species.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of non-target impacts (including RH/S) given the wide distribution and high inter-annual variability of most non-target species' availability, including RH/S (see appendices 1 and 2). If effort is displaced from a small area, there might be lower catches inside the area but higher catches outside for a zero net change, especially since the areas are relatively small.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

3. Habitat Impacts Including EFH

A neutral or minimal impact overall impact would be expected compared to the no-action alternatives. With mackerel most effort is with mid-water gear so moving effort from one location to another should not impact habitat. Even for the bottom-trawl effort for mackerel, the action alternative would probably result in no change in net fishing effort across areas. The action alternatives would decrease effort inside the hotspots (a positive for habitat there) but increase effort outside the hotspots (a negative for habitat there). Overall however, there is no information to suggest that there would be a net change in effort and habitat impacts, just a redistribution. And since the areas are relatively small, the redistribution of effort should be relatively small, with minimal impacts between the no action and action alternatives.

4. Protected Resources

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of protected resource impacts given the wide distribution and high inter-annual variability of most protected resources. If effort is displaced from a small area, there might be lower interactions inside the area but higher interactions outside for a zero net change, especially since the areas are relatively small.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

A low negative impact would be expected compared to the no-action alternative. Participants would either have to pay to take an observer aboard ($800/day), raising mackerel trip costs by

23%-49% (see section 7.5 for analysis of observer cost compared to average mackerel revenues), or avoid fishing in the proposed areas. Conservation benefits are unlikely to be large based on the biological impact sections above. Given the small size of the areas, vessels are more likely to avoid the areas altogether rather than pay for costly observer coverage. Thus, because vessels are likely to decide not to fish in these areas, they have the potential to not incur costs for observer coverage, so impacts would likely be low. However, near-shore fishermen near the closed areas may be disproportionately impacted by closures around their home port, having to incur costs by traveling away from these areas.

8cLong. For longfin squid permitted vessels, more than an incidental level of fish (2,500 pounds longfin squid) may not be retained/transferred/ possessed if any fishing occurs in a River Herring Monitoring/Avoidance Area without a NMFS-approved observer at any point during the trip. Vessels would have to pay for observers to meet any observer coverage goals adopted by the Council that are greater than existing sea day allocations assigned through the sea day allocation process (already implemented in other fisheries).

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere than the Monitoring/Avoidance Area with the action alternative but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that catches of the managed resources would be substantially impacted overall, especially given the wide distribution and migratory nature of the managed species, leading to high inter-annual variability in availability. There might be lower catches inside the area if this alternative was implemented, but higher catches outside due to effort displacement for a minimal net change because the areas are relatively small, affording vessels the opportunity to shift fishing effort and maintain level catches of the managed species.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of non-target impacts (including RH/S) given the wide distribution and high inter-annual variability of most non-target species' availability, including RH/S (see appendices 1 and 2). If effort is displaced from a small area, there might be lower catches inside the area but higher catches outside for a zero net change, especially since the areas are relatively small.

From an information point of view, if vessels still fish in these areas then more information is gained related to the observer requirement which is a potentially positive impact. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

Also, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

3. Habitat Impacts Including EFH

A neutral or minimal impact overall impact would be expected compared to the no-action alternatives. Even for the bottom-trawl effort, the action alternative would probably result in no change in net fishing effort across areas. The action alternatives would decrease effort inside the hotspots (a positive for habitat there) but increase effort outside the hotspots (a negative for habitat there). Overall however, there is no information to suggest that there would be a net change in effort and habitat impacts, just a redistribution. And since the areas are relatively small, the redistribution of effort should be relatively small, with minimal impacts between the no action and action alternatives.

4. Protected Resources

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of protected resource impacts given the wide distribution and high inter-annual variability of most protected resources. If effort is displaced from a small area, there might be lower interactions inside the area but higher interactions outside for a zero net change, especially since the areas are relatively small.

5. Human Communities

A low negative impact would be expected compared to the no-action alternative. Participants would either have to pay to take an observer aboard ($800/day), raising longfin squid trip costs by 85%-189% (see section 7.5 for analysis of observer cost compared to average longfin squid trip revenues), or avoid fishing in the proposed areas. Conservation benefits are unlikely to be large based on the biological impact sections above. Given the small size of the areas, vessels are more likely to avoid the areas altogether rather than pay for costly observer coverage. Thus, because vessels are likely to decide not to fish in these areas, they have the potential to not incur costs for observer coverage, so impacts would likely be low. However, near-shore fishermen near the closed areas may be disproportionately impacted by closures around their home port, having to incur costs by traveling away from these areas.

8dMack. If a mackerel-permitted vessel is fishing in any River Herring Monitoring/Avoidance Areas identified in this alternative with an observer onboard, vessels would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Unless specific conditions are met (see section 5.8), vessels would be prohibited from releasing fish from the net, transferring fish to another vessel that is not carrying a NMFS-approved observer, or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the NMFS-approved observer.

As described in 5.8, if vessels do slip hauls in a monitoring/avoidance area they would be required to leave the monitoring/avoidance area for the duration of their trip.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to impact the managed resources compared to the no-action alternative since total catch of the managed resources is not likely to be substantially impacted. Even if fishing activity is displaced from these areas, since the managed species are widely distributed and the areas are relatively small, substantial changes in overall catch would not be expected.

From an information point of view, most of the managed species are already brought on board for sampling/inspection so related impacts would be minimal if vessels still fish in these areas. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

Also, most fish are already brought on board for inspection.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

If vessels continue to fish in these areas, a requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to impact non-target species (including RH/S) compared to the no-action alternative since the fishing activity would continue. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of non-target impacts (including RH/S) given the wide distribution and high inter-annual variability of most non-target species' availability, including RH/S (see appendices 1 and 2). If effort is displaced from a small area, there might be lower catches inside the area but higher catches outside for a zero net change, especially since the areas are relatively small.

From an information point of view, if vessels still fish in these areas then better data would be collected because all caught fish would be inspected. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere rather than be subject to these requirements in these areas but since the majority of mackerel landings are made with mid-water gear, which generally does not contact the bottom, any redirection or displacement of mackerel effort due to this alternative would not be expected to have any impacts on habitat. There is some directed bottom trawling for mackerel but not enough for there to be more than minimal impacts.

4. Protected Resources

If vessels continue to fish in these areas, a requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to impact protected resources compared to the no-action alternative since the fishing activity would continue. If vessels just fish elsewhere, there would be lower interactions inside the areas but higher interactions outside the areas. Since the areas are relatively small it would not be expected that overall effort would change, and while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that the new areas would be substantially different than the old areas in terms of protected resources or protected resource interactions, especially since the areas are relatively small.

From an information point of view, if vessels still fish in these areas then better data would be collected because all caught fish would be inspected for protected resources. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

A requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to substantially impact human communities compared to the no-action alternative since most fish are brought on board already and because the areas are relatively small relative to the wide distribution of fishing activity for the managed resources. Some loss of revenue and/or additional costs may accrue if a vessel has to leave an area after a slippage event but given the relatively small areas involved it is likely that fishermen will be able to react to keep any economic losses relatively low.

<u>8dLong</u>. If a longfin squid-permitted vessel is fishing in a River Herring <u>Monitoring/Avoidance</u> Areas identified in this alternative with an observer onboard, vessels would be required to pump/haul aboard all fish from the net for inspection and sampling by the observer. Vessels that do not pump fish would be required to bring all fish aboard the vessel for inspection and sampling by the observer. Unless specific conditions are met (see section 5.8), vessels would be prohibited from releasing fish from the net, transferring fish to another vessel that is not carrying a NMFS-approved observer, or otherwise discarding fish at sea, unless the fish have first been brought aboard the vessel and made available for sampling and inspection by the NMFS-approved observer.

As described in 5.8, if vessels do slip hauls in a monitoring/avoidance area they would be required to leave the monitoring/avoidance area for the duration of their trip.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to impact the managed resources compared to the no-action alternative since total catch of the managed resources is not likely to be substantially impacted. Even if fishing activity is displaced from these areas, since the managed species are widely distributed and the areas are relatively small, substantial changes in overall catch would not be expected.

From an information point of view, most of the managed species are already brought on board for sampling/inspection so related impacts would be minimal if vessels still fish in these areas. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

If vessels continue to fish in these areas, a requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to impact non-target species (including RH/S) compared to the no-action alternative since the fishing activity would continue. Vessels may fish elsewhere with the action alternatives but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of non-target impacts (including RH/S) given the wide distribution and high inter-annual variability of most non-target species' availability, including RH/S (see appendices 1 and 2). If effort is displaced from a small area, there might be lower catches inside the area but higher catches outside for a zero net change, especially since the areas are relatively small.

From an information point of view, if vessels still fish in these areas then better data would be collected because all caught fish would be inspected. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

Also, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

3. Habitat Impacts Including EFH

A neutral or minimal impact overall impact would be expected compared to the no-action alternatives. Even for the bottom-trawl effort, the action alternative would probably result in no change in net fishing effort across areas. The action alternatives might decrease effort inside the hotspots (a positive for habitat there) but increase effort outside the hotspots (a negative for habitat there). Overall however, there is no information to suggest that there would be a net change in effort and habitat impacts, just a redistribution. And since the areas are relatively small, the redistribution of effort should be relatively small, with minimal impacts between the no action and action alternatives.

4. Protected Resources

If vessels continue to fish in these areas, a requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to impact protected resources compared to the no-action alternative since the fishing activity would continue. If vessels just fish elsewhere, there would be lower interactions inside the areas but higher interactions outside the areas. Since the areas are relatively small it would not be expected that overall effort would change, and while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that the new areas would be substantially different than the old areas in terms of protected resources or protected resource interactions, especially since the areas are relatively small.

From an information point of view, if vessels still fish in these areas then better data would be collected because all caught fish would be inspected for protected resources. If vessels just avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

A requirement to bring all fish on board for inspection when observers are onboard in these areas would not be expected to substantially impact human communities compared to the no-action alternative since most fish are brought on board already and because the areas are relatively small relative to the wide distribution of fishing activity for the managed resources. Some loss of revenue and/or additional costs may accrue if a vessel has to leave an area after a slippage event but given the relatively small areas involved it is likely that fishermen will be able to react to keep any economic losses relatively low.

<u>8eMack</u>. Vessels possessing a federal mackerel permit would not be able to retain, possess or transfer more than an incidental level of fish (20,000 pounds mackerel) while in a River Herring <u>Protection Area</u> unless no mesh smaller than 5.5 inches is onboard the vessel.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A neutral or minimal impact would be expected compared to the no-action alternative. While there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that catches of the managed resources would be substantially impacted overall, especially given the wide distribution and migratory nature of the managed species, leading to high inter-annual variability in availability. There might be lower catches inside the area if this alternative was implemented, but higher catches outside due to effort displacement for a minimal net change because the areas are relatively small, affording vessels the opportunity to shift fishing effort and maintain level catches of the managed species.

From an information point of view, if overall observer coverage is level, more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered, especially since the areas are relatively small.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A neutral or minimal impact would be expected compared to the no-action alternative. While there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of non-target impacts (including RH/S) given the wide distribution and high inter-annual variability of most non-target species' availability, including RH/S (see appendices 1 and 2). If effort is displaced from a small area, there might be lower catches inside the area but higher catches outside for a zero net change, especially since the areas are relatively small.

From an information point of view, assuming vessels avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere rather than in these areas but since the majority of mackerel landings are made with mid-water gear, which generally does not contact the bottom, any redirection or displacement of mackerel effort due to this alternative would not be expected to have any impacts on habitat. There is some directed bottom trawling for mackerel but not enough for there to be more than minimal impacts.

4. Protected Resources

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change or that the new areas would be substantially different than the old areas in terms of protected resources or rates of protected resource interactions. Thus while there may be fewer interactions inside the areas, there may be more interactions outside the areas, probably with minimal net impacts since the areas are relatively small.

From an information point of view, assuming vessels avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

A low negative impact would be expected compared to the no-action alternative. If the protection areas overlap with productive fishing areas in a given year, revenues may be decreased or fishermen may incur higher costs traveling to other fishing areas. Given the complexity of fishermen's responses to regulations and given the protection areas are relatively small, the effects may not be substantial for most fishermen in most years compared to the no-action alternative. However, near-shore fishermen near the closed areas may be disproportionately impacted by closures around their home port. Given where and when the mackerel and longfin squid fisheries are conducted, mackerel participants are more likely to be impacted than longfin squid participants, who tend to fish offshore in the winter months.

<u>8eLong</u>. Vessels possessing a federal moratorium longfin squid permit would not be able to retain, possess or transfer more than an incidental level of fish (2,500 pounds longfin squid) while in a River Herring <u>Protection Area</u> unless no mesh smaller than 5.5 inches is onboard the vessel.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A neutral or minimal impact would be expected compared to the no-action alternative. While there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that catches of the managed resources would be substantially impacted overall, especially given the wide distribution and migratory nature of the managed species, leading to high inter-annual variability in availability. There might be lower catches inside the area if this alternative was implemented, but higher catches outside due to effort displacement for a minimal net change because the areas are relatively small, affording vessels the opportunity to shift fishing effort and maintain level catches of the managed species.

From an information point of view, if overall observer coverage is level, more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered, especially since the areas are relatively small.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

A neutral or minimal impact would be expected compared to the no-action alternative. While there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change nor would it be expected that the new areas would be substantially different than the old areas in terms of non-target impacts (including RH/S) given the wide distribution and high inter-annual variability of most non-target species' availability, including RH/S (see appendices 1 and 2). If effort is displaced from a small area, there might be lower catches inside the area but higher catches outside for a zero net change, especially since the areas are relatively small.

From an information point of view, assuming vessels avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

Also, targeting information collected by NEFOP observers suggests that only a small portion of small mesh bottom trawl catches of RH/S are actually from longfin squid-targeted tows with herring accounting for most followed by mackerel and silver hake. While these are not extrapolated catches, and target species is self-reported to observers prior to each tow, on a relative basis the information suggests that the longfin squid fishery may not actually be accounting for that much RH/S catch, which is consistent with the directed-trip based analysis conducted annually for the specifications' environmental assessment (provided above in section 6.3).

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere rather than in these areas but since the areas are relatively small, while there may be some redirection or displacement of longfin squid fishing effort due to this alternative, it would not be expected that the new areas would be substantially different than the old areas in terms of habitat and/or habitat impacts.

4. Protected Resources

A neutral or minimal impact would be expected compared to the no-action alternative. Vessels may fish elsewhere but since the areas are relatively small, while there may be some redirection or displacement of fishing effort due to this alternative, it would not be expected that total effort would change or that the new areas would be substantially different than the old areas in terms of protected resources or rates of protected resource interactions. Thus while there may be fewer interactions inside the areas, there may be more interactions outside the areas, probably with minimal net impacts since the areas are relatively small.

From an information point of view, assuming vessels avoid these areas and observer coverage is steady, then more information would be collected outside the areas and less information would be collected inside the area for probably no substantial net change in the value of information gathered.

5. Human Communities

A low negative impact would be expected compared to the no-action alternative. If the protection areas overlap with productive fishing areas in a given year, revenues may be decreased or fishermen may incur higher costs traveling to other fishing areas. Given the complexity of fishermen's responses to regulations and given the protection areas are relatively small, the effects may not be substantial for most fishermen in most years compared to the no-action alternative. However, near-shore fishermen near the closed areas may be disproportionately impacted by closures around their home port. Given where and when the mackerel and longfin squid fisheries are conducted, mackerel participants are more likely to be impacted than longfin squid participants, who tend to fish offshore in the winter months.

8f. Make the above measures 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong only effective if/when they are effective for Atlantic Herring vessels, including if they become effective in the middle of a season because a catch-cap based trigger is reached by the Atlantic Herring fleet under a trigger established by Amendment 5 to the Atlantic Herring FMP.

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would thus only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen. The effect of 8f is essentially that the Hotspot alternatives would only be implemented if they are also implemented for Atlantic herring in a kind of light-switch on-off fashion. Thus the impact of 8f is the same as the action alternatives described above if the measures also apply to Atlantic herring and it is the same as the no-action alternative if no hotspot measures are implemented for Atlantic herring.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would thus only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen. The effect of 8f is essentially that the Hotspot alternatives would only be implemented if they are also implemented for Atlantic herring in a kind of light-switch on-off fashion. Thus the impact of 8f is the same as the action alternatives described above if the measures also apply to Atlantic herring and it is the same as the no-action alternative if no hotspot measures are implemented for Atlantic herring.

3. Habitat Impacts Including EFH

8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would thus only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen. The effect of 8f is essentially that the Hotspot alternatives would only be implemented if they are also implemented for Atlantic herring in a kind of light-switch on-off fashion. Thus the impact of 8f is the same as the action alternatives described above if the measures also apply to Atlantic herring and it is the same as the no-action alternative if no hotspot measures are implemented for Atlantic herring.

4. Protected Resources

8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would thus only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen. The effect of 8f is essentially that the Hotspot alternatives would only be implemented if they are also implemented for Atlantic herring in a kind of light-switch on-off fashion. Thus the impact of 8f is the same as the action alternatives described above if the measures also apply to Atlantic herring and it is the same as the no-action alternative if no hotspot measures are implemented for Atlantic herring.

5. Human Communities

8f, which would make any of the requirements selected in this Alternative Set only applicable when the same measures were in effect for the Atlantic Herring fishery, would thus only be chosen if at least one alternative among 8cMack, 8cLong, 8dMack, 8dLong, 8eMack, or 8eLong was also chosen. The effect of 8f is essentially that the Hotspot alternatives would only be implemented if they are also implemented for Atlantic herring in a kind of light-switch on-off fashion. Thus the impact of 8f is the same as the action alternatives described above if the measures also apply to Atlantic herring and it is the same as the no-action alternative if no hotspot measures are implemented for Atlantic herring.

<u>Alternative Set 8 Summary - Hotspot Restrictions</u>

1. Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

The alternatives in this section, for either mackerel or longfin squid, and inside the so called "hotspots", would either require observers for catches greater than incidental levels ("8c" alternatives), prohibit slippage ("8d" alternatives), or require the use of mesh greater than 5.5 inches for catches greater than incidental levels ("8e" alternatives). 8b would make such alternatives frameworkable and 8f would make such alternatives effective only when similar measures were in effect for the Atlantic Herring fishery. None of these alternatives are expected to substantially affect the managed resources because the hotspot areas are small while the managed resources are widely distributed and migrate throughout the coastal and shelf waters of the Mid-Atlantic and northeast U.S. coast. While there may be less fish caught within a hotspot, total catch is not expected to be substantially impacted – fishing effort and catch may be redistributed slightly but not reduced overall. Also, while more or less information may be collected within a hotspot because of these alternatives depending on fishery participant behavior, overall information quantity and quality is not likely to substantially change because of the small areas impacted.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

As with the managed resources, while fishing effort may be redistributed slightly it is not expected to be reduced overall, which means that no substantial impacts are expected on non-target species including RH/S. While the so-called hotspots do contain areas of relatively higher RH/S catch, they are also generally the areas of higher effort and redistributing effort may just result in new incidental catch hotspots. The nature of within-year and inter-annual variability of RH/S distributions (see appendices 1 and 2) does not support a conclusion that limiting fishing access to the hotspots is likely to reduce overall RH/S catches, though it would likely reduce catch within the hotspot. Also, while more or less information may be collected within a hotspot because of these alternatives depending on fishery participant behavior, overall information quantity and quality is generally not likely to substantially change because of the small areas impacted. The alternatives to reduce slippage (8d) could improve observer data if vessels keep fishing in the hotspot areas.

3. Habitat Impacts Including EFH

Since the action alternatives are likely to involve only relatively minor re-distributions of effort related to the small area-based observer requirements, area-based slippage prohibitions, or area-based gear requirements, minimal impacts are expected.

4. Protected Resources

Since the action alternatives are likely to involve only relatively minor re-distributions of effort related to the small area-based observer requirements, area-based slippage prohibitions, or area-based gear requirements, minimal impacts are expected.

5. Human Communities

Commercial participants would have to re-distribute their effort to some degree but could probably adjust with relatively low costs. However, smaller operations located near the closed areas could be disproportionately impacted in that they could have to travel beyond the relevant restricted areas. Minimal benefits related to conservation gains would be expected due to the lack of expected overall conservation improvements.

Comparison of Alternative Sets 7 and 8

As stated above, given the overlapping nature of Alternative Sets 7 and 8, it is not expected that alternatives would be chosen from both Alternative Sets 7 and 8 for one fishery. One could select an alternative for the longfin squid fishery from one set and for the mackerel fishery from another set, but not from both sets for one fishery. There are some hotspot areas north of Cape Cod that are not covered by Alternative Set 7's larger areas but there is relatively low mackerel and/or longfin squid activity in those areas at the relevant times of the year. Because of Alternative Set 8's small areas (hotspots) the difference in terms of impacts are not expected to be proportionally less for Set 8 compared to Set 7. Rather, Set 8 would be expected to have negligible impacts across resource types due to fishery participants' abilities to redistribute effort, which could not occur to the same degree with Set 7 given how large the areas are in Set 7.

7.9 <u>Alternative Set 9</u> – Addition of RH/S as "Stocks in the Fishery" in the MSB FMP

<u>Statement of Problem/Need for Action:</u>

The overall existing federal/state/regional management framework may be insufficient to adequately conserve RH/S stocks (see Section 6.2 for a summary of RH/S stock statuses). Adding RH/S stocks as "stocks in the fishery" in the MSB FMP would not fix every problem but would bring some additional resources to bear on RH/S problems, though that may mean that other management priorities receive less resources.

It is not possible to develop all of the measures (especially ACLs/AMs and essential fish habitat or EFH) that would be necessary for the FMP not to be deficient if any RH/S species were officially added as stocks in the fishery in this document. Instead, selection of an Alternative Set 9 action alternative would "kick off" another Amendment to fully add stocks to the MSB FMP in a manner that would keep the plan in compliance with the Magnuson Stevens Act. The Act's required provisions for management plans are detailed in section 5.9.

<u>Background:</u>

The Magnuson Stevens Act describes various "National Standards" for fishery management plans. National Standard One (NS1) states: "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry." NMFS has published detailed guidance for NS1, available at: http://www.nmfs.noaa.gov/msa2007/catchlimits.htm. While Council's are provided considerable flexibility, the guidance describes which stocks should be "in the Fishery" and describes the requirements for those stocks deemed by a Council to be "in the Fishery." The NS1 guidance is described in more detail in Section 5.

The impacts for all of the RH/S species are essentially the same so they are discussed together. While there may be differences of degrees, since these fish occupy similar habitats and trophic niches, and face similar challenges, the differences do not warrant a discussion for each species separately. Thus, when RH/S is used it means one, several, or all four of the relevant species.

Even though many of the details would have to be developed in another action, this action provides a good way to evaluate the benefits and costs of adding RH/S as stocks in MSB fishery. The potential costs and benefits are described below for the valued ecosystem components but one additional cost is the costs incurred by management if RH/S. It is likely that several additional Council and/or NMFS staffers would become involved in RH/S management. If these were new hires then there is cost to the taxpayers of those new hires. If existing staff are re-purposed then the cost is the priorities they were working on no longer get as much attention.

NOTE ON IMPACT ANALYIS FOR ALTERNATIVES: Impacts would be similar for all four species so they are addressed as a group below. While impacts compared to the no-action alternative would be largest if all four species were added, further delineation of how impacts would change for any of the 15 possible combinations of the 4 species being added (1, 2, 3, or all) is not possible. Unlike a traditional alternative that has impacts on managed species, non-target species, habitat, protected resources, and human communities, this alternative involves shifting a non-target species to a managed resource.

NOTE ON COMBINATIONS: All of the action alternatives in the set could be adopted individually or together.

9a. No-action

Under the no-action alternative, primary RH/S management would continue to rest with the states as coordinated through the ASMFC as described in section 5.9. The states would continue to address catch in state waters and address habitat improvements through collaborative work with NOAA, U.S. F&W Service, and private partners. From the Council perspective, RH/S would continue to be managed as a bycatch species, with bycatch to be minimized to the extent practicable within the Council's FMPs. The Council could also continue to consider discretionary measures designed to reduce retained incidental catch (bycatch is defined as discards in the MSA) as it is doing in Amendment 14.

The Atlantic Coastal Fisheries Cooperative Management Act organizes the States in marine conservation efforts and within the status quo provides for the ASMFC to request that the Secretary of Commerce implement measures in federal waters to complement any state waters conservation measures.

If this alternative is selected, then no measures from Alternative Set 9 would be implemented and the existing state management measures (as described in section 5.9) would remain in place. Thus there would be no incremental impacts compared to the status quo, but there are relative impacts compared to the action alternatives, as described below. While this section focuses on incremental impacts, cumulative impacts are discussed in Section 8.

Specific potential forgone benefits (detailed in the action alternative impact analyses) and avoided costs of choosing the no-action alternative versus choosing action alternatives would include the following for whichever species were not added as stocks in the fishery:

1. Currently Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

It is not expected that adding RH/S as stocks in the fishery would directly impact the managed resources. However future closures of the directed fisheries could be required as a result of ACLs/AMs if RH/S were added as stocks in the fishery (due to incidental RH/S catch issues), resulting in lower managed species catches and thus potential positive impacts for the managed fisheries. Since fully catching the managed resources' quotas should be sustainable, such positive impacts would likely be low, but forgone if the no-action alternative was chosen.

2. Other non-target Species Impacts besides RH/S (RH/S are discussed in detail below)

It is not expected that adding RH/S as stocks in the fishery would directly impact non-RH/S non-target species currently impacted by the MSB FMP. However future closures of the directed fisheries could be required as a result of ACLs/AMs if RH/S were added as stocks in the fishery (due to incidental RH/S catch issues), resulting in less fishing effort and thus lower non-target species catches. These potential positive impacts for non-target species would be forgone if the no-action alternative was chosen.

3. Habitat Impacts Including EFH to the currently managed species.

It is not expected that adding RH/S as stocks in the fishery would directly impact habitat. However future closures of the directed fisheries could be required as a result of ACLs/AMs if RH/S were added as stocks in the fishery (due to incidental RH/S catch issues), resulting in less fishing effort and thus lower habitat impacts. These potential positive impacts for habitat would be forgone if the no-action alternative was chosen.

4. Protected Resources

Blueback herring and alewife are candidate ESA species but impacts related to RH/S are discussed below. It is not expected that adding RH/S as stocks in the fishery would directly impact other protected resources. However future closures of the directed fisheries could be required as a result of ACLs/AMs if RH/S were added as stocks in the fishery (due to incidental RH/S catch issues), resulting in less fishing effort and thus lower protected species impacts. These potential positive impacts for protected resources would be forgone if the no-action alternative was chosen.

5. Human Communities

If future closures of the MSB fisheries were avoided by not taking action this would be a positive impact associated with the no-action alternative.

Potential Human community benefits from rebuilt fisheries if conserving RH/S stocks through more direct federal management led to rebuilding (which itself is an uncertain outcome) would be forgone. To the extent that these alternatives lead to better management (i.e. sustainable fisheries producing optimal yields) of RH/S, then choosing the no-action alternative in comparison to the other alternatives might result in foregone benefits related to lost commercial revenues, recreational opportunities, ecosystem services, cultural values for RH/S, and/or other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully). Due to the uncertainty about how the productivity of either the managed species or RH/S is impacted by current catch levels these impacts are not quantifiable. However, the actual rebuilding of RH/S runs to optimally productive levels would be expected to lead to substantial positive benefits. These fisheries have supported thriving (if seasonal) commercial and recreational fisheries in the past. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large. If limiting RH/S catch through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

6. River Herring and Shad Stocks, i.e. potential future managed resources.

While potential benefits of adding RH/S stocks are described below, the forgone benefits may be summarized as:

-There would not be additional federal support of RH/S management or additional coordination among management partners including more federal involvement in assessments.

-There would not be explicit consideration of RH/S observer coverage needs.

-Other than mortality caps instituted in the MSB or Atlantic herring fisheries there would not be direct controls (ACLs/AMs) on federal catch of RH/S.

-The Council would not be able to address the catch and/or discarding of RH/S in other fisheries.

-EFH would not be designated which could mean less habitat improvements for RH/S.

-The costs of management (hiring of additional staff or redirection of staff away from other tasks) would not be incurred. These could include staff at NERO, the NEFSC, and the MAFMC.

9b. Add blueback herring as a stock in the MSB FMP.

9c. Add alewife as a stock in the MSB FMP.

9d. Add American shad as a stock in the MSB FMP.

9e. Add hickory shad as a stock in the MSB FMP.

Addressed as a group below

Analyzing the impacts of adding a species as a stock in the fishery in the MSB FMP is slightly unique. The analysis first concentrates on impacts to resources currently impacted by the MSB fisheries and then moves to impacts on RH/S.

1. Currently Managed Resources Impacts (mackerel, *Illex*, butterfish, longfin squid)

A neutral or minimal impact would be expected compared to the no-action alternative for the managed species. Just adding additional stocks to the MSB FMP should not substantially change landings of the currently managed species or their stock status. However, it is possible that future closures of the currently managed fisheries could be required as a result of implementing ACL/AMs requirements for RH/S in order to keep overall RH/S catch below the ACL. Closures resulting from such measures could benefit the currently managed species by lowering overall fishing effort and catch. However, catching the full quota of the managed species is not expected to cause sustainability problems for the managed species so impacts are minimal. The impacts of such actions would be analyzed separately in future specifications, frameworks, or amendments.

2. Non-target Species Impacts (Including RH/S and species managed in other plans)

Impacts specific to RH/S are discussed in detail below. A neutral or minimal impact would be expected compared to the no-action alternative. Just adding additional stocks to the MSB FMP should not substantially change effort for current managed species. As discussed under the managed resource above, it is possible that future closures of the currently managed fisheries could be required as a result of implementing ACL/AM requirements for RH/S. Closures resulting from such measures could benefit the currently impacted non-target species by lowering overall fishing effort, which could translate to fewer non-target species interactions in the managed fisheries. The impacts of such actions would be analyzed separately in future specifications, frameworks, or amendments.

3. Habitat Impacts Including EFH

A neutral or minimal impact would be expected compared to the no-action alternative for existing EFH. Impacts related to new EFH that would be designated if stocks were added to this fishery are discussed below. Just adding additional stocks to the MSB FMP should not substantially change effort. As discussed under the managed resource above, it is possible that future closures of the currently managed fisheries could be required as a result of implementing ACL/AM requirements for RH/S. Closures resulting from such measures could benefit the currently impacted habitat by lowering overall fishing effort, which could less habitat interactions with the gears used in the managed fisheries. The impacts of such actions would be analyzed separately in future specifications, frameworks, or amendments.

4. Protected Resources

A neutral or minimal impact would be expected compared to the no-action alternative for existing EFH. Blueback herring and alewife are candidate ESA species but impacts related to RH/S are discussed below. Just adding additional stocks to the MSB FMP should not substantially change effort. As discussed under the managed resource above, it is possible that future closures of the currently managed fisheries could be required as a result of implementing ACL/AM requirements for RH/S. Closures resulting from such measures could benefit the currently impacted protected resources by lowering overall fishing effort, which could less protected resources interactions with the gears used in the managed fisheries. The impacts of such actions would be analyzed separately in future specifications, frameworks, or amendments. If interactions with protected species were occurring related to directed RH/S fishing that activity might have to be mitigated.

5. Human Communities

Compared to the no-action alternative, impacts are mixed and the net benefit is uncertain due to the uncertainties involved. On one hand, if additional incidental catch reduction was required as a result of adding this species as a stock in the fishery there could be negative economic impacts to the MSB or other fisheries. Such actions and their impacts would be analyzed separately in other specifications, frameworks, or amendments. This document considers a number of different measures to reduce incidental catch of RH/S, and the reader can look to Sections 7.6-7.8 for analyses of how some types of RH/S catch reduction measures can impact human communities. Revenue losses (or potentially forgone revenue) from such measures range from very low in the case of a cap that does not constrain the fishery to near elimination of the mackerel and longfin squid fisheries in the case of the broadest area closures (they have had a combined value in the $18-$36 million dollar range in the last 5 years). It is also possible that the Council could select some of these measures to reduce incidental catch in mackerel/longfin squid fisheries, but may still have to implement further measures to reduce RH/S catch through this or its other FMPs for other fisheries.

On the other hand, it is also possible that benefits could accrue in the future if adding these species as federally managed species assisted in conserving these stocks and potentially redeveloping directed fisheries (which is uncertain). While historical high levels of landings may have been unsustainably high , RH/S fisheries had combined landings in the 20,000 mt to 30,000 mt range throughout the 1950s and 1960s ranging from Maine to South Carolina. While there are some issues (climate, stream flow, non-point run-off, etc.) that the Council may have minimal impact upon, to the degree that enhanced conservation efforts can assist recovery, then positive human community impacts are possible in terms of both additional commercial and additional recreational fishing opportunities that could result from rebuilt RH/S stocks. Recreational benefits could be direct (catching RH/S) or indirect in that RH/S are forage species for higher trophic level predators such as striped bass so higher RH/S populations could indirectly help striped bass populations.

River Herring and Shad runs also are or have been important culturally for communities (just Google “Shad Festival” or “Herring Festival”) and even recently have supported some subsistence fishing (e.g. Mashpee Wampanoag Indian Tribe on Cape Cod, Massachusetts (ASMFC 2011). There also are other non-market existence values (i.e. value gained by the public related to the knowledge that these species are being conserved successfully) that could increase in value from successful management. Public interest in this amendment demonstrates that that the general public holds a certain value for the knowledge that these fisheries are being sustainably managed, and even if each individual's value is small the total public value may be quite large.

If limiting RH/S catch, EFH designation and protection, and increased federal-state cooperation through this alternative set led to rebuilding then the benefits of the action alternatives would be large. If limiting RH/S catch through this alternative set did not substantially lead to rebuilding (i.e. other factors are primarily to cause for RH/S declines - see sections 6.2.5 and 6.2.6) then the benefits of the action alternatives would be minor. Future research may provide information on what factors are primarily responsible to RH/S declines but currently that information is not available.

<u>Impacts Specific for RH/S if They Were Added as Stocks in the Fishery, Compared to the No-Action Alternative</u>

Impacts to RH/S would be expected to be positive for all relevant RH/S species and in approximately the same fashion given their similar life histories and place in the ecosystem. However, quantification is very difficult given the myriad challenges facing RH/S stocks. The only substantial negative impact would be costs for management and whether those costs could be justified by the potential benefits. Accordingly, the focus here is on the potential benefits so that managers can weigh the trade-offs between potential benefits and the additional costs of adding stocks as managed resources in the MSB FMP.

1. There would be additional federal support of RH/S management (assessments, FMP and specifications review, etc.) and additional coordination of conservation activities.

Right now there is some federal involvement by U.S. Fish and Wildlife Service, NMFS Northeast Region Protected Resource Branch staff, NMFS Northeast Fisheries Science Center staff, and Council staff (quasi-federal) in RH/S management. However, these staffers do not have RH/S as a primary responsibility or focus. For example, there is no RH/S coordinator at the NMFS Northeast Regional Office or a fishery management council RH/S coordinator, as there is for directly managed resources. There is direct involvement by a lead Atlantic States Marine Fisheries Commission (ASMFC) staffer but without dedicated leads at other agencies coordination can be difficult (and the ASMFC staffer also coordinates American Eel, Atlantic

Striped Bass, and Sturgeon). If RH/S were added as managed species into the MSB FMP, it may add staff with RH/S responsibilities (at NMFS or at the Council) or at the least existing staff would have RH/S responsibilities added to their primary activities. So for example, there would be a NMFS Northeast Region plan coordinator for RH/S, a Council plan coordinator for RH/S, a NMFS Northeast Fisheries Science Center assessment lead, etc., even if it primarily involves a reassignment of duties among current staff. As part of coordination responsibilities the Council coordinator and NMFS coordinator would each likely become more involved in a wide range of RH/S conservation activities especially in terms of how fishing interacts with the variety of challenges facing RH/S stocks.

These staffers would also become responsible for several annual/cyclic activities. First, they would conduct annual fishery descriptions and fishery reviews as part of specifications. Second, they would become more directly involved in assessments since NMFS strives to complete successful assessments for managed species in order to improve is Fish Stock Sustainability Index score, the primary measure of how well NMFS is performing it's duties (http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm). Adding these stocks into the FMP would not guarantee that reference points/stock determination criteria would be available (reference points are generally not available for even the existing species in this plan due to high levels of scientific uncertainty) but at least additional resources would likely be expended on RH/S assessment (though they may just be diverted from other species due to the current budget environment). If an assessment successfully generated reference points and status determination criteria then rebuilding requirements would be instituted if a stock was found to be overfished.

As part of specifications the Council's SSC would also review RH/S status and make Acceptable Biological Catch recommendations. If ACLs were instituted (see below) they would provide ACL recommendations but even if ACLs were not instituted (see additional discussion below) the Council would need a functional equivalent for incidental catch in its other managed fisheries and the SSC would likely provide relevant recommendations. Related to incidental catch management, another annual activity would be integrating RH/S considerations into bycatch reporting and observer prioritization. While NMFS has been diverting resources from other small mesh fisheries to mackerel in the last year to better characterize RH/S interactions, as a stock in the fishery NMFS would have to directly describe its plans for RH/S bycatch monitoring, and the Council would presumably have a stronger case arguing for more coverage for a managed species than it currently can make in terms of making a case for more resources about a non-target species.

Adding RH/S as stocks in the fishery would also change the nature of management actions that are available to the Council. Currently the Council is limited to addressing catch in its other managed fisheries. If RH/S were stocks in the fishery, as managed stocks the Council could implement restrictions on other fisheries that interact with RH/S. As an example, currently the Summer Flounder-Scup-Black Sea Bass FMP restricts all bottom trawling in areas where survey data has shown scup to aggregate. If RH/S were managed species the Council could implement broader restrictions on fishing activities beyond its other managed species if necessary and/or appropriate to conserve RH/S.

2. EFH would be designated for RH/S.

Designating EFH for RH/S would increase NMFS's ability to conserve habitats used by these anadromous species, especially freshwater habitats used for spawning and as juvenile nursery areas that are most affected by a wide range of human activities.

Currently, acting under the authority of the MSA, there is a mandatory requirement that NMFS must issue EFH conservation recommendations to federal agencies for activities proposed, funded, permitted, or undertaken by those agencies. Designation of EFH for RH/S would greatly expand the geographic boundaries where mandatory consultations would be required including most coastal rivers and their watersheds on the Atlantic coast. With such designation comes the authority to more aggressively regulate the adverse impacts of non-fishing activities on riverine and estuarine habitats for these species. However, the agency may lack the resources to effectively implement the necessary actions, similar to the Agency's funding issues with Atlantic salmon (see below).

Since A) states are already independently acting to improve riverine habitats B) NOAA has ongoing consultations with upstream dam removal/riverine habitat improvement projects, and C) NMFS has already been successful mitigating impacts to some habitats (tidal riverine waters) used by RH/S because they are forage species for other federally-managed fish species (e.g., bluefish), and are, therefore, considered a component of EFH for these predatory species, it is unclear exactly what the marginal added function of NOAA EFH efforts would be.

NMFS also already prescribes mandatory measures necessary to provide safe, timely and effective passage around hydropower facilities (upstream and downstream) under Section 18 of the Federal Power Act. However, this authority is only applicable to those hydropower facilities licensed by the Federal Energy Regulatory Commission and most FERC licenses are issued for a period of 30 + years.

Freshwater habitats used by RH/S also already benefit indirectly from EFH conservation measures that are proposed for Atlantic salmon because salmon and RH/S share many of the same habitats. However, the indirect benefits of Atlantic salmon EFH conservation are limited to those areas within New England where Atlantic salmon EFH rivers are located and are greatly constrained by funding limitations. The U.S. Fish and Wildlife Service is also engaged in riverine habitat issues but their focus is primarily on dam passage issues.

In summary, designation of EFH for RH/S would greatly expand the geographic boundaries where mandatory consultations would be required for activities that may impact RH/S habitat but it is unclear what tangible benefits would accrue beyond those already being pursued by the states, NMFS, and other federal agencies.

3. ACLs and AMs would likely be implemented.

Compared to the no-action alternative, if ACLs/AMs were established there would be better accounting of RH/S catch. If overfishing limits are identified (none exist now) then high quality catch data can be used to prevent overfishing, which would be a positive impact for any RH/S species that had ACLs/AMs. Adding ACLs/AMs also has some costs, primarily the costs of reporting and monitoring. However, regardless of the ACL/AM question additional reporting and monitoring provisions are being considered for RH/S.

One question that has surfaced repeatedly has been “Could the Council add river herring or shad as stocks in the fishery but use the ACL/AM flexibility provisions of the NS1 guidance to defer to ASMFC for primary management?” The NPFMC is considering such a path for salmon and deferring to Alaska. This could theoretically allow the designation of EFH and result in greater federal resources without having to deal with ACLs for the currently data-poor RH/S stocks. There are several key issues however, which become evident when reviewing analysis for updating the NPFMC's salmon plan (http://www.fakr.noaa.gov/npfmc/), where Alaska has primary authority even though it is a federally managed species. First, Alaska has a long history of well-documented successful/sustainable management with salmon. Second, the salmon situation is different in that RH/S landings, and certainly discards, appear not nearly as well documented (especially at the species level) as salmon landings and discards. Existing or pending ASMFC moratoriums will likely address most of the landings control but not discards and some states may still allow relatively uncontrolled landings of RH/S that are caught incidentally in federal waters. For these reasons it currently seems likely that ACLs and AMs would be needed, i.e. it would be difficult to argue that the state management would effectively account for all catch. This is at least the viewpoint of the Amendment 14 FMAT and NOAA GC, though the Council looks forward to getting additional perspectives on this topic during the public input process.

The ACL flexibility guidelines also still require consistency with Magnuson (alternatives to ACLs/AMs would have to essentially achieve the same results). So even if primary management could be ceded to the ASMFC, the Council’s suite of management measures would still have to function as ACLs/AMs. Thus the Council would still have to implement hard caps on its other managed species to control overall catch (this is the case with Salmon in the North Pacific’s groundfish fishery).

Also if ASMFC had primary responsibility, the Council would have to limit incidental catch in its directed fisheries based on the best available science about what catch level is consistent with sustainability and/or rebuilding as well as accounting upfront for whatever catch (landings and/or discards) occurs in state waters. Thus while there might not be ACLs/AMs on paper, the caps on incidental catch in Council-managed fisheries would need to have the same function as ACLs/AMs in order to be consistent with the Magnuson Act and the National Standard One final rule guidelines. Again however, this is the viewpoint of the Amendment 14 FMAT and NOAA GC and the Council looks forward to getting additional perspectives on this topic during the public input process.

If the Council added RH/S as a stock in the fishery and just the provisions deferring primary management to the ASMFC were disapproved by NMFS or struck down in subsequent legal action then the standard ACL provisions would presumably apply. If such events took place, or if the Council decided to just outright add one or more RH/S stocks into the fishery then ACLs and AMs would be required, along with all the other requirements of fishery management plans (EFH, rebuilding when appropriate, etc.) as detailed in section 5.9.

While ASMFC/Council coordination for RH/S issues has been extensive in the last 2 years the ramifications of ACLs would likely lead to additional collaboration. The Council would either have a joint or complementary plan with the Commission and ACLs or other catch quotas for federal management would be based on ABCs provided by its SSC and would have to account for any state fishing mortality beyond the control of the Council. While the Council would not be able to totally control all mortality because of state fisheries and discards in state waters, mortality in federal waters would be limited. If an Acceptable Biological Catch (ABC) provided by the Council's SSC was greater than anticipated state mortality then the difference could be utilized as federal water mortality.

Alternative Set 9 Summary and Conclusion

The two key questions that will have to be answered by the Council are: 1) Is the current management framework is sufficient to conserve RH/S stocks; **and** 2) Can federal management by the Council improve management of RH/S enough to justify the management cost burden. It is not clear that Council involvement would be sufficient to conserve RH/S stocks given the varied challenges faced by RH/S stocks. It also may be true that the Council could achieve much of what it would do for RH/S informally outside of federal FMP management. However, adding RH/S stocks into an FMP would likely bring additional resources to bear and at least result in additional efforts and coordination between ASMFC, NMFS, the Council, the states, and other management partners for whichever stocks were chosen if any. The future efforts of these organizations are difficult to predict, but it is reasonable to conclude that there would be some gains for RH/S species through future actions if they are listed as stocks in the MSB fishery, as described above. However, the uncertainty regarding the current factors causing RH/S populations to remain in a depressed state means that it is difficult to identify specific causes and link remedies to specific outcomes. Given this, the extent of benefits from adding RH/S as stocks in the fishery is very difficult to quantify even though impacts are likely to be positive.

Given RH/S share similar life histories each would benefit to some degree if any were chosen, but each species would benefit most if it itself was chosen due to the catch control, EFH conservation, and general management coordination that would result.

8.0 Cumulative Effects Assessment

A cumulative effects assessment (CEA) is a required part of an EIS according to the Council on Environmental Quality (CEQ) (40 CFR part 1508.7). The purpose of the CEA is to integrate into the impact analyses the combined effects of many actions over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective but rather, the intent is to focus on those effects that are truly meaningful. This section serves to examine the potential direct and indirect effects of the alternatives in Amendment 14 together with past, present, and reasonably foreseeable future actions that affect the MSB environment. It may be noted that the predictions of potential synergistic effects from multiple actions, past, present and/or future will generally be qualitative in comparison to the analysis of the effects of individual actions given in Section 7.0.

The assessment presented here is explicitly structured upon the CEQ's 11-step CEA process that is described in their 1997 report, "Considering Cumulative Effects under the National Environmental Policy Act" (CEQ 1997). These eleven steps are itemized below:

The CEQ's eleven step CEA process. Taken from Table 1-5 in CEQ (1997).

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.

2. Establish the geographic scope for the analysis.

3. Establish the timeframe for the analysis.

4. Identify other actions affecting the resources, ecosystems, and human communities of concern.

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.

7. Define a baseline condition for the resources, ecosystems, and human communities.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

9. Determine the magnitude and significance of cumulative effects.

10. Modify and add alternatives to avoid, minimize, or mitigate significant cumulative effects.

11. Monitor the cumulative effects of the selected alternative(s) and adapt management.

To a great extent, the descriptions and analyses presented in previous sections of this document have contributed to the completion of most of the CEQ's eleven steps, however; the purpose of this section of the document is to point out to the reader how these steps have been accomplished within the development of Amendment 14 and its accompanying environmental impact analyses.

8.1 Significant Cumulative Effects from Proposed Action and Assessment Goals

In Section 6.0 (Description of the Affected Environment) the valued ecosystem components (VECs) that exist within the MSB fishery environment are identified and the basis for their selection is established. This is associated with the completion of Step 1 in the CEQ's 11-Step process. The VECs are listed below.

1. Managed Resources
   - Atlantic mackerel stock
   - *Illex* stock
   - *Longfin squid* stock
   - Atlantic butterfish stock
2. Non-target species
3. Habitat including EFH for the managed resources and non-target species
4. Endangered and other protected resources
5. Human Communities

8.2 Geographic Boundaries

The analysis of impacts focuses primarily on actions related to the harvest of the managed resources. Therefore, the geographic area used to define the core geographic scope for *managed resources*, *non-target species*, *habitat*, and *endangered and protected species* was the area within which the majority of harvest effort for the managed resources occurs (See Figure 22). For *human communities*, the core geographic boundaries are defined as those U.S. fishing communities directly involved in the harvest of the managed resources. These communities were found to occur in coastal states from Maine to North Carolina.

8.3 Temporal Boundaries

The temporal scope of past and present actions for *managed resources*, *non-target species*, *habitat and human communities* is primarily focused on actions that have occurred after FMP implementation (1979). For *endangered and other protected species*, the scope of past and present actions is on a species-by-species basis (Section 6.4) and is largely focused on the 1980s and 1990s through the present, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. The temporal scope of future actions for all five VECs, which includes the measures proposed by this amendment, extends five years into the future following the expected implementation in 2012 (i.e., ~2017). This period was chosen because the dynamic nature of resource management and lack of information on projects that may occur in the future makes it difficult to predict impacts beyond this timeframe with any certainty.

8.4 Identify Other Action Affecting the Resources, Ecosystems, and Human Communities of Concern.

Table 75 accomplishes Step 4 of the CEQ process which calls for the identification of other actions that affect the VECs, i.e., actions *other* than those being developed in this document. These actions are presented in chronological order, and codes indicate whether an action relates to the past (**P**), present (**Pr**), or reasonably foreseeable future (**RFF**). When any of these abbreviations occur together, it indicates that some past actions are still relevant to the present and/or future. A brief explanation of the rationale for concluding what effect each action has (or will have) had on each of the VECs is provided in the table and is not repeated here.

Note that most of these *other* actions come from *fishery-related activities* (e.g., Federal fishery management actions). As expected, these activities have fairly straight-forward effects on environmental conditions, and were, are, or will be taken, in large part, to improve those conditions. The reason for this is the statutory basis for Federal fisheries management - the MSA, as amended in 1996 and 2007. That legislation was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. More specifically the act stipulates that management comply with a set of National Standards that collectively serve to optimize the conditions of the human environment. Under this regulatory regime, the cumulative impacts of past, present, and future Federal fishery management actions on the VECs should be expected to result in positive long-term outcomes. Nevertheless, these actions are often associated with offsetting impacts. For example, constraining effective fishing effort (e.g., minimum mesh size for longfin squid in Amendment 5) may result in negative short-term socio-economic impacts for fishery participants (added cost of modifying gear). However, these impacts are usually necessary to bring about long-term sustainability of a given resource (in this case, increasing butterfish escapement, albeit marginally), and as such, should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon the managed resource.

Non-fishing activities that have meaningful effects on the VECs include the introduction of chemical pollutants, sewage, changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment. These activities pose a risk to the all of the identified VECs in the long term. Human induced non-fishing activities that affect the VECs under consideration in this document are those that tend to be concentrated in nearshore areas. Examples of these activities include, but are not limited to agriculture, port maintenance, beach nourishment, coastal development, marine transportation, marine mining, dredging and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and, as such, may indirectly lower the maximum sustainable yield of the managed resources, and negatively affect non-target species and protected resources. Decreased habitat suitability would tend to reduce the tolerance of these VECs to the impacts of fishing effort. Mitigation of this outcome through regulations that would reduce fishing effort could then negatively impact human communities.

The overall impacts of these *other* (past, present, and reasonably foreseeable) actions are summarized in Table 75 and discussed below. These impacts, in addition to the impacts of the management actions being developed in this document (Section 7.0), comprise the total cumulative effects that will contribute to the significance determination for each of the VECs exhibited later in Table 76.

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Table 75. Impacts of Past, Present and Reasonably Foreseeable Future Actions on the five VECs. These actions do not include those under consideration in this Amendment.

Action	Description	Impacts on Managed Resources	Impacts on Non-target Species	Impacts on Habitat and EFH	Impacts on Protected Species	Impacts on Human Communities
FISHERY-RELATED ACTIONS						
[P] Prosecution of the MSB fisheries by foreign fleets in the area that would become the U.S. EEZ (prior to implementation of the MSA)	Foreign fishing pressure peaked in the 1960s and slowly declined until passage of the MSA and implementation of the FMPs	**Direct High Negative** Foreign fishing depleted Atl. Mackerel stock below biomass threshold	**Potentially Direct High Negative** Limited information on discarding, but fishing effort was very high	**Potentially Direct High Negative** Limited information on discarding, but fishing effort was very high	**Potentially Direct High Negative** Limited information on protected resource encounters, but fishing effort was very high	**Potentially Indirect Negative** Revenue from fishing benefited foreign businesses
[P] Original FMPs (3) implemented (1978 and 1979)	Established management of the MSB fisheries	**Indirect Positive** Regulatory tool available to rebuild and manage stocks	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Benefited domestic businesses
[P, Pr] Original FMPs merged (1983)	Consolidated management of the MSB fisheries under one FMP	**No Impact** Administrative procedure	**No Impact** Administrative procedure	**No Impact** Administrative procedure	**No Impact** Administrative procedure	**No Impact** Administrative procedure
[P, Pr] Amendment 2 to the MSB FMP (1986)	Revised squid bycatch TALFF allowances	**Indirect Positive** Reduced squid mortality	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Benefited domestic businesses
[P] Amendment 3 to the MSB FMP (1991)	Established overfishing definitions for all four species	**Indirect Positive** Provided basis for sustainable management	**Indirect Low Positive** Reduced fishing effort	**Indirect Low Positive** Reduced fishing effort	**Indirect Low Positive** Reduced fishing effort	**Indirect Positive** Increased probability of long term sustainability
[P] Amendment 4 to the MSB FMP (1991)	Limited activity of directed foreign fishing and JV transfers to foreign vessels	**Indirect Low Positive** Reduced fishing effort	**Indirect Low Positive** Reduced fishing effort	**Indirect Low Positive** Reduced fishing effort	**Indirect Low Positive** Reduced fishing effort	**Indirect Positive** Benefited domestic businesses

Table 75 (continued)

Action	Description	Impacts on Managed Resources	Impacts on Non-target Species	Impacts on Habitat and EFH	Impacts on Protected Species	Impacts on Human Communities
[P, Pr] Amendment 5 to the MSB FMP (1996)	Eliminated foreign fisheries for squids and butterfish	**Potentially Indirect Positive** Reduced effort	**Potentially Indirect Positive** Reduced effort	**Potentially Indirect Positive** Reduced effort	**Potentially Indirect Positive** Reduced effort	**Indirect Positive** Benefited domestic businesses
	Implemented limited access for squid/butterfish	**Indirect Positive** Constrained fishing effort	**Indirect Positive** Constrained fishing effort	**Indirect Positive** Constrained fishing effort	**Indirect Positive** Constrained fishing effort	**Indirect Positive** Reduced overcapacity
	Expanded mg. unit to all four species	**No Impact** Administrative	**No Impact** Administrative	**No Impact** Administrative	**No Impact** Administrative	**No Impact** Administrative
	Establish longfin squid minimum mesh size (included exemption for *Illex* fishery)	**Low Positive** Marginal increase in butterfish escapement	**Direct Positive** Increased finfish escapement	**Unknown** Changes in fishing effort unknown	**Unknown** Changes in fishing effort unknown	**Indirect Negative (short term)** Cost of modifying gear
[P, Pr] Amendment 8 to the MSB FMP (1998)	Brought FMP into compliance with new and revised National Standards	**Indirect Positive** Improved regulatory tool for ensuring sustainability	**Indirect Positive** Strengthened mandate to reduce bycatch	**Indirect Positive** Strengthened mandate to protect habitat	**Indirect Positive**	**Indirect Positive (long term)**
[P, Pr] Summer Flounder, Scup and Black Sea Bass Specifications (2000)	Established scup small mesh gear restricted areas	**Potentially Indirect Positive** Reduced fishing effort locally	**Potentially Indirect Positive** Reduced fishing effort locally	**Potentially Indirect Positive** Reduced fishing effort locally	**Potentially Indirect Positive** Reduced fishing effort locally	**Indirect Negative (short term)** Cost associated with shifting effort for some participants
[P, Pr] Framework 2 to the MSB FMP (2002)	Extended moratorium on entry into limited access *Illex* fishery	**Indirect Positive** Constrain harvest capacity	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Potentially Indirect Positive** Prevented increases in capacity
[P] Framework 3 to the MSB FMP (2003)	Extended by one year moratorium on entry into limited access *Illex* fishery	**Indirect Positive** Constrain harvest capacity	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Potentially Indirect Positive** Prevented increases in capacity
[P, Pr] Framework 4 to the MSB FMP (2004)	Extended by five years moratorium on entry into limited access *Illex* fishery	**Indirect Positive** Constrain harvest capacity	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Potentially Indirect Positive** Prevented increases in capacity

Table 75 (continued)

Action	Description	Impacts on Managed Resources	Impacts on Non-target Species	Impacts on Habitat and EFH	Impacts on Protected Species	Impacts on Human Communities
[P, Pr] Amendment 9 to the MSB FMP (2008)	Multiple year specs	**No Impact** Administrative	**No Impact** Administrative	**No Impact** Administrative	**No Impact** Administrative	**No Impact** Administrative
	Extend *Illex* moratorium	**Positive** Would decrease the likelihood that the fishing quota would be exceeded	**Positive** Constrains effort	**No Impact** If current trawling effort is maintained, would not increase habitat disturbances.	**Positive** Constrains effort	**Potentially Positive** Maintains net benefits to fleet and dependent communities by limiting overcapitalization.
	Revise biological reference points for longfin squid	**Potentially Positive** Increase chance of achieving long term sustainable yield for longfin squid.	**Potential low negative** May increase effort slightly if it results in a higher quota.	**Potential low negative** May increase effort slightly if it results in a higher quota.	**Potential low negative** May increase effort slightly if it results in a higher quota.	**Potential low positive** May increase benefits slightly if it results in a higher quota.
	Designate EFH for longfin squid eggs based on documented observations of egg mops	**Potentially positive** if used as basis for future management.	**Potentially positive** if used as basis for future management.	**Potentially positive** if used as basis for future management.	**Potentially positive** if used as basis for future management.	**Potentially positive long term** if used as basis for future management to improve long-term sustainability of resource.
	Area closures to reduce gear impacts on EFH	**Low positive** Small area with low effort impacted	**Low positive** Small area with low effort impacted	**Low positive** Protects deep-sea corals in small area.	**Low positive** Small area with low effort impacted	**No impact** Small area with low effort impacted
[RFFA] Amendment 5 to Atlantic Herring FMP – See Appendix 4	Addresses reporting, monitoring, and RH catch in the Atl. herring fishery	**Indirect Positive** May improve data quality for monitoring total removals	**Positive** May increase information about RH/S catch and/or reduce that catch	**Probably Minimal**	**Probably Minimal**	**Negative if effort is restricted. Potentially positive long term** if used to improve long-term sustainability of resources.

Table 75 (continued)						
Action	**Description**	**Impacts on Managed Resources**	**Impacts on Non-target Species**	**Impacts on Habitat and EFH**	**Impacts on Protected Species**	**Impacts on Human Communities**
[Pr]Amendment 10 to the MSB FMP (2010-2011)	Rebuild Butterfish with butterfish bycatch mortality cap.	**Positive** Stock Rebuilding	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Variable** Significant losses possible if longfin squid fishery cannot avoid butterfish.
	Reduce bycatch to the extent practicable.	**Positive** Majority of butterfish caught are discarded.	**Low Positive** Minor mesh increase included.	**Likely neutral.**	**Likely neutral.**	**Potentially negative if efficiency decreases.**
[Pr] Atlantic Trawl Gear Take Reduction Team	Recommend measures to reduce mortality and injury to the common dolphin and long fin pilot whale	**Indirect Positive** Will improve data quality for monitoring total removals	**Indirect Positive** Reducing availability of gear could reduce bycatch	**Indirect Positive** Reducing availability of gear could reduce gear impacts	**Indirect Positive** Reducing availability of gear could reduce encounters	**Indirect Negative** Reducing availability of gear could reduce revenues
[P,Pr] Standardized Bycatch Reporting Methodology (2008)	Recommend measures to monitor bycatch at an acceptable level of precision and accuracy	**Indirect Positive** Will improve data quality for monitoring total removals of managed resources	**Indirect Positive** Will improve data quality for monitoring removals of non-target species	**Neutral** Will not affect distribution of effort	**Indirect Positive** Will increase and/or optimize observer coverage	**Potentially Indirect Negative** May impose an inconvenience on vessel operations
[P,Pr] Omnibus ACL/AM Amendment (2011)	Implemented ACLs/AMs in all FMPs as necessary	**Neutral to Positive** Managed species already managed with quotas	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Indirect Positive** Constrain fishing effort	**Positive** Sustainability of resources maintained.
[P,Pr,] Amendment 11 to the MSB FMP (2010-2011)	Updated EFH, established Rec-Com allocation, will implement mackerel limited access	**Positive –** limited access should limit race to fish	**Indirect Positive** Constrain fishing effort	**Potentially positive** if used as basis for future management.	**Indirect Positive** Constrain fishing effort	**Positive** Sustainability of resources maintained.
[RFFA] Strategy for Sea Turtle Conservation for the Atlantic Ocean and the Gulf of Mexico Fisheries	May recommend strategies to prevent the bycatch of sea turtles in commercial fisheries operations	**Indirect Positive** Will improve data quality for monitoring total removals	**Indirect Positive** Reducing availability of gear could reduce bycatch	**Indirect Positive** Reducing availability of gear could reduce gear impacts	**Indirect Positive** Reducing availability of gear could reduce encounters	**Indirect Negative** Reducing availability of gear could reduce revenues

Table 75 (continued)

NON –FISHERY RELATED ACTIONS						
Action	**Description**	**Impacts on Managed Resources**	**Impacts on Non-target Species**	**Impacts on Habitat and EFH**	**Impacts on Protected Species**	**Impacts on Human Communities**
P, Pr, RFFA Agriculture runoff	Nutrients applied to agriculture land are introduced into aquatic systems	**Indirect Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability in the immediate project area
P, Pr, RFFA Port maintenance	Dredging of wetlands, coastal, port and harbor areas for port maintenance	**Indirect Negative** Localized decreases in habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability in the immediate project area
P, Pr, RFFA Offshore disposal of dredged materials	Disposal of dredged materials	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Reduced habitat quality negatively affects resource viability in the immediate project area
P, Pr, RFFA Beach nourishment	Offshore mining of sand for beaches	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Mixed** Positive for mining companies, possibly negative for fisheries
	Placement of sand to nourish beach shorelines	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Positive** Beachgoers generally like sand
P, Pr, RFFA Marine transportation	Expansion of port facilities, vessel operations and recreational marinas	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Direct Negative** Reduced habitat quality in the immediate project area	**Indirect Negative** Localized decreases in habitat quality in the immediate project area	**Mixed** Positive for some interests, potential displacement for others

Table 75 (continued)

Action	Description	Impacts on Managed Resources	Impacts on Non-target Species	Impacts on Habitat and EFH	Impacts on Protected Species	Impacts on Human Communities
[P, Pr, RFFA] Installation of pipelines, utility lines and cables	Transportation of oil, gas and energy through pipelines, utility lines and cables	**Unknown** Dependent on mitigation effects	**Unknown** Dependent on mitigation effects	**Potentially Direct Negative** Reduced habitat quality in the immediate project area	**Unknown** Dependent on mitigation effects	**Unknown** Dependent on mitigation effects
[RFFA] Liquefied Natural Gas (LNG) terminals (w/in 5 years)	Transportation of natural gas via tanker to terminals located offshore and onshore (Several LNG terminals are proposed, including MA, RI, NY, NJ and DE)	**Unknown** Dependent on mitigation effects	**Unknown** Dependent on mitigation effects	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Unknown** Dependent on mitigation effects	**Unknown** Dependent on mitigation effects
[RFFA] Offshore Wind Energy Facilities (medium probability w/in 5 years)	Construction of wind turbines to harness electrical power (Several facilities proposed from ME through NC, including off the coast of MA, NY/NJ and VA)	**Unknown** Dependent on mitigation effects	**Unknown** Dependent on mitigation effects	**Potentially Direct Negative** Localized decreases in habitat quality possible in the immediate project area	**Unknown** Dependent on mitigation effects	**Unknown** Dependent on mitigation effects

Summary of Non-Fishing Effects Though largely unquantifiable, it is likely that the non-fishing activities noted above would have negative impacts on habitat quality from disturbance and construction activities in the area immediately around the affected area. This would be a direct impact on habitat and an indirect effect to planktonic, juvenile, and adult life stages of fish and protected species in the project areas due to habitat degradation. Given the wide distribution of the affected species, minor overall negative effects to habitat are anticipated since the affected areas are localized to the project sites, which involve a small percentage of the fish populations and their habitat.

Summary Effects of Past and Present Actions The present conditions of the VECs are empirical indicators of the summary effects of past actions since, independent of natural processes, and these present conditions are largely the product of these past actions. The combined effects of these actions are described in the VEC-by-VEC discussion below and are summarized in Table 76.

Managed species: The status of mackerel, butterfish, *Illex*, and longfin squid are unknown as of November 2011. Longfin squid biomass in 2009 was established to be above an accepted target but given the short lifespan of longfin squid it's true status, like that of the other MSB stocks, is unknown. While the negative effects of past and present actions associated with non-fishing activities (**Table 75**) may have increased negative effects, it is likely that those actions were minor due to the limited scale of the habitat impact compared with the populations at large.

Non-target species: The summary effects of past and present actions are less clear than for the managed resources. This is because the information needed to quantitatively measure the impacts on these species of MSB fishery activities and non-fishing activities is generally lacking. The continued implementation of the omnibus SBRM Amendment is expected to provide more data to allow management to better manage bycatch. The summary effects of past and present actions on non-target species are considered to be a mixed set of partially offsetting positive effects through fishery effort reduction and negative effects through bycatch mortality and non-fishing activities. The prosecution of fishing activities in general will necessarily reduce the abundance of various non-target species. As such, effort reduction or gear modifications will, in effect, reduce the magnitude of the negative impact of fishing in general. Again, although the negative effects of past and present actions associated with non-fishing activities (**Table 75**) may have increased negative effects, it is likely that those actions were minor due to the limited scale of the habitat impact compared with the populations at large. Altogether, the resultant impact of past and present actions on non-target species is a likely net negative sum effect. Again this would likely improve with future actions to reduce bycatch.

Habitat and Protected Species: For the habitat and protected resource VECs, the summary effects of past and present actions are also considered to be negative. This follows the same logic presented under the discussion of impacts on non-target species: effort reduction or gear modifications will, in effect, reduce the magnitude of the negative impact on these VECs that results from fishing activities. Again, although the negative effects of past and present actions associated with non-fishing activities (**Table 75**) may have increased negative effects, it is likely that those actions were minor due to the limited scale of the habitat impact compared with the populations at large. Thus, the resultant impact of past and present actions on non-target species is a net negative sum effect on these VECs.

Human communities: The summary effect of past and present actions is complex since the effects have varied among fishery participants, consumers, and communities. Nevertheless, the net effect is considered to be positive in that the fisheries managed under the MSB FMP currently support viable domestic and international market demand. While some short-term economic costs have been associated with effort reductions and gear modifications (see **Table 75**), economic returns have generally been positive and as such, have tended to make a positive contribution to the communities associated with harvest of these species.

Summary Effects of Future Actions As with past and present actions, the list of reasonably foreseeable future actions is provided in **Table 75**. Additionally, the same general trends will be noted with regard to the expected outcomes of fishery-related actions and non-fishing actions; the summary effects of fishery related actions tend to be positive with respect to natural resources although short-term negative or mixed effects are expected for human communities. Conversely, for the non-fishing actions listed in **Table 75**, the general outcome remains negative in the immediate project area, but minor for all VECs, again due to the difference in scale of exposure of the habitat perturbation and the population.

The directionality of the impacts of future actions on the VECs will necessarily be a function of the offsetting negative vs. positive impacts of each of the actions. Since the magnitude and significance of the impacts of these future actions, especially non-fishing impacts, is poorly understood, conclusions as to the summary effects will essentially consist of an educated guess.

Recall that the future temporal boundary for this CEA is five years after implementation of the amendment (~2015; Section 8.3). Within that timeframe, the summary effects of future actions on managed resources, non-target species, habitat, and protected resources are all expected to be positive, notwithstanding the localized nearshore negative effects of non-fishing actions. The optimization of the conditions of the resources is the primary objective of the management of these natural resources. Additionally, it is unknown, but expected that technology to allow for mitigation of the negative impacts of non-fishing activities will improve. Future actions (Amendment 10) are anticipated to decrease butterfish discards and incidental catch, thus, providing for a positive future impact for this and non-target species. Also noteworthy is the forthcoming Trawl Take Reduction Strategy, which would reduce the take of marine mammals and other species in the trawl gear used in these fisheries.

For human communities, short-term (i.e., within the temporal scope of this CEA) costs may occur. This negative impact is expected to be the byproduct of an adjustment to the improved management of the natural resources. In the longer term, positive impacts on human communities should come about as sustainability of natural resources is attained.

Table 76. Summary effects of past, present and reasonably foreseeable future actions on the VECs identified for Amendment 14 (based on actions listed in Table 75).

VEC	Past Actions (P)	Present Actions (Pr)	Reasonably Foreseeable Future Actions (RFFA)	Combined Effects of Past, Present, Future Actions
Managed Resources	Uncertain since status of all species is currently unknown but likely positive given continued fisheries.	Uncertain since status of all species is currently unknown but likely positive given continued fisheries.	Uncertain since status of all species is currently unknown but likely positive given continued fisheries.	Uncertain since status of all species is currently unknown but likely positive given continued fisheries.
Non-Target Species	**negative** combined effects of bycatch mortality and non-fishing actions that reduce habitat quality	**negative or somewhat less negative than past** combined effects of reduced bycatch mortality and non-fishing actions that reduce habitat quality	**positive** reductions in bycatch incidence, improved bycatch estimation,	**Negative in short term** bycatch will continue until reduction measures are implemented **Long term positive** Amendment 10, 14 measures would benefit other species, improved bycatch accounting, improved habitat quality
Habitat	**negative** combined effects of disturbance by fishing gear and non-fishing actions have reduced habitat quality	**negative or somewhat less negative than past** continued combined effects of disturbance by fishing gear and non-fishing actions have reduced habitat quality	**positive** reduction in effects of disturbance by fishing gear are expected	**positive** reduced habitat disturbance by fishing gear
Protected Resources	**negative** combined effects of gear encounters and non-fishing actions that reduce habitat quality	**Negative or somewhat less negative than past** combined effects of gear encounters and non-fishing actions that reduce habitat quality	**positive** reduced gear encounters through effort reduction, and Sea Turtle Strategy; improved habitat quality is expected	**Negative short term** until trawl take reduction research plan is implemented; **Positive long term** reduced encounters through effort reduction and Trawl take reduction research plan /Sea Turtle Strategy; improved habitat quality is expected

Human Communities	**positive** fisheries have supported profitable industries and viable fishing communities	**positive** fisheries continue to support profitable industries and viable fishing communities	**short-term negative** some revenue loss may occur if management results reduction of revenue per unit of effort	**short-term negative** Uncertain since status of all species is currently unknown **long-term positive** sustainable resources should support viable communities and economies

8.5 RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES IDENTIFIED IN SCOPING IN TERMS OF THEIR RESPONSE TO CHANGE AND CAPACITY TO WITHSTAND STRESSES

See 8.6, below.

8.6 STRESSES AFFECTING THE RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES AND THEIR RELATION TO REGULATORY THRESHOLDS

CEQ Steps 5 and 6 were accomplished either explicitly or implicitly in this document for each VEC in Section 6.0. It is suggested that the reader refer to the appropriate subsections to obtain details regarding this information.

In terms of stresses affecting fishing businesses, the Council has been conducting a visioning exercise and receiving much input from stakeholders. For MSB participants, 3 common themes were 1) The price of fuel has made profitable fishing difficult and 2) a sequential limiting of fishermen's ability to switch from a less abundant to a more abundant species has bade profitable fishing difficult and exacerbated stock size swings, and 3) It is not so much any one regulation that puts fishermen out of business so much as the every growing compendium of regulations.

Table 77. Summary of information related to CEQ steps 5 and 6 that were addressed in Section 6.0.
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VEC	CEQ Step 5 (Response to change and ability to withstand stress – i.e., significance criteria)	CEQ Step 6 (Stresses affecting the resources)
Managed Resource	• Biomass drops below threshold (e.g., ½ B_{MSY}) • Fishing mortality exceeds threshold (e.g., F_{MAX}) (these thresholds are defined for each managed resource in Section 6.1)	• Directed harvest • Discarding • Non-fishing activities
Non-target species	• Largely unquantifiable, but implementation of development of omnibus SBRM FMP should improve.	• Encounters with fishing gear • Non-fishing activities
Habitat	See EFH overlap analysis of Amendment 9, Section 6.3.4.1	• Encounters with fishing gear • Non-fishing activities
Protected Resources	• Marine mammals - mortalities exceed potential biological removal (PBR) which is defined for each species in Section 6.4. • Sea Turtles – nest counts, or estimated number of nesting females below target levels	• Encounters with fishing gear • Non-fishing activities
Human Communities	In general, the significance of impacts is measured by the potential for revenue loss. The standards established under E.O. 12866 or RFA may be candidates.	• Short term: revenue losses from changes in current fishing practices (e.g., gear modifications, area closures). • Short term and long term: revenue losses from resource depletion

For the purposes of providing a conceptual context for this discussion of the affect the human environment, some general categories of the environmental influences on the VECs are provided in **Figure 70**. Most of the time, influences of actions on the population size of a managed resource can, by and large, be extended to populations of non-target species or protected species, and vice versa, especially with regard to increases and decreases in fishing effort. The effects of actions on habitat quality can come from a wide variety of fishing and non-fishing activities. In turn, habitat quality factors into the condition of the managed resource, non-target species, and protected resource VECs.

The condition of the human communities VEC is generally associated with increases and decreases in revenue from fishing operations. Operating costs tend to increase when availability of the managed resource decreases either through scarcity or through regulatory restrictions on harvest. The availability of the managed resource also affects competition among fishing entities for resources and consumer demand. These factors influence product price which feeds back to the economic and social well-being of the human communities.

Optimizing the future condition of a given VEC can have offsetting impacts on other VECs. For example, if updating EFH designations led to future gear restricted areas, closing areas to bottom otter trawling would directly improve habitat quality, and be expected to indirectly improve the conditions of managed resources, non-target species, and protected resources. This action, however, would negatively impact human communities dependent on revenue from otter trawling in that area, at least in the short term. Additionally, the indirect benefits to managed resources, non-target species, and protected resources may be localized, and increased bottom trawl effort in other areas may offset these benefits to some degree.

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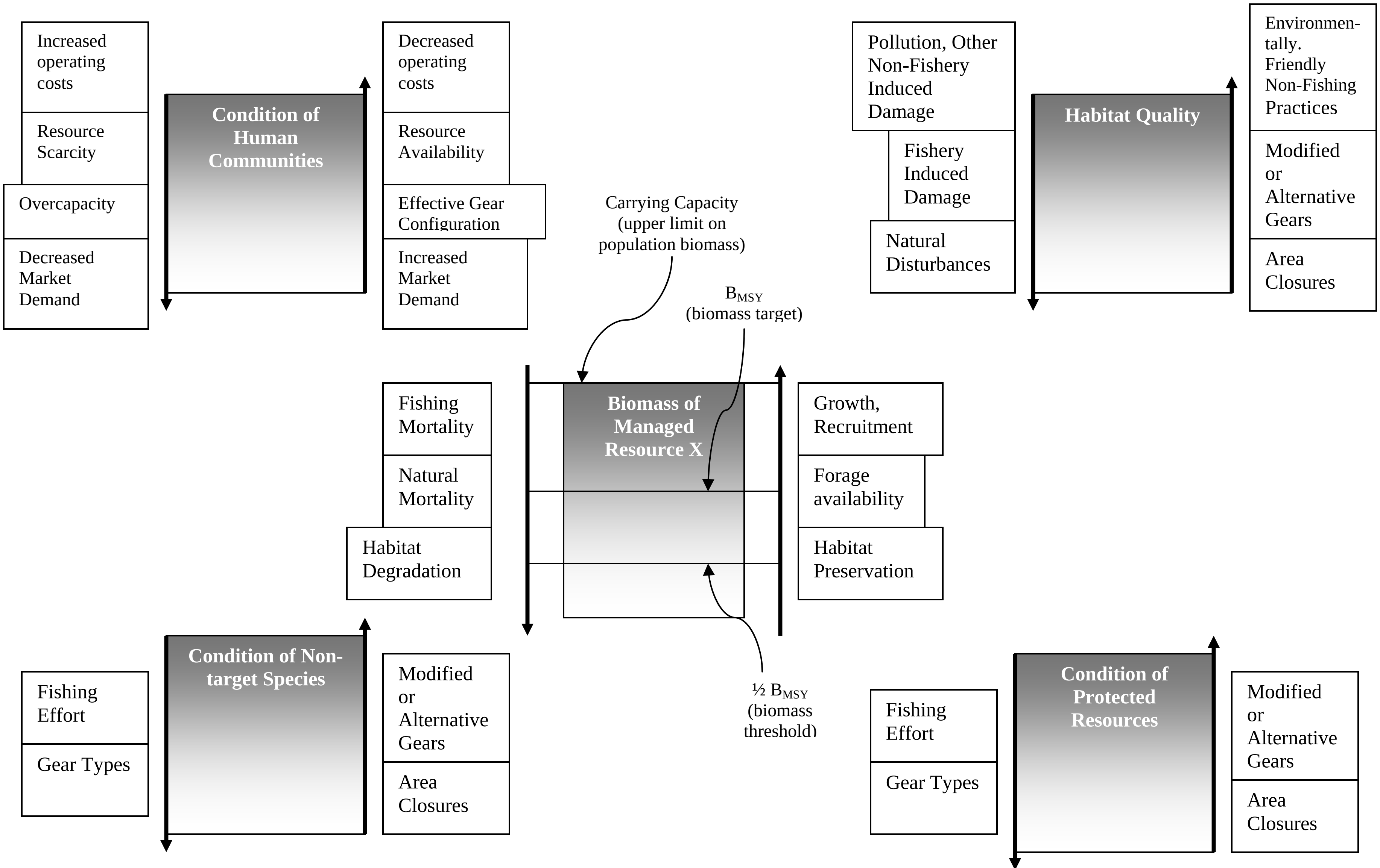

Figure 70. Examples of environmental sources of positive impacts (up arrows) and negative impacts (down arrows) for the five VECs.

8.7 BASELINE CONDITION FOR THE RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES

The CEQ's step 7 calls for a characterization of the baseline conditions for the VECs. For the purposes of this CEA, the baseline condition is considered as the present condition of the VECs plus the combined effects of the past, present and reasonably foreseeable future actions. **Table 78** summarizes the added effects of the condition of the VECs (i.e., status/trends/stresses from Section 6 and **Table 77**) and the sum effect of the past, present and reasonably foreseeable future actions (from Table 78). The resulting CEA baseline for each VEC is exhibited in the last column (shaded). In general, only qualitative metrics are available for the VECs. For managed species, the baseline condition is uncertain since the status of all managed species is currently unknown but it is likely positive given the continued fisheries that target and catch the managed species. For non-target species, the constraints of data quality preclude a quantitative baseline. The conditions of the habitat and human communities VECS are complex and varied. As such, the reader should refer to the characterizations given in Sections 6.3 and 6.5, respectively. For protected resources the baseline is negative in the short run given continued interaction but should be positive in the long run as additional mitigations are implemented. As mentioned above, this CEA Baseline is then used to assess cumulative effects of the proposed management actions.

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Table 78. CEA baseline conditions of the VECs.

VEC		Status/Trends/Stresses	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 76)	Combined CEA Baseline Conditions
Managed Resource	**Atl. Mackerel**	Unknown; landings variable	Uncertain since status of all species is currently unknown but likely positive given continued fisheries.	Uncertain since the status of all species is currently unknown but likely positive given continued fisheries exist.
	Illex	Unknown; landings variable		
	longfin squid	Unknown; landings variable		
	Butterfish	Unknown; landings constrained by regulations		
Non-target Species (principle species listed in section 6. 2)		Quantitative characterization of bycatch in MSB fisheries is poor to unknown; longfin squid fishery continues to account for large proportion of discards observed in NEFOP for several species including butterfish	**Negative in short term** bycatch will continue until reduction measures are implemented; **Long term positive** Amendment 10 measures would benefit other species, improved bycatch accounting, improved habitat quality	**Negative in short term** Increased bycatch rates will continue until reduction measures are implemented **Positive in long term** continued bycatch minimization should improve bycatch accounting and/or reduce bycatch
Habitat		Complex and variable - See Section 6.3.4.1of Amendment 9; Non-fishing activities had historically negative but site-specific effects on habitat quality; Mouth of Hudson Canyon/Tilefish HAPC among the areas most ecologically sensitive	**Positive** reduced habitat disturbance by fishing gear	**Positive** - reduced habitat disturbance by fishing gear and non-fishing actions

Protected Resources	Common dolphin	Unknown status, but takes are below PBR; taken by longfin squid, mackerel and other fisheries;	**Negative or somewhat less negative than past in short term** until Trawl take reduction research plan is implemented, improved habitat quality **Long term positive** reduced gear encounters through effort reduction and Trawl take reduction research plan /Sea Turtle Strategy; improved habitat quality are expected	**Negative or low negative in short term** -- Until Trawl take reduction research plan is implemented **Positive** – reduced gear encounters through effort reduction and Trawl take reduction research plan, Sea Turtle Strategy; improved habitat quality
	White-sided dolphin	Unknown status, but takes are below PBR; historically taken by foreign mackerel vessels;		
	Pilot whales	Unknown status, but takes are below PBR; taken by *Illex* and longfin squid		
	Leatherback sea turtle	ESA classification: Endangered, number of nesting females below sustainable level; taken by longfin squid trawl		
	Loggerhead sea turtle	ESA classification: Threatened, nest counts (~6,200 in 1998) below goal (12,800); taken by *Illex* and longfin squid trawl		
Human Communities		Complex and variable - See Section 6.5	**Positive -** Long-term sustainable resources should support viable communities and economies	**Short-term is uncertain given uncertainty about stock status.** **Long-term positive** as sustainable resources should support viable communities and economies

The following sections elaborate on each CEA Baseline:

Managed Resource Impacts CEA Baseline: Since the current status of the managed resources is unknown, the CEA Baseline is uncertain but probably positive given the stocks continue to support fisheries although landings can be highly variable. **Bottom Line: Uncertain but probably positive.**

Non-target Species Impacts CEA Baseline: Fishery encounters with non-target species (6.2), and the subsequent bycatch mortality remains a substantial fishery management problem. At present, the nature and extent of non-target species discarding by the MSB fisheries, as well as many others operating in the U.S. Atlantic remains difficult to characterize. Given impending incidental catch reduction management measures, the CEA baseline is negative in the short run as high incidental catch rates and discards (especially in the longfin squid fishery) are likely still occurring but positive in the long run as management measures are implemented to reduce incidental catch. As mentioned above, non-fishing effects, although potentially negative to all fish species, are likely not exerting much negative effects on non-target species, due to the small scale of the habitat perturbation relative to the populations at large. **Bottom Line: Still negative in short run but expected positive in long run.**

Habitat Impacts CEA Baseline: For habitat, the summary effects of past and present actions assessed above in Section 8.4 were considered to be positive. Effort reduction or gear modifications will, in effect, reduce the magnitude of the negative impact on this VEC that results from fishing activities. Again, although the negative effects of past and present actions associated with non-fishing activities (**Table 75**) may have increased negative effects, it is likely that those actions were minor due to the limited scale of the habitat impact compared with the populations at large. Considering fishing effort over the next 5 years will likely be reduced, a resultant positive impact on habitat of “other” actions is anticipated. **Bottom Line: Positive due to effort reduction and habitat-based area closures.**

Protected Resource Impacts CEA Baseline: For the protected species affected by this Amendment (listed in Section 6.4), the summary effects of the “other” past and present actions assessed above were considered to be negative in the short term but positive in the long term due to future effort reduction or gear modifications (gear modifications lessen the negative impact of a given level of effort). Future actions that would directly reduce the mortality of protected resources from encounters with MSB fisheries include the implementation of the Atlantic Trawl Gear Take Reduction Plan and the Strategy for Sea Turtle Conservation for the Atlantic Ocean and the Gulf of Mexico Fisheries. These actions and the current protection under MMPA and ESA are expected to result in positive cumulative impacts for these protected resources. **Bottom Line: Negative in short term but positive due to effort reduction and other efforts to reduce gear interactions.**

Human Communities Impacts CEA Baseline: The net effect of past and present “other” actions is considered to be positive in that the fisheries managed under the MSB FMP currently support viable domestic and international market demand. While some short-term economic costs have been associated with effort reductions and gear modifications (see **Table 75**), economic returns have generally been positive and as such, have tended to make a positive contribution to the communities associated with harvest of these species. In the short-term future (i.e., within the temporal scope of this CEA), costs may occur. This negative impact is expected to be the byproduct of an adjustment to the improved management of the natural resources. In the longer term, positive impacts on human communities should come about as sustainability of natural resources is attained. **Bottom Line: Uncertain but probably positive in short run and should be positive in the long run.**

8.8 CAUSE-AND-EFFECT RELATIONSHIPS BETWEEN HUMAN ACTIVITIES AND RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES

CEQ's step 8 has been accomplished through the analyses of impacts presented in Section 7.0, as well as the summary of past, present, and reasonably foreseeable future actions presented in **Table 75**, and the relationships between the VECs illustrated in **Figure 70** and its accompanying text.

8.9 MAGNITUDE AND SIGNIFICANCE OF CUMULATIVE EFFECTS

According to CEQ guidance, determining the magnitude of the cumulative effects consists of determining the separate effects of past actions, present actions, the proposed action (and reasonable alternatives), and other future actions. Once that is done, cumulative effects can be described. The significance of the effects is related to the magnitude, but also takes into account context and distribution. **Table 75** in Section 8.4 lists the effects of individual past, present, and future actions and is organized in chronological order so that review of that table will assist the reader in understanding the conclusions presented below regarding the summary effects of these separate actions. Note that fishery-related activities consist almost entirely of positive effects (with the exception of some short term negative effects on human communities) while non-fishing activities are generally associated with negative effects. This is not to say that some aspects of the various VECs are not experiencing negative impacts, but rather that when taken as a whole and compared to the level of unsustainable effort that existed prior to and just after the fishery came under management control, the overall long-term trend is positive. The basis for this general outcome is explained in the text provided in Section 8.4. **Table 78** and associated text describes the summary effects of the past, present and future actions on the VECs.

<u>Summary Incremental Impacts of the Proposed Actions</u>

The impacts of the proposed actions are described in Section 7 and summarized in the executive summary (see also table 8). Since the impact of every alternative on every VEC is described in those sections, they are not repeated here. For the Final EIS the incremental impacts of the preferred alternatives will be repeated here but there are no preferred alternatives yet.

<u>Summary Cumulative Effects of the Proposed Actions</u>

The cumulative effects of the proposed actions are strongly dependent on which combinations of actions are ultimately implemented. Once preferred alternatives have been selected a summary effects comparison will be made. However, regardless of which actions are ultimately implemented through this amendment, it is expected that the overall long-term cumulative effects should be positive for all VECs. This is because, barring some unexpected natural or human-induced catastrophe, the regulatory atmosphere within which Federal fishery management operates requires that management actions be taken in a manner that will optimize the conditions of resources, habitat, and human communities. Consistent with NEPA, the MSA requires that management actions be taken only after consideration of impacts to the biological, physical, economic, and social dimensions of the human environment. This document functions to identify the likely outcomes of various management alternatives. Identification of alternatives that would compromise resource sustainability should make implementation of those alternatives unlikely. With this in mind, the expected likely cumulative impacts for the VECs are described below. While again, the final selection of alternatives are not known, all of the alternatives in this document are geared toward goals of better monitoring of directed catch, better monitoring and data about incidental catch, reduction of non-target catch of river herrings and shads, and general management of river herrings and shads. Assuming that some alternatives are ultimately selected, and the ones that are selected are those predicted to have positive impacts as described above in Section 7, there should be positive impacts related to the above goals.

<u>Cumulative Managed Resources</u>

The CEA baseline for managed resources is uncertain but probably positive (Table 78) . The provisions considered in this amendment, by improving monitoring and reducing effort should maintain or improve upon the baseline, though these stocks are likely to be plagued by uncertainty given their difficult-to-assess life history and the limited resources of NMFS to conduct the level of surveying and assessing that would be necessary to ascertain the real stock status of the managed resources in near real time. The past and present impacts, combined with any alternatives selected from the Proposed Alternatives and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should continue to yield positive impacts to the managed resources in the long term.

<u>Cumulative Non-target Species Impacts:</u>

The CEA baseline for non-target species resources is negative in the short run but expected to be positive in the long run (Table78). The provisions considered in this amendment, by increasing monitoring, at-sea observing, and reducing catch of RH/S should contribute to positive effects on the VEC's cumulative impacts in the future but there are still other non-target species interactions to address so cumulative impacts will still probably be negative in the short term. The past and present impacts, combined with any alternatives selected from the Proposed Alternatives and future actions which are expected to continue attempts to minimize impacts to non-target species, should continue to eliminate negative impacts to non-target species and produce a neutral to low positive cumulative impact in the future.

<u>Cumulative Habitat Impacts:</u>

The CEA baseline for habitat is positive (Table 78). Nothing in the amendment is expected to increase effort (and therefore habitat impacts), so cumulative impacts for habitat would be expected to continue to be positive. Also, if RH/S were added as stocks in the fishery in this fishery EFH for those species would be afforded further protection which would further provide positive habitat impacts. The past and present impacts, combined with any alternatives selected from the Proposed Alternatives and future actions should continue to have a positive cumulative impact on habitat.

Cumulative Protected Resource Impacts:

The CEA baseline for protected resources is negative in the short term but positive due to effort reduction and other efforts to reduce gear interactions (Table 78). While some effort reduction could occur as a result of the alternatives in this document, since the alternatives are not designed specifically to reduce protected species impacts, cumulative protected resource impacts are likely the same as the baseline, negative in the short run but positive in the long run. The past and present impacts, combined with any alternatives selected from the Proposed Alternatives and future actions will continue to produce a low negative impact until reduced gear encounters are realized.

Cumulative Human Communities Impacts:

The CEA baseline for human communities is probably positive in short run and should be positive in the long run (Table78). The monitoring, at-sea observing, and bycatch reduction alternatives considered in this document should reinforce effective conservation of the managed and non-target species leading to improved management of these natural resources which would continue to support positive long term cumulative impacts and continue to support viable domestic and international market demand and revenues related to these fisheries. The past and present impacts, combined with any alternatives selected from the Proposed Alternatives and future actions and produce a positive cumulative impact to human communities in the future

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9.0 CONSISTENCY WITH THE MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

9.1 NATIONAL STANDARDS

Section 301 of the MSA requires that FMPs contain conservation and management measures that are consistent with the ten National Standards:

In General. – Any fishery management plan prepared, and any regulation promulgated to implement any such plan, pursuant to this title shall be consistent with the…national standards for fishery conservation and management.

Unless otherwise mentioned below, the alternatives identified in this amendment do not address any of the management measures previously implemented under the FMP which were found to be fully in compliance with all national standards of the MSA.

(1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

(2) Conservation and management measures shall be based upon the best scientific information available.

(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

(4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

(5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

(8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

(9) Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

9.2 OTHER REQUIRED PROVISIONS OF THE MAGNUSON-STEVENS ACT

Section 303 of the MSA contains 15 additional required provisions for FMPs, which are discussed below. Any FMP prepared by any Council, or by the Secretary, with respect to any fishery, shall:

(1) contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are-- (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the National Standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

(2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

(3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

(4) assess and specify-- (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3); (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing; and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

(5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

(6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

(7) describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

Section 6.3 of this document describes and identifies EFH in order to satisfy this provision.

(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

The preparation of this amendment included a review of the scientific data that were available to assess the impacts of all alternatives in this amendment.

(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and management measures on-- (A) participants in the fisheries and fishing communities affected by the plan or amendment; and (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

Section 7.5 of this document provides an extensive assessment of the likely effects of the actions proposed in this amendment on fishery participants and communities.

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority-- (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided;

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;

(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

(15) establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

9.3 ESSENTIAL FISH HABITAT ASSESSMENT

The MSA / EFH Provisions (50 CFR 600.920(e)(3)) require that any Federal action which may adversely affect EFH must include a written assessment of the effects of that action on EFH. As describes in Section 7, there are not expected to be substantial adverse impacts on EFH.

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10.0 Relationship to Other Applicable Law

10.1 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

10.1.1 Introduction

In order to consider a full range of alternatives related to this Amendment, the Council determined that the development of an EIS would be necessary to fulfill the requirements of NEPA. NEPA requires preparation of an Environmental Impact Statement (EIS) for major Federal actions that significantly affect the quality of the environment. The Council published a Notice of Intent (NOI) to prepare this Amendment and the EIS in the *Federal Register* on June 9, 2010

The primary purposes of Amendment 14 to the Atlantic Mackerel, Squid, and Butterfish (MSB) Fishery Management Plan (FMP) are to:

> **Purpose A**: "**Implement Effective RH/S Catch Monitoring**" **–** Purpose A is to consider alternatives that would implement monitoring programs for the Mackerel, Squid, and Butterfish (MSB) fisheries that are sensitive enough and robust enough to the spatial and temporal variability of RH/S distributions so that good RH/S catch estimates can be generated. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires Councils "to specify the pertinent data which shall be submitted to the Secretary with respect to…fishing…in the fishery" (Section 303(a)(5)) and Section 8 under discretionary fishery management plan provisions allows implementation of observer requirements.
>
> **Purpose B**: "**Reduce RH/S Bycatch and/or Catch**" **–** Purpose B is to consider alternatives to reduce bycatch (discards) and/or total catch of RH/S in the MSB fisheries. The MSA requires Councils to minimize bycatch (discards) to the extent practicable (Section 301 – National Standard 9) and provides discretionary authority to "include management measures in the plan to conserve…non-target species…considering the variety of ecological factors affecting fishery populations" (Section 303(b)(12)). Because information on how much RH/S catch might be sustainable is lacking, it is not currently possible to quantify the impact on RH/S stocks of any catch reductions that may occur but such catch reductions would be likely to have a positive impact to some degree.
>
> **Purpose C**: "**Consider RH/S NS1 Stock Issues**" **–** Purpose B is to consider alternatives that would bring RH/S into the MSB plan in terms of Council management responsibilities, including annual catch limits and accountability measures, in order to improve overall RH/S management and conservation. The Magnuson-Stevens Fishery Conservation and Management Act's National Standard One (NS1) states "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery…" NMFS guidance on NS1 suggests that Councils have the discretion to add additional non-target species as stocks in the fishery to existing FMPs.

Potential measures being considered are detailed in Section 5 and summarized below:

Alternatives Related to Purpose A: Implement Effective RH/S Catch Monitoring

- **Alternative Set 1: Additional Vessel Reporting Measures**
- **Alternative Set 2: Additional Dealer Reporting Measures**
- **Alternative Set 3: Additional At-Sea Observation Optimization Measures**
- **Alternative Set 4: Port-side and Other Sampling/Monitoring Measures**
- **Alternative Set 5: At-Sea Observer Coverage Requirements**

Alternatives Related to Purpose B: Reduce RH/S Bycatch and/or Catch

- **Alternative Set 6 : Mortality Caps**
- **Alternative Set 7 : Restrictions in areas of high RH/S catch**
- **Alternative Set 8 : Hotspot Restrictions**

Alternatives Related to Purpose C: Considering RH/S NS1 Stock Issues

- **Alternative Set 9: Addition of RH/S as "Stocks in the Fishery" in the MSB FMP.**

10.1.2 Development of EIS

The Council began the formal development of Amendment 14's EIS in 2008 following the publication of the supplemental NOI to prepare an EIS. The Council held a number meetings of its Squid, Mackerel, and Butterfish (SMB) Committee, and Amendment 14's Fishery Management Action Team (FMAT). All of these meetings, as well as several related Council meetings, were open to the public.

10.1.3 List of Preparers and DEIS Distribution List

This document was prepared by the Mid-Atlantic Fishery Management Council staff and other members of the Amendment 14 Fishery Management Action Team. Copies of this document and other associated documents are available from Dr. Christopher M. Moore, 114 Executive Director, Mid-Atlantic Fishery Management Council, Suite 201, 800 North State Street, Dover, DE 19901 or online at www.mafmc.org, in the section for MSB fisheries.

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10.2 MARINE MAMMAL PROTECTION ACT (MMPA)

The MAFMC has reviewed the impacts of Amendment 14 on marine mammals and has concluded that the proposed management actions are consistent with the provisions of the MMPA, and will not alter existing measures to protect the species likely to inhabit the management unit. For further information on the potential impacts of the fishery and the proposed management action on marine mammals, see Section 7.4 of this document.

10.3 ENDANGERED SPECIES ACT (ESA)

Section 7 of the ESA requires Federal agencies conducting, authorizing, or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. Formal consultation on the MSB fishery was last completed on October 29, 2010. The October 29, 2010, Biological Opinion concluded that the operation of the MSB fishery is not likely to jeopardize the continued existence of listed species. Since the Atlantic sturgeon DPSs have been listed as endangered and threatened under the ESA, the ESA Section 7 consultation for the MSB fisheries has been reinitiated, and additional evaluation will be included in the resulting Biological Opinion to describe any impacts of the fisheries on Atlantic sturgeon and define any measures needed to mitigate those impacts, if necessary. It is anticipated that any measures, terms and conditions included in an updated Biological Opinion will further reduce already low impacts to the species.

10.4 COASTAL ZONE MANAGEMENT ACT

Section 307(c)(1) of the Federal CZMA of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Pursuant to the CZMA regulations at 15 CFR 930.35, a negative determination may be made if there are no coastal effects and the subject action: (1) Is identified by a state agency on its list, as described in § 930.34(b), or through case-by-case monitoring of unlisted activities; or (2) which is the same as or is similar to activities for which consistency determinations have been prepared in the past; or (3) for which the Federal agency undertook a thorough consistency assessment and developed initial findings on the coastal effects of the activity. Accordingly, NMFS has determined that this action would have no effect on any coastal use or resources of any state. Letters documenting the NMFS negative determination, along with this document, will be sent to the coastal zone management program offices of the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. A list of the specific state contacts and a copy of the letters will be made available upon request.

10.5 ADMINISTRATIVE PROCEDURES ACT

Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Council is not requesting any abridgement of the rulemaking process for this action.

10.6 INFORMATION QUALITY ACT

Utility of Information Product

The proposed document includes: A description of the management issues, a description of the alternatives considered, and the reasons for selecting the management measures, to the extent that this has been done. These actions propose modifications to the existing FMP. These proposed modifications implement the FMP's conservation and management goals consistent with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as well as all other existing applicable laws.

This proposed amendment was developed as part of a multi-stage process that involves review of the amendment document by affected members of the public. The public had the opportunity to review and comment on management measures at public hearings after the Council approved the public hearing document/DEIS. There will also be a comment period for the FEIS. The Federal Register notice that announces the proposed rule and the implementing regulations will be made available in printed publication and on the website for the Northeast Regional Office. The notice provides metric conversions for all measurements.

Integrity of Information Product

The information product meets the standards for integrity under the following types of documents:

Other/Discussion (e.g., Confidentiality of Statistics of the Magnuson-Stevens Fishery Conservation and Management Act; NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics; 50 CFR 229.11, Confidentiality of information collected under the Marine Mammal Protection Act.)

Objectivity of Information Product

The category of information product that applies for this product is “Natural Resource Plans.”

In preparing documents which amend the FMP, the Council must comply with the requirements of the Magnuson-Stevens Act, the National Environmental Policy Act, the Regulatory Flexibility Act, the Administrative Procedure Act, the Paperwork Reduction Act, the Coastal Zone Management Act, the Endangered Species Act, the Marine Mammal Protection Act, the Data Quality Act, and Executive Orders 12630 (Property Rights), 12866 (Regulatory Planning), 13132 (Federalism), and 13158 (Marine Protected Areas).

This amendment was developed to comply with all applicable National Standards, including National Standard 2. National Standard 2 states that the FMP's conservation and management measures shall be based upon the best scientific information available. Despite current data limitations, the conservation and management measures proposed to be implemented under this amendment are based upon the best scientific information available. This information includes NMFS dealer weighout data for 2007, which was used to characterize the economic impacts of the management proposals. These data, as well as the NMFS Northeast Fisheries Observer Program (NEFOP) database, were used to characterize historic landings, species co-occurrence in the MSB catch, and discarding. The specialists who worked with these data are familiar with the most recent analytical techniques and with the available data and information relevant to the MSB fisheries. Marine Recreational Fisheries Statistical Survey (MRFSS) data were used to characterize the recreational fishery for Atlantic mackerel (the only species managed under this FMP with a significant recreational component).

The policy choices (i.e., management measures) proposed to be implemented by this amendment document are supported by the available scientific information and, in cases where information was unavailable, proxy reference points are based on observed trends in survey data. The management measures considered via this document are being designed to meet the conservation goals and objectives of the FMP, and prevent overfishing and rebuild overfished resources, while maintaining sustainable levels of fishing effort to ensure a minimal impact on fishing communities.

The supporting materials and analyses used to develop the measures in the amendment are contained in the amendment document and to some degree in previous amendments and/or FMPs as specified in this document.

The review process for this amendment involves the Mid-Atlantic Fishery Management Council, the Northeast Fisheries Science Center, the Northeast Regional Office, and NOAA Fisheries headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, demersal resources, population biology, and the social sciences. The Council review process involves public meetings at which affected stakeholders have the opportunity to provide comments on the document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of the amendment document and clearance of the rule is conducted by staff at NOAA Fisheries Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

10.7 PAPERWORK REDUCTION ACT

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the Federal paperwork burden for individuals, small businesses, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government. With significant changes to the catch monitoring program proposed for the MSB fisheries, Amendment 14 may contain new collection of information requirements subject to the PRA, including changes to vessel and dealer reporting requirements, notification requirements, and affidavit requirements, among other things (see Section 10.10.2). The PRA package prepared in support of this action and the information collection required by the proposed action, including forms and supporting statements, will be submitted when the final measures are selected and Amendment 14 is submitted.

10.8 IMPACTS RELATIVE TO FEDERALISM/E.O. 13132

This amendment does not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under Executive Order (EO) 13132.

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10.9 ENVIRONMENTAL JUSTICE/E.O. 12898

This EO provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." EO 12898 directs each Federal agency to analyze the environmental effects, including human health, economic, and social effects of Federal actions on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA. Agencies are further directed to "identify potential effects and mitigation measures in consultation with affected communities, and improve the accessibility of meetings, crucial documents, and notices."

The alternatives in this amendment may significantly affect participation in the MSB fisheries. However, the proposed action would not be expected to cause disproportionately high and adverse human health, environmental or economic effects on minority populations, low-income populations, or Indian tribes. Moreover, while there may be short-term adverse impacts on fishery participants as a whole, the measures are expected to result in long-term benefits by effectively conserving fishery resources such that long-term sustainable harvests are optimized.

10.10 Regulatory Flexibility Act/E.O. 12866

10.10.1 Regulatory Impact Review and Initial Regulatory Flexibility Analysis (IRFA)

This section provides the analysis and conclusions to address the requirements of Executive Order 12866 and the Regulatory Flexibility Act (RFA). Since many of the requirements of these mandates duplicate those required under the Magnuson-Stevens Act and NEPA, this section contains references to other sections of this document. The following sections provide the basis for concluding that the proposed actions are not significant under E.O. 12866 and will not have a significant economic impact on a substantial number of small entities under the RFA.

10.10.2 Description of Management Objectives

The goals and objectives of the management plan for the MSB resources are stated in Section 4.3 of this document. The proposed actions are consistent with, and do not modify those goals and objectives.

10.10.3 Description of the Fisheries

Section 6.1 of this document contains a detailed description of the fisheries managed under this FMP.

10.10.4 <u>Statement of Problem/Need for Action</u>

The purpose and need for this action were summarized in the Executive Summary, 10.1, and further described in Section 4.1 of this document.

10.10.5 Description of the Alternatives

The potential measures being considered were summarized in the Executive Summary, 10.1, and further described in Section 5 of this document.

10.10.6 Economic Analysis

The economic impacts of the alternatives in this amendment are discussed in Section 7.5 of this document.

10.10.7 Determination of Significance under E.O. 12866

NMFS Guidelines provide criteria to be used to evaluate whether a proposed action is significant. A significant regulatory action means any regulatory action that is likely to result in a rule that may:

1. *Have an annual effect on the economy of $100 million or more, or adversely effect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities.*

The proposed actions are not expected to have an effect on the economy in excess of $100 million because the mackerel and longfin squid fisheries, the two fisheries that are impacted by the proposed actions, have a combined value of about $20-$33 million dollars 2008-2010. While if every alternative under consideration was selected these fisheries would be curtailed, it is expected that the final group of alternatives would be a grouping that achieves the desired RH/S monitoring and catch reduction goals in a practicable manner. In addition, costs incurred by the mackerel and longfin squid fisheries could be offset by gains made relative to RH/S conservation. Additional analysis of the final set of selected alternatives relative to E.O. 12866 will be completed for the final EIS.

2. *Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency.*

The proposed actions will not create a serious inconsistency with or otherwise interfere with an action taken or planned by another agency. No other agency has indicated that it plans an action that will interfere with the MSB fisheries in the EEZ.

3. *Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof.*

The proposed action will not materially alter the budgetary impact of entitlements, grants, user fees or loan programs, or the rights and obligations of their participants.

4. *Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.*

The considered actions do not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866. The considered actions have generally been considered in other fisheries managed by NMFS.

10.10.8 Initial Regulatory Flexibility Analysis

The following sections contain analyses of the effect of the proposed action on small entities. Under Section 603(b) of the RFA, each initial regulatory flexibility analysis is required to address:

1. Reasons why the agency is considering the action,
2. The objectives and legal basis for the proposed rule,
3. The kind and number of small entities to which the proposed rule will apply,
4. The projected reporting, record-keeping and other compliance requirements of the proposed rule, and
5. All Federal rules that may duplicate, overlap, or conflict with the proposed rule.

10.10.9 Reasons for Considering the Action

The needs and purposes for action are described in Section 5 of this document.

10.10.10 Objectives and Legal Basis for the Action

Amendment 14 was developed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the National Environmental Policy Act (NEPA), the former being the primary domestic legislation governing fisheries management in the U.S. Exclusive Economic Zone (EEZ). In 1996, Congress passed the Sustainable Fisheries Act (MSA), which amended and reauthorized the MSFCMA and included a new emphasis on precautionary fisheries management. New provisions mandated by the MSA require managers to end overfishing and rebuild overfished stocks within specified time frames, minimize bycatch and bycatch mortality to the extent practicable, and identify and protect essential fish habitat (EFH). This document presents and evaluates management alternatives and measures to achieve specific goals and objectives for the Atlantic mackerel, squid and butterfish fisheries (Section 4.0). The associated document was prepared by the Mid-Atlantic Fishery Management Council (Council) in consultation with the National Marine Fisheries Service (NMFS, NOAA Fisheries).

10.10.11 Description and Number of Small Entities to Which the Rule Applies

The Regulatory Flexibility Act (RFA) requires the Federal rulemaker to examine the impacts of proposed and existing rules on small businesses, small organizations, and small governmental jurisdictions. In reviewing the potential impacts of proposed regulations, the agency must either certify that the rule "will not, if promulgated, have a significant economic impact on a substantial number of small entities or prepare a final regulatory flexibility analysis. The Small Business Administration (SBA) defines a small business in the commercial fishing sector as a firm with receipts (gross revenues) of up to $4.0 million. Party/charter small businesses are included in NAICS code 487210 and are defined as a firm with gross receipts of up to $7 million.

The measures in this amendment could affect any vessel holding an active Federal permit for Atlantic mackerel, longfin squid, *Illex* or butterfish, as well as vessels that fish for any one of these species in state waters. According to NMFS permit file data, in 2010, 2,201 commercial vessels possessed Atlantic mackerel permits, 351 vessels possessed longfin squid/butterfish moratorium permits, 76 vessels possessed *Illex* permits, 1904 vessels possessed incidental catch permits and 831 vessels possessed squid/mackerel/butterfish party/charter permits. In 2010 all but 3 of the relevant commercial vessels were within the definition of a small business. Only a very few commercial vessels may be above the gross revenue cut-off in a given year. While gross revenue data is not available for the party/charter sector, it is a reasonably safe presumption that almost all if not all of the party/charter vessels would qualify as a small business. Many vessels participate in more than one of these fisheries; therefore, permit numbers are not additive. The distribution of permitted and active vessels by state may be found in Section 6.

Since all permit holders may not actually land any of the four species, the more immediate impact of the considered measures may be felt by the commercial vessels that are actively participating in these fisheries (see active vessel tables in Section 6 above). An active participant was defined as being any vessel that reported having landed one or more pounds of any one of the four species in the Northeast dealer data during calendar year 2010. NMFS weighout databases cover activity by unique vessels that hold a Federal permit of any kind and provides summary data for vessels that fish exclusively in state waters. This means that an active vessel may be a vessel that holds a valid Federal Atlantic mackerel, squid, or butterfish permit, a vessel that holds a valid Federal permit but no Atlantic mackerel, squid, or butterfish permit; a vessel that holds a Federal permit other than Atlantic mackerel, squid, or butterfish permit and fishes for those species exclusively in state waters; or may be a vessel that holds no Federal permit of any kind. Of the four possibilities the number of vessels in the latter two categories cannot be estimated because the dealer data provides only summary information for state waters vessels and because the vessels in the last category do not have to report landings.

Not all landings and revenues reported through the Federal dealer data can be attributed to a specific vessel. Vessels with no Federal permits are not subject to any Federal reporting requirements with which to corroborate the dealer reports. Thus, it is possible that some vessel activity cannot be tracked with the landings and revenue data that are available. Thus, these vessels cannot be included in the threshold analysis, unless each state were to report individual vessel activity through some additional reporting system - which currently does not exist. This problem has two consequences for performing threshold analyses. First, the stated number of entities subject to the regulation is a lower bound estimate, since vessels that operate strictly within state waters and sell exclusively to non-Federally permitted dealers cannot be counted. Second, the portion of activity by these uncounted vessels may cause the estimated economic impacts to be over- or underestimated.

The effects of actions were analyzed by employing quantitative approaches to the extent possible. In the current analysis, effects on profitability associated with the management measures should be evaluated by looking at the impact the measures on individual vessel costs and revenues. However, in the absence of cost data for individual vessels engaged in these fisheries, changes in gross revenues are used a proxy for profitability.

10.10.12 Recordkeeping and Reporting Requirements

The following measures could entail additional recordkeeping and reporting requirements and will be evaluated per the PRA as appropriate.

1b (weekly VTRs)
1c (weekly VTRs)
1d (pre-trip notifications)
1e, f, g (VMS reporting requirements)
2b (SAFIS confirmations)
2c, 2d, 2e, 2f (requirement for weighing fish)
3e, 3j, 8d (released catch affidavits)
4b, 4c (dockside monitoring)
4d, 4e (hold certifications)
5 (all) Require communication with observer providers and NMFS

10.10.13 Duplication, Overlap, or Conflict with Other Federal Rules

The proposed action does not duplicate or conflict with any other Federal rules. There is some natural overlap between the Atlantic Mackerel and Atlantic Herring fisheries and this overlap and the regulations for the Atlantic herring fishery were taken into consideration during the development of this amendment.

10.10.14 Economic Impacts on Small Entities

All of the small entities described in 10.10.11 could be impacted by this action to some degree. Economic impacts for each alternative are detailed in Section 7 of this document.

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FMAT Working Paper (DO NOT CITE) **9/15/2011**

Part I. Analyses for Amendment 14 to the Atlantic mackerel, squid and butterfish Fishery Management Plan

1.0 Survey relative abundance and biomass indices

1.1 Background

The Atlantic States Marine Fisheries Commission (ASMFC) is currently conducting a river herring (*Alosa pseudoharengus*, alewife, and *Alosa aestivalis*, blueback herring) stock assessment, but the results are not yet available. The most recent stock assessment of American shad (*Alosa sappidissima*) was conducted using data through 2005 (ASMFC 2007), but hickory shad *Alosa mediocris* has not been assessed. Therefore, in order to evaluate trends in oceanic population sizes, relative abundance and biomass indices were derived for these species using catch data from research bottom trawl surveys conducted by the NEFSC on the eastern US continental shelf. These anadromous species spend most of their lives in oceanic waters but migrate into freshwater to spawn.

The oceanic ranges of all four species extend beyond the northern and southern latitudinal range of the NEFSC spring and fall surveys, which occur from the Gulf of Maine to Cape Hatteras, NC (35° 30’ to 44° 30’ N). The geographic range of blueback herring in the northwest Atlantic extends from Cape Breton, Nova Scotia, to the St. Johns River in FL and the range of American shad extends from the Sand Hill River in Labrador to the St. John’s River in FL (Page and Burr 1991). The geographic range of alewife extends from Red Bay, Labrador, to SC. Hickory shad have a narrower geographic range than these three species and is most abundant between Cape Cod, MA and the St. John’s River in FL, but is also infrequently found in the Gulf of Maine (Munroe 2002).

1.2 Methods

The NEFSC conducts annual bottom trawl surveys, between the Gulf of Maine and Cape Hatteras, North Carolina, using a stratified random design. Standardized tows were conducted for 30 minutes at 3.5 knots until 2009 when a new research vessel replaced the SRV *Albatross IV* and the towing protocol changed to a duration of 20 minutes at 3.0 knots. Details regarding the survey design and sampling protocols are described in Azarovitz (1981). Inshore strata (8-27 m) and offshore strata (27-366 m) have been most consistently sampled by the SRVs *Albatross IV* and *Delaware II* since the fall of 1975 and spring of 1976. Prior to these time periods, either only a portion of the survey area was sampled or a different vessel and gear were used to sample the inshore strata (Azarovitz 1981). Although winter surveys (February) were conducted during 1992-2007, the sampling area only covered a subset of offshore strata (e.g., no sampling in the Gulf of Maine) and employed sampling gear different from that used during the spring and fall surveys.

Indices of relative abundance (stratified mean number per tow) and biomass (stratified mean kg per tow) were derived, for alewife, blueback herring, and American shad, using data from NEFSC spring (1976-2011) and fall (1975-2010) bottom trawl surveys. Indices were not computed for hickory shad because the species was caught in low numbers at only a few stations during a few years (i.e., at 18 stations during 9 years and at 16 stations during 10 years for the spring and fall surveys, respectively). For the time series utilized, sampling during the fall and spring surveys generally occurred during September-November and March-April, respectively, in a south to north direction (Figure 1).

Catches from all inshore and offshore survey strata located between Cape Hatteras, NC and the northern Gulf of Maine (Figure 1) were used to compute the survey indices for each of three species because preliminary evaluations of the spatial distribution of each species indicated high degrees of interannual variability. In addition, both tagging data (Boreman 1981) and correlation analyses (ASMFC 2008) suggest riverine stocks become mixed within their oceanic habitat. For most of the blueback and alewife time series analyzed, correlation coefficients were not significant for comparisons between time series of New England run sizes and spring survey relative abundance indices for nearby coastal areas, the latter which included indices derived from two subsets of NEFSC survey strata.

Beginning in 2009, the SRV *H. B. Bigelow* replaced the SRV *Albatross IV* as the primary survey vessel. As a result, the two shallowest series of inshore strata (8-18 m depths) are no longer sampled due to the deeper draft of the *Bigelow*. These inshore strata constitute important habitat during both the fall and spring survey periods for all of the species analyzed herein. Since the fall of 2007, inshore areas of 6.1 to 18.3 m have been sampled during a separate bottom trawl survey, the Northeast Area Monitoring and Assessment Program (NEAMAP) survey, conducted between Long Island and Cape Hatteras, NC. The NEAMAP survey is conducted during the fall (late Sept.-mid-Oct., which is similar to the timing of the NEFSC fall survey) and during spring (late April-mid-May, which is later than the NEFSC spring survey. Approximately 150 stations are sampled with fourteen of the stations located in Block Island Sound and Rhode Island Sound at slightly deeper depths of 18.3 m to 36.6 m (Bonzek et al. 2009). The cruise track is from south to north during spring surveys and from north to south during fall surveys. The NEAMAP surveys are conducted between sunrise and sunset and use the same towing protocol (20 minutes at 3.0 knots) that has been used since 2009 to conduct the NEFSC surveys. Although a different vessel is used during the NEAMAP surveys, the gear is the same as that used by the *Bigelow*, with the exception of a 3-inch cookie sweep rather than the rockhopper sweep used by the *Bigelow*. There are no calibration factors available with which to convert the NEAMAP survey catches to *Bigelow* catches. However, swept-area biomass estimates from the spring and fall NEAMAP surveys were available and are presented herein along with the length compositions of the catches (C. Bonzek, pers. comm.).

1.2.1 Catch conversion factors

Vessel, door and net changes have occurred during the NEFSC bottom trawl surveys, resulting in the need for conversion factors to adjust the survey catches for some species. A Yankee #36 net was used to conduct the spring and fall surveys, with the exception of spring surveys conducted during 1973-1981 for which a Yankee #41 net was used. A trawl door change occurred in 1985. However, there are no net or door conversion factors available to adjust the survey indices for the three species being evaluated herein. During some years, both the SRV *Albatross IV* and the SRV *Delaware II* were used to conduct the surveys. However, a vessel conversion factor is only available for alewife. A vessel conversion factor of 0.58 was applied to the alewife weight per tow indices. Alewife number per tow indices did not require a conversion factor because there was no significant difference between the numbers of alewife caught by each vessel (Byrne and Forrester 1991).

Beginning in 2009, the NEFSC SRV *Albatross IV* was replaced with the SRV *Henry B. Bigelow*. The new vessel is quieter and the increased headrope height of the Bigelow's net has improved the catchability of pelagic species like those being evaluated herein. In order to extend the NEFSC spring and fall survey time series beyond 2008, vessel calibration factors were applied to the *Bigelow* catches of each of the three species to convert them to *Albatross* equivalents. Bottom trawl catches of the subject alosid species tend to be higher during the daytime because of diel migration patterns (Neves and Despres 1979; Loesch et al. 1982; Stone and Jessop 1992). Additional variance is associated with time-of-day conversion factors used to adjust nighttime catches to daytime equivalents. In addition, the time-of-day used to separate "day" tows from "night" tows is most often arbitrarily selected. In order to avoid these pitfalls, only daytime tows were used to compute the relative abundance and biomass indices. Daytime tows (i.e., tows between sunrise and sunset) were defined based on solar zenith angle. Sunrise and sunset were determined for each survey station based on sampling date, location, and solar zenith angle using the method of Jacobson et al. 2011. Although there is a clear general relationship between solar zenith and time of day, tows carried out at the same time but at different geographic locations may have substantially different irradiance levels that might affect survey catchability to different extents (NEFSC 2011). Daytime catch number and weight calibration factors (Table 1) were computed for alewife and blueback herring using the method of Miller et al. (2010) and were applied to survey indices from 2009 onward to convert SRV *Bigelow* catches to SRV *Albatross* equivalents. The calibration factors were combined across seasons due to the low within-season sample sizes from the 2008 calibration studies (i.e., < 30 tows with positive catches by one or both vessels). American shad were caught in fewer than 30 tows during each of the 2008 calibration studies, so estimates of daytime-based conversion factors were not possible. Instead, American shad indices for 2009 onward were converted to *Albatross* equivalents using conversion factors based on all tows regardless of when they occurred.

The NEFSC survey database contained some records with catches of a small number of individuals for which the catch weight data are missing. For such records, which occurred primarily during the spring surveys, the spring numbers-at-length were converted to catch weight values using species-specific spring survey length-weight equations (Table 2).

1.3 Results and Discussion

1.3.1 Survey indices

NEFSC spring surveys occur during March and April when mature individuals, for the subject anadromous species, are migrating shoreward and into rivers and streams to spawn. The timing of spring spawning migrations into freshwater occurs earliest in the southern portion of each species' geographic range then progress northward and blueback herring generally spawn later in the spring than alewives (Boreman 1981). Latitudinal trends in fall emigration patterns also occur. Juvenile American shad emigrate seaward during the fall from northern rivers first and those from southern areas emigrate progressively later (Leggett 1977). A similar north-to-south emigration trend exists for river herring, but alewives emigrate before blueback herring (Boreman 1981). The NEFSC survey cruise track follows a general south to north direction during both the spring and fall surveys. The distribution of each species during the spring and fall surveys depends on the timing of the survey in relation to the timing of seasonal and annual migration patterns of each of the four subject species. The timing of the NEFSC spring and fall surveys has been variable and this may have affected availability of the subject species to the survey gear. During most years, the mean Julian dates of the fall surveys ranged between 270 and 290 and ranged between 84 and 102 for the spring surveys. The spring and fall spatial distributions of each species are described below in Section 2.0.

Relative abundance and biomass indices could not be computed for hickory shad because catch rates for both surveys were very low during the few years for which the species was caught (Figure 2). For the other three species, spring and fall survey indices exhibited considerable inter-annual variability, and in general, were more informative for the spring surveys because each of the species was caught at more stations (Figures 3-5). Consequently, the precision of the spring survey indices was higher than for the fall survey indices (Tables 3-8). Fall relative abundance of blueback herring has been above the median since 2002 and the 2009 and 2010 indices were the highest of the time series (Figure 3). Spring relative abundance has been above the median since 2006. Alewives were caught at more stations and in higher numbers than blueback herring and an obvious increase in fall relative abundance was evident for 2008-2010; the highest three years of the time series (Figure 4). Spring relative abundance of alewives was above the median during 2008-2011 and was the highest of the time series in 2011. Interannual variability in the fall relative abundance of American shad was extremely high, but has been above the median during most years since 1992 (Figure 5). Spring relative abundance of

American shad has fluctuated above and below the median for multi-year periods and was highest during 1990-1997, but then declined through 2005 but has generally been above the median since 2006 (Figure 5).

Swept area abundance (log number per 25,000 m^2) and biomass (log kg per 25,000 m^2) estimates of blueback herring, alewife and American shad were available for spring NEAMAP surveys during 2008-2011, but were only available for alewives during the fall (2007-2010) surveys because fall catch rates of blueback herring and American shad were too low (Figures 6-8). Only the fall 2010 abundance estimate for alewife was significantly different from the rest of the values in its respective time series (Figure 7). The NEAMAP time series is short, and because it only covers a small portion of the entire survey area, it is not clear whether the indices are measuring relative abundance within the NEAMAP survey area or migrations between the NEAMAP and NEFSC survey areas or between the NEAMAP strata and estuarine habitat of the subject species. For example, distribution maps from a seasonal, stratified random bottom trawl survey conducted in the Hudson-Raritan estuary, during 1992-1997, indicate that river herring utilize this estuarine habitat during the time that the spring and fall NEAMAP and NEFSC surveys are conducted and were not present in the estuary during the summer (NEFSC 1998).

1.3.2 Survey length compositions

Length compositions of the survey catches during the 1976-2008 spring and fall surveys are shown as stratified mean numbers per tow for each of the three species. Fall survey length distributions of blueback herring (modes at 15 and 24 cm FL) and alewife (modes at 18 and 23 cm FL) were bimodal. Similar size modes were present during the spring surveys, but a third mode of smaller individuals (at 9 cm for blueback and 11 cm for alewife) was also present (Figure 9). Limited data from age-length keys for NEFSC spring surveys indicate that the 9 and 11 cm modal groups consist of age 1 fish. Spring NEAMAP survey catches of blueback herring are dominated by age 1 fish which were caught in very large numbers during the 2011 spring survey (Figure 10). Age 0 fish were not present in either the NEAMAP or NEFSC surveys. Age data for blueback herring caught in NEFSC fall surveys is lacking.

American shad length distributions were unimodal during the fall surveys (mode at 22 cm FL) and bimodal during the spring surveys, with modes at 16 and 25 cm FL (Figure 9). There are no age data from NEFSC surveys for either of the shad species. The spring NEAMAP survey catches of American shad were dominated by small fish within the 13 cm modal size group and also consisted of a second modal size group of 20 cm (Figure 10).

2.0 Species-specific seasonal and interannual spatial distributions

2.1 Background

Limited tagging studies indicate that extensive coastwide migrations are undertaken by river herring (Boreman 1981). For example, a blueback herring tagged off South Carolina was recovered as far north as Cape Cod (Curtis 1971). American shad also undergo lengthy migrations. Shad tagged in the Gulf of Maine, where they spend the summer and fall, were recovered in areas located between Quebec and Georgia (Cheek 1968).

2.2 Methods

Several methods were used to characterize the seasonal and annual spatial distribution patterns of American shad, hickory shad, alewife and blueback herring on the Northeast continental shelf using data collected during NEFSC and NEAMAP surveys. Catch rate data included in the spatial analyses include numbers per tow from the 1976-2010 spring surveys and the 1975-2010 fall surveys for the same set of strata used to compute relative abundance and biomass indices. As explained above in Section 1.2, data from surveys conducted prior to these time periods were excluded from the analyses because important habitat of the subject species was either not sampled or sampled by a vessel for which conversion factors are not available.

Maps of density data, including tows with zero catch, collected during NEFSC and NEAMAP (2009 onward) surveys were generated for each year of the spring and fall time series, as well as for the spring and fall time series, using ArcGIS v. 10 © ESRI. A spatial statistical tool, the standard deviational ellipse, was used to characterize the interannual variability in the spatial distributions of each species as well as to define the geographical extents of the distribution time series for each species. The method involves computation of the standard deviation of the latitudinal and longitudinal coordinates from the mean center of the density distribution to define the axes of the ellipse and thereby define the orientation of the distribution. Each ellipse encompasses one standard deviation, or 68% of all density values, from the centroid of the distribution.

A second method was used to define offshore habitat areas with the highest cumulative densities of each species for the spring and fall survey time series. The same method, which involves post-stratification of the NEFSC and NEAMAP survey data, was previously used to generate Essential Fish Habitat maps for Amendment 11 to the MSB FMP (MAFMC 2011). NEFSC and NEAMAP catch rate data were mapped by ten-minute square (TNMS) as cumulative percentages (75, 90, 95, and 100%) of the back-transformed mean catch densities (representing a pseudo-geometric mean). The mean catch density per TNMS ($\bar{d}_j$) was computed as:

$$\bar{d}_j = \sum_{i=1}^{n_j} \frac{(\ln(d_i)+1)_j}{n_j}$$

where $(\ln(d_i)+1)_j$ is the log-transformed density plus 1 at station *i* for TNMS *j* and n_j is the number of stations sampled within each TNMS. Although this method introduces a slight bias, the back-transformed mean of the log(X+1) observations has some resistance to the effects of outliers and reduces potential distortions introduced when large values occur. Skewed catch density distributions, attributable to infrequent, large-magnitude catches, are common for pelagic schooling species such as those being analyzed herein. Mean densities were not computed for TNMS where fewer than four tows were conducted during the time series.

2.3 Results and Discussion

Inter-annual variability in the sizes and locations of the habitat areas occupied by of each of the four species are important considerations for determining whether closed areas would be beneficial in reducing the incidental catches of these species. Maps showing the one standard deviational ellipses for all years combined (red ellipses) suggest that bluebacks, alewives and American shad are distributed across smaller geographic areas during the fall (Figures 11-13), primarily in the western and northern Gulf of Maine and to a lesser extent in southern New England, than during the spring (Figures 14-16). The same maps also show that the "envelopes" of all of the annual standard deviational ellipses for each species (dashed lines) are much larger for the spring time series than for the fall time series, indicating greater inter-annual variability in the sizes and locations of the three species spatial distributions during the spring than during the fall. Catches of hickory shad were very low for both the fall and spring survey time series, and consequently, distributions of the species are only presented as density-per tow maps for each of the two time series (Figures 17 and 18, respectively).

Examples of annual standard deviational ellipse maps, during three consecutive years, show the high degree of interannual variability in the spatial distributions of the subject species, particularly during spring surveys. Figure 19 indicates that alewives are less abundant in the fall NEFSC surveys than during the spring surveys (Figure 20) and that the species is much more broadly distributed during the spring, extending along most of the shelf between the Gulf of Maine and Cape Hatteras, NC. Stations with the highest densities during the spring surveys were broadly dispersed, rather than clustered within small localized areas, and their locations changed annually (e.g., in southern New England during 1996 and 1997 but in also in the Gulf of Maine during 1998). Similarly high levels of interannual variability occurred in the fall and spring spatial distributions of blueback herring (Figures 21 and 22) and American shad (Figures 23 and 24).

Maps showing cumulative percentages (75, 90, 95 and 100%) of the geometric mean densities of *Alosa pseudoharengus, A. aestivalis*, and *A. sapidissima* during the 1975-2010 NEFSC fall bottom trawl surveys indicate that the highest mean densities (75%) of all three species occurred in the western Gulf of Maine and in southern New England south of Cape Cod and east of Long Island (Figure 25). During the spring surveys, the highest mean densities of each species occurred across much broader areas than during the spring surveys, within both the Gulf of Maine and from Cape Cod to Cape Hatteras, NC (Figure 26).

Maps of the spatial distributions of Atlantic mackerel and Atlantic herring indicate that during NEFSC fall bottom trawl surveys, the densities of both species were highest in the Gulf of Maine, but during the spring surveys both species were much more broadly distributed across the continental shelf, between Cape Hatteras and the Gulf of Maine, similar to the spring and fall distributions of the subject bycatch species (Figures 27). The high degree of interannual variability in the spring and fall spatial distributions of all three species is an important consideration with respect to implementation of closed area management measures to reduce the bycatch of these species.

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Table 1. Calibration factors used to convert daytime (between sunrise and sunset) SRV *Albatross IV* catches to SRV *Henry B. Bigelow* equivalents for NEFSC spring and fall bottom trawl survey catches for 2009 onward.

	Number per tow	SE	Kg per tow	SE
Alewife	1.0532	0.1569	0.7165	0.1127
Blueback herring	0.8706	0.1710	1.5943	0.4456

Table 2. Sample sizes and parameter estimates for NEFSC spring survey length-weight relationships for *Alosa aestivalis*, *Alosa pseudoharengus*, and *Alosa sapidissima*.

Species	ln(a)	b	r^2	N fish
Alosa aestivalis	-12.943	3.4827	0.97	1,532
Alosa pseudoharengus	-12.898	3.5023	0.94	132
Alosa sapidissima	-12.508	3.3323	0.99	780

Table 3. Stratified mean number per tow and mean weight (kg) per tow indices for blueback herring caught during daytime tows (between sunrise and sunset) in NEFSC fall bottom trawl surveys, 1975-2010. CVs for indices from 2009 onward do not account for the additional variance associated with SRV *H. B. Bigelow* conversion factors.

YEAR	Mean number per tow	CV	Mean kg per tow	CV
1975	0.05	100.0	0.010	100.0
1976	0.07	14.4	0.002	88.1
1977	0.64	97.1	0.144	96.6
1978	0.28	42.6	0.049	48.1
1979	0.03	45.5	0.007	50.1
1980	1.00	99.9	0.042	99.7
1981	0.02	49.7	0.006	39.7
1982	0.00	100.0	0.000	100.0
1983	0.05	71.0	0.014	71.0
1984	0.05	18.5	0.006	34.0
1985	0.08	75.4	0.012	86.1
1986	0.03	46.7	0.005	54.4
1987	0.02	56.8	0.004	52.7
1988	0.00		0.000	
1989	0.02	70.7	0.004	70.7
1990	0.00		0.000	
1991	0.09	70.7	0.011	88.7
1992	0.00		0.000	
1993	0.05	75.3	0.003	56.0
1994	0.52	4.6	0.027	8.9
1995	0.25	2.6	0.029	2.3
1996	0.04	0.0	0.001	0.0
1997	0.16	54.4	0.019	56.9
1998	0.00		0.000	
1999	0.01	25.4	0.002	31.1
2000	0.20	35.1	0.028	29.9
2001	0.05	9.7	0.004	12.7
2002	0.59	58.5	0.090	61.5
2003	0.31	25.7	0.046	22.9
2004	0.65	5.8	0.031	16.1
2005	0.48	2.5	0.028	3.5
2006	0.08	58.6	0.011	69.4
2007	0.10	28.4	0.008	33.9

2008	0.36	10.6	0.040	12.8
2009	2.30	58.5	0.066	61.4
2010	1.59	18.0	0.081	20.7

Table 4. Stratified mean number per tow and mean weight (kg) per tow indices for blueback herring caught during daytime tows (between sunrise and sunset) in NEFSC spring bottom trawl surveys, 1976-2010. CVs for indices from 2009 onward do not account for the additional variance associated with SRV *H. B. Bigelow* conversion factors.

YEAR	Mean number per tow	CV	Mean kg per tow	CV
1976	2.64	31.1	0.141	26.6
1977	1.03	27.6	0.111	29.5
1978	2.76	19.6	0.297	31.5
1979	11.79	23.3	1.522	43.4
1980	4.64	48.8	0.266	30.1
1981	5.69	34.6	0.377	46.4
1982	1.25	19.8	0.087	33.7
1983	1.60	21.2	0.153	26.9
1984	9.47	52.6	0.946	55.4
1985	2.22	29.6	0.282	42.2
1986	2.53	12.2	0.075	28.6
1987	2.25	11.8	0.230	10.1
1988	1.12	21.6	0.060	24.7
1989	0.96	26.7	0.060	30.4
1990	0.79	22.2	0.052	28.3
1991	0.58	18.5	0.032	45.2
1992	2.99	49.1	0.310	73.6
1993	5.37	15.1	0.195	21.0
1994	2.20	23.1	0.127	36.0
1995	4.19	16.8	0.285	5.5
1996	2.41	16.2	0.155	24.5
1997	1.85	16.2	0.151	18.0
1998	0.91	28.6	0.026	31.7
1999	2.19	21.6	0.162	23.7
2000	1.35	34.0	0.142	52.0
2001	0.77	23.7	0.055	22.3
2002	0.71	14.8	0.070	19.8
2003	2.55	17.6	0.133	12.8
2004	2.80	23.9	0.133	38.8
2005	0.76	18.9	0.029	22.0
2006	7.11	25.2	0.178	36.8
2007	6.07	29.2	0.390	28.0
2008	2.24	28.9	0.100	36.8
2009	13.95	64.5	0.656	76.5
2010	3.26	30.3	0.129	40.5
2011	2.83	22.6	0.109	29.8

Table 5. Stratified mean number per tow and mean weight (kg) per tow indices for alewife caught during daytime tows (between sunrise and sunset) in NEFSC fall bottom trawl surveys, 1975-2010. CVs for indices from 2009 onward do not account for the additional variance associated with SRV *H. B. Bigelow* conversion factors.

YEAR	Mean number per tow	CV	Mean kg per tow	CV
1975	1.00	33.6	0.20	29.2
1976	2.38	5.6	0.31	6.3
1977	0.75	39.2	0.09	36.4
1978	0.85	24.0	0.10	20.3
1979	0.80	43.4	0.14	38.2
1980	6.41	67.5	0.45	60.1
1981	2.32	44.4	0.25	14.9
1982	0.72	6.2	0.08	15.3
1983	0.38	29.3	0.07	33.8
1984	0.87	70.3	0.07	50.9
1985	2.36	67.4	0.36	78.9
1986	0.98	18.9	0.19	20.1
1987	1.43	27.3	0.30	24.3
1988	1.59	18.3	0.18	11.6
1989	1.77	37.5	0.13	21.8
1990	1.11	26.0	0.09	40.1
1991	1.65	5.2	0.09	11.5
1992	1.08	22.3	0.13	33.4
1993	1.19	23.0	0.06	13.7
1994	3.45	41.0	0.43	35.9
1995	4.30	10.4	0.58	14.1
1996	0.64	32.2	0.08	43.0
1997	0.93	18.8	0.10	22.6
1998	4.81	32.9	0.41	30.7
1999	1.20	33.4	0.14	34.2
2000	4.55	19.5	0.56	15.9
2001	0.47	20.6	0.06	14.2
2002	5.71	37.8	0.96	48.2
2003	2.04	21.4	0.33	12.3
2004	2.76	34.9	0.25	23.1
2005	5.04	15.6	0.46	23.3
2006	5.36	42.4	0.63	37.4
2007	2.50	14.8	0.35	12.9
2008	7.32	18.0	1.04	23.3
2009	6.37	14.6	0.72	14.9
2010	10.85	24.4	1.82	20.6

Table 6. Stratified mean number per tow and mean weight (kg) per tow indices for alewife caught during daytime tows (between sunrise and sunset) in NEFSC spring bottom trawl surveys, 1976-2010. CVs for indices from 2009 onward do not account for the additional variance associated with SRV *H. B. Bigelow* conversion factors.

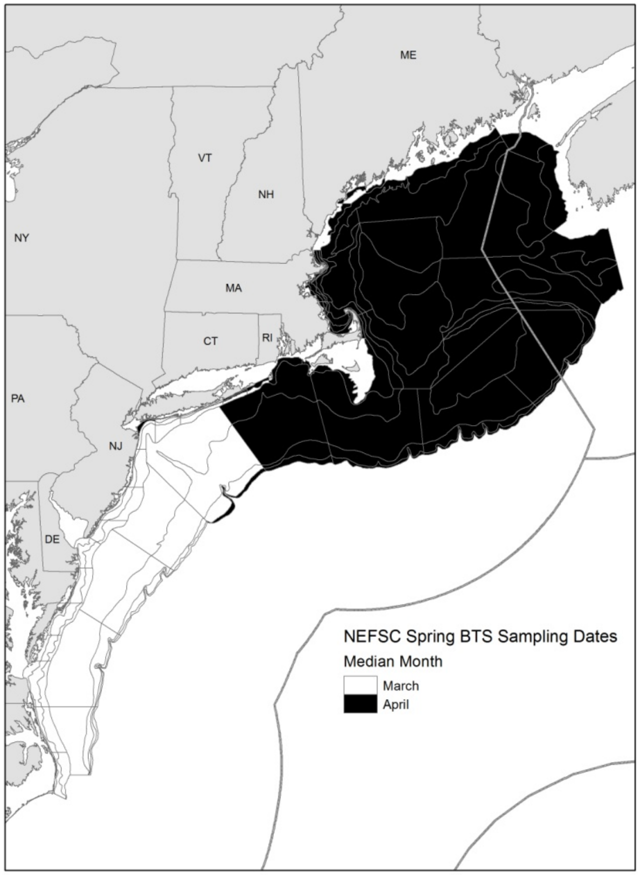
YEAR	Mean number per tow	CV	Mean kg per tow	CV
1976	6.72	34.6	0.91	40.7
1977	5.44	30.1	0.96	31.9
1978	8.30	14.8	0.95	10.7
1979	12.64	41.9	1.44	43.5
1980	15.18	29.9	1.19	30.0
1981	8.99	28.3	1.00	27.4
1982	7.05	22.7	0.69	23.4
1983	3.28	30.8	0.64	44.1
1984	5.03	36.8	0.89	45.7
1985	2.52	20.1	0.39	24.2
1986	4.04	26.8	0.60	21.9
1987	7.93	9.7	1.30	9.1
1988	2.96	14.6	0.40	16.0
1989	4.08	18.8	0.35	21.1
1990	5.00	14.3	0.33	16.2
1991	6.24	34.9	0.48	51.5
1992	13.86	6.8	2.10	5.5
1993	10.33	18.3	0.76	16.8
1994	6.96	24.4	0.32	20.5
1995	6.95	26.9	0.99	29.4
1996	14.87	33.8	1.55	33.7
1997	11.85	25.4	1.60	29.3
1998	11.93	17.8	1.22	19.9
1999	14.65	24.3	1.51	26.5
2000	12.45	51.3	0.83	18.3
2001	5.99	24.8	0.71	33.4
2002	7.35	10.2	0.97	13.8
2003	8.57	22.9	0.59	25.7
2004	10.95	23.7	0.85	35.8
2005	4.72	15.8	0.27	24.7
2006	16.88	21.7	0.66	21.9
2007	5.87	17.9	0.56	17.4
2008	8.51	24.4	0.61	22.2
2009	15.94	14.6	1.57	12.4
2010	14.61	11.5	1.41	11.8
2011	37.72	16.2	2.51	21.3

Table 7. Stratified mean number per tow and mean weight (kg) per tow indices for American shad caught during daytime tows (between sunrise and sunset) in NEFSC fall bottom trawl surveys, 1975-2010. CVs for indices from 2009 onward do not account for the additional variance associated with SRV *H. B. Bigelow* conversion factors.

YEAR	Mean number per tow	CV	Mean kg per tow	CV
1975	0.01	49.2	0.01	61.6
1976	0.24	26.0	0.06	21.2
1977	0.03	79.9	0.02	66.9
1978	0.31	56.9	0.08	40.3
1979	0.08	38.9	0.04	32.4
1980	0.15	70.6	0.03	53.0
1981	0.59	40.6	0.12	30.6
1982	1.14	4.6	0.26	17.3
1983	0.66	94.8	0.13	91.0
1984	0.04	44.8	0.01	39.7
1985	0.11	30.8	0.02	32.5
1986	0.05	31.9	0.02	44.1
1987	1.17	8.4	0.37	20.9
1988	0.07	44.8	0.01	33.8
1989	0.11	25.7	0.03	35.5
1990	0.12	27.6	0.07	83.3
1991	0.05	46.9	0.02	60.8
1992	4.21	86.8	0.57	73.9
1993	0.08	47.8	0.02	43.5
1994	0.96	51.8	0.15	51.1
1995	0.65	51.7	0.60	67.3
1996	0.28	51.4	0.08	38.3
1997	0.19	40.9	0.09	49.1
1998	0.22	23.1	0.10	32.1
1999	0.16	57.9	0.03	59.8
2000	0.27	30.6	0.07	33.9
2001	0.07	18.9	0.03	21.7
2002	0.20	33.9	0.13	42.0
2003	0.21	38.0	0.08	14.9
2004	0.16	28.7	0.06	30.7
2005	0.16	54.6	0.07	81.7
2006	0.23	27.1	0.04	25.5
2007	0.17	25.5	0.04	28.1
2008	0.59	51.6	0.28	78.1
2009	0.10	32.5	0.03	35.2
2010	0.28	20.2	0.11	34.8

Table 8. Stratified mean number per tow and mean weight (kg) per tow indices for American shad caught during daytime tows (between sunrise and sunset) in NEFSC spring bottom trawl surveys, 1976-2010. CVs for indices from 2009 onward do not account for the additional variance associated with SRV *H. B. Bigelow* conversion factors.

YEAR	Mean number per tow	CV	Mean kg per tow	CV
1976	0.22	38.2	0.05	45.2
1977	0.04	58.3	0.00	55.0
1978	0.15	20.8	0.07	16.1
1979	0.52	32.2	0.12	33.7
1980	0.25	15.8	0.07	26.6
1981	0.40	37.6	0.09	32.1
1982	0.25	30.2	0.05	30.3
1983	0.18	25.4	0.07	59.1
1984	0.34	27.1	0.09	30.8
1985	0.35	18.8	0.18	40.0
1986	0.33	48.4	0.24	64.5
1987	0.15	27.6	0.07	34.3
1988	0.16	28.0	0.09	23.4
1989	0.32	21.2	0.09	32.3
1990	0.37	39.0	0.11	51.9
1991	0.58	28.1	0.16	27.6
1992	0.49	17.8	0.10	15.4
1993	0.57	10.6	0.13	22.6
1994	1.16	69.6	0.49	82.1
1995	0.32	13.2	0.09	37.9
1996	0.43	14.3	0.07	17.7
1997	0.56	15.9	0.23	18.0
1998	0.28	26.0	0.10	22.9
1999	0.36	14.2	0.17	29.5
2000	0.37	18.7	0.13	26.9
2001	0.36	34.6	0.16	35.7
2002	0.33	19.6	0.11	23.9
2003	0.28	22.5	0.05	24.9
2004	0.24	33.6	0.06	40.5
2005	0.13	32.8	0.06	74.1
2006	0.61	12.7	0.03	15.0
2007	0.59	28.7	0.11	36.5
2008	0.38	25.1	0.10	33.3
2009	0.47	18.1	0.13	25.7
2010	0.28	25.6	0.07	24.2
2011	0.59	32.9	0.13	27.1



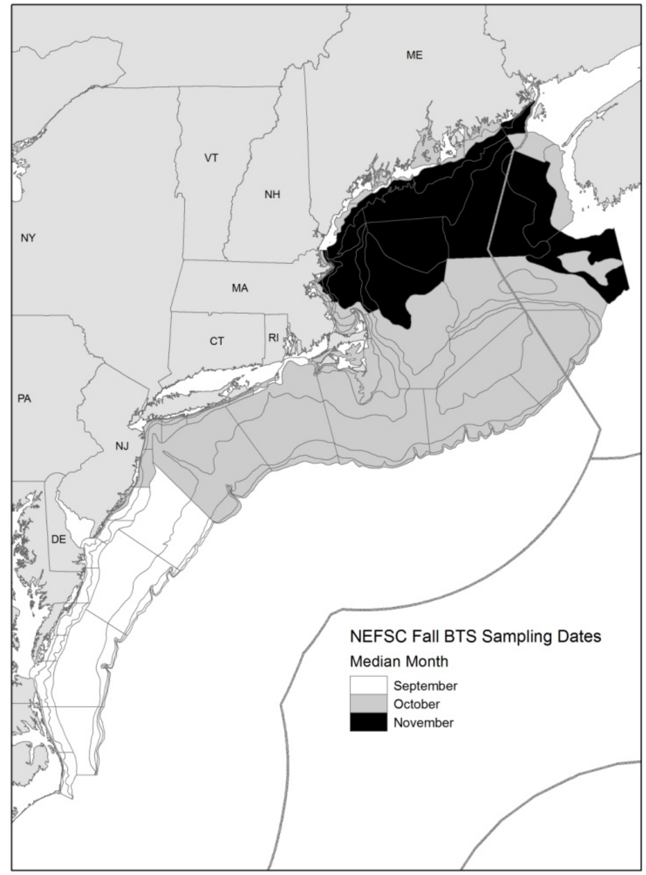


Figure 1. Median month during which the inshore and offshore depth strata were sampled during Northeast Fisheries Science Center spring and fall bottom trawl surveys, 1976-2010.

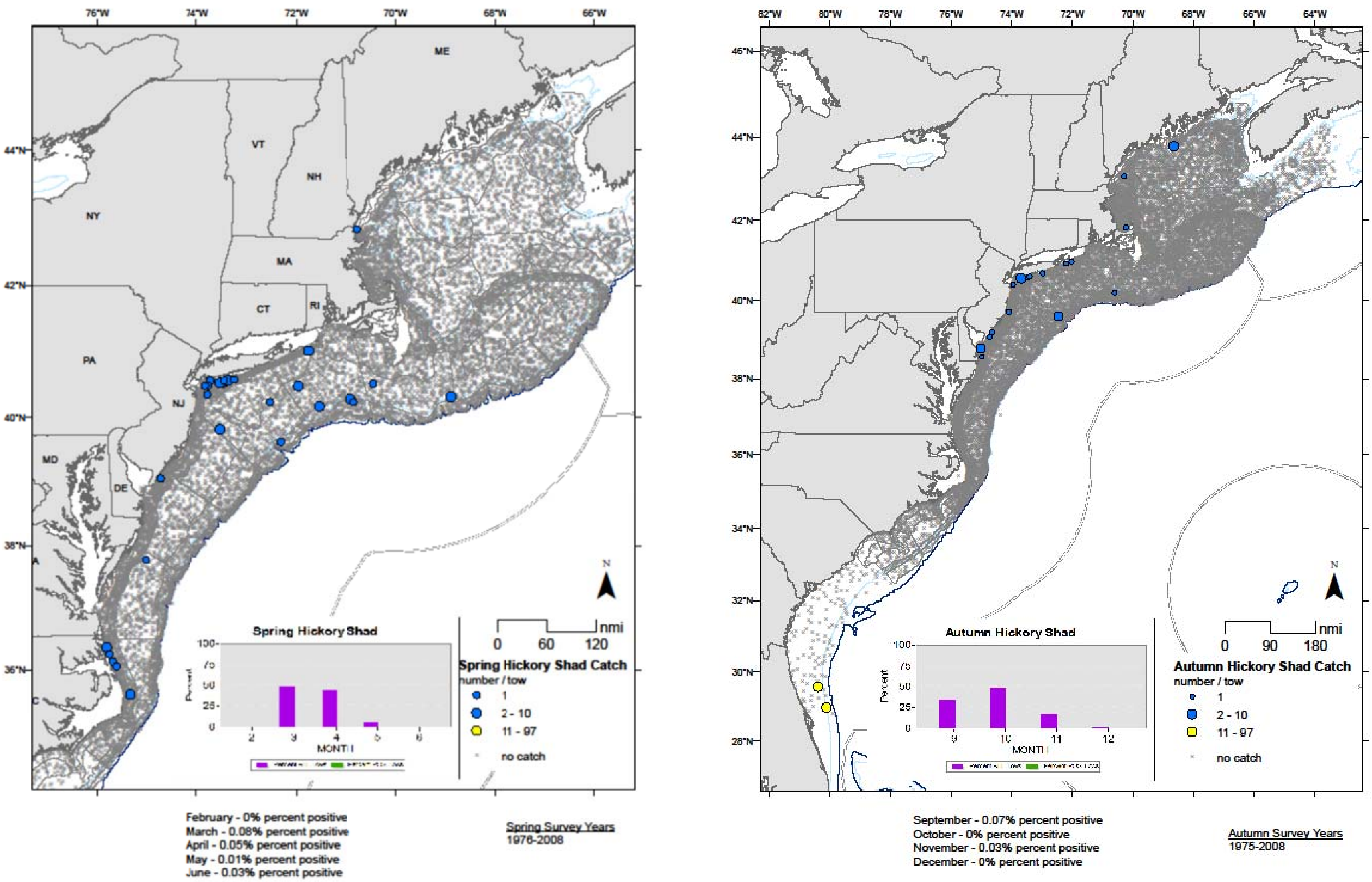


Figure 2. Distribution of hickory shad during NEFSC spring (1976-2008, left panel) and fall (1985-2008, right panel) bottom trawls surveys.

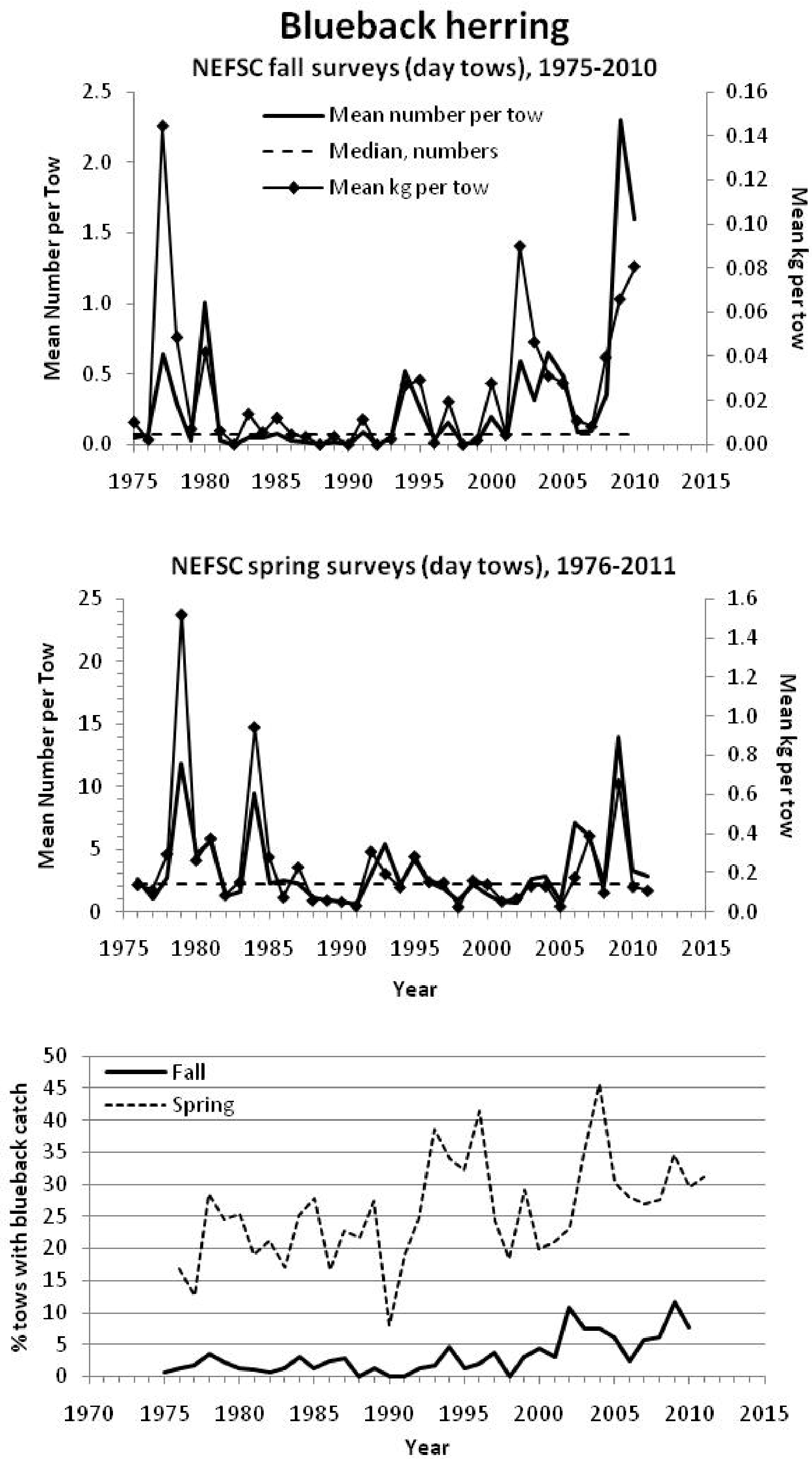


Figure 3. Blueback herring relative abundance (mean number per tow) and biomass (mean kg per tow) indices and percent positive tows for NEFSC fall (1975-2010) and spring (1976-2011) bottom trawl surveys.

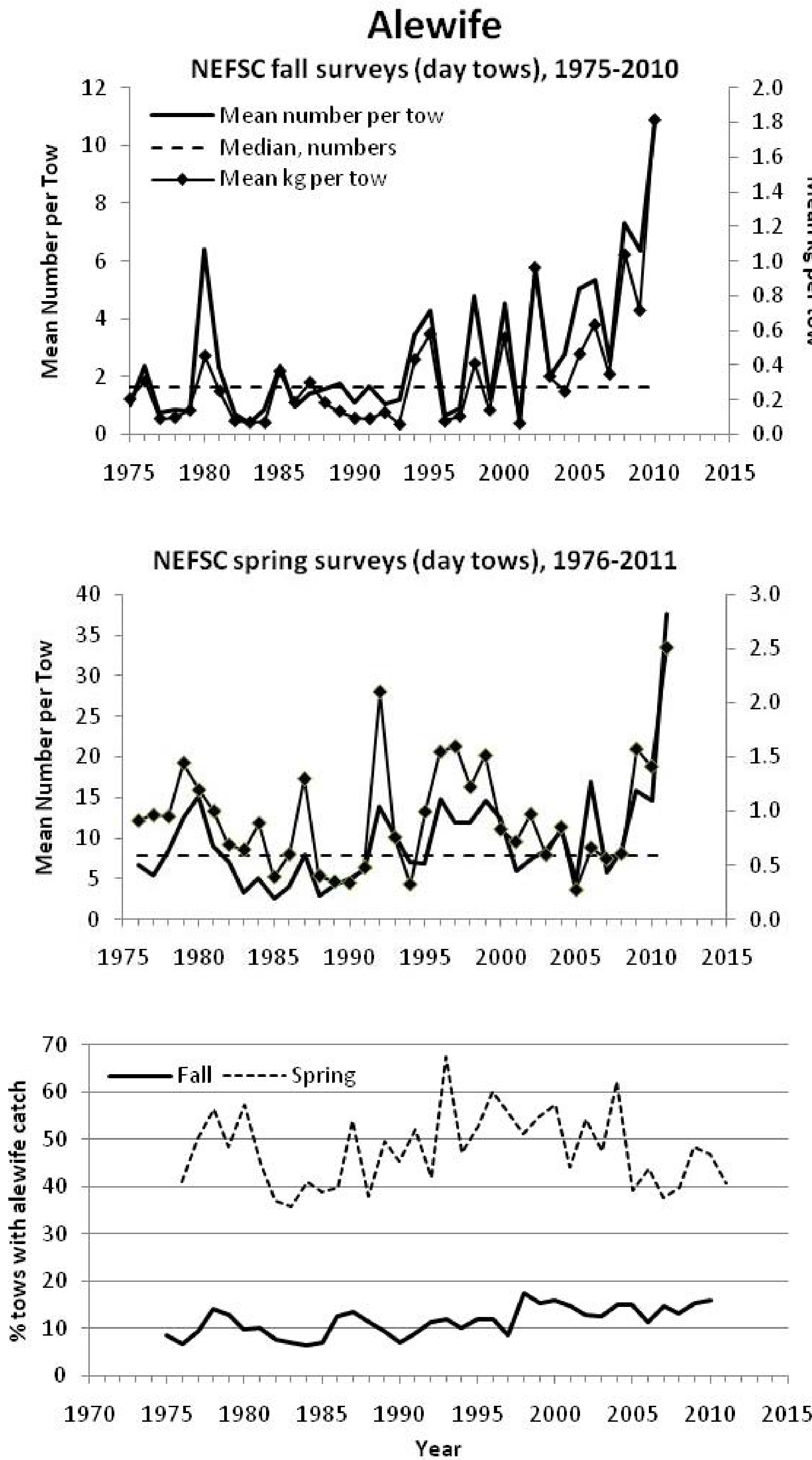


Figure 4. Alewife relative abundance (mean number per tow) and biomass (mean kg per tow) indices and percent positive tows for NEFSC fall (1975-2010) and spring (1976-2011) bottom trawl surveys.

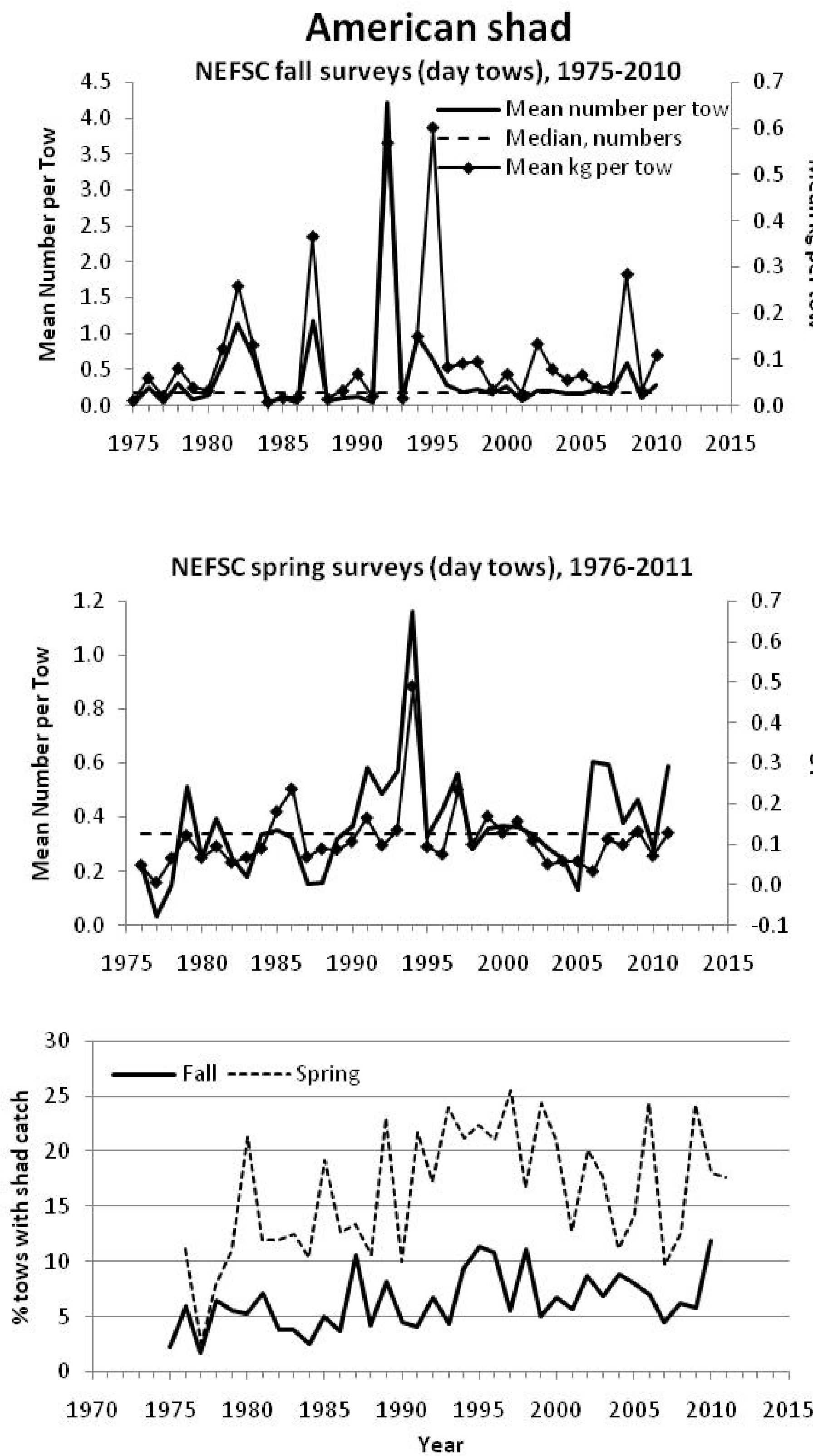
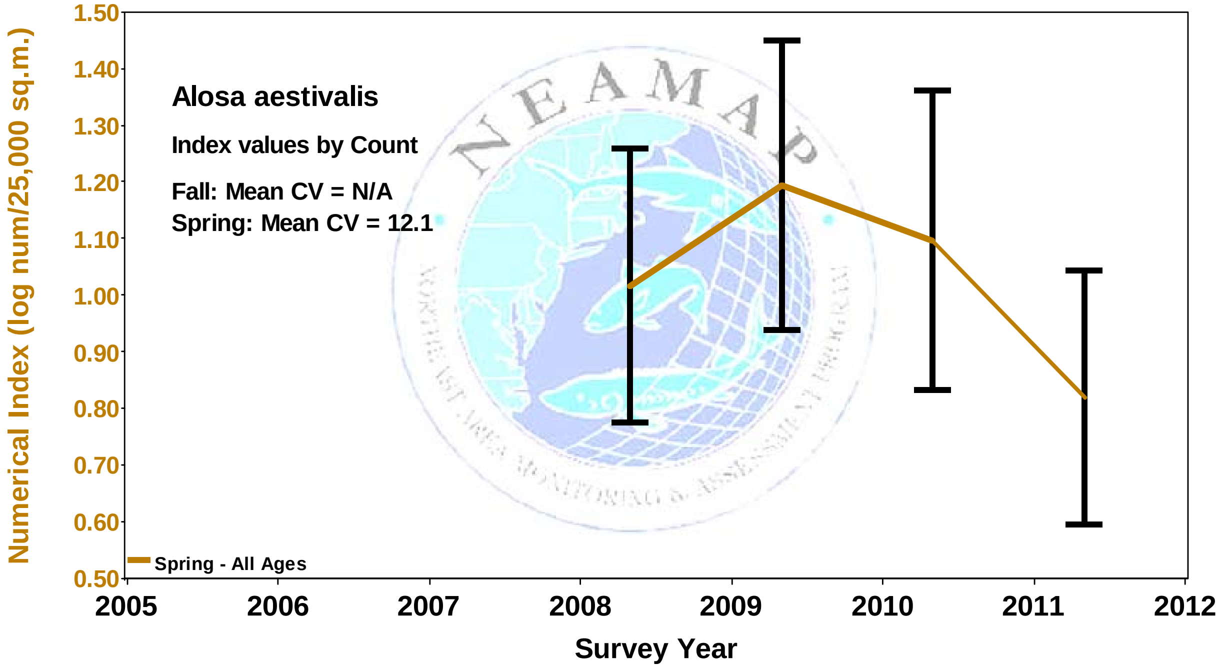


Figure 5. American shad relative abundance (mean number per tow) and biomass (mean kg per tow) indices and percent positive tows for NEFSC fall (1975-2010) and spring (1976-2011) bottom trawl surveys.



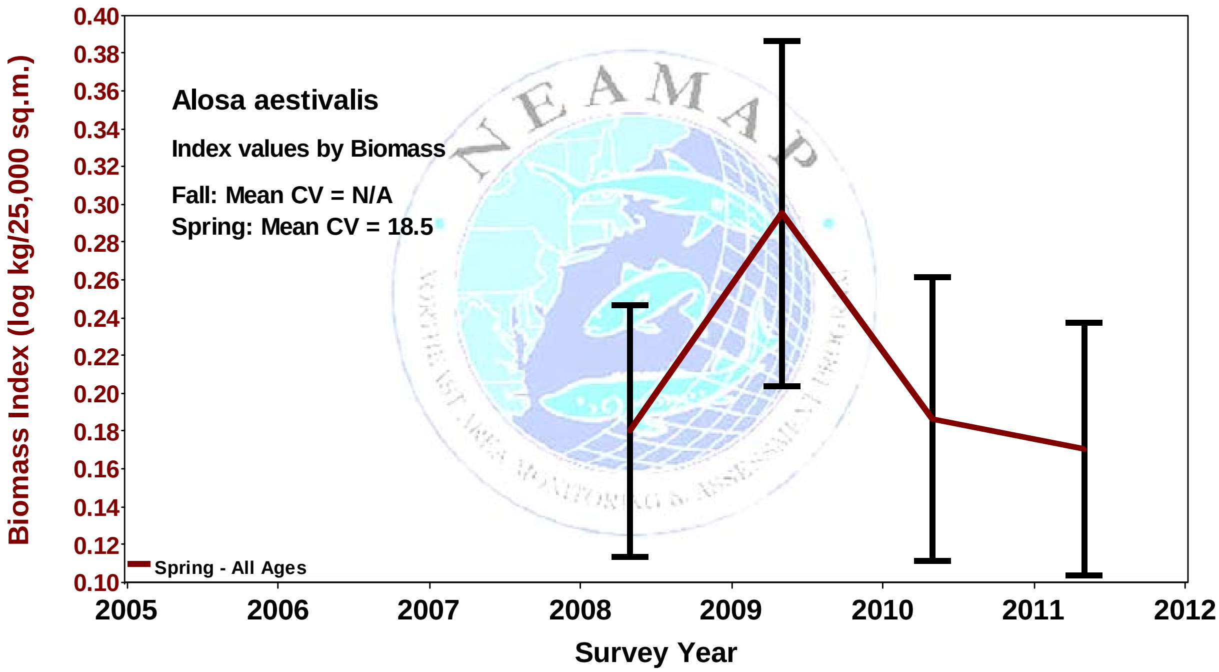
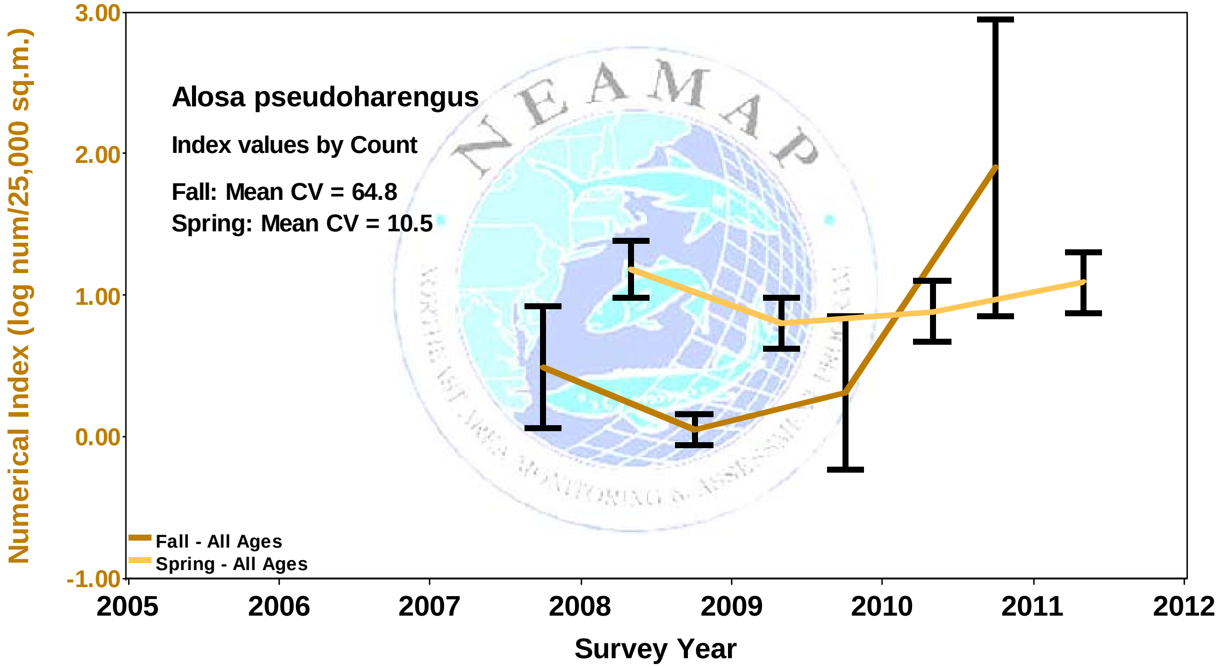


Figure 6. Swept area abundance (log number per 25,000 m^2) and biomass (log kg per 25,000 m^2) estimates of blueback herring derived from the spring (2008-2011) NEAMAP bottom trawl surveys.



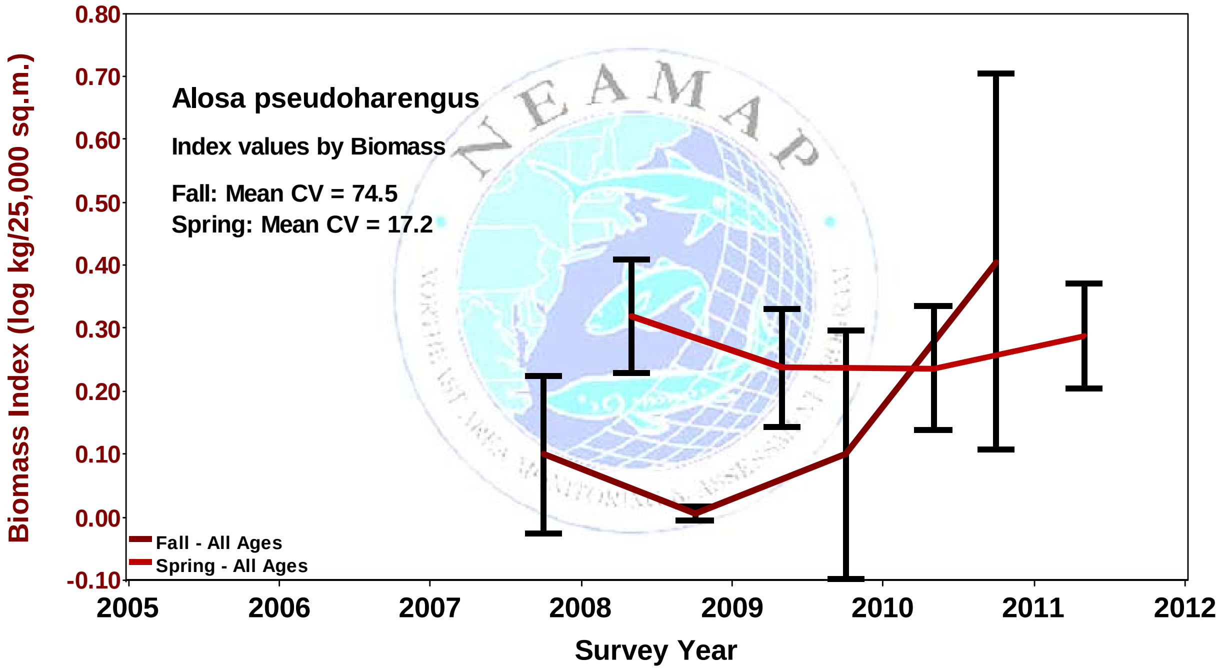


Figure 7. Swept area abundance (log number per 25,000 m^2) and biomass (log kg per 25,000 m^2) estimates of alewife derived from the fall (2007-2010) and spring (2008-2011) NEAMAP bottom trawl surveys.

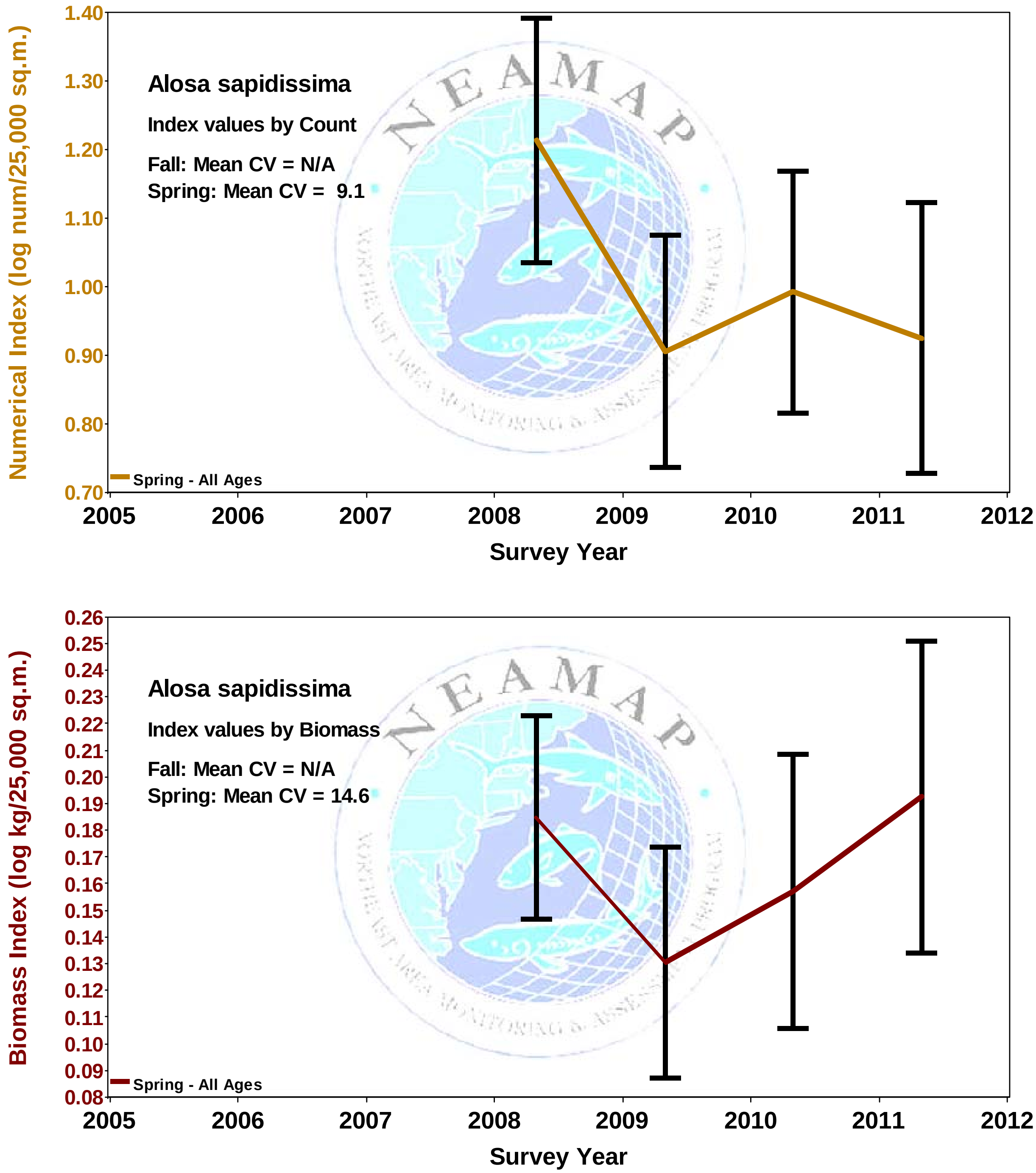


Figure 8. Swept area abundance (log number per 25,000 m^2) and biomass (log kg per 25,000 m^2) estimates of American shad derived from the spring (2008-2011) NEAMAP bottom trawl surveys.

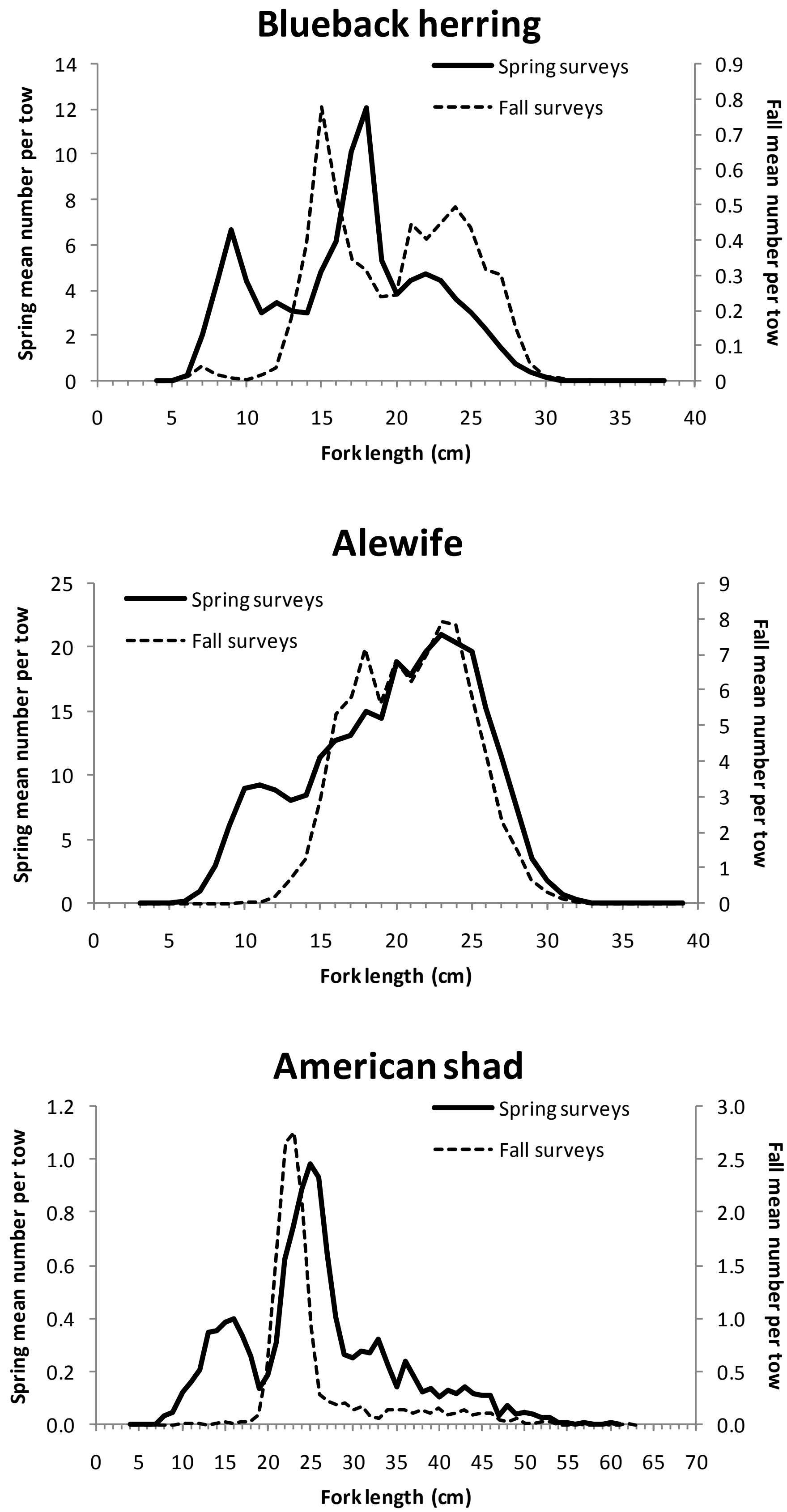
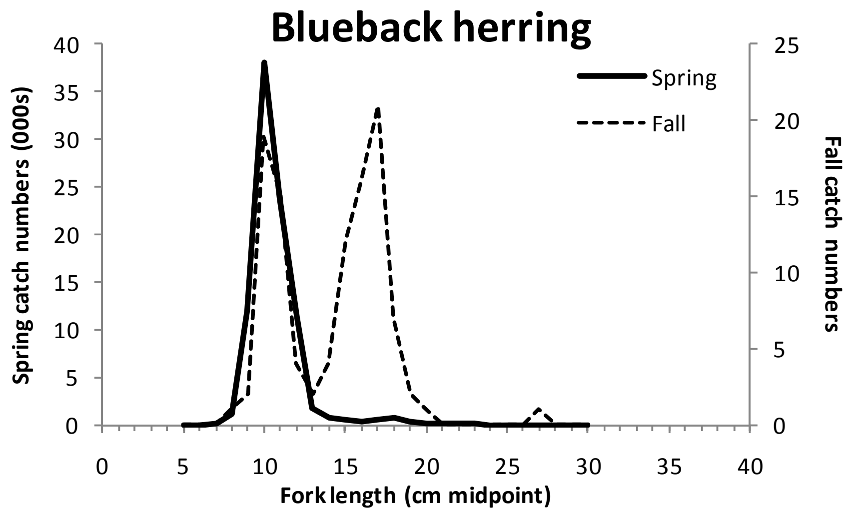
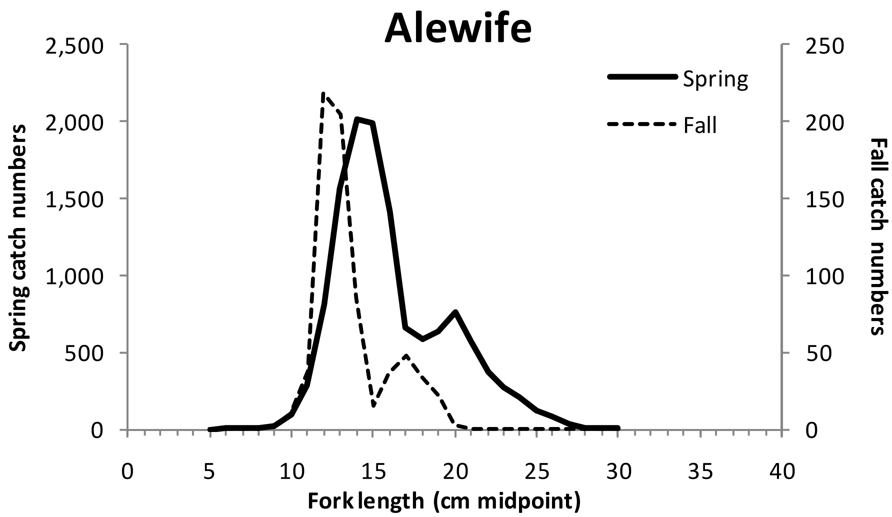


Figure 9. Length compositions (stratified mean numbers per tow) of blueback herring, alewife, and American shad caught during NEFSC spring and fall bottom trawl surveys, 1976-2008.





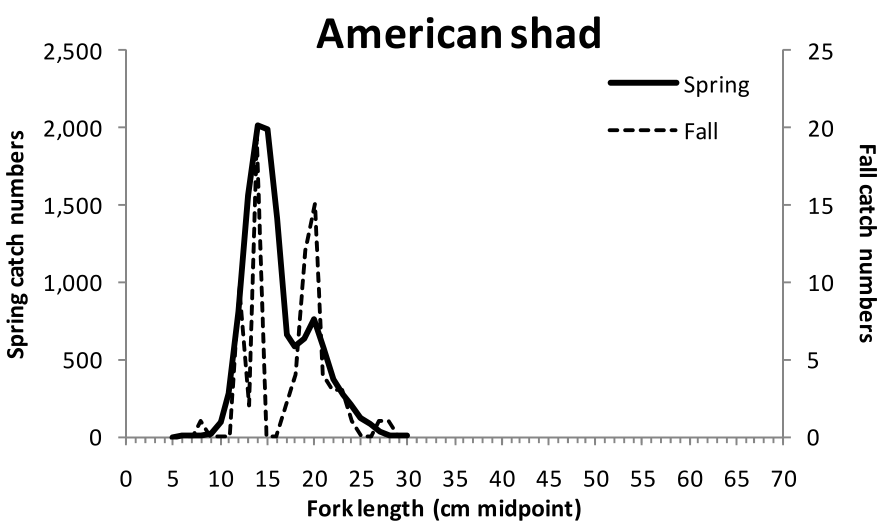


Figure 10. Length compositions (stratified mean numbers per tow) of blueback herring, alewife, and American shad caught during NEAMAP spring (2008-2011) and fall (2007-2010) bottom trawl surveys

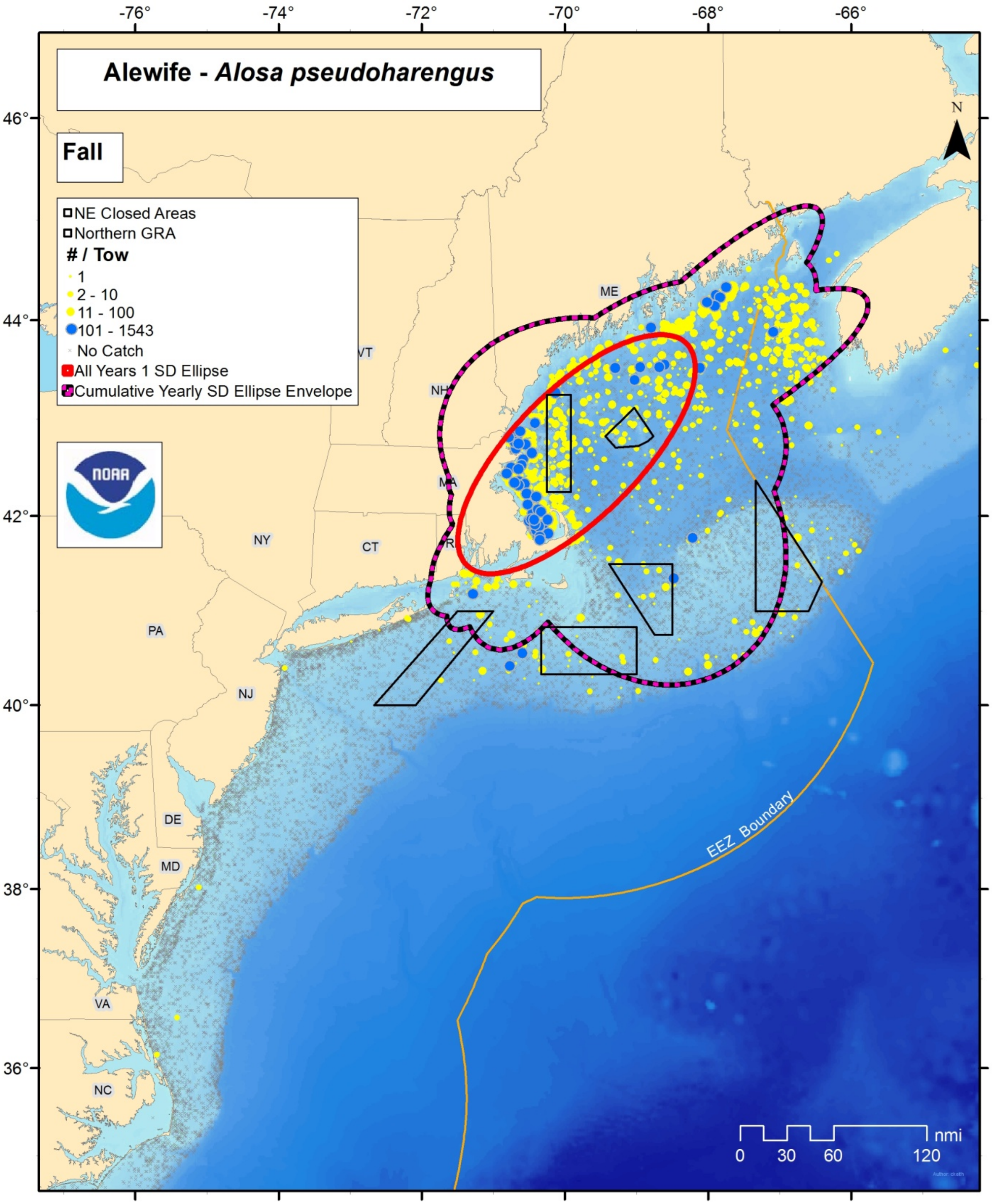


Figure 11. The standard deviational ellipse (one standard deviation) for *Alosa pseudoharengus* catches (numbers per tow) in fall NEFSC and NEAMAP bottom trawl surveys, for all years combined during 1975-2010 (red ellipse), and the "envelope" which encompasses all of the annual standard deviational ellipses for the same time period.

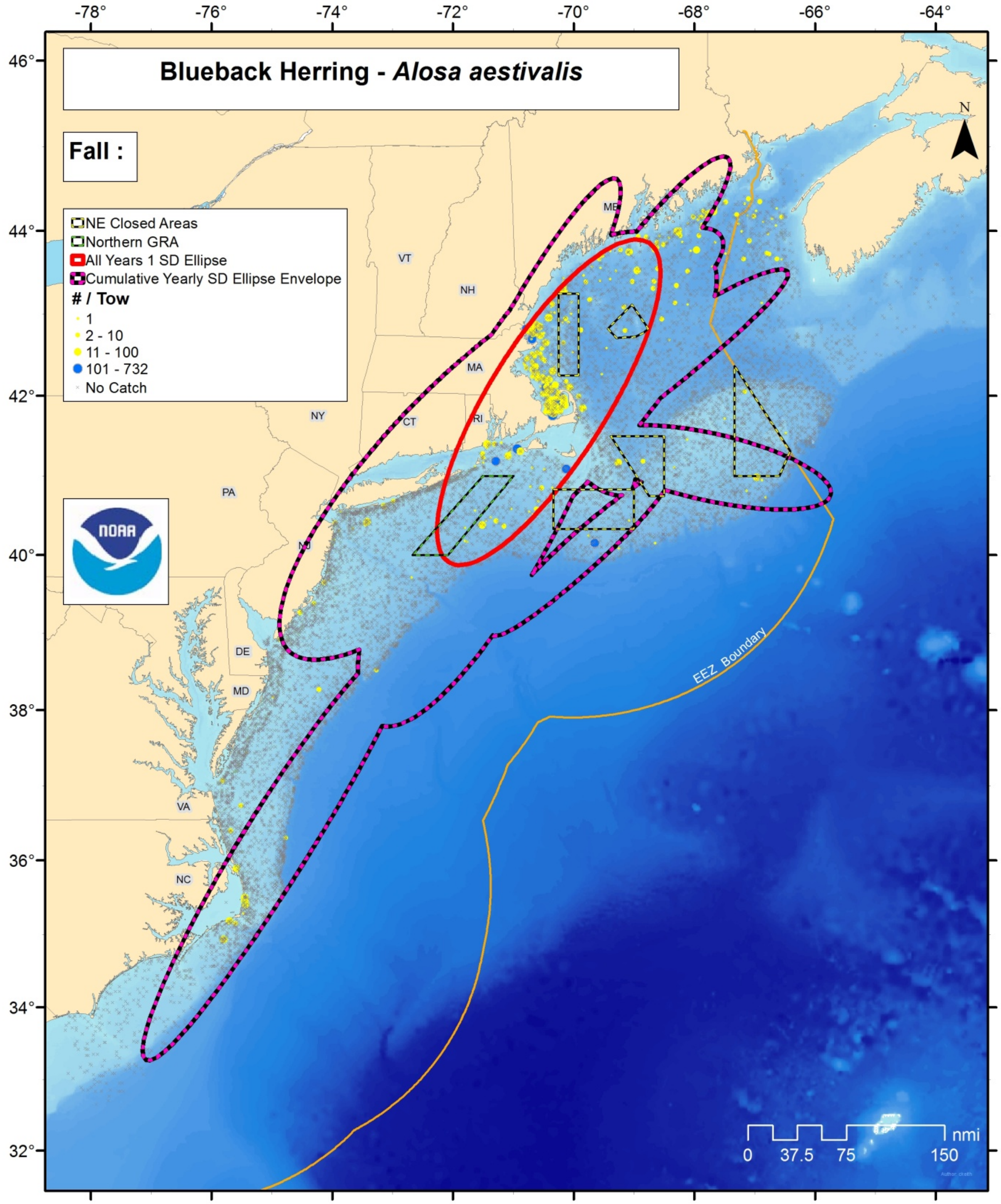


Figure 12. The standard deviational ellipse (one standard deviation) for *Alosa aestivalis* catches (numbers per tow) in fall NEFSC and NEAMAP bottom trawl surveys, for all years combined during 1975-2010 (red ellipse), and the "envelope" which encompasses all of the annual standard deviational ellipses for the same time period.

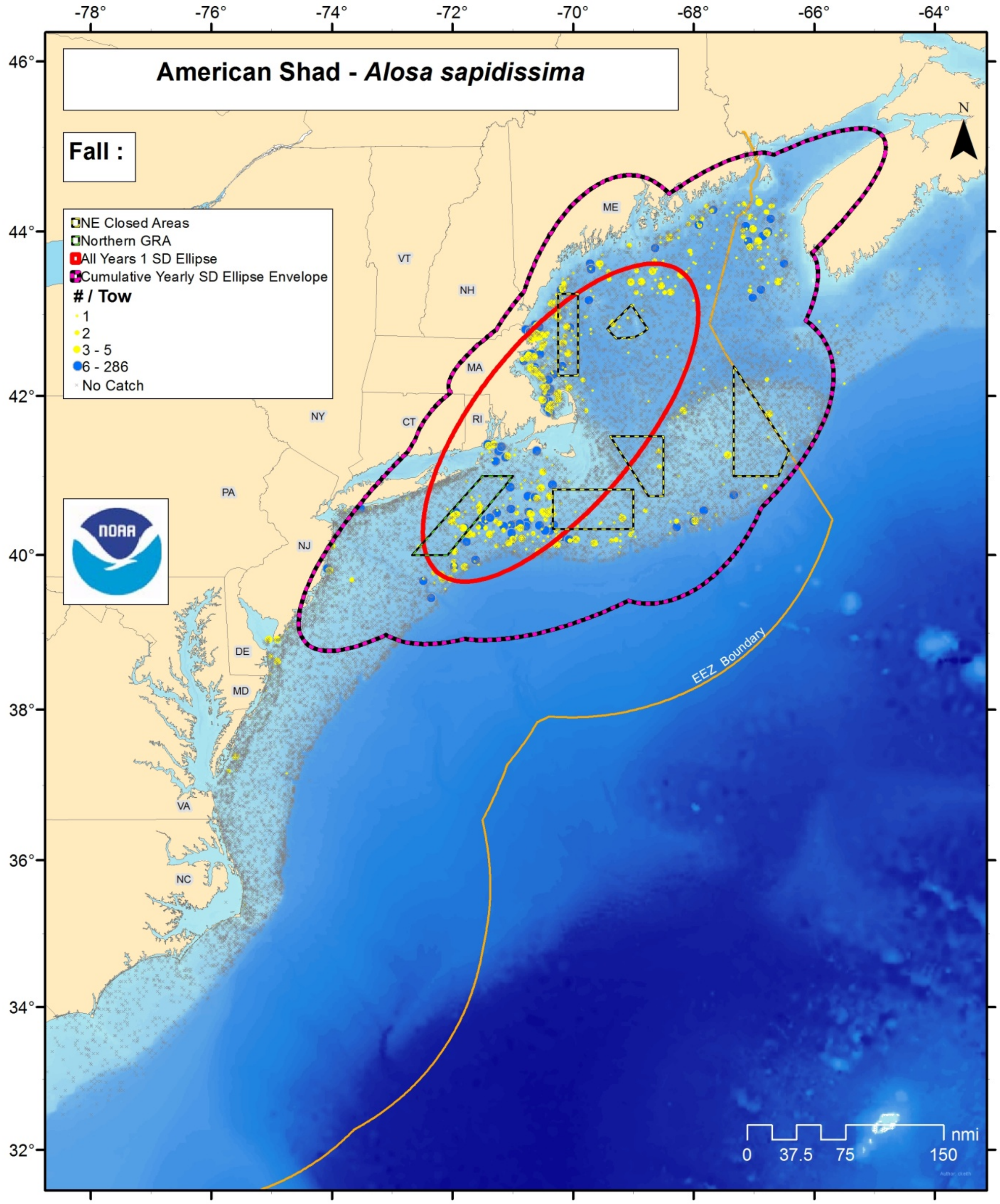


Figure 13. The standard deviational ellipse (one standard deviation) for *Alosa sapidissima* catches (numbers per tow) in fall NEFSC and NEAMAP bottom trawl surveys, for all years combined during 1975-2010 (red ellipse), and the "envelope" which encompasses all of the annual standard deviational ellipses for the same time period.

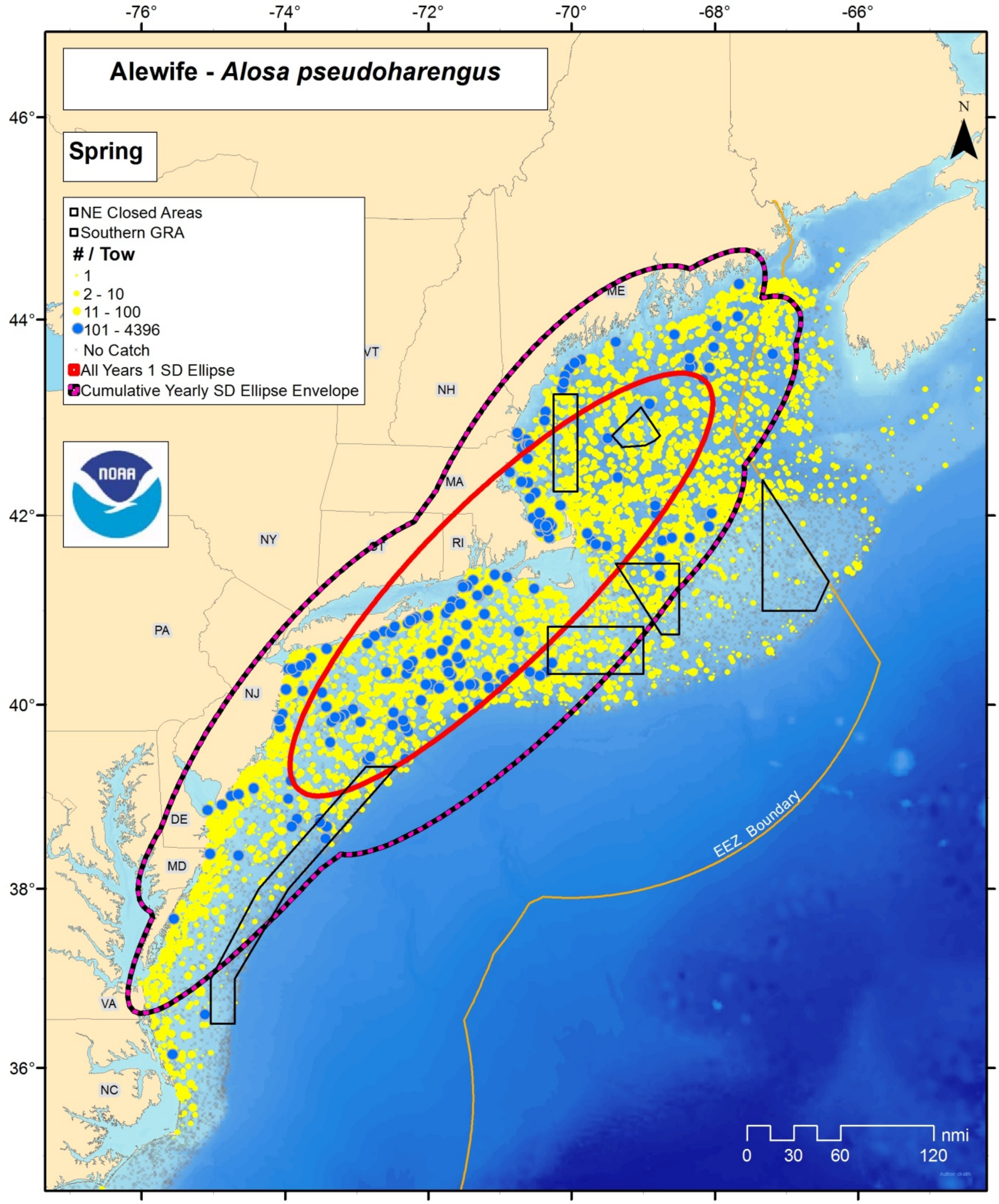


Figure 14. The standard deviational ellipse (one standard deviation) for *Alosa pseudoharengus* catches (numbers per tow) in spring NEFSC and NEAMAP bottom trawl surveys, for all years combined during 1976-2010 (red ellipse), and the "envelope" which encompasses all of the annual standard deviational ellipses for the same time period.

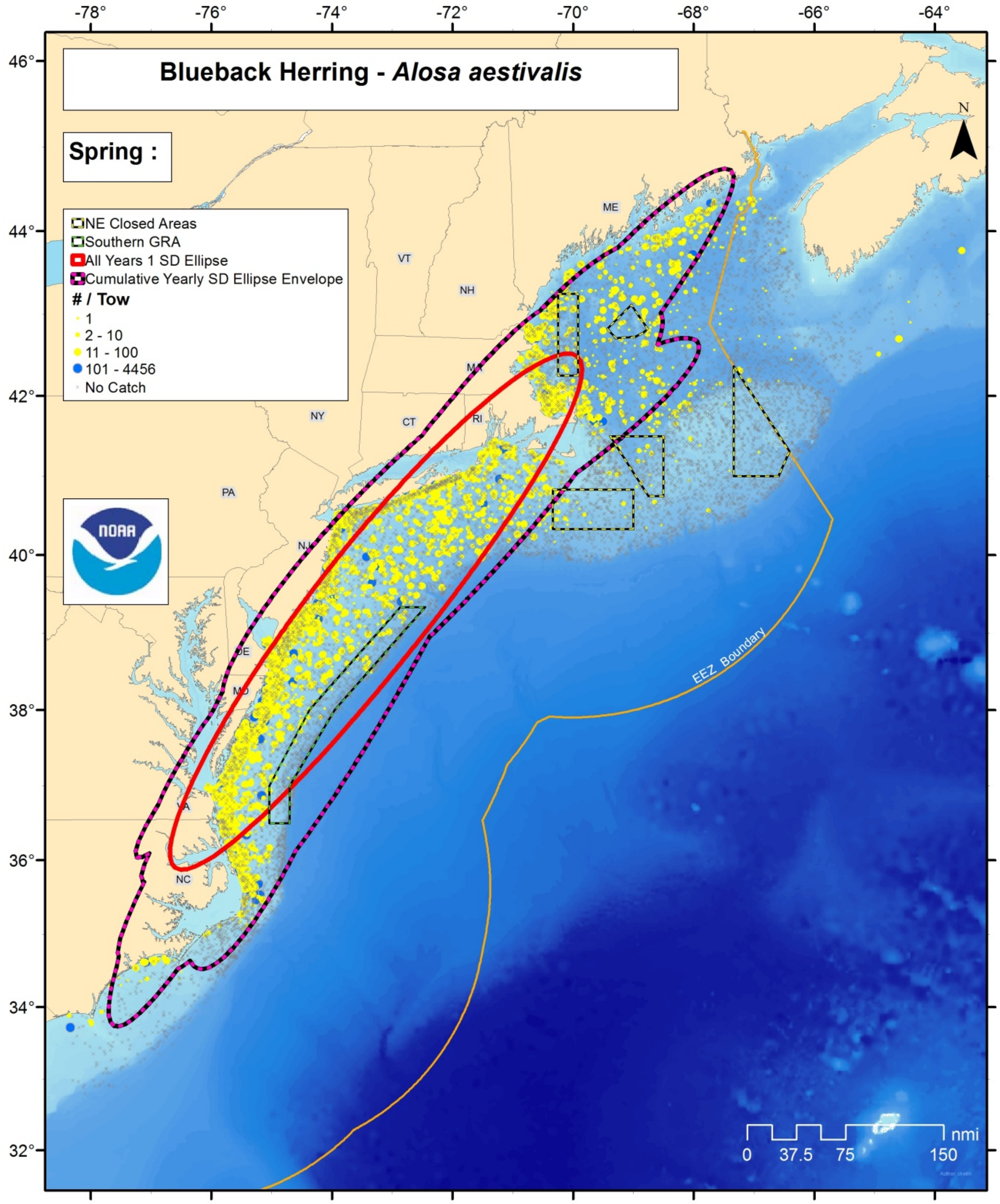


Figure 15. The standard deviational ellipse (one standard deviation) for *Alosa aestivalis* catches (numbers per tow) in spring NEFSC and NEAMAP bottom trawl surveys, for all years combined during 1976-2010 (red ellipse), and the “envelope” which encompasses all of the annual standard deviational ellipses for the same time period.

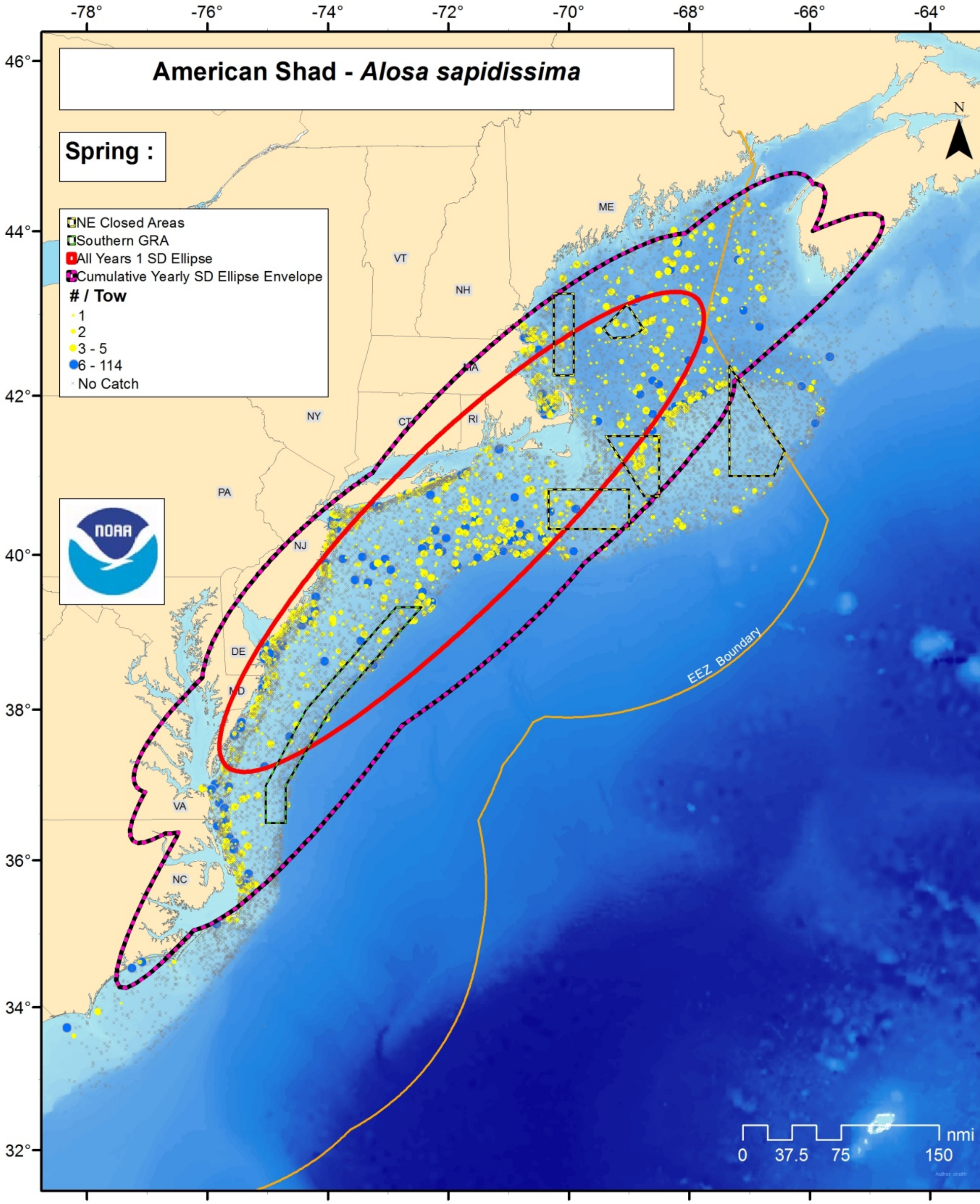


Figure 16. The standard deviational ellipse (one standard deviation) for *Alosa sapidissima* catches (numbers per tow) in spring NEFSC and NEAMAP bottom trawl surveys, for all years combined during 1976-2010 (red ellipse), and the “envelope” which encompasses all of the annual ellipses for the same time period.

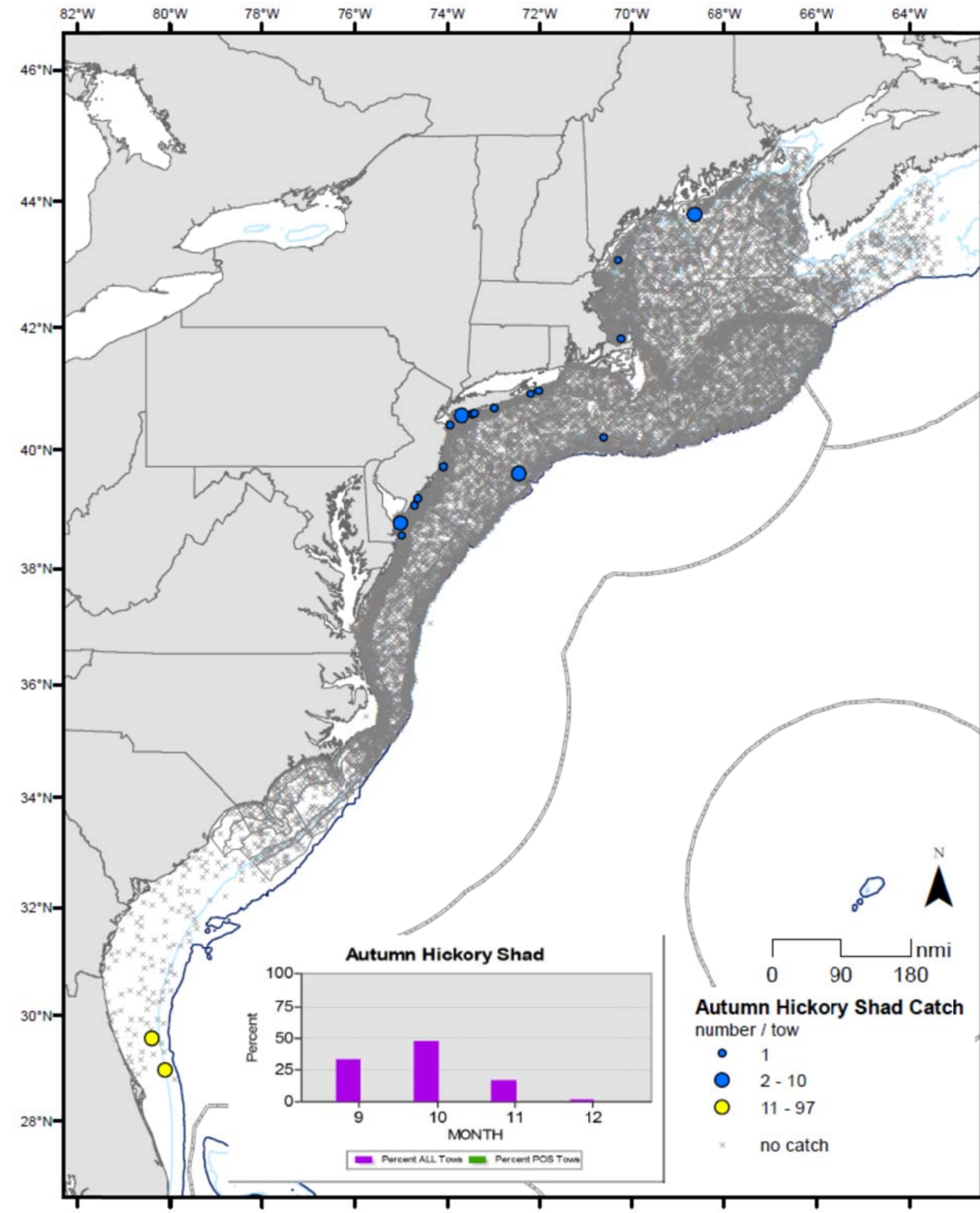


Figure 17. Distribution of *Alosa mediocris* (numbers per tow) during NEFSC and NEAMAP fall surveys, 1975-2010.

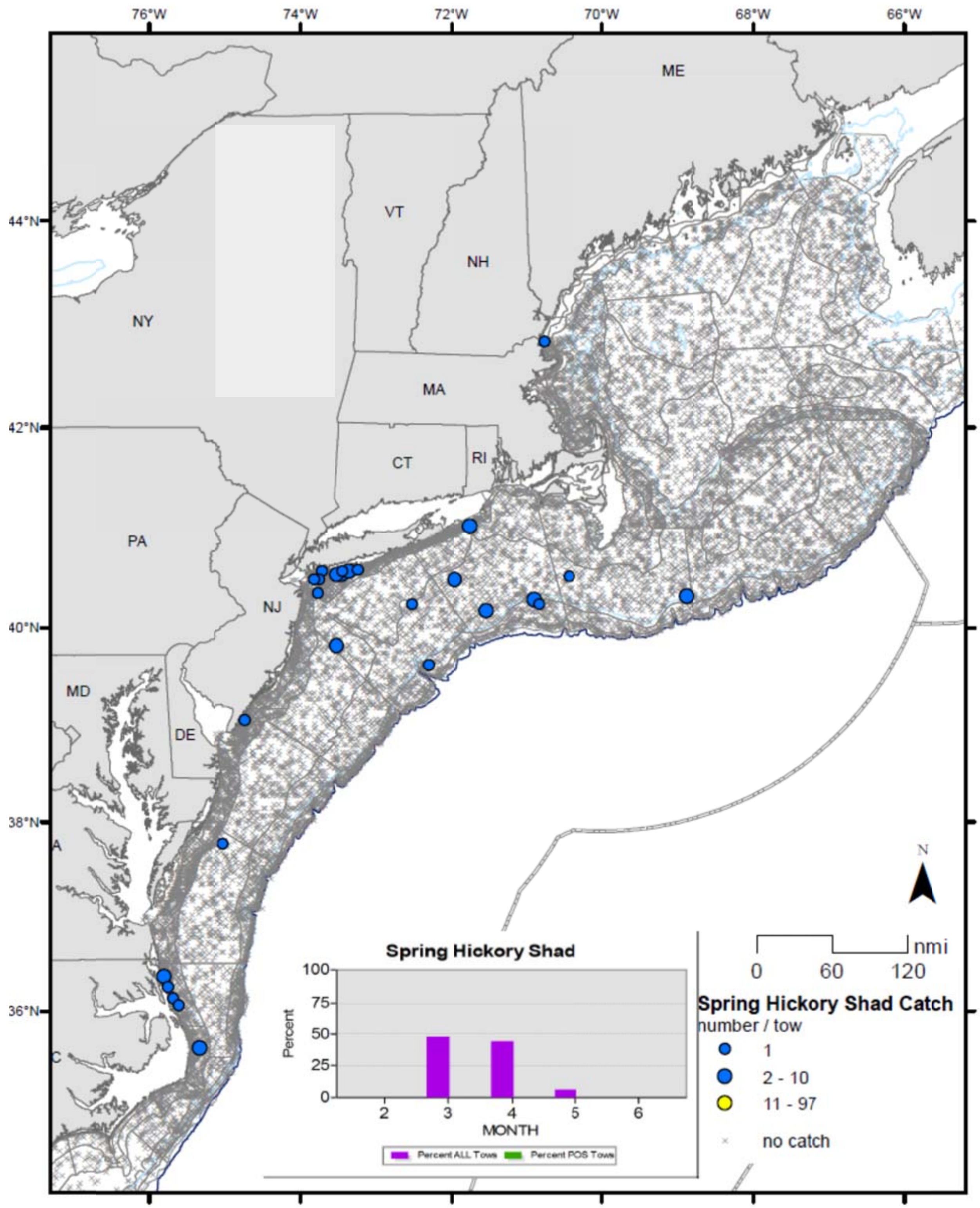


Figure 18. Distribution of *Alosa mediocris* (numbers per tow) during NEFSC and NEAMAP spring surveys, 1976-2010.

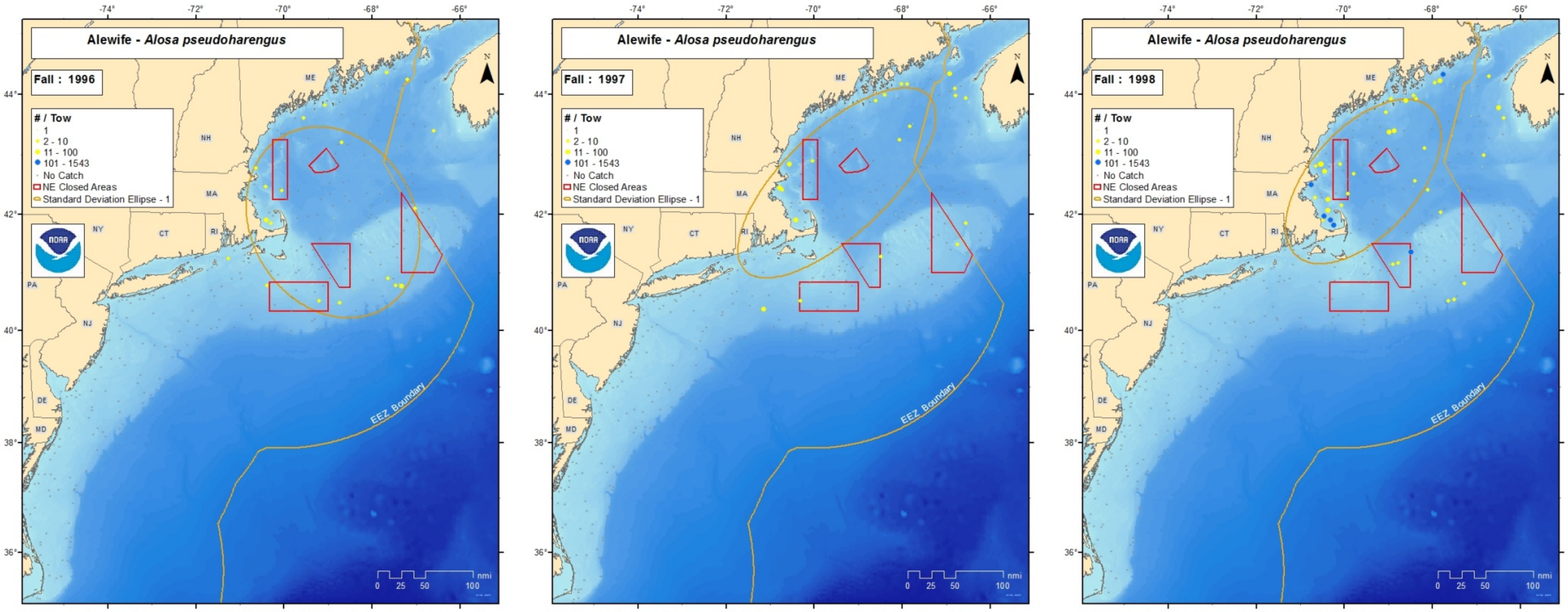


Figure 19. Annual standard deviational ellipses (one standard deviation) for *Alosa pseudoharengus* catches (numbers per tow) during the 1996-1998 NEFSC fall bottom trawl surveys.

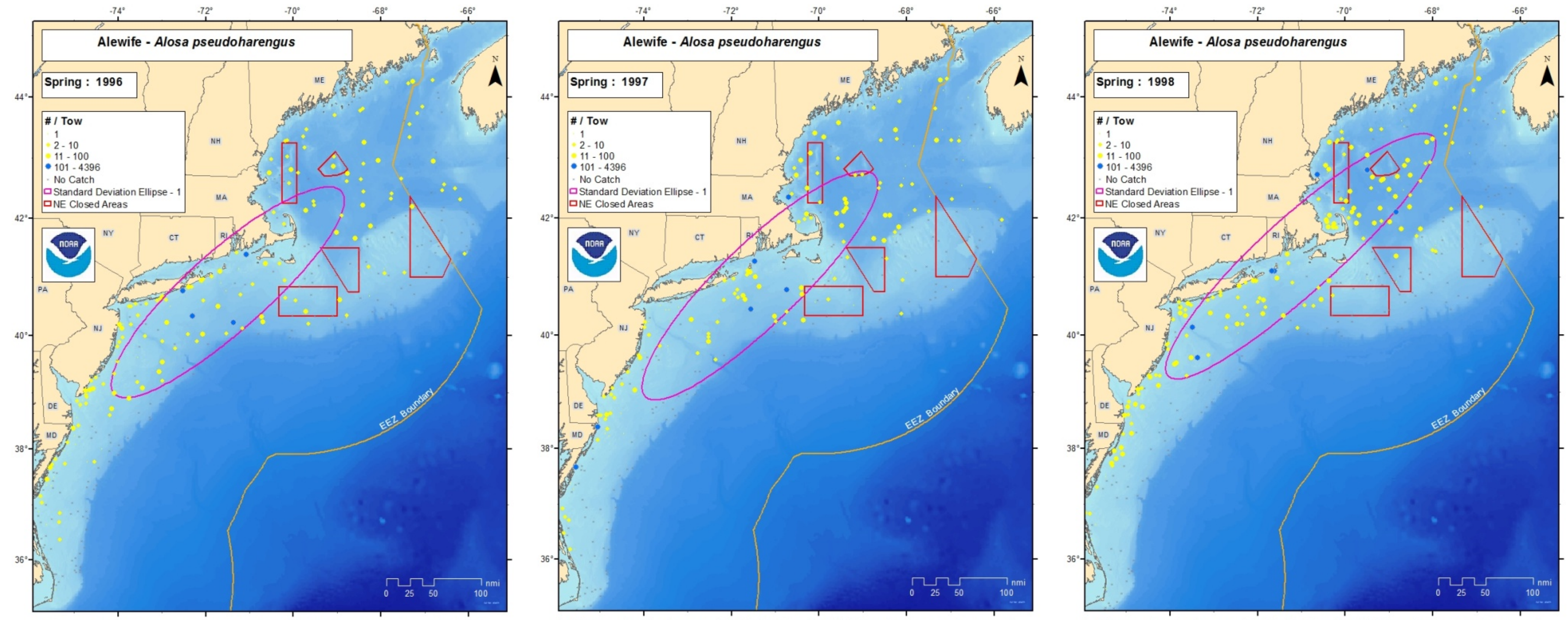


Figure 20. Annual standard deviational ellipses (one standard deviation) for *Alosa pseudoharengus* catches (numbers per tow) during the 1996-1998 NEFSC spring bottom trawl surveys.

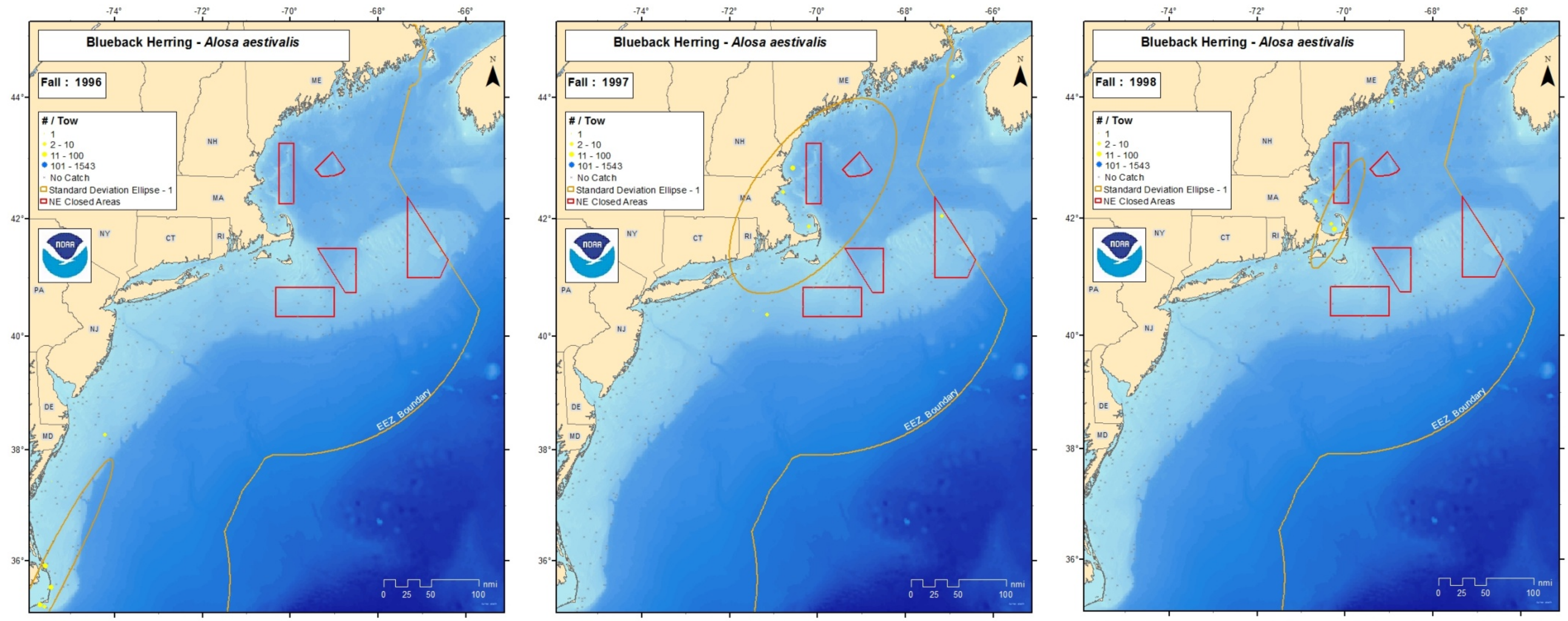


Figure 21. Annual standard deviational ellipses (one standard deviation) for *Alosa aestivalis* catches (numbers per tow) during the 1996-1998 NEFSC fall bottom trawl surveys.

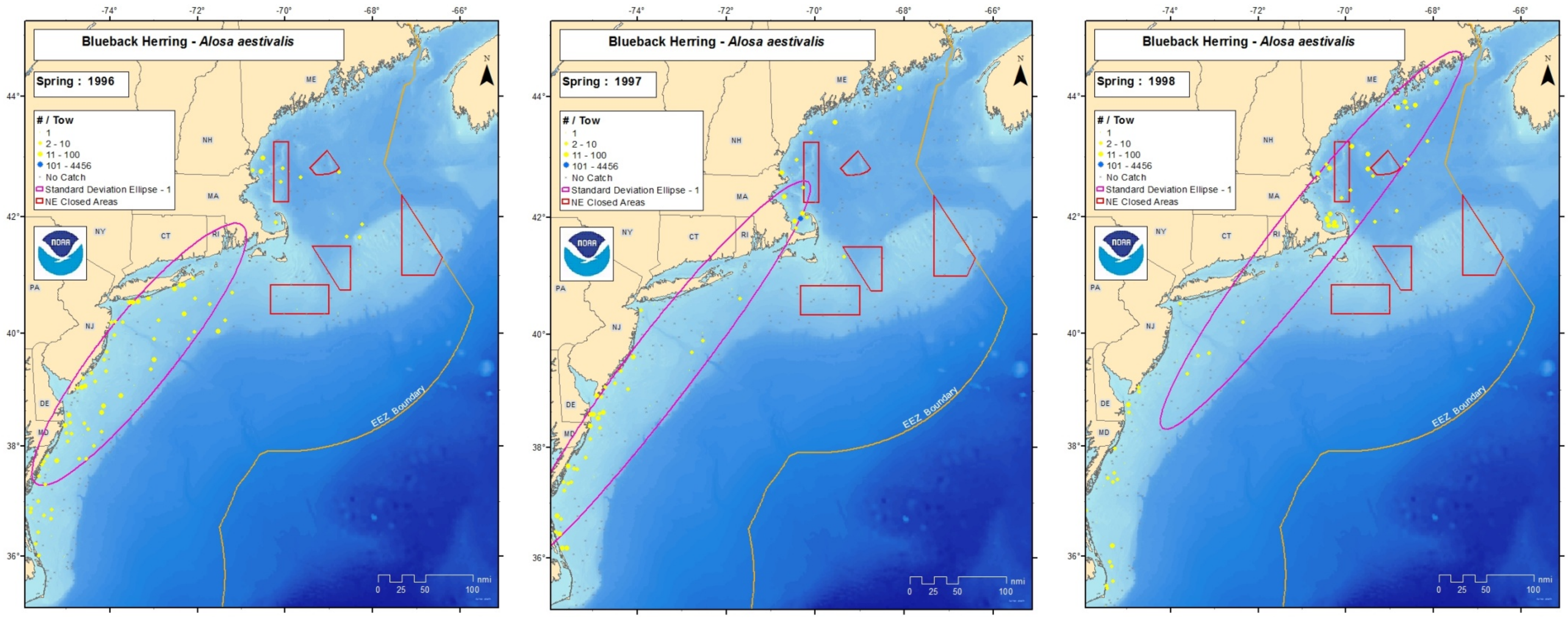


Figure 22. Annual standard deviational ellipses (one standard deviation) for *Alosa aestivalis* catches (numbers per tow) during the 1996-1998 NEFSC spring bottom trawl surveys.

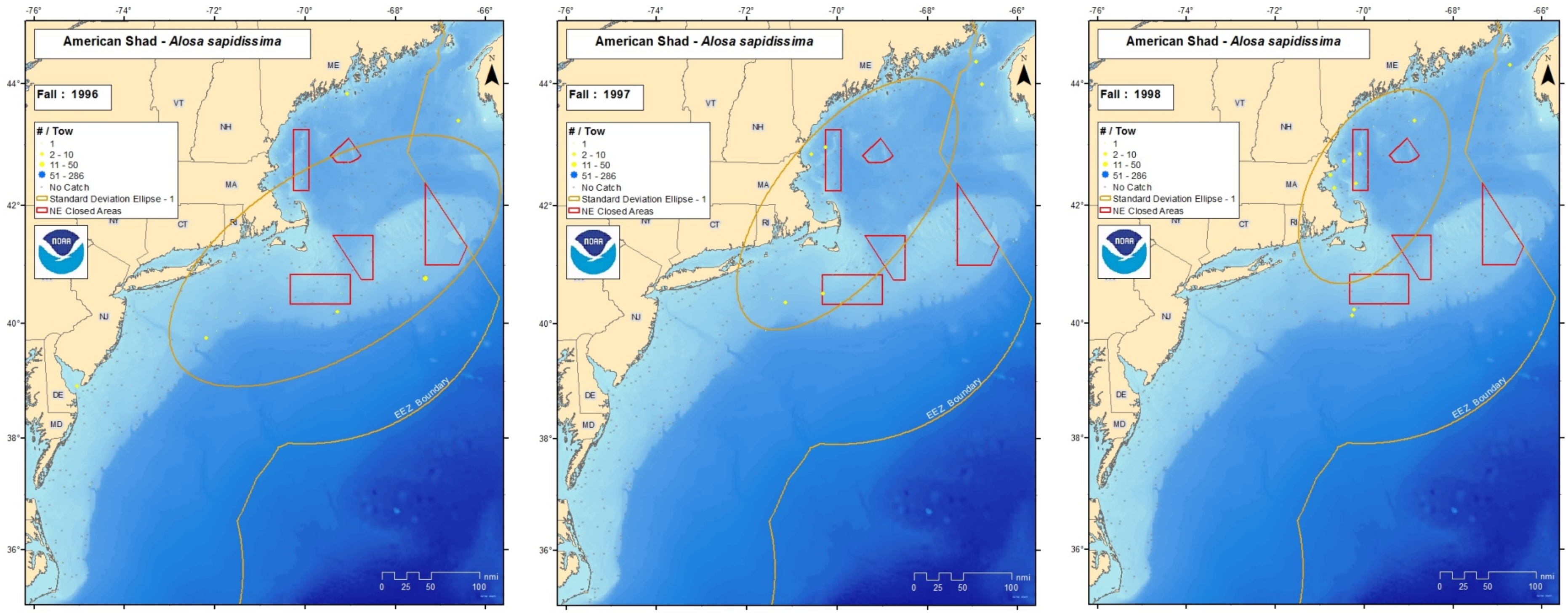


Figure 23. Annual standard deviational ellipses (one standard deviation) for *Alosa sapidissima* catches (numbers per tow) during the 1996-1998 NEFSC fall bottom trawl surveys.

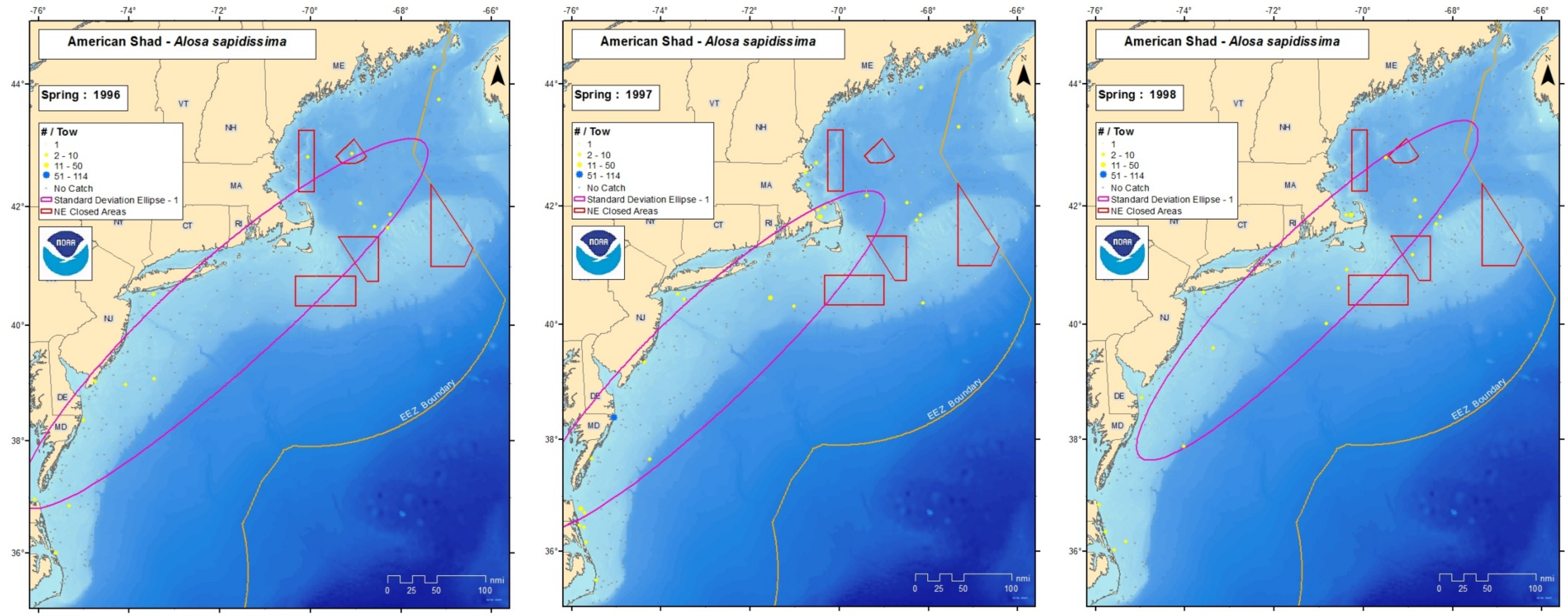


Figure 24. Annual standard deviational ellipses (one standard deviation) for *Alosa sapidissima* catches (numbers per tow) during the 1996-1998 NEFSC spring bottom trawl surveys.

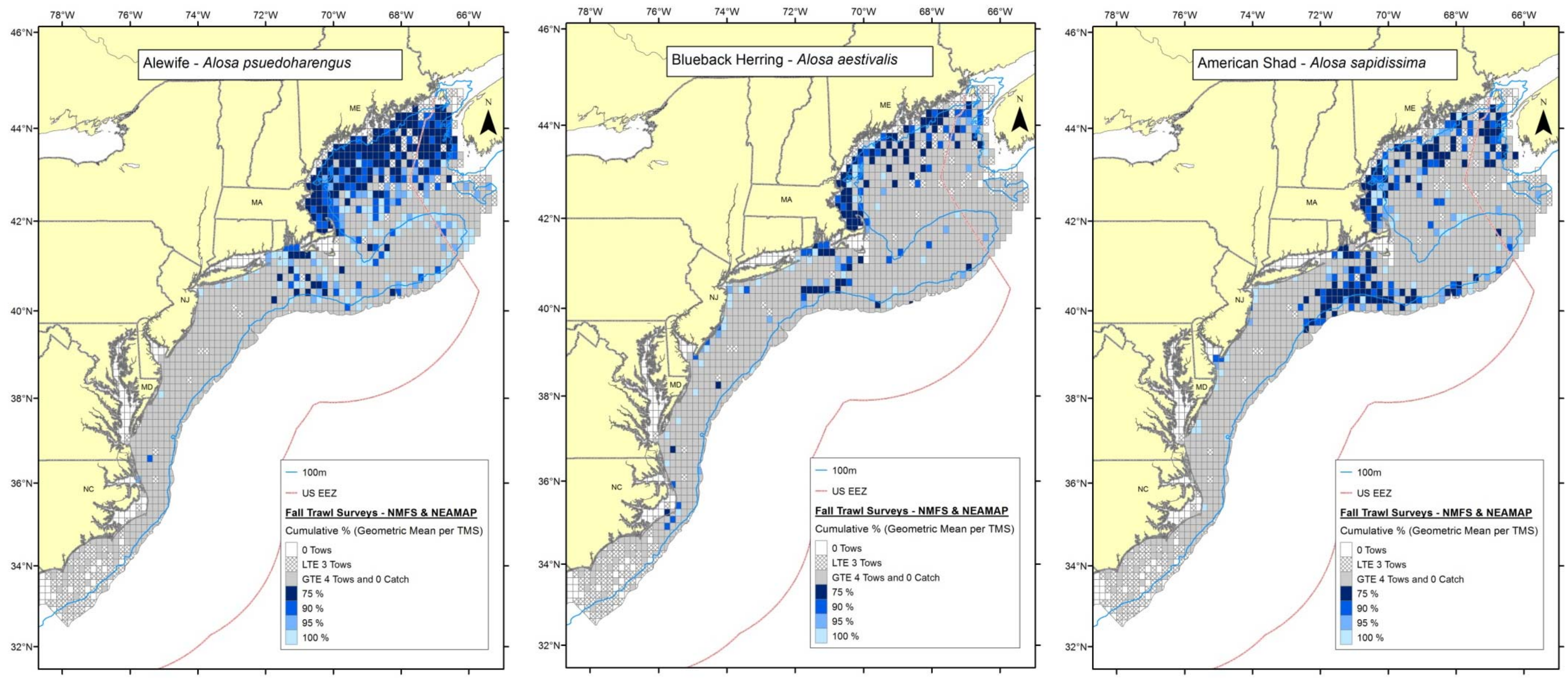


Figure 25. Distribution maps showing cumulative percentages (75, 90, 95 and 100%) of the geometric mean densities of *Alosa pseudoharengus*, *A. aestivalis*, and *A. sapidissima* during the 1975-2010 NEFSC fall bottom trawl surveys.

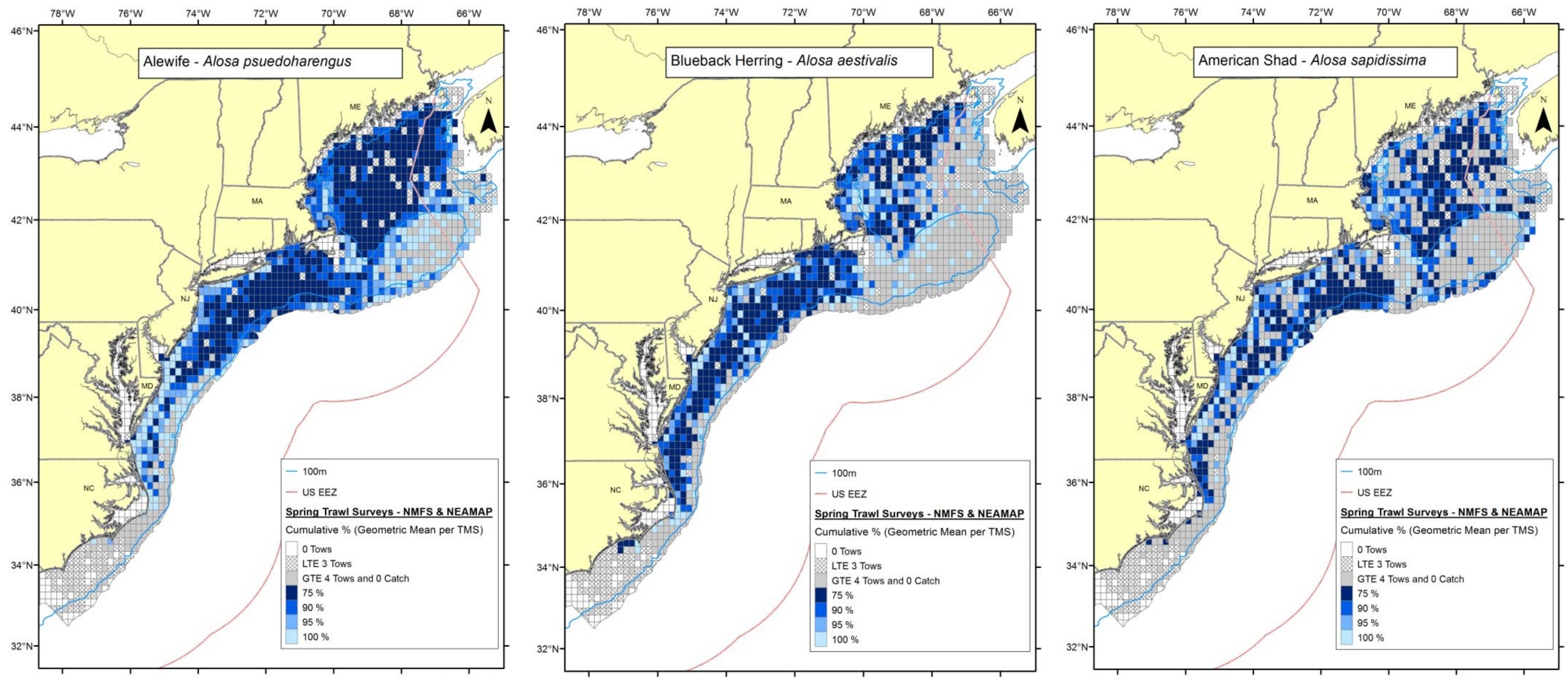


Figure 26. Distribution maps showing cumulative percentages (75, 90, 95 and 100%) of the geometric mean densities of *Alosa pseudoharengus, A. aestivalis*, and *A. sapidissima* during the 1976-2010 NEFSC spring bottom trawl surveys.

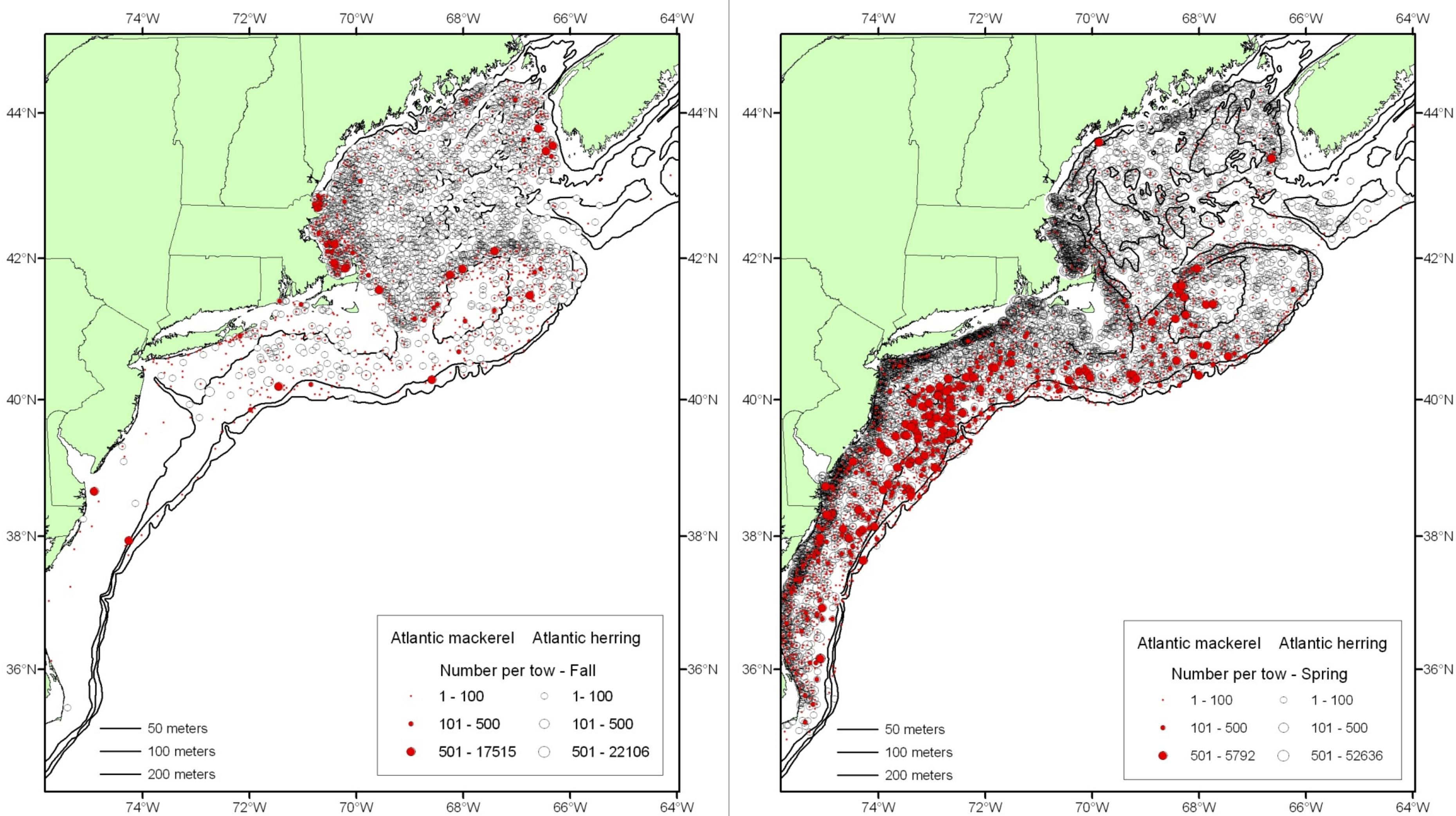


Figure 27. Distribution maps of Atlantic mackerel and Atlantic herring during NEFSC fall (left) and spring (right) bottom trawl surveys, 1976-2010.

FMAT Working Paper (DO NOT CITE) **9/15/2011**

Part II. Analyses for Amendment 14 to the Atlantic mackerel, squid and butterfish Fishery Management Plan

1.0 Estimates of incidental catch

1.1 Methods

Total incidental catch of river herring (alewife and blueback herring) and hickory and American shad (RHS) was quantified by fleet. Fleets included in the analyses were those sampled by the Northeast Fisheries Observer Program (NEFOP) and were stratified by region fished (Mid-Atlantic versus New England), time (year and quarter), gear group, and mesh size. Estimates that are restricted to a subset of trips identified as "targeted" trips for specific species were not used. These estimates are considered to be incomplete because the catches that occur on trips outside the trip subset are excluded. Furthermore, multiple species, such as Atlantic herring and mackerel, are often caught in a mixed fishery on the same trips during portions of the year. As such, defining targeted trips using a catch weight limit may lead to double counting of RHS incidental catch.

Region fished was defined using Statistical Areas for reporting commercial fishery data (Figure 1). The Mid-Atlantic region included Statistical Areas greater than 600, and New England included Statistical Areas 464 through 599. Gear groups included in the analyses were: bottom trawls, paired midwater trawls, single midwater trawls, gillnets, dredges, handlines, haul seines, longlines, pots/traps, purse seines, scallop trawl/dredge, seines and shrimp trawls. Bottom trawls and gillnets were further stratified into mesh groups. The estimated levels of precision when gillnet and bottom trawl incidental catches were quantified across all mesh sizes were very similar, and not consistently lower, than the precision estimates for these gears when estimated by mesh category. Since there was no gain in precision when we did not stratify by mesh, we split bottom trawl and gillnets into the following mesh categories:

Mesh category	Bottom Trawl	Gillnet
small	mesh $\leq$ 3.5	mesh < 5.5
medium	3.5 < mesh < 5.5	---
large	mesh $\geq$ 5.5	5.5 $\leq$ mesh < 8
x-large	---	mesh $\geq$ 8

Single and paired midwater trawls were split into separate fleets because the majority of both mackerel and herring landings during 2005-2010 were from paired midwater trawls, and the total catch-to-kept ratios varied between midwater trawl types.

The combined ratio method (Wigley et al 2007) is the standard discard estimation method implemented in NEFSC stock assessments. We used this method to quantify and estimate the precision (CV) of RHS total incidental catch for 1989 – 2010 across all fleets. Incidental catch estimates for the midwater trawl fleet are only provided for 2005-2010 because the estimates are most accurate as a result of improved sampling methodologies described below. Estimates of the precision are necessary in order to evaluate significant differences between incidental catch estimates by fleet and year.

Marked improvements to NEFOP sampling methodologies occurred in the high-volume midwater trawl (MWT) fisheries beginning in 2005, limiting the interpretability of estimates from these fleets in prior years. The NEFOP currently deploys specially-certified observers on paired and single midwater trawl vessels and purse seine vessels. NEFOP coverage of these high-volume fisheries that pump catch began in 2003 but the sampling focused on marine mammal interactions. In 2005, the focus of the sampling changed and the priorities became quantification of groundfish bycatch. At this time, the NEFOP implemented the catch composition log and observers began sampling the catches using a basket subsampling methodology in order to more accurately estimate catch weights over the course of pumping operations. At the same time, NEFOP protocols also required a more accurate quantification of the catches culled by the crew. Therefore, incidental catch estimates are provided beginning in 2005 because they are considered more accurate.

The NEFOP data used in this analysis were aggregated at the trip level. The sampling unit for the NEFOP database is a trip (Wigley et al. 2007) and observer sea days are allocated at the trip and fleet level, in contrast to the haul level. In addition, hauls within a trip are not independent of one another and are considered to be pseudo-replicates. The numbers of trips included in the analyses, for the Mid-Atlantic and New England regions, are presented in Tables 1 and 2, respectively.

For each trip, NEFOP data were used to calculate a total catch to kept (t/k) ratio, where t represents the total (retained+discarded) catch of an individual species (e.g., alewife, American shad) and k is the kept weight of all species. Annual estimates of total incidental catch were derived by quarter. Imputations were used for quarters with one or less observed trips.

The t/k ratios were expanded using a raising factor to quantify total incidental catch. With the exception of the midwater trawl fleets, total landed weight of all species (from the dealer database) was used as the raising factor. Total landings from the dealer database are considered to be more accurate than those of the VTR database because VTR landings represent a captain’s hail estimate. However, for the MWT fleets, we were unable to use the dealer data to estimate the kept weight of all species when stratifying by fishing area. When the area allocation (AA) tables were developed, MWT was not included in effort calculations because of difficulties determining effort for paired MWTs. Only those gears with effort information could be assigned to a Statistical Area. Given these limitations, VTR data were used as the expansion factor for the MWT fleet.

When quantifying incidental catch across multiple fleets, total kept weight of all species is an appropriate surrogate for effective fishing power because it is likely that all trips will not exhibit the same attributes (Wigley et al 2007). The use of effort without standardization makes the implicit assumption that effort is constant across all vessels, thereby resulting in a biased effort metric.

1.2 Results

1.2.1 Temporal distribution of incidental catches

The temporal distribution of incidental catches was summarized by quarter and fishing region (i.e., New England versus Mid-Atlantic), for the most recent six-year period (2005-2010), to take into account any effects that the most recent management changes may have had on the fleets included in the analyses. The gear types which exhibited the highest incidental catches of the combined four species consisted of bottom trawls, midwater trawls and gillnets. These gears comprised 92% of the total incidental catches in the Mid-Atlantic from all gear types and 97% in New England.

Incidental catches of the four species combined varied by region and quarter for each gear type. For the three predominant gear types, most of the catch of the four species combined was taken in midwater trawls (72%, of which 53% was from paired midwater trawls and the rest from single midwater trawls), followed by 24% in small mesh bottom trawls and 3% in large mesh gillnets (Table 3). Most of the catch (58%) occurred in the New England region where catches were higher for all three gear types; 36% taken in midwater trawls, followed by 18% in small mesh bottom trawls and 3% in large mesh gillnets. The highest quarterly catch (34%) occurred during Quarter 1 (Q1) in the Mid-Atlantic, of which the majority (32%) was taken in midwater trawls. The second and third highest quarterly catches of all four species occurred during Q4 (21%) and Q2 (14%) in New England. About 16% and 11% of the catches in New England during Q4 and Q2, respectively, were taken in midwater trawls.

Catches of all four species taken in midwater trawls during Q1 in the Mid-Atlantic and during all four quarters in New England comprised 69% of the total incidental catch during 2005-2010 (Table3). Small mesh bottom trawl catches in New England comprised an additional 19% of the total incidental catch and were highest during Q1 (7%) followed by Q3 (5%), Q4 (4%) and Q2 (3%). Catches in large mesh gillnets were highest in New England, comprising 3% of the total incidental catch, and were highest during Q3 and Q4 (both totaling 1%).

Given the similar migration patterns between the two shad species and between alewife and blueback herring, incidental catches were also summarized separately for river herring and shads. Shad catches occurred primarily in midwater trawls (42% of which 32% were from paired midwater trawls and the rest from single midwater trawls), followed by large mesh gillnets (27%) and small mesh bottom trawls (26%, Table 4). Shad catches were highest in the New England region (69%) and ranked from high to low were 29%, 23% and 13% for midwater trawls, large mesh gillnets and small mesh bottom trawls, respectively. Quarterly trends in shad catches were highly variable. The highest quarterly catches of shad occurred in midwater trawls during Q4 in New England (13%) and during Q1 in the Mid-Atlantic (12%), followed by catches taken during Q3 (9%) and Q4 (9%) in large mesh gillnets in New England.

River herring catches also occurred primarily in midwater trawls (76%, of which 56% were from paired midwater trawls and the rest from single midwater trawls), followed by small mesh bottom trawls (24%, Table 5). Catches of river herring in gillnets were negligible. Across gear types, catches of river herring were greater in New England (56%) than in the

Mid-Atlantic (44%). The percentages of midwater trawl catches of river herring were similar between New England (37%) and the Mid-Atlantic (38%). However, catches in New England small mesh bottom trawls were three times higher (18%) than those from the Mid-Atlantic (6%). Overall, the highest quarterly catches of river herring occurred in midwater trawls during Q1 in the Mid-Atlantic (35%), followed by catches in New England during Q4 (16%) and Q3 (11%). Quarterly catches in small mesh bottom trawls were highest in New England during Q1 (7%) and totaled 3-4% during each of the other three quarters.

1.2.2 Species-specific incidental catch estimates for 2005-2010

From 2005-2010, the total annual incidental catch of alewife ranged from 19.0-473.3 metric tons (mt) in New England and 8.9-256.2 mt in the mid-Atlantic. The dominant gear varied across years between paired midwater trawls and bottom trawls (Figure 2). Corresponding estimates of precision exhibited substantial interannual variation and ranged from 0.28-3.12 across gears and regions. In all years and regions, the small mesh category dominated alewife bottom trawl catches (Figure 3). With the exception of 2007, alewife catches in the mid-Atlantic were greatest in the first quarter and dominated by paired and single midwater trawls (Figure 4). In quarters 2-4, mid-Atlantic alewife catches were primarily from small mesh bottom trawls. In contrast, New England catches of Alewife generally increased with quarter, and with the exception of 2007, were consistently greatest in the fourth quarter. New England alewife catches represented a mixture of single midwater trawls, paired midwater trawls and small mesh bottom trawls.

Total annual blueback herring incidental catch from 2005-2010 ranged from 13.9–176.5 mt in New England and 1.2-382.6 mt in the mid-Atlantic. Across years paired and single midwater trawls exhibited the greatest blueback herring catches, with the exception of 2010 in the mid-Atlantic where bottom trawl was the most dominant gear (Figure 5). Corresponding precision estimates ranged from 0.27 – 3.65. The small mesh category dominated blueback herring bottom trawl catches (Figure 6). Similar to alewife, blueback herring catches were greatest in the 1st quarter in the Mid-Atlantic and, with the exception of 2007, in the fourth quarter in New England. In the mid-Atlantic, blueback herring catches were predominantly from midwater trawls. While small and medium mesh bottom trawls comprised approximately 60% of the total annual mid-Atlantic catch in 2007, the magnitude of this 2007 catch was small compared to other years. In New England, catches were largely from midwater trawls and to a lesser extent small mesh bottom trawls.

Total annual American shad incidental catches from 2005-2010 were generally less than that of the river herring species and ranged from 12.7–53.2 mt in New England and 5.9-36.6 mt in the mid-Atlantic. In contrast to both river herring species, the greatest annual American shad catches were due to gillnets as well as single MWTs, paired MWTs, and bottom trawls. Corresponding coefficients of variation ranged from 0.19 – 10.7. Within the bottom trawl fleet, the small mesh category generally exhibited the greatest catches; however, American shad were also caught in medium and large mesh bottom trawl fleets (Figure 9). Across regions and years, the large-mesh category generally dominated gillnet catches. Similar to the river herring species, American shad catches were greatest during the first quarter in the mid-Atlantic and the fourth quarter in New England. However, in contrast to the river herring species, the primary gears were more evenly distributed between midwater trawls, bottom trawls and large-mesh gillnets.

Total annual 2005-2010 hickory shad incidental catch was the smallest of all RHS species and ranged from 0.1–11.8 mt in New England and 1.0-8.7 mt in the mid-Atlantic. Across years, the dominant gear varied between bottom trawls, paired midwater trawls and gillnets (Figure 11). Precision estimates varied annually and ranged from 0.19–2.9 across gears and regions. Bottom trawl catches of hickory shad were predominantly comprised of the small mesh category, where gillnet catches were from both small and large mesh categories (Figure 12). Mid-Atlantic catches were more evenly distributed over quarter than for other RHS species, and were primarily comprised of small mesh bottom trawl and small and large mesh gillnets (Figure 13). The majority of New England quarterly catches was from midwater trawls, small-mesh bottom trawls and to a lesser extent large-mesh bottom trawls and gillnets.

Total annual incidental catch of unknown herring from 2005-2010 ranged from 5.2–228.2 mt in New England and 0.1 – 163.4 mt in the mid-Atlantic. The dominant gear by year and region varied between gillnet, paired MWT, single MWT, bottom trawl and the ‘other’ category (Figure 14). Corresponding coefficients of variation range from 0.2-0.8. Small- and large-mesh categories dominated unknown herring bottom trawl and gillnet catches, respectively (Figure 15). Mid-Atlantic catches were generally greatest in the first quarter and were from paired MWT, single MWT, small-mesh bottom trawl and large-mesh gillnets. New-England catches were approximately evenly distributed across quarter and largely from small-mesh bottom trawls and single MWTs (Figure 16).

Species-specific annual incidental catch estimates and the associated coefficients of variation are presented in Appendix 1.

1.2.2.1 Validation of incidental catch estimates

Species-specific total catch and discard estimates can be used to quantify the amount kept by calculating the difference between the two estimates. These kept estimates can then be compared to species-specific landings obtained from the dealer or VTR databases to serve as validation. For both the river herring and shad species groups, kept estimates did not track the landings well (Figure 17). For Atlantic herring, however, landings and kept estimates were quite similar during the last 4-5 years of the time series. This consistency between kept and landed Atlantic herring estimates indicates that the employed methodology can be used to reconstruct landings. The discrepancy between landings and kept estimates of the RHS species suggests an inconsistency in the identification of these species at the ports of landing.

1.2.2.2 Fisheries conducted by the fleets used in the incidental catch estimates

The incidental catch estimates are based on fleets (ex: gear, region, mesh) rather than fishery directivity. In order to identify the directivity of each of the fleets used in the incidental catch analysis, we analyzed trends in mackerel, herring, *Illex*, *Loligo*, and silver hake landings by month, area and mesh size. The analysis clearly indicated substantial fishery directivity overlap within fleets. For example, trends in mackerel and herring landings by gear indicate that both species are caught predominantly by paired midwater trawls (Figure 18).

Graphs of catch by codend mesh size recorded in the NEFOP database for observed hauls indicated an overlap in mesh sizes used on midwater trawl tows when the target species (i.e., targspec1 field in the NEFOP database) is either mackerel or Atlantic herring (Figure 19a). About 85% of mackerel midwater trawl catches and 96% of herring midwater trawl catches occurred with mesh sizes between 24 and 50 mm. Similar overlap in mesh size was apparent in bottom trawl tows targeting either mackerel or silver hake. Bottom trawl mesh sizes between 48 and 76 mm represented 99% of mackerel catches and 77% of silver hake catches (Figure 19b).

Some segregation in mackerel and herring 2005-2010 landings by Statistical Area was apparent (Figure 20a). The greatest proportions of herring midwater trawl landings occurred in New England (specifically Statistical Areas 512 through 522), whereas the greatest proportions of mackerel landings occurred in the Mid-Atlantic (Statistical Areas 612-622). However, there was some overlap in regional trends between the two species. For example, 20% of the total mackerel landings were from New England (Statistical Areas 525-537) and 19% of the total Atlantic herring landings were from the Mid-Atlantic. Similarly for bottom trawl landings, the greatest proportions of mackerel landings occurred in Mid-Atlantic statistical areas 612-622 and the greatest proportions of silver hake landings occurred in New England statistical areas 513-538 (Figure 20b). However, overlap was still apparent; 15% of total mackerel landings were caught in New England and 25% of total silver hake landings were from the Mid-Atlantic. Accordingly, Statistical Area alone does not appear to permit separation of fleets into fisheries.

Analysis of mackerel and herring landings by month and region indicated a mixed midwater trawl fishery from January-April in both the Mid-Atlantic and New England (Figure 21a). In the Mid-Atlantic, landings during January-April represented the vast majority (98%) of regional midwater trawl landings. Of the total January-April combined mackerel and herring landings from the Mid-Atlantic, between 24-39% were herring and 61–76% were mackerel. In New England, January-April landings only represented 21.7% of regional midwater trawl landings. Of the combined mackerel and herring landings, 32-41% were herring and 55-68% were mackerel. Analysis of mackerel, *Loligo* and silver hake bottom trawl landings by both region and month indicated a mixed fishery throughout the year (Figure 21b). While most mackerel landings occurred in January-April and most *Illex* landings occurred from June-October, silver hake and *Loligo* landings largely occurred throughout all months in both regions. Further examination of the distribution of January-April landings by Statistical Area indicated substantial overlap in both regions within both bottom trawl and midwater trawl fleets (Figure 22).

Based on trends in landings over time, region, gear and mesh category, and the strong evidence for mixed fisheries, it is not possible to clearly identify fishery directivity for each of the fleets used in the incidental catch analysis.

1.2.3 Spatial distribution of incidental catches

ArcGIS software (v. 10, ©ESRI) was used to produce maps of nominal fishing effort (days fished, from the Vessel Trip Reports), by ten-minute square (TNMS), for the gear types with the highest levels of incidental catch of each the four subject species during 2005-2010 (refer to Section 1.2.1). As previously noted, 2005-2010 was considered as the reference time period because it takes into account any effects that the most recent management changes may have had on the temporal and spatial distributions of the fleets included in the analyses. Gear types that were mapped included small mesh bottom trawls, single midwater trawls, paired midwater trawls and large mesh gillnets. Each TNMS was shaded according to the cumulative percentage of the total effort for the mapped time period. For each gear type, CPUE (kept+discarded weight of each of the four species / days fished) was computed from NEFOP data using observed tows. It should be noted that the days fished data from the Vessel Trip Reports (VTR) differ from the days fished data used to compute CPUE. The latter type of data is more accurate because it represents the sum of the actual tow durations within each TNMS, whereas days fished data from the VTRs represent the product of the average tow duration and the number of tows conducted during a subtrip as reported by each captain. Likewise, the data resolution of the geographic location data used to map VTR effort data differs from that used to map the NEFOP CPUE data. Mapping of the VTR data by TNMS represents a post-stratification of the effort data because captains are only asked to report a single fishing location (as a Statistical Area and a single latitude/longitude location within the Statistical Area) within each Statistical Area that is fished during a trip. The assignment of NEFOP CPUE data to each TNMS is more accurate because catch and effort data are recorded for each tow location.

For each map, CPUE data were mapped as the center point of a TNMS and overlain on the fishing effort layer to determine: 1.) where CPUE levels were highest; 2.) whether high incidental catch rates coincided with high levels of fishing effort; and 3.) to characterize the variability in temporal and spatial trends in effort and CPUE with respect to the potential for establishing closed areas or gear restriction areas to reduce bycatch of the four alosid species. Maps from the 2005-2010 reference period were compared to the 1999-2004 period to determine the degree of spatial consistency in broad-scale patterns of fishing effort for each gear type and incidental catch rates of each species. For comparative purposes, CPUE data classes used in the map legends for each of the two time periods were the same within each gear type. For midwater trawls, nominal effort and CPUE were not mapped for 1999-2004 because VTRs were not mandatory for the midwater trawl herring fleet until 2001 and, as previously explained in Section 1.1, the methods used by NEFOP fishery observers to quantify large-volume catches in the midwater trawl fleets were most accurate beginning in 2005 and the number of midwater trawl trips sampled by NEFOP was much higher.

1.2.3.1 Maps of CPUE and effort, by fleet, for each species

As concluded in Section 1.2.1, most of the total incidental catch of river herring during 2005-2010, as well as the two shad species, occurred in midwater trawls (mainly in paired midwater trawls). Incidental catch rates of both alewife and blueback herring in paired midwater trawls during 2005-2010 were similar and were highest across broad areas in the western Gulf of Maine (SA 521 and 514 along and shoreward of the 100 m isobath), off the coast of central NJ (SA 612, 615 and 616), and scattered throughout southern New England (particularly off Rhode Island in Block Island Sound and along the southeast shore of Long Island, Figure 23). The highest catch rates of both species did not always coincide with the highest fleet effort. Catch rates of hickory shad in paired midwater trawls were much lower than those of American shad and occurred primarily in the western Gulf of Maine (Figure 24). American shad catch rates were highest in the same general areas as river herring, with the exception that American shad catch rates were lower in southern New England.

The second highest levels of incidental catches of each of the four alosid species occurred in small mesh bottom trawls. Fishing effort in the small mesh bottom trawl fleet varied between 2005-2010 and 1999-2004. During 1999-2004, effort occurred across a broader area, in the western Gulf of Maine and was much higher in southern New England (Figure 25). Incidental catch rates of blueback herring and alewife were also different between the two time periods, with the highest rates occurring in and around Block Island Sound during 2005-2010, but occurred offshore, for blueback herring, in scattered TNMS within SA 612, 613, 615 and 616 during 1999-2004 (Figures 25 and 26). Similar to the paired midwater trawl fleet, the highest incidental catch rates of both species did not always coincide with the highest levels of effort (e.g., Block Island Sound catch rates during 2005-2010). Catch rates of American shad in small mesh bottom trawls (Figure 27) were much higher than for hickory shad (Figure 28), similar to catch rates of the two shad species in paired midwater trawls. Catch rates of American shad in small mesh bottom trawls varied between the time periods and were highest in the vicinity of Long Island Sound during 2005-2010, followed by a broad range of mostly contiguous offshore areas in the Mid-Atlantic and southern New England (between the 100 and 400 m isobaths). During 1999-2004, catch rates of American shad and hickory shad were highest in the offshore areas, particularly in the southern portion of SA 537 between the 100 and 400 m isobaths (Figure 27 and 28).

Of the four bycatch species, most of the incidental catch in large-mesh gillnet fleet consists of the two shad species. Although fleet effort was highest off MA and NH (mainly inside of 100 m) during 2005-2010, catch rates of American shad were highest in areas where the fleet’s effort was lowest; in the central Gulf of Maine in SA 515 (Figure 29). Incidental catches of hickory shad were extremely low (Figure 30).

Some of the maps included in the analysis showed CPUE data within ten-minute squares which lacked VTR effort data. Where this disconnect occurred in state waters, it may have been attributable to the fact that those vessels were not required to have federal permits, and thus, not required to submit VTRs. When this disconnect occurred seaward of the boundary for state territorial waters, it may have been due to incomplete submittals of VTR data for all trips, but more likely was due to differences between the spatial resolution of the VTR and NEFOP effort data.

1.2.3.2 Maps of CPUE and effort, by fleet and quarter, for all four species combined

A second series of CPUE and effort maps was prepared for single and paired midwater trawls combined and small mesh bottom trawls, by quarter, during 2005-2010 because these two gear types comprised a majority of the incidental catches of all four species during this time period (Table 3). Incidental catches of all four species were mapped on a quarterly basis to provide a comprehensive summary of the data in time and space. Within each of the two gear types, the CPUE and effort data are comparable across quarters.

During 2005-2010, catch rates of all four species combined were highest in midwater trawls during Q1 and Q4 and were distributed across very large areas, but the areas were not always contiguous (Figures 31 and 32). During Q1, catch rates were very high in Block Island Sound and off eastern Long Island as well as in scattered areas of the Mid-Atlantic off New Jersey (Figure 31). During Q4, catch rates were highest in the western Gulf of Maine, along the 100 m isobath between Cape Cod, Massachusetts and New Hampshire and were also very high in an area of low effort by the fleet located south of Martha's Vineyard (Figure 32).

During 2005-2010, catch rates of all four species combined were highest in small mesh bottom trawls during Q1 and Q2 and were also distributed across very large areas, but which were generally contiguous (Figures 33 and 34). During Q1, the highest catch rates occurred in and around Block Island Sound, followed secondarily by the area of highest effort which was located near the shelf edge and north of a the Southern Gear Restricted Area (polygon denoted as a dashed line in the Mid-Atlantic). The high catch rates in Block Island Sound occurred primarily in Statistical Area 538, and also adjacent portions of SA 611 and SA 537, but effort by the small mesh bottom trawl fleet is unknown.

1.2.3.3 Effectiveness of closed areas to reduce alosid bycatch

The establishment of year-round and/or seasonal closed areas (CAs) and/or gear restriction areas (GRAs) was evaluated as a potential management measure to reduce incidental catches of the subject alosid species. The degree of effectiveness of CAs and GRAs in accomplishing this objective is dependent on the degree of temporal and spatial overlap between the distribution of fishing effort for the fleets with the predominant bycatch and the distribution of the bycatch species, and more importantly, the interannual consistency of such overlap. If the highest incidental catches consistently occur across a reasonably small area each year, then CAs and/or GRAs may be effective. However, if the opposite situation is true, the size of the CA and/or GRA must be large in order to encompass the spatial extent of the interannual variability, and therefore, may not be practicable. In addition to these considerations, quantification of the effectiveness of CAs and GRAs is difficult for mobile species.

Maps of NEFSC spring and fall survey catches (presented in Part I) indicate that the seasonal and interannual distributions of all four species are highly variable in time and space. In addition, the analyses presented herein indicate that the incidental catches of all four bycatch species, as well as effort patterns in the predominant fleets which catch theses species are also highly variable in time and space. This is because of all four species undergo extensive coastwide migrations, which are largely influenced by water temperatures, and because the predominant gear types which incidentally catch these species (e.g., Atlantic herring and Atlantic mackerel in the MWT fleet and *Loligo*, *Illex*, hakes, and Atlantic mackerel in the small mesh BT fleet) are seeking target species which are also highly migratory. For example, the interannual variability in the spatial distribution of fishing effort in the midwater trawl fleet was quite variable during 2005-2010 (Figure 35). There was less variability in the annual effort distributions for the small mesh bottom trawl fleet, but during some years (e.g., 2005 and 2007) very little effort occurred inshore (Figure 36). Commercial catches of Atlantic mackerel also showed substantial interannual variability in the spatial distribution of monthly catches (Figures 37 and 38).

In conclusion, as a result of the high degree of interannual and seasonal variability in the spatial distributions of the four bycatch species as well as in the fishing effort of for the midwater trawl and small mesh bottom trawl fleets which incidentally catch these species, closed areas are not considered to be an effective management measure for the reduction of incidental catch of the four species addressed herein.

Table 1: Total number of trips recorded for each fleet in the observer, dealer and VTR databases for the Mid-Atlantic. Landings from the VTR database were used as the raising factor to estimate catch in the midwater trawl fleets. For all other fleets, the dealer database was used.

	Number of trips									
	Bottom trawl						Midwater trawl			
	Small mesh		Medium mesh		Large mesh		Single		Paired	
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	VTR	Observer	VTR
1989	29	1,781	7	412	1	7				
1990	31	1,363	19	386	0	11			0	0
1991	61	1,711	20	361	4	100	5	0	0	0
1992	39	1,294	12	283	14	284			9	0
1993	6	1,167	1	103	7	441			14	0
1994	6	2,170	6	156	14	1,998	1	64	30	44
1995	60	2,918	3	330	53	3,332	0	120	33	50
1996	68	3,143	10	652	16	3,344	0	264	0	14
1997	41	3,426	9	692	5	3,711	0	210	0	6
1998	24	3,693	3	784	13	3,647	0	239	0	34
1999	26	3,250	9	777	5	3,865	0	205	0	26
2000	25	3,230	10	806	28	3,250	5	194	1	74
2001	42	2,684	12	879	44	3,886	0	170	0	56
2002	15	2,408	18	998	38	4,172	0	72	1	107
2003	21	1,637	51	795	11	4,208	0	115	5	195
2004	108	1,836	151	692	96	4,874	2	99	8	249
2005	74	1,086	101	466	88	6,478	4	81	11	221
2006	100	1,810	47	736	62	5,051	8	74	6	184
2007	86	1,711	139	714	159	3,899	1	86	2	83
2008	66	1,776	84	701	129	4,391	10	17	8	143
2009	169	2,031	125	661	162	4,737	5	27	20	162
2010	182	1,895	187	420	276	3,944	4	15	13	85

	Number of trips							
	Gillnet						Other	
	Small mesh		Large mesh		X-large mesh			
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	Dealer
1989	0	67	0	27			0	15,494
1990	0	137	0	1	0	3	1	16,633
1991	0	121	0	1			8	17,948
1992	0	100	0	5			15	17,042
1993	0	80	0	33			42	17,467
1994	83	85	58	57	20	24	42	15,086
1995	126	185	202	516	73	294	44	13,440
1996	133	343	172	531	65	638	24	14,109
1997	90	422	133	400	111	1,021	27	18,541
1998	100	699	130	456	73	1,403	36	16,378
1999	42	848	23	566	19	1,443	57	15,424
2000	49	1,110	17	543	18	1,954	72	15,308
2001	54	1,280	17	441	17	2,193	97	15,747
2002	34	1,267	10	376	11	2,139	96	16,653
2003	25	750	4	294	13	2,104	115	17,997
2004	12	1,303	6	475	38	1,409	330	16,892
2005	19	1,270	4	335	82	1,739	400	23,185
2006	20	1,160	7	500	32	1,470	144	25,122
2007	19	1,231	13	516	32	2,045	245	27,634
2008	7	905	2	642	44	2,029	506	25,958
2009	9	1,252	8	1177	43	1,693	433	25,787
2010	12	851	52	1122	91	1,455	283	16,538

Table 2: Total number of trips recorded for each fleet in the observer, dealer and VTR databases for New England. Landings from the VTR database were used as the raising factor to estimate catch in the midwater trawl fleets. For all other fleets, the dealer database was used.

	Number of trips									
	Bottom trawl						Midwater trawl			
	Small mesh		Medium mesh		Large mesh		Single		Paired	
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	VTR	Observer	VTR
1989	72	1,432	14	528	56	5,406			0	0
1990	33	1,665	4	355	54	5,851			0	0
1991	84	1,278	13	156	78	5,890	2	0	0	0
1992	56	1,348	1	120	68	5,531	0	0	0	0
1993	19	1,750	2	153	31	5,079	0	0	7	0
1994	9	3,426	2	239	27	8,341	0	306	4	53
1995	37	2,944	2	154	67	12,458	4	785	2	11
1996	47	2,665	2	51	39	12,475	0	902	0	18
1997	18	2,477	3	100	24	10,498	0	705	0	93
1998	5	2,979	0	94	11	11,095	0	508	0	170
1999	19	2,774	0	214	32	10,193	1	519	2	165
2000	8	2,297	9	124	99	11,064	7	463	0	367
2001	8	2,073	10	173	152	11,270	1	336	0	631
2002	35	1,625	29	221	214	11,138	0	371	0	651
2003	44	1,653	24	184	385	10,801	2	251	18	614
2004	86	1,283	83	152	525	9,343	23	254	60	581
2005	82	1,064	169	131	1341	8,388	43	265	91	463
2006	48	1,569	35	299	612	7,656	10	195	21	488
2007	57	1,745	18	213	618	7,461	10	84	11	235
2008	46	2,016	16	175	751	7,688	11	34	36	185
2009	195	1,895	23	270	877	7,373	10	48	67	223
2010	206	2,227	50	251	1049	6,043	29	57	106	213

	Number of trips							
	Gillnet						Other	
	Small mesh		Large mesh		X-large mesh			
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	Dealer
1989	0	10	0	497	0	1	40	28,527
1990	0	10	0	712			32	30,631
1991	0	50	0	1045	0	2	79	33,011
1992			0	1159	0	47	144	33,574
1993			0	1133	0	81	118	33,700
1994	0	3	61	2870	40	934	107	28,586
1995	0	8	105	6910	46	2,029	101	31,904
1996	0	21	55	6448	23	1,533	62	35,361
1997	0	12	51	5854	19	1,214	32	35,373
1998	3	14	115	5202	15	1,061	15	32,140
1999	1	6	98	3860	21	1,352	34	25,018
2000	0	17	107	4187	50	1,881	229	21,374
2001	1	17	69	4280	33	2,530	28	22,532
2002	0	14	91	3724	41	2,810	30	23,239
2003	0	20	326	4485	190	2,987	72	20,573
2004	1	16	699	3342	536	2,966	240	16,696
2005	0	39	587	3491	459	2,939	484	39,261
2006	0	67	142	3866	79	2,416	262	47,023
2007	2	78	132	5467	164	2,102	317	43,561
2008	3	27	170	6538	112	2,274	368	55,716
2009	2	12	313	6824	76	1,989	243	66,351
2010	0	22	1267	5374	771	2,653	383	150,268

Table 3: Proportion of 2005-2010 incidental catch of all river herring and shad species by region, fleet and quarter.

	Bottom Trawl			Gillnet			Paired MWT	Single MWT	Total MWT	Grand Total
	lg	med	sm	xlg	lg	sm	all	all		
Mid-Atlantic (SA >= 600)	**0.001**	**0.002**	**0.062**	**0.000**	**0.005**	**0.001**	**0.270**	**0.083**	**0.353**	**0.424**
Q1	0.000	0.001	0.018	0.000	0.002	0.000	0.246	0.074	0.320	0.342
Q2	0.000	0.000	0.012	0.000	0.001	0.000	0.016	0.007	0.023	0.037
Q3	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.001	0.002	0.026
Q4	0.000	0.001	0.010	0.000	0.001	0.000	0.007	0.000	0.008	0.020
New England (SA <= 500)	**0.007**	**0.000**	**0.177**	**0.000**	**0.028**	**0.000**	**0.259**	**0.105**	**0.364**	**0.576**
Q1	0.002	0.000	0.065	0.000	0.003	0.000	0.025	0.015	0.040	0.111
Q2	0.002	0.000	0.030	0.000	0.004	0.000	0.056	0.051	0.107	0.142
Q3	0.002	0.000	0.046	0.000	0.011	0.000	0.050	0.007	0.057	0.115
Q4	0.002	0.000	0.037	0.000	0.010	0.000	0.128	0.031	0.159	0.208
Grand Total	**0.008**	**0.002**	**0.239**	**0.000**	**0.033**	**0.001**	**0.529**	**0.188**	**0.716**	**1.000**

Table 4: Proportion of 2005-2010 incidental catch of American and hickory shad by region, fleet and quarter.

	Bottom trawl			Gillnet			Paired MWT	Single MWT	Total MWT	Grand Total
	lg	med	sm	xlg	lg	sm	all	all		
Mid-Atlantic (SA >= 600)	**0.004**	**0.012**	**0.115**	**0.000**	**0.041**	**0.008**	**0.115**	**0.016**	**0.132**	**0.312**
Q1	0.001	0.006	0.030	0.000	0.014	0.003	0.103	0.014	0.117	0.172
Q2	0.001	0.001	0.022	0.000	0.012	0.001	0.010	0.001	0.011	0.049
Q3	0.001	0.001	0.045	0.000	0.004	0.002	0.000	0.000	0.001	0.054
Q4	0.001	0.004	0.018	0.000	0.011	0.002	0.002	0.000	0.003	0.038
New England (SA <= 500)	**0.027**	**0.000**	**0.140**	**0.001**	**0.233**	**0.000**	**0.208**	**0.078**	**0.286**	**0.688**
Q1	0.007	0.000	0.036	0.000	0.028	0.000	0.019	0.006	0.025	0.096
Q2	0.007	0.000	0.030	0.000	0.032	0.000	0.043	0.013	0.056	0.125
Q3	0.006	0.000	0.048	0.000	0.089	0.000	0.054	0.021	0.075	0.219
Q4	0.006	0.000	0.027	0.000	0.085	0.000	0.092	0.038	0.130	0.248
Grand Total	**0.030**	**0.013**	**0.256**	**0.001**	**0.274**	**0.008**	**0.324**	**0.094**	**0.418**	**1.000**

Table 5: Proportion of 2005-2010 incidental catch of river herring by region, fleet and quarter.

	Bottom trawl			Gillnet			Paired MWT	Single MWT	Total MWT	Grand Total
	lg	med	sm	xlg	lg	sm	all	all		
Mid-Atlantic (SA >= 600)	**0.001**	**0.001**	**0.055**	**0.000**	**0.000**	**0.000**	**0.291**	**0.092**	**0.383**	**0.439**
Q1	0.000	0.000	0.017	0.000	0.000	0.000	0.265	0.082	0.347	0.365
Q2	0.000	0.000	0.010	0.000	0.000	0.000	0.017	0.008	0.025	0.036
Q3	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.001	0.002	0.022
Q4	0.000	0.000	0.009	0.000	0.000	0.000	0.008	0.000	0.008	0.017
New England (SA <= 500)	**0.004**	**0.000**	**0.182**	**0.000**	**0.000**	**0.000**	**0.266**	**0.109**	**0.374**	**0.561**
Q1	0.001	0.000	0.069	0.000	0.000	0.000	0.026	0.016	0.043	0.113
Q2	0.001	0.000	0.030	0.000	0.000	0.000	0.057	0.056	0.114	0.145
Q3	0.001	0.000	0.045	0.000	0.000	0.000	0.049	0.006	0.055	0.101
Q4	0.001	0.000	0.038	0.000	0.000	0.000	0.133	0.030	0.163	0.202
Grand Total	**0.005**	**0.001**	**0.237**	**0.000**	**0.000**	**0.000**	**0.556**	**0.200**	**0.757**	**1.000**

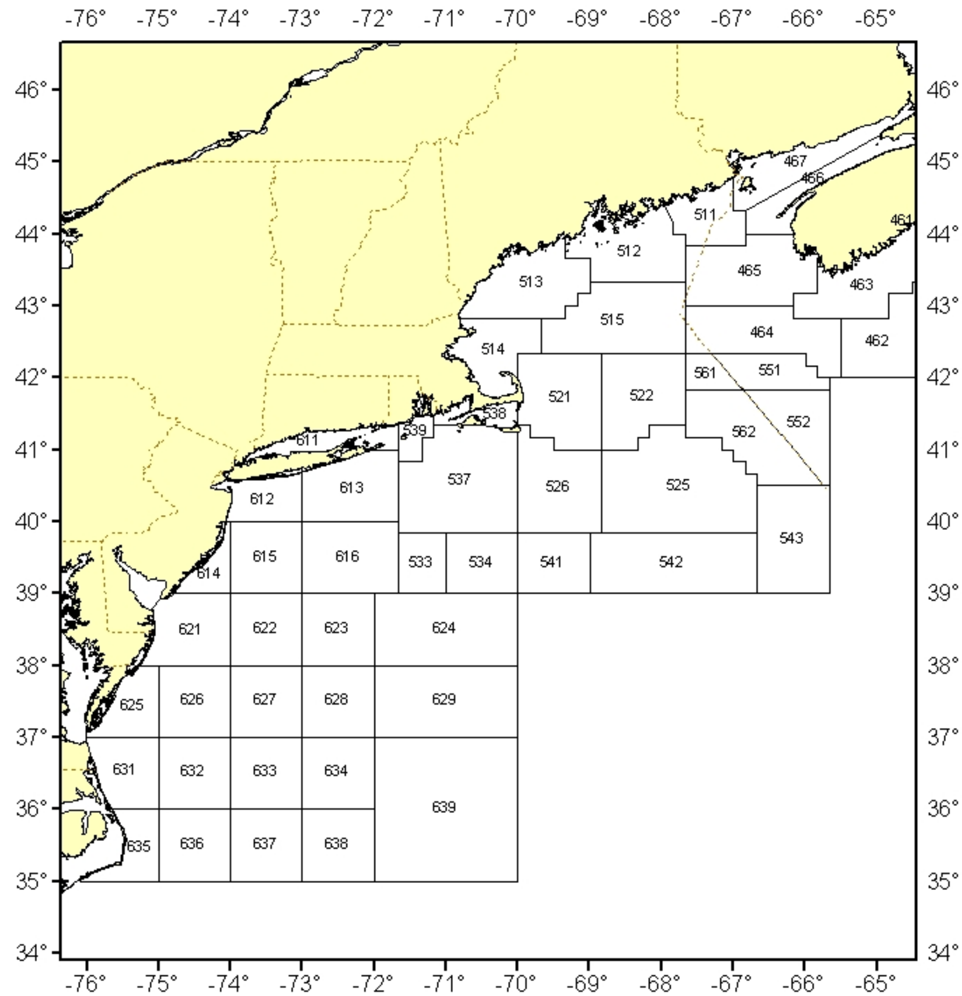


Figure 1: Statistical Areas used to define the fishing regions used in the incidental catch analysis. The Mid-Atlantic region included Statistical Areas greater than 600. The New England region included Statistical Areas 464 through 599.

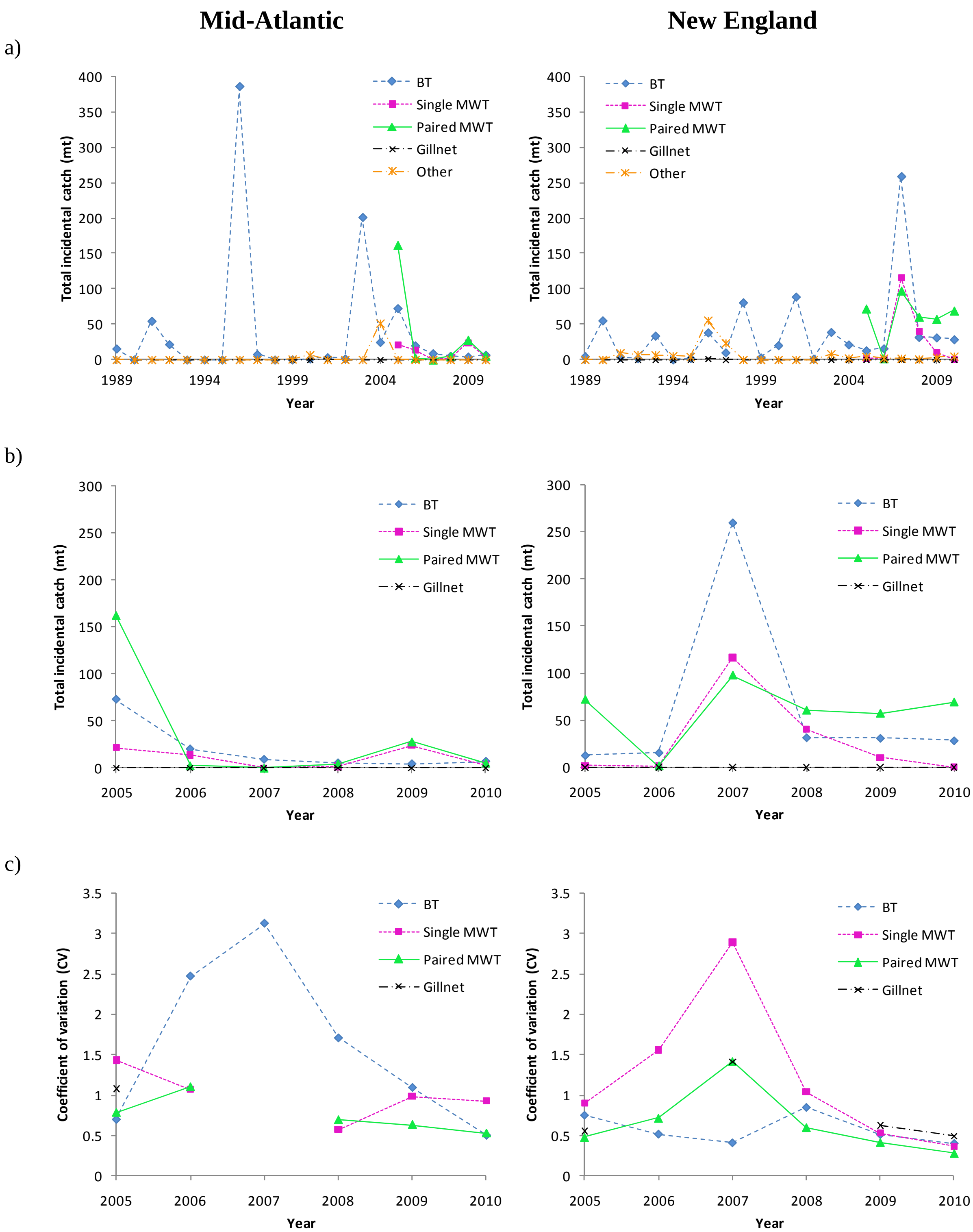


Figure 2: Alewife total annual incidental catch (mt) by region for the four gears with the largest catches from a) 1989 – 2010 and b) 2005 – 2010, and c) the corresponding estimates of precision. Midwater trawl estimates are only included beginning in 2005.

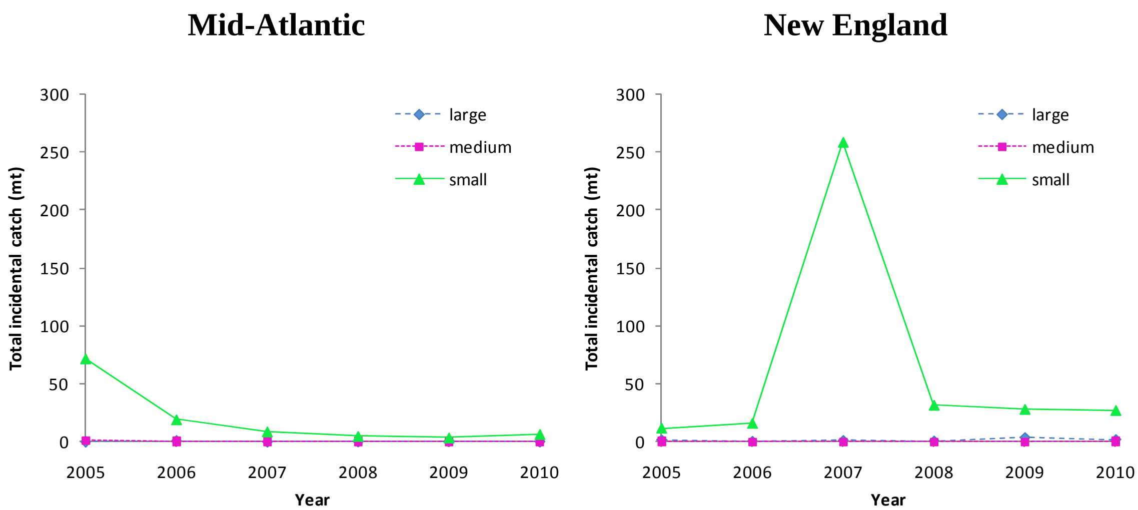
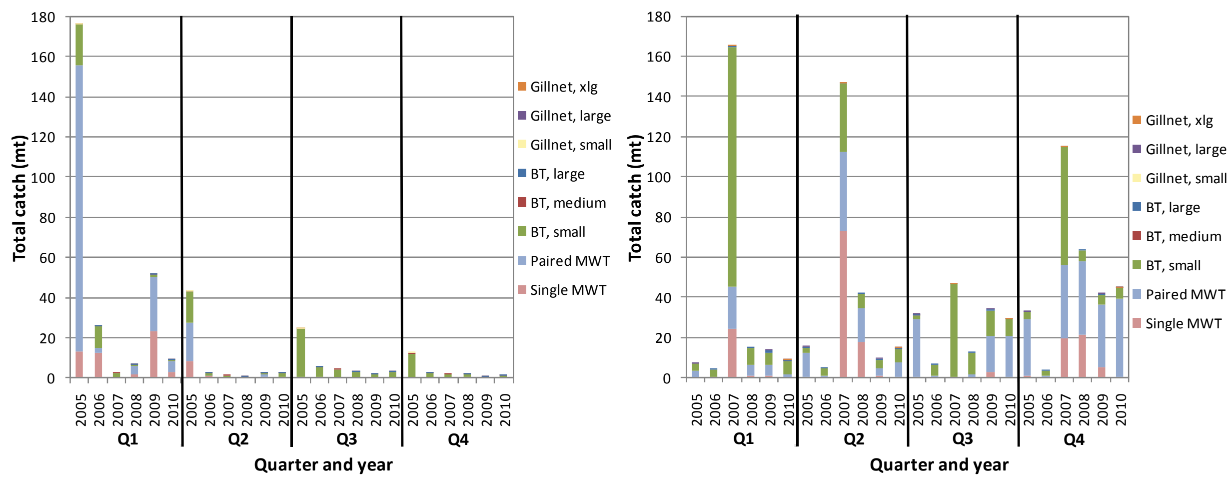


Figure 3: Alewife total incidental catch (mt) from 2005 – 2010 by region and bottom trawl mesh category.

Mid-Atlantic **New England**

a)



b)

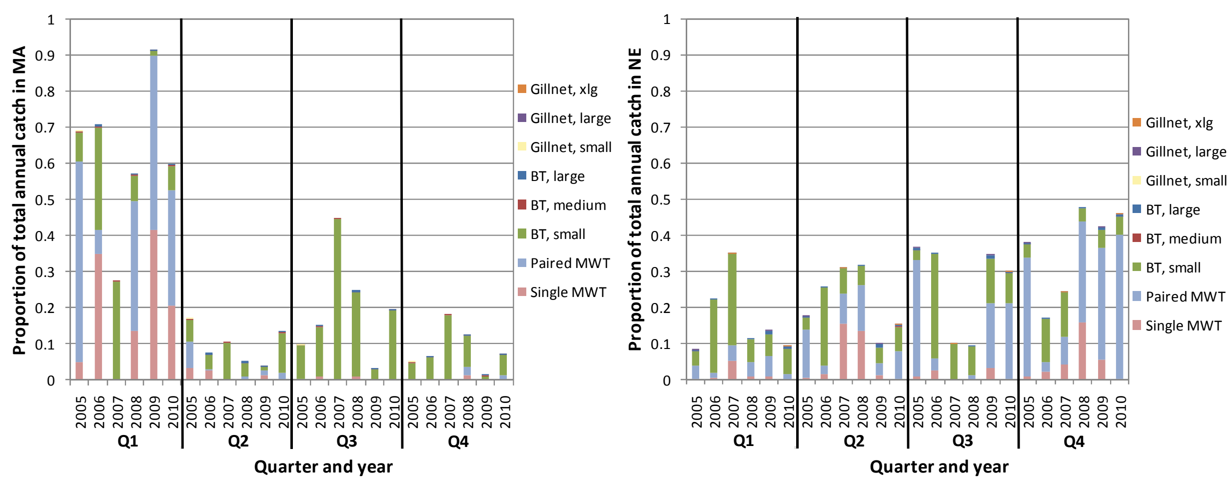


Figure 4: Alewife quarterly incidental catch (mt) by region and fleet (a) and the corresponding proportion of the total annual catch within each region and quarter (b).

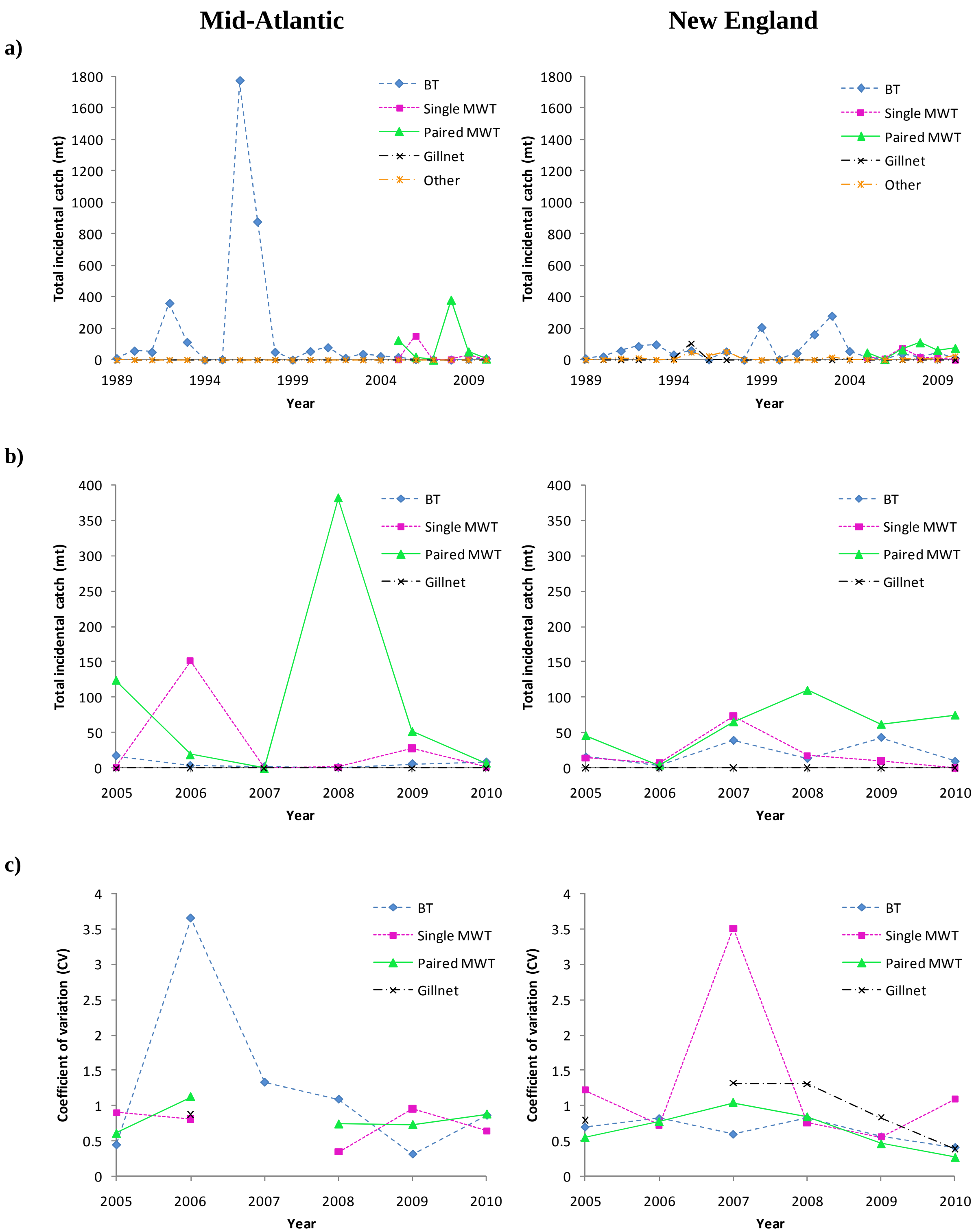


Figure 5: Blueback herring total annual incidental catch (mt) by region for the four gears with the largest catches from a) 1989 – 2010 and b) 2005 – 2010, and c) the corresponding estimates of precision. Midwater trawl estimates are only included beginning in 2005.

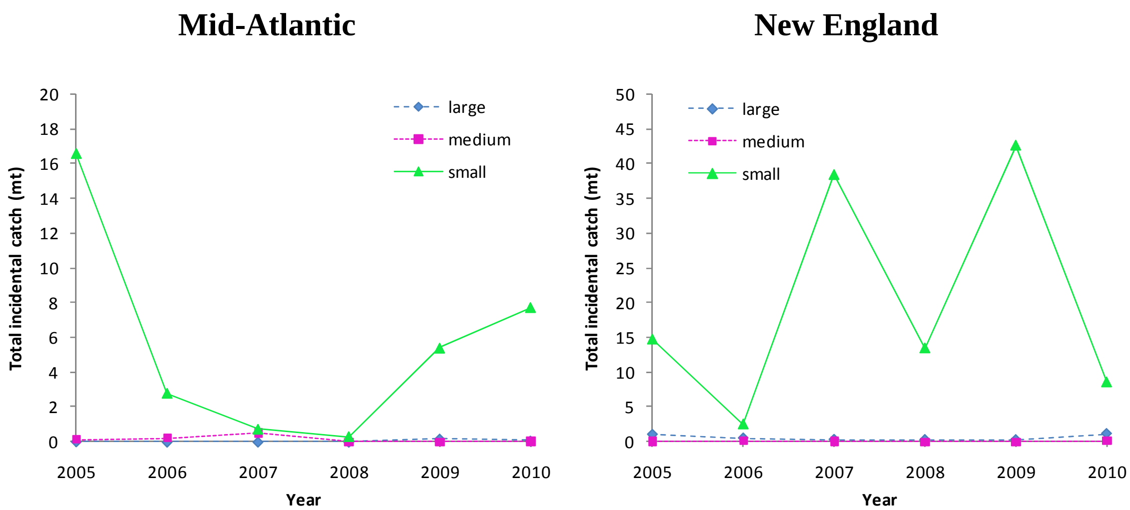


Figure 6: Blueback herring total incidental catch (mt) from 2005 – 2010 by region and bottom trawl mesh category.

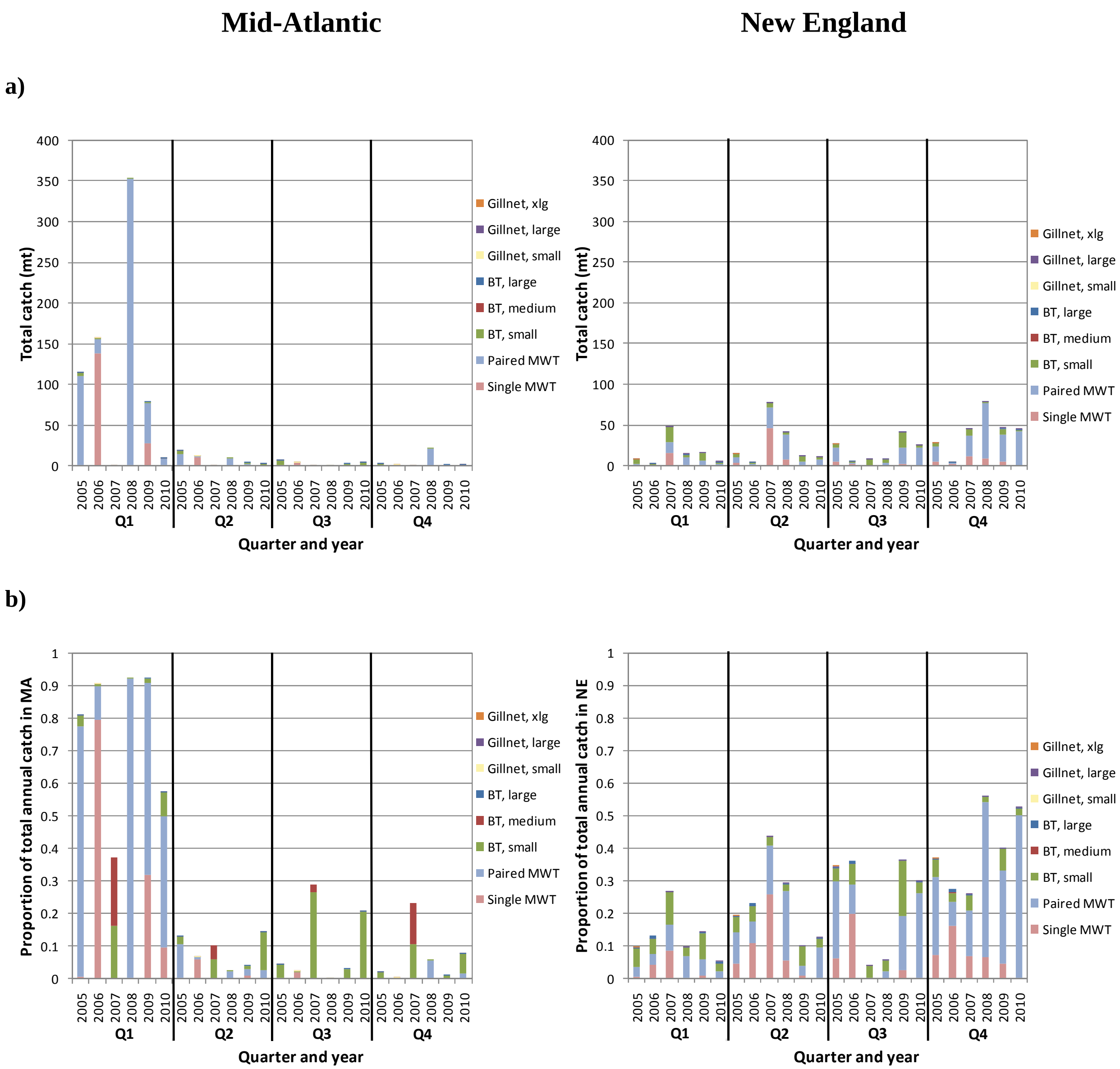


Figure 7: Blueback herring incidental catch (mt) by region and fleet (a) and the corresponding proportion of the total annual catch within each region and quarter (b).

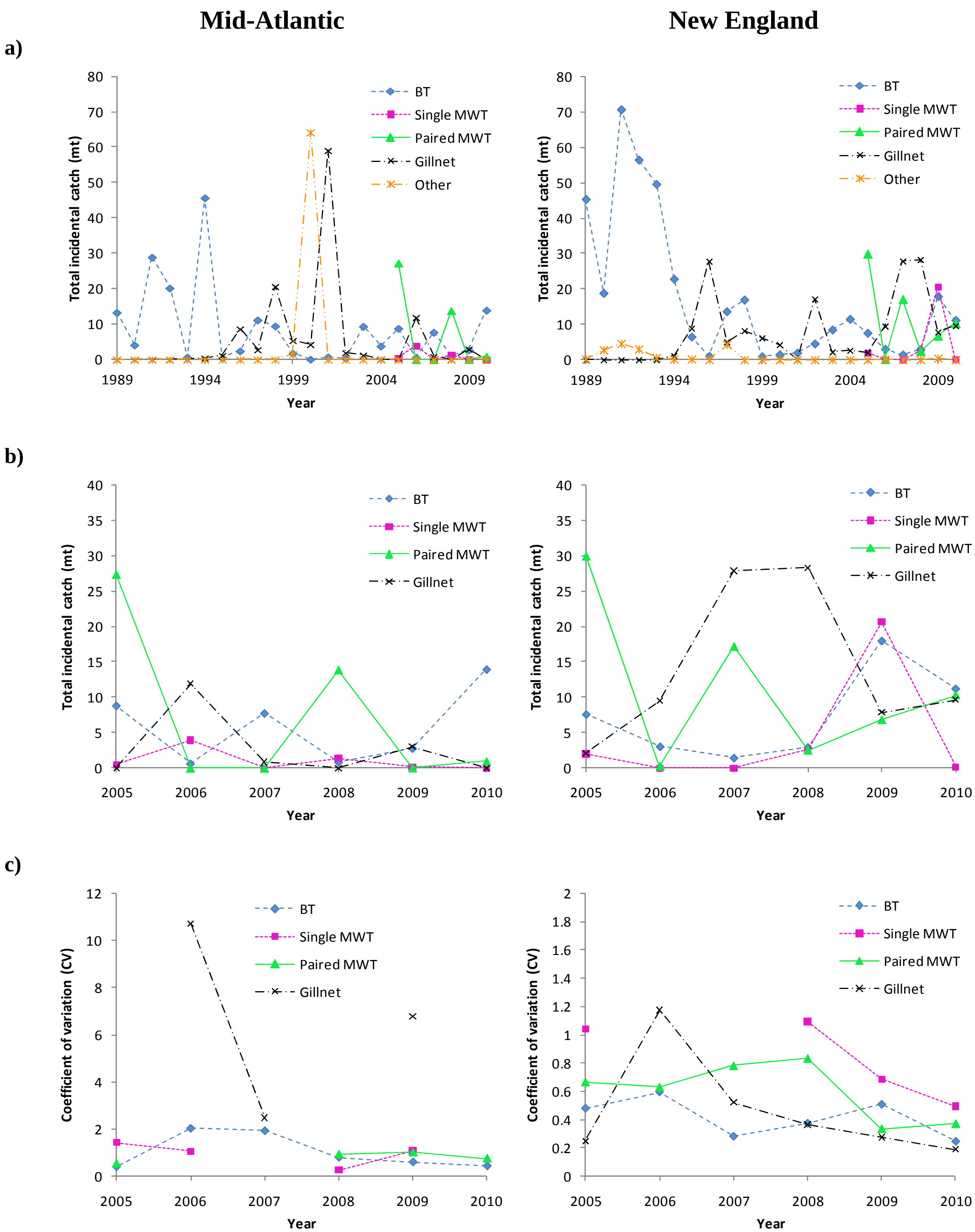


Figure 8: American shad total annual incidental catch (mt) by region for the four gears with the largest catches from a) 1989 – 2010 and b) 2005 – 2010, and c) the corresponding estimates of precision. Midwater trawl estimates are only included beginning in 2005.

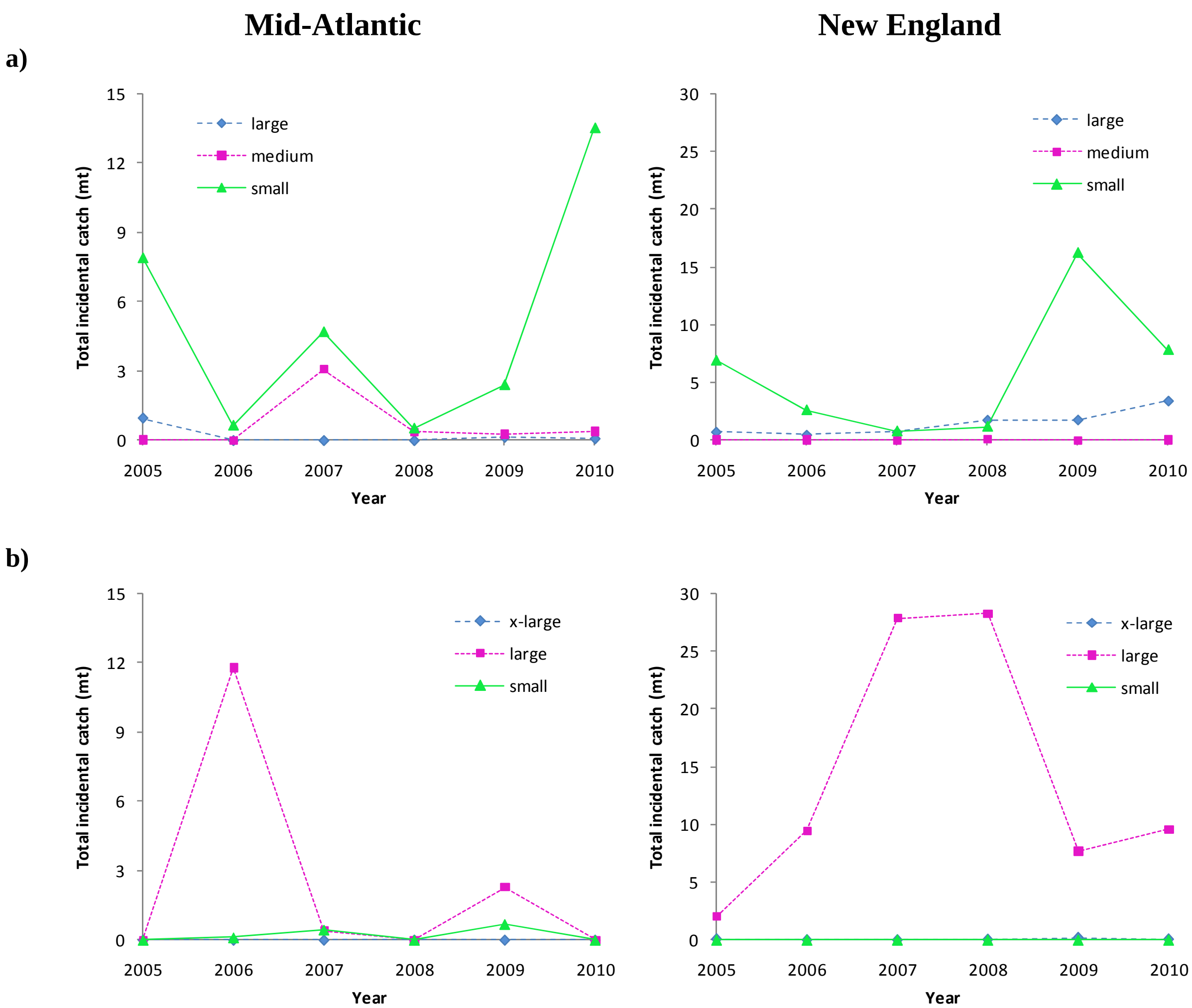


Figure 9: American shad total incidental catch (mt) from 2005 – 2010 by region and mesh category for a) bottom trawl and b) gillnet fleets.

Mid-Atlantic **New England**

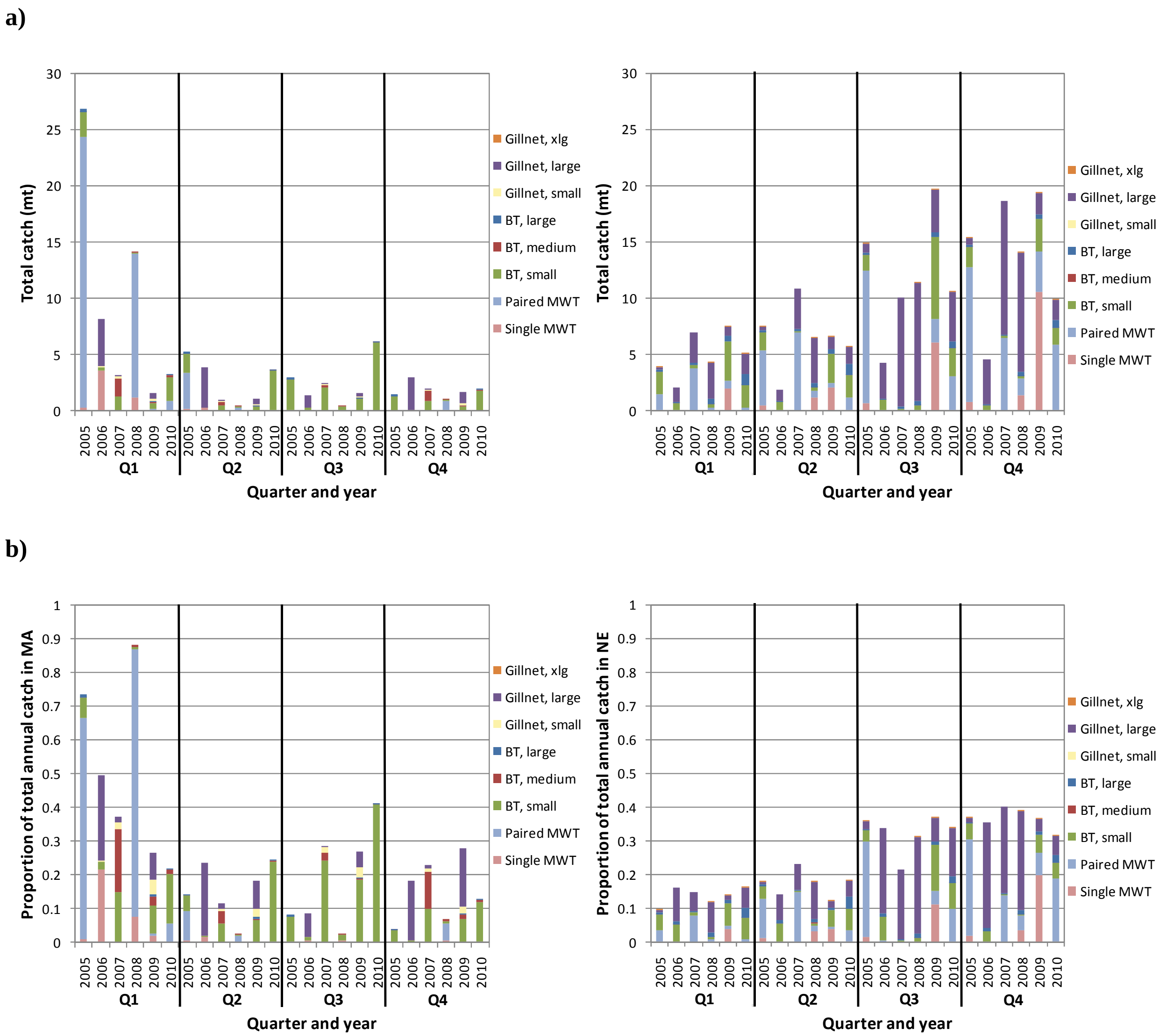


Figure 10: American shad quarterly incidental catch (mt) by region and fleet (a) and the corresponding proportion of the total annual catch within each region and quarter (b).

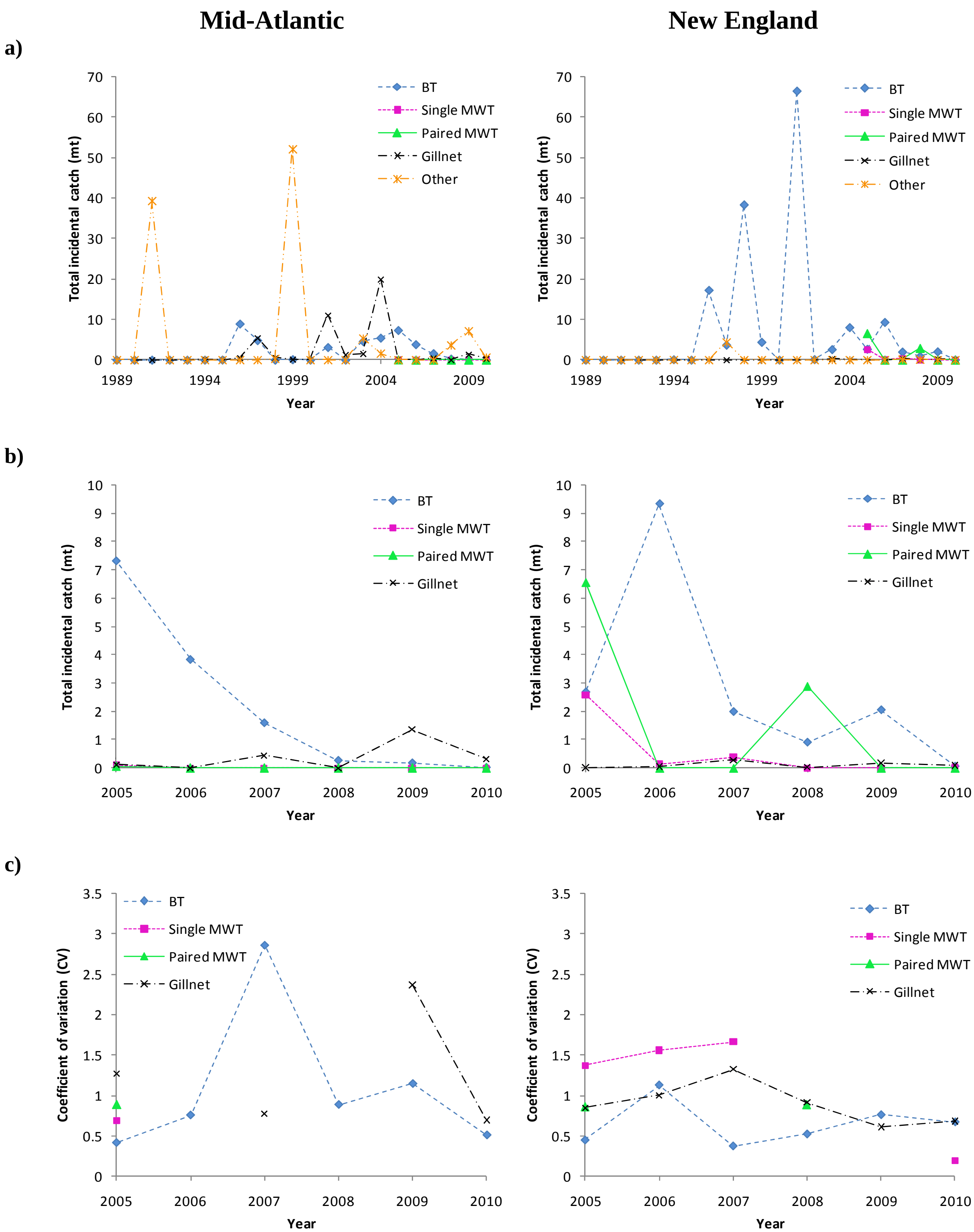


Figure 11: Hickory shad total annual incidental catch (mt) by region for the four gears with the largest catches from a) 1989 – 2010 and b) 2005 – 2010, and c) the corresponding estimates of precision. Midwater trawl estimates are only included beginning in 2005.

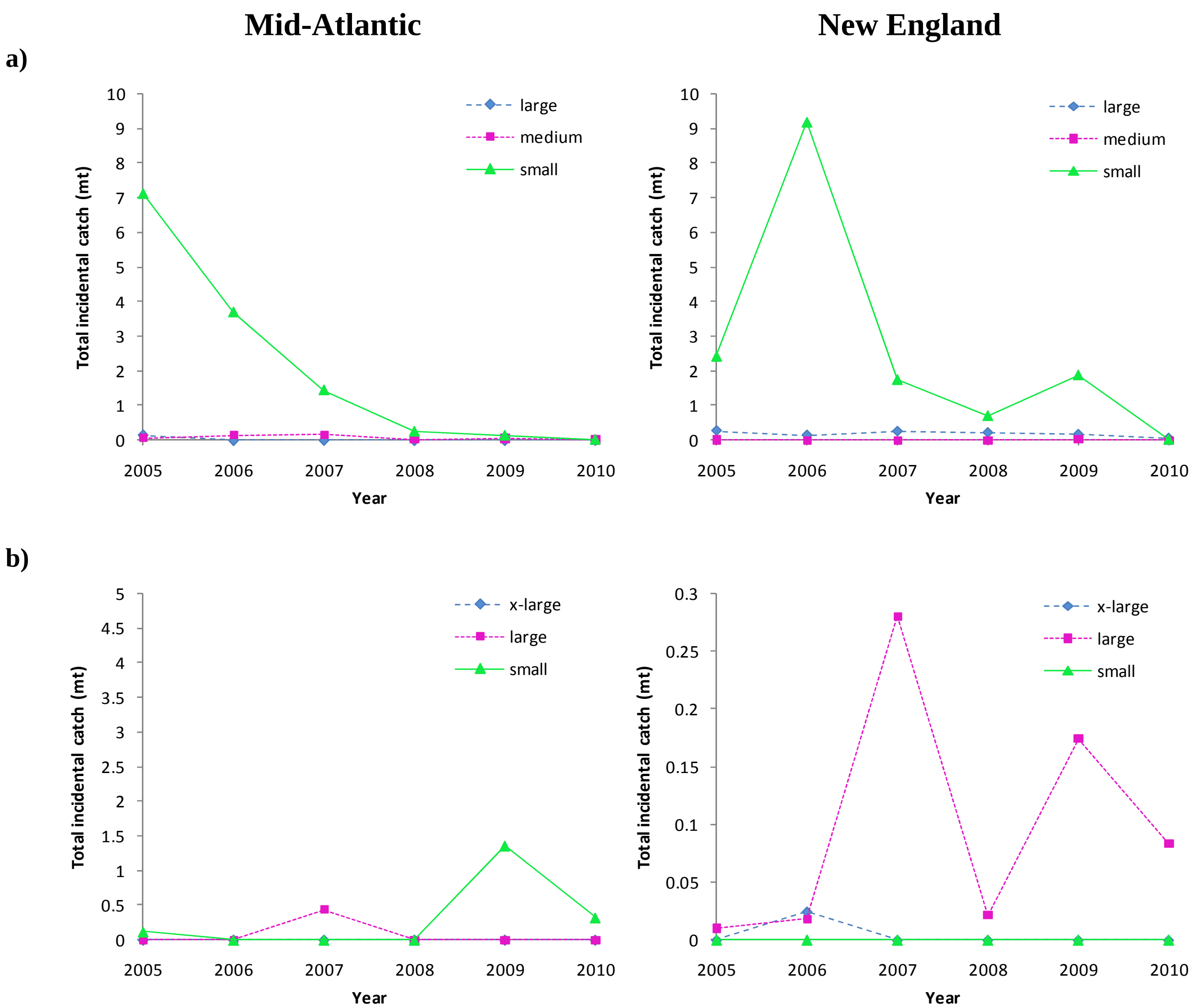
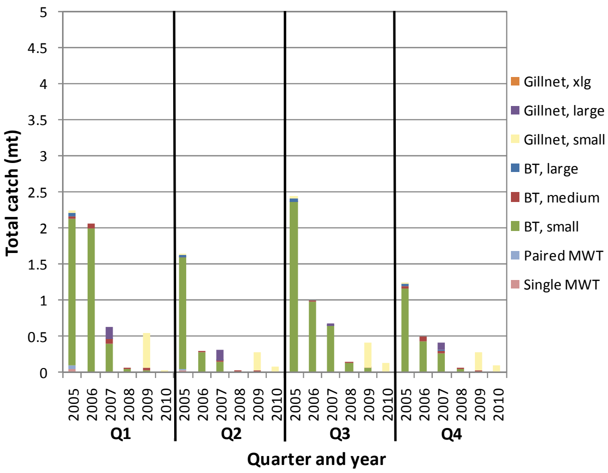
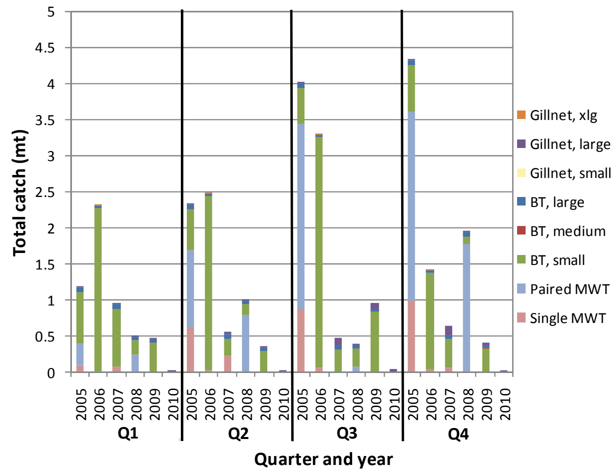


Figure 12: Hickory shad total incidental catch (mt) from 2005 – 2010 by region and mesh category for a) bottom trawl and b) gillnet fleets.

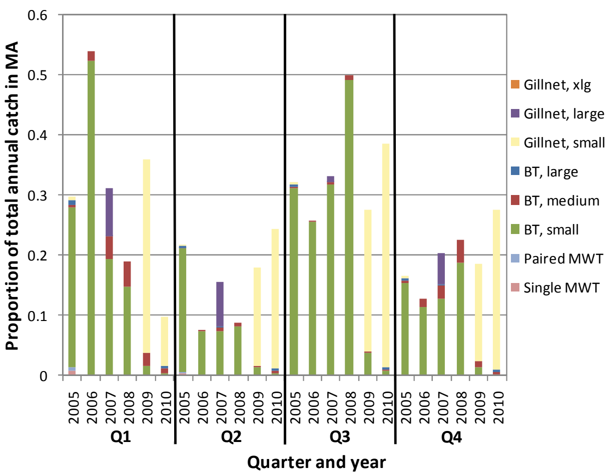
Mid-Atlantic **New England**

a)





b)



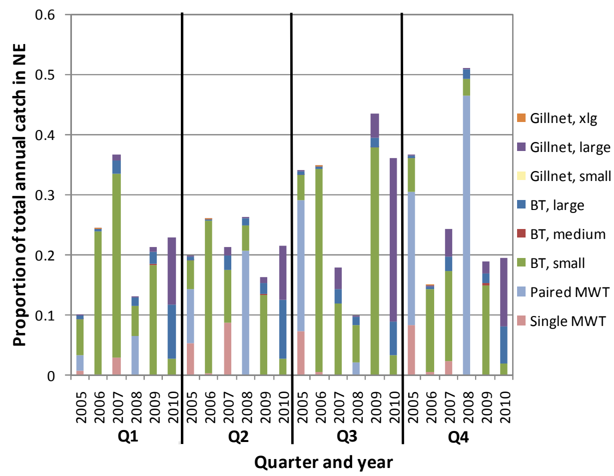


Figure 13: Hickory shad quarterly incidental catch (mt) by region and fleet (a) and the corresponding proportion of the total annual catch within each region and quarter (b).

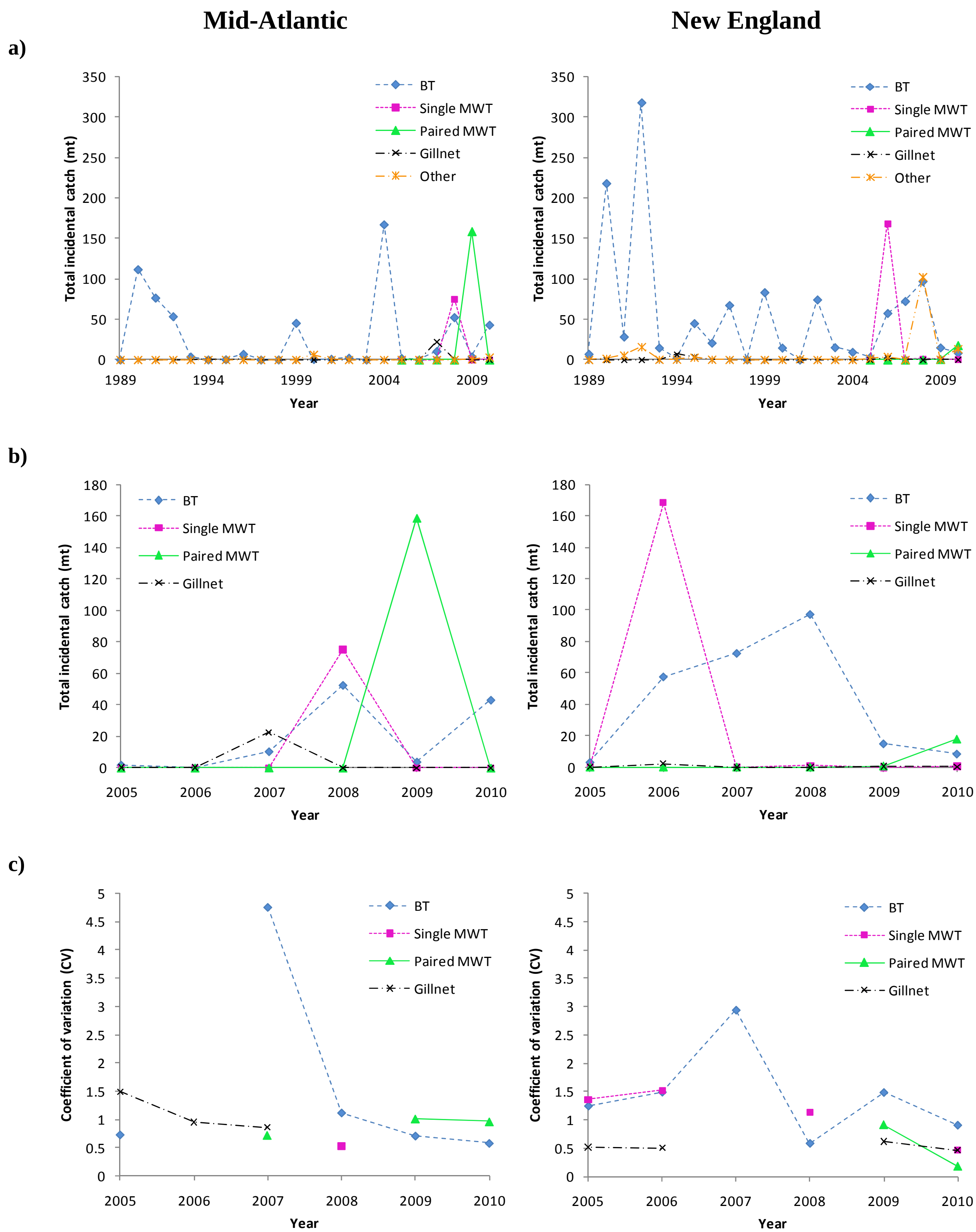


Figure 14: Unknown herring total annual incidental catch (mt) by region for the four gears with the largest catches from a) 1989 – 2010 and b) 2005 – 2010, and c) the corresponding estimates of precision. Midwater trawl estimates are only included beginning in 2005.

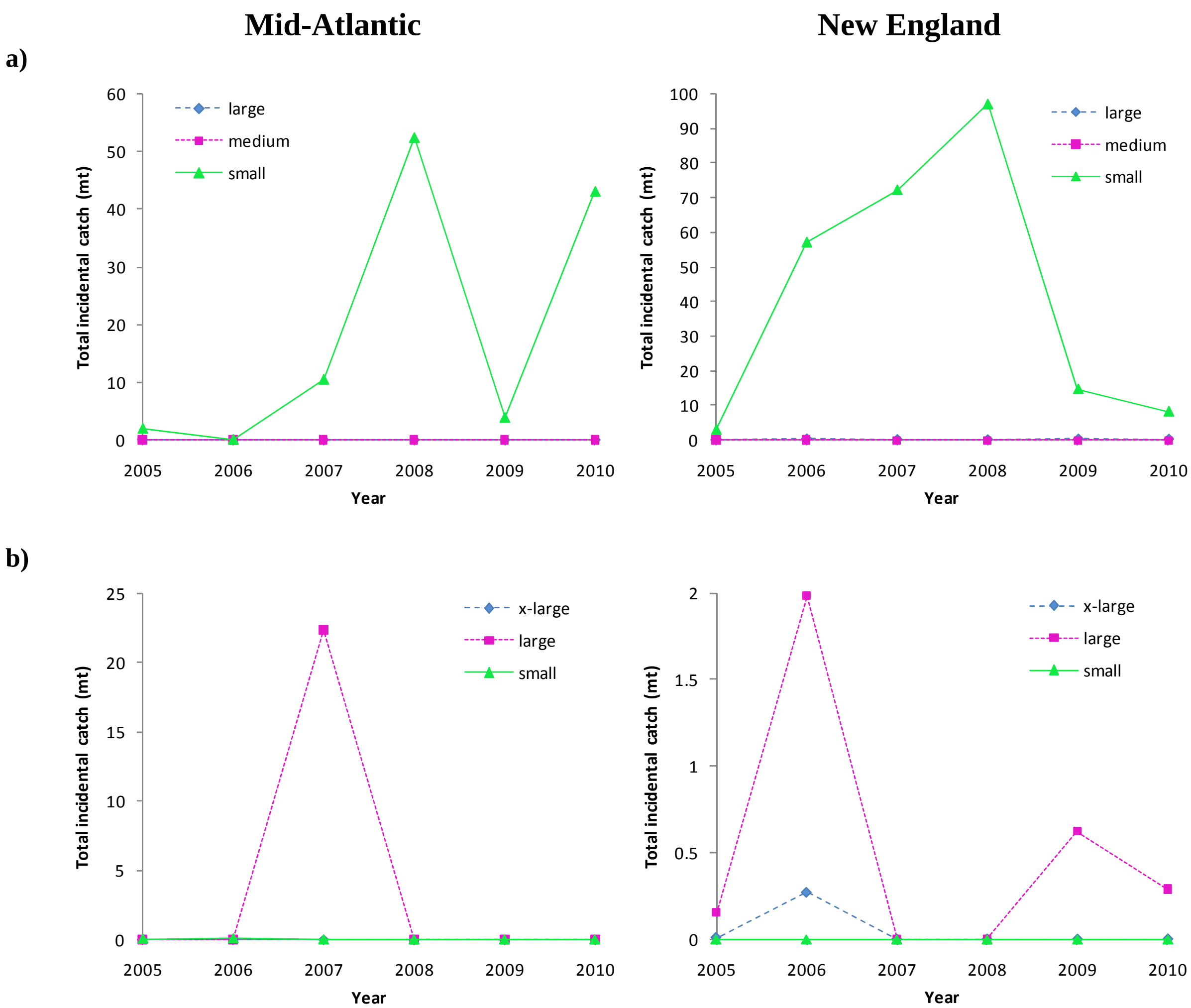


Figure 15: Unknown herring total incidental catch (mt) from 2005 – 2010 by region and mesh category for a) bottom trawl and b) gillnet fleets.

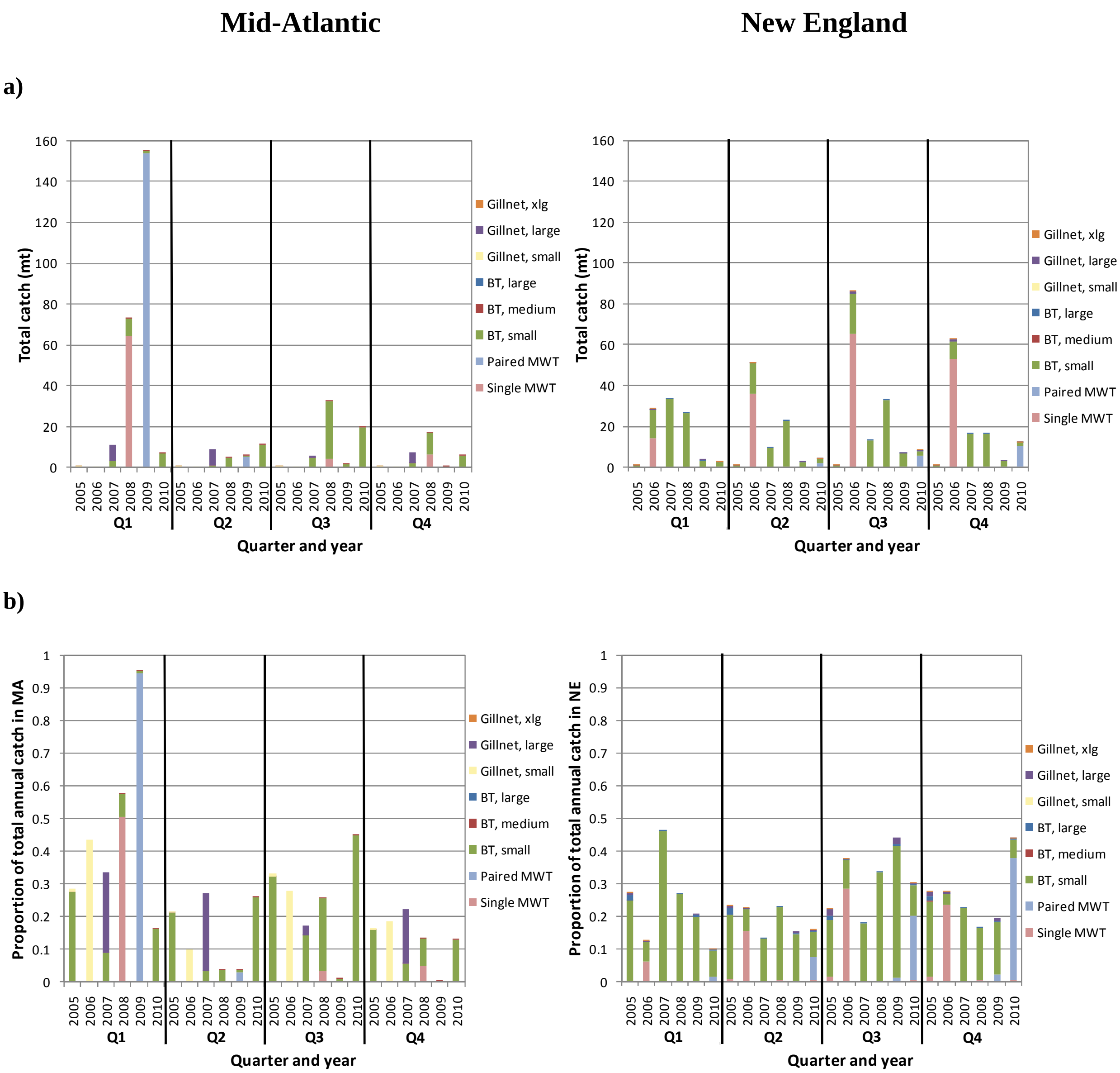


Figure 16: Unknown herring quarterly incidental catch (mt) by region and fleet (a) and the corresponding proportion of the total annual catch within each region and quarter (b).

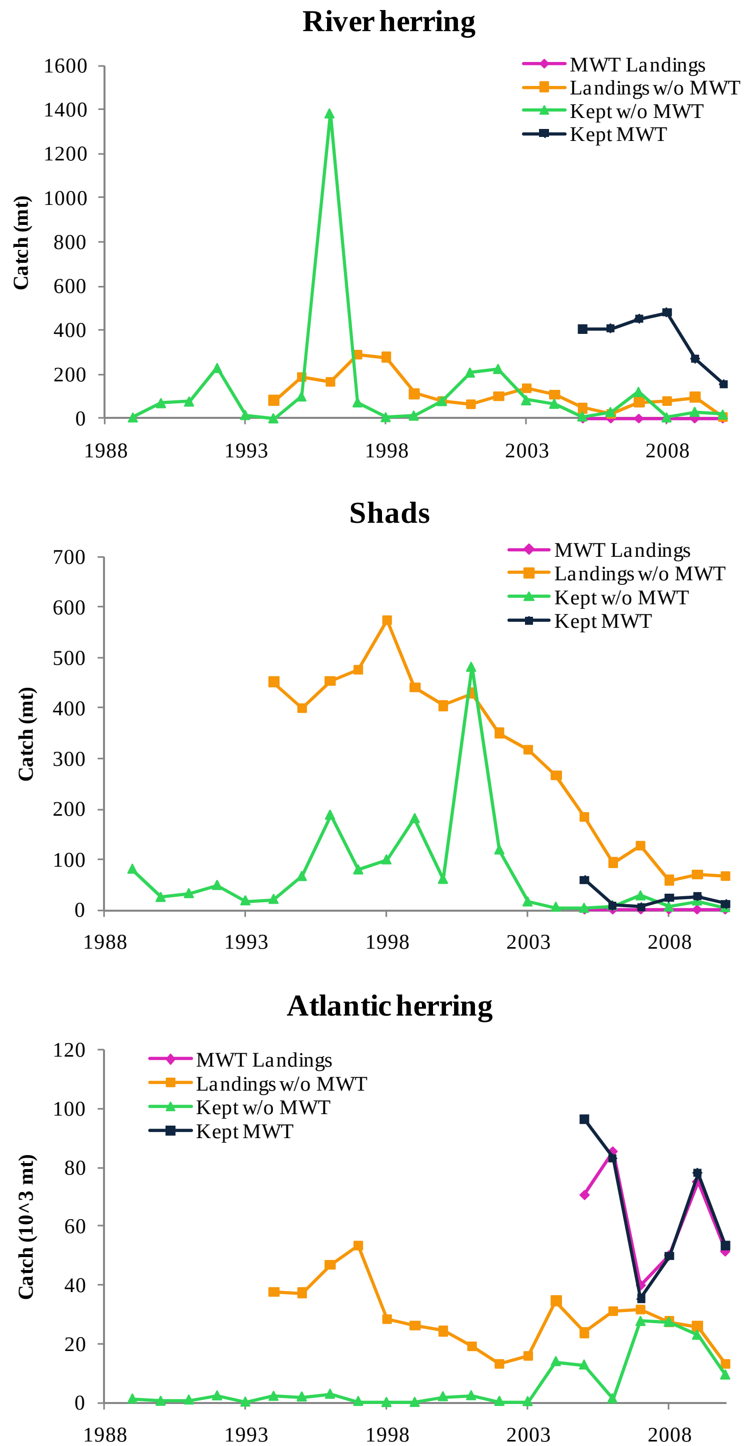
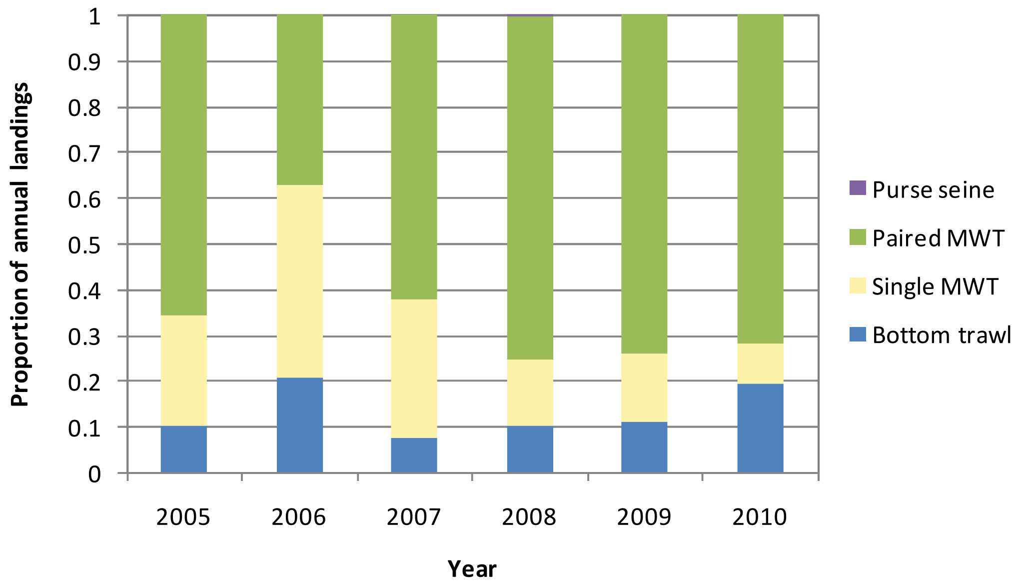


Figure 17: Comparison of landings obtained from the dealer database to the amount kept, quantified as the difference between total incidental catch and discards, for river herring (alewife and blueback herring), shad species (hickory and American shad) and Atlantic herring. Midwater trawl estimates are only included beginning in 2005. This validation exercise was conducted in a preliminary run where gear was not split into mesh categories.

a)



b)

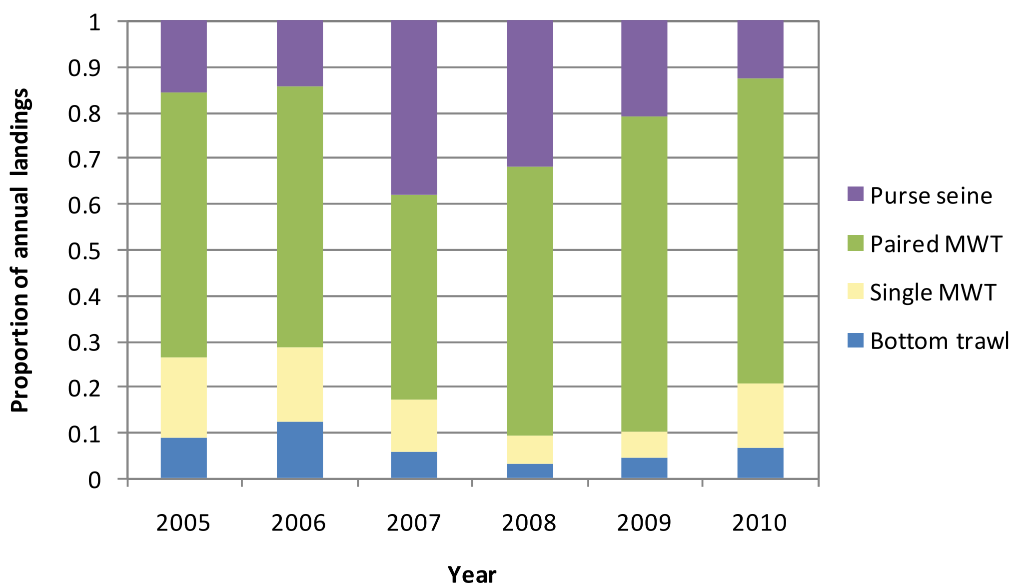


Figure 18: Distribution of a) mackerel and b) herring landings across gear from 2005 - 2010. Gears included in the analysis were purse seine, paired midwater trawls, single midwater trawls and bottom trawls. It was assumed that these gears represented the majority of both mackerel and herring landings.

a)

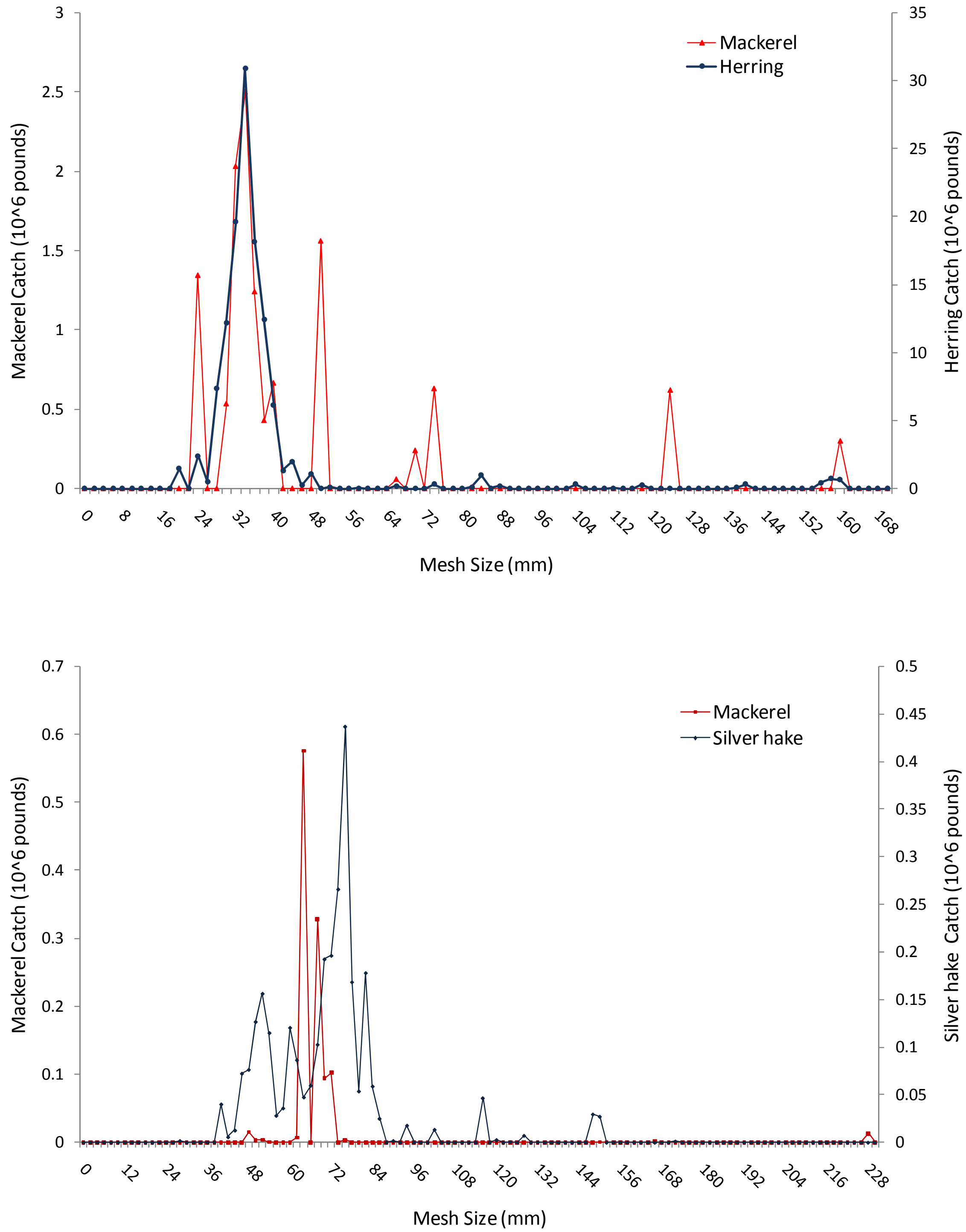
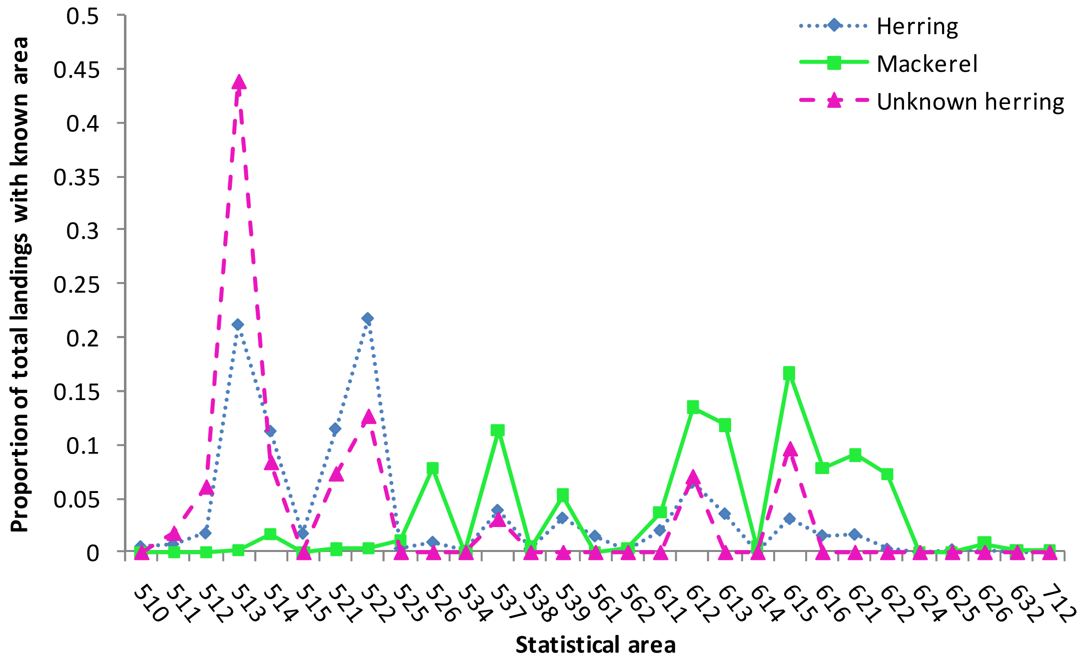


Figure 19: Mackerel and herring midwater trawl landings (a) and mackerel and silver hake bottom trawl landings (b) by mesh size from 2005 – 2010.

a)



b)

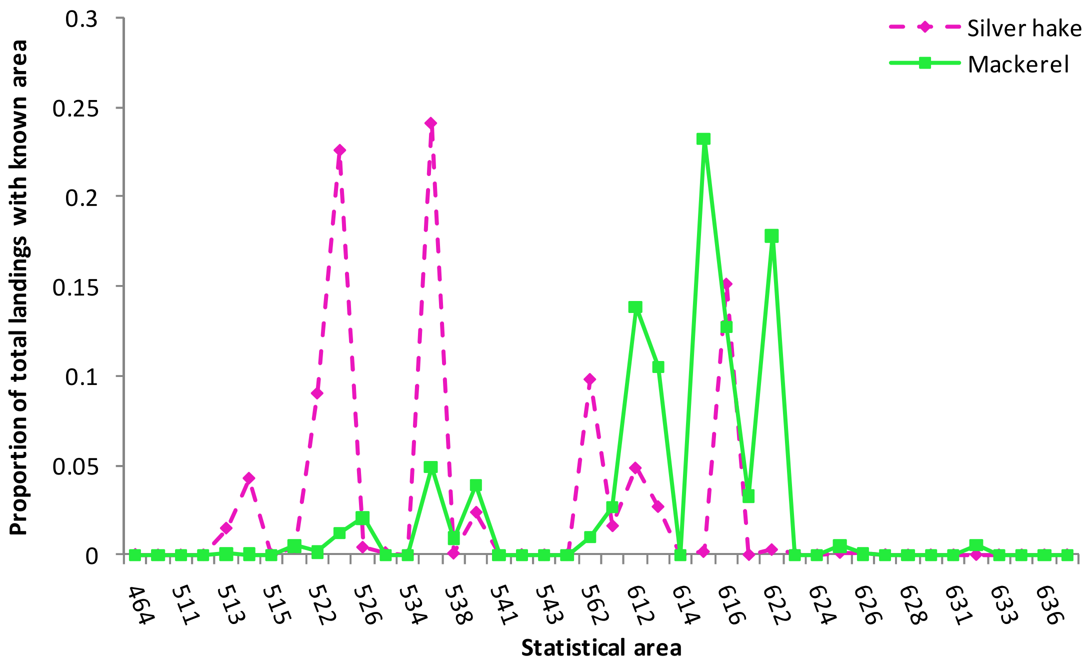


Figure 20: Proportion of species-specific midwater trawl (a) and bottom trawl (b) landings by statistical area from 2005 - 2010.

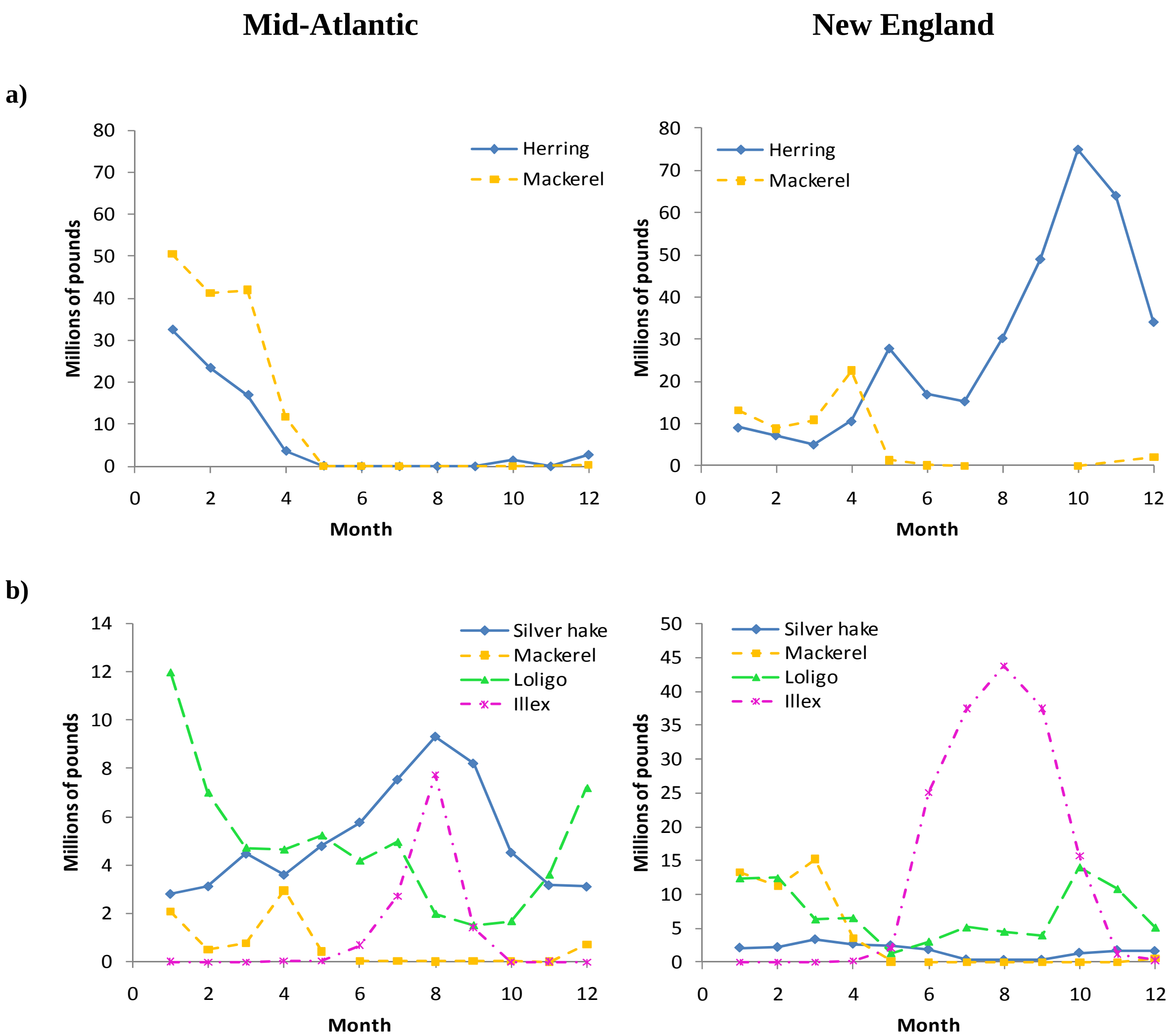
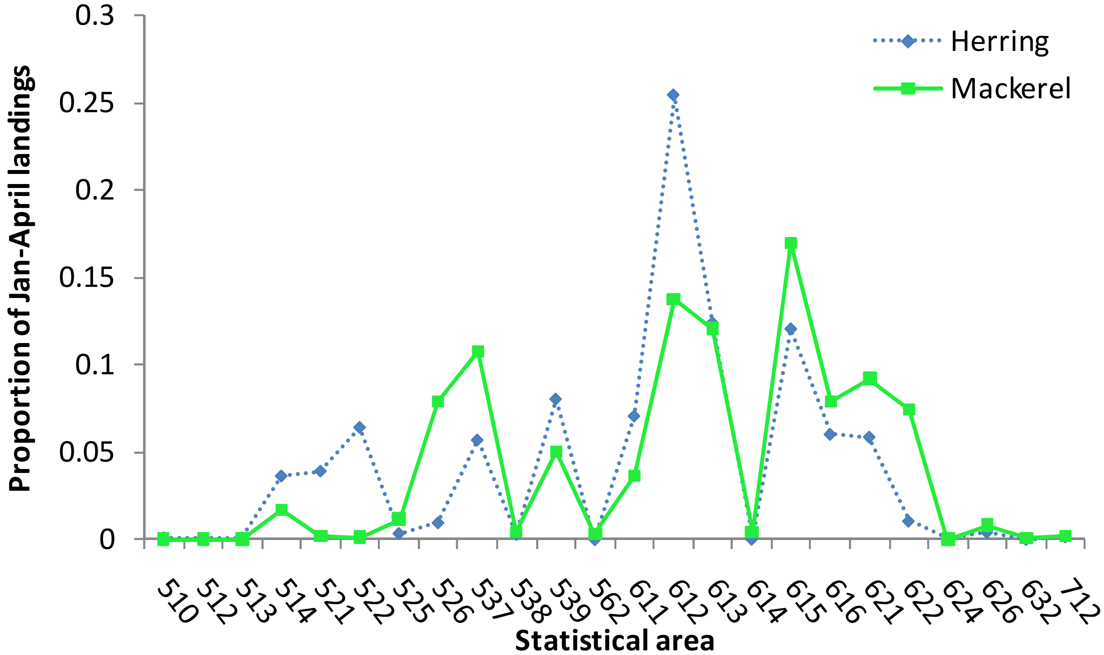


Figure 21: Species-specific midwater trawl (a) and bottom trawl (b) landings (millions of pounds) by month and region from 2005 - 2010.

a)



b)

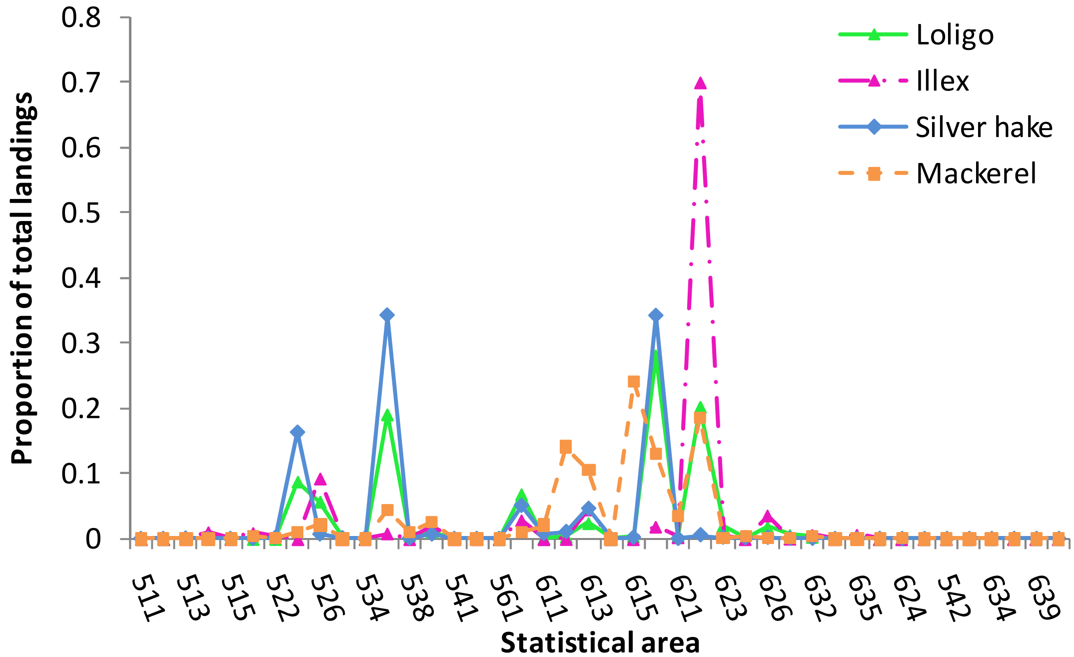


Figure 22: Proportion of January – April species-specific midwater trawl (a) and bottom trawl (b) landings by statistical area from 2005 - 2010.

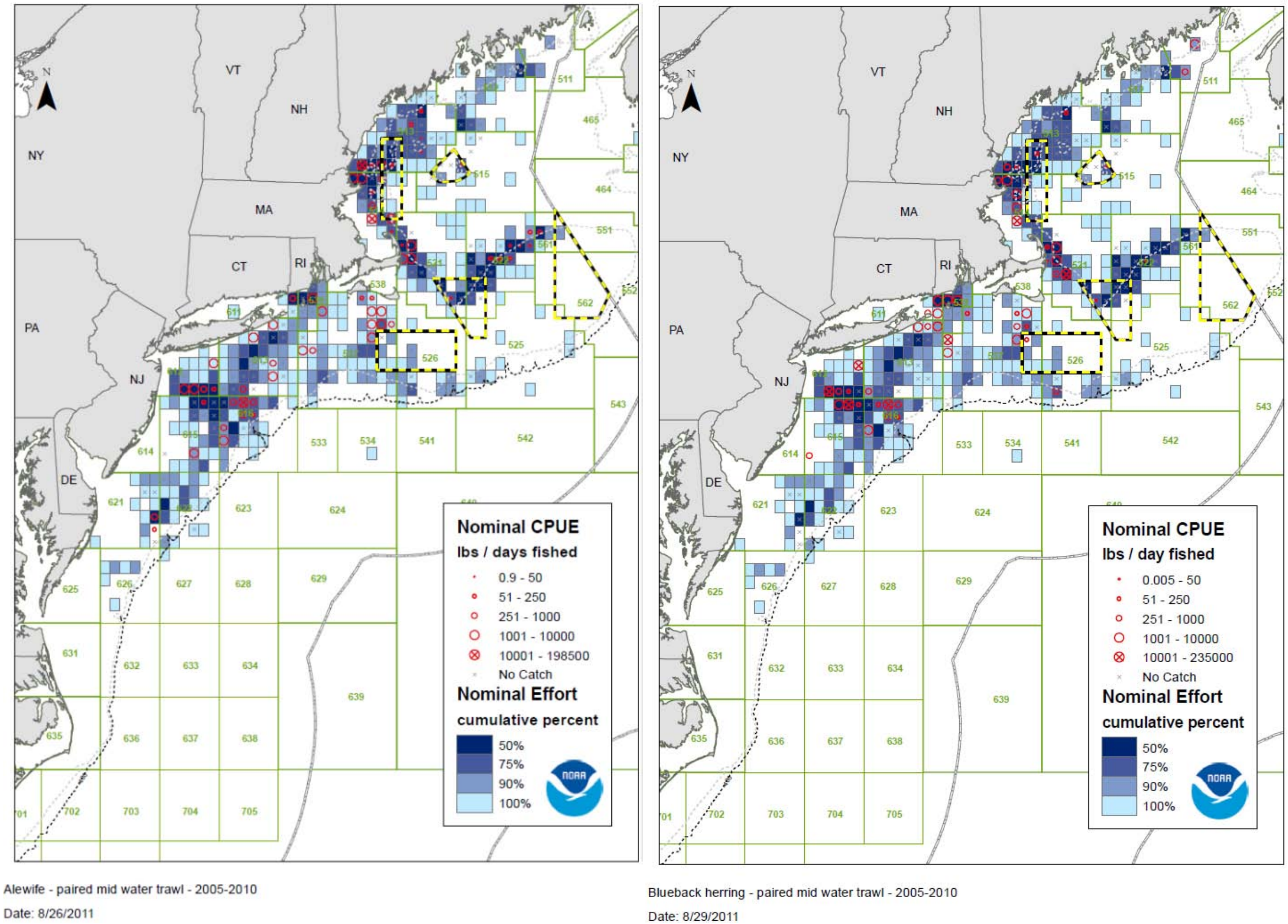
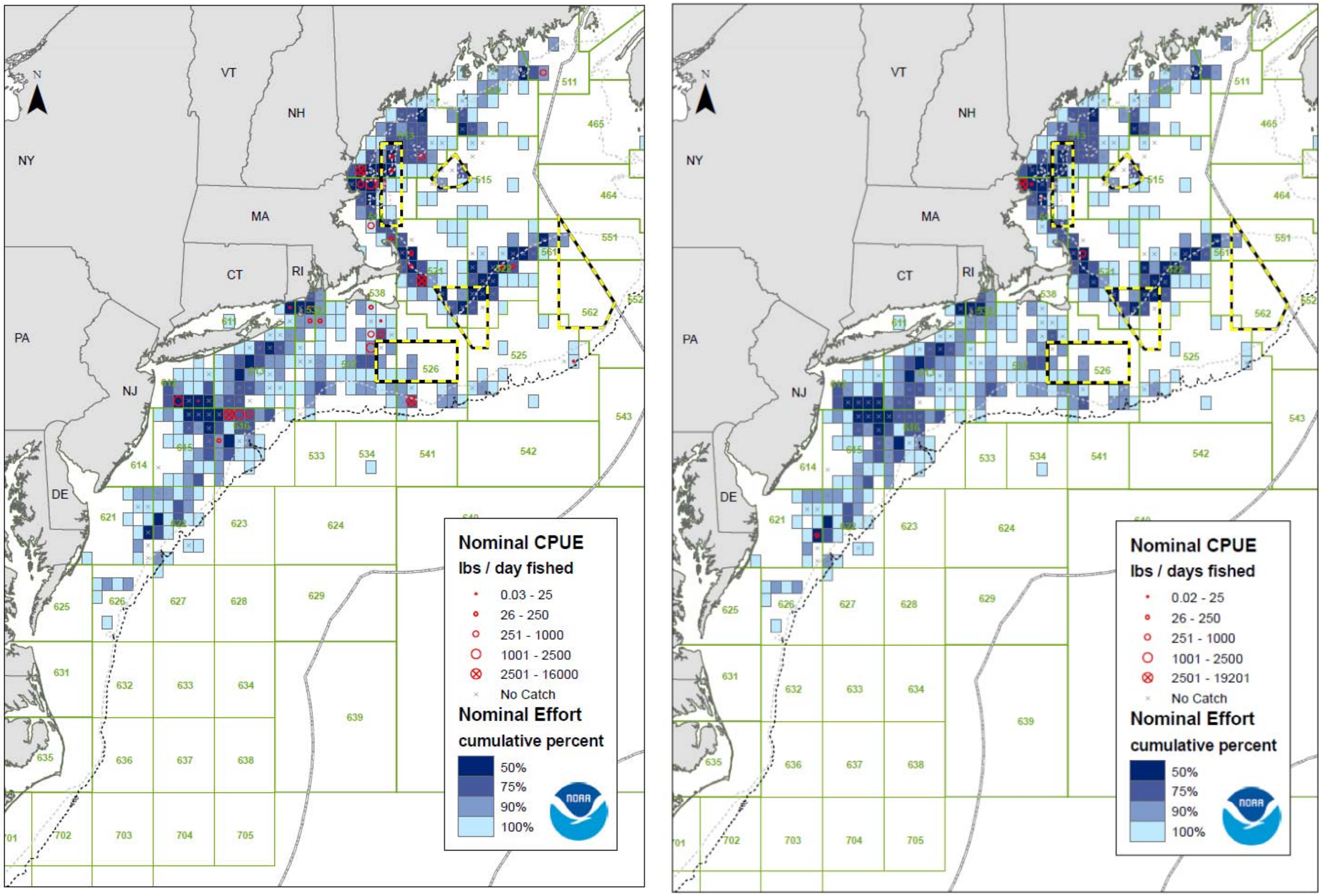


Figure 23. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the paired midwater trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife (left) and blueback (right), by ten-minute square, during 2005-2010.



American shad - paired mid water trawl - 2005-2010

Date: 8/26/2011

Hickory shad - paired mid water trawl - 2005-2010

Date: 8/29/2011

Figure 24. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the paired midwater trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of American shad (left) and hickory shad (right), by ten-minute square, during 2005-2010.

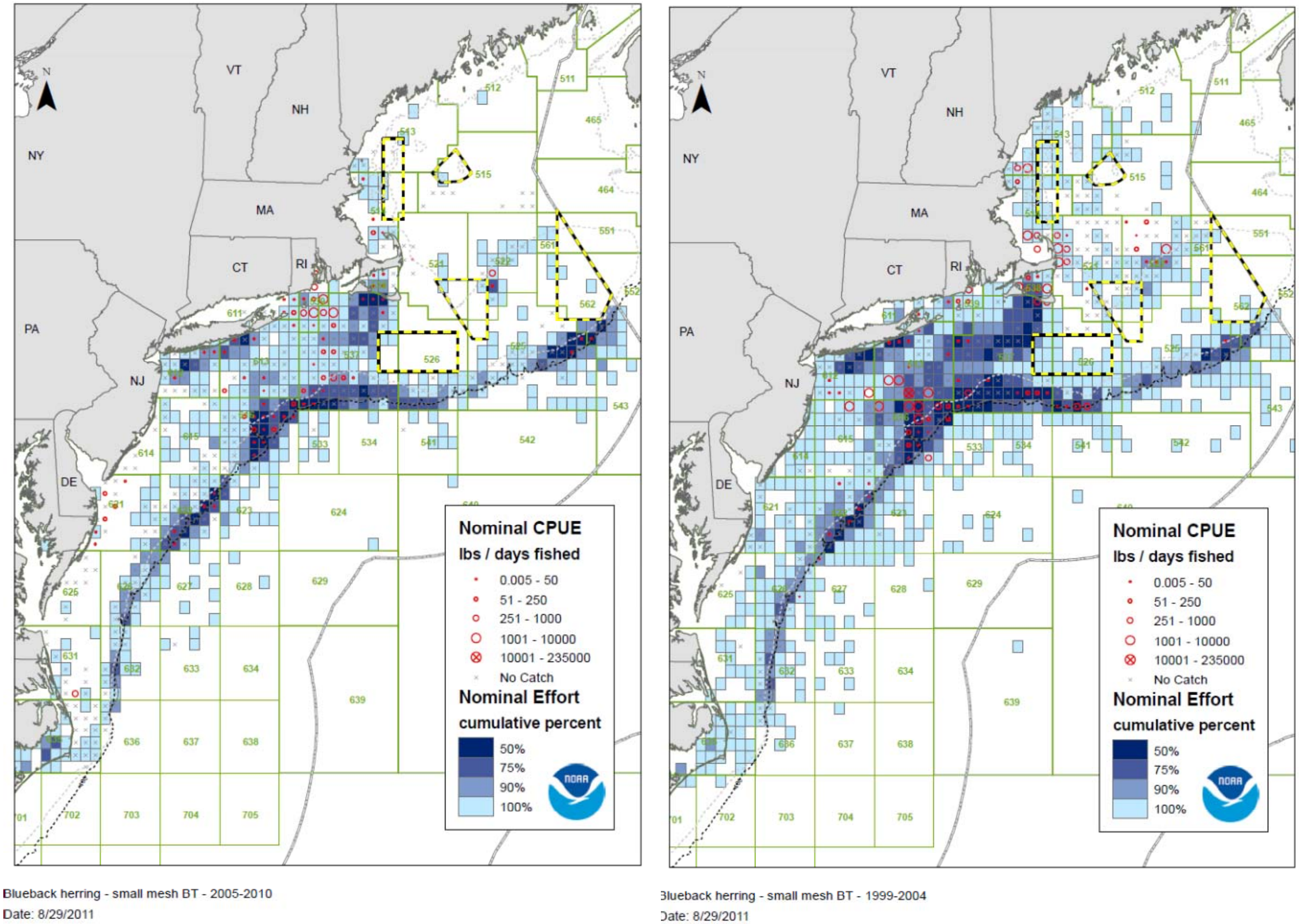
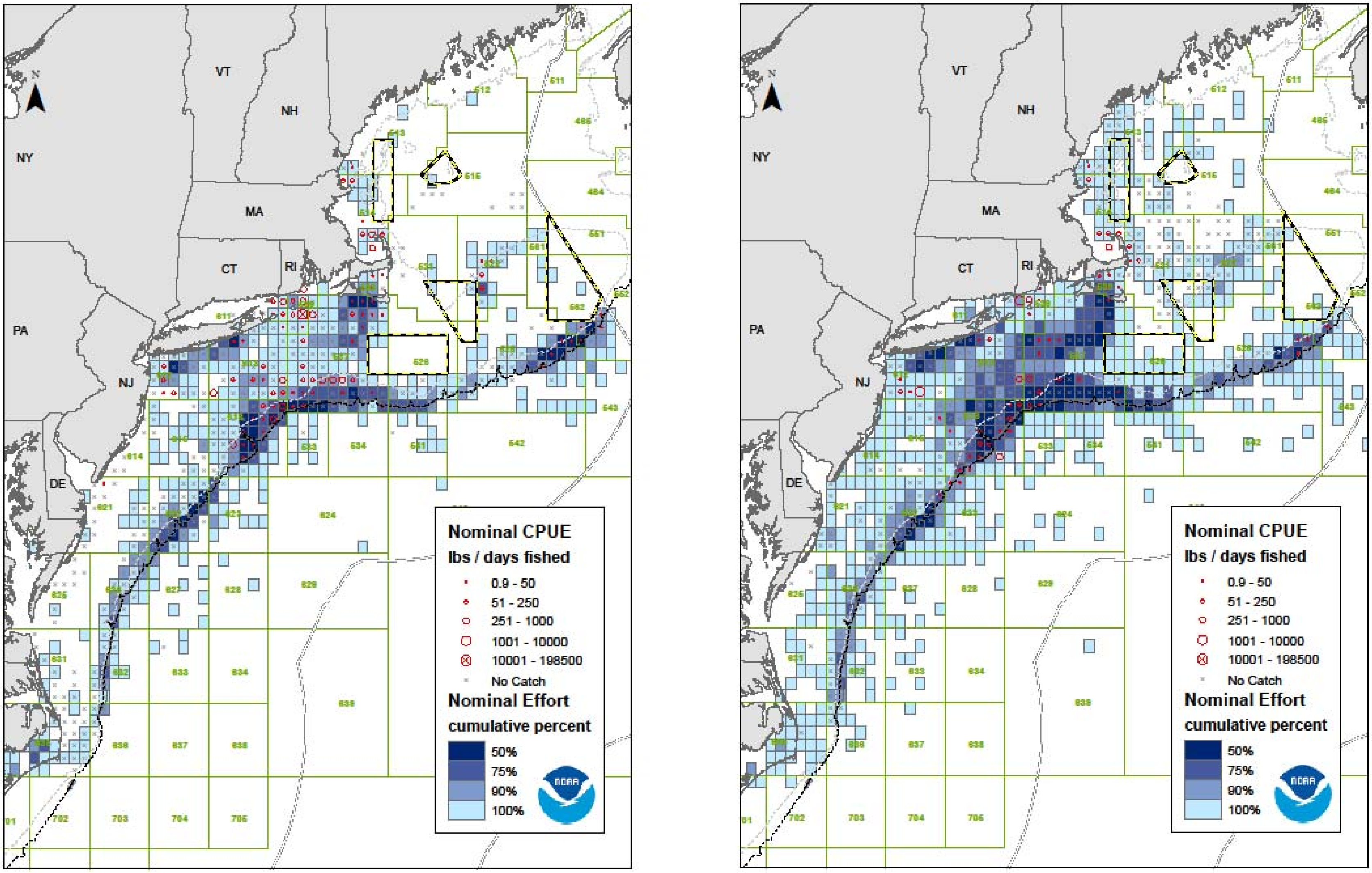


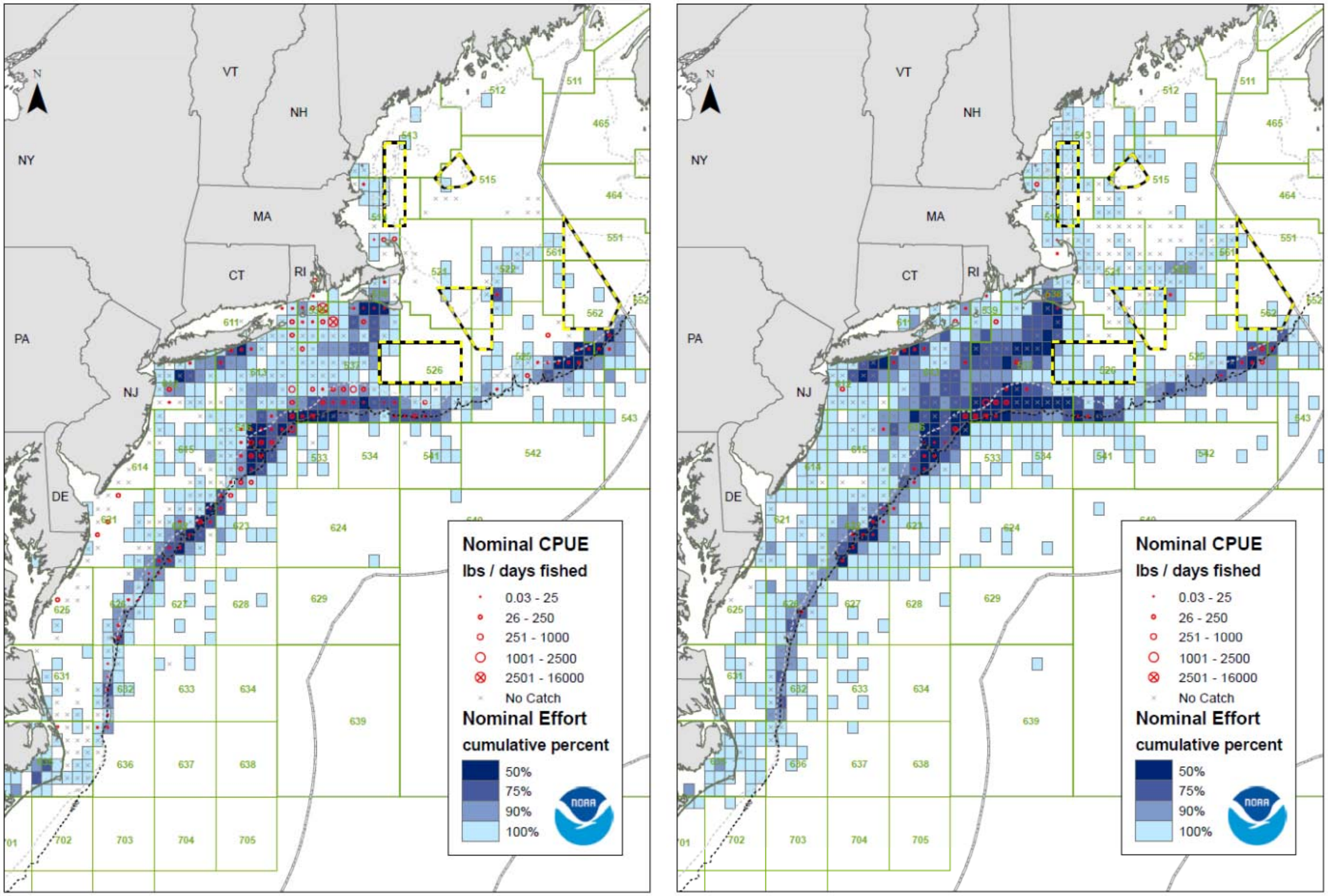
Figure 25. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of blueback herring, by ten-minute square, during 2005-2010 and 1999-2004.



Alewife - small mesh BT - 2005-2010
Date: 8/26/2011

Alewife - small mesh BT - 1999-2004
Date: 8/26/2011

Figure 26. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet’s incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, by ten-minute square, during 2005-2010 and 1999-2004.



American shad - small mesh BT - 2005-2010
Date: 8/26/2011

American shad - small mesh BT - 1999-2004
Date: 8/26/2011

Figure 27. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of American shad, by ten-minute square, during 2005-2010 and 1999-2004.

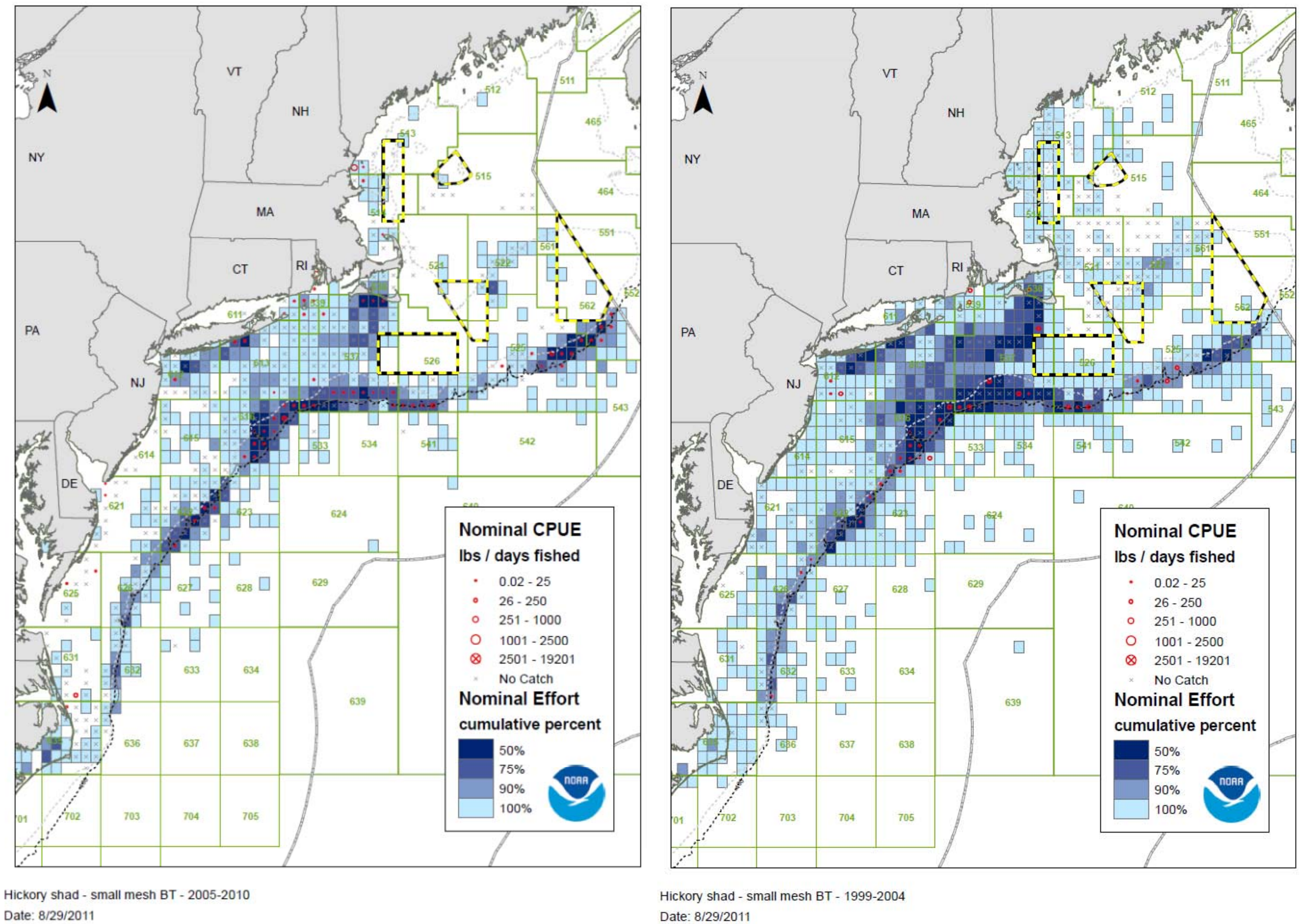


Figure 28. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of hickory shad, by ten-minute square, during 2005-2010 and 1999-2004.

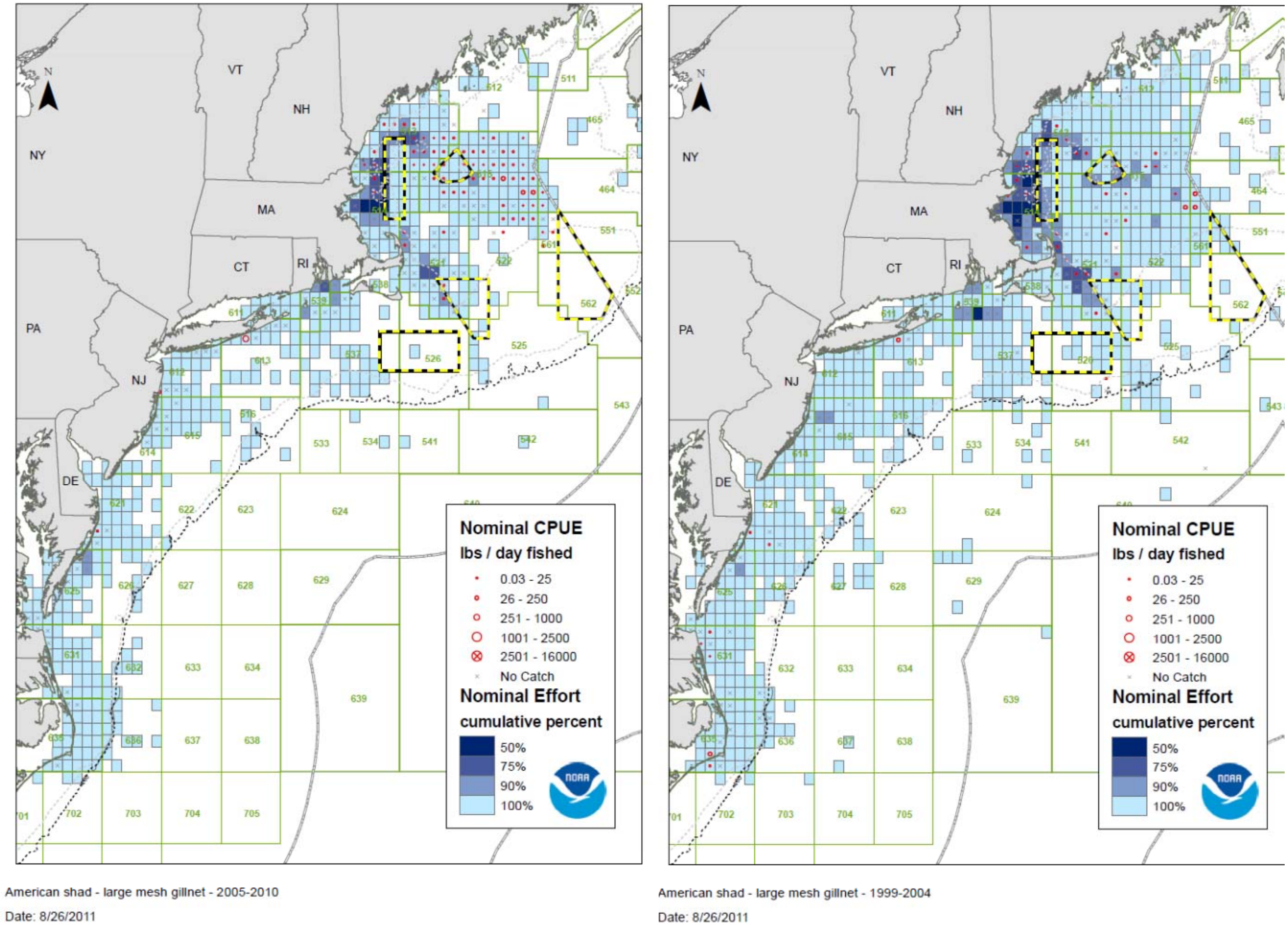
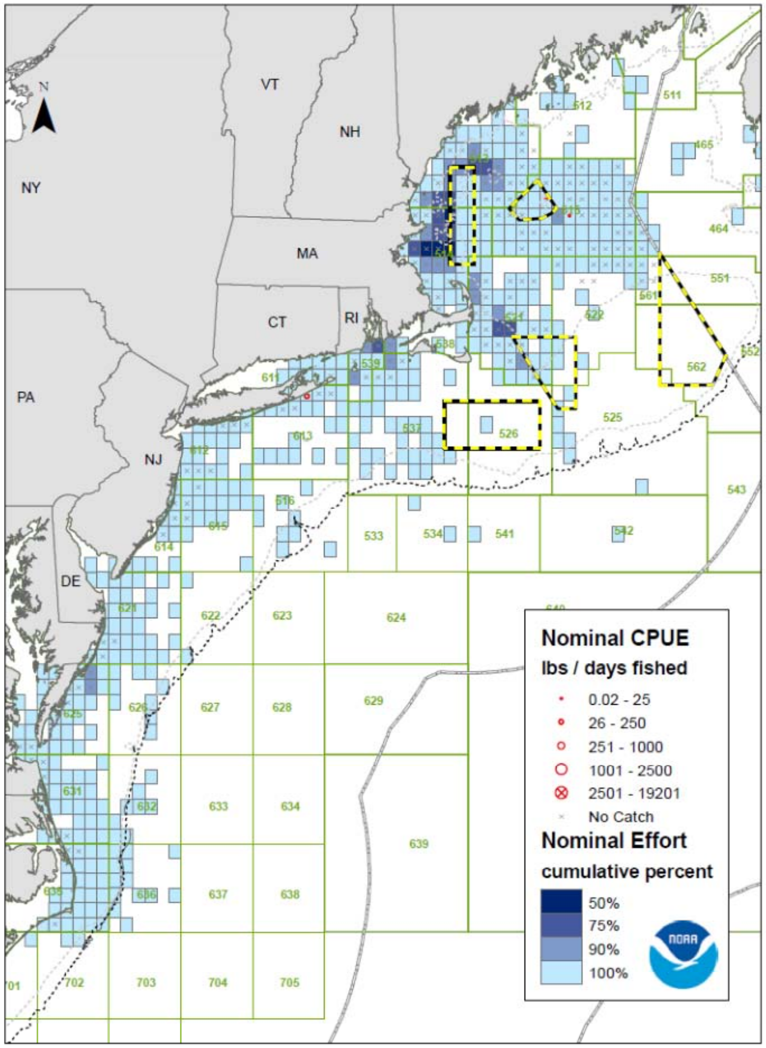
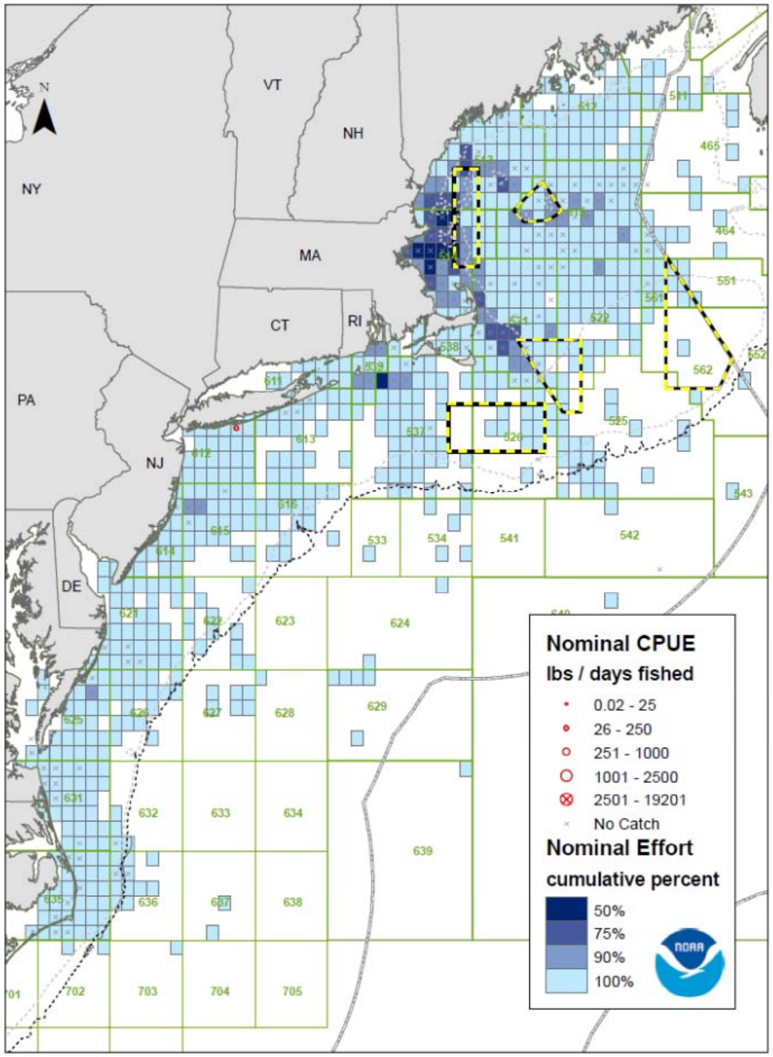


Figure 29. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the large mesh (mesh 5.50-7.99 in.) gillnet fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of American shad, by ten-minute square, during 2005-2010 and 1999-2004.



Hickory shad - large mesh gillnet - 2005-2010

Date: 8/29/2011



Hickory shad - large mesh gillnet - 1999-2004

Date: 8/29/2011

Figure 30. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the large mesh (mesh 5.50-7.99 in.) gillnet fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of hickory shad, by ten-minute square, during 2005-2010 and 1999-2004.

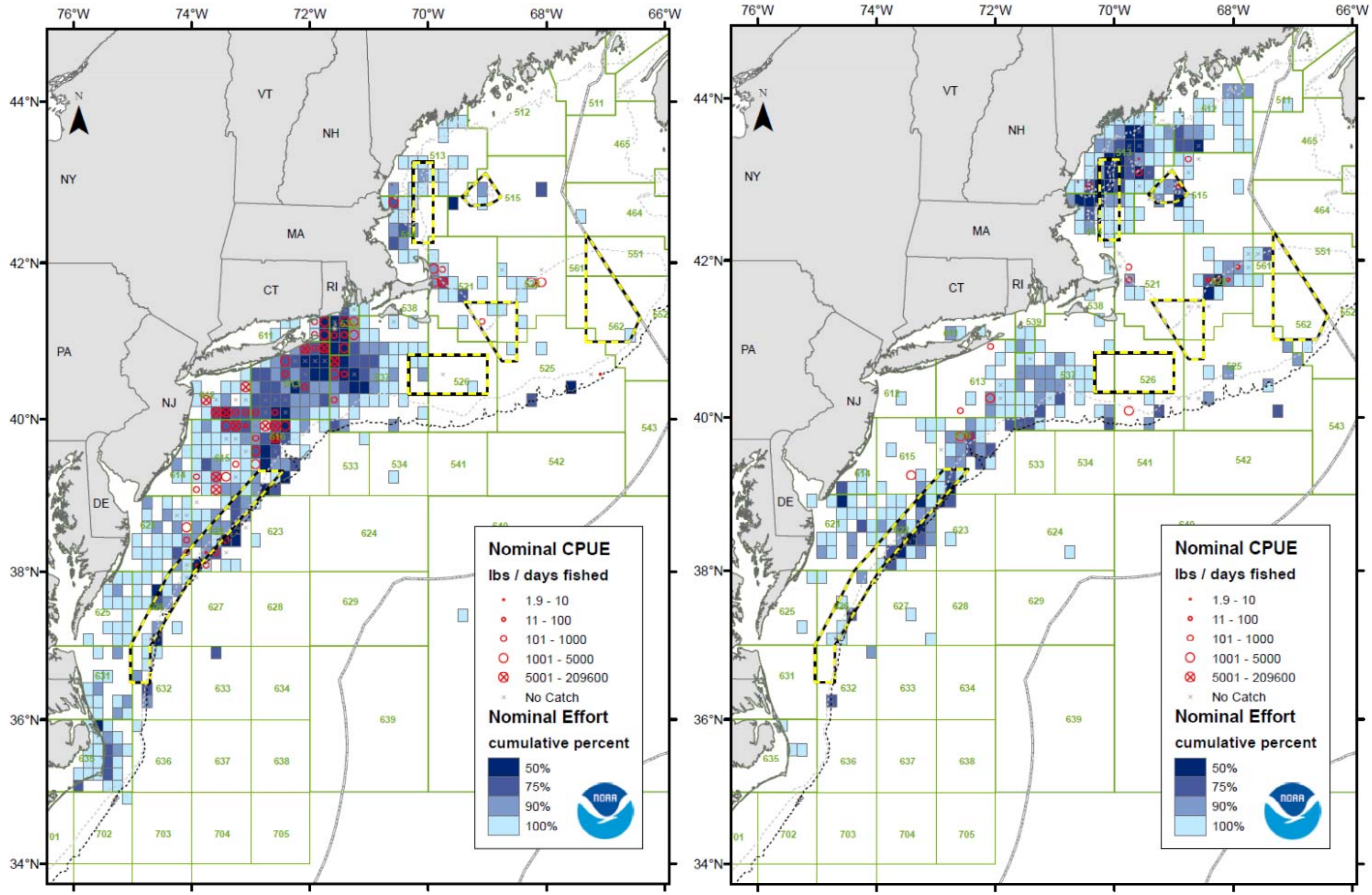


Figure 31. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the paired and single midwater trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 1 (left) and 2 (right) for 2005-2010.

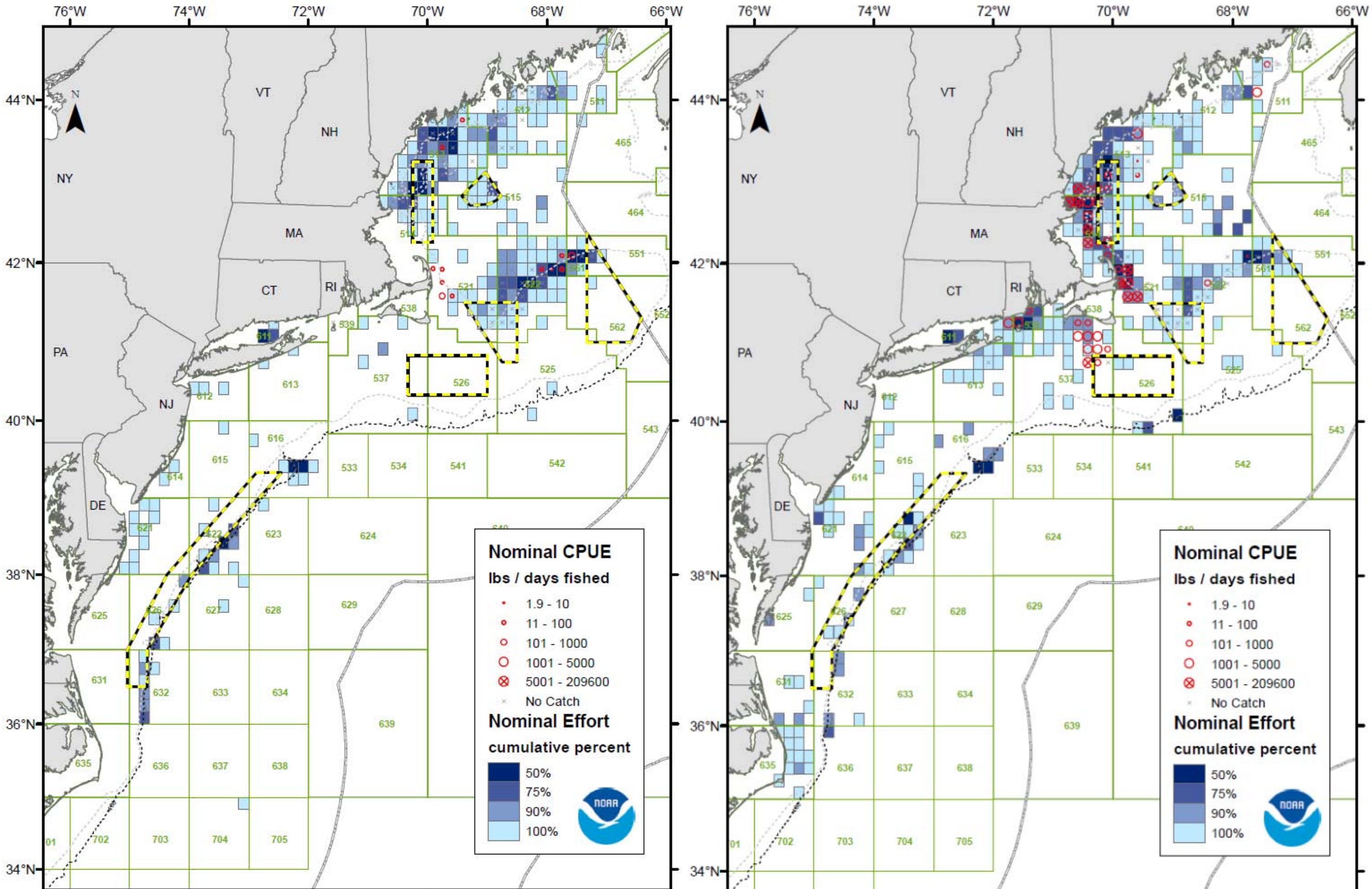


Figure 32. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the paired and single midwater trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 3 (left) and 4 (right) for 2005-2010.

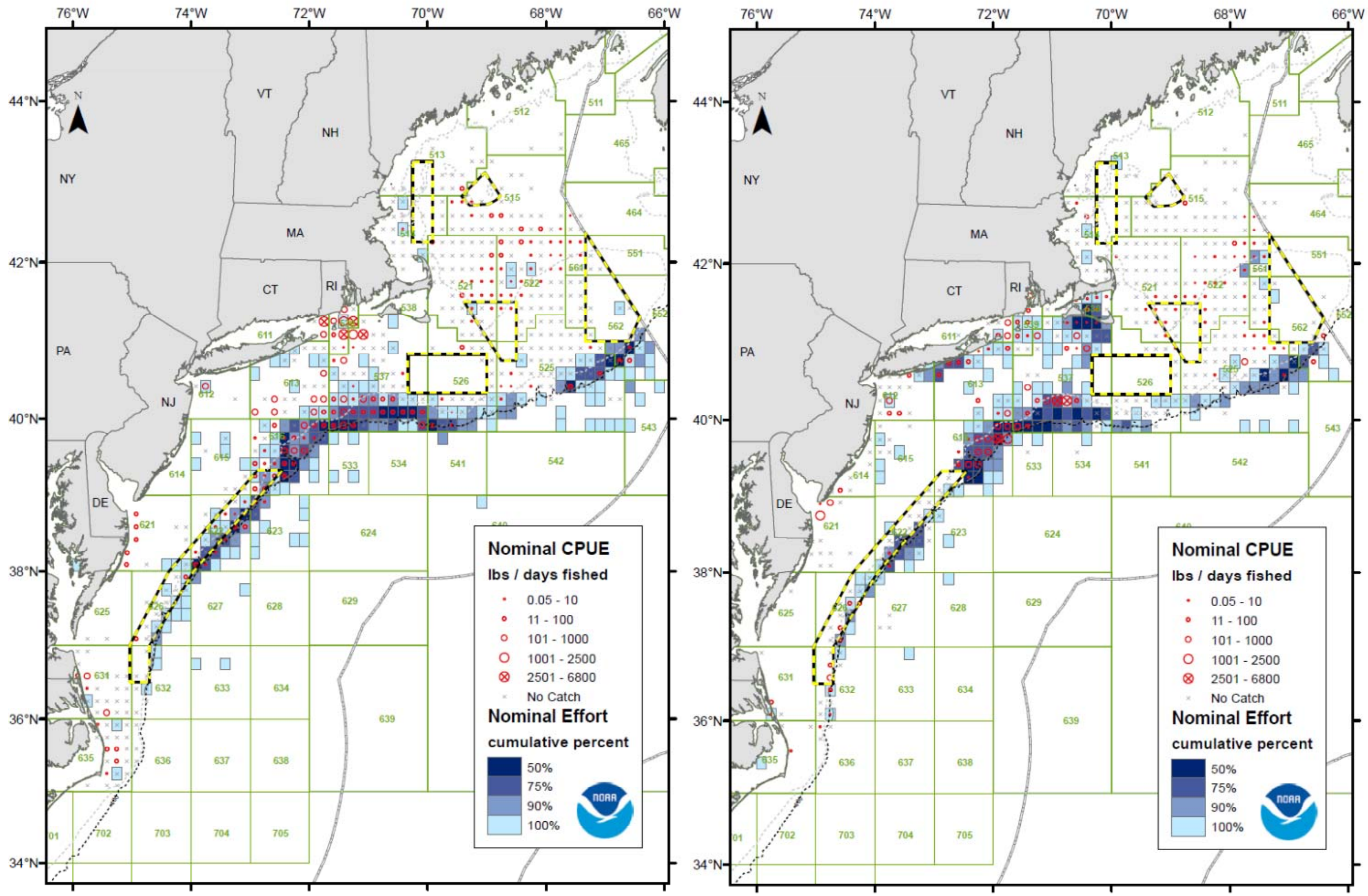


Figure 33. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 1 (left) and 2 (right) for 2005-2010.

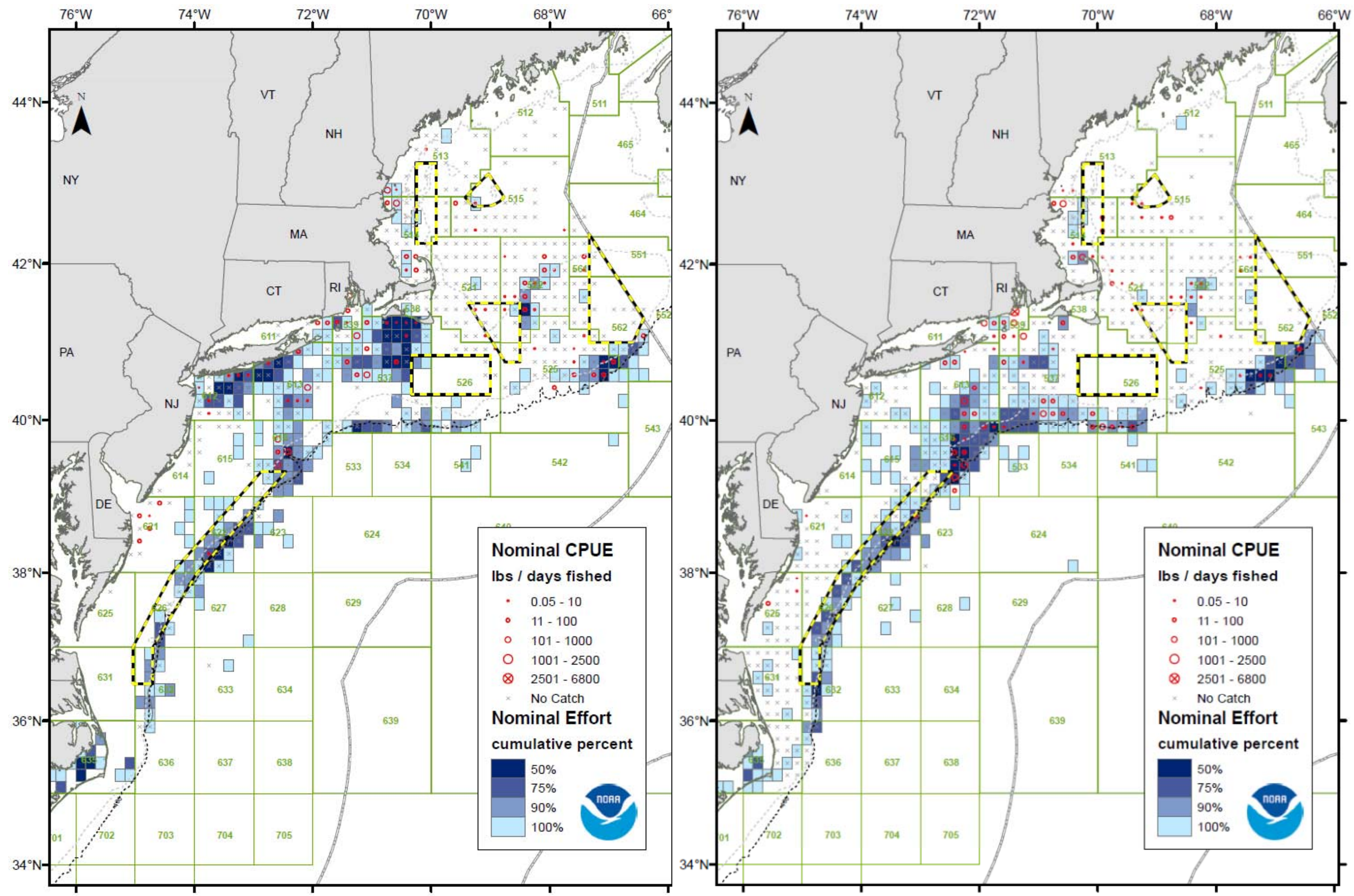


Figure 34. Spatial distribution of nominal effort (days fished from Vessel Trip Reports) for the small mesh (codend mesh ≤ 3.5 in.) bottom trawl fleet and the fleet's incidental catch rates (kept+discarded weight/days fished from observed NEFOP trips) of alewife, blueback herring, hickory shad, and American shad combined, by ten-minute square, during Quarter 3 (left) and 4 (right) for 2005-2010.

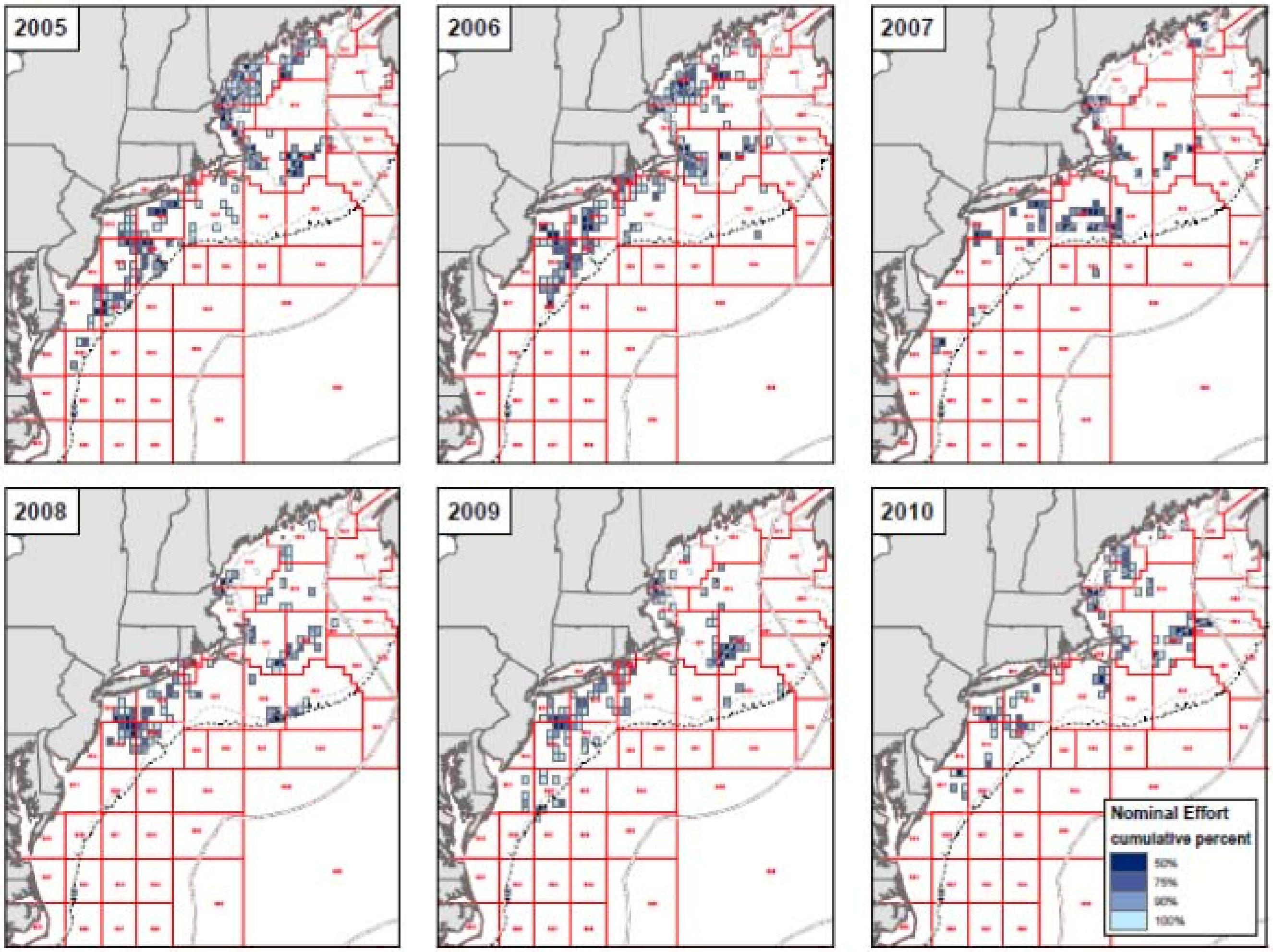


Figure 35. Variability in the spatial distribution of fishing effort (days fished from the Vessel Trip Reports), by the paired midwater trawl fleet, during 2005-2010.

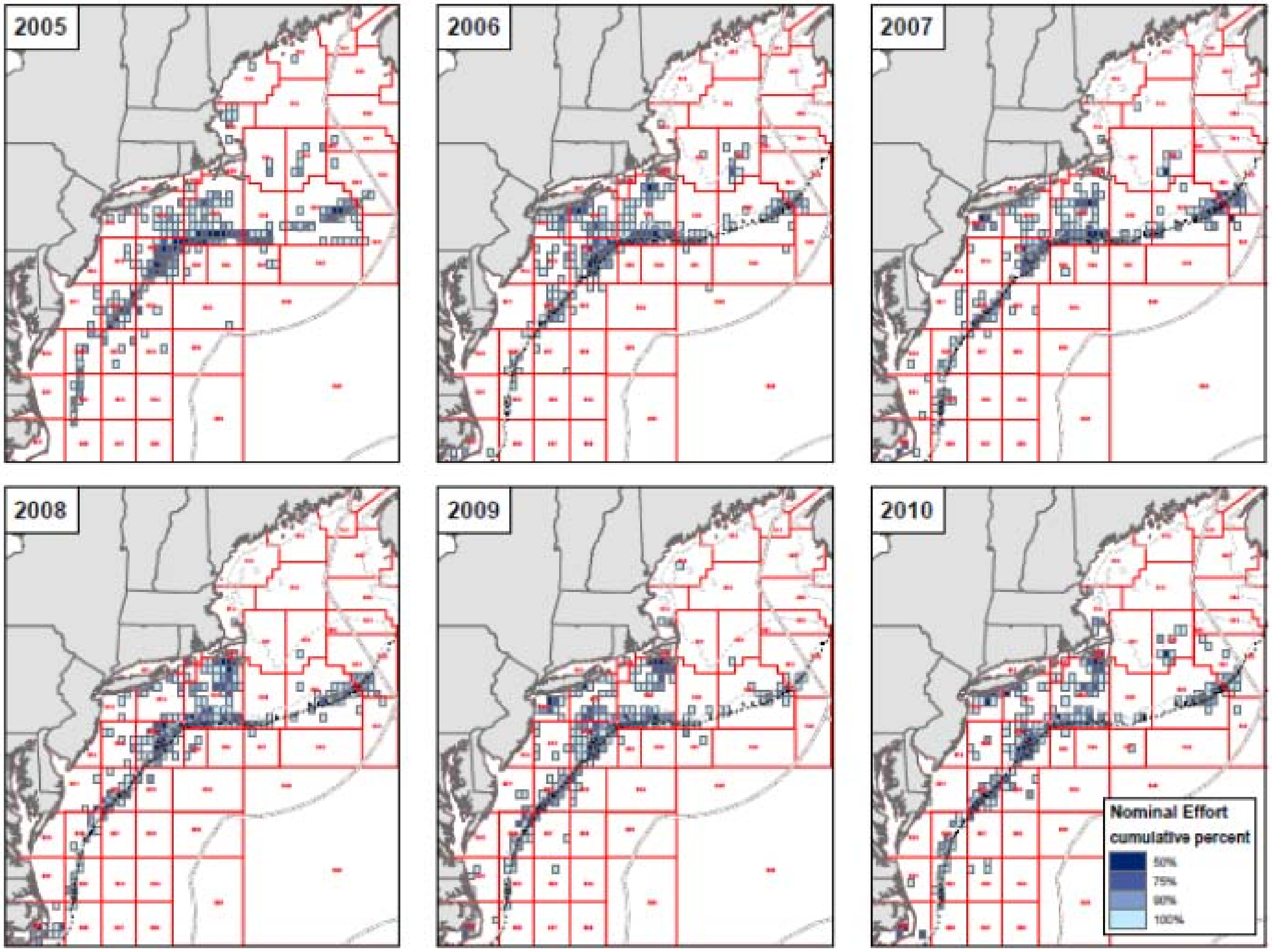


Figure 36. Variability in the spatial distribution of fishing effort (days fished from the Vessel Trip Reports), by the small mesh (codend mesh ≤ 3.5 in.) trawl fleet, during 2005-2010.

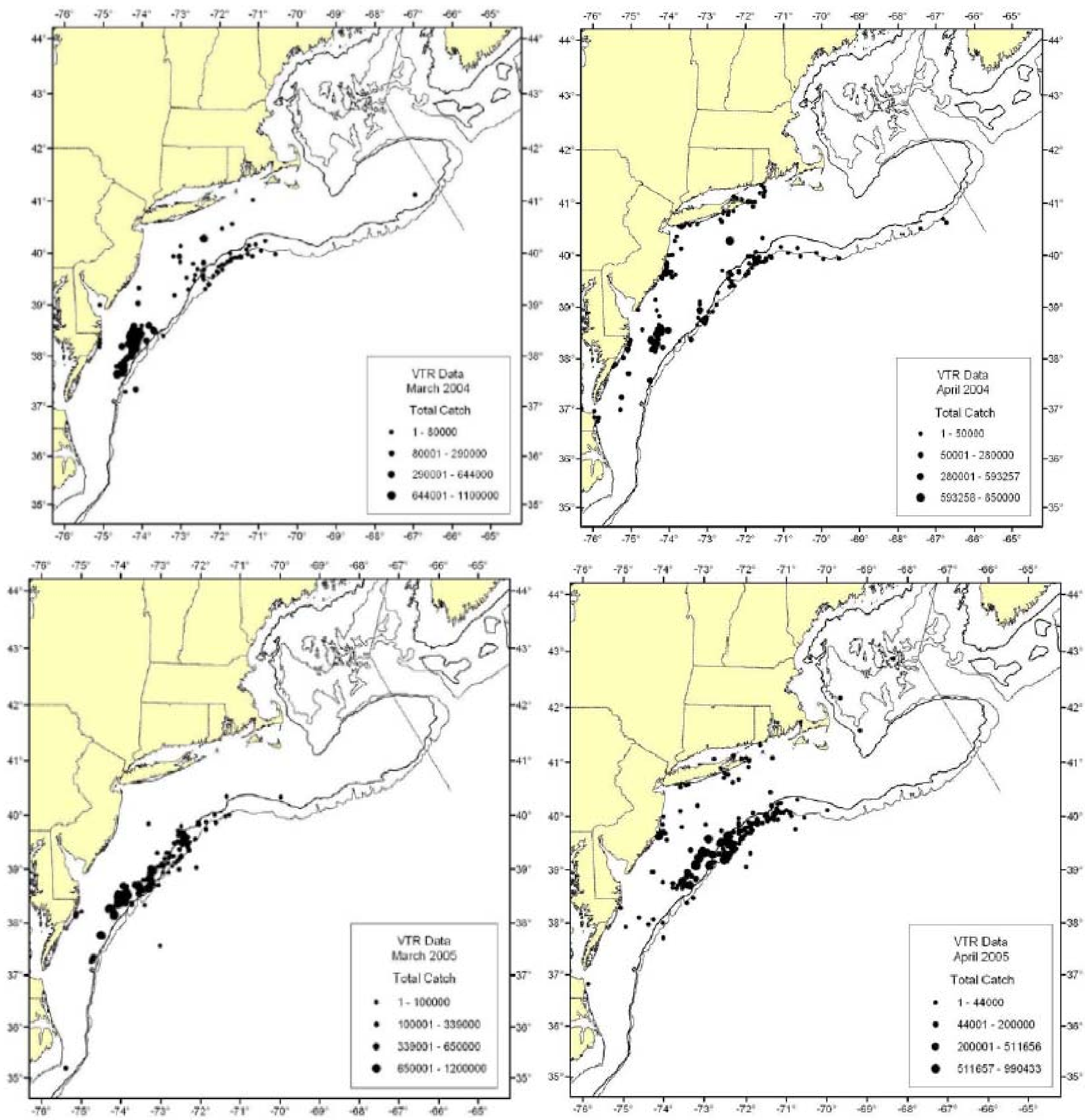


Figure 37. Differences in the spatial distributions of Atlantic mackerel catches during March and April of 2004 (top) versus 2005 (bottom). Each circle may represent a portion of a trip if the trip occurred in different statistical areas. Source: 2009 Working Paper for TRAC assessment of mackerel.

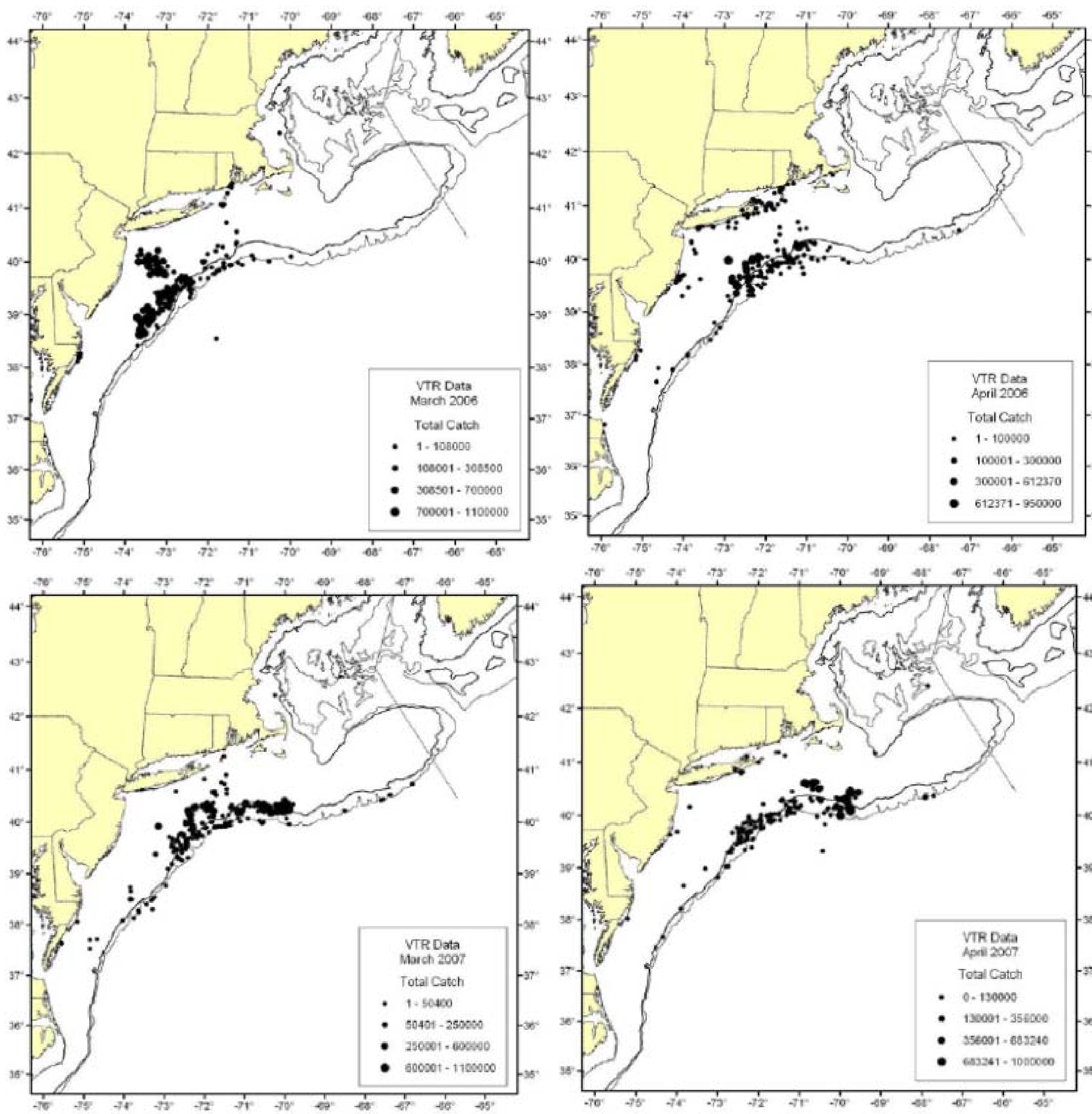


Figure 38. Differences in the spatial distributions of Atlantic mackerel catches during March and April of 2006 (top) versus 2007 (bottom). Each circle may represent a portion of a trip if the trip occurred in different statistical areas. Source: 2009 Working Paper for TRAC assessment of mackerel.

sub Appendix 1 (still part of Appenidx 2)

Table A1: Species-specific total annual incidental catch (mt) and the associated coefficient of variation across all fleets and regions. Midwater trawl estimates were only included beginning in 2005.

	Alewife		American shad		Blueback herring		Herring NK		Hickory Shad	
Year	Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV
1989	20.35	0.49	58.92	0.60	19.60	0.39	7.08	1.03	0.00	
1990	55.31	0.68	25.81	0.34	78.94	0.44	331.34	0.72	0.00	
1991	68.24	0.48	104.27	0.25	115.41	0.37	110.46	0.48	39.35	0.00
1992	30.56	0.36	79.80	0.29	458.17	0.44	387.54	0.39	0.00	
1993	40.47	0.51	50.96	0.52	210.56	0.40	18.60	0.46	0.00	
1994	5.45	0.30	70.31	0.67	40.16	0.33	9.79	0.59	0.24	0.31
1995	6.36	0.48	17.17	0.41	213.50	0.43	51.89	1.44	0.02	1.42
1996	482.01	1.07	39.99	0.38	1803.43	2.10	28.68	0.43	26.64	0.82
1997	41.25	1.01	37.00	0.67	982.04	0.65	67.60	4.25	18.27	0.90
1998	80.88	1.47	55.31	0.43	49.32	1.27	0.42	0.65	39.19	1.45
1999	3.86	0.96	15.72	0.41	206.66	0.59	128.81	1.26	56.79	0.58
2000	28.37	0.67	74.39	1.82	55.46	0.37	21.96	0.53	0.06	0.80
2001	93.02	1.05	61.92	0.42	120.13	0.47	2.10	0.42	80.62	0.38
2002	2.72	3.86	24.07	0.41	173.23	0.31	76.51	1.85	1.41	1.05
2003	248.43	1.46	21.37	0.91	332.48	0.56	15.31	1.21	14.30	0.89
2004	99.74	0.93	18.16	0.35	81.54	0.47	176.74	0.74	35.03	0.78
2005	347.43	0.42	78.24	0.32	220.04	0.38	7.18	0.60	19.41	0.38
2006	57.61	0.91	29.29	4.37	187.48	0.67	232.02	1.16	13.35	0.81
2007	484.02	0.79	55.08	0.45	180.13	1.47	105.31	2.08	4.77	0.98
2008	145.03	0.43	52.38	0.32	526.59	0.57	327.99	0.40	7.83	0.65
2009	158.66	0.26	59.54	0.45	202.02	0.30	180.05	0.91	10.89	0.83
2010	118.50	0.20	46.12	0.17	125.02	0.20	86.50	0.32	1.12	0.65

Table A2: Mid-Atlantic total annual incidental catch (mt) and the associated coefficient of variation for bottom trawl, single and paired midwater trawls, gillnet, and all other fleets for each individual species. Herring NK represents unknown herring. Midwater trawl estimates are only included beginning in 2005.

		Bottom Trawl		Single MWT		Paired MWT		Gillnet		Other	
Species	**Year**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**
Alewife	1989	15.55	0.61					0.00		0.00	
	1990	0.04	1.07					0.00		0.00	
	1991	54.78	0.59					0.00		0.00	
	1992	21.74	0.51					0.00		0.00	
	1993	0.00						0.00		0.00	
	1994	0.00						0.00		0.00	
	1995	0.00	3.28					0.00		0.00	
	1996	386.70	1.33					0.03	0.13	0.00	
	1997	7.63	3.31					0.00		0.00	
	1998	0.00						0.01	0.30	0.00	
	1999	0.13	2.03					0.00		0.76	0.26
	2000	1.38	1.28					0.00		6.70	0.88
	2001	3.24	0.59					0.83	1.49	0.00	
	2002	1.52	6.90					0.00		0.00	
	2003	201.52	1.80					0.00		0.00	
	2004	24.83	1.57					0.00		51.49	1.61
	2005	72.68	0.70	21.35	1.43	162.03	0.78	0.14	1.08	0.00	
	2006	19.97	2.47	13.96	1.07	2.61	1.11	0.00		0.00	
	2007	8.87	3.12	0.00		0.00		0.00		0.00	
	2008	5.20	1.71	1.81	0.57	4.51	0.69	0.00		0.00	
	2009	4.24	1.10	24.06	0.98	27.90	0.63	0.00		0.00	
	2010	6.85	0.51	3.16	0.92	5.40	0.52	0.00		0.01	0.97
American Shad	1989	13.32	0.41					0.00		0.00	
	1990	4.15	0.46					0.00		0.00	
	1991	28.95	0.50					0.00		0.00	
	1992	20.25	0.42					0.00		0.00	
	1993	0.71	1.29					0.00		0.00	
	1994	45.73	1.00					0.43	0.11	0.00	
	1995	0.46	3.63					1.14	0.55	0.00	
	1996	2.44	0.51					8.66	0.57	0.00	
	1997	11.21	1.92					2.78	0.20	0.00	
	1998	9.49	1.05					20.64	0.34	0.00	
	1999	1.77	1.89					5.40	0.49	1.48	1.33
	2000	0.11	0.52					4.27	0.87	64.25	2.11
	2001	0.78	0.77					59.09	0.44	0.00	

Species	Year	Bottom Trawl		Single MWT		Paired MWT		Gillnet		Other	
		Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV
	2002	0.40	0.73					1.93	0.41	0.00	
	2003	9.41	2.03					1.25	0.59	0.01	1.06
	2004	3.85	0.62					0.13	0.39	0.04	0.86
	2005	8.83	0.40	0.48	1.43	27.30	0.53	0.00		0.00	
	2006	0.63	2.03	3.92	1.07	0.00		11.89	10.70	0.00	
	2007	7.75	1.93	0.00		0.00		0.83	2.49	0.00	
	2008	0.85	0.79	1.40	0.27	13.84	0.94	0.00		0.00	
	2009	2.78	0.60	0.12	1.07	0.05	1.02	2.97	6.78	0.00	
	2010	13.97	0.43	0.00		0.93	0.76	0.00		0.00	
	1989	8.93	0.65					0.00		0.00	
	1990	56.86	0.48					0.00		0.00	
	1991	49.54	0.53					0.00		0.00	
	1992	360.88	0.44					0.00		0.00	
	1993	112.69	0.53					0.00		0.12	1.15
	1994	0.00						0.00		0.00	
	1995	2.24	3.33					0.17	1.55	0.00	
	1996	1777.32	2.13					0.03	0.87	0.00	
	1997	878.61	0.67					0.09	0.48	0.00	
	1998	49.05	1.28					0.11	0.23	0.00	
Blueback Herring	1999	0.10	0.52					0.01	1.34	0.00	
	2000	54.02	0.38					0.00		0.00	
	2001	78.34	0.49					0.19	0.78	0.02	2.11
	2002	11.52	0.76					0.00		0.00	
	2003	37.41	1.91					0.15	0.47	0.00	
	2004	22.23	1.11					0.03	1.04	0.00	
	2005	16.76	0.45	1.31	0.91	123.94	0.61	0.00		0.00	
	2006	2.99	3.65	151.37	0.81	19.07	1.13	0.01	0.88	0.00	
	2007	1.21	1.33	0.00		0.00		0.00		0.02	0.94
	2008	0.30	1.09	1.58	0.35	380.77	0.75	0.00		0.00	
	2009	5.57	0.32	27.99	0.96	51.90	0.74	0.00		0.01	0.88
	2010	7.81	0.86	1.66	0.65	7.51	0.88	0.00		0.01	1.03
	1989	0.00						0.00		0.00	
	1990	111.73	0.69					0.00		0.00	
	1991	76.60	0.56					0.00		0.00	
Herring NK	1992	53.54	0.65					0.00		0.00	
	1993	3.65	0.00					0.00		0.00	
	1994	0.08	1.00					0.38	0.10	0.00	
	1995	0.36	2.82					0.03	0.49	0.07	1.13
	1996	7.01	0.79					0.32	0.84	0.00	

Species	Year	Bottom Trawl Catch	Bottom Trawl CV	Single MWT Catch	Single MWT CV	Paired MWT Catch	Paired MWT CV	Gillnet Catch	Gillnet CV	Other Catch	Other CV
	1997	0.00						0.00		0.00	
	1998	0.07	1.85					0.16	0.25	0.00	
	1999	45.35	2.06					0.14	1.09	0.00	
	2000	0.64	0.98					0.23	0.63	6.34	0.94
	2001	0.93	0.80					0.12	0.62	0.00	
	2002	2.21	0.73					0.00		0.00	
	2003	0.00						0.02	1.68	0.01	1.29
	2004	167.25	0.78					0.00		0.00	
	2005	1.89	0.73	0.00		0.00		0.06	1.50	0.07	0.19
	2006	0.00		0.00		0.00		0.09	0.96	0.00	
	2007	10.41	4.76	0.00		0.10	0.73	22.37	0.86	0.00	
	2008	52.40	1.12	75.02	0.53	0.00		0.00		0.00	
	2009	3.84	0.71	0.00		158.78	1.02	0.00		0.79	0.82
	2010	43.02	0.58	0.00		0.03	0.97	0.00		2.96	0.95
Hickory Shad	1989	0.00						0.00		0.00	
	1990	0.00						0.00		0.00	
	1991	0.00						0.00		39.35	0.00
	1992	0.00						0.00		0.00	
	1993	0.00						0.00		0.00	
	1994	0.00						0.11	0.17	0.00	
	1995	0.02	2.09					0.01	0.11	0.00	
	1996	8.92	0.57					0.47	0.32	0.00	
	1997	4.82	2.18					5.41	0.80	0.00	
	1998	0.00						0.47	0.39	0.31	0.98
	1999	0.11	2.47					0.14	0.71	52.14	0.63
	2000	0.00						0.05	0.87	0.00	
	2001	3.10	1.04					10.99	0.53	0.00	
	2002	0.00						1.28	1.15	0.00	
	2003	4.58	2.61					1.52	1.73	5.35	0.40
	2004	5.44	1.60					19.91	1.25	1.60	2.28
	2005	7.32	0.41	0.08	0.69	0.06	0.89	0.12	1.27	0.00	
	2006	3.83	0.75	0.00		0.00		0.00		0.00	
	2007	1.59	2.86	0.00		0.00		0.44	0.77	0.00	
	2008	0.26	0.88	0.00		0.00		0.00		3.63	1.20
	2009	0.18	1.14	0.00		0.00		1.35	2.36	7.14	1.17
	2010	0.02	0.51	0.00		0.00		0.32	0.70	0.64	1.08

Table A3: New England total annual incidental catch (mt) and the associated coefficient of variation for bottom trawl, single and paired midwater trawls, gillnet, and all other fleets for each individual species. Herring NK represents unknown herring. Midwater trawl estimates are only included beginning in 2005.

		Bottom Trawl		Single MWT		Paired MWT		Gillnet		Other	
Species	**Year**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**
Alewife	1989	4.66	0.63					0.00		0.13	0.95
	1990	55.27	0.68					0.00		0.00	
	1991	4.02	0.62					0.00		9.44	0.44
	1992	1.92	0.45					0.00		6.90	0.25
	1993	33.80	0.61					0.00		6.67	0.28
	1994	0.08	1.56					0.00		5.36	0.31
	1995	2.10	1.37					0.09	1.07	4.17	0.25
	1996	38.37	0.39					1.31	1.02	55.60	0.47
	1997	10.08	3.16					0.00		23.54	0.40
	1998	80.88	1.47					0.00		0.00	
	1999	2.96	1.24					0.00		0.00	
	2000	20.30	0.88					0.00		0.00	
	2001	88.94	1.10					0.00		0.00	
	2002	1.20	0.78					0.00		0.00	
	2003	38.87	0.57					0.03	0.66	8.02	0.46
	2004	21.31	0.59					0.04	0.55	2.08	0.74
	2005	12.98	0.75	1.92	0.90	71.99	0.48	0.02	0.56	4.32	0.52
	2006	15.86	0.52	1.34	1.56	1.81	0.72	0.00		2.05	0.43
	2007	259.38	0.41	116.52	2.89	97.42	1.42	0.02	1.41	1.82	0.80
	2008	31.84	0.85	40.49	1.04	60.46	0.60	0.00		0.71	0.38
	2009	31.26	0.51	10.60	0.53	57.29	0.42	0.01	0.63	3.30	0.41
	2010	28.62	0.40	0.58	0.36	69.08	0.28	0.02	0.49	4.79	0.34
American Shad	1989	45.43	0.77					0.00		0.18	1.02
	1990	18.86	0.44					0.00		2.79	0.56
	1991	70.77	0.30					0.00		4.54	1.11
	1992	56.54	0.38					0.00		3.01	0.41
	1993	49.68	0.53					0.00		0.57	0.97
	1994	22.86	0.55					1.12	0.88	0.16	0.76
	1995	6.52	0.96					8.89	0.29	0.16	1.05
	1996	1.05	4.45					27.82	0.48	0.03	1.10
	1997	13.68	0.87					5.01	0.44	4.31	0.60
	1998	16.98	1.20					8.19	0.44	0.00	
	1999	0.93	0.64					6.15	0.71	0.00	
	2000	1.50	1.20					4.25	0.51	0.00	
	2001	1.98	0.62					0.07	1.66	0.00	

Species	Year	Bottom Trawl Catch	Bottom Trawl CV	Single MWT Catch	Single MWT CV	Paired MWT Catch	Paired MWT CV	Gillnet Catch	Gillnet CV	Other Catch	Other CV
	2002	4.56	1.41					17.17	0.44	0.00	
	2003	8.52	0.41					2.18	0.78	0.02	1.07
	2004	11.52	0.52					2.63	0.26	0.00	1.29
	2005	7.59	0.48	1.98	1.04	29.97	0.67	2.09	0.25	0.00	
	2006	3.04	0.60	0.00		0.18	0.63	9.46	1.18	0.15	1.06
	2007	1.45	0.28	0.00		17.15	0.78	27.86	0.52	0.03	0.95
	2008	2.95	0.38	2.57	1.09	2.43	0.84	28.30	0.37	0.04	0.99
	2009	17.98	0.51	20.64	0.69	6.76	0.34	7.83	0.28	0.42	0.83
	2010	11.22	0.25	0.11	0.49	10.28	0.37	9.61	0.19	0.00	
Blueback Herring	1989	8.20	0.56					0.00		2.48	0.69
	1990	19.64	1.11					0.00		2.44	0.60
	1991	57.25	0.58					0.00		8.62	0.83
	1992	85.85	1.45					0.00		11.44	0.50
	1993	96.72	0.61					0.00		1.02	0.55
	1994	32.99	0.37					6.64	0.84	0.53	0.71
	1995	59.07	0.83					104.57	0.71	47.44	0.48
	1996	1.53	1.35					0.23	0.73	24.33	0.36
	1997	51.56	4.66					0.00		51.79	0.51
	1998	0.00						0.17	0.72	0.00	
	1999	206.56	0.59					0.00		0.00	
	2000	1.43	0.87					0.00		0.01	0.67
	2001	41.50	1.00					0.00		0.08	0.96
	2002	161.07	0.33					0.64	1.23	0.00	
	2003	279.00	0.61					0.02	0.79	15.90	0.41
	2004	54.11	0.55					1.83	0.69	3.34	0.61
	2005	15.75	0.70	14.03	1.22	45.50	0.55	0.23	0.80	2.53	0.75
	2006	3.14	0.82	7.06	0.73	3.65	0.77	0.00		0.17	0.76
	2007	38.65	0.60	72.91	3.51	64.97	1.05	0.01	1.32	2.37	0.83
	2008	13.73	0.83	17.46	0.76	109.73	0.84	0.02	1.31	3.01	0.77
	2009	42.84	0.56	9.85	0.56	61.42	0.46	0.03	0.84	2.40	0.47
	2010	9.79	0.41	0.39	1.09	74.45	0.27	0.07	0.39	23.34	0.45
Herring NK	1989	7.08	1.03					0.00		0.00	
	1990	218.18	1.04					0.00		1.43	0.82
	1991	28.44	1.04					0.00		5.43	1.35
	1992	318.11	0.46					0.00		15.88	0.37
	1993	14.75	0.58					0.00		0.20	0.51
	1994	2.26	0.53					6.73	0.84	0.35	0.56
	1995	44.96	1.66					3.69	0.59	2.79	0.91
	1996	20.80	0.53					0.30	0.99	0.25	1.08

Species	Year	Bottom Trawl		Single MWT		Paired MWT		Gillnet		Other	
		Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV
	1997	67.48	4.26					0.08	1.28	0.04	0.64
	1998	0.18	1.27					0.00		0.00	
	1999	83.28	1.59					0.03	1.15	0.00	
	2000	14.75	0.68					0.00		0.01	1.03
	2001	0.00						0.05	1.54	1.00	0.46
	2002	74.30	1.91					0.00		0.00	
	2003	15.25	1.21					0.03	0.59	0.00	
	2004	9.47	0.63					0.02	0.57	0.00	
	2005	3.20	1.24	0.15	1.36	0.00		0.17	0.52	1.64	0.55
	2006	57.53	1.49	168.41	1.52	0.00		2.25	0.50	3.75	0.58
	2007	72.42	2.93	0.00		0.00		0.00		0.00	
	2008	97.17	0.58	0.98	1.13	0.00		0.00		102.41	0.93
	2009	15.01	1.48	0.00		0.67	0.91	0.63	0.62	0.35	0.78
	2010	8.52	0.90	0.49	0.46	17.84	0.18	0.29	0.46	13.34	0.55
Hickory Shad	1989	0.00						0.00		0.00	
	1990	0.00						0.00		0.00	
	1991	0.00						0.00		0.00	
	1992	0.00						0.00		0.00	
	1993	0.00						0.00		0.00	
	1994	0.10	0.63					0.00		0.03	1.05
	1995	0.00						0.00		0.00	
	1996	17.26	1.24					0.00		0.00	
	1997	3.68	3.16					0.00		4.37	0.63
	1998	38.40	1.48					0.00		0.00	
	1999	4.40	0.70					0.00		0.00	
	2000	0.00	0.83					0.00		0.00	
	2001	66.53	0.45					0.00		0.00	
	2002	0.12	1.00					0.00		0.00	
	2003	2.59	1.02					0.27	0.46	0.00	
	2004	8.04	0.78					0.04	0.84	0.00	
	2005	2.68	0.45	2.58	1.37	6.56	0.86	0.01	0.85	0.00	
	2006	9.32	1.12	0.15	1.56	0.00		0.04	1.00	0.01	1.06
	2007	1.99	0.38	0.37	1.66	0.00		0.28	1.33	0.11	0.98
	2008	0.90	0.52	0.00		2.89	0.88	0.02	0.91	0.12	1.01
	2009	2.05	0.76	0.00		0.00		0.17	0.61	0.00	
	2010	0.06	0.67	0.00	0.19	0.00		0.08	0.68	0.00	

Table A4: Mid-Atlantic total annual incidental catch (mt) and the associated coefficient of variation by mesh category for bottom trawl and gillnet for each individual species. Herring NK represents unknown herring. Midwater trawl estimates are only included beginning in 2005.

		Bottom Trawl						Gillnet					
		Small mesh		Med. mesh		Large mesh		Small mesh		Large mesh		X-large mesh	
Species	Year	Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV
Alewife	1989	15.55	0.61	0.00		0.00		0.00		0.00			
	1990	0.04	1.07	0.00		0.00		0.00		0.00		0.00	
	1991	54.78	0.59	0.00		0.00		0.00		0.00			
	1992	21.72	0.51	0.00		0.02	1.10	0.00		0.00			
	1993	0.00		0.00		0.00		0.00		0.00			
	1994	0.00		0.00		0.00		0.00		0.00		0.00	
	1995	0.00	3.28	0.00		0.00		0.00		0.00		0.00	
	1996	386.66	1.33	0.04	0.53	0.00		0.03	0.12	0.00	0.81	0.00	
	1997	6.74	3.75	0.89	0.44	0.00		0.00		0.00		0.00	
	1998	0.00		0.00		0.00		0.01	0.30	0.00		0.00	
	1999	0.13	2.03	0.00		0.00		0.00		0.00		0.00	
	2000	1.38	1.28	0.00		0.00		0.00		0.00		0.00	
	2001	3.24	0.59	0.00		0.00		0.83	1.49	0.00		0.00	
	2002	1.52	6.90	0.00		0.00		0.00		0.00		0.00	
	2003	201.52	1.80	0.00		0.00		0.00		0.00		0.00	
	2004	24.29	1.61	0.54	0.50	0.00		0.00		0.00		0.00	
	2005	71.58	0.71	1.11	3.34	0.00		0.14	1.08	0.00		0.00	
	2006	19.20	2.57	0.10	2.74	0.67	1.95	0.00		0.00		0.00	
	2007	8.86	3.12	0.01	0.58	0.00		0.00		0.00		0.00	
	2008	4.95	1.80	0.02	1.38	0.24	0.74	0.00		0.00		0.00	
	2009	3.62	1.28	0.09	1.04	0.53	0.82	0.00		0.00		0.00	
	2010	6.63	0.53	0.06	0.45	0.16	0.95	0.00		0.00		0.00	
American Shad	1989	11.34	0.48	0.00		1.98	0.00	0.00		0.00			
	1990	4.15	0.46	0.00		0.00		0.00		0.00		0.00	
	1991	16.27	0.49	12.67	0.94	0.00		0.00		0.00			
	1992	20.13	0.42	0.00		0.12	0.51	0.00		0.00			
	1993	0.71	1.29	0.00		0.00		0.00		0.00			
	1994	45.69	1.00	0.00		0.04	0.75	0.42	0.11	0.01	0.27	0.00	
	1995	0.43	3.92	0.03	0.90	0.00		0.36	1.56	0.78	0.35	0.00	
	1996	2.42	0.51	0.02	7.54	0.00		7.27	0.68	1.39	0.28	0.00	
	1997	6.17	3.48	5.04	0.40	0.00		0.53	0.54	2.23	0.22	0.02	0.86
	1998	9.49	1.05	0.00		0.00		13.36	0.51	6.49	0.23	0.79	0.87
	1999	1.57	2.12	0.19	0.91	0.00		1.75	0.77	3.64	0.62	0.00	
	2000	0.11	0.52	0.00		0.00		0.00	1.08	4.27	0.87	0.00	
	2001	0.61	0.68	0.18	2.48	0.00		58.84	0.44	0.25	0.65	0.00	

		Bottom Trawl						Gillnet					
		Small mesh		Med. mesh		Large mesh		Small mesh		Large mesh		X-large mesh	
Species	**Year**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**
	2002	0.40	0.73	0.00		0.00		1.65	0.48	0.29	0.19	0.00	
	2003	9.41	2.03	0.00		0.00		0.12	0.70	1.12	0.65	0.00	
	2004	3.23	0.73	0.25	0.83	0.38	0.70	0.13	0.39	0.00		0.00	
	2005	7.88	0.44	0.01	3.34	0.94	0.59	0.00		0.00		0.00	
	2006	0.63	2.03	0.00		0.00		0.11	0.34	11.79	10.80	0.00	
	2007	4.68	3.16	3.07	0.76	0.00		0.44	1.06	0.39	5.17	0.00	
	2008	0.51	1.27	0.35	0.60	0.00		0.00		0.00		0.00	
	2009	2.39	0.69	0.26	0.69	0.13	0.85	0.69	2.17	2.28	8.80	0.00	
	2010	13.51	0.45	0.38	0.51	0.08	1.11	0.00		0.00		0.00	
	1989	8.93	0.65	0.00		0.00		0.00		0.00			
	1990	49.94	0.52	6.93	1.22	0.00		0.00		0.00		0.00	
	1991	49.53	0.53	0.01	1.06	0.00		0.00		0.00			
	1992	360.88	0.44	0.00		0.00		0.00		0.00			
	1993	112.69	0.53	0.00		0.00		0.00		0.00			
	1994	0.00		0.00		0.00		0.00		0.00		0.00	
	1995	2.18	3.43	0.00		0.06	1.21	0.10	2.56	0.07	0.40	0.00	
	1996	1777.32	2.13	0.00		0.00		0.03	0.93	0.00	0.86	0.00	
	1997	877.27	0.68	1.34	1.30	0.00		0.00		0.02	0.52	0.07	0.60
	1998	49.05	1.28	0.00		0.00		0.04	0.30	0.07	0.33	0.00	0.91
Blueback Herring	1999	0.10	0.52	0.00		0.00		0.01	1.34	0.00		0.00	
	2000	54.02	0.38	0.00		0.00		0.00		0.00		0.00	
	2001	78.34	0.49	0.00		0.00		0.00		0.00		0.19	0.78
	2002	11.52	0.76	0.00		0.00		0.00		0.00		0.00	
	2003	37.41	1.91	0.00		0.00		0.15	0.47	0.00		0.00	
	2004	18.21	1.35	3.90	0.56	0.13	1.06	0.00		0.00		0.03	1.04
	2005	16.61	0.45	0.13	0.52	0.02	0.91	0.00		0.00		0.00	
	2006	2.79	3.91	0.20	0.60	0.00		0.01	0.88	0.00		0.00	
	2007	0.72	2.20	0.49	0.58	0.00		0.00		0.00		0.00	
	2008	0.30	1.09	0.00		0.00		0.00		0.00		0.00	
	2009	5.40	0.32	0.00		0.17	0.75	0.00		0.00		0.00	
	2010	7.74	0.87	0.01	0.47	0.06	1.09	0.00		0.00		0.00	
	1989	0.00		0.00		0.00		0.00		0.00			
	1990	111.73	0.69	0.00		0.00		0.00		0.00		0.00	
	1991	76.60	0.56	0.00		0.00		0.00		0.00			
Herring NK	1992	51.48	0.67	2.07	1.56	0.00		0.00		0.00			
	1993	0.00		3.65	0.00	0.00		0.00		0.00			
	1994	0.08	1.00	0.00		0.00		0.38	0.10	0.00	0.63	0.00	
	1995	0.31	3.25	0.00		0.05	1.09	0.00	0.18	0.03	0.51	0.00	
	1996	7.01	0.79	0.00		0.00		0.29	0.93	0.03	0.81	0.00	

		Bottom Trawl						Gillnet					
		Small mesh		Med. mesh		Large mesh		Small mesh		Large mesh		X-large mesh	
Species	**Year**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**
	1997	0.00		0.00		0.00		0.00		0.00		0.00	
	1998	0.07	1.85	0.00		0.00		0.01	0.30	0.13	0.28	0.02	0.91
	1999	45.35	2.06	0.00		0.00		0.07	0.81	0.07	1.96	0.00	
	2000	0.60	1.03	0.00		0.04	2.67	0.21	0.67	0.02	1.03	0.00	
	2001	0.93	0.80	0.00		0.00		0.12	0.62	0.00		0.00	
	2002	2.21	0.73	0.00		0.00		0.00		0.00		0.00	
	2003	0.00		0.00		0.00		0.02	1.68	0.00		0.00	
	2004	167.25	0.78	0.00		0.00		0.00		0.00		0.00	
	2005	1.89	0.73	0.00	0.83	0.00		0.06	1.50	0.00		0.00	
	2006	0.00		0.00		0.00		0.09	0.96	0.00		0.00	
	2007	10.41	4.76	0.00	2.55	0.00		0.00		22.37	0.86	0.00	
	2008	52.35	1.12	0.05	0.61	0.00		0.00		0.00		0.00	
	2009	3.79	0.72	0.05	0.87	0.00		0.00		0.00		0.00	
	2010	43.01	0.58	0.01	1.12	0.00		0.00		0.00		0.00	
Hickory Shad	1989	0.00		0.00		0.00		0.00		0.00			
	1990	0.00		0.00		0.00		0.00		0.00		0.00	
	1991	0.00		0.00		0.00		0.00		0.00			
	1992	0.00		0.00		0.00		0.00		0.00			
	1993	0.00		0.00		0.00		0.00		0.00			
	1994	0.00		0.00		0.00		0.11	0.17	0.00	0.63	0.00	
	1995	0.00		0.00		0.02	2.09	0.01	0.11	0.00		0.00	
	1996	8.92	0.57	0.00		0.00		0.16	0.16	0.30	0.49	0.00	
	1997	3.01	3.40	1.81	1.24	0.00		5.40	0.80	0.00	0.91	0.00	
	1998	0.00		0.00		0.00		0.47	0.39	0.00		0.00	
	1999	0.11	2.47	0.00		0.00		0.14	0.71	0.00		0.00	
	2000	0.00		0.00		0.00		0.02	1.07	0.03	1.28	0.00	
	2001	0.44	0.53	2.66	1.21	0.00		10.94	0.54	0.05	0.87	0.00	
	2002	0.00		0.00		0.00		1.28	1.15	0.00		0.00	
	2003	4.44	2.70	0.14	0.71	0.00		1.52	1.73	0.00		0.00	
	2004	5.44	1.60	0.00		0.00		0.00		19.91	1.25	0.00	
	2005	7.11	0.42	0.07	2.60	0.15	0.62	0.12	1.27	0.00		0.00	
	2006	3.69	0.74	0.14	6.42	0.00		0.00		0.00		0.00	
	2007	1.44	3.17	0.15	0.43	0.00	0.53	0.00		0.44	0.77	0.00	
	2008	0.24	0.97	0.02	0.78	0.00		0.00		0.00		0.00	
	2009	0.12	1.58	0.05	0.99	0.00		1.35	2.36	0.00		0.00	
	2010	0.01	1.04	0.00	1.08	0.01	0.44	0.32	0.70	0.00		0.00	

Table A5: New England total annual incidental catch (mt) and the associated coefficient of variation by mesh category for bottom trawl and gillnet for each individual species. Herring NK represents unknown herring. Midwater trawl estimates are only included beginning in 2005.

		Bottom Trawl						Gillnet					
		Small mesh		Med. mesh		Large mesh		Small mesh		Large mesh		X-large mesh	
Species	**Year**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**
Alewife	1989	4.22	0.69	0.32	1.64	0.12	0.98	0.00		0.00		0	
	1990	11.91	1.91	0.00		43.36	0.69	0.00		0.00			
	1991	3.21	0.74	0.57	1.28	0.24	1.17	0.00		0.00		0.00	
	1992	1.16	0.62	0.00		0.76	0.64			0.00		0.00	
	1993	33.75	0.61	0.00		0.06	1.89			0.00		0.00	
	1994	0.00		0.00		0.08	1.56	0.00		0.00		0.00	
	1995	2.10	1.37	0.00		0.00		0.00		0.09	1.07	0.00	
	1996	38.37	0.39	0.00		0.00		0.00		1.31	1.02	0.00	
	1997	10.05	3.17	0.00		0.03	1.39	0.00		0.00		0.00	
	1998	80.88	1.47	0.00		0.00		0.00		0.00		0.00	
	1999	2.96	1.24	0.00		0.00		0.00		0.00		0.00	
	2000	20.30	0.88	0.00		0.00		0.00		0.00		0.00	
	2001	88.28	1.10	0.00		0.66	1.22	0.00		0.00		0.00	
	2002	1.16	0.80	0.00	2.33	0.04	0.88	0.00		0.00		0.00	
	2003	38.21	0.58	0.00		0.65	0.40	0.00		0.03	0.66	0.00	
	2004	21.02	0.60	0.00	0.88	0.28	0.35	0.00		0.04	0.55	0.00	
	2005	11.53	0.84	0.00	0.13	1.45	0.94	0.00		0.02	0.56	0.00	
	2006	15.68	0.52	0.00		0.18	0.50	0.00		0.00		0.00	
	2007	258.45	0.41	0.00		0.93	0.65	0.00		0.00		0.02	1.41
	2008	31.31	0.87	0.00		0.53	0.28	0.00		0.00		0.00	
	2009	27.75	0.57	0.00		3.52	0.65	0.00		0.01	0.63	0.00	
	2010	26.81	0.43	0.10	1.81	1.71	0.18	0.00		0.02	0.51	0.00	0.84
American Shad	1989	38.90	0.89	0.00		6.53	0.33	0.00		0.00		0.00	
	1990	2.95	0.56	0.00		15.91	0.51	0.00		0.00			
	1991	6.87	0.50	0.28	1.31	63.63	0.33	0.00		0.00		0.00	
	1992	6.87	0.58	0.00		49.67	0.42			0.00		0.00	
	1993	38.25	0.68	0.00		11.42	0.41			0.00		0.00	
	1994	18.89	0.66	0.12	0.69	3.86	0.43	0.00		1.12	0.88	0.00	
	1995	1.24	0.83	0.03	0.99	5.25	1.18	0.00		8.85	0.29	0.04	0.84
	1996	0.36	12.72	0.04	0.00	0.64	1.07	0.00		27.82	0.48	0.00	
	1997	2.10	4.25	0.00		11.58	0.68	0.00		4.86	0.46	0.15	1.04
	1998	12.95	0.32	0.00		4.03	4.93	0.00		7.21	0.49	0.98	0.91
	1999	0.10	1.24	0.00		0.83	0.70	0.00		4.75	0.86	1.40	1.15
	2000	0.00		0.00		1.50	1.20	0.00		4.13	0.52	0.12	0.95
	2001	0.84	1.27	0.05	0.66	1.08	0.54	0.00		0.07	1.66	0.00	

		Bottom Trawl						Gillnet					
		Small mesh		Med. mesh		Large mesh		Small mesh		Large mesh		X-large mesh	
Species	**Year**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**	**Catch**	**CV**
	2002	4.39	1.47	0.00		0.17	0.71	0.00		17.10	0.44	0.08	1.08
	2003	7.35	0.47	0.00	0.85	1.17	0.31	0.00		1.62	1.00	0.56	0.88
	2004	10.90	0.55	0.00	1.37	0.61	0.30	0.00		2.49	0.27	0.14	0.73
	2005	6.88	0.53	0.00	0.12	0.72	0.20	0.00		2.02	0.26	0.07	0.37
	2006	2.58	0.70	0.00	0.62	0.46	0.24	0.00		9.46	1.18	0.00	
	2007	0.75	0.49	0.00		0.70	0.26	0.00		27.86	0.52	0.00	
	2008	1.15	0.86	0.05	0.61	1.75	0.29	0.00		28.27	0.37	0.03	1.10
	2009	16.21	0.56	0.00		1.77	0.23	0.00		7.65	0.28	0.18	0.79
	2010	7.80	0.35	0.02	1.64	3.40	0.12	0.00		9.55	0.19	0.06	0.43
Blueback Herring	1989	4.58	0.72	0.00		3.62	0.89	0.00		0.00		0.00	
	1990	5.79	1.66	0.00		13.85	1.42	0.00		0.00			
	1991	57.20	0.58	0.01	0.93	0.05	0.75	0.00		0.00		0.00	
	1992	85.38	1.46	0.00		0.47	0.72			0.00		0.00	
	1993	96.08	0.61	0.00		0.64	0.59			0.00		0.00	
	1994	32.94	0.37	0.00		0.05	0.63	0.00		6.64	0.84	0.00	
	1995	58.98	0.83	0.00		0.09	0.48	0.00		104.57	0.71	0.00	
	1996	1.53	1.35	0.00		0.00		0.00		0.23	0.73	0.00	
	1997	51.49	4.66	0.00		0.07	1.41	0.00		0.00		0.00	
	1998	0.00		0.00		0.00		0.00		0.17	0.72	0.00	
	1999	199.81	0.61	0.00		6.74	1.83	0.00		0.00		0.00	
	2000	1.41	0.88	0.00		0.02	1.49	0.00		0.00		0.00	
	2001	41.48	1.00	0.00		0.03	0.97	0.00		0.00		0.00	
	2002	159.90	0.33	0.02	1.31	1.15	0.56	0.00		0.64	1.23	0.00	
	2003	272.92	0.62	0.12	0.46	5.97	0.35	0.00		0.01	0.96	0.00	1.36
	2004	49.61	0.60	0.02	0.80	4.47	0.53	0.00		1.77	0.71	0.06	0.54
	2005	14.73	0.75	0.02	0.16	1.01	0.38	0.00		0.23	0.80	0.00	0.90
	2006	2.55	1.01	0.12	0.77	0.48	0.40	0.00		0.00		0.00	
	2007	38.36	0.60	0.01	8.19	0.28	0.45	0.00		0.01	1.32	0.00	
	2008	13.47	0.85	0.00		0.26	0.41	0.00		0.02	1.31	0.00	
	2009	42.59	0.57	0.00		0.25	0.60	0.00		0.03	0.84	0.00	
	2010	8.59	0.46	0.07	0.48	1.13	0.41	0.00		0.07	0.39	0.00	
Herring NK	1989	6.83	1.07	0.00		0.25	1.00	0.00		0.00		0.00	
	1990	10.95	1.90	0.00		207.24	1.09	0.00		0.00			
	1991	21.44	1.35	6.35	0.87	0.64	1.07	0.00		0.00		0.00	
	1992	313.19	0.47	0.00		4.92	0.55			0.00		0.00	
	1993	9.70	0.81	0.00		5.05	0.66			0.00		0.00	
	1994	0.35	0.99	0.00		1.91	0.60	0.00		6.73	0.84	0.00	
	1995	44.36	1.69	0.00		0.60	0.40	0.00		3.69	0.59	0.00	
	1996	20.46	0.54	0.07	0.00	0.27	0.68	0.00		0.00		0.30	0.99

Species	Year	Bottom Trawl						Gillnet					
		Small mesh		Med. mesh		Large mesh		Small mesh		Large mesh		X-large mesh	
		Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV
	1997	61.89	4.64	5.20	0.62	0.38	0.77	0.00		0.04	1.02	0.04	2.28
	1998	0.00		0.00		0.18	1.27	0.00		0.00		0.00	
	1999	83.28	1.59	0.00		0.00		0.00		0.03	1.15	0.00	
	2000	14.31	0.70	0.00		0.44	1.48	0.00		0.00		0.00	
	2001	0.00		0.00		0.00		0.00		0.05	1.54	0.00	
	2002	73.95	1.91	0.00	0.77	0.35	0.73	0.00		0.00		0.00	
	2003	14.49	1.28	0.00		0.76	0.58	0.00		0.03	0.59	0.00	
	2004	9.24	0.64	0.00		0.22	0.59	0.00		0.02	0.60	0.00	1.16
	2005	2.97	1.34	0.01	0.12	0.23	0.29	0.00		0.16	0.55	0.01	0.90
	2006	57.15	1.50	0.05	0.63	0.33	0.57	0.00		1.98	0.56	0.27	0.99
	2007	72.27	2.94	0.00		0.15	0.51	0.00		0.00		0.00	
	2008	97.08	0.58	0.00		0.09	0.62	0.00		0.00		0.00	
	2009	14.70	1.51	0.00		0.30	0.39	0.00		0.63	0.62	0.00	
	2010	8.27	0.93	0.00		0.26	0.68	0.00		0.29	0.46	0.00	0.84
	1989	0.00		0.00		0.00		0.00		0.00		0.00	
	1990	0.00		0.00		0.00		0.00		0.00			
	1991	0.00		0.00		0.00		0.00		0.00		0.00	
	1992	0.00		0.00		0.00				0.00		0.00	
	1993	0.00		0.00		0.00				0.00		0.00	
	1994	0.00		0.00		0.10	0.63	0.00		0.00		0.00	
	1995	0.00		0.00		0.00		0.00		0.00		0.00	
	1996	17.26	1.24	0.00		0.00		0.00		0.00		0.00	
	1997	3.43	3.40	0.00		0.25	0.81	0.00		0.00		0.00	
	1998	38.40	1.48	0.00		0.00		0.00		0.00		0.00	
Hickory Shad	1999	4.40	0.70	0.00		0.00		0.00		0.00		0.00	
	2000	0.00		0.00		0.00	0.83	0.00		0.00		0.00	
	2001	66.32	0.45	0.00		0.20	0.76	0.00		0.00		0.00	
	2002	0.00		0.00		0.12	1.00	0.00		0.00		0.00	
	2003	2.53	1.05	0.00		0.06	0.93	0.00		0.25	0.48	0.01	0.84
	2004	7.98	0.79	0.00		0.06	0.39	0.00		0.04	0.84	0.00	
	2005	2.41	0.49	0.00	0.92	0.26	0.56	0.00		0.01	0.85	0.00	
	2006	9.19	1.14	0.00		0.13	0.32	0.00		0.02	1.88	0.02	1.05
	2007	1.74	0.43	0.00		0.24	0.36	0.00		0.28	1.33	0.00	
	2008	0.70	0.66	0.00		0.21	0.45	0.00		0.02	0.91	0.00	
	2009	1.88	0.83	0.02	0.30	0.15	0.35	0.00		0.17	0.61	0.00	
	2010	0.02	1.24	0.00		0.04	0.80	0.00		0.08	0.68	0.00	

Summary of September 20 Fishery Management Action Team (FMAT) meeting for

Amendment 14 to the

Atlantic Mackerel, Squid, and Butterfish (MSB) Fishery Management Plan.

Amendment 14 pertains to reducing the incidental catch of blueback herring, alewife, American shad and hickory shad in MSB fisheries. Amendment 14 also considers the larger question of optimal river herring and shad management. The following is a summary of the discussions of the Fishery Management Action Team (FMAT), at a September 20, 2011 meeting held by webinar, with respect to Amendment 14 Alternatives.

Attendees:

Didden, Jason (FMAT)	Rudolph, Tom
Ellis, Steven (FMAT)	deFur, Peter
Kelliher, Peter (FMAT)	Lyons Gromen, Pam
Hendrickson, Lisa (FMAT)	Stump, Kenneth
Curti, Kiersten (FMAT)	Cevoli, Kristen
Taylor, Kate (FMAT)	Pellegrino, Joanne
Richardson, Katie (FMAT)	Kaelin, Jeff
Stevenson, David (FMAT)	DiDomenico, Greg
Kitts, Drew (FMAT)	Paquette, Patrick
Szumylo, Aja (FMAT)	

Part I: J Didden first summarized the analysis conducted on catch of Atlantic (sea) herring, Atlantic mackerel, river herrings, and shads. From here on, RH/S = River Herrings/Shads

Incidental catch analysis (full summary found in working paper II)

Despite the fact that management is done by target species, the best way is to look at incidental catch is by discreet time, area, gear (including mesh size) strata. This avoids problems with the mixed/overlapping nature of the fisheries that incidentally catch RH/S. Considering incidental catch by a directed trip definition (e.g. 2,000 pounds of herring or 20,000 pounds of mackerel retained or landed) can confound data interpretation because: 1) fleets often overlap in catch/target; and 2) a vessel that fished for, but did not catch the targeted species could be missed. It should be noted that the observer program did not implement high-volume sampling protocols until 2005. For this reason, mid-water trawl estimates of incidental catch were only calculated from 2005 on. This also means that comparisons among all gear groups of such estimates can only be made from 2005 on.

Data sources included:

Northeast Fisheries Science Center (NEFSC) bottom trawl survey data

NEFSC Northeast Fishery Observer Program observer data

Vessel trip report data

Dealer landings data

Table 4 of Working Paper II summarizes estimated shad catch, by stratum, as a proportion of the total incidental catch during 2005-2010.

Overall by gear: Midwater Trawl (MWT): 42%; Large Mesh (5.5-8.0 in.) Gillnet: 27%; Small Mesh Bottom Trawl (SMBT): 26%

Overall by Area: Mid-Atlantic (M-A): 31%; New England (NE) 69%

By quarter: Quarter 4 NE MWT: 13%; Q1 M-A MWT: 12%; Q3 NE MWT: 8%; Q3 NE Gillnet: (8%)Q4 NE Gillnet: (8%) (50% of total catch from these 6 strata).

Table 5 of Working Paper II summarizes estimated river herring incidental catch, by stratum, as a proportion of the total incidental catch during 2005-2010:

Overall by gear group: Midwater Trawl (MWT): 76%; Small Mesh (<= 3.5 in.) Bottom Trawl (SMBT): 24%

Overall by Area: Mid-Atlantic (M-A): 44%; New England (NE) 56%

By quarter: Quarter 1 (Q1) M-A MWT: 35%; Q4 NE MWT: 16%; Q2 NE MWT: 11%; Q1 NE SMBT: 7%; Q3 NE MWT: 6%; Q3 NE SMBT: 5% (80% of total catch from these 6 strata).

When discards are subtracted from the incidental catch estimates, the amount of “kept catch” of Atlantic Herring, for 2005-2010, closely matches the landings values in the dealer database, generally validating the incidental catch estimation method. Comparisons for river herring and shad do not match in a similar fashion - this is not surprising given the reported discrepancies in reporting of landings of the four species.

River herring indices/distribution (full summary in working paper I)

Daytime relative abundance and biomass indices were calculated from NEFSC spring and fall bottom trawl survey data for blueback, alewife, and American Shad. Catches of hickory shad only occurred during some years and were too low to construct meaningful indices. It is important to note that the 2009-2011 indices were converted from Bigelow units to Albatross equivalents and uncertainties related to the conversion factor were not accounted for in the overall coefficient of variation (CV) calculations for those years.

Blueback: Fall CVs are very high and the percent of positive tows is low, making these indices less informative than the spring indices. Spring CVs are lower and the percent of positive tows is much higher. Fall relative abundance has been above the median since 2002 and the 2009 and 2010 indices were the highest of the time series. Spring relative abundance has been near or above the median since 2006.

Alewife: CV's are relatively low for Alewife with which also had a higher percentage of positive tows than Blueback. Fall relative abundance indices were generally below the median from 1975-2001and were above the median from 2002-2010.. The spring survey indices showed several periods of rises and falls: a decline during 1978-1990, increase during 1990-1999, decline again during 1999-2005, and increase during 2005-2010. Relative abundance indices for the fall of 2010 and spring of 2011 were the highest values in each of the time series.

American Shad: Survey indices were noisy with relatively high CVs and low percentages of occurrence, which made it difficult to discern any real trends in the indices.

It is difficult to interpret the NEAMAP (NorthEast Area Monitoring and Assessment Program) survey indices given the short time series. Also, because the survey covers a small portion of the entire survey area, it is not clear whether the indices are measuring overall relative abundance or migrations in and out of the survey area. Migrations could be in or out of estuarine or deeper waters compared to NEAMAP.

Maps indicating densities of each species from NEFSC spring and fall surveys, pooled by ten minute square, and across years, showed a wide distribution of RH/S and overlap of Atlantic Herring and Mackerel catches during both seasons.

Summary

Lack of status information: Catch of river herring appears higher than shad but given the lack of coast-wide productivity and biological reference points for these stocks, it is not possible to quantify the impacts of these incidental catches on stock status. This makes the impact analysis of alternatives extremely uncertain.

Overlap in managed/directed fisheries: Analysis of Atlantic herring and Atlantic mackerel landings suggests strong overlap between the two in terms of gear/mesh/area, especially in Q1 in the Mid-Atlantic.

Spatial-Temporal RH/S catch variability (observer data): GIS analyses of effort and incidental catch rates of river herring and shad combined, by gear group, suggest that while there are some areas that appear to have high catch rates of RH/S and low effort, incidental catch rates were generally highest in the areas where fishing effort was highest. The GIS analyses also indicated that areas with high incidental catch rates during one time period may not show the same pattern in another time period.

Spatial-Temporal Effort and Directed Catch Variability: Analysis of the spatial distribution of effort by paired midwater trawls showed substantial variation among years. Analysis of the spatial distribution of mackerel catches also showed substantial variation when looking at one month to the next or the same month across years.

Spatial-Temporal catch variability in the Northeast Science Center Bottom Trawl RH/S: The results of earlier analyses showing substantial year-to-year variability in trawl survey catches of RH/S were noted. The sizes and locations of standard deviational ellipses that defined the core distributions of each species indicated a high degree of inter-annual variability during both spring and fall.

PART II: Recommendations on Management Measures

1. Vessel Reporting

After further review of the potential biological and economic benefits of additional port-side sampling versus additional at-sea sampling, the FMAT recommends that a port-side program for sampling of the landings (i.e. landed weight by species) be resurrected into the DEIS. This would be structured as a 3rd party provider type program. NMFS has stated on the record that NMFS cannot furnish funding for new programs. Staff will create alternatives to cover funding options.

FMAT recommends making VTR submissions be required on a weekly basis throughout all MSB fisheries for general consistency purposes. There is a lot of overlap between permit holders for mackerel, Illex and Loligo/butterfish and most Illex permit holders will have to report weekly for other permits in the near future (especially if the Loligo and mackerel permit holders have weekly reporting requirements added through this Amendment). FMAT suggests Council include as a Preferred Alternative.

FMAT recommends deleting 48 hour pre-trip notification because the NEFSC observer program still needs 72 hours for observer placement. Notification should be preferred if a bycatch cap is preferred.

FMAT reaffirmed that VMS could be useful if area-based management is used but probably not worth the cost otherwise (though there would be some benefits for assessments and/or fleet communications to avoid river herring).

2. Dealer reporting.

2b: The FMAT acknowledged the benefits of vessels confirming dealer data, and more importantly, for additional enforcement of the current requirement for dealers to obtain VTR serial numbers from vessel captains to link the dealer and VTR data for each trip. This kind of cross-checking would need to be catalogued for quality assurance. The Regional Office's Fish-On-Line allows vessels to cross-check their landings, but is not currently mandatory, and not all vessels may have regular internet access. Changing VTR forms is cumbersome. As discussed above, alternatives for port-side sampling, by NMFS-certified samplers, to quantify dealer purchases of landings by species (potentially dealer discards also) should also be included in the DEIS (across MSB fisheries).

FMAT recommends removing the sort and weigh all fish alternative (2c1/2d1). Sorting all fish for all dealers is not currently practicable.

FMAT suggests that the other Alternatives (regarding weighing all fish) in Alternative Set 2 be included in the DEIS, but it is probably not necessary to identify preferred alternatives at this point within this alternative set.

3. Observer Optimization.

FMAT recommends 3b (reasonable assistance) and 3c (pumping/haul-back notification to observers) as preferred alternatives.

While the FMAT was unable to come to consensus on the issue of always placing observers on pair-trawl operations, J Didden checked with observer program regarding placement of observers on paired-vessels. The observer program is already placing observers on both vessels unless one vessel is only going to be operating as a "wing boat" (not taking on any fish) so this issue appears to already have been dealt with by the observer program.

FMAT recommends removing 3f and 3g (pumping a certain portion of a haul to avoid a "slipped haul designation) because they are unfeasible and/or unenforceable. J Didden confirmed with observer program that these appear very problematic from their perspective.

Regarding operational discards (OD), which for midwater trawlers are fish stuck in the net that can't be pumped into the hold, there is concern that we are dealing with minutia. The observer program staff has quantified OD for declared midwater trawl Atlantic herring trips during 2010 and found that they averaged 10.6% of the total discards of all species by weight (discards brought on board as well as discards not brought on board). Given the probable small benefit, FMAT was leaning toward dropping but additional information on operational discards will be included in analysis. Follow-up with observer program revealed that operational discards are now usually being brought onto the vessel and sampled in most cases on observed trips and vessels have been overall cooperative in this regard.

Regarding trip termination due to slippage, add option where vessels have an individual quota of slippage events.

4. Dockside Monitoring

4b (3rd party landings weight verification) - FMAT suggests wrapping these into the "to be added" portside sampling alternatives (hiring of 3rd party certified sampler to obtain the following trip information: VTR serial number, permit number, vessel gear type, and to subsample landings and dealer discards by species, then scale them up to the trip level and give total landings and discard information.

4c (volumetric vessel-hold certifications for Tier 3 mackerel and Loligo moratorium permits) - good to have in DEIS, but not necessarily a Preferred Alternative

4d (Sustainable Fisheries Coalition bycatch avoidance project) - Given just involves a commitment to review, fine to identify as a Preferred Alternative.

5. At-sea observer coverage options

FMAT suggests adding 75% to fill out range.

FMAT has not yet been able to determine which coverage levels would result in various levels of precision. FMAT will try to have this for the October meeting. However, predicted coverage levels are based on the assumption that fishing effort and catch variability patterns for each fleet during the previous 12-month period are indicative of future patterns. To the extent that changes occur, predicted CVs may or may not be realized. For MWT herring limited access vessels in Southern New England, Amendment 5 analyses suggested that a 25% coverage level would result in a C.V. around 0.4-0.5, a 50% coverage level would result in a C.V around 0.2-0.3, and a 75% level of coverage would result in a C.V. around 0.2. These values are for river herring bycatch estimates.

FMAT recommended splitting alternatives out by gear type - as long as bottom trawl appears lower than mid-water trawl it might not need as much coverage.

The DEIS will note NERO concerns about any phase-in of industry funding (even the first years would need to be industry-funded to pay for additional coverage for this to be viable).

6. Caps

Probably should have a fleet-area cap (e.g., midwater trawls in New England) rather than using the regulatory definition of a "Mackerel" or "Herring" trip to define vessels that are subject to the cap. In other words, the greatest amount of impact on RH/S bycatch reduction would come from the implementation of a joint cap on both the herring & mackerel fleets. If one instituted just a cap on the mackerel fleets, one of two things would happen if the mackerel fishery was closed due to reaching the cap:

One possibility: mackerel fishery closes and the exact same fleet continues fishing in the exact same place (Mid-Atlantic Q1) and just retains the Atlantic herring catches and discards mackerel. Since catch per unit effort of the combined species would go down, overall effort could go up.

Other possibility: Q1 catches of mackerel and Atlantic herring in the Mid-Atlantic are so mixed that closing mackerel would effectively close herring.

FMAT discussed whether to remove alternatives to have a bycatch cap on shad since shad incidental catches are much lower than river herring catches, and since shad landings appear much higher than the incidental catches in the gear types examined. The FMAT also discussed the possibility of a catch cap that included all four species. No consensus was reached.

FMAT noted that setting the cap would be problematic as river herring would probably be a "data poor" stock w/o approved biological reference points.

7. Area-Based Management

FMAT recommended removing all mesh-based Alternatives because of a lack of selectivity information for both the target species and for RH/S in trawl fisheries. (make these alternatives considered but rejected)

FMAT noted that for other kinds of area-based management, if you eliminate effort in one area, you need to make sure that the effort is not merely displaced to another area with medium or high densities of RH/S and that large losses of the target species do not occur as a result of the closed area. Otherwise the fishery may just increase effort to make up the difference and you may end up killing more RH/S than in the status-quo case.

So the question then becomes can one quantify what would happen to the target and bycatch species if effort is shifted because of a closed area. The results of analyses to-date (spatial-temporal effort variability, spatial-temporal directed catch variability, spatial-temporal RH/S catch variability (observer data), and spatial-temporal catch variability of RH/S in the NEFSC spring and fall bottom trawl surveys, all suggest that it is not currently possible to determine whether any small closed area would lead to LESS, the SAME, OR MORE RH/S catch. To implement area-based management, a very large area would need to be used, and it would need to also encompass different areas seasonally to incorporate the herring fishery to be effective, to know that positive impacts resulted for RH/S (probably not practicable for closing an area if also trying to maintain some portion of the mackerel fishery). Area-based management (large areas) could be useful for fine-tuning observer coverage. Though again, if coverage is required in a small area and effort is displaced, it is not currently possible to determine whether any small closed area would lead to LESS, the SAME, OR MORE RH/S catch.

FMAT recommends removing Herring Amendment 5 small area management alternativea for same reasons as above as they may do more harm than good.

8. Mesh-based management

FMAT recommends removing all mesh-based alternatives because of a lack of selectivity information for both the target species and for RH/S in trawl fisheries.

9. Stock in the fishery alternatives.

There have been two primary outstanding issues beyond previous discussions (which will be incorporated into DEIS).

a. Could you add as a stock in the fishery but use ACL/AM flexibility provisions to defer to ASMFC for primary management as the NPFMC is considering for salmon and deferring to Alaska? There are several key differences however, that become evident when reviewing analysis for updating the NPFMC's salmon plan (http://www.fakr.noaa.gov/npfmc/). First, Alaska has a long history of well-documented successful/sustainable management with Salmon. Second, it appears that even in terms of just knowing how much is caught, the salmon situation is different in that RH/S landings and certainly catch (including discards) appear not as well documented (especially at the species level). ASMFC moratoriums will likely address most of the landings but not discards. Given these issues, and given that the ACL flexibility guidelines still require consistency with Magnuson (which the FMAT interprets to mean that alternatives to ACLs/AMs must achieve the same results), it would not appear that the Council could add RH/S as a stock in the fishery and then defer responsibility to cap mortality to the ASMFC at the current time.

b. How could complementary management measures work? In general, if there was a state retention prohibition (like Virginia will have as of January 1, 2012) across the states then ASMFC could request similar measures for Federal Waters. Note: Virginia's prohibition will also apply to vessels transiting state waters after fishing in the EEZ. The ASMFC could request complimentary management measures regardless of Council actions.

Appendix 4 Overlap Between Amendment 14 to the Squid/Mackerel/Butterfish FMP (MAFMC) and Amendment 5 to the Herring FMP (NEFMC)

RESTRICTIONS IN AREAS OF HIGH RH/S CATCH

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5 (alternative and description)	Consistency Issues
Closed area alternatives	• 7bMack: Q1 prohibition on retention of more than 20,000 lb mackerel in management area • 7bLong: Full year prohibition on retention of more than 2,500 lb longfin in management area • 8eMack: Possession over 20,000 lb mackerel prohibited in Am5 Protection Areas (bimonthly closures) • 8eLong: Possession over 2,500 lb longfin prohibited in Am5 Protection Areas (bimonthly closures)	• Section 3.3.3.2.1, bimonthly closure areas	• Confusing for industry if different action alternatives are selected in each plan • If different approaches are selected, benefits to river herring may be diminished
Observers required in management areas	• 7cMack: required to possesses over 20,000 lb mackerel; industry funded • 7cLong: required to possess over 2,500 lb longfin; industry funded • 8cMack: Same monitoring/avoidance areas as Am 5; required to possess over 20,000 lb mackerel • 8cLong: Same monitoring/avoidance areas as Am 5; required to possess over 2,400 lb longfin	• Section 3.3.2.2.1, with sub-options to apply this provision either to just limited access permits (A) or all permits (B)	
Closed Area I Provisions	• 8dMack: in Am 5 monitoring/avoidance areas • 8dLong: in Am 5 monitoring/avoidance areas	• Section 3.3.2.2.2, with sub-options to apply this provision either to just limited access permits (A) or all permits (B)	
Above requirements with mortality trigger	• 7d for Alt Set 7 • 8f for Alt Set 8	• Section 3.3.2.2.3 for observer coverage or Closed Area I provisions • Section 3.3.3.2.2 for closed areas	
Formally review results of SFC bycatch avoidance program, and possibly incorporate by framework	• 4f	• Section 3.3.2.2.4	
Mechanism to adjust areas (specifications)	• 7e: bi-annually	• Section 3.3.4: every 3 years or during interim years through a revised specs package	

VESSEL REPORTING MEASURES

Measure	MSB Amendment 14	Herring Amendment 5 (*existing requirements in italics*)	Consistency Issues
Weekly VTR	• 1bMack: All mackerel permits • 1bLong: Longfin/butterfish moratorium permit • 1c: all MSB permits	• *Existing: Weekly VTR requirement for all herring permits recently implemented by NMFS (76 FR 54385; September 1, 2011)*	NONE
Pre-trip notification to observer program	• 1d48: 48 hr prior to trip for mackerel permits • 1d72: 72 hr prior to trip for mackerel permits	• *Existing: 72-hr requirement for Cat A/B permits on declared herring trip with midwater trawl /purse seine gear* • *Existing: 72-hr requirement for Cat C/D permits using midwater trawl gear in Areas 1A, 1B, or 3 (NE Multispecies FW 46)* • Section 3.1.4.2: 48-hr requirement for all limited access herring permits and herring carrier LOAs	• Need to ensure that third-party providers could handle a 48 hr notification (could just be one of requirements to apply • Should have the same pre-trip notification times within an FMP --For Herring, Am 5 – the option for a 48 hr requirement is different than that put in place in FW 46 --For MSB, there is a 72 hr notification for longfin already; may be good to be consistent • Vessels often target mackerel and herring on the same trip, best for industry and enforcement if requirements are the same
VMS requirement	• 1eMack: Limited access mackerel permits • 1eLong: Longfin/butterfish moratorium permits	• *Existing: VMS already required for limited access herring permits* • *Existing: VMS trip declaration required for limited access herring permits* • Section 3.1.4.2: Gear declaration for all limited access herring permits	
VMS catch reporting	• 1fMack: Daily for limited access mackerel vessels • 1fLong: Daily for Longfin/butterfish moratorium permits	• *Existing: Daily VMS requirement for all limited access herring permits recently implemented by NMFS (76 FR 54385; September 1, 2011)*	
Pre-landing notification	• 1gMack: 6-hr pre-land via VMS to land over 20,000 lb mackerel • 1gLong: 6-hr pre-land via VMS to land over 2,500 lb longfin	• *Existing: 6-hr pre-landing requirement for Cat A/B permits on declared herring trip with midwater trawl /purse seine gear* • *Existing: 6-hr requirement for Cat C permits using midwater trawl gear in Areas 1A, 1B, or 3 (NE Multispecies FW 46)* • Section 3.1.4.3: 6-hr requirement for all limited access herring permits and herring carrier LOAs	

DEALER REPORTING MEASURES

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5 (alternative number and description)	Consistency Issues
SAFIS dealer and vessel counter- signature	• 2b: Landings over 20,000 lb mackerel; 2,500 lb longfin; or 10,000 lb *Illex*	• Section 3.1.5.2, Sub-Option 2C: All herring landings	If action alternatives are selected, it is probably most convenient for mackerel/herring vessels and dealers if the requirements are the same for all 3 species.
Dealers must weigh all fish, and document estimation of relative composition annually on dealer application if not sorted	• 2c: over 20,000 lb mackerel • 2e: over 2,500 lb longfin	• Section 3.1.5.2, Sub-Option 2A: All herring landings	
Dealers must weigh all fish, and document estimation of relative composition at each transaction if not sorted	• 2d: over 20,000 lb mackerel • 2f: over 2,500 lb longfin	• Section 3.1.5.2, Sub-Option 2B: All herring landings	
Allow volume to weight conversions	• 2g: allow volume to weight conversions if dealers cannot weigh catch	• Section 3.1.5.2, Sub-Options 2A and 2B: Neither of these alternatives exclude the use of volume to weight conversions	

AT-SEA OBSERVER OPTIMIZATION MEASURES

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5 (alternative number and description)	Consistency Issues
Safe Sampling Station	• 3b	• Section 3.2.2.2, Sub-Option 2A	Most convenient for observers in high volume fisheries if the same action items are selected in both plans
Reasonable Assistance	• 3b	• Section 3.2.2.2, Sub-Option 2B	
Haul back notice to observers	• 3c	• Section 3.2.2.2, Sub-Option 2C	
Observers on any vessel taking on fish whenever and wherever possible	• 3d	• Section 3.2.2.2, Sub-Option 2D	
Pair Trawl Communication	NONE	• Section 3.2.2.2, Sub-Option 2E	
Visual Access to Codend	• Included in 3f and 3g	• Section 3.2.2.2, Sub-Option 2F	

AT-SEA OBSERVER OPTIMIZATION MEASURES

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5 (alternative number and description)	Consistency Issues
Slippage reports/affidavit from vessel operator	• 3e	• Section 3.2.3.2	If plans select incompatible measures from this range, vessels targeting both mackerel and herring could end up with a complicated layering of rules that could apply on the same trip.
Vessels with observers prohibited from releasing discards before they a brought aboard for sampling	• 3f: mackerel vessels • 3g: longfin vessels	NONE	
Trip termination following slippage on observed trip	• 3h: after 1 slipped haul • 3i: after 2 slipped hauls	• Section 3.2.3.4, Option4A	
Closed Area I Provisions	• 3j: No trip termination	• Section 3.2.3.3	
Closed Area I Provisions with Trip Termination	• 3k: mackerel vessels, may be selected with 3j; trip termination for every observed slippage event after 5 events • 3l: mackerel vessels, same as 3k but after 10 events • 3m: Same as 3k but for longfin vessels • 3n: Same as 3l but for longfin vessels	• Section 3.2.3.4, Option 4C; after 10 events • Section 3.2.3.4, Option 4D; after 5 events	
Closed Area I Provisions with Trip Termination and Catch Deduction	NONE	• Section 3.2.3.4, Option 4B; assumed that 100,000 lb herring caught in each slipped haul, catch deducted from area sub-ACL	
Annual slippage quota for individual vessels	• 3p: mackerel/longfin vessels assigned annual slippage quota; trip termination on every slippage event after quota attained.	NONE	

AT-SEA OBSERVER COVERAGE REQUIREMENTS

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5	Consistency Issues
Percentage based	• 5b: Mackerel MWT; 25%, 50%, 75%, and 100% options • 5c: Mackerel SMBT; 25%, 50%, 75%, and 100% options • 5d: Longfin SMBT; 25%, 50%, 75%, and 100% options	• Section 3.2.1.2, only 100%	• If the preferred coverage rates are different for mackerel and herring, there may be difficulties for the observer program • Administration for industry funding for mixed mackerel/herring trips will need to be developed
Coverage levels to achieve target CVs	• 5e1: CV below 0.3 for RH species for MWT • 5e2: CV below 0.2 for RH species for MWT • 5e3: CV below 0.3 for RH species for SMBT • 5e4: CV below 0.2 for RH species for SMBT	• Section 3.2.1.4: CV below 0.2 for river herring, and below 0.3 for Atlantic herring and haddock	
Modified SBRM	NONE	• Section 3.2.1.3	
Funding alternatives	• 5f: Vessels pay for observers greater than existing sea day allocation • 5g: Phase-in industry funding over 4 yrs., NMFS would pay for 100%, then 75%, 50%, 25%	• Funding options (Federal or Federal and Industry) are specified within above alternatives	

MEASURES TO ADDRESS PORTSIDE SAMPLING

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5 (alternative number and description)	Consistency Issues
Industry-funded 3rd party port-side sampling program	• 4b: landings over 20,000 lb mackerel • 4c: Landings over 2,500 lb longfin	NONE	NONE
Vessel hold volume certification	• 4d: Tier 3 mackerel • 4e: Longfin/Butterfish moratorium	NONE	NONE

RIVER HERRING CATCH CAPS

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5 (alternative number and description)	Consistency Issues
Mortality Caps	• 6b: River herring for the mackerel fishery • 6c: Shads for the mackerel fishery • 6d: River herring for the longfin fishery • 6e: Shads for the longfin fishery	• Section 3.3.5: Mechanism to establish River herring catch caps through Framework adjustment or specifications package in the future after a RH stock assessment is completed	If Atlantic herring fishing continues during a mackerel closure, the fleet could continue to catch river herring in the same location while discarding mackerel. Benefits to river herring may be diminished.
Caps added through a future framework	• 6f	• Section 3.3.5: River herring (same as above)	None

ADD RH/S AS STOCKS IN THE FISHERY

Measure	MSB Amendment 14 (alternative number and description)	Herring Amendment 5 (alternative and description)	Consistency Issues
Add as stock in MSB fishery, would confer full Magnuson-Stevens benefits, i.e. ACLs/AMs and EFH	• 9a: blueback • 9b: alewife • 9c: American shad • 9d: hickory shad	NONE	NONE

Appendix 5: Northeast Fishery Science Center Report on Slippage and FISH, NK usage.

(Borrowed from NEFMC Herring Amendment 5)

5.3.2.1 Analysis of Available Slippage Data

This section provides a summary and technical assessment of available information collected by observers at the NEFOP about ***Released Catch/Catch Not Brought on Board***.

Data on slippage events need to be collected in a more consistent manner, and this amendment provides an opportunity to implement the necessary elements of a catch monitoring program to do so. Originally, the Northeast Fisheries Observer Program was not designed to sample high-volume fisheries for species composition and/or collect detailed information about released catch events and net slippage, but this is a need that has arisen in recent years and something that continues to be addressed in the observer sampling protocol, added to observer logs, and addressed through provisions requiring detailed information when slippage events occur. The NEFOP has taken significant steps to improve the collection of this information since before the Council began the development of Amendment 5. Analyses of available slippage data collected by observers over recent years confirms that (1) information about these events and the amount and composition of fish that are slipped has improved; and (2) the number of full/partial slippage events occurring on limited access herring vessels has declined.

Observer Coverage Levels

Table 144 summarizes coverage rates from the NEFSC Observer Program for the 2007-2010 calendar years (also the herring fishing years) by gear type for all trips that landed greater than 2,000 pounds of Atlantic herring. 2008, 2009, and 2010 have seen relatively high levels of coverage across all major gear types in the fishery. Summary coverage rates based on the number of trips observed as a percentage of the number of trips taken are 4.1% in 2007, 14.8% in 2008, 20.6% in 2009, and 31.7% in 2010. During the 2010 fishing year (regardless of trip type), the Northeast Fisheries Observer Program covered trips for about 46% of all Atlantic herring landings.

Table 144 Observer Program Coverage Rates for Trips Landing Greater than 2,000 pounds of Herring, 2007-2010

Year	Gear Type	Total Trips	Total Days	Total Herring Landed (lbs.)	Obs Trips	Obs Days	Obs Herring Kept (lbs.)	% trips obs	% days obs	% herring obs
2007	OTF	397	569	10,518,575	12	15	411,751	3%	3%	4%
2007	OTM	138	451	17,491,210	10	40	1,918,285	7%	9%	11%
2007	PTM	240	849	74,405,385	14	58	6,880,147	6%	7%	9%
2007	PUR	346	743	70,088,194	10	23	2,122,267	3%	3%	3%
2008	OTF	100	234	4,588,190	4	4	70,409	4%	2%	2%
2008	OTM	28	107	8,816,600	16	59	3,163,763	57%	55%	36%
2008	PTM	269	1044	110,453,766	46	176	27,211,668	17%	17%	25%
2008	PUR	232	550	59,211,542	27	64	6,941,134	12%	12%	12%
2009	OTF	180	306	9,647,215	11	15	554,579	6%	5%	6%
2009	OTM	50	242	13,875,075	16	69	3,747,316	32%	29%	27%
2009	PTM	356	1321	153,345,903	98	350	49,596,367	28%	26%	32%
2009	PUR	223	596	49,706,514	42	130	9,943,521	19%	22%	20%
2010	OTF	185	343	8,452,546	9	22	298,691	5%	6%	4%
2010	OTM	58	230	19,851,018	32	122	10,190,452	55%	53%	51%
2010	PTM	290	1129	98,165,321	128	545	47,528,352	44%	48%	48%

OTF – small mesh bottom trawl; OTM – single midwater trawl; PTM – paired midwater trawl; PUR – purse seine
Herring is Atl Herring or Unk Herring
Day defined as (date land - date sail) + 1
Landings data from Vessel Trip Reports

A closer look at observer coverage for the primary gear types in the herring fishery show that coverage rates have been relatively high for the most recent years. Table 145 summarizes observer coverage levels for 2009 by gear type, based on number of trips and number of sea days corresponding with landings from the VTR, Dealer, and IVR databases. **All observed trips for these gear types** (SMW = single midwater trawl, PMW = paired midwater trawl, and PS = purse seine) are included in Table 145 *regardless of target species or pounds of herring landed*. The totals also include trips covered by two or more observers (i.e., pair trawl trips, trips with catcher/carriers). Overall, coverage across the vessels using the primary gear types in the herring fishery was greater than 20% in 2009 and averaged close to 30% based on herring landings.

Table 145 Summary of NEFOP Observer Coverage Levels by Gear Type, January – December 2009

	# trips				# sea days				Metric tons of herring landed
	SMW	**PMW**	**PS**	**Total**	**SMW**	**PMW**	**PS**	**Total**	**Total**
OBS	18	138	53	209	74	473	162	709	28,938
VTR	78	489	222	789	352	1844	591	2787	106,301
Dealer									101,025
IVR									102,617
% coverage	**23%**	**28%**	**24%**	**26%**	**21%**	**26%**	**27%**	**25%**	**27% (VTR)** **29% (Dealer)** **28% (IVR)**

A detailed assessment of observer coverage rates based on limited access herring permit category further confirms that the NEFOP has been covering the vessels managed by the Herring FMP and subject to the Amendment 5 provisions at relatively high levels in recent years. Table 146 summarizes observer coverage by the NEFOP for 2009 and 2010 collectively (combined). The total percent coverage based on the weight of herring landed was 33%; compared to the coverage rates in prior years, coverage for midwater trawls and purse seine vessels has never been as high.

Table 146 Observer Program Coverage Rates for 2009-2010, by Gear and Permit Category

Permit	Gear	Total Trips	Total Days	Trips w/ Herring	Total Herring Landed (000's of pounds)	Obs Trips	Obs Days	Observed Herring Kept (000's of pounds)	% Trips Obs	% Days Obs	% Herring Obs
A	Pair Trawl	882	3,382	683	250,685	329	1,250	96,696	37%	37%	39%
A/B	Single Trawl	123	530	108	33,726	54	211	13,918	44%	40%	41%
A	Purse Seine	398	1,086	362	66,752	101	290	11,794	25%	27%	18%
A	Bottom Trawl	1,020	4,344	118	12,202	119	713	482	12%	16%	4%
B/C	Bottom Trawl	5,278	11,262	409	5,710	465	1,068	356	9%	9%	6%
D	Bottom Trawl	36,511	83,639	657	454	2,609	9,386	25	7%	11%	6%

2008/2009 Slippage Information

***It is important to note that 2008/2009 slippage information is not directly comparable to 2010 slippage information due to increased observer coverage, changes to observer protocols, and implementation of the observer discard log in 2010. While the 2008/2009 information is useful to generally characterize the nature/extent of slippage in the fishery, it is not a complete record of slippage events observed during these years (unlike 2010); 2010 slippage data has been determined by the Herring PDT to be more complete and more reliable.**

Table 147 provides some information about released catch in the herring fishery based on observed trips during 2008 and 2009 where slippage events occurred and details were provided by the vessel captain/operator. In general, released catch includes operational discards (fish sill in gear after pumping is completed), partial slippage (some fish pumped), full slippage (no fish pumped), and gear damage. Partial/full slippage accounted for about 1.5% of total observed catch in 2008 and 2009 (total observed catch – 120,932,721 pounds). When operational discards were observed during 2008 and 2009, comments indicated fish "were left in net after pumping" or "fell out of gear when pumps were switched." Operational discarding events represent the smallest amounts of released catch (see Figure 80). Partial slippage events included comments like "vessel capacity filled," "too many dogfish," "poor quality haul," "pump jammed by dogfish," and "captain did not like the mackerel:herring ratio." Full slippage events included comments like "herring too small," "too many dogfish," "not enough to be worth pumping," and "undesired catch, thought he set on herring" (Figure 81 and Figure 82).

For the 2008/2009 data, NEFOP staff examined the data by hand to investigate and summarize comments that were provided about slippage events. Sampling protocols in 2008/2009 did not include comprehensive and detailed documentation of slippage events, so there were events for which no comments were provided. The data in Table 147 and Figure 80 – Figure 83, therefore, do not represent all slippage events that were observed, but rather just the events for which additional information was provided by the captain. This is no longer the case, as the NEFOP discard log implemented in 2010, as well as observer re-training for high-volume fisheries sampling, has produced clearer protocols for observers and allowed for detailed information to be collected about all slippage events that are observed in the fishery (see additional 2010 information below).

Table 147 Frequency of Released Catch Events 2008/2009

year	month	# hauls covered	kept lbs observed	# hauls w/ released catch	estimated lbs released
2008	Jan	18	822,447	0	
2008	Feb	13	2,621,846	0	
2008	Mar	17	2,184,187	5	17,000
2008	Apr	7	1,890,207	0	
2008	May	21	4,884,872	1	20,000
2008	Jun	27	2,560,004	2	280
2008	Jul	34	3,712,098	5	250,600
2008	Aug	14	2,626,778	0	
2008	Sep	5	110,020	1	200
2008	Oct	40	6,617,020	6	18,740
2008	Nov	24	5,181,209	2	130
2008	Dec	18	4,794,028	4	25,400
2009	Jan	38	7,432,979	2	10,201
2009	Feb	28	2,782,767	6	175,950
2009	Mar	16	1,958,569	2	226,000
2009	Apr	17	3,585,031	3	300
2009	May	33	3,711,450	10	107,675
2009	Jun	35	2,339,028	22	28,595
2009	Jul	43	5,773,521	23	181,580
2009	Aug	36	3,040,099	15	81,650
2009	Sep	85	17,204,553	27	402,117
2009	Oct	64	10,046,838	20	214,400
2009	Nov	67	11,730,652	34	938,215
2009	Dec	11	131,920	2	6,025

Figure 80, Figure 81, and Figure 82 summarize the comments that NEFOP observers received from vessel captains regarding released catch events in 2008 and 2009. During these years, the estimates of the amount of released catch were most often provided by the captains. These figures only summarize events for which comments were provided by the captain; providing these details is voluntary, and while cooperation between the industry and observers has always been good, additional details were not required, and observers did not ask as many questions about the released catch until the implementation of the discard log in 2010. Based on comments received for some of the events that occurred in 2008 and 2009, operational discards and gear damage accounted for 55% of the released catch events, but represented a much smaller fraction of the total estimated weight of released catch (less than 6%). The estimated weight of partial slippage events (events for which captains provided an estimate) in 2008/2009 averaged 45,175 pounds, and the estimated weight of full slippage events (when comments were provided) averaged 27,581 pounds (Figure 80 and Figure 81).

Figure 80 Analysis of Comments Regarding Released Catch 2008/2009

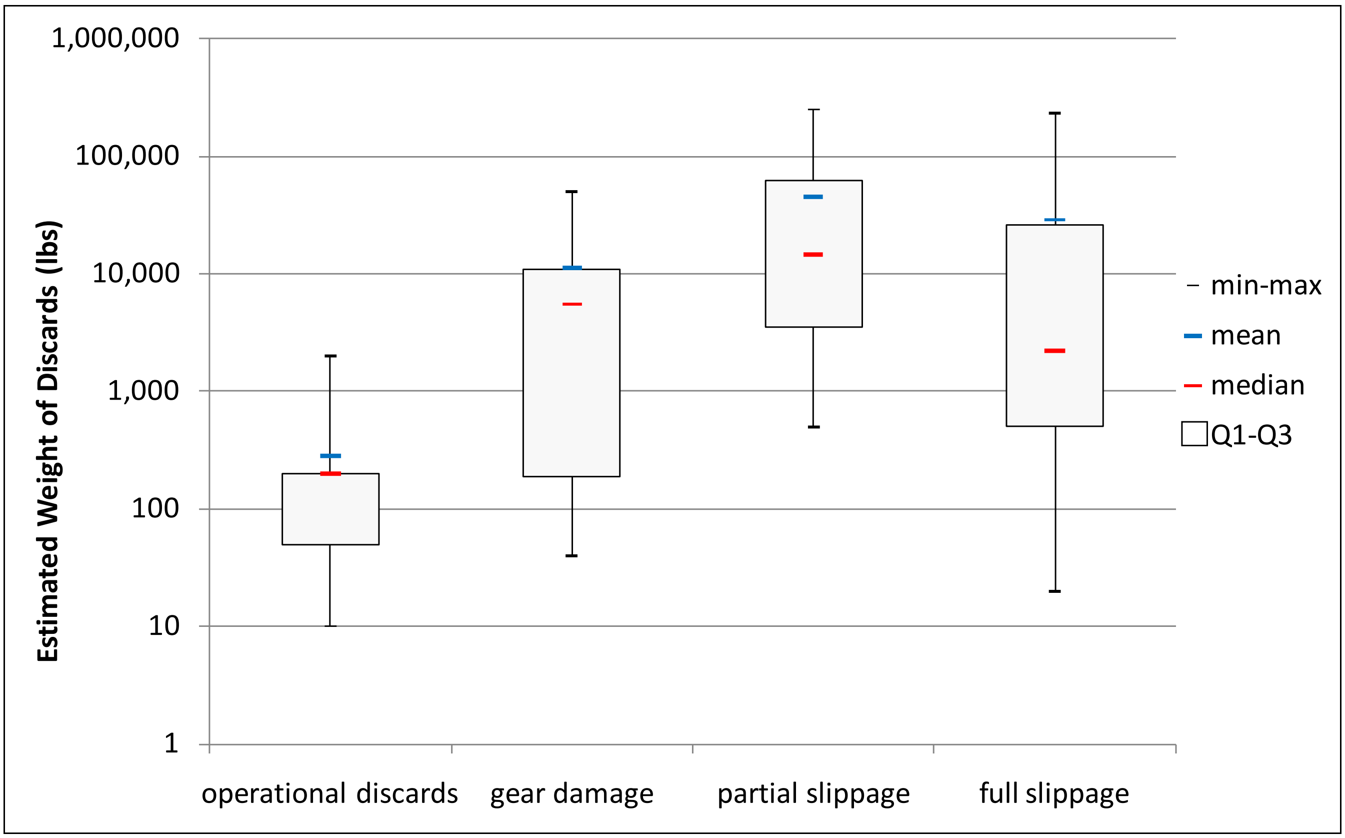
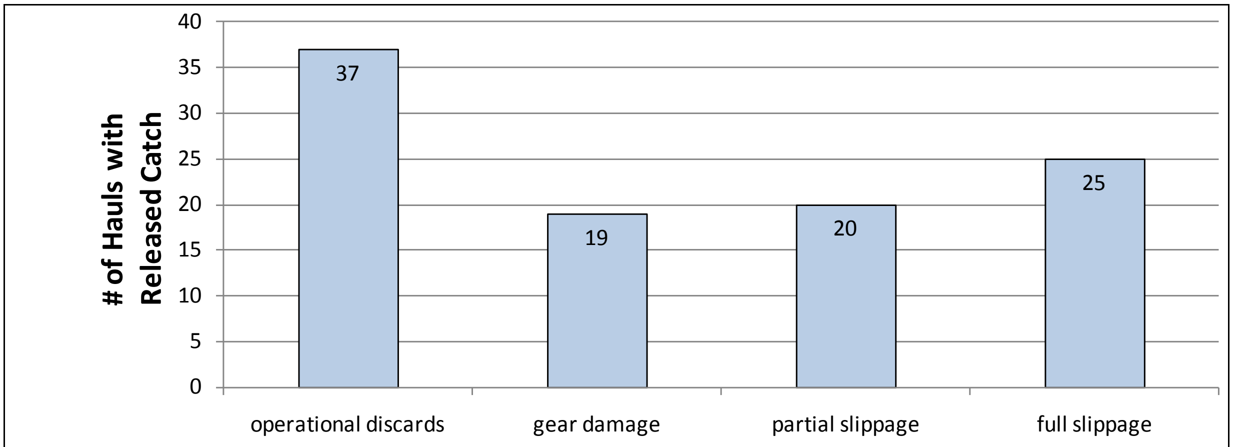


Figure 81 Analysis of Comments Regarding Released Catch 2008/2009 (continued)



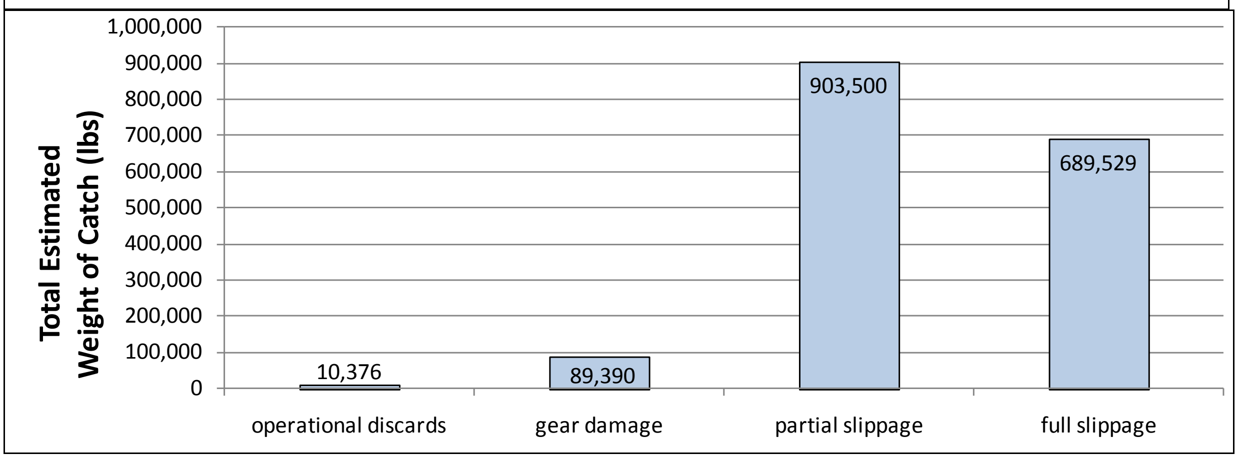
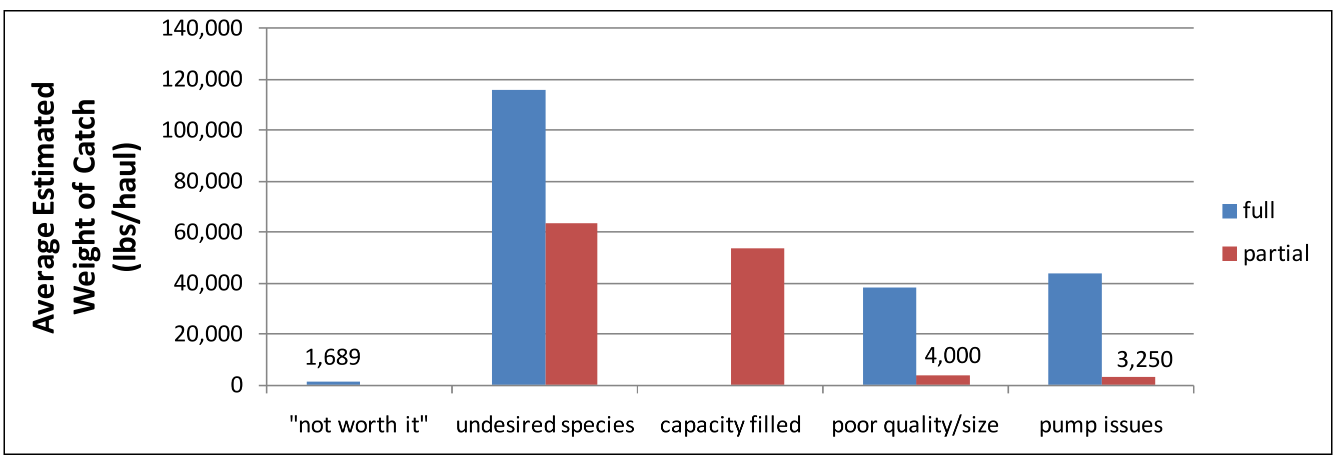


Figure 82 Information About Full and Partial Slippage Events 2008/2009



Slippage information collected by observers in 2008 and 2009 was also examined to identify similarities/differences between events occurring on vessels using different gear types (Figure 83). The information provided in 2008 and 2009 suggests that purse seine vessels may experience more released catch events as a result of operational discards and/or gear damage than midwater trawl vessels. Purse seine vessels fish almost exclusively in the inshore Gulf of Maine (Area 1A), and the nature of the gear and the operation of the fishery may result in more instances of operational discards and/or gear damage. This is an important consideration relative to management measures that would require purse seine vessels to bring all fish across the deck for sampling, including operational discards (i.e., recently-revised Closed Area I sampling provisions).

However, as indicated in Figure 83 and previously discussed, comments were not provided for all released catch events, and information about these events is incomplete. The implementation of the discard log in 2010, along with increased cooperation from the industry and a desire by everyone to obtain better information about released catch, has improved sampling, reduced the amount of released catch that could not be observed, and improved the quality of information collected about these events (see 2010 information below).

Figure 83 Analysis of Comments Regarding Released Catch 2008/2009 by Gear Type

	# of Hauls with Comments				
	Operational Discards	Gear Damage	Full Slippage	Partial Slippage	# of Hauls Observed
Bottom Trawl			2		63
Purse Seine	21	13	11	4	205
Paired Midwater Trawl	14	5	9	15	558
Single Midwater Trawl	2	1	2	1	83

Post-Pumping Questions

	# Hauls w/ fish left in net	# Hauls w/o fish left in net	# Hauls could not see	% of Hauls w/ Responses
Purse Seine	75	82	14	83%
Paired Midwater Trawl	129	92	125	62%
Single Midwater Trawl	6	41	7	65%

2010 Slippage Information

It is important to note that 2008/2009 slippage information is not directly comparable to 2010 slippage information due to increased observer coverage, changes to observer protocols, and implementation of the observer discard log in 2010. While the 2008/2009 information is useful to generally characterize the nature/extent of slippage in the fishery, it is not a complete record of slippage events observed during these years (unlike 2010); 2010 slippage data has been determined by the Herring PDT to be more complete and more reliable.

The NEFOP has updated its observer training program to address new requirements for herring vessel access to Closed Area I as well as general training for observing high volume fisheries. In 2010, the NEFOP conducted three high-volume fishery training classes to recertify 70 observers. The program was designed to improve sampling in fisheries that pump fish on board and ensure that only experienced observers who have proven high data quality will be assigned to these fisheries. The program was developed to improve fishery-specific training and focuses on defining gear, understanding bycatch issues, knowing and identifying species of concern, subsampling methodology, common scenarios, safety, and the process of pumping fish on board.

The NEFOP also implemented a discard log in 2010 to obtain more detailed information regarding discards in high-volume fisheries. The new discard log is being completed for every haul, and it includes fields to provide information on what kind of discard event may have occurred, whether or not the observer could see the contents of the codend when pumping stopped, why catch may have been discarded, information about the composition of discarded catch, and any challenges the observer may have experienced when observing the haul. Observers are also documenting released catch (including operational discards and slippage events) with photographs whenever possible, and bringing in samples of fish from every trip to confirm species identification.

Between increased observer coverage levels, an increase in information being provided by the fishermen and crew, and the new observer discard log implemented in 2010, data collected by observers regarding released catch events on limited access herring vessels during the 2010 fishing year provides much more detail about catch not brought on board herring vessels, and overall, the information collected about slippage has improved considerably. Operational discards have been confirmed by observers to be relatively small amounts of fish that may remain in the net following a successful haul/pump; these fish are usually caught in the net and/or cannot be pumped on board. Information collected by observers about operational discards has improved, and hauls with operational discards are considered to be "observed" hauls; the operational discards are estimated by the observers and represent "small" amounts of fish. Any partial or full released catch ("slippage" as defined in Amendment 5) is considered unobserved, but observers still collect as much information as possible about these discards.

In 2010, observer coverage for the midwater trawl fleet was close to 30% fishery-wide and was even higher on Georges Bank (85% coverage by weight of fish landed). Overall, observers provided data for 929 hauls on limited access herring vessels during the 2010 fishing year. The new discard log allows observers to provide more information about reasons for not bringing fish on board, including who estimated the released catch, additional details regarding why the catch was released, and whether the discards were observed on the deck or in the water; additional information from the 2010 discard log should be available by the end of this year and will be added to the final Amendment 5 EIS document.

Table 148 provides data for the 332 observer records (287 unique hauls) in 2010 that included fish not brought on board. About 290 of these hauls were documented with “not enough fish to pump,” i.e., operational discards. Observers document operational discards as *Herring NK* if they are able to see the fish that are not pumped and confirm that the discards are all herring-bodied fish. Otherwise, the discards are documented as *Fish NK* (see below for more information about the evolution of the Herring NK and Fish NK categories). The total weight of fish not brought on board estimated by observers in 2010 was about 460,000 pounds; this includes operational discards, which, although more frequent, generally represent very small amounts of fish. Total herring landings for this fleet in 2010 were about 58 million pounds.

A preliminary review of the observer data indicate that in 2010, only 35 records (approximately 30 unique hauls) of 929 hauls (3.2%) that were observed on limited access herring vessels were documented to have experienced full or partial slippage events. The total estimated catch not brought on board compared to the total observed catch on these vessels in 2010 was about 0.7% (this does not include fish that were brought on board and then discarded). In addition, there were 99 hauls observed in Closed Area I during 2010, under the new provisions for sampling catch, implemented in November 2009. There were no slippage events observed in these 99 hauls, and consequently no Released Catch Affidavits were submitted from the Closed Area I fishery in 2010. There appears to have been one released catch event (estimated 1,500 pounds) on a haul that ended (but did not begin) in Closed Area I. However, the recently-implemented revisions to the Closed Area I rules (January 2011) require that all operational discards be brought on board; potential logistical and sampling issues associated with this new requirement are unclear because fishing effort has not yet moved into Closed Area I this year.

Table 148 Summary of 2010 Observed Events on Limited Access Herring Vessels (by Number and Estimated Weight of Fish in Lbs.) with Fish Not Brought on Board

	species	"reason not specified"	"gear damage"	"fell out of gear"	"no market value"	"vessel capacity filled"	"not enough fish to pump"
Number of hauls with occurrence	butterfish	1					1
	haddock						6
	herring nk			3		1	105
	atl herring	1				1	18
	mackerel	1				1	4
	redfish						7
	spiny dogfish						1
	striped bass			1			1
	whiting	1					4
	fish nk	10	5	3	2	3	138
	hake nk						6
	lobster						1
	Loligo	1					1
	Illex						2
	eel nk						2
Estimated weight (lbs)	butterfish	5					1
	haddock						72
	herring nk			410		3,000	20,622
	atl herring	100				175	6,425
	mackerel	50				175	155
	redfish						38
	spiny dogfish						25
	striped bass			12			10
	whiting	10					372
	fish nk	169,450	108,000	4,700	44,000	20,050	72,766
	hake nk						215
	lobster						10
	Loligo	3					10
	Illex						13
	eel nk						8,150

Figure 84 Observed Events on Limited Access Herring Vessels (by Number of Hauls) with Fish Not Brought on Board in 2010

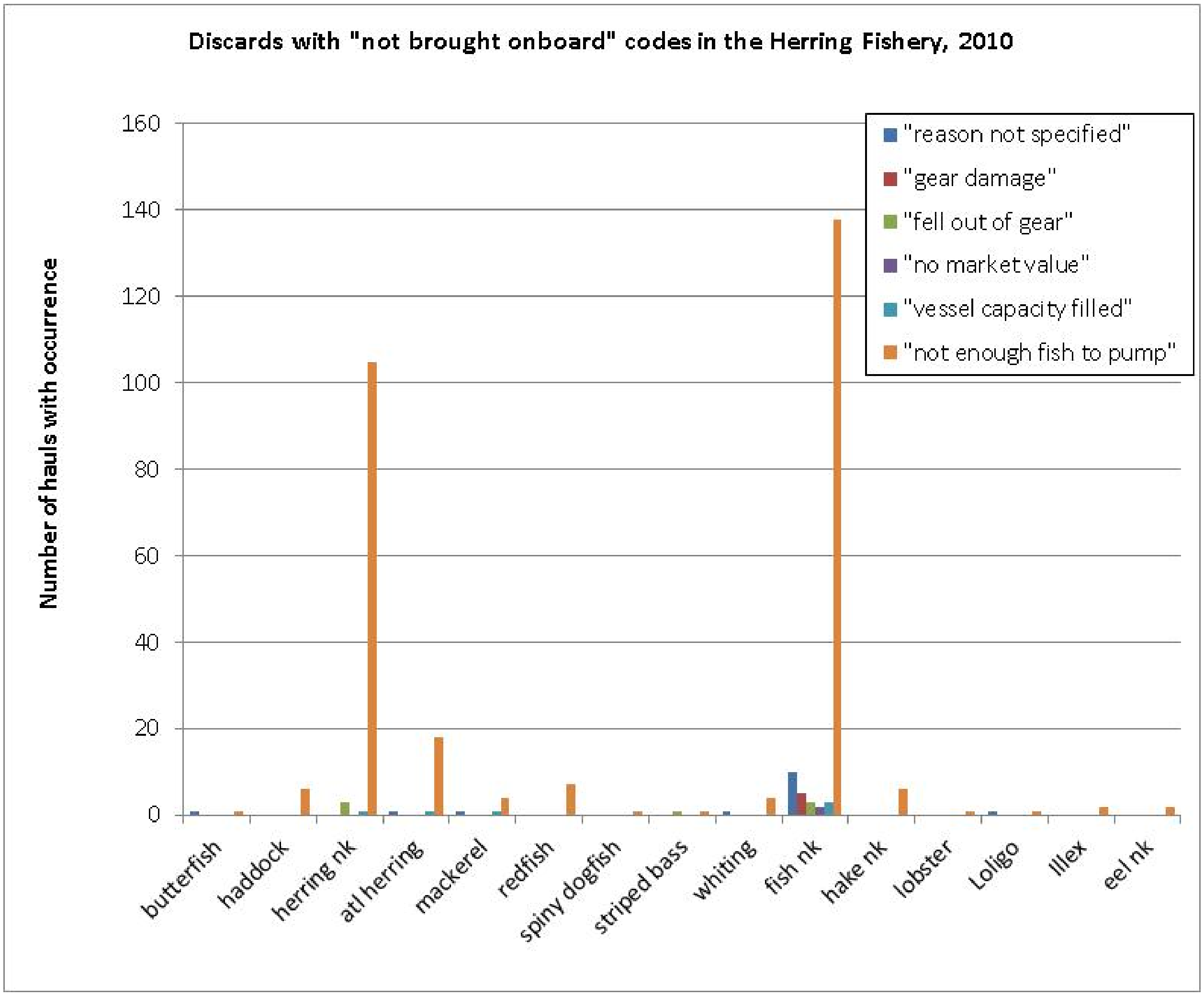
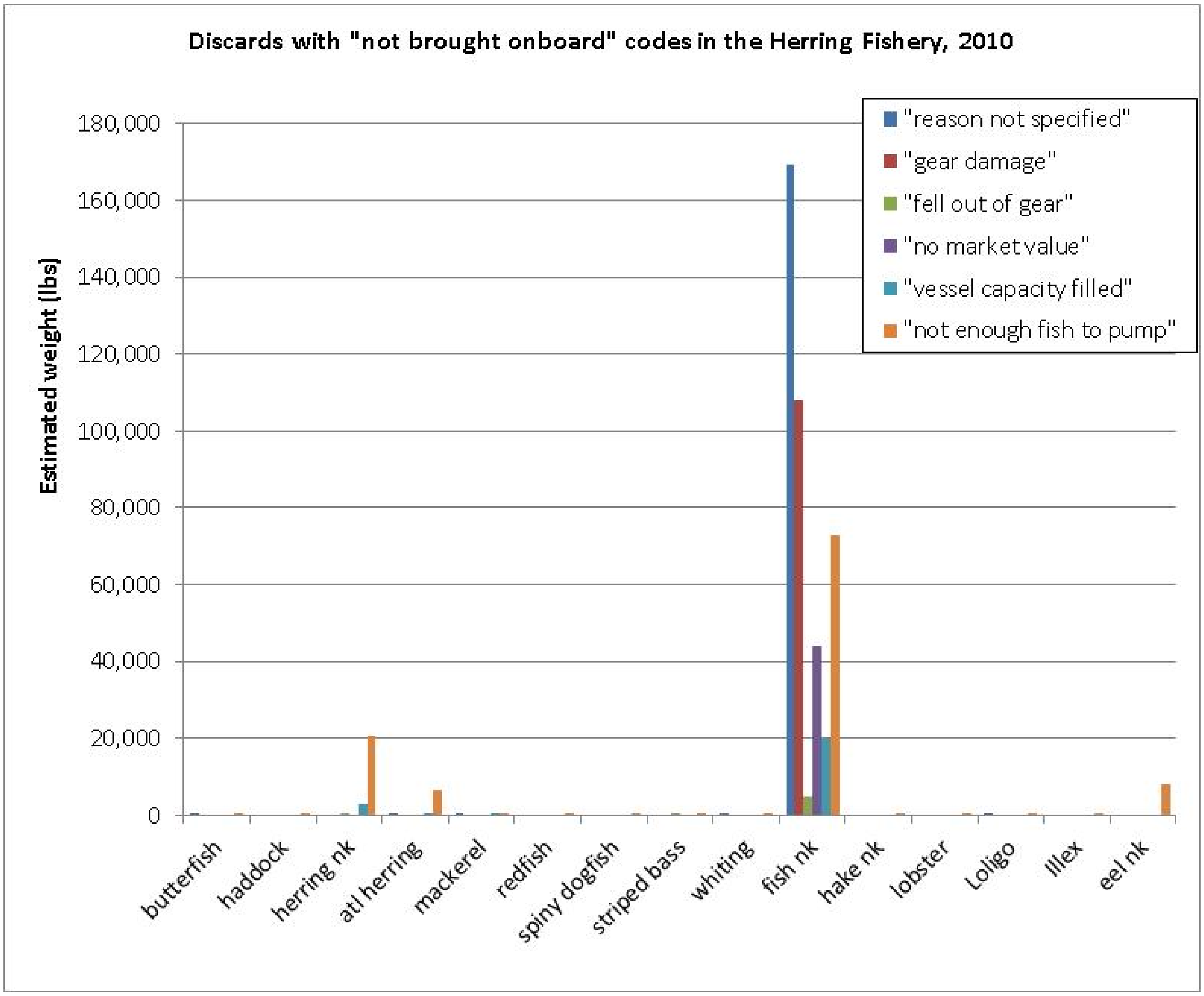


Figure 85 Observed Events on Limited Access Herring Vessels (by Estimated Weight of Fish in Pounds) with Fish Not Brought on Board in 2010



Use of "Herring NK" and "Fish NK"

It is important to understand the use of the Fish NK and Herring NK categories in the observer data and the ongoing effort by the NEFOP to reduce these categories and better document all fish either kept, discarded, transferred, or not brought on board in the limited access herring fishery. In 2009, the NEFOP transitioned to the use of Fish NK to represent the component of the catch for which observers could not verify identification. This includes partial and fully released tows and operational discards. Prior to 2009, Fish NK, or Herring NK, or Atlantic herring were used to describe this component of the catch, depending upon observer determinations based on their own visual inspection and/or captain and crew input.

In 2009, the NEFOP also transitioned to the use of Fish NK to represent the composition of the catch pumped to the paired vessel when an observer is not present on the boat taking on the fish. Prior to 2009, Atlantic herring, or Herring NK, or Fish NK were used to represent this component of the catch, based on the observers assumption that partial catches being pumped to the vessel they were deployed on, were made up of the similar species composition of that being pumped to the alternate vessel. The 2009 and 2010 protocols for the use of Fish NK and Herring NK were consistent. Using the most recent data as an example (Table 149), the majority of Fish NK records in 2010 (54%) are associated with fish that were pumped to the paired vessel without an observer present to subsample. These fish were landed, sold, and documented through the dealer and VTR data (along with IVR at the time), and the landings may have been sampled through a State portside sampling program.

In 2010, Herring NK was documented on 122 hauls, and Fish NK was documented on 200 hauls. The majority of Herring NK (86%) was due to "not enough fish to pump" (operational discards). Sixty nine percent (69%) of Fish NK was associated with operational discards. In general, the amounts of fish classified in these categories per haul are relatively small. There was one sampling event in 2010 that documented 30,000 pounds of Herring NK "kept," which represents almost half of all Herring NK observed in 2010 (Table 149, Figure 86, Figure 87). In this one event, the observer was able to see the fish as they came on board, and during the pumping process, the observer could confirm that the fish were all herring-bodied fish but could not obtain basket samples for safety reasons. About ½ of observed Fish NK and Herring NK in 2010 was landed; in these cases, portside sampling would be beneficial to confirm the species composition of the landings.

The remaining Fish NK records are mostly associated with fish that were discarded and the reason was not specified, fish that were discarded due to gear damage and operational discards. Operational discards that the observer is able to visually inspect and therefore term Herring NK instead of Fish NK, represent 36% of the herring NK records. Nine percent (9%) of the Herring NK records are associated with fish that mainly fell from the chute, were seen by the observer and therefore identified as herring, then washed overboard. Species identification issues also result in the use of Fish NK or Herring NK. In these cases, an observer has sent in a whole fish sample, which is identified by experienced staff at the NEFOP. If the observer has mis-identified the species the use of Fish NK or Herring NK may be used. In 2010, there was one record changed to Herring NK due to mis-identification of the species.

Table 149 Quantification of Fish NK and Herring NK (in Pounds) on Observed Hauls by Limited Access Herring Vessels in 2010

	species group	"kept"	"kept, transferred to other vessel"	"discarded, other"	"discarded, poor quality, gear damage"	"discarded no market, too small"	"discarded no market, reason not specified"	"not brought onboard reason not specified"	"not brought onboard gear damage"	"not brought onboard fell out of gear"	"not brought onboard no market value"	"not brought onboard vessel capacity filled"	"not brought onboard not enough fish to pump"	TOTALS
Number of hauls with occurrence	herring nk	2	0	10	0	1	1	0	0	3	0	0	105	**122**
		1.6%	0 %	8.2%	0%	0.8%	0.8%	0 %	0 %	2.5%	0 %	0 %	86.1%	
	fish nk	6	11	14	1	0	5	10	5	3	3	4	138	**200**
		3%	5.5%	7%	0.5%	0%	2.5%	5%	2.5%	1.5%	1.5%	2 %	69 %	
														322
Observed Pounds	herring nk	30,004	0	5,620	0	100	150	0	0	410	0	0	20,622	**56,906**
		52.73%	0 %	9.9%	0 %	0.2%	0.3%	0 %	0 %	0.7%	0 %	0 %	36.2%	
	fish nk	110	692,240	67,065	20	0	90,430	169,450	108,000	4,700	52,000	23,050	72,766	**1,279,831**
		0.01%	54.1%	5.2%	0 %	0 %	7.1%	13.2%	8.4%	0.4%	4.1%	1.8%	5.7%	
														1,336,737

Figure 86 Use of Fish NK and Herring NK Codes on Observed Limited Access Herring Trips (by Number of Hauls) in 2010

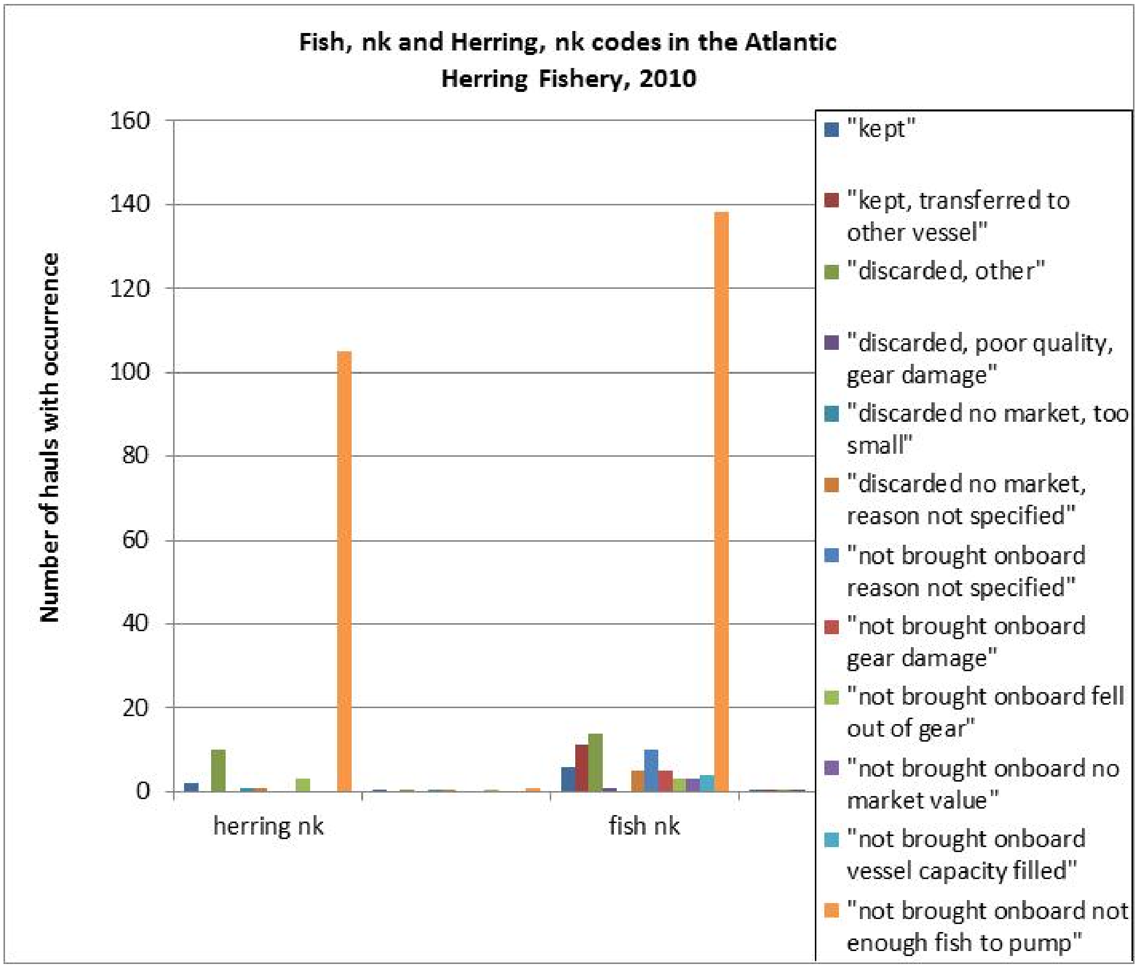
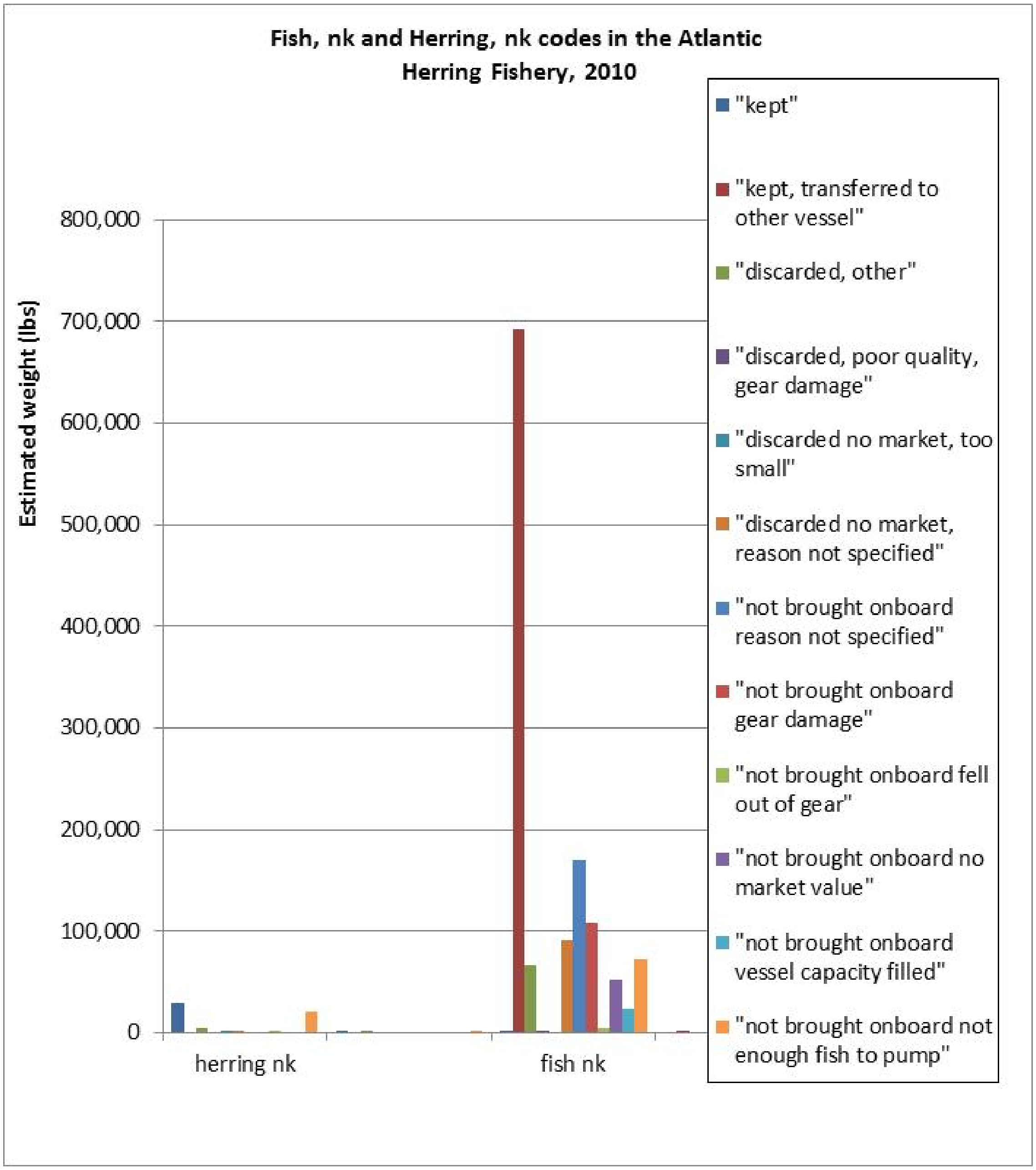
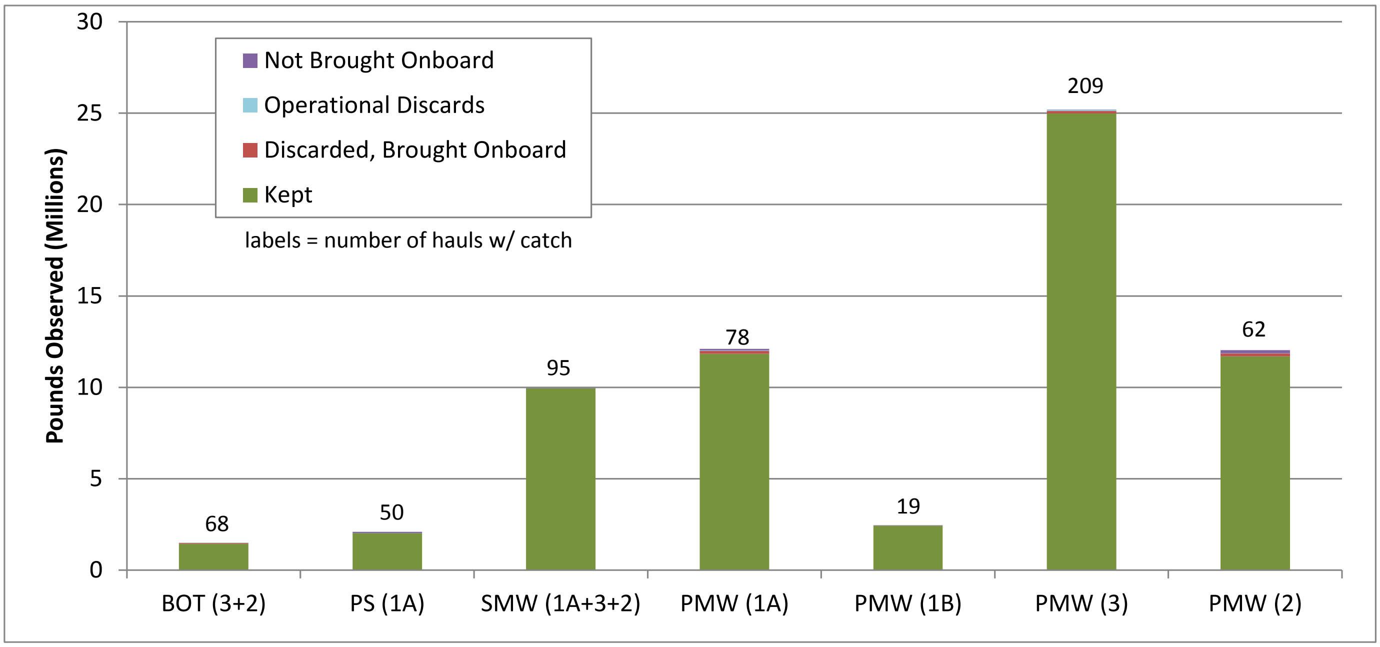


Figure 87 Use of Fish NK and Herring NK Codes on Observed Limited Access Herring Trips (by Estimated Weight) in 2010



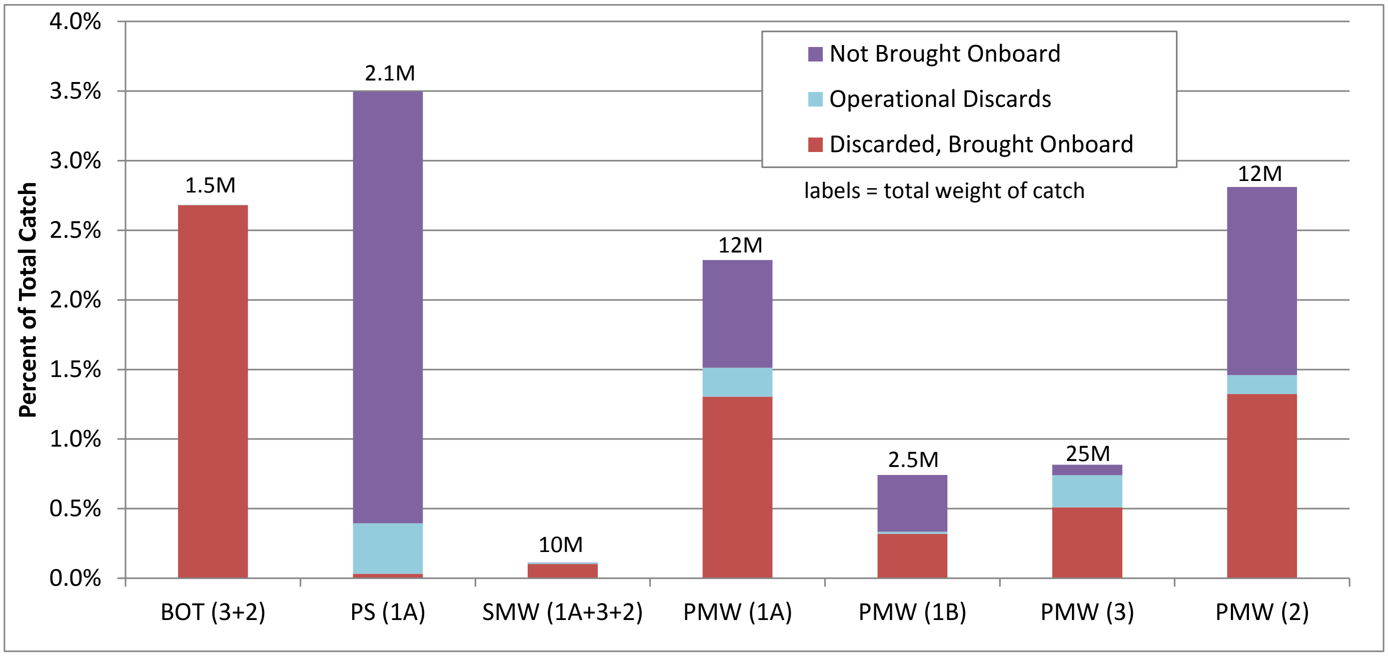
Available information suggests that the amount of fish estimated to be slipped in full/partial slippage events is less than 100,000 pounds. Information provided by vessel captains in 2008/2009, although incomplete, indicates that the estimated weight of partial slippage events (events for which captains provided an estimate) in averaged 45,175 pounds, and the estimated weight of full slippage events (when comments were provided) averaged 27,581 pounds (Figure 80 and Figure 81). Information about slippage events and details about the released catch improved considerably in 2010 with the establishment of the new discard log. In addition, the observed number of slippage events declined in 2010. Figure 88 and Figure 89 characterize discards observed in 2010 and provide some perspective on slippage events by gear type and management area. Because few slippage events were observed in 2010 (with a relatively high level of observer coverage across the fishery), disaggregating the data is more difficult due to confidentiality restrictions. However the information in Figure 88 and Figure 89 show that discards at-sea, in total, represent a very small fraction of catch on herring vessels; catch not brought on board represented the highest fractions of total catch for purse seine and pair trawl vessels fishing in Areas 1 and 2 (purse seine vessels only fish in Area 1).

Figure 88 Summary of 2010 Observed Catch (Pounds) on A/B/C Herring Vessels on Declared Herring Trips by Gear Type, Management Area, and Disposition



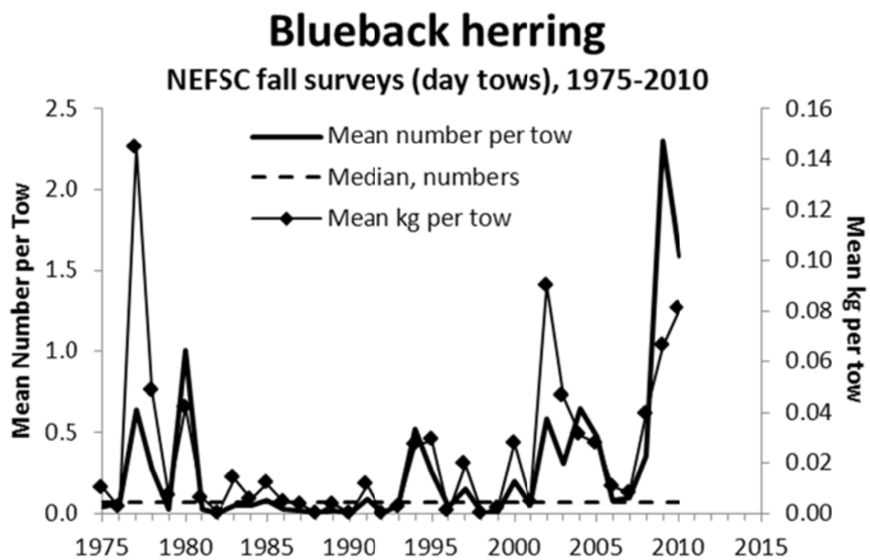
BOT – Bottom Otter Trawl; PS – Purse Seine; SMW – Single Midwater Trawl; PMW – Paired Midwater Trawl

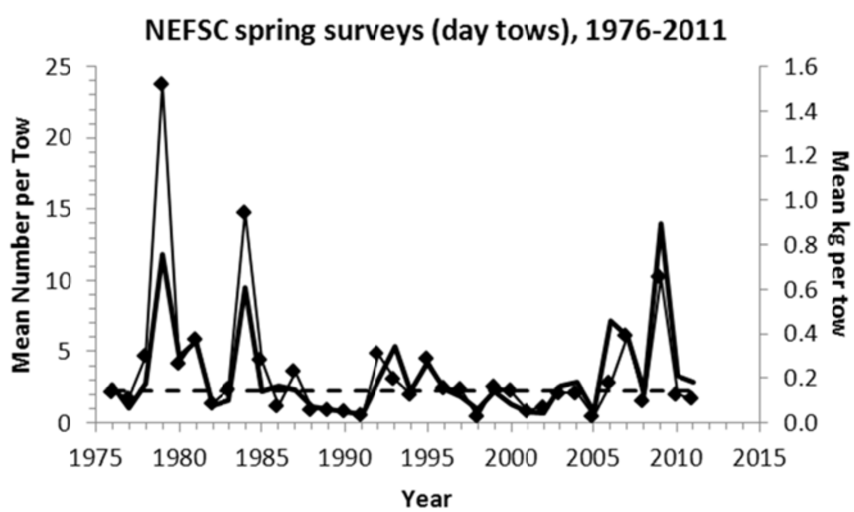
Figure 89 Summary of 2010 Observed Discards (as Percent of Total Observed Catch) on A/B/C Herring Vessels on Declared Herring Trips by Gear Type, Management Area, and Disposition



BOT – Bottom Otter Trawl; PS – Purse Seine; SMW – Single Midwater Trawl; PMW – Paired Midwater Trawl

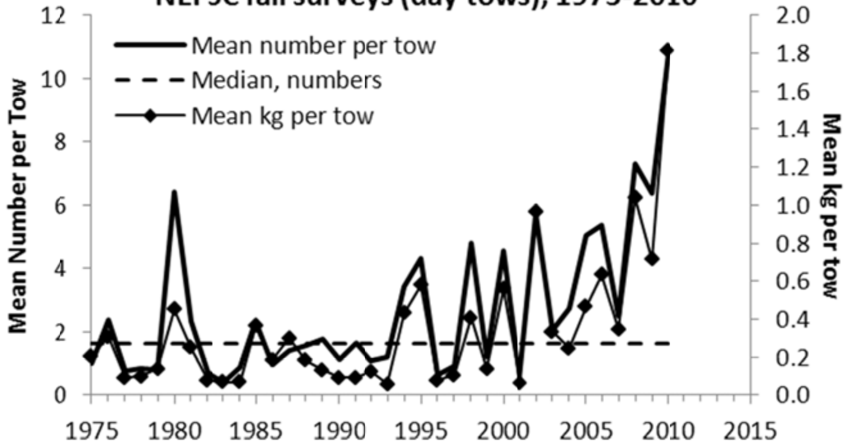
Appendix 6: Northeast Fishery Science Center Trawl Survey Data for RH/S



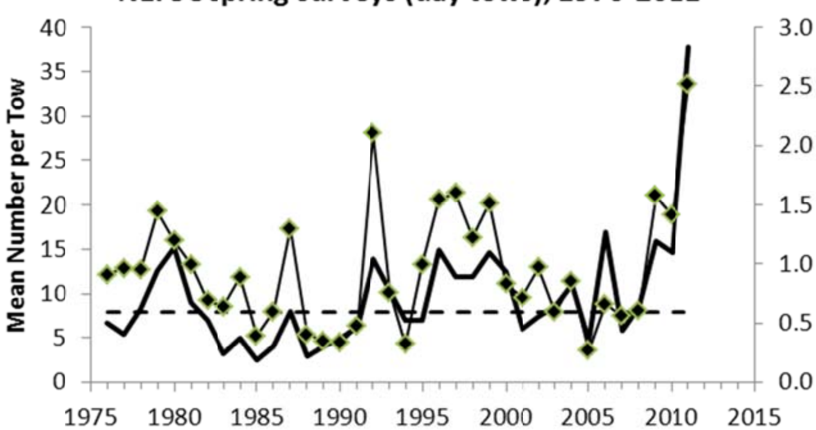


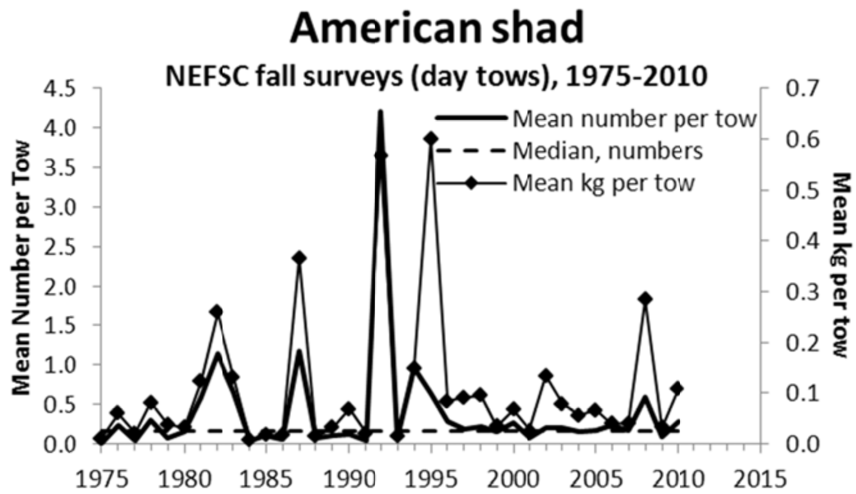
Alewife

NEFSC fall surveys (day tows), 1975-2010

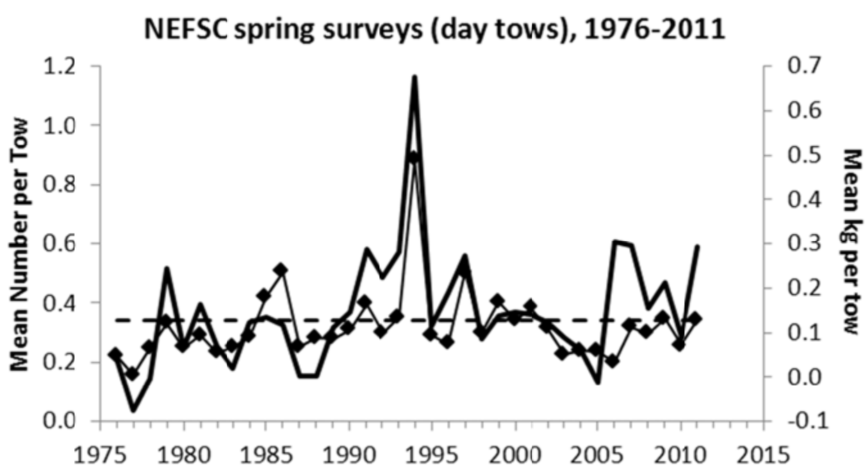


NEFSC spring surveys (day tows), 1976-2011





American shad
NEFSC fall surveys (day tows), 1975-2010
Mean number per tow
Median, numbers
Mean kg per tow
Mean Number per Tow
Mean kg per tow
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1975
1980
1985
1990
1995
2000
2005
2010
2015



NEFSC spring surveys (day tows), 1976-2011
Mean Number per Tow
Mean kg per tow
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
1975
1980
1985
1990
1995
2000
2005
2010
2015

Appendix 7: Summary of School for Marine Science and Technology (SMAST) and Sustainable Fisheries Coalition (SFC) Voluntary River Herring/Shad Avoidance Project

Sustainable Fisheries Coalition (SFC) members account for the majority of US landings of Atlantic herring and mackerel. River herring species are also encountered in these directed fisheries. Minimizing unintended bycatch has been a goal of SFC members since fisheries managers alerted the industry in 2006 that the river herring species complex was depressed. To help achieve this goal the SFC has joined with the Massachusetts Division of Marine Fisheries (MA DMF) and the University of Massachusetts Dartmouth School of Marine Science and Technology (SMAST) to develop river herring and American shad (alosine) bycatch avoidance methods. This collaboration seeks to develop (1) a predictive model of where alosines are likely to occur in space and time, (2) a real-time bycatch avoidance intra-fleet communication system, and (3) additional support for port sampling to inform the initiative.

The project will test if oceanographic features can be used to indicate areas with a high probability of large catches alosines. The Finite-Volume Community Ocean Model (FVCOM) system will be used to hindcast ocean conditions. FVCOM is a verified prognostic coastal ocean circulation model that incorporates realistic time-dependent temperature projections and can identify oceanographic conditions on a daily basis. Sea surface temperature, bottom temperature, the difference between sea surface and bottom temperature, surface salinity, bottom salinity and depth are the initial variables that have been mapped on a monthly basis. The project will use Northeast Fisheries Observer Program (NEFOP) mid-water trawl and National Marine Fisheries Service (NMFS) bottom trawl datasets for alosine catch at sea information. Other data sources may be used but these two datasets provide the best catch at sea information when timing, size, resolution (information on a tow by tow basis), and spatial uncertainty are considered. NEFOP catch at sea data has been linked to environmental conditions using a stepwise process within ArcGIS 10. Initial plots suggest alosine bycatch is associated with shallow depths and specific temperature ranges. However, the predictive power of these associations is unknown and results need to be further analyzed and expanded. The intent is ultimately to predict alosine hotspots amidst the distribution of Atlantic herring and mackerel, which could be avoided by vessels to reduce bycatch incidents.

The project relies on near real-time communication between fishing vessels, MA DMF and SMAST to circulate information regarding alosine hotspots and to relay this information to fishing captains before and during their trips. The first system was implemented during the 2011 winter mid-water trawl fishery (January through March) over an approximately 60x70 nm area off the coast of New Jersey identified as a high bycatch area by historic MA DMF port sampling, NEFOP data and the Atlantic herring Amendment 5 draft. Bycatch information in this area was accessed and shared with captains using a coded, grid system of smaller cells approximately 5x8 nm (10' longitude x 5' latitude) (Figure 1).

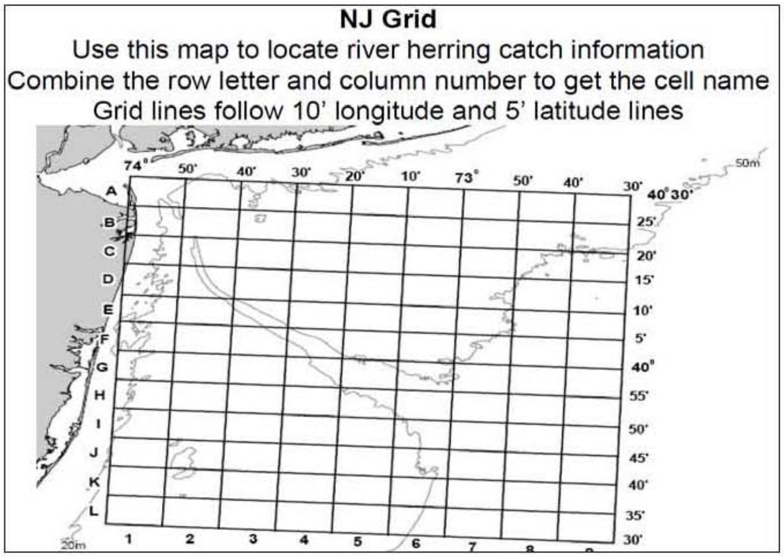


Figure 1. Grid distributed to captains and used to communicate bycatch information.

Catch composition was compiled through the MA DMF port sampling program which relied on electronic communications from captains and onshore managers that identified the location and time of vessel landings and departure. The program sampled just under 50% of all mid-water fishing trips landing in Massachusetts during the winter fishery and was an efficient (information relayed to SMAST in less than 48 hours) and accurate method to gather bycatch data. While at sea captains of participating vessels completed MA DMF tow logs (Figure 2). Although the completed logs gave tow by tow information the resolution of catch composition was trip level. Communication with onboard NEFOP observers was critical in identifying individual tows with alosines. The NEFOP has also agreed to share logs of trips with alosine bycatch with MA DMF/SMAST in a timely manner (about 5 days).

FOR OFFICE USE ONLY:

MarineFisheries

River Herring Bycatch Avoidance

MA DMF Trip Log

NFWF Grant

*To be filled out for EVERY midwater trawl trip targeting herring or mackerel.

Vessel Name ____________ Target Species __________ Date Sailed __________

Area(s) Fished: 1A / 1B / 2 / 3 Observer Onboard: Y / N Date Landed __________

Port Landed __________ Hail Weight __________ Sampled by DMF: Y / N

☐ Trip start notification email sent via boatracs to SEA.HERRING@STATE.MA.US containing:

- Target Species
- Observer Onboard: Y / N
- Intended Landing Port

Tow Information – This information will complement the Observer logs and provide data essential to assessing River Herring interactions through dockside sampling.

Tow #	Tow Location (Lat/Long)	Grid ID	Grid Cell #	Tow Date/Start Time	Tow Duration	RSW Tank #	Approx. Weight
1							
2							
3							
4							
5							
6							

When headed to port:

☐ Landing notification email sent via boatracs to SEA.HERRING@STATE.MA.US containing:

- Time and Port of Landing
- Hail Weight (trucks, tons or pounds)

Upon Landing:

MA DMF sampler will be collecting the following logs and information:

- State Copy of VTR
- Photocopy of Observers Haul, Catch Composition, Discard and Length Frequency Logs from trip (copies can be made for you by sampler)
- Hard copy of MA DMF Trip Log

***If your trip is not being sampled by a DMF sampler it is important that you fill out and retain this log. A DMF sampler will collect all Trip Logs during the next portside sample.**

Thank you for completing this worksheet and for your participation. If you would like the results of this portside bycatch sample please ask the sampler and a copy will be made available.

Figure 2. Trip log completed by captains and returned to MA DMF/SMAST upon landing

Based on the pace of the fishery weekly or bi-weekly advisories from SMAST worked best. Advisories classified grid cells as either having low, moderate, or high bycatch. Information was not reported for cells without tows and advisories only included cells with information less than 2 weeks old. Cumulative bycatch information was/is available through the SMAST website. Classifications were based on ratio thresholds intended to reduce the frequency of trips with over 2,000kg of alosines. The low incidence, high impact nature of alosine bycatch in the mid-water trawl fishery justifies this goal. From 2000 through September 2010 tows with greater than 2,000kg of alosines accounted for over 80% of NEFOP observed alosine mid-water trawl bycatch by weight despite accounting for only about 10% of the number of tows with 1kg of alosines or more. MA DMF portside sampling data also reflects this pattern on a trip level (Figure 3). For this project MA DMF portside sampling numbers were used to establish the classification thresholds because it was the catch composition information source. Ratio thresholds were used instead of hard numbers to avoid biases created by small tow or trip sizes.

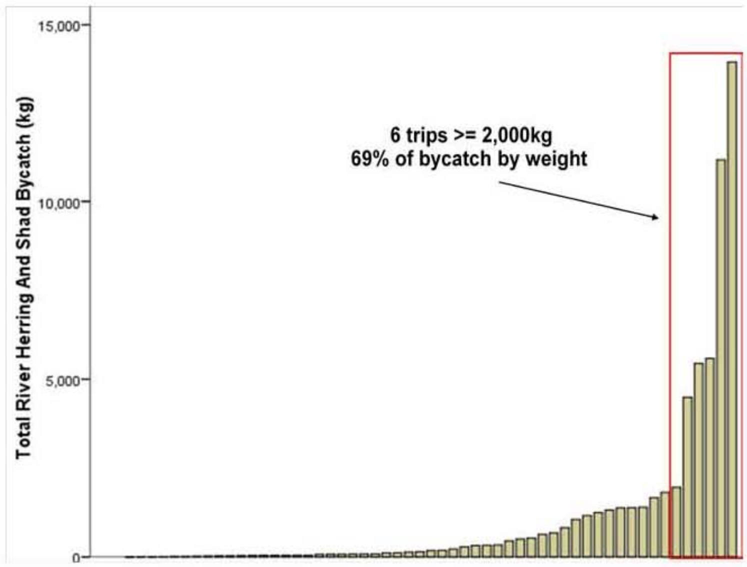


Figure 3. Seventy two mid-water trawl trips sampled by MA DMF portside sampling from May 2008-July 2010. This information was used to set the ratio thresholds used to classify areas as having high, moderate, or low bycatch.

Industry cooperation and the appearance of distinct spatial and temporal bycatch patterns within the avoidance area suggests this system may be effective at reducing alosine bycatch. Due to the number of trips within the avoidance grid, it is impossible to prove statistically from the results of one fishing season that bycatch advisories were not disregarded but high levels of cooperation and fishing patterns within the area suggest that advisories were not ignored. Eight of nine targeted vessels voluntarily shared detailed trip and tow information with the MA DMF and SMAST. The purpose of this high level of data sharing was to increase the fleets knowledge of the quantity, location, and timing of bycatch events. This suggests participation would be an unnecessary burden unless the occurrence of bycatch was a concern. The overall behavior of the vessels within the avoidance area also provides evidence of cooperation. Though the shift of effort from the northwest part of the avoidance area to the southeast could be due to the availability target species, the timing of this shift in effort coincides with bycatch advisories and avoidance of a known high bycatch area (Figure 4). In total 5 cells were classified as having high bycatch with only one possibly reentered. Though reentry is not ideal, it does show that target species were present in both the northwest and southeast potions of the avoidance area simultaneously (Figure 4). After the reentry and subsequent advisory, effort was primarily in the low bycatch southeast region but trips were conducted in the cells between the northwest and southeast (row F) that previously had no effort (Figure 4). This suggests the vessels were interested in "filling in" the avoidance grid, possibly to test how far west they could fish while avoiding the high and moderate bycatch cells located in the northwest.

A total of 10 trips and 24 tows occurred in the study area with two tows and one trip classified as having high bycatch. These three events accounted for 75% of alosine bycatch observed by MA DMF port sampling and all occurred between mid-February and mid-March. A high bycatch region (northwest area of grid, above row H) and low bycatch region (southeast, row H and below) developed within the grid during the winter fishery (Figure 4.). The percentages of effort, target catch, and alosine catch in northwest and southeast regions (75, 75, 97 and 25, 25, 3 respectively) confirm this and also show both areas to economically viable. Though the timing and exact area of alosine abundance within the study area undoubtedly varies from year to year, these results suggests it is plausible for mid-water trawl vessels to be moved to areas with low alosine bycatch and adequate levels of target species using the scale of this study.

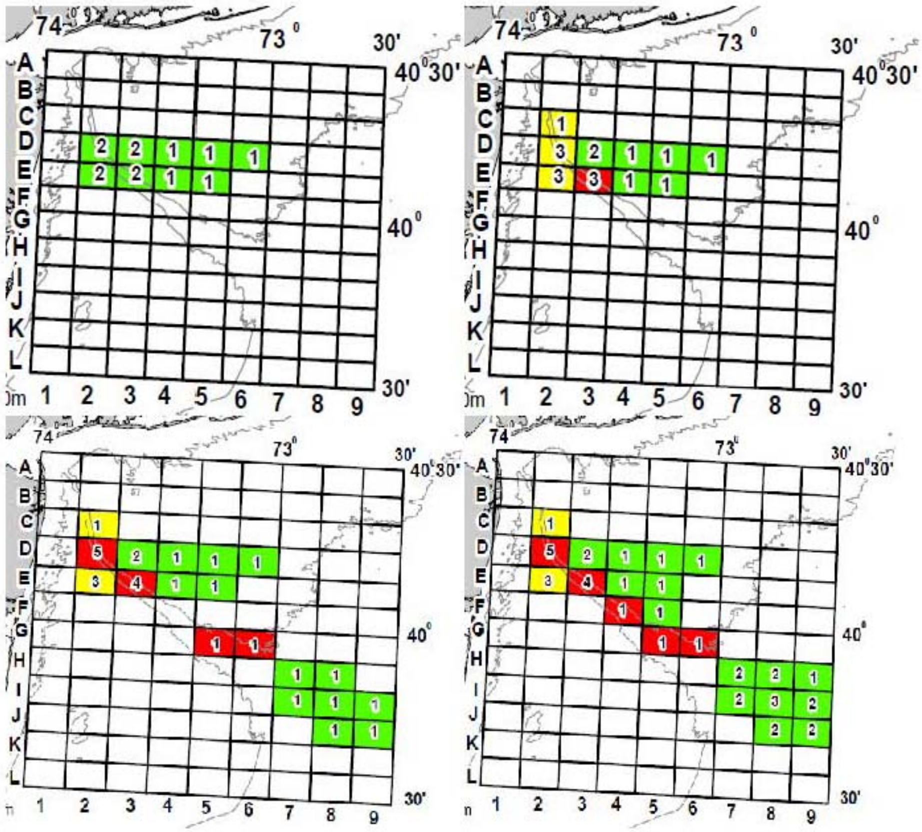


Figure 4. Cumulative bycatch information from 4 different time periods, from top left: 2/1/11, 2/17, 3/2,4/1. Numbers inside cells indicate the number of tows within each cell. Red indicates cells with high alosine bycatch while yellow and green indicate moderate and low respectively.