VOLUME I

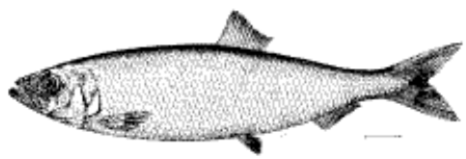
DRAFT
AMENDMENT 5

to the

Fishery Management Plan (FMP)

for

Atlantic Herring



Including a

Draft Environmental Impact Statement (DEIS)

Prepared by the

New England Fishery Management Council

in consultation with

National Marine Fisheries Service

Atlantic States Marine Fisheries Commission

Mid-Atlantic Fishery Management Council

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AMENDMENT 5 TO THE ATLANTIC HERRING FISHERY MANAGEMENT PLAN

Proposed Action:	Adoption and implementation of management measures to adjust the fishery management program for the federally managed Atlantic Herring fishery through Amendment 5 to the Atlantic Herring FMP.
Type of Statement:	Draft Environmental Impact Statement (DEIS)
Responsible Agencies:	New England Fishery Management Council 50 Water Street, Mill #2 Newburyport, MA 01950 National Marine Fisheries Service National Oceanic and Atmospheric Administration U.S. Department of Commerce Washington, D.C. 20235
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Abstract:

The New England Fishery Management Council, in consultation with NOAA's National Marine Fisheries Service, proposes to adopt and implement Amendment 5 to the Atlantic Herring Fishery Management Plan (FMP) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA). This Draft EIS presents a range of alternatives under consideration in Amendment 5, which relate to the goals and objectives outlined in the document. The proposed alternatives focus on establishing a comprehensive catch monitoring program for the limited access herring fishery, addressing river herring bycatch in the herring fishery, establishing criteria for midwater trawl vessel access to groundfish closed areas, and adjusting other aspects of the fishery management program to keep the FMP in compliance with the MSA and other applicable laws. This document also includes a detailed description of the affected environment and valued ecosystem components, and analyses of the impacts of the measures under consideration on the affected environment. It addresses the requirements of the National Environmental Policy Act (NEPA), the MSA, the Regulatory Flexibility Act (RFA), and other applicable laws.

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Executive Summary

This draft amendment document and draft environmental impact statement (DEIS) presents and evaluates management alternatives and measures to achieve specific goals and objectives for the Atlantic herring fishery. This document was prepared by the New England Fishery Management Council and its Herring Plan Development Team (PDT), in consultation with the National Marine Fisheries Service (NMFS, NOAA Fisheries), the Atlantic States Marine Fisheries Commission (ASMFC), and the Mid-Atlantic Fishery Management Council (MAFMC). This amendment is being developed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, M-S Act) 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 (SFA), which amended and reauthorized the MSFCMA and included a new emphasis on precautionary fisheries management. New provisions mandated by the SFA require managers to end overfishing and rebuild overfished fisheries within specified time frames, minimize bycatch and bycatch mortality to the extent practicable, and identify and protect essential fish habitat (EFH). The MSFCMA was again reauthorized in 2007 to require the establishment of annual catch limits (ACLs) and accountability measures (AMs) in order to end and/or prevent overfishing in all FMPs. The proposed amendment is also consistent with the provisions contained in the reauthorized Magnuson-Stevens Act (MSA, January 2007).

This document represents Volume I and includes the Draft Amendment as well as its draft Environmental Impact Statement (DEIS) and a preliminary evaluation of impacts relative to the Regulatory Flexibility Act (RFA) and other applicable laws. Volume I provides the background and context for Amendment 5 (Affected Environment), describes in detail all of the management alternatives under consideration in the amendment, provides updated information about all of the components of the ecosystem and fishery potentially affected by the measures proposed in Amendment 5, evaluates the potential impacts of the management alternatives under consideration, addresses the Amendment 5 alternatives under consideration with respect to other applicable laws, provides the public and the Council with adequate information about the measures and their impacts to ultimately inform decision-making following the public comment period. Volume II includes all of the appendices referenced throughout this Draft Amendment document and DEIS.

The primary purpose of this amendment is to modify the management program for the Atlantic herring fishery by:

- Considering changes to the reporting system and fishery management program to improve the collection of real-time, accurate catch information;
- Considering measures to enhance monitoring and sampling of herring catch at-sea; and
- Addressing bycatch issues through responsible management.

The purposes and needs for this amendment are expected to advance the goals and objectives of the herring management program, as modified in Section 2.1.2 of this document. The management measures under consideration are intended to achieve both the goals and objectives of the management program, the specific goals and objectives of the catch monitoring program (identified in Section 2.1.3), in addition to the primary purposes of this action. The management measures under consideration in this amendment include:

- General adjustments to the Atlantic herring fishery management program (permitting provisions, dealer and vessel reporting requirements, measures to address carrier vessels and transfers of Atlantic herring at sea, and requirements for vessel monitoring systems (VMS) and trip notifications);

- Measures to address/prioritize the allocation of NMFS-approved observers for at-sea sampling on limited access herring vessels;
- Provisions to enhance NMFS-approved observers' ability to maximize sampling at-sea;
- Measures to address/minimize net slippage by limited access herring vessels;
- Monitoring, avoidance, and protection alternatives to address river herring bycatch; and
- Criteria for midwater trawl vessel access to the year-round groundfish closed areas.

The Council intends for the major elements of the catch monitoring program to apply to the limited access herring fishery, i.e., the 100 or so Category A/B and Category C vessels that catch more than 99% of Atlantic herring in any given year. However, the Category A/B boats catch the vast majority of herring (about 97-98%), so the Council may consider the economic costs of the proposed limited access program relative to the objectives of the amendment, and evaluate the trade-offs when determining whether or not Category C vessels will be subject to all of the requirements of the Amendment 5 catch monitoring program. Similarly, while Category D vessels (open access) are not being considered in the catch monitoring program, there are adjustments to the fishery management program that may affect Category D vessels, and the Council is considering an option that would require Category D vessels to adhere to the management measures established in this amendment to address river herring bycatch. The following table generally summarizes the management measures under consideration, to which vessel categories they are proposed to apply (or may affect), and what options the Council has to select from when it picks the final measures for Amendment 5 and determines which vessels will be subject to the rules. The Council is seeking public comment regarding to which permit categories the catch monitoring program and the measures to address river herring bycatch should apply.

Summary of Measures Proposed in Amendment 5 and Herring Permit Categories to Which They May Apply

Proposed Measures/Alternatives	Category A/B (LA Directed)	Category C (LA Incidental)	Category D (Open Access)
Section 3.1 – Adjustments to Fishery Management Program			
Regulatory Definitions	✓	✓	✓
Administrative/General Provisions	✓	✓	✓
Measures to Address Carrier Vessels	Apply to all carrier vessels regardless of permit category		
Transfer At-Sea Option 2 (A and B Only)	✓	Prohibited	Prohibited
Transfer At-Sea Option 3 (Herring-permitted vessels only)	✓	✓	✓
Trip Notification Requirements (pre-trip and pre-landing)	✓	✓	Only D vessels that use MWT gear and/or qualify for new OA permit for Areas 2/3*
Dealer Reporting Requirements	N/A	N/A	N/A

Proposed Measures/Alternatives	Category A/B (LA Directed)	Category C (LA Incidental)	Category D (Open Access)
Changes to OA Provisions for Limited Access Mackerel Vessels in Areas 2/3	N/A	N/A	✓
Section 3.2.1 – Alternatives to Allocate Observer Coverage on LA Vessels			
• Alternative 2 – 100% Coverage	✓	Option Under Consideration/TBD	N/A
• Alternative 3 – SBRM Coverage as Minimum	✓	Option Under Consideration/TBD	N/A
• Alternative 4 – Coverage based on Council Targets	✓	Option Under Consideration/TBD	N/A
Additional Measures to Improve Sampling At-Sea	✓	Option Under Consideration/TBD	N/A
Section 3.2.3 – Measures to Address Net Slippage			
• Option 2 – Released Catch Affidavit	✓	Option Under Consideration/TBD	N/A
• Option 3 – Closed Area I Sampling Provisions	✓	Option Under Consideration/TBD	N/A
• Option 4 – Catch Deduction and Possible Trip Termination	✓	Option Under Consideration/TBD	N/A
MR Experimental Fishery	✓	Option Under Consideration/TBD	N/A
Section 3.3 – Measures to Address River Herring Bycatch			
Alternative 2 – Monitoring/Avoidance Options: -100% Observer coverage -CAI Sampling -Trigger-Based Monitoring -Two-phase bycatch avoidance	✓	Option Under Consideration/TBD	Option to include all D permit holders
Alternative 3 – Protection Options -Closed Areas -Trigger-Based Closed Areas	✓	Option Under Consideration/TBD	Option to include all D permit holders
Section 3.4 – Measures to Address Midwater Trawl Access to Groundfish Closed Areas	Applies to all vessels fishing with midwater trawl gear, regardless of permit category		

The Affected Environment is described in this document based on valued ecosystem components (VECs) that are identified specifically for Amendment 5. The VECs for consideration in Amendment 5 include: Atlantic Herring; Non-Target Species and Other Fisheries; Physical Environment and Essential Fish Habitat (EFH); Protected Resources; and Fishery-Related Businesses and Communities. VECs represent the resources, areas, and human communities that may be affected by the management measures under consideration in this amendment. VECs are the focus of an EIS since they are the "place" where the impacts of management actions are exhibited. The sections of the Affected Environment are therefore divided into the five VECs.

The impacts of the alternatives/options under consideration in Amendment 5 on each of the VECs are generally summarized below. Much of the detailed analyses to support the development of the alternatives/options under consideration in Amendment 5 were provided by the Herring PDT and form the basis for determining the potential impacts of the measures on each of the VECs. The complete analyses and supporting technical documents are included in the appendices to the Amendment 5 document (Volume II). The no action alternative represents status quo conditions for the Atlantic herring fishery management program and forms the basis for comparison and assessment of all management options/alternatives under consideration.

Atlantic Herring: The Atlantic herring fishery is managed through an overall annual catch limit (ACL, reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs for management areas that are designed to prevent overfishing on individual stock components. The ACLs and sub-ACLs are set through a specifications process every three years, based on the best available scientific information. The Atlantic herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of no action relative to most of the alternatives/options in Amendment 5 would not be expected to directly impact the herring resource. This is because the measures are not likely to affect the amount of herring available for harvest and/or total removals. However, some of the indirect long-term benefits likely to result from the alternatives/options under consideration in Amendment 5 (discussed below) would not be realized if no action is taken.

The long-term benefits to the Atlantic herring resource from the alternatives/options under consideration in Amendment 5 are somewhat indirect but stem from improved catch monitoring and data documenting removals from the fishery. The measures to improve catch monitoring, address river herring bycatch, and/or establish criteria for midwater trawl vessel access to groundfish closed areas should reduce the likelihood for errors in reporting, and consequently, in the calculation of catch statistics. Relative to taking no action, by implementing some of the alternatives/options proposed in Amendment 5, improving catch reporting could lead to better catch data for stock assessments and may also reduce scientific uncertainty over the long-term. This will lead to more effective long-term management of the herring resource.

Overall, the alternatives/options proposed in Amendment 5 are likely to have a low positive impact on the herring resource. The measures most likely to affect the herring resource are the alternatives to allocate observer coverage on limited access herring vessels and the management measures to address net slippage. These measures have potential to increase the likelihood of better documenting herring catch (total removals). As catch information improves, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. The quantification of previously unaccounted mortality could improve the data used in assessments, thereby decreasing scientific uncertainty, albeit to an unknown degree. In addition, reducing the likelihood for errors in the calculation of catch statistics through increased sampling could reduce management uncertainty (uncertainty about catch estimates is a component of management uncertainty), again enhancing long-term management of the Atlantic herring fishery.

Non-Target Species and Other Fisheries: *Non-target species* refers to species other than herring which are landed by federally permitted vessels while fishing for herring. These non-target species may be caught by the same gear while fishing for herring, and may be sold assuming the vessel has proper authorization or permit(s). For the purposes of Amendment 5, the term *other fisheries* refers to those fisheries which are directly affected or related to the operation of the Atlantic herring fishery; namely river herring, the Atlantic mackerel fishery, and the Northeast (multispecies) groundfish fishery. In the Atlantic herring fishery, river herring (alewife, blueback herring) are bycatch species that are not landed when caught. Due to the overlap of the species, measures proposed in Amendment 5 to address river herring bycatch are likely to have similar impacts on shad (American shad and hickory shad). Atlantic mackerel is a primary alternate species caught by herring vessels and is commonly landed. The Northeast multispecies (groundfish) fishery is a primary alternate fishery for some herring vessels, and the areas of operation of both fisheries overlap. The potential impacts of the alternatives/options under consideration in Amendment 5 are evaluated with respect to non-target species and other fisheries throughout this document.

While many of the measures under consideration in Amendment 5 relate to improving catch reporting in the directed herring fishery, positive impacts (indirect) are expected for non-target species and other fisheries depending on which alternatives/options are ultimately selected. The catch monitoring measures that are likely to have the most positive impact on non-target species and other fisheries are the alternatives that allocate observer coverage on limited access herring vessels and the measures under consideration to address net slippage. The alternatives proposed to allocate observer coverage on limited access herring vessels are intended to improve sampling in the limited access herring fishery and increase precision associated with catch/bycatch estimates of non-target species and other fisheries. There may be indirect long-term benefits that would likely result from improvements to catch sampling, increased sampling, a reduction in unobserved catch, and an increase in the accuracy of bycatch estimates that result from observer sampling. These benefits are discussed throughout this document and relate to improving catch data for stock assessments and enhancing long-term management. Measures to address net slippage are intended to provide observers with a better ability to fully sample the catch on herring vessels. To the extent that the proposed measures can improve the observers' access to all of the fish in the net, the observers' ability to identify species composition of operational discards and other discarded fish may improve. This may improve estimates of bycatch/discards of non-targeted species in the herring fishery and ultimately lead to a more reliable discard estimate that can be factored into stock assessments and utilized for better managing non-target species.

The management measures to address river herring bycatch were developed by the Council in response to concerns about the impacts of bycatch of this important species in the directed herring fishery. The status of river herring is unknown, although a stock assessment by ASMFC will be finalized in 2012. The ASMFC-managed directed river herring fishery is under a coastwide landings moratorium effective January 1, 2012. States with approved sustainable harvest plans have exemptions from the moratorium. These States include Maine, New Hampshire, New York, North Carolina, and South Carolina. NOAA considers both species, alewife and blueback herring, as species of concern and is reviewing whether they should be listed under the Endangered Species Act. The selection of the no action alternative with respect to river herring measures is not likely to be aligned with the coastwide moratorium and exemption process; however, the measures in place under the ASMFC and States would continue for both shad and river herring if the no action alternative is selected. It is likely, however, that the increased monitoring and data collection benefits or reductions in fishing effort in some times/areas that may be realized under the alternatives under consideration to address river herring bycatch may not be realized under the no action alternative. However, as previously noted, the catch monitoring measures in Amendment 5 are also expected to have positive impacts on river herring and other non-target species.

The alternatives to establish criteria for midwater trawl vessel access to the year-round closed areas may have a positive impact on non-target species and other fisheries, depending on which alternative is selected. The potential for positive impacts is greatest for the groundfish species, as these areas were selected by the Council to reduce groundfish mortality and rebuild groundfish stocks. Catch information presented in this document indicates that the majority of groundfish bycatch by midwater trawl vessels is haddock, the catch of which on midwater trawl vessels is already managed through a catch cap. The groundfish year-round closed areas were selected and closed to groundfish fishing to reduce fishing mortality and offer protection to groundfish stocks and spawning grounds. Eliminating midwater trawl fishing from these areas could provide a positive impact in that it would further reduce fishing activity in the areas and help to ensure that catch of non-target species and other fisheries in the area is minimized. The closed areas may provide mortality reductions for some non-target species, especially groundfish. This benefit, however, is dependent on individual species life history and migratory patterns along with their susceptibility to fishing gears at different life stages.

Physical Environment and Essential Fish Habitat: Under the no action alternatives/options, no additional management measures would be implemented in Amendment 5. Since these alternatives/options represent the status quo, no changes in the impacts on seabed habitats are expected, because current management measures to protect them would remain in place. Specifically, adverse effects on EFH that result from the herring fishery are estimated to be minimal and temporary, and would continue to be minimal and temporary if these alternatives/options are selected.

Most of the alternatives/options under consideration in this amendment are not expected to affect the amount or location of herring fishing effort where impacts can be predicted, and therefore most of the proposed measures are not likely have any adverse effects on EFH. For instance, the measures under consideration for adjustments to the fishery management plan are generally administrative in nature, and therefore not likely to have an effect on EFH. The two options under consideration that would implement changes to the open access provisions for limited access mackerel vessels may result in some impact to EFH by increasing potential for effort in the areas beyond recent or current levels, however the magnitude of the increase in trips that would be taken would not likely be large and would not change the areas in which operation typically occurs, and therefore any increase in bottom contact resulting from this alternative would have no more than a minimal adverse impact on benthic EFH, so the impacts to EFH is expected to be slight.

The measures under consideration for catch monitoring at sea are also expected to have a neutral impact overall, as effort in the herring fishery is not expected to increase or decrease as a result, and therefore adverse effects on EFH that result from the herring fishery are estimated to be minimal and temporary, and would likely continue to be minimal and temporary if these measures are selected. The impacts of the measures to address river herring bycatch on essential fish habitat are expected to enhance monitoring requirements or close areas; enhanced monitoring requirements are not expected to result in any additional impacts to seabed habitats/EFH, and while predetermined seasonal closures could influence spatial patterns of fishing effort, the changes are difficult to predict. Because seabed contact by midwater trawl gear is rare, it is assumed that herring fishery adverse effects on EFH will continue to be minimal and temporary if monitoring and avoidance areas are implemented. Under Alternative 3 (River Herring Protection), however, a shift in fishing that results in increased effort on Georges Bank during herring spawning (September – November) might lead to an increase in seabed gear contact, and thus an increase in adverse effects to EFH. The management measures to address midwater trawl access would either increase observer coverage in some areas or close areas to midwater trawl vessels; since midwater trawl gear has been determined to only occasionally contact the bottom and its impact on benthic habitats has been determined to be minimal and temporary, the increase in observer coverage would not cause any additional impacts to EFH. Potential changes in the magnitude and location of fishing effort as a result of the closures, and thus potential changes in seabed contact rates, are difficult to predict, however.

Protected Resources: There are numerous protected species that inhabit the environment within the Atlantic Herring FMP management unit, and that, therefore, potentially occur in the operations area of the fishery. These species are afforded protection under the Endangered Species Act of 1973 (ESA; i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA), and are under NMFS' jurisdiction. Due to this ongoing management of protected resources in the areas in which the herring fishery operates, the selection of no action relative to most of the alternatives/options in Amendment 5 would not be expected to directly impact them. Not selecting the other alternatives/options, however, may result in a small lost opportunity. Overall, most of the impacts of the management measures under consideration to protected resources are likely to be neutral or present a low positive impact, as the measures will not be changing operations within the fishery in a way that would negatively or positively impact them, but may increase observer coverage or close areas, thereby benefitting the species by collecting more information that will improve management in the future or removing them from the possibility of being impacted by herring fishery operations.

From the standpoint of protection and monitoring of protected resources in the area, most of the measures under consideration for adjustments to the fishery management plan are administrative in nature, and therefore not likely to have an effect. The two options under consideration that would implement changes to the open access provisions for limited access mackerel vessels may result in some impact to protected resources by increasing potential for effort in the areas beyond recent or current levels; however, the magnitude of the increase in trips that would be taken would not likely be large and would not change the areas in which operation typically occurs, so the impacts to protected resources is expected to be slight. The measures under consideration for catch monitoring at sea are also expected to have a neutral impact overall, as effort in the fishery is not expected to increase or decrease as a result, although a few measures that would potentially capture more rare events or record information from slipped catch have the potential to present a low positive impact on protected resources. The impacts of the measures to address river herring bycatch on protected resources are harder to predict, as the shift in effort as a result of the measures may or may not concentrate effort where the species overlap; however, most of the impacts are expected to be neutral or have a low positive effect, if observer effort is increased. Finally, the management measures to address midwater trawl access generally have the potential to have a low positive impact on protected resources through the collection of more information during encounters with the herring fishery and in areas which would potentially close as a result of the measure. Some shift in effort may occur as a result of the closures, however, so some impacts are currently unknown or are expected to be neutral as a result.

Fishery-Related Businesses and Communities: The Atlantic herring fishery occurs over the Mid-Atlantic shelf region from Cape Hatteras to Maine, including an active fishery in the inshore Gulf of Maine and seasonally on Georges Bank. The Atlantic herring winter fishery is generally prosecuted south of New England during the winter (January-April), and oftentimes as part of the directed mackerel fishery. There is significant overlap between the herring and mackerel fisheries during the winter months, although catches on Georges Bank (Area 3) tend to be relatively low. The herring summer fishery (May-August) is generally prosecuted throughout the Gulf of Maine and Georges Bank as fish are available. Restrictions in Area 1A (including ASMFC days out measures implemented in response to quota reductions) have pushed the fishery in the inshore Gulf of Maine to later months (late summer). Fall fishing (September-December) tends to be more variable and dependent on fish availability. A complete description of the Atlantic herring fishery, including vessels, dealers, processors, and fishing communities, is provided in the Draft Amendment 5 document.

In general, the catch monitoring program proposed in Amendment 5 is intended to improve reporting and documentation of catch – landings and discards – in the Atlantic herring fishery. The long-term impacts of improving catch monitoring is positive for fishery-related businesses and communities. As reporting and compliance improves, management uncertainty may be reduced (uncertainty about catch estimates is a component of management uncertainty) and long-term management of the herring fishery may improve. For example, some of the measures under consideration could reduce the likelihood for misallocating or double counting herring catches. Ultimately, this could lead to better catch data for stock assessments and may also reduce scientific uncertainty over the long-term. To the extent that scientific and management uncertainty can be reduced, additional yield can be made available to the herring fishery. The long-term impacts of reducing scientific and management uncertainty are likely to be positive. Some of the fishery-related impacts expected from the alternatives/options under consideration in the Amendment 5 catch monitoring program are summarized in the following bullets; the DEIS presented in this document, as well as the documents in Volume II, should be referenced for more thorough analysis and discussion of impacts.

- The impacts of the proposed options to address carrier vessels (Section 3.1.3.2) are expected to be positive for vessels engaged in this activity. For those vessels that already have VMS units on board, there would likely be no cost increase to using that unit to declare into the herring fishery as a carrier vessel.
- The measures to address transfers-at-sea (Section 3.1.3.3) may reduce opportunities for some vessels to participate in the herring fishery by limiting their ability to transfer herring at sea (unless they are carrying herring or participating in a pair trawl operation). Because of the high cost of fuel, the requirement to return to port in order to land their catch could negatively impact herring-related businesses that have permits that would fall under a transfer restriction. The impacts of these options on fishery-related businesses and communities, therefore, may be low negative.
- Extending the pre-trip and pre-landing notification requirements (Section 3.1.4) may improve allocation of observers and help ensure the timely sampling of the Atlantic herring fishery. Thus, data collected via the observer program may be more likely to achieve management goals (e.g., CV targets on discard estimates). Subsequently, management uncertainty may be reduced (uncertainty about discard estimates is a component of management uncertainty) and long-term management of the herring fishery may improve. Ultimately, this could lead to better catch data for stock assessments and may also reduce scientific uncertainty over the long-term. To the extent that management uncertainty can be reduced, additional yield can be made available to the fishery. The long-term impacts of reducing management uncertainty are positive for fishery-related businesses and communities.
- Overall, the impacts of the options to change open access permit provisions for limited access mackerel vessels (Section 3.1.6) are expected to be positive in comparison to the no action option, because of increased fishing opportunities and potential reductions in regulatory discards of herring.
- The impacts of measures to improve/maximize sampling at-sea (Section 3.2.2) are not expected to be significant for fishery-related businesses and communities. There may be some operational adjustments required by vessel operators and crew to comply with the new provisions; however, the proposed measures codify many of the practices that are already occurring at-sea when vessels take observers on-board. Interviews with captains and representatives/owners of herring businesses suggest that the proposed steps for improving or maximizing sampling at sea are currently a part of every herring vessels' normal operating practices, agreed upon by the fleet. To the extent that there are any vessels who do not comply, this option will make it easier to mandate these steps, thus making certain that observers on every boat have equal opportunity to fully sample the catch. The measures should improve the vessel owner/operator's understanding regarding expectations and the collection of information by observers during a fishing trip, and ensure safe working conditions for

observers on all fishing vessels. For the most part, there should be no differential impacts (by permit category) associated with these options. The direct pecuniary economic impacts of this option on the participants in limited access herring fishery are expected to be minimal. Any economic impacts to the herring fishery will be through increased administrative and regulatory burden.

- Some of the measures under consideration to address net slippage (Section 3.2.3) may have negative impacts on fishery-related businesses and communities. Any economic impacts to the herring fishery will be through increased time spent pumping fish aboard the vessel to be sampled and inspected by a NMFS-approved observer. The pecuniary impacts on the participants in herring fishery are therefore expected to be potentially low negative when compared to taking no action. In general, the option/sub-options proposing a catch deduction/trip termination for slippage events are designed to create a disincentive for limited access herring vessels to slip catch. When choosing to slip a net or bring all fish onboard, vessel operators will compare the costs of bringing those fish aboard to the penalty associated with slippage. The costs of bringing fish aboard which would otherwise be slipped are the extra time spent in this activity and, possibly, decreases in vessel safety during poor operating conditions. To the extent that Option 3 (and Option 4) compromise safety under some circumstances, both the herring fishery and communities would be negatively affected. The extent of impacts would depend on to what extent safety was affected (e.g., injury to loss of life for crewmembers and damage to loss of vessel for the boat) and the result. These costs are the same under all of the options/sub-options under consideration. The overall impact of the options that propose catch deductions and trip termination, in comparison to no action, is therefore expected to be negative.

During final decision-making, the long-term positive impacts of improving catch monitoring must be weighed against the negative impacts of implementing the catch monitoring program (and other measures proposed in Amendment 5) on fishery-related businesses and communities. Some of the measures proposed in Amendment 5 are likely to impose a cost on the industry, and the impacts on fishery-related businesses and communities are therefore likely to be negative. The alternatives/options that are most likely to result in negative impacts on fishery-related businesses and communities are the alternatives to allocate observer coverage on limited access herring vessels, measures to address river herring bycatch, and management measures to establish criteria for midwater trawl vessel access to the year-round groundfish closed areas.

Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels (Section 3.2.1)

In general, the potential impacts of the alternatives to allocate observer coverage on limited access herring vessels depend on whether additional funding would be required and if so, which funding option is selected. The impacts of the funding options are discussed in the Draft Amendment 5 document and apply to any alternatives under consideration that would require additional funding. Under Funding Option 1, Alternatives 2-4 are expected to have a neutral effect on fishery-related businesses and communities with respect to the no action alternative. Under Funding Option 2, Alternative 2 is likely to have the largest negative impacts on fishery-related businesses and communities. Alternative 4 is likely to have negative impacts, although the size of these impacts depends on the Council-specified targets/priorities. Alternative 3 is likely to have neutral or low negative impacts on fishery-related business and communities. Options for Observer Service Providers are likely to have neutral impacts on fishery-related businesses.

Relative to the daily operating costs for the Atlantic herring fishery, the cost of an observer is fairly high. For example, paying for a Northeast Fisheries Observer Program (NEFOP) observer would increase the per-day costs of single midwater trawl, pair trawl, purse seine and bottom trawl by 28%, 36%, 67%, and 153% respectively (see analysis in Section 5.2.6 of the Draft Amendment 5 document). However, relative to daily revenues, the cost of an observer is lower; an observer would cost 9%, 9%, 6%, and 22% of average daily revenues for the midwater, pair trawl, purse seine, and bottom trawl vessels respectively.

These figures are presented for illustration; it is possible that the type of data required in this fishery would result in higher or lower per-day costs than the $1,200 amount used to estimate costs of an NEFOP or other NMFS-approved observer.

Alternative 2 requires 100% observer coverage and would create negative impacts on herring-related businesses or communities if Federal funds were not used to pay for the additional observer coverage. Under Funding Option 1 (no action) were selected, the presumption is that Federal funds would be used. Under Funding Option 2, industry funds would be required to cover costs when Federal funds were unavailable; therefore, negative impacts on fishery participants are likely. These increased economic costs would result in less effort, lower landings, and affect the supply of herring bait in other fisheries. It would also negatively affect the businesses that supply (directed) herring-related businesses, and the communities whose economies are partially reliant on them (see the profiles for the Amendment 5 communities of interest, provided in the Draft Amendment 5 document). In 2010, a NEFOP observer costs approximately $1,200 per day (see previous section for more information). If industry members were required to pay for observers for every fishing day, this would increase operating costs by 28-153%.

Measures to Address River Herring Bycatch (Section 3.3)

Relative to the no action alternative, Alternative 2 (River Herring Monitoring/Avoidance, Section 3.3.2) and Alternative 3 (River Herring Protection, Section 3.3.3) are expected to have a negative impact on fishery-related businesses and communities due to the costs associated with increased monitoring and/or area closures.

Under Alternative 2, the extent of the impacts will depend on the option selected for monitoring as well as the availability of Federal funding for observer coverage in the proposed River Herring Monitoring/Avoidance Areas. Option 1, requiring 100% observer coverage in the Monitoring/Avoidance Areas, would likely have the largest negative impact on fishery-related businesses and communities, especially if the industry is required to pay for some or all observer coverage. Option 2 would have a similar negative impact as Option 1 if the sub-option for 100% observer coverage is selected. Option 3 implements either Options 1 or 2 after a catch trigger is reached and would therefore have less impact on fishery-related businesses and communities because the additional monitoring requirements would not become effective until the catch trigger is reached; if the catch trigger is not reached in any area during the fishing year, then no additional monitoring requirements would be applied to the Monitoring/Avoidance Areas. Option 4 represents an approach that builds from some industry-based initiatives and has potential to minimize adverse effects on fishery-related businesses and communities.

Under Alternative 3, some/all vessels having a Category A, B, C, or D permit may be prohibited from fishing for, possessing, catching, transferring, or landing herring from the proposed River Herring Protection Areas on all fishing trips using small mesh. The economic impact of this alternative on fishing vessels is the change in profits of these vessels, after accounting for any behavioral changes. Under a spatial closure, the directed herring fleet may undertake different averting behavior to minimize the impact of those spatial closures. Vessels may fish in other areas, likely with lower profits. Vessels may fish in other fisheries, again, likely earning lower profits, or cease fishing operations, in which case they earn zero operating profits. The exact impacts cannot be quantified at this time. However, based on current patterns of use, the impacts are expected to be neutral for vessels that use purse seine gear. The impacts are expected to be negative for vessels that use trawl gear to harvest herring.

Measures to Establish Criteria for Midwater Trawl Access to Groundfish Closed Areas (Section 3.4)

Alternatives 1 and 2 are not likely to result in significant impacts on fishery-related businesses and communities. Alternative 1 would maintain the measures in place that currently govern the Atlantic herring fishery and the associated fishery-related businesses and communities. Alternative 2 would eliminate the Closed Area I sampling provisions and the requirement that vessels take an observer on any trip that may enter Closed Area I. This alternative would likely have positive impacts on fishery-related businesses and communities because it increases flexibility and fishing opportunities while decreasing the regulatory burden associated with fishing in Closed Area I.

Under Alternative 3, 100% observer coverage would be required on midwater trawl vessels fishing in the groundfish closed areas. Using $1,200 per NEFOP-day as the cost of a day of monitoring, the total costs of this observer coverage is estimated at $254,400. However, based on observer days allocated through the current SBRM process, the midwater trawl fleet is likely to receive about 30% coverage. Therefore, the additional impacts to the fishing industry are likely to be approximately $169,000 if industry-funded observers are utilized to cover the additional cost in the groundfish closed areas (see Section 5.2 of the Draft Amendment 5 document for more information). If observer coverage is industry-funded, it is possible that herring vessels will avoid fishing in these areas more often (depending on markets, fish availability, fuel prices, and other factors) because fishing in the groundfish closed areas would be more expensive.

The expected impacts of Alternative 4(A) are similar to the expected impacts of Alternative 3 because this option requires 100% observer coverage in all of the groundfish closed areas. Restrictions on fishing practices as a result of the additional requirements are likely to increase costs of fishing slightly. The other potential impact is diminishing flexibility since the vessel operator would be required to provide notice if fishing in any of the year-round closed areas was contemplated. The requirement that a vessel must leave a Closed Area acts as a disincentive to slip a nets; however, this requirement may not promote safety-at-sea.

Alternative 5 proposes to close the year-round groundfish closed areas to midwater trawl vessels participating in the herring fishery. This alternative would reduce revenues for the midwater trawl fishery, and the number of midwater trawl trips would likely also decrease. While 12% of revenues for the midwater trawl fishery were located in the five closed areas (see analysis in Draft Amendment 5 document), this effort and revenue is not likely to completely disappear. Instead, the midwater fleet is likely to fish in other, less productive areas. This will increase costs for the fleet. The purse seine fleet is likely to benefit from additional catch due to the exclusion of trawl gear from the Western Gulf of Maine Closed Area portion of Area 1A.

The following tables summarize the impacts of the management measures under consideration in Amendment 5 on each of the VECs identified in this amendment and described in the Affected Environment.

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	Potential Impacts of the Proposed Adjustments to the Fishery Management Plan (Section 3.1)			
Measure Description	**VEC 1: Atlantic Herring**	**VEC 2: Non-Target Species /Other Fisheries**	**VECs 3 and 4: Essential Fish Habitat and Protected Resources**	**VEC 5: Fishery Related Businesses and Communities**
Section 3.1.1, Regulatory Definitions: Proposed regulatory definitions for *offload* and *transfer at sea*	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled	Neutral Measures are administrative and not likely to affect non-target species encountered in the herring fishery	Neutral Measures are administrative and not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled
Section 3.1.2, Administrative/General Provisions: -Expand possession limits to vessels working cooperatively -Eliminate the VMS power down provision - At-sea Dealer Permit	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled	Neutral Measures are administrative and not likely to affect non-target species encountered in the herring fishery	Neutral Measures are administrative and not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled
Section 3.1.3, Carrier Vessels: Option 2 - allow carriers to declare in/out through VMS to eliminate the 7-day minimum enrollment Option 3 - dual option allows SQ for carriers with no VMS	Neutral Measures not likely to affect the amount of herring for harvest or fishing effort	Neutral Measures not likely to affect non-target species encountered in the herring fishery	Neutral Measures not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Negative/Low Positive Option 2 would increase flexibility for limited access vessel but may negatively impact open access vessels that would need to purchase ($1,750-$3,300) and operate ($40-$100/month) a VMS; Option 3 increases flexibility for all vessels without the additional cost of purchasing/ operating a VMS
Section 3.1.3.3, Transfers at Sea: Option 2 - Category A and B vessels only Option 3 - prohibit transfers to non-permitted vessels	Low Positive Measures not likely to affect the amount of herring for harvest or fishing effort; transfers at sea represent small component of fishery, but options under consideration may improve catch monitoring	Neutral Measures not likely to affect non-target species encountered in the herring fishery	Neutral Measures not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Negative Option 2 decreases flexibility of Category C and D vessels; Option 3 decreases flexibility for all herring vessels by prohibiting vessels from selling herring at sea as lobster bait; Options 2 and 3 increase reporting burden but should have minimal negative economic impacts as less than 0.5% of catch is transferred at sea

Measure Description	Potential Impacts of the Proposed Adjustments to the Fishery Management Plan (Section 3.1) Continued VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Business and Communities
Section 3.1.4: Trip Notification Requirements Option 2 - modify/extend pre-trip notification requirements and add VMS gear declaration Option 3 - extend pre-landing notification requirement	Low Positive Herring harvest or fishing effort is not expected to change, but catch accounting and/or the tracking of catch may improve; either may improve allocation of observers and help ensure the timely sampling of the Atlantic herring fishery	Neutral Measures are administrative and not likely to affect non-target species encountered in the herring fishery	Neutral Measures are administrative and not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Positive Options 2 and 3 will increase reporting burden, but measures should provide consistency regarding which vessels are subject to the pre-trip and pre-landing notifications and extending notification requirements will likely improve allocation of observer coverage and management uncertainty can therefore be reduced.
Section 3.1.5: Reporting Requirements for Federally Permitted Dealers Option 2 - require dealers to weigh all fish Sub-Option 2A and 2B– requirement for annual/weekly reporting of catch composition estimation method Sub-Option 2C – vessel owner/operator confirmation of SAFIS	Neutral/Low Positive Option 2 does not require dealers to use any particular method to accurately weigh all fish; dealers are therefore unlikely to change their behavior under Option 2, in comparison to the no action alternative; sub-options may provide more information	Neutral/Low Positive Option 2 does not require dealers to use any particular method to accurately weigh all fish; dealers are therefore unlikely to change their behavior under Option 2, in comparison to the no action alternative; sub-options may provide more information	Neutral Measures are not likely to affect EFH or Protected Resources; Sub-Options is not likely to improve separation of protected resources	Neutral Sub-Option 2A/2B Low Negative Sub-Option 2C Low Positive Option 2 does not require dealers to use any particular method to accurately weigh all fish; dealers are therefore unlikely to change their behavior under Option 2, in comparison to the no action alternative; Sub-Options 2A/2B would require extra time and effort for owner/operators; 2C may improve quality of data, resulting in better monitoring against sub-ACLs (potential economic benefit)
Section 3.1.6: Changes to Open Access Provisions for Limited Access Mackerel Vessels in Areas 2/3 Option 2 - 20K pound possession limit of LA mackerel vessels with OA herring permit Option 3 - 10K pound possession limit option for LA mackerel vessels with OA herring permit	Neutral Increases the potential for targeted fishing for herring in SNE and MA areas; should not be a concern for herring because of quota management (controls F) but impact on inshore stock depends on timing of catch and stock component mixing	Unknown Impacts will depend largely on how many vessels/which tiers the Council agrees to apply these options to; will also depend on if additional measures are implemented to monitor or manage the catch of non-target species in the times and areas where vessels with the new mackerel permit may fish	Low Negative Increase in effort may lead to more encounters with EFH and/or Protected Resources, however the effort increase is expected to be minimal based on the magnitude of the overall fishery	Positive Could decrease the occurrence of regulatory discards and increase revenues for vessels that qualify for this permit category; vast majority of mackerel are landed by vessels which are not subject to the 3 mt possession limit; equity issue between LA herring and mackerel permit holders may be resolved by permitting similar levels of non-directed catch in both fisheries

Measure Description	VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Business and Communities
	Potential Impacts of the Catch Monitoring at Sea Alternatives (Section 3.2)			
Section 3.2.1.2, Alternative 2 - 100% Observer Coverage: Funding Option 2 - federal and industry funds States as Service Providers Option 2 - states authorized	Positive Benefits to resource would be highest under this alternative because it increases the likelihood of better documenting herring catch the most; may improve the precision of estimates of discards and/or landed bycatch; long-term effects may have low positive effects; relationship between observer coverage and precision important to consider at high levels of coverage	Positive Benefits from significant increase in sampling and coverage, which should lower CVs and increase precision of bycatch estimates in the herring fishery; relationship between observer coverage and precision important to consider at high levels of coverage	Neutral/Low Positive Measures are not likely to affect EFH; the effects to Protected Resources result from significant increase in sampling and observer coverage	Potentially High Negative Impacts depend on funding options for observer coverage; would only create negative impacts on herring-related businesses or communities if Federal funds were not used to pay for the additional observer coverage; full cost of 100% coverage of the A/B/C herring fishery is likely to be approximately $2.5M per year
Section 3.2.1.3, Alternative 3 - Require SBRM Coverage Levels as Minimum: Funding Option 2 - federal and industry funds	Unknown/Potentially Low Positive Unclear how observer allocations may differ from the status quo; if sampling increases, may improve the precision of estimates of discards and/or landed bycatch; have low positive long-term effects	Unknown/Neutral Unclear how observer allocations may differ from the status quo; if sampling increases, will only affect a minor component of Northeast Region fisheries	Neutral/Unknown Measures are not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Unknown/Potentially Low Negative Similar to status quo; unclear what additional coverage would result from adopting this approach; would negatively affect fishery-related businesses if industry has to pay for additional coverage
Section 3.2.1.4, Alternative 4 - Council Specified Targets: Funding Option 2 - federal and industry funds	Low Positive May improve the precision of estimates of discards and/or landed bycatch; long-term effects may have low positive effects	Positive Allocation of additional observer coverage of river herring and haddock may lead to a great understanding and reliability of their bycatch estimates; would not impact the SBRM allocation scheme, and would therefore not cause other fisheries to be under-sampled	Neutral/Low Positive Measures are not likely to affect EFH; Protected Resources may benefit from additional monitoring	Potentially Negative Impacts depend on funding options for observer coverage; would negatively impact herring-related businesses if the industry has to pay for coverage; depends on the Council-specified targets/priorities

Measure Description	Potential Impacts of the Catch Monitoring at Sea Alternatives (Section 3.2) Continued			
	VEC 1: Atlantic Herring	**VEC 2: Non-Target Species /Other Fisheries**	**VECs 3 and 4: Essential Fish Habitat and Protected Resources**	**VEC 5: Fishery Related Businesses and Communities**
Section 3.2.2.2, Additional Measures Improve Sampling: Option 2A - requirements for a safe sampling station Option 2B - requirements for reasonable assistance Option 2C - requirements to provide notice Option 2D - requirements for trips with multiple vessels Option 2E - pair trawl communication Option 2F - visual access to net/codend	Neutral May have little impact on the Atlantic herring resource; several of the measures may provide some additional information on the contents of slipped nets, discards, and landed catch, but likely to be qualitative	Neutral Several of the measures may provide some additional information on the contents of slipped nets, discards, and landed catch, but likely to be qualitative and not likely to affect the outcome of future assessments of non-target species	Neutral Measures are not likely to affect EFH or Protected Resources	Neutral Minimal direct economic impacts on the herring fishery; the proposed steps for improving or maximizing sampling at sea are currently a part of every herring vessels' normal operating practices, according to interviewed captains; it is unknown how this measure may affect purse seine operations; any economic impacts to the herring fishery will be through increased administrative and regulatory burden, but expected to be slight
Section 3.2.3.2, Measures to Address Net Slippage: Option 2 - require released catch affidavit for slippage events	Unknown May improve accounting of Atlantic herring catch but still represents an estimate; may therefore be redundant and unlikely to affect herring resource	Neutral May improve accounting of non-target species/other fisheries catch, but still represents an estimate	Neutral Released catch affidavits are not likely to affect EFH or Protected Resources	Neutral Minimal impacts on the directed herring fishery
Section 3.2.3.3, Measures to Address Net Slippage: Option 3 - CAI Sampling Provisions	Positive Likely to improve accounting of Atlantic herring catch; may improve statistics used in stock assessment and reduce uncertainty to an unknown degree	Low Positive Likely to improve accounting of non-target species/other fisheries	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Potentially Low Negative Minimal direct economic impacts on the herring fishery; however there may be new challenges associated with bringing operational discards on board for some vessels; increased times spent pumping fish to be sampled and observed; it is unknown how this measure may affect purse seine operations

Measure Description	Potential Impacts of the Catch Monitoring at Sea Alternatives (Section 3.2) Continued VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
Section 3.2.3.4, Measures to Address Net Slippage: Option 4 - catch deduction (and possible trip termination) for slippage events Option 4A -catch deduction, possible trip termination Option 4B - with CAI provisions Option 4C - with CAI provisions (10 events) Option 4D - with CAI provisions (5 events)	Low Positive Would likely result in sub-ACLs being attained more quickly with subsequent directed fishery closures occurring sooner; possible increase in herring abundance	Neutral/Potentially Low Positive Effects difficult to predict; trip termination could reduce the amount of effective fishing effort in an area throughout the course of the fishing season, thereby reducing bycatch and mortality of non-target species; the extent of the impacts will be determined by how fishing effort shifts and whether or not the fleet moves into an area(s) with a higher potential of encountering these species.	Unknown Not likely to affect EFH; impacts to Protected Resources will vary based on reaction of the fleet to the new measures	Negative Trip termination increases costs to participants; sub-ACL deductions could reduce catch and revenue, although this is likely to have an effect only in Areas 1A and 1B unless sub-ACLs are fully utilized in other areas; aggregate revenues expected to decline by $12,000-$15,000 per slippage event in areas where ACLs are fully utilized; potential safety concerns with trip termination and measures that are perceived as punitive
Section 3.2.4.2, Alternative 2: Evaluation of maximized retention through the annual issuance of exempted fishing permits	Unknown/Low Positive Would likely have little effect on the herring resource because it would not affect the mortality rate exerted on the stock; dealers may record previously undocumented catch	Unknown/Low Positive Could increase the scientific knowledge available to fisheries managers about bycatch of non-target species; impacts to mackerel fishery would need to be evaluated by NMFS when the alternative is developed	Neutral Exempted fishing permits are not likely to affect EFH or Protected Resources	Unknown Could degrade the quality of the catch by damaging in while in the fish hold; retention of non-marketable fish in the hold of a vessel reduces the amount of marketable fish which can be landed; magnitude of these effects are unknown at this time.

Measure Description	Potential Impacts of the Management Measures to Address River Herring Bycatch (Section 3.3) VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
Section 3.3.2.2.1, 3.3.2.2.2, and 3.3.2.2.3; Alternative 2 - Monitoring/Avoidance Management Options: Option 1 - 100% Observer Coverage Option 2 - CAI sampling provisions Option 3 - trigger based monitoring	Low Positive No direct biological impact on the herring resource; indirect long-term benefits likely to result from improvements to catch sampling, increased sampling, and a reduction in unobserved catch	Potentially Positive May improve understanding of river herring encounters in the Atlantic herring fishery through focused monitoring and could lead to possible reductions in river herring mortality if the fleet avoids those areas; more monitoring may mean more bycatch/discards information in specific areas where river herring may be missed; monitoring specific areas instead of across the full range of the species may miss important river herring encounters by the fleet	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Negative Potential for increased costs associated with industry payment for observers; could trigger additional losses, thereby affecting bait supplies; slightly higher regulatory/compliance costs; indirect users of the river herring resource may benefit if higher stock levels of river herring are achieved; uncertainty of trigger mechanisms makes business planning difficult; complexity of trigger reporting options likely to be very challenging for fishery participants to provide accurate catch information in a real-time manner; impact may be mitigated for shrimp fishery and large-mesh bottom trawl vessels if exemption is approved
Section 3.3.2.2.4, Alternative 2 - Monitoring/Avoidance Management Options: Option 4 - two phase bycatch avoidance approach based on SFC project	Neutral No direct biological impact on the herring resource; indirect long-term benefits if the industry can work cooperatively to develop a long-term avoidance strategy	Potentially Positive Could be reductions in river herring mortality in the bimonthly avoidance areas; would need to be adequate incentives in place for the fleet to avoid the areas	Neutral The shift in effort is not likely to affect EFH or Protected Resources	Low Negative Collaboration with trusted institutions may allow herring fishery participants to participate in observations and facilitate monitoring/sampling that will lead to appropriate adjustments of Monitoring/Avoidance Areas and to the development of avoidance strategies; could ultimately reduce costs associated with bycatch avoidance because the industry would likely prioritize cost-effectiveness when developing strategies

	Potential Impacts of the Management Measures to Address River Herring Bycatch (Section 3.3)			
Measure Description	**VEC 1: Atlantic Herring**	**VEC 2: Non-Target Species /Other Fisheries**	**VECs 3 and 4: Essential Fish Habitat and Protected Resources**	**VEC 5: Fishery Related Businesses and Communities**
Section 3.3.3.2.1, Alternative 3 - River Herring Protection: Option 1 - closed areas	Neutral Not likely to affect total removals of herring from the fishery; many of the blocks proposed for seasonal closure under Alternative 3 overlap substantially with the herring fishery, suggesting that directed herring fishing effort may be reduced, at least seasonally, in some of the areas, but the areas are small and closed for short durations; other fishing activity is likely to occur as well; no benefits to the resource are expected	Potentially Positive May provide river herring protection during at-sea migrations, leading to reductions in mortality; fixed protection areas would not provide river herring mortality protection outside of protection areas; open areas could therefore have increased river herring encounter rates, depending on year-to-year variability associated with river herring distribution	Unknown Closed areas levels are not likely to affect EFH; Protected Resources impacts are unknown due to uncertainty in shift of effort	Negative Decreases in revenue in the directed fishery and/or increases in costs of fishing may occur with the closures; trawl fishery participants during the winter season may experience hardship due to the overlap with Protection Areas; may be straight-forward option to enforce; economic and social costs may be incurred though the variability of the hotspots; impact may be mitigated for shrimp fishery and large-mesh bottom trawl vessels if exemption is approved
Section 3.3.3.2.2, Alternative 3 - River Herring Protection: Option 2 - trigger based closed areas	Neutral Not likely to affect total removals of herring from the fishery; many of the blocks proposed for seasonal closure under Alternative 3 overlap substantially with the herring fishery, suggesting that directed herring fishing effort may be reduced, at least seasonally, in some of the areas, but the areas are small and closed for short durations; other fishing activity is likely to occur as well; no benefits to the resource are expected	Potentially Positive May provide river herring protection during at-sea migrations, reducing mortality; fixed protection areas would not provide river herring protection outside of the areas; open areas could therefore have increased river herring encounter rates, depending on year-to-year variability associated with river herring distribution; triggered closures may not be implemented quickly enough to protect river herring during migration	Unknown Closed areas levels are not likely to affect EFH; Protected Resources impacts are unknown due to uncertainty in shift of effort	Negative Decreases in revenue in the directed fishery and/or increases in costs of fishing may occur with the closures; trawl fishery participants during the winter season may experience hardship due to the overlap with Protection Areas; economic and social costs may be incurred though the variability of the hotspots, complexity of reporting catch under triggers, and uncertainty associated with reaching the triggers during the fishing year

Potential Impacts of the Management Measures to Address Midwater Trawl Access to Groundfish Closed Areas (Section 3.4)

Measure Description	VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
Section 3.4.1, Alternatives 1, 2: No Action/ Pre-CAI Provisions	Neutral/Low Negative Maintain current provisions or adopt pre-CAI provisions; Alt 2 less restrictive by eliminating CAI sampling provisions	Neutral/Low Negative Maintain current provisions or adopt pre-CAI provisions; Alt 2 less restrictive by eliminating CAI sampling provisions	Neutral Maintain current provisions or adopt pre-CAI provisions; Alt 2 less restrictive by eliminating CAI sampling provisions	Neutral/Potentially Positive No impact (status quo); Alt 2 increases flexibility and fishing opportunities while decreasing the regulatory burden associated with fishing in CAI
Section 3.4.2, Alternative 3: 100% observer coverage in closed areas	Low Positive No direct biological impact on the herring resource; indirect long-term benefits likely to result from improvements to catch sampling, increased sampling, and a reduction in unobserved catch	Low Positive May improve accounting and precision of estimates of discards and/or landed bycatch for non-target species, especially groundfish (i.e. haddock, cod); almost all groundfish catch by herring vessels is haddock, which is already managed under a catch cap	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Potentially Low Negative Impacts depend on funding options for observer coverage; would only create negative impacts on herring-related businesses or communities if Federal funds were not used to pay for the additional observer coverage
Section 3.4.3, Alternative 4: Apply CAI provisions Option 4A - 100% observer coverage Option 4B - Less than 100% observer coverage	Low Positive No direct biological impact on the herring resource; indirect long-term benefits likely to result from improvements to catch sampling, increased sampling, and a reduction in unobserved catch	Low Positive Likely to improve accounting of non-target species/other fisheries; may improve estimation of principle bycatch species (herring, haddock, river herring, etc.)	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Potentially Low Negative Minimal direct economic impacts on the herring fishery; however there may be new challenges associated with bringing operational discards on board for some vessels; unknown how measure may affect purse seine operations; diminishing flexibility may result since the vessel operator would be required to provide notice if fishing in any of the closed areas
Section 3.4.4, Alternative 5: Closed Areas - prohibit midwater trawl fishing in year-round closed areas	Neutral/Low Positive Not likely to affect total removals because of shifts in fishing effort; may be beneficial for herring in Georges Bank closures (CAI and CAII) and in the more inshore closures in the Nantucket Lightship Closure, GOM Closure, and Cashes Ledge Closures; may offer protection for biodiversity rich areas	Positive May offer protection against groundfish mortality extended beyond existing gear exclusions; may be beneficial for haddock in GB closures (CAI and CAII) and a diverse suite of species (such as river herring, shad, and mackerel) in the more inshore closures in the Nantucket Lightship Closure, GOM Closure, and Cashes Ledge Closures; may offer protection for biodiversity rich areas	Neutral/Unknown Closed areas levels are not likely to affect EFH; Protected Resources impacts are unknown due to uncertainty in shift of effort	Negative Would likely reduce revenues for the midwater trawl fishery; number of midwater trawl trips would likely also decrease; midwater fleet is likely to fish in other, less productive areas while purse seine fleet benefits from their exclusion

List of Acronyms

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
AE	Affected Environment
AHE	Affected Human Environment
AM	Accountability Measure
APA	American Pelagic Association
ASMFC	Atlantic States Marine Fisheries Commission or Commission
B	Biomass
BT	Border Transfer
CAI	Closed Area I
CAII	Closed Area II
CAA	Catch at Age
CEQ	Council on Environmental Quality
CHOIR	Coalition for the Atlantic Herring Fishery's Orderly, Informed, and Responsible Long-Term Development
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAP	Domestic Annual Processing
DEA	Data Envelopment Analysis
DMF	Division of Marine Fisheries
DMR	Department of Marine Resources
DEIS	Draft Environmental Impact Statement
DWF	Distant-Water Fleets
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
E.O.	Executive Order
ESA	Endangered Species Act
F	Fishing Mortality Rate
FEIS	Final Environmental Impact Statement
FMP	Fishery Management Plan
FY	Fishing Year
GB	Georges Bank
GEA	Gear Effects Evaluation
GIFA	Governing International Fisheries Agreement

GMRI	Gulf of Maine Research Institute
GOM	Gulf of Maine
GRT	Gross Registered Tons
HCA	Habitat Closed Area
HPTRP	Harbor Porpoise Take Reduction Plan
ICNAF	International Commission for the Northwest Atlantic Fisheries
IRFA	Initial Regulatory Flexibility Analysis
IOY	Initial Optimal Yield
IVR	Interactive Voice Response
IWC	International Whaling Commission
IWP	Internal Waters Processing
JVP	Joint Venture Processing
LWTRP	Large Whale Take Reduction Plan
M	Natural Mortality Rate
MA DMF	Massachusetts Division of Marine Fisheries
MAFMC	Mid-Atlantic Fishery Management Council
ME DMR	Maine Department of Marine Resources
MMPA	Marine Mammal Protection Act
MR	Maximized Retention
MRFSS	Marine Recreational Fisheries Statistical Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
mt	Metric Tons
NAO	North Atlantic Oscillation
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NLSCA	Nantucket Lightship Closed Area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
NT	Net Tonnage
NSGs	National Standard Guidelines
OCS	Outer Continental Shelf
OFL	Overfishing Limit

OLE	Office of Law Enforcement
OY	Optimum Yield
PBR	Potential Biological Removal
PDT	Plan Development Team
PS/FG	Purse Seine/Fixed Gear
PRA	Paperwork Reduction Act
RFA	Regulatory Flexibility Act
RH	River Herring
RIR	Regulatory Impact Review
SARC	Stock Assessment Review Committee
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
SFA	Sustainable Fisheries Act
TAC	Total Allowable Catch
TALFF	Total Allowable Level of Foreign Fishing
TC	Technical Committee
TRAC	Transboundary Resource Assessment Committee
USAP	U.S. At-Sea Processing
USFWS	US Fish and Wildlife Service
VEC	Valued Ecosystem Component
VMS	Vessel Monitoring System
VPA	Virtual Population Analysis
VTR	Vessel Trip Report

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Table of Contents

List of Tables

List of Figures

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AMENDMENT 5 TO THE ATLANTIC HERRING FMP

1.0 INTRODUCTION AND BACKGROUND

This draft amendment document and draft environmental impact statement (DEIS) proposes and analyzes management alternatives and measures to achieve specific goals and objectives for the Atlantic herring fishery. This document was prepared by the New England Fishery Management Council and its Herring Plan Development Team (PDT), in consultation with the National Marine Fisheries Service (NMFS, NOAA Fisheries), the Atlantic States Marine Fisheries Commission (ASMFC), and the Mid-Atlantic Fishery Management Council (MAFMC). This amendment is being developed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, 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). In 1996, Congress passed the Sustainable Fisheries Act (SFA), which amended and reauthorized the MSA and included a new emphasis on precautionary fisheries management. New provisions mandated by the SFA require managers to end overfishing and rebuild overfished fisheries within specified time frames, minimize bycatch and bycatch mortality to the extent practicable, and identify and protect essential fish habitat (EFH). The MSA was again reauthorized in 2007 to require the establishment of annual catch limits (ACLs) and accountability measures (AMs) in order to end and/or prevent overfishing in all FMPs. The proposed amendment is also consistent with the provisions contained in the reauthorized Magnuson-Stevens Act.

Although this FMP amendment has been prepared primarily in response to the requirements of the MSA and NEPA, it also addresses the requirements of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). When preparing a Fishery Management Plan or FMP amendment, the Council also must comply with the requirements of the Regulatory Flexibility Act (RFA), the Administrative Procedures 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/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 of the FMP amendment, including a DEIS as required by NEPA and information to ensure consistency with other applicable laws and executive orders.

1.1 DOCUMENT ORGANIZATION

This document is organized into the following volumes:

<u>Volume I: Draft Amendment 5/DEIS Document</u>

This document represents Volume I and includes the Draft Amendment as well as its draft Environmental Impact Statement (DEIS) and a preliminary evaluation of impacts relative to other applicable laws. Volume I provides the background and context for Amendment 5 (Affected Environment), describes in detail all of the management alternatives under consideration in the amendment, provides detailed information about all of the components of the ecosystem and fishery potentially affected by the measures proposed in Amendment 5, evaluates the potential impacts of the management alternatives under consideration, addresses the Amendment 5 alternatives under consideration with respect to other applicable laws, provides the public and the Council with adequate information about the measures and their impacts to ultimately inform decision-making following the public comment period.

<u>Volume II: Draft Amendment 5 Appendices</u>

Appendix I. Discussion Paper: *Potential Applicability of Flow Scales, Hopper Scales, Truck Scales and Volumetric Measurement in the Atlantic Herring Fishery*

Appendix II. Herring PDT Portside Sampling/Sea Sampling Data Analysis

IIA. *Comparison of (Landed) Bycatch Estimates from Portside and At-Sea Observer Sampling Programs in the Atlantic Herring Fishery* (July 2010)

IIB. *A Comparison of Portside and At-Sea Sampling Methods of Estimating Bycatch in the Atlantic Herring Fishery* (May 2011)

Appendix III. *Detailed Analysis of Impacts of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels*

Appendix IV. Herring PDT Analysis: Development of Measures to Address River Herring Bycatch

IVA. *Identification of river herring hotspots at sea using multiple fishery dependent and independent datasets* (July 2010)

IVB. *Update: Identification of river herring hotspots at sea using fisheries dependent and independent datasets (8/30/2010)*

IVC. *Update (Supplemental Material): Identification of river herring hotspots at sea using fisheries dependent and independent datasets (8/30/2010)*

IVD. *Spatial Management Alternatives to Address River Herring Bycatch in the Directed Atlantic Herring Fishery* (12/20/2010)

Appendix V. *Spatial and Temporal Analysis of River Herring Bycatch in the Northern Shrimp Fishery* (Cournane November 2011)

Appendix VI. *Detailed Analysis of Impacts of Management* Measures Under Consideration in Amendment 5 to Address River Herring Bycatch

Appendix VII. Discussion Paper: *Developing River Herring Catch Cap Options in the Directed Atlantic Herring Fishery* (December 2010)

Appendix VIII. Discussion Paper: *Summary of Available Information and Management Approaches to Addressing Spawning Atlantic Herring*

1.2 BACKGROUND – MANAGEMENT HISTORY AND FMP DEVELOPMENT

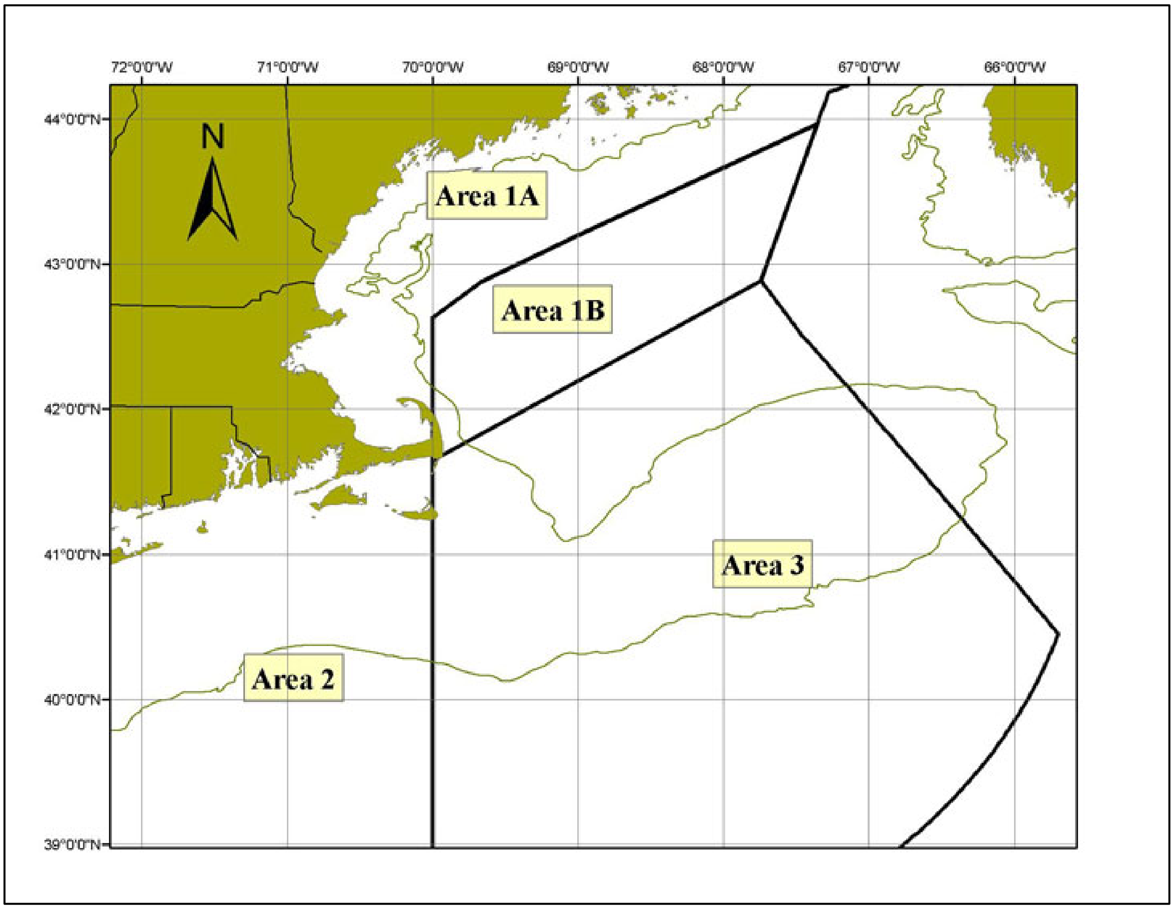
Atlantic sea herring stocks were first managed in 1972 through the International Commission for the Northwest Atlantic Fisheries (ICNAF). ICNAF regulated the international fishery until the United States withdrew from the organization in 1976 with the passage of the Magnuson Fishery Conservation and Management Act (now Magnuson-Stevens, MSFCMA). From 1976-1978, the National Marine Fisheries Service (NMFS, NOAA Fisheries) developed a Preliminary Management Plan (PMP) to regulate foreign fishing for herring in the U.S. Exclusive Economic Zone (EEZ). Under the aegis of the MSFCMA, the newly-established New England Fishery Management Council (NEFMC) developed a Fishery Management Plan (FMP) for Atlantic herring, which was approved by the Secretary of Commerce and implemented on December 28, 1978. In 1982, NMFS withdrew the Federal Herring FMP once it became clear that catch quotas for adult herring in the Gulf of Maine were not enforced in State waters. In the absence of a Federal FMP, Atlantic herring was placed on the prohibited species list, thereby eliminating directed fisheries by foreign nationals or joint ventures in the EEZ and requiring any herring bycatch by such vessels to be discarded.

While directed fishing for Atlantic herring was prohibited in Federal waters in 1983, the herring fishery in State waters was managed through an agreement among the States of Maine, New Hampshire, Massachusetts, and Rhode Island. The final draft of the "Interstate Sea Herring Management Plan of Maine, New Hampshire, Massachusetts, and Rhode Island" was adopted in late 1983 and formally recognized by the Atlantic States Marine Fisheries Commission (ASMFC) in 1987. The premise of the Interstate Herring FMP was to gather information to further develop and facilitate the implementation of a more robust management program for Atlantic herring in the future. The Interstate FMP also protected spawning herring through spawning closures and promoted complementary management throughout the species' range.

As the size of the resource grew, so did the interest in Internal Water Processing (IWP) operations. It became clear that the 1983 Interstate FMP was no longer adequate to manage the U.S. Atlantic herring resource. Utilizing spawning closures as the primary management tool, the agreement was not comprehensive enough to maintain a healthy resource or equitably distribute IWP shares between the States with IWP applicants. In 1993, a second Memorandum of Understanding (MOU) was circulated among the States of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York and New Jersey. Through the MOU, the participating States demonstrated their intent to cooperatively manage Atlantic herring. The ASMFC developed the Atlantic Herring Fishery Management Plan in 1993 to address the growth of the herring resource, formalize the allocation process for IWP shares, and lay the foundation for a joint ASMFC-NEFMC management plan (ASMFC 1993).

The New England Council's Herring FMP became effective on January 10, 2001 and included administrative and management measures to ensure effective and sustainable management of the herring resource. The FMP establishes Total Allowable Catches (TACs, now referred to as sub-ACLs) for each of four management areas as the primary control on fishing mortality (see Figure 1 for current herring management areas).

Figure 1 Atlantic Herring Fishery Management Areas



Other elements of the Federal Herring FMP include requirements for vessel, dealer, and processor permits as well as reporting requirements and restrictions on the size of vessels that can take, catch, or harvest herring. Framework Adjustment 1 to the Council's Herring FMP was implemented for the 2002 fishing year (January 1, 2002 – December 31, 2002) and currently remains in effect. Framework 1 split the TAC for Area 1A (inshore Gulf of Maine/GOM) into two seasonal components in an attempt to prevent an early closure of the fishery in 1A when the TAC is reached.

Amendment 1 to the Herring FMP was submitted in 2006 to improve resource conservation, address new scientific information to the extent possible, minimize the potential for excess harvesting capacity in the fishery, and provide a platform to promote long-term economic stability for harvesters, processors, and fishing communities. The primary purpose of Amendment 1 was to modify the management program for the Atlantic herring fishery by implementing:

- A limited access program for all management areas in the Atlantic herring fishery – separate limited access program for Area 1 and Areas 2/3 with two-tier permit system to qualify vessels for a directed fishery and an incidental catch fishery; limited access permit provisions consistent with those in other Northeast Region limited access fisheries; open access incidental catch permit and 3 mt possession limit for vessels that do not qualify for any limited access permits and catch small amounts of herring incidentally;

- Adjustments to herring management area boundaries – re-specification of Area 3 and consequent modifications to the boundaries for Areas 1B and 2;
- Establishment of a seasonal purse seine/fixed gear-only area – all of Area 1A from June – September of each fishing year;
- Specification of a proxy for maximum sustainable yield (220,000 mt);
- Adjustments to the herring fishery specification process, including a more flexible process for determining the distribution of TACs, a process for multi-year specifications (three fishing years); and a process for establishing TAC set-asides for research;
- Measures to address fixed gear fisheries, including an approach to account for the Downeast ME fixed gear fishery catch as part of the New Brunswick weir fishery catch when determining fishery specifications, and a 500-mt set-aside of the TAC in Area 1A for the remainder of fixed gear fisheries in this area until November 1 of each year; and
- Changes to the regulatory definition of midwater trawl gear.

Amendment 2 to the Herring FMP was part of an omnibus amendment developed by NMFS to ensure that all FMPs of the Northeast Region comply with the Standardized Bycatch Reporting Methodology (SBRM) requirements of the MSA. Amendment 3 to the Herring FMP is currently under development by the Council and represents an omnibus amendment to all Council FMPs to address Essential Fish Habitat (EFH) consistent with the MSA. Amendment 4 implemented a process for establishing annual catch limits and accountability measures in the herring fishery and brought the Herring FMP into compliance with the recently reauthorized MSA.

Amendment 4 included management measures to:

- Establish annual catch limits (ACLs) in the fishery, a measure which consists of four components:
  - Define terms which would bring the Atlantic Herring FMP into compliance with the MSA, which included setting an interim ABC control rule;
  - Eliminate Joint Venture Processing (JVP), Internal Waters Processing (IWP), Total Allowable Level of Foreign Fishing (TALFF) and Reserve specifications from the process (the council decided upon this sub-option as opposed to the status quo sub-option which would have retained JVP, IWP, TALFF and Reserve in the specifications process);
  - Establish the possibility of sub-ACLs in the fishery, along with possible corresponding AMs or other sub-ACL measures; and
  - Establish the Atlantic Herring Fishery Specification Process which utilizes the elements being established within Amendment 4;
- Establish accountability measures (AMs) for the herring fishery:
  - Institute the current management measures, which close the fishery when 95% of the sub-ACL is projected to be reached, as an AM;
  - Create a consequential AM that can apply to ACLs or sub-ACLs for overages by subtracting the amount of the overage from subsequent ACLs; and
  - Create a haddock catch cap which complies with current management.

1.3 NOTICE OF INTENT AND SCOPING PROCESS

The New England Fishery Management Council published a Notice of Intent (NOI) to announce its intent to develop this amendment (Amendment 4 at the time) and prepare an EIS to analyze the impacts of the proposed management alternatives on May 8, 2008. A second, Supplementary NOI was published on December 28, 2009 to announce the intent to prepare an EA for Amendment 4 and EIS for Amendment 5, after the two amendments were split. The purpose of both of the NOIs was to alert the interested public to the commencement of the scoping process and to provide for public participation in the development of this amendment, consistent with the requirements of NEPA.

NEPA provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with Federal actions and for considering a reasonable range of alternatives to avoid or minimize adverse impacts to the extent practicable. The scoping process is the first and best opportunity for members of the public to raise issues and concerns for the Council to consider during the development of an amendment. The Council relies on public input during the scoping process both to identify management issues and develop alternatives that meet the Herring FMP objectives. Public comments early in the amendment development process help the Council to address issues of concern in a thorough and appropriate manner.

A scoping document was prepared and distributed to inform the public of the Council's intent to gather information necessary for the preparation of Amendment 4 and ask for suggestions and information on the range of issues to be addressed in this amendment. During the scoping period for Amendment 4 (May 8 – June 30, 2008), four scoping meetings were conducted, and numerous written comments were received. Comments received during the scoping process were considered carefully by the Council when developing the management alternatives under consideration in this amendment.

The measures proposed in this amendment were originally developed as part of Amendment 4 to the Atlantic Herring FMP, but Amendment 4 was split in June 2009 so that the Council could develop annual catch limits (ACLs) and accountability measures (AMs) for implementation for the 2011 fishing year (as mandated by the MSA). The ACL/AM component was designated to be part of Amendment 4, and other measures under consideration (catch monitoring program, river herring bycatch measures, criteria for midwater trawl access to groundfish closed areas, measures to address interactions with the Atlantic mackerel fishery) required additional work/discussion and was developed for this amendment.

The Herring Committee, Advisory Panel, and Plan Development Team considered all the scoping comments during the development of the range of alternatives in this amendment. The major issues that were identified and discussed during the scoping process for the Amendment 5 EIS are generally summarized below. This summary is not intended to reflect every comment that was received, and the letters and scoping meeting summaries should be referenced to gain a better perspective on individual comments, ideas and suggestions.

1.3.1 General Scoping Comments

- It was suggested that the regulations for the VMS system were antiquated and duplicative with the call-in and IVR system. Complications with the system and the observer program were also mentioned. Likewise, difficulties with the IVR system were brought forward. It was asked that these issues be addressed to make the reporting system simpler.
- One issue that also arose was dealer reporting. It was suggested that species identification and reporting requirements for dealers be improved so that the information gathered could be more consistent.

1.3.2 Comments About Bycatch

- Many interested parties felt that the midwater trawl sector of the Atlantic herring fleet was more detrimental to stocks in the ocean than had been previously observed. Bycatch was a primary concern, and many felt that the observer coverage at the time did not adequately detect it. Some who commented felt that the protocols utilized by observers were not adequate to capture what was occurring in the fishery. Some felt that punitive measures should be taken to avoid bycatch in the fishery. Others felt that higher observer coverage would provide more data to better understand herring and their role in the ecosystem (as a forage fish), which was a significant concern for many parties.
- A few interested parties suggested that observation of the fishery could benefit from video monitoring (cameras) and newer technology, as well as scales. A few other parties felt that maximized retention should become an alternative in the document, which would allow for a full sampling of bycatch in the fishery. Several commenters suggested that a more robust dockside monitoring program would be beneficial.

1.3.3 Comments About River Herring

- There was concern from several interested parties that bycatch of river herring by the Atlantic herring fleet was high. Some suggested that higher monitoring would allow for better estimates of the amount of river herring being caught. Others felt that more restrictive measures should be taken in the herring fishery.
- Some also requested that the Council consider spatial restrictions such as “safe zones”, in which the Atlantic herring fleet would not be able to operate. Although many issues were mentioned with regard to degraded habitat in coastal areas and inland, most were in reference to how those issues are being addressed. The greatest concern for the decline in river herring populations was believed by many to be occurring during the ocean stage of the river herring’s life.

1.3.4 Comments about Interactions with the Mackerel Fishery

- The overlap of the herring and mackerel fisheries and the potential for bycatch of these species to occur in the fisheries was raised as an issue during scoping by some parties. More specifically, one concern expressed was regarding mackerel vessels that did not qualify for a herring limited access permit and may be restricted by a low herring trip limit when fishing for mackerel. Although an open access incidental catch permit exists, the limit is such that it may be restrictive for mackerel fishing. It was suggested that increasing the limit would benefit both fisheries.

1.3.5 Comments About the Multispecies (Groundfish) Fishery

- Some individuals mentioned the need to protect stocks in the groundfish fishery from herring trawlers, such as haddock. A few mentioned the particular need to protect juvenile and spawning fish. Buffer zones and closed areas were suggested approaches to consider.

1.3.6 Comments About Social and Community Impacts

The following is a general discussion of the social and community impacts related to Amendment 5 to the Herring FMP. These impacts are discussed from the industry/community perspective, as well as the perspective of other affected stakeholders.

Herring Fishery-Related Businesses and Communities

For midwater and pair trawl vessels, reduced sub-ACLs (quotas) for Atlantic herring, combined with the summertime ban on midwater trawling in Area 1A and the haddock catch cap on Georges Bank led to 2010 being one of the worst herring fishing years since 1986. ASMFC regulations that limited landing days further exacerbated the losses. Purse seine vessels, that are permitted to fish in Area 1A in the summer, appear to also have had a poor fishing year in 2010. Some observers said that the impacts on the seiners came largely from fish behavior since herring was "tight to the bottom" which makes them more inaccessible to the purse seiners. Other observers argue that too much herring is caught by the trawlers, thereby limiting the amount of herring resident or moving through Area 1A.

Another effect of the lowering the sub-ACLs was that the Connor Brothers, the owner of the only remaining sardine cannery in the Northeast (Prospect Harbor, ME), could argue that they should be permitted to close due to lack of herring, despite an agreement with the State of Maine to keep the plant open and buying herring for a specified number of years after its purchase from Stinson Seafoods.

Higher fuel costs also increased the impact of regulatory changes in herring management. Herring processing plants with their associated midwater and pair trawl vessels depend on mackerel to bolster their income, but in some years mackerel moves farther offshore and/or is harder to locate. With fewer vessels "searching" because of the high fuel costs and the regulations, mackerel did not provide the necessary supplement in 2010. Two of the major herring processing plants in New Bedford and Gloucester have been struggling to stay viable. One of the plants has lost its vessels and, according to a company representative, the other has at least one of its dedicated vessels up for sale.

Larger vessels may also have certain disadvantages relative to smaller vessels in coping with lower quotas and restricted landing days. According to representatives of the companies that own or lease several of these multimillion-dollar vessels, they do not believe that their business is sustainable when they are limited to one or two landing days per week. Consequently, even the larger purse seines that are allowed to fish in Area 1 A in the summer have been forced to move offshore. Fishing in Area 3, however, takes a 12 to 16 hour steam with the concomitant high cost of fuel. In contrast, the smaller purse seines fish only three or four hours from their dock.

Furthermore, the cap on haddock bycatch was set based on a calculation of uncertainty that envisioned limited observer coverage, and was not adjusted when the uncertainty was lessened due to increased observer coverage. As a result, vessels tried to avoid fishing on Georges Bank (Area 3), for fear of encountering haddock and prematurely closing the entire herring fishery. Neither the catch cap for haddock nor the Area 3 sub-ACL for herring was taken in 2010. The Council addressed this issue during

2011 through Framework 46 to the Multispecies FMP by specifying a haddock bycatch cap adjustment based on the expected observer coverage for each haddock stock.

The market for herring used as lobster bait generally extends from May to November, though August and September are usually the busiest months. The summer restriction on Area 1A to fixed gear and purse seines is said to have led to a significant increase in the price of herring for bait, potentially a major impact on the lobster fishery.

Herring boats that are not associated with a particular plant need a winter market, since lobster fishing is rarely active in the winter. If the processing plants in New Bedford and Gloucester close, only Lund's in Cape May, New Jersey and the Canadian canneries would likely remain as buyers of winter herring from independent vessels.

With lower landings and higher fuel costs, fewer herring-dependent companies have been able to retain full-time representatives to speak on their behalf at NEFMC meetings or other regulatory venues. In contrast, environmental organizations have continued to provide funding to representatives who are opposed to midwater and pair trawling for herring. These organizations are more supportive of weirs (fixed gear) or purse seines than trawls because they believe these are more ecologically friendly (Ruais 2006; Pew Environmental Group, 2008).

Effects on specific processors and/or dealers depend in part on what alternative fisheries or products are available to the company. Mackerel and/or squid, for example, may be processed in the same plants as herring. Although the facilities in New Bedford and Gloucester do process mackerel when available, they are not as diversified as Lund's in New Jersey. Lund's benefits from their ability to handle diverse species.

Similarly, herring closures triggered by bycatch, for example, affect individual fishing businesses differently. Some vessels have permits to catch a variety of species; because they are not solely dependent on herring they can switch to another species when herring is closed if the species are in the same region. However, this is a less viable option for vessels with permits and quota for species in distant regions (e.g., Bering Sea pollock).

Interviews with participants in the fishery suggest that regulations have affected herring markets; led to decreased revenues from the fishery; decreased participants' sense of well-being; and reduced some participants' children's options to continue family participation in fishing. Lower revenues (after costs) may also affect safety since companies may postpone vessel maintenance. As noted in Figure 74, the total ex-vessel value of herring sold by federally permitted dealers in 2010 showed a 22% decrease in revenues from 2009.

Other Herring-Related Businesses

While the lobster industry relies on the availability of herring for bait in their lobster traps, commercial tuna fishermen and charter boat businesses rely on the availability of herring as forage for their target species. In addition, groundfishermen point to the need for sufficient herring to form egg beds that may be critical to the development of haddock as well as quantities of juvenile herring that serve as prey to a host of other groundfish. Consequently, these stakeholders are affected indirectly, though no less seriously, by herring management. The social and economic impacts, however, are a result of what these businesses regard as insufficient controls on herring fishing rather than what the directed herring fishery considers "overly-precautionary" restrictions on their industry.

Scientific models used to determine if fish populations are being overfished incorporate estimates of the portion of a population that serves as prey. Even with the estimates of mortality due to forage, herring is not considered overfished, however, the literature suggests that local or traditional ecological knowledge (LEK or TEK) may identify patterns missed by science (Breton-Honeyman et.al. 2010; Thornton et al. 2010). Consequently, the issues raised by herring-related businesses is appropriate to consider when weighing the socio-economic impacts of herring management.

The CHOIR Coalition was formed in 2002 by commercial and recreational fishermen concerned about the increased use of midwater and pair trawling for herring in inshore areas as well as a lack of monitoring (CHOIR Coalition 2011). The Coalition has grown to include ecotourism businesses, a variety of researchers, and environmental conservation groups. Another, separate organization focused on herring is The Herring Alliance, a group of environmental organizations that formed in 2007 with members from Maine to Virginia.

CHOIR is a diverse group that includes members from Maine to Connecticut, so many of the communities described in the “Communities” section could be considered impacted by herring fisheries management from this perspective. Some of these communities are representative of the dual impacts of the management plan. For example, Gloucester is home to Cape Seafoods (see profile under “Processors”), lobster fishing vessels, several ecotourism businesses (including whalewatch vessels), charter boat businesses, recreational fishermen, groundfishermen and commercial tuna boat fisheries. Impacts may therefore be attributed to either tighter controls on the herring fishery that could threaten the viability of the herring plant and cause higher prices for bait for the lobstermen (because too few herring are landed), or looser controls on herring that could negatively impact the businesses that rely on herring for forage to attract their species of interest (because too many herring are allowed to be caught). Achieving a balance is a major challenge.

One concern voiced by CHIOR is that if the midwater and pair trawl operations catch something other than herring, while the volume maybe low based on a percentage of their catch, the total numbers can be large. This is a particularly sensitive issue for groundfishermen who are not allowed to fish in certain closed areas in order for the groundfish stocks to rebuild, while the herring vessels can fish in these areas. If the herring vessels are catching juvenile groundfish, their recovery will be slowed, thus impacting the groundfishermen.

Related to the concerns about catches of non-targeted species is the herring industry’s practice of releasing catches or dumping. This can occur when there are mechanical problems or when, for example, a pump is blocked by dogfish, but it also may occur when the herring fishermen find that the herring they have caught is too small, too “feedy” or otherwise unsellable. With the increase in monitoring, dumping/releasing events have decreased, so these herring-related businesses consider this a benefit of the increased controls.

Measuring the effect of increased herring fishing on these other businesses is hampered by a lack of quantitative data. The stock assessments and scientific research, for example, do not demonstrate such phenomena as “localized depletion,” that these businesses say they have observed. Though localized depletion per se has not been scientifically demonstrated, there are several studies that identify localized stocks and the potential problems (e.g., loss of subpopulations) that can arise if management fails to manage at correct spatial scales (Fogarty and Myers 1998; Smedbol and Stephenson 2001, Ames 2004). Nevertheless, numerous accounts suggest that there is at least a perceived effect of herring fishing on the availability of forage for other species. In the 1990s the tuna fishing industry showed graphically that as herring catches associated with midwater trawling increased, the success rate of general category permitted bluefin tuna fishing decreased (Ruais 2011). (See graph in Herring Alliance 2009:12).

While this analysis has not been replicated lately, some of the businesses have noted benefits of the adoption of controls on the herring fishery. For example, Amendment 1 to the Herring FMP that restricted Area 1A to fixed gear and purse seine only in the summer has reportedly resulted in benefits to the various members of the Coalition. (Several representatives of the group noted that they had coexisted with purse seine herring fishermen for many years.) Bluefin landings have reportedly increased since 2009. Nevertheless, the summer closure of the inshore area is not considered sufficient. In particular, the access of the midwater/pair trawlers to Area 1A in October and November is believed to disrupt nascent spawning aggregations of herring and may interfere with rebuilding inshore herring stocks.

Coalition members also note that the bluefin are moving to Canadian waters where midwater trawling is not allowed. Drawing the inference that more herring is available, so the bluefin are attracted to Canada, members suggest that their presence in Canadian waters (and thus availability of bluefin tuna to the Canadian fisheries) has radically increased. This view is supported by the Report of the 2010 Atlantic Bluefin Tuna Stock Assessment Session that includes graphs that compare trends in the indices of abundance for western bluefin tuna by area fished. The graph for Canada's Gulf of St. Lawrence shows a significant relative increase (ICCAT 2010:61).

Like the U.S., Canada has a quota agreed upon internationally through the International Commission to Conserve Atlantic Tuna or ICCAT. A summary of landings in Canada by Neilson et al. 2011 shows a fairly stable quantity of landings from 2002 to 2008, with the exception of a significant increase in 2006. CBS News-Canada reported that both Prince Edward Island (PEI) and Nova Scotia tuna fishermen caught their quota in two days in 2010, leading to the PEI imposing stringent regulations to slow down their landings in 2011 (CBS News, 2010).

According to Fisheries and Oceans Canada's Atlantic Bluefin Tuna management plan (effective 2007), "bluefin tuna are at the northern edge of their range in Canada and often show unpredictable and changeable distribution. This, combined with their schooling behavior, the patchiness of their prey, and age-specific preference for waters of particular temperatures associated with annual variability in hydrographic/oceanographic conditions, accounts for the considerable year-to-year variation in fishing location." However, conditions in 2010 and 2011, possibly including prey availability, have clearly succeeded in attracting the bluefin tuna to Canada.

Increased monitoring (observer coverage) and catch sampling in 2010 of the commercial midwater and trawl herring vessels was also considered a benefit by the coalition, although representatives of the group suggest that greater coverage, especially 100 percent coverage, would ensure that the midwater and pair trawlers are neither catching juvenile groundfish or other non-targeted species in their small mesh nets nor dumping/releasing unsampled catch.

Observer reports under the increased coverage in 2011 suggest that the midwater and pair trawl operations can avoid catching and dumping non-targeted species. What the representatives of the other businesses say, however, is that they are concerned that this avoidance is a result of an observer effect, i.e., if there were no observer on board (or alternative monitoring) that the catch would not be so clean.

The members of the Coalition and the Herring Alliance both refer to the cumulative impact of over a decade of midwater and pair trawling on herring as having negative impacts on the quantity of herring needed for forage, especially as groundfish stocks begin to rebound. Further, they criticize the overreliance on inshore areas that concentrates fishing effort in vulnerable areas important to small fishing operations. Finally, they express concern about the bycatch of herring fishing that includes endangered river herring, as well as marine mammals and other protected species. In summary, the impacts affect the businesses that depend on herring to attract the species that they fish or watch.

1.4 PURPOSE AND NEED FOR ACTION

The need for this action arose shortly after the development of Amendment 1 to the Herring FMP, which included a limited access program for the herring fishery and established a seasonal purse seine/fixed gear area in the inshore Gulf of Maine, along with implementing other measures to address the long-term management of the fishery. Since the implementation of Amendments 1, 2, and 4, concerns about the fishery have led the Council to determine that additional action is warranted to further address issues related to the long-term health of the herring resource, how the resource is harvested, how catch/bycatch in the fishery are accounted for, and the important role of herring as a forage fish in the Northeast region. These concerns are reflected in the unprecedented level of interest in managing this fishery by New England's commercial and recreational fishermen, eco-tourism and shoreside businesses, and the general public.

The primary purpose of this amendment, therefore, is to improve catch monitoring and ensure compliance with the MSA. One purpose of the amendment is to implement measures to improve the long term monitoring of catch in the herring fishery. Additionally, a purpose of this amendment is to specifically address river herring bycatch, while ensuring that the amendment is consistent with the provisions of the MSA, including the National Standard to minimize bycatch and bycatch mortality to the extent practicable.

The purposes and needs for this amendment are expected to advance the goals and objectives of the herring management program identified in Section 2.0 of this document. The management measures under consideration are intended to achieve both the goals and objectives of the management program, the specific goals and objectives of the catch monitoring program (identified in Section 2.1.3), in addition to the primary purposes of this action (Table 1).

Table 1 Purpose and Need for Amendment 5

Need for Amendment 5	Corresponding Purposes of Amendment 5
Address long term health of the herring resource, including how herring is harvested in order to sustain the important biologic role of herring as a forage fish in the Northeast Atlantic	To improve long term catch monitoring and to ensure better compliance with the provisions of the MSA
Improve how catch and bycatch from the herring fishery are accounted for	Better monitor bycatch in the herring fishery, including specifically monitoring river herring bycatch, and to ensure that the FMP is consistent with the bycatch provisions of the MSA

2.0 GOALS AND OBJECTIVES

2.1.1 Background – Goals and Objectives for the Herring Fishery Management Program

The goals and objectives of the Atlantic herring fishery management program were specified in Amendment 1 to the Herring FMP and will continue to frame the long-term management of the resource and fishery:

GOAL: Manage the Atlantic herring fishery at long-term sustainable levels consistent with the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act.

OBJECTIVES:

1. Harvest the Atlantic herring resource consistent with the definition of overfishing contained in the Herring FMP and prevent overfishing.

2. Prevent the overfishing of discrete spawning components of Atlantic herring.

3. Avoid patterns of fishing mortality by age which adversely affect the age structure of the stock.

4. Provide for the orderly development of the herring fishery in inshore and offshore areas, taking into account the viability of current and historical participants in the fishery.

5. Provide for long-term, efficient, and full utilization of the optimum yield from the herring fishery while minimizing waste from discards in the fishery. Optimum yield is the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, taking into account the protection of marine ecosystems, including maintenance of a biomass that supports the ocean ecosystem, predator consumption of herring, and biologically sustainable human harvest. This includes recognition of the importance of Atlantic herring as one of many forage species of fish, marine mammals, and birds in the Northeast Region.

6. Prevent excess capacity in the harvesting sector.

7. Minimize, to the extent practicable, the race to fish for Atlantic herring in all management areas.

8. Provide, to the extent practicable, controlled opportunities for fishermen and vessels in other Mid-Atlantic and New England fisheries.

9. Promote and support research, including cooperative research, to improve the collection of information in order to better understand herring population dynamics, biology and ecology, and to improve assessment procedures.

10. Promote compatible U.S. and Canadian management of the shared stocks of herring.

11. Continue to implement management measures in close coordination with other Federal and State FMPs and the ASMFC management plan for Atlantic herring, and promote real-time management of the fishery.

2.1.2 Goals and Objectives of Amendment 5 to the Atlantic Herring FMP

At this time, it is intended that the management measures considered in this amendment will address one or more of the following:

GOAL

To develop an amendment to the Herring FMP to improve catch monitoring and ensure compliance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA)

OBJECTIVES

I. To implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery;

II. To implement other management measures as necessary to ensure compliance with the MSA;

III. To implement management measures to address bycatch in the Atlantic herring fishery;

IV. In the context of Objectives I-III (above), to consider the health of the herring resource and the important role of herring as a forage fish and a predator fish throughout its range.

2.1.3 Goals and Objectives of the Amendment 5 Catch Monitoring Program

The Council has identified ***catch monitoring*** as a primary management issue for consideration in Amendment 5 and approved a specific set of goals and objectives for the catch monitoring program. A catch monitoring program for the Atlantic herring fishery that supplements and improves the existing program can take on many forms and include several different approaches. At-sea monitoring should focus on both total catch and bycatch– maximizing the sampling of everything that enters the net and is either pumped aboard the fishing vessel or discarded at sea. Another important element of catch monitoring is improving reporting and ensuring real-time monitoring of the management area sub-ACLs for the Atlantic herring fishery. A thorough understanding of the strengths and weaknesses of the existing catch monitoring program is a fundamental first step towards designing a new and better program. This has been the focus of the Herring Committee and Advisory Panel's discussions during and since the initiation of Amendment 5. The existing catch monitoring program will be described in detail and evaluated to the extent possible as part of the description and discussion of the no action alternative in this document.

In general, the goals (numbered) and objectives (bulleted) of the catch monitoring program established in Amendment 5 are:

1. **To create a cost effective and administratively feasible program for provision of accurate and timely records of catch of all species caught in the herring fishery;**

    - Review federal notification and reporting requirements for the herring fishery to clarify, streamline, and simplify protocols;

2. Develop a program providing catch of herring and bycatch species that will foster support by the herring industry and others concerned about accurate accounts of catch and bycatch, i.e., a well-designed, credible program;

- Avoid prohibitive and unrealistic demands and requirements for those involved in the fishery, i.e., processors and fishermen using single and paired midwater trawls, bottom trawls, purse seines, weirs, stop seines, and any other gear capable of directing on herring;

- Improve communication and collaboration with sea herring vessels and processors to promote constructive dialogue, trust, better understanding of bycatch issues, and ways to reduce discards;

- Eliminate reliance on self-reported catch estimates;

3. Design a robust program for adaptive management decisions;

4. Determine if at-sea sampling provides bycatch estimates similar to dockside monitoring estimates;

- Assure at-sea sampling of at-sea processors' catches is at least equal to shoreside sampling;

- Reconcile differences in federal and states' protocols for dockside sampling, and implement consistent dockside protocols to increase sample size and enhance trip sampling resolution.

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3.0 MANAGEMENT ALTERNATIVES UNDER CONSIDERATION

3.1 PROPOSED ADJUSTMENTS TO THE FISHERY MANAGEMENT PROGRAM

3.1.1 Regulatory Definitions (Transfer at Sea and Offload)

A. No Action Option

If no action is taken regarding this measure, no new regulatory definitions would be established in Amendment 5 for the Atlantic herring fishery (although some existing definitions may be revised to reflect consistency with other measures in this amendment).

B. Proposed Regulatory Definitions

Under this option, Amendment 5 would establish a regulatory definition of *transfer at sea* and a regulatory definition of *offload* for the purposes of the Atlantic herring fishery to clarify provisions related to each vessel engaged in transfer operations and to clarify reporting provisions.

This measure would define a herring transfer at sea as: *a transfer from an Atlantic herring vessel (i.e. in the vessel hold or on deck), codend, purse seine to another vessel for personal use as bait, to an Atlantic herring carrier or at-sea processor, or to another permitted herring vessel. Two vessels hauling one codend is pair trawling and is not considered a transfer at sea.*

This measure would also modify the definition of *offload* to add the following:
For the purposes of the Atlantic herring fishery, an offload or offloading means to remove, begin to remove, to pass over the rail, or otherwise take fish away from any vessel for sale to either a permitted At-sea Atlantic Herring dealer (as defined in the options proposed in Section 3.1.3.2 of this document) or a permitted land-based Atlantic herring dealer.

3.1.2 Administrative/General Provisions

Some administrative/general provisions are proposed in Amendment 5 to address provisions related to fishing operations involving multiple vessels, as well as vessel monitoring system (VMS) and vessel trip report (VTR) requirements. The goal of the proposed administrative/general provisions is to create a cost-effective and administratively-feasible management program to develop accurate and timely records of catch of all species caught in the Atlantic herring fishery and to enhance the catch monitoring to ensure that management can be timely, efficient, and adaptive.

A. No Action Option

Under the no action option, no changes would be made to the current provisions regarding vessels working cooperatively in herring fishing operations, VMS provisions, or reporting through vessel trip reports (VTRs).

The regulations at §648.204(b) state that both vessels involved in a pair trawl operation must be issued the herring permit appropriate for the amount of herring jointly possessed by both of the vessels participating in the pair trawl operation. This means that the more restrictive possession limit of the vessels participating in a pair trawl operation is the limit of the total amount of herring that the vessels may jointly fish for, possess, or land in any calendar day. For example, if Vessel 1 has a Category A permit, which has no possession limit, and Vessel 2 has a Category C permit, with a possession limit of 55,000 lbs./day, then the vessels are only permitted to jointly fish for, possess, and land 55,000 lbs./day.

Under this option, no changes would be made to the current restrictions on vessels working cooperatively in the Atlantic herring fishery.

If no action is taken, the current VMS "power down" provision would not be eliminated for limited access herring vessels. Limited access herring vessels would be able to continue turning off their VMS units when in port.

B. Proposed Administrative/General Provisions

Under this option, the following additional provisions would be implemented in Amendment 5 to modify some of the FMP's administrative/general provisions:

2A. Expand Possession Restrictions to All Vessels Working Cooperatively in the Atlantic Herring Fishery (to Include Purse Seine Vessels and Vessels that Transfer Herring At-Sea)

This measure would expand the provisions §648.204(b) to include paired purse seine operations and transfers at sea between vessels. In summary, all vessels working cooperatively in the herring fishery are subject to the most restrictive possession limit associated with any of the vessels.

2B. Eliminate the VMS "Power Down" Provision for Limited Access Herring Vessels

Under this option, Amendment 5 would include a measure that would prohibit limited access herring vessels (and carrier vessels that utilize VMS) from turning off their VMS units when in port unless specifically authorized by NMFS through a Letter of Exemption, consistent with VMS provisions for the multispecies, scallop, and surf clam/ocean quahog fleet:

- The Northeast Fisheries Regulations allow vessels holding certain permits to turn off their VMS units during periods when the vessel will be out of the water or during extended periods of no fishing activity. The request must be made in advance of the intended exemption period, and a "Letter of Exemption" (LOE) must be issued by NMFS. Vessels may not turn VMS units off until they receive a LOE approval from NMFS.
- **All Vessels.** May request a Letter of Exemption from NMFS if the vessel is expected to be out of the water for more than 72 consecutive hours.

  Limited Access Multispecies, Limited Access Scallop and Surfclam/Ocean Quahog Vessels (Proposed to Add Limited Access Herring Vessels). May sign out of the VMS program for a minimum of 30 consecutive days by obtaining a Letter of Exemption from NMFS. The vessel may not engage in any fisheries until the VMS unit is turned back on.

2C. Establish a New At-Sea Herring Dealer Permit

Under this option, Amendment 5 would establish a new Federal At-Sea Herring Dealer permit that would be required for carrier or other vessels that sell Atlantic herring to any entity.

- The definition of "Atlantic Herring Dealer" in Section 648.2 (Definitions) would be modified to include carrier vessels that may sell fish.
- This permit would require compliance with federal dealer reporting requirements (Section 648.7) at any time the vessel is in possession of the at-sea dealer permit. A "dealer identifier" would have to be developed for at-sea for the purposes of reporting. Vessels that have both the At-Sea Herring Dealer Permit and a herring fishing permit would be required to fulfill the reporting requirements of both permits while in possession of both permits.

3.1.3 Measures to Address Carrier Vessels and Transfers of Atlantic Herring At-Sea

The Council is considering several options in this document to address herring carrier activity (reporting) and the transfer of Atlantic herring at-sea. The options under consideration are described in the following subsections.

3.1.3.1 Background

The Letters of Authorization (LOAs) issued by NMFS for the Atlantic herring fishery currently allow herring, consistent with applicable possession limits, to be transferred at-sea (a) from herring catcher vessels to carriers; (b) between federally permitted herring vessels; and (c) from herring catcher vessels to non-permitted vessels for personal use as bait (see Table 2, which summarizes all of the LOAs available to vessels participating in the herring fishery).

Table 2 Summary of Current Letters of Authorization for the Atlantic Herring Fishery

LOA	Who	Provisions
Transfer at Sea	Any permitted herring vessels wishing to transfer herring at sea	• Enrollment duration: Permit year • Transfer, within the transferring vessel's permitted possession limits, to vessels not issued an Atlantic herring permit for personal use as bait, provided that the vessel does not have purse seine, midwater trawl, pelagic gillnet, sink gillnet, or bottom trawl gear aboard; • Transfer, within the transferring vessel's permitted possession limits, to vessels issued an Atlantic herring carrier LOA, or to permitted at-sea processors; • Transfer, within the transferring vessel's permitted possession limits, to another permitted herring vessel
Carrier	Any permitted herring vessels wishing to transport herring from catcher vessels to land-based dealers	• Enrollment period: Minimum 7 days • Receive, transport, and transfer Atlantic herring caught by another vessel. • No gear allowed on board • All reporting requirements associated with carrier's permit apply
Midwater trawl	Any permitted herring vessels wishing to fish with midwater trawl gear in the Gulf of Maine (GOM)/Georges Bank (GB) Regulated Mesh Area (RMA)	• Enrollment period: Minimum 7 days • Vessel may fish with midwater trawl gear in GOM/GB RMA, including Closed Area I, Closed Area II, and Nantucket Lightship Closed Area, with nets less than the minimum mesh size at §648.80(a)(3)(ii). • All notification and reporting requirements associated with vessel's permit apply
Purse Seine	Any permitted herring vessels wishing to fish with purse seine gear in the GOM/GB RMA	• Enrollment period: Minimum 7 days • Vessel may fish with purse seine gear in GOM/GB RMA, including Closed Area I, Closed Area II, and Nantucket Lightship Closed Area, with nets less than the minimum mesh size at §648.80(a)(3)(ii). • All notification and reporting requirements associated with vessel's permit apply

3.1.3.2 Measures to Address Carrier Vessels

In Amendment 5, reporting provisions will be modified to clarify that herring carrier vessels are required to report a NMFS-specified trip identifier (for example, VTR serial number) to the dealer receiving the offload. Carrier vessels acting as dealers would be required to report the NMFS-specified trip identifier from the catcher vessels in their dealer reports. This clarification is intended to improve the reporting of herring transferred at-sea.

Amendment 5 also will eliminate the VTR reporting requirement for herring carrier vessels when they are engaged in carrying activities. Currently, carrier vessels are required to submit VTRs to NMFS, which indicate 'no catch' for the days during which they were carrying and the vessel name and permit number of the catcher vessel for which they were carrying fish. All catch is to be reported by and attributed to the vessels harvesting the catch. Eliminating the VTR reporting requirement is intended to help prevent the double counting of landings that may occur if a dealer mistakenly attributes the landings to the carrier vessel and not the harvesting vessel.

In addition to the above clarifications to existing provisions for Atlantic herring carrier vessels, the Council is considering options to provide carrier vessels with more flexibility that the current Letter of Authorization (LOA) for carrying herring currently allows. These options are described in the following subsections.

3.1.3.2.1 Option 1: No Action (Status Quo for Carrier Vessels)

If the no action option is selected, no additional requirements/provisions for herring carrier vessels would be implemented in Amendment 5 (with the exception of the two provisions/clarifications described in the introductory section above).

Vessels acting as Atlantic herring carriers are required to have a valid Letter of Authorization (LOA) from the Regional Administrator and are not required to report catch via the IVR/VMS reporting system implemented by NMFS in 2011. When herring is transferred to another vessel, the vessel that catches the fish (the catcher vessel) is required to report the catch via the VMS system if it possesses a limited access permit or through the IVR system if it possesses an open access permit (the carrier should not report catch to minimize double counting).

3.1.3.2.2 Option 2: Require VMS on Carrier Vessels for Declaration Purposes and Eliminate Seven-Day LOA Enrollment Restriction

In addition, under this option, vessels that want to act as Atlantic herring carriers could obtain a LOA from NMFS to do so for the entire fishing year, but they would also be required to utilize a vessel monitoring system (VMS) and comply with the VMS provisions for limited access herring vessels. Carrier vessels would be required to use their VMS pre-trip declaration to indicate whether or not they will be engaged in herring carrying activity.

Because carrier vessels would be required to utilize VMS for trip declaration purposes, this option would allow them to engage in other activities while in possession of the herring carrier LOA (versus being restricted to carrying activities only for the minimum seven-day enrollment period). Prior to each fishing trip, the carrier vessels would utilize VMS declarations to indicate what activity they intend to engage in during the trip. If the vessel declares "carrier other," then it cannot carry Atlantic herring on that fishing trip.

- Herring vessels on standard fishing trips would declare HER-HER for a herring fishing trip, or DOF when not participating in the fishery.
- Carrier vessels that possess the Carrier LOA could declare HER-CAR. These vessels would be subject to the provisions of the LOA and would not be allowed to carry fishing gear or other species on that trip.
- Carrier vessels that possess the Carrier LOA could declare OTH-CAR. These vessels would not be allowed to carry fishing gear or Atlantic herring on that trip.

3.1.3.2.3 Option 3: Dual Option for Carriers (VMS or Current LOA)

This option would provide flexibility for herring carriers to choose to either:

A. Utilize a VMS for declaration, eliminate the minimum seven-day enrollment period for carrying (LOA restriction), and engage in other activities during LOA enrollment (identical to the provisions described in the previous option); or
B. Maintain the status quo (minimum seven day enrollment period with current LOA restrictions, described in Table 2).

This option accommodates smaller carrier vessels that do not utilize VMS and is similar to the multispecies requirements for common pool vessels fishing in the RGAs:

> *Common pool vessels fishing in the RGAs would be required to declare into these areas via VMS, as instructed by the Regional Administrator. In lieu of a VMS declaration, the Regional Administrator may authorize such vessels to obtain a letter of authorization (LOA) to fish in these RGAs. The minimum participation period for these LOAs would be 7 consecutive days, meaning that a vessel must agree to fish in these areas for a minimum of 7 consecutive days. If issued a LOA, a vessel must retain the LOA on board for the duration of the participation period.*

3.1.3.3 Measures to Address Transfers of Atlantic Herring At-Sea

In Amendment 5, the Council is considering measures to minimize transfers at sea and/or standardize reporting requirements for vessels transferring/receiving Atlantic herring. Management options currently under consideration to address transfers of herring at sea are described below and are not necessarily independent of each other.

3.1.3.3.1 Option 1: No Action

If no action is taken, the current provisions for transferring herring at-sea (status quo) would remain effective (summarized below):

- A vessel that transfers herring at sea to a vessel that receives it for personal use at bait must report all catch via the required reporting system (daily VMS for limited access vessels and weekly IVR for open access vessels) and must report all transfers on the Fishing Vessel Trip Report (VTR).
- A vessel that transfers herring at sea to an authorized carrier vessel must report all catch via the required reporting system (daily VMS for limited access vessels and weekly IVR for open access vessels) and must report all transfers on weekly VTRs. Each time the vessel offloads to the carrier vessel is defined as a trip for the purposes of reporting requirements and possession allowances.
- A vessel that transfers herring at sea to an at-sea processor must report all catch via the required reporting system (daily VMS for limited access vessels and weekly IVR for open access vessels) and must report all transfers on weekly VTRs. Each time the vessel offloads to the at-sea processing vessel is defined as a trip for the purposes of the reporting requirements and possession allowances. For each trip, the vessel must submit a VTR and the at-sea processing vessel must submit the detailed dealer report.
- A transfer between two vessels issued valid Atlantic herring permits requires each vessel to submit a VTR, filled out as required by the LOA to transfer herring at sea, as well as a real-time catch report (daily VMS for limited access vessels and weekly IVRs for open access vessels) for the amount of herring each vessel catches.

VTR Requirements for Transfers at Sea

The transferring vessel may not fish for, catch, transfer, or possess more herring than allowed by the vessel permit category. Each vessel has the responsibility to record how fish is transferred at sea on their weekly VTR reports; the information reported will vary slightly for each vessel type as follows:

- Transfers at sea from a catcher vessel to a vessel that receives herring for personal use as bait:
    - The catcher vessel must report all herring catch on their weekly VTR and indicate on their VTR that herring catch was transferred to another vessel for use as bait. The vessel receiving herring for personal use as bait is not required to have a federal herring permit, and as such does not have any reporting requirements.
- Transfers at sea from a catcher vessel to a carrier vessel:
    - A carrier vessel must have an Atlantic herring Carrier LOA (carrier LOA) from the Regional Administrator, must operate exclusively as a herring carrier, and is prohibited from having any fishing gear on board. Vessels issued a carrier LOA may not have any species on board other than herring, with the exception of multispecies received from vessels issued a Category A or B herring permit.

  - The vessel that catches the herring (catcher vessel) is responsible for reporting all catch on their weekly VTR. The catcher vessel's VTR for a trip should note the dealer name and permit number where the carrier vessel is going to land the herring. In addition, the catcher vessel is responsible for giving the carrier vessel a copy of their VTR serial number.
  - Carrier vessels must provide each catcher vessel's VTR serial number to each dealer purchasing the catch. The carrier vessel's VTR serial number should not be provided to the dealer(s).
  - The carrier vessel is required to submit VTRs which indicate 'no catch' for the days in which they were carrying, and should note the vessel name and permit number of the catcher vessel they were carrying for on their VTR.
  - Although the carrier vessel lands the catch, the dealer is responsible for attributing catch the catcher vessel using the vessel name, permit number, and VTR serial number the catcher vessel provided to the carrier vessel.
- Transfers at sea to another permitted herring vessel:
  - The catcher vessel must report all catch on their weekly VTR. The catcher vessel should indicate on their VTR that herring catch was transferred to another federally permitted herring vessel and include the name and permit number of the vessel receiving the catch.
  - The permitted herring vessel that receives the catch is required to submit VTRs that indicate 'received catch' and should note the vessel name and permit number of the catcher vessel on their VTR.

3.1.3.3.2 Option 2: Restrict Transfers At-Sea to Only Vessels with Category A or B Limited Access Herring Permits

This measure would allow only vessels participating in the limited access directed fishery for Atlantic herring (Category A or B permits) to transfer herring at sea.

- Transferring and receiving vessels would be required to possess a limited access Category A or B permit for the herring fishery.
- Herring carrier vessels operating under a Carrier LOA would be exempt from this requirement.

3.1.3.3.3 Option 3: Prohibit Transfers At-Sea to Non-Permitted Vessels

This measure would allow only vessels that possess a federal Atlantic herring permit to transfer herring at sea. Non-permitted vessels would be prohibited from receiving herring at-sea, even for personal use as bait.

- Transferring and receiving vessels would be required to possess a Category A, B, C, or D permit for the herring fishery. The Category D permit is an open access permit, so any vessel can obtain this permit, but possession of this permit subjects the vessel to VTR and other reporting requirements.

This measure may improve reporting compliance. Requiring a federal permit of some sort by all vessels engaged in the transfer activity reduces the likelihood that some herring catch, even in small amounts, will not be documented. However, this measure would require that vessels with no Federal permits (recreational vessels, for example) obtain a permit for herring and comply with all related reporting requirements.

3.1.4 Trip Notification Requirements

The Council is considering several options (described below) to expand current trip notification requirements in the Atlantic herring fishery. Option 1 represents the no action alternative and would maintain current requirements for pre-trip and pre-landing notifications. Option 2 incorporates all limited access vessels into the pre-trip notification system (PTNS) for observers upon the implementation of Amendment 5, and Option 3 summarizes the modifications to the pre-landing notification requirements that are under consideration. When the Council selects final measures for Amendment 5, either Option 1 (no action), Option 2, or Option 3 could be selected individually, or Options 2 and 3 could be selected in combination with each other.

3.1.4.1 Option 1: No Action

If the no action option is selected, notification requirements would remain the same upon implementation of Amendment 5. Current notification requirement are described below.

All vessels issued a Category A (All Areas Limited Access) or Category B (Areas 2/3 Limited Access) Permit fishing on a declared herring trip with midwater trawl or purse seine gear regardless of area fished, as well as Categories C and D (Limited Access Incidental Catch and Open Access) vessels fishing with midwater trawl gear in Areas 1A, 1B, or 3 must provide notice of the following information to NMFS at least 72 hours prior to beginning any trip for obtaining an at-sea observer: Vessel name, contact name for coordinating an at-sea observer, telephone number, date, time, and port of departure, and whether the vessel intends to fish in Closed Area I.

If a vessel has been issued a limited access herring permit, a vessel representative must activate the VMS unit and declare that the vessel is participating in the herring fishery by entering the code "HER" prior to leaving port. If a vessel representative declares the vessel out of the herring fishery ("DOF") prior to leaving port to target a non-VMS required species, such as mackerel, that vessel may not harvest, possess, or land herring on that trip. Open-access vessels that maintain a VMS unit on board as a requirement for another Federal permit should declare "DOF" before leaving port on a herring trip.

Category A/B vessels fishing on a declared herring trip with midwater trawl or purse seine gear regardless of area fished, as well as Category C vessels fishing with midwater trawl gear in Areas 1A, 1B, or 3 must notify NMFS Law Enforcement via VMS of the time and place of offloading at least six hours prior to crossing the VMS demarcation line on their return trip to port (or six hours prior to landing if the vessel does not fish seaward of the demarcation line).

In summary:

- The current notification requirement for vessels to request an observer at least 72 hours before leaving port applies to all Category A and B vessels fishing on a declared herring trip with midwater trawl or purse seine gear regardless of area fished and Category C and D vessels fishing with midwater trawl gear in Areas 1A, 1B, and/or 3.
- Under the status quo, limited access herring vessels are required to declare a herring trip via VMS prior to leaving port when they participate in the herring fishery.
- Category A and B vessels fishing on a declared herring trip with midwater trawl or purse seine gear regardless of area fished, and Category C vessels fishing with midwater trawl gear in Areas 1A, 1B, and/or 3 are also required to notify NMFS Law Enforcement via VMS of the time and place of offloading at least six hours prior to crossing the VMS demarcation line on their return trip to port (or six hours prior to landing if the vessel does not fish seaward of the demarcation line).
- Category D vessels that do not use midwater trawl gear do not have any trip notification requirements. However, if a Category D vessel possesses a VMS because of other Federal permit requirements, it is recommended that the vessel declare out of fishery (DOF) prior to leaving port when participating in the herring fishery.

**Vessels can provide pre-trip notification for multiple trips at one time.*

3.1.4.2 Option 2: Modify and Extend the Pre-Trip Notification Requirements

The following modifications to pre-trip notifications are proposed in this option:

1. ***Modifications to the Pre-Trip Notification System (for Observers):*** This option would require all limited access herring vessels (as well as Category D vessels fishing with midwater trawl gear in Areas 1A, 1B, and/or 3) and all herring carrier vessels to notify the Observer Program through the Pre-Trip Notification System (PTNS) **prior to any trip where the operator may harvest, possess, or land Atlantic herring.**

   In order to possess, harvest, or land herring, representatives for Category A, B, and C fishing vessels, as well as Category D vessels fishing with midwater trawl gear in Areas 1A, 1B, and/or 3 must provide notice to NMFS through the PTNS **at least 48 hours** prior to beginning the trip, and must provide information including the vessel name, permit number/permit category, contact person name and contact phone number, date sail, time sail, port of departure, gear type, and area intending to fish (i.e., herring management area, river herring area, closed area, etc., consistent with the management measures ultimately adopted in this amendment), as well as target species (target species will be particularly helpful to try to identify directed herring versus directed mackerel trips). There are several methods available for the pre-trip notification: internet; email; and telephone.

If a vessel has been issued a limited access herring permit, or if the vessel has an open access herring permit and is fishing with midwater trawl gear in Areas 1A, 1B, and/or 3, but does not provide notification to NMFS before beginning the fishing trip, the vessel is prohibited from possessing, harvesting, or landing Atlantic herring on that trip. If a trip is cancelled, a vessel representative must notify NMFS of the cancelled trip, even if the vessel is not selected to carry an observer. All waivers or selection notices for observer coverage will be issued to the vessel by VMS so as to have on-board verification of the waiver or selection.

Category D vessels that may fish under a higher possession limit in Areas 2/3 only (under consideration in Section 3.1.5) would be subject to the same notification requirements as Category C vessels (described in this section) regardless of gear type used.

**Vessels can provide pre-trip notification for multiple trips at one time.*

There are three methods available for notifying the Northeast Fisheries Observer Program:

1) **ONLINE via the Pre-Trip Notification System (preferred method):** The Pre-Trip Notification System (PTNS) is accessible at https://fish.nefsc.noaa.gov/PTNS/. Vessels should log in using the same username (permit number) and password (PIN) as they use for Fish-On-Line. If you do not have access please contact NMFS immediately at (978) 281-9133 or by email at fso.data.requests@noaa.gov.

2) **EMAIL:** Please submit trip notification by email NEFSC.PTNS@noaa.gov.

3) **TELEPHONE:** Please call 508-495-2309 (M-F 7:00am-6:00pm) or the emergency cell phone number after hours 508-681-9104.

2. ***Pre-Trip VMS Declaration:*** This option would also add a gear declaration to the existing pre-trip VMS notifications for all herring fishing vessels using VMS to declare in/out of the herring fishery.

3.1.4.3 Option 3: Extend Pre-Landing Notification Requirement

This option would require limited access herring vessels and herring carrier vessels that opt to use VMS (see Section 3.1.3.2) to notify NMFS Law Enforcement via VMS of the time and place of offloading at least six hours prior to crossing the VMS demarcation line on their return trip to port (or six hours prior to landing if the vessel does not fish seaward of the demarcation line).

Category D vessels that may fish under a higher possession limit in Areas 2/3 only (under consideration in Section 3.1.5) would be subject to the same notification requirements as Category C vessels (described in this section) regardless of gear type used.

This option may be implemented as a stand-alone measure or in combination with Option 2 described above, which proposes to modify and extend the pre-trip notification requirements for herring vessels.

3.1.5 Reporting Requirements for Federally Permitted Herring Dealers

In Amendment 5, the Council is considering measures to address reporting requirements for federally permitted Atlantic herring dealers. The options under consideration are described below.

3.1.5.1 Option 1: No Action (Status Quo Dealer Reporting Requirements)

Under this option, reporting requirements for federally permitted Atlantic herring dealers would remain the same.

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. Dealers are required to submit a report even if there is no activity during a week.

Reporting Herring Landed by a Carrier Vessel

Dealers must attribute catch to the vessel that harvested the herring, which may not necessarily be the vessel that landed the herring. Vessels acting as herring carriers must obtain the VTR serial number from the catcher vessel. Subsequently, dealers must request the name, permit number, and VTR serial number of the catcher vessel from the carrier vessel, and report the fish as being harvested by the catcher vessel. Dealers should not report landings from a carrier vessel, as it may lead to double counting landings and could lead to trip limit reductions in a particular management area.

Reporting Haddock Landed from Herring Vessels

Dealers, including at-sea processors, that cull or separate all other fish from the herring catch must separate and retain all haddock offloaded from vessels that have a Category A or B permit fishing on a declared herring trip and from vessels that have a Category C or D permit fishing with midwater trawl gear in Areas 1A, 1B, and/or 3. Any haddock may not be sold, purchased, received, traded, bartered, or transferred, and must be retained, after it has been separated from the herring, for at least 12 hours for dealers and processors on land, and for 12 hours after landing on shore by at-sea processors for inspection by law enforcement officials. The dealer or at-sea processor must report all such haddock on the weekly electronic dealer report and must use the appropriate disposition code for the haddock. The weekly dealer report must clearly indicate the vessel name and permit number of the vessels that caught the retained haddock.

3.1.5.2 Option 2: Require Dealers to Accurately Weigh All Fish

This option would require federally permitted Atlantic herring dealers to accurately weigh all fish.

This option may be selected in combination with any one or more of the sub-options described below.

Sub-Option 2A: This sub-option would require federally permitted Atlantic herring dealers to accurately weigh all fish. If dealers do not sort by species, they would be required to document (annually in dealer applications) how they estimate the relative composition of a mixed catch, to facilitate quota monitoring and cross-checking with other data sources.

Sub-Option 2B: This sub-option would require federally permitted Atlantic herring dealers to accurately weigh all fish. If dealers do not sort by species, they would be required to document (for individual landing submissions) how they estimate the relative composition of a mixed catch, to facilitate quota monitoring and cross-checking with other data sources.

Sub-Option 2C: This sub-option would require federally permitted Atlantic herring dealers to obtain vessel representative confirmation of SAFIS transaction records to minimize data entry errors at the first point of sale. It 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.

Additionally, NMFS recommends increasing the frequency of VTRs and dealer reports to improve the effectiveness of Sub-Option 2C. VTRs would be required to be submitted within 24 hours of the end of a trip and dealer reports would be required to be submitted within 24 hours of receipt or purchase. These changes would increase the timeliness of reports and would provide data to NMFS for validation sooner than they are available currently. While these changes would not likely have a significant impact on information used in weekly monitoring, they would improve the validation efforts that are currently conducted by NMFS and improve the overall state of data in these fisheries.

3.1.6 Changes to Open Access Permit Provisions for Limited Access Mackerel Vessels in Areas 2/3

Since the implementation of Amendment 1, concerns have been raised about vessels participating in the Atlantic mackerel fishery that do not qualify for any of the limited access herring permits, either because they do not have adequate herring landings history between 1988 and 2003, or because they are new participants in the mackerel fishery. These vessels are currently required to fish with the open access incidental catch permit to retain any herring, and they may encounter herring in amounts larger than 3 mt on some fishing trips. Without a permit that allows them to retain an adequate amount of herring, these vessels may be forced to discard any herring they catch incidentally. If the mackerel fishery grows in the future, a herring bycatch problem could become an increasing concern. The management options under consideration in Amendment 5 to address this issue are described in the following subsections.

3.1.6.1 Mackerel Option 1: No Action

Under this option, no action would be taken in Amendment 5 to address herring/mackerel fishery interactions and concerns about the potential for herring bycatch in the directed mackerel fishery. This option would maintain the status quo with respect to mackerel vessels with an open access herring permit.

- The open access incidental catch permit for herring (Category D) would continue to apply to all management areas.
- Vessels that obtain the open access incidental catch herring permit would continue to be restricted by a possession limit of 3 mt of herring per trip (6,600 pounds) in all management areas and limited to one landing per calendar day up to the 3 mt possession limit.
- When catch is projected to reach 95% of the sub-ACL in a management area and the directed fishery closes, incidental catch in the area would be limited to 2,000 pounds per trip, as it is currently.

3.1.6.2 Mackerel Option 2: Increase the Open Access Possession Limit to 20,000 Pounds in Areas 2/3 for Vessels that also Possess a Federal Limited Access Mackerel Permit

Under this option, two open access permits for herring would be created, one for all management areas and one for mackerel fishery participants in Areas 2/3 only:

1. The current provisions for the Category D permit, including the 3 mt possession limit, reporting requirements, and landings restrictions, would apply to an open access permit for all management areas, as described in the no action option;
2. A new open access incidental catch permit would be created for limited access mackerel fishery participants in Areas 2/3 only that do not have a limited access herring permit; this permit would be associated with a 20,000 pound possession limit for herring; all other provisions currently associated with the current open access Category D permit would apply:
    - Vessels that do not qualify for a limited access herring permit and possess a federal limited access permit for Atlantic mackerel would be eligible for this herring permit.

- **Vessels that obtain this permit would be restricted to fishing for herring in Areas 2/3 only**, under a possession limit of 20,000 pounds of herring and limited to one landing per calendar day up to the 20,000 pound possession limit.
- For quota/ACL monitoring purposes, reporting requirements for vessels that possess this permit would be consistent with requirements for limited access Category C vessels.
- When catch is projected to reach 95% of the sub-ACL in a management area and the directed fishery closes, incidental catch in the area would be limited to 2,000 pounds per trip, as it is currently.

Note: The Council may determine that mackerel limited access permit holders should be treated differently, depending on their level of activity in both the herring and mackerel fisheries and the limited access mackerel permit that they may possess.

3.1.6.3 Mackerel Option 3: Increase the Open Access Possession Limit to 10,000 Pounds in Areas 2/3 for Vessels that also Possess a Federal Limited Access Mackerel Permit

Under this option, two open access permits for herring would be created, one for all management areas and one for mackerel fishery participants in Areas 2/3 only:

1. The current provisions for the Category D permit, including the 3 mt possession limit, reporting requirements, and landings restrictions, would apply to an open access permit for all management areas, as described in the no action alternative;
2. A new open access incidental catch permit would be created for limited access mackerel fishery participants in Areas 2/3 only that do not have a limited access herring permit; this permit would be associated with a 10,000 pound possession limit for herring; all other provisions currently associated with the current open access Category D permit would apply:

- **Vessels that obtain this permit would be restricted to fishing for herring in Areas 2/3 only**, under a possession limit of 10,000 pounds of herring and limited to one landing per calendar day up to the 10,000 pound possession limit.
- For quota/ACL monitoring purposes, reporting requirements for vessels that posses this permit would be consistent with requirements for limited access Category C vessels.
- When catch is projected to reach 95% of the sub-ACL in a management area and the directed fishery closes, incidental catch in the area would be limited to 2,000 pounds per trip, as it is currently.

Note: The Council may determine that mackerel limited access permit holders should be treated differently, depending on their level of activity in both the herring and mackerel fisheries and the limited access mackerel permit that they may possess.

3.2 CATCH MONITORING: AT-SEA

All of the management measures under consideration in this section are proposed to apply to limited access herring vessels (Categories A, B, and C).

3.2.1 Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels

The alternatives under consideration to allocate observer coverage on limited access herring vessels **(Categories A/B/C)** are described in the following subsections. Each alternative includes targets/priorities for allocating coverage, a process for reviewing/allocating/prioritizing coverage, options for funding observer coverage, and provisions (if applicable) for utilizing service providers and authorizing waivers in specific circumstances that may prevent deployment of an observer.

The alternatives under consideration to allocate observer coverage on limited access herring vessels (Categories A/B/C) are described in the following subsections. In general, each management alternative under consideration includes:

1. **Targets/priorities for allocating coverage;**
2. **Provisions/process for reviewing/allocating/prioritizing coverage;**
3. **Options for funding observer coverage; and**
4. **Provisions for utilizing service providers and authorizing waivers in specific circumstances that may prevent deployment of an observer.**

For all alternatives that allocate observer coverage in Amendment 5, limited access herring vessels will be required to comply with trip notification provisions and reporting requirements, as modified through the other management measures proposed in this amendment.

3.2.1.1 Alternative 1: No Action Alternative

The no action alternative represents the status quo for allocating observer coverage on limited access herring vessels. This alternative would allocate observer coverage on limited access herring vessels through the current optimization/allocation process, based on the Omnibus Standardized Bycatch Reporting Methodology (SBRM) amendment.

The priorities for allocating sea days would continue to be based on the SBRM process (no action/status quo). The analytical basis for allocation of future sea day coverage rests on a target level of precision (i.e., 30% CV) and an expectation that the pattern of fishing activity observed in the prior year will be similar to the next year. Fishing activity by fleets often changes in response to patterns of stock abundance, weather, and fishery regulations. The SBRM is designed to adapt to these changing circumstances. As specified in the SBRM Omnibus Amendment, when a shortfall occurs, a prioritized sea day allocation is made. This allocation uses a combination of statistical methods and ad-hoc methods to assign sea days while keeping within the federally funded constraints.

Under the no action alternative, no changes would be made to the SBRM process for reviewing and allocating observer coverage. As established by the SBRM omnibus amendments (NEFMC 2007; NMFS 2008), the Councils and public are provided an opportunity to consider and provide input into decisions regarding prioritization of at-sea observer coverage allocations if the expected resources necessary may not be available to achieve CV-based performance goals. In any year in which external operational constraints would prevent NMFS from fully implementing the required at-sea observer coverage levels, the Regional Administrator and Science and Research Director will consult with the Councils to determine the most appropriate prioritization for how the available resources should be allocated. If re-prioritization is undertaken, the re-prioritized sea day allocations will be summarized in a subsequent document.

Under the no action alternative, no action would be taken in Amendment 5 to generate funds or require specific funding for observer coverage required on limited access herring vessels. It is assumed that Federal funds would be utilized to fully support the administration of the fishery management plan and data collection required through the provisions in this amendment. While observer coverage may be ***desired*** or ***targeted*** at a higher rate, realized annual coverage would be based on the allocation of Federal resources and would be subject to prioritization in the face of funding limitations.

Under the no action alternative, no provisions would be established for utilizing service providers for additional observer coverage on limited access herring vessels.

A detailed discussion regarding the impacts of the no action alternative, as well as the SBRM methodology and its relationship to the limited access Atlantic herring fishery, is presented in Appendix III (Volume II) and summarized in Section 5.2 of this document.

3.2.1.2 Alternative 2: Require 100% Observer Coverage on Limited Access Herring Vessels

Alternative 2 would require at-sea observers on every trip taken by limited access herring vessels (Categories A/B/C) unless they are declared out of the herring fishery (through VMS). Options under consideration to address the necessary elements of Alternative 2 are described below.

Priorities for Allocating Sea Days/Target Coverage Levels (Alternative 2)

Under Alternative 2, the priorities/targets for coverage would be 100% of declared herring trips on limited access Category A, B, and C vessels.

Process for Reviewing/Allocating Observer Days (Alternative 2)

Under Alternative 2, no changes would be made to the SBRM process for reviewing and allocating observer coverage. On an annual basis, the Regional Administrator and Science and Research Director will consult with the Councils to determine the most appropriate prioritization for how available Federal resources should be allocated. Additional days to meet the 100% requirement on limited access herring vessels would be funded through other sources (see options below).

Funding Options (Alternative 2)

Option 1: No Action

Under this option, no action would be taken in Amendment 5 to generate funds or require specific funding for observer coverage required on limited access herring vessels. It is assumed that Federal funds would be utilized to fully support the administration of the fishery management plan and data collection required through the provisions in this amendment. While observer coverage may be ***desired*** or ***targeted*** at a higher rate, realized annual coverage would be based on the allocation of Federal resources and would be subject to prioritization in the face of funding limitations. This option equates to the status quo with respect to funding observer coverage in the limited access herring fishery.

Option 2: Federal and Industry Funds

This option would require that observer coverage on limited access herring 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 5 provisions, limited access herring vessels would be responsible for covering costs associated with contracting service providers for the additional observer coverage.

Provisions for Utilizing Observer Service Providers and Authorizing Waivers (Alternative 2)

Because Alternative 2 requires 100% observer coverage on limited access herring vessels, provisions would be included that authorize the use of non-government service providers for sea sampling in the event that Federal funds are not sufficient to provide 100% coverage and/or the fishing industry is required to fund some/all of the sea sampling.

Prior to any trip when declared into the herring fishery (declared "HER"), limited access herring 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 provisions described in Section 3.1.4 of 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 herring trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any Atlantic herring 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 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 utilized by Atlantic herring vessels 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).

****Option Under Consideration: State Agencies as Service Providers for Observer Coverage****

In Amendment 5, the Council is considering an option to authorize State agencies to be service providers for catch monitoring (sea sampling/observer coverage).

Option 1: No Action. Under the no action option, States would not be authorized in Amendment 5 as service providers for observer coverage. If a State Agency intends to provide sea sampling services for Atlantic herring vessels, it would apply to NMFS to become an authorized service provider, consistent with the provisions specified in 50 CFR 648.11(h) and (i)– *Observer service provider approval and responsibilities* and *Observer certification*.

Option 2: States Authorized as Service Providers. Under this option, Amendment 5 would authorize all States in the Northeast Region as service providers for sea sampling on limited access Atlantic herring vessels. States would not be required to apply to NMFS for an authorization and comply with the provisions specified in 50 CFR 648.11(h) and (i) – *Observer service provider approval and responsibilities* and *Observer certification*. To ensure data compatibility, States that are authorized as service providers must ensure that data collection standards and methods are consistent with NEFOP standards and methods for the herring fishery.

Issuance of Waivers If/When Observers Cannot be Deployed

In the event that an observer is required for a particular fishing trip but cannot be provided by the NEFOP, NMFS would notify the vessel within 24 hours of the vessel's notification of the prospective herring trip. If this amendment does not require the industry to pay for observer sea days that cannot be funded using Federal resources, then either the vessel would be prohibited from fishing for, taking, possessing, or landing any Atlantic herring without carrying an observer for that trip, or NMFS would issue a waiver for the trip within 24 hours.

As part of the selection of final management measures for Amendment 5, the Council may specify instances and/or identify specific fishing trips that would not be authorized for waivers by NMFS regardless of whether an observer can be deployed. The Council is seeking public comment on this issue.

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 herring trip. A list of approved service providers will be published on the NMFS/NEFOP website. If a certified observer cannot be procured within 24 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 a waiver is to be issued by NMFS, consistent with the provisions in this amendment, then it will be issued within 12 hours.

3.2.1.3 Alternative 3: Require SBRM Observer Coverage Levels as Minimum Levels

This alternative would require that **at a minimum**, the annual levels of observer coverage recommended by the NEFSC's Standardized Bycatch Reporting Methodology (SBRM) analysis be achieved annually for the SBRM fleets identified in this amendment. The process for determining coverage levels using the SBRM methodology is described under the no action alternative. Under Alternative 3, SBRM sea day allocations for "herring fleets" (identified in this amendment) would represent minimum requirements for sea days that must be covered during the upcoming year.

<u>*SBRM Fleets to Which This Alternative Applies*</u>

Based on the Herring PDT's detailed analysis presented in Appendix III (Volume II), the SBRM fleets to which this alternative applies include:

- **New England Midwater Trawl;**
- **Mid-Atlantic Midwater Trawl; and**
- **New England Purse Seine.**

<u>Priorities for Allocating Sea Days/Target Coverage Levels (Alternative 3)</u>

The priorities for allocating sea days would be based on the SBRM process (no action alternative, Section 3.2.1.1).

<u>Process for Reviewing/Allocating Observer Days (Alternative 3)</u>

Under Alternative 3, no changes would be made to the SBRM process for reviewing and allocating observer coverage. As specified in the SBRM Omnibus Amendment, when a shortfall occurs, a prioritized sea day allocation is made. Under Alternative 3, re-prioritizing or shifting the allocation of observer days on SBRM herring fleets would be prohibited by the Council or NMFS during the annual SBRM review/prioritization process.

<u>Funding Options (Alternative 3)</u>

The funding options under consideration for Alternative 3 are the same as those for Alternative 2 (see Section 3.2.1.2).

Option 1: No Action

Option 2: Federal and Industry Funds

<u>Provisions for Utilizing Observer Service Providers and Authorizing Waivers (Alternative 3)</u>

Under Alternative 3, SBRM observer allocations would be mandated, and shifting days away from the herring fleets during the prioritization process would be prohibited. As a result, additional funding may be necessary to achieve the coverage levels specified by the SBRM, especially if the optimization process limits the amount of Federal resources available to fund sampling at these levels. The Council is therefore considering an option to establish provisions for utilizing service providers in the event that Federal funds are not sufficient. The options to establish provisions for sea sampling service providers under Alternative 3 are the same as those proposed for Alternative 2 (see Section 3.2.1.2).

3.2.1.4 Alternative 4: Allocate Observer Coverage Based on Council-Specified Targets/Priorities

This alternative would require that observer coverage on limited access herring vessels be allocated annually based on the following targets/priorities identified by the New England Fishery Management Council: a 30% CV on catch estimates for Atlantic herring and haddock, and a 20% CV on catch estimates for river herring *(catch = total removals).*

<u>Priorities for Allocating Sea Days/Target Coverage Levels (Alternative 4)</u>

Under this alternative, allocating observer days on limited access Atlantic herring vessels would be based on a process similar to the SBRM, designed to target 30% CV on catch estimates for Atlantic herring and haddock, and a 20% CV on catch estimates for river herring. These targets differ from the current SBRM performance standards in that: (1) river herring is incorporated as a priority species and a basis for allocating observer coverage; (2) the goal of this alternative is to achieve precision targets for total catch estimates (*retained and discarded* – not just discarded); (3) the precision standard for river herring catch estimates more conservative than the current SBRM standards (20% CV versus 30% CV); and (4) a precision target for haddock is identified separately (versus large-mesh groundfish in the current SBRM).

The Council emphasized the need to be practical when determining an appropriate sampling design for at-sea monitoring, especially given available resources. When designing the sampling program, priority should be given to the species of greatest concern, from a biological perspective. It is acknowledged that all species will be sampled regardless of the priorities, and CVs of 30% or even less may be achieved for many of the other species. River herring, haddock, and Atlantic herring have all been identified by the Council as priority species under this alternative.

<u>Process for Reviewing/Allocating Observer Days (Alternative 4)</u>

Option 1 – NEFSC Supplemental SBRM Analysis

Under this option, the NEFSC would prepare a supplemental SBRM analysis to relate SBRM fleets/coverage levels to the limited access herring vessels and evaluate the potential allocation of additional days on these vessels to achieve a 20% CV on river herring catch estimates and a 30% CV on catch estimates for Atlantic herring and haddock. The timing of the supplemental analysis would mirror the annual SBRM prioritization process, and the supplemental analysis/report would be presented to the Council by the NEFSC in conjunction with the annual SBRM Sea Day Analysis and Prioritization.

The NEFSC would utilize approaches similar to those in the SBRM to consider how to effectively increase precision estimates on total river herring catch (kept and discarded) for the herring fleets identified in this alternative. The supplemental report would evaluate CVs for river herring, haddock, and Atlantic herring catch estimates based on the previous year's data, relate the SBRM Sea Day Analysis and SBRM fleets identified in this alternative to the limited access herring vessels, and provide information about the number and distribution of additional observer days to achieve the standards for the limited access herring fleet. The Council would review the additional analysis in the context of prioritizing sea days throughout the region and could evaluate the costs/benefits associated with requiring days above those allocated through the SBRM process to achieve the goals/objectives of the sampling program in this amendment.

The intent of this option is to provide a supplemental process to evaluate the sampling goals and performance standards identified in this amendment without compromising or formally changing the SBRM methodologies or the annual optimization process. This option relies on analyses developed concurrently by the SBRM analysts at the NEFSC and focuses specifically on just the fleets identified in this alternative.

Option 2 – Herring PDT Supplemental Analysis

Under this option, the Herring Plan Development Team (PDT) would prepare a supplemental analysis to relate SBRM fleets/coverage levels to the limited access herring vessels and evaluate the potential allocation of additional days on these vessels to achieve a 20% CV on river herring catch estimates and a 30% CV on catch estimates for Atlantic herring and haddock.

The Herring PDT could utilize different approaches (not just SBRM methods) to evaluate how to effectively increase precision estimates on river herring, haddock, and Atlantic herring catch on limited access herring vessels. The PDT would not be limited to SBRM methodologies under this option. The supplemental Herring PDT Report evaluate CVs for river herring, haddock, and Atlantic herring catch estimates based on the previous year's data, relate the SBRM Sea Day Analysis and SBRM fleets identified in this alternative to the limited access herring vessels, provide information about the number and distribution of additional observer days to achieve the standards for the limited access herring fleet, and provide an estimate of the potential costs of those days.

The intent of this option is to provide a supplemental process to evaluate the sampling goals and performance standards identified in this amendment without compromising or formally changing the SBRM methodologies or optimization process. This option requires the Herring PDT to meet annually to develop analyses concurrently while the NEFSC develops the SBRM analyses related to the allocation of sea days across all fisheries in the region. Timing is an important consideration for this option. The intent would be for the timing of the supplemental analysis to mirror the annual SBRM prioritization process; however, the Herring PDT's supplemental analysis/report would benefit from building on the SBRM analysis. The Council would review the additional analysis in the context of prioritizing sea days throughout the region and could evaluate the costs/benefits associated with requiring days above those allocated through the SBRM process to achieve the goals/objectives of the sampling program in this amendment.

Funding Options (Alternative 4)

The funding options under consideration for Alternative 4 are the same as those for Alternative 2 (see Section 3.2.1.2).

Option 1: No Action

Option 2: Federal and Industry Funds

Provisions for Utilizing Observer Service Providers and Authorizing Waivers (Alternative 4)

Under Alternative 4, observer allocations would be based on Council-specified priorities/targets. As a result, additional days may be necessary to achieve the coverage levels desired by the Council, especially after the SBRM optimization process. The Council is therefore considering an option to establish provisions for utilizing service providers in the event that Federal funds are not sufficient. The options to establish provisions for sea sampling service providers under Alternative 3 are the same as those proposed for Alternative 2 (see Section 3.2.1.2).

3.2.1.5 Summary of Alternatives Under Consideration for Allocating Observer Coverage on Limited Access Herring Vessels

Table 3 summarizes the alternatives under consideration to allocate observer coverage on limited access herring vessels.

Table 3 Summary of Alternatives Under Consideration to Allocate Observer Coverage on Limited Access Herring Vessels

ALTERNATIVE	PRIORITIES/ TARGETS FOR ALLOCATING OBSERVER DAYS	PROCESS FOR REVIEWING/ ALLOCATING DAYS	FUNDING	OBSERVER SERVICE PROVIDERS/WAIVERS	ADDITIONAL COMMENTS
ALT 1: NO ACTION	• SBRM • CAI and other areas/times required in A5	• No Action (SBRM)	• No Action (Federal, subject to resource limitations and priorities)	• No Action (N/A)	
ALT 2: 100% OBSERVER COVERAGE	• 100% of declared herring trips for A/B/C vessels	• No Action • SBRM process plus additional days required on A/B/C vessels	• Option 1: No Action • Option 2: Federal and Industry Funds	• Consistent with scallop/groundfish regs; additional option to consider States as service providers; waivers at discretion of NMFS; Council may specify instances when waivers may/may not be granted	
ALT 3: REQUIRE SBRM COVERAGE LEVELS AS MINIMUM	• SBRM-recommended coverage levels would be mandated as minimum levels – no reprioritizing • CAI and other areas/times required in A5	• No Action (SBRM)	• Same as Alt 2	• Same as Alt 2	• Herring PDT Analysis evaluates the distribution of limited access herring vessels across the current SBRM fleets to identify the fleets to which this alternative applies
ALT 4: ALLOCATE COVERAGE BASED ON COUNCIL TARGETS	• 30% CV for haddock/herring and 20% CV on for RH catch estimates for A/B/C vessels • CAI and other areas/times required in A5	• Option 1: Supplemental NEFSC/SBRM Analysis • Option 2: Herring PDT Supplemental Analysis	• Same as Alt 2	• Same as Alt 2	• Herring PDT Analysis provides example of supplemental analysis that can be provided to the Council to determine priorities when allocating observer days on limited access herring vessels

3.2.2 Management Measures to Improve/Maximize Sampling At-Sea

Additional management measures are being considered in Amendment 5 to enhance regulations pertaining to the current at-sea monitoring program. The Council is considering options to maximize the sampling of catch by NMFS-approved observers on board limited access Atlantic herring vessels (Categories A, B, and C).

3.2.2.1 Option 1: No Action

Under the no action option, no additional provisions would be implemented in Amendment 5 to improve/maximize sampling by at-sea observers.

Current regulations for vessels carrying NMFS-approved sea samplers/observers on board (Section 648.11(d)) specify that owners/operators of fishing vessels must:

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, 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.

3.2.2.2 Option 2: Implement Additional Measures to Improve Sampling

Under this option, the following additional provisions would be implemented in Amendment 5 to improve sampling by NMFS-approved observers at-sea:

2A. Requirements for a Safe Sampling Station

Vessel operators would be required to provide at-sea observers with a safe sampling station adjacent to the fish deck– this may include a safety harness (if footing is compromised and grating systems are high above the deck), a safe method to obtain samples, and a storage space for baskets and sampling gear. Vessels must maintain safe conditions on the vessel for the protection of observers including adherence to all U.S. Coast Guard and other applicable rules, regulations, or statutes pertaining to safe operation of the vessel.

2B. Requirements for "Reasonable Assistance"

Vessel operators would be required to provide NMFS-approved observers with reasonable assistance to enable observers to carry out their duties, including but not limited to obtaining samples and sorted discards. "Reasonable assistance" could be defined as:

- Measuring decks, codends, and holding bins;
- Collecting bycatch when requested by the observers; and/or
- Collecting and carrying baskets of fish when requested by the observers.

2C. Requirements to Provide Notice

Vessels operators would be required to provide observers notice when pumping may be starting and when to allow sampling of the catch, and when pumping is coming to an end.

2D. Requirements for Trips with Multiple Vessels

When observers are deployed on herring trips involving more than one vessel, observers would be required on any vessel taking on fish wherever/whenever possible.

2E. Communication on Pair Trawl Vessels

In pair trawl operations, additional communication would be required between the boats if fish are being pumped to both vessels with to keep the observer informed of catch.

2F. Visual Access to the Net/Codend

Vessel operators would be required to provide and assist NMFS-approved observers in obtaining visual access to the codend (or purse seine bunt) and any of its contents after pumping has ended, before the pump is removed. On trawl vessels, the codend and any remaining contents should be brought on board after pumping. If this is not possible, the vessel operator would be required to work with the observer to ensure that the observer can see the codend and its contents as clearly as possible. The observer will document this process and what he/she is able to see/sample in the observer log.

3.2.3 Measures to Address Net Slippage

In Amendment 5, the Council is not only considering options to maximize the sampling of catch by NMFS-approved observers, but also to address net slippage on board limited access Atlantic herring vessels (Categories A, B, and C).

For the purposes of Amendment 5, *slippage* 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.

3.2.3.1 Option 1: No Action

Under the no action option, no additional provisions would be implemented in Amendment 5 specifically to address net slippage.

Existing sampling requirements for herring vessels in Closed Area I would continue to apply under the no action option. These are based on the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80) and include (for any trip in CAI with an observer):

- A requirement to pump aboard all fish from the net for inspection and sampling by the observer.
- If the net is released for any of the reasons allowed in the rule, 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.

3.2.3.2 Option 2: Require Released Catch Affidavit for Slippage Events

Under this option, vessel operators would be required to provide additional information about whether a net was partially/fully slipped, the reason for the slippage, and the estimated weight of fish that were released on any trip with slippage events when a NMFS-approved observer is on board.

This option requires that a **Released Catch Affidavit** be created for slippage events on both trawl and purse seine vessels with Category A, B, or C herring permits on all declared herring trips with a NMFS-approved observer on board, to be signed by vessel operators under penalty of perjury. The Released Catch Affidavit will contain detailed information including (1) the reason for slippage; (2) an estimate of the quantity and species composition of the slipped fish; and (3) the location and time that the slippage event occurred. When an observer is present on the vessel during a slippage event, the event would be fully documented with photographs. Released catch that is identified as Atlantic herring also should be reported as discarded herring through the herring ACL-monitoring program (IVR or VMS) as well as the VTRs.

3.2.3.3 Option 3: Closed Area I Sampling Provisions

This option would apply management measures similar to those for herring vessel access to Multispecies Closed Area I based on the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80). The following provisions would apply to limited access herring vessels (all gear types) on declared herring trips in all herring management areas carrying a NMFS-approved observer on board (for any trip with an observer):

- Vessels would be required to pump aboard all fish from the net for inspection and sampling by the NMFS-approved 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 observer.
- Vessels may make short test tows in the area to check the abundance of target and bycatch 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.

3.2.3.4 Option 4: Catch Deduction (and Possible Trip Termination) for Slippage Events

The Council is considering options for management measures that would apply a deduction against the herring sub-ACL in a management area if a slippage event is observed and/or may require trip termination if multiple slippage events occur in one management area. The intent of these options is to discourage slippage to the extent practicable, while still allowing for catch to be released in cases where safety is a concern or there may be gear/mechanical failure. Several related options are described below. These options would apply on any trips by limited access herring vessels carrying a NMFS-approved observer on board.

Option4A: Catch Deduction and Possible Trip Termination

Under this option, the following provisions would apply to limited access herring vessels (all gear types) carrying a NMFS-approved observer on board (for any trip with an observer):

For slippage events that occur if the vessel operator finds that (1) pumping the catch could compromise the safety of the vessel or (2) mechanical failure precludes bringing some or all of the catch aboard the vessel:

- It will be assumed that the sea herring not pumped on board will equal 100,000 lbs. of herring, to be counted as part of the catch and against the sub-ACL for that management area. Vessel operators will be responsible for reporting this catch through the quota monitoring mechanism (IVR or VMS) and their VTRs, under penalty of perjury. The slipped catch will be identified separately so that the number of slippage events per management area can be tracked and any resulting discrepancies between datasets can be more easily resolved.
- Once ten slippage events are observed in a particular management area, each additional slippage event for reasons specified in (1) and (2) above will cause trip termination and the vessel will be required to return to port.

Option4B: Closed Area I Provisions with Catch Deduction and Possible Trip Termination

This option would apply management measures similar to those for herring vessel access to Multispecies Closed Area I based on the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80). The following provisions would apply to limited access herring vessels (all gear types) on declared herring trips in all herring management areas carrying a NMFS-approved observer on board (for any trip with an observer):

- Vessels would be required to pump 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 observer.
- Vessels may make short test tows in the area to check the abundance of target and bycatch 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.

For slippage events that occur if the vessel operator finds that (1) pumping the catch could compromise the safety of the vessel or (2) mechanical failure precludes bringing some or all of the catch aboard the vessel:

- It will be assumed that the sea herring not pumped on board will equal 100,000 lbs. of herring, to be counted as part of the catch and against the sub-ACL for that management area. Vessel operators will be responsible for reporting this catch through the quota monitoring mechanism (IVR or VMS) and their VTRs, under penalty of perjury. The slipped catch will be identified separately so that the number of slippage events per management area can be tracked and any resulting discrepancies between datasets can be more easily resolved.

- Once ten slippage events are observed in a particular management area, each additional slippage event for reasons specified in (1) and (2) above will result in trip termination and the vessel will be required to return to port.

Option4C: : Closed Area I Provisions with Trip Termination Only (10 Events)

Under this option, the following provisions would apply to limited access herring vessels (all gear types) carrying a NMFS-approved observer on board (for any trip with an observer):

- Vessels would be required to pump 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 observer.
- Vessels may make short test tows in the area to check the abundance of target and bycatch 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.
- NMFS would track the number of slippage events observed in each management area. Once ten (10) slippage events occur in any management area, each additional slippage event will result in trip termination and the vessel will be required to return to port.

Option4D: : Closed Area I Provisions with Trip Termination Only (5 Events)

Option 4D is the same as Option 4C except trip termination would result once five (5) slippage events occur in any management area.

3.2.4 Maximized Retention Alternative (Experimental Fishery)

The Council is considering an alternative to require maximized retention (MR) of catch through an experimental fishery when NMFS-approved observers are on board Atlantic herring limited access vessels.

3.2.4.1 Alternative 1: No Action

Under the no action alternative, no provisions would be implemented in Amendment 5 to evaluate maximized retention in the herring fishery. Herring vessels would continue to operate under the regulations and possession limits for any fisheries for which they possess permits. Other measures to address at-sea monitoring (described in other sections of this document) may be implemented in Amendment 5 even if no action is taken regarding MR.

3.2.4.2 Alternative 2: Evaluate Maximized Retention through the Annual Issuance of Exempted Fishing Permits

Under this alternative, the experimental fishery process would be utilized to determine whether maximized retention is appropriate for the Atlantic herring fishery, and if so, which species should be part of the maximized retention program and which FMPs should be amended to allow for long-term implementation of the program.

Under this alternative, for four years following the implementation of Amendment 5, Category A, B, and C Atlantic herring vessels would be issued an Exempted Experimental Fishing Permit (EFP) by the Sustainable Fisheries Division (SFD) at NERO as part of the annual herring permit renewal process. The EFP would provide the regulatory relief necessary to allow the currently non-permitted landings to take place when the vessels are required to comply with maximized retention provisions. Regulations implementing the details of the experimental fishery would address the handling of unwanted/unmarketable catch and provisions regarding the counting and sale of such catch.

During the EFP years (four years), vessels would be required to comply with the maximized retention provisions specified in this section on any trip with a NMFS-approved observer on board (NEF.

3.2.4.2.1 General Provisions

- For the first four years after implementation of Amendment 5, limited access Category A, B, and C vessels would be required to obtain an exempted experimental fishery permit (EFP) to fish for Atlantic herring in any management area(s). Conditions of the EFP include a requirement to retain all species identified for maximized retention on any trip with a NEFOP or NMFS-certified observer on board (discarding would be prohibited on observed trips).
- The EFP would allow the herring vessel to keep all catch of the species identified for the maximized retention program on observed trips only, including catch above trip limits/quotas for the maximized retention species. The sale of the non-permitted species (and landings above the possession limit/quota) caught by herring limited access vessels for *human consumption* would be prohibited on maximized retention trips. Atlantic herring dealers and processors would also be prohibited from purchasing these fish to be sold for human consumption. This does not apply to sale for use as bait because herring catches that are landed for sale as bait are generally offloaded by pumping the fish

from the vessel hold into tanker trucks. It is not possible to require all such landings to be culled and sorted and would be inequitable to make downstream purchasers of such bait legally liable for the presence of these fish in their bait.

- All observed trips in the fishery would become maximized retention trips and would form a “study group” for the fishery. Catch/landings data would be collected and documented by observers, as well as by vessels based on the reporting and monitoring provisions associated with the vessels’ permits and specified in this amendment.
- During Year 3, the Herring PDT would begin to analyze the data collected by observers through the maximized retention program and: evaluate the strengths/weaknesses and costs/benefits of a maximized retention program; determine the need for a long-term maximized retention program in the herring fishery; evaluate the appropriateness of each species selected for maximized retention; and develop recommendations for the Herring Committee/Council regarding future regulatory action. The technical review and ensuing discussion regarding the need for management action would likely be time-consuming and would occur throughout most of the third year of the program as data from the experimental program continued to be collected.
- During Year 4, the Council would receive input from the herring industry and advisors and would review the Herring PDT’s recommendations to determine whether or not a long-term maximized retention program should be established for the Atlantic herring fishery. The experimental fishery for maximized retention and the EFP requirements and provisions would expire after four years regardless of the determination. Other catch monitoring and reporting requirements implemented in this amendment would continue to be effective.
- If the Council supports a long-term maximized retention program, then development of the corresponding management actions would begin during Year 4 of the experimental fishery program with the intention of implementing the program as soon as all regulatory mechanisms are in place. This includes an amendment to the Herring FMP to design the program and implement the specific requirements as well as amendments to all other relevant species FMPs in the Northeast Region (NEFMC, MAFMC, and ASMFC) to authorize the catch/landing of the species in the herring fishery (including allowances for landings above possession limits and/or quotas).

3.2.4.2.2 Options for Exemption to Maximized Retention Provisions

There may be instances that a vessel cannot pump all fish aboard. The Council could consider incorporating exemptions into the EFP provisions that allow a vessel to release some catch under certain circumstances, and possibly with specific consequences. Any or all of the following provisions could be incorporated into the EFP for maximized retention:

- 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.
- A Released Catch Affidavit would be required for slippage events on both trawl and purse seine vessels, to be signed by vessel operators under penalty of perjury. The Released Catch Affidavit would contain detailed information including (1) the reason for slippage; (2) an estimate of the quantity and species composition of the slipped fish; and (3) the location and time that the slippage event occurred. Since an observer will be present on the vessel when the maximized retention provisions apply, slippage events would require an affidavit and would be fully documented by the observer with photographs.

3.3 MANAGEMENT MEASURES TO ADDRESS RIVER HERRING BYCATCH

The Council is considering several management measures to address river herring bycatch in Amendment 5. Each of these alternatives relates to a general management goal. While there may be some overlap and flexibility in combining management measures to achieve more than one of these goals, a range of options is being considered to achieve the goal identified within each of these alternatives.

3.3.1 Alternative 1: No Action

Under this alternative, no additional management measures would be implemented in Amendment 5 to address river herring bycatch. The catch monitoring provisions and other measures established in the Herring FMP and in this amendment would continue to apply.

3.3.2 Alternative 2: River Herring Monitoring/Avoidance

The management goal associated with this alternative is to monitor river herring bycatch and encourage bycatch avoidance. Under this alternative, additional management measures would apply during certain times and in certain areas where river herring encounters with the herring fishery were observed between 2005 and 2009 (areas are defined below). The intent of the additional management measures would be to increase sampling (above and beyond the requirements of the Amendment 5 catch monitoring program) and closely monitor the catch of river herring by the Atlantic herring fleet (defined by permit category). The long-term goal is to adopt river herring bycatch avoidance strategies in the times/areas where interactions with the herring fishery are observed/anticipated.

3.3.2.1 Identification of Monitoring/Avoidance Areas (Alternative 2)

The areas identified in this alternative would be considered River Herring Monitoring/Avoidance Areas. In Amendment 5, the Monitoring/Avoidance Areas would be 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 (Figure 2 – Figure 7). These areas can be modified in the future through a Herring FMP amendment, framework adjustment, or the herring fishery specifications process (see Section 3.3.4).

Figure 2 Alternative 2: River Herring Monitoring/Avoidance Areas January – February

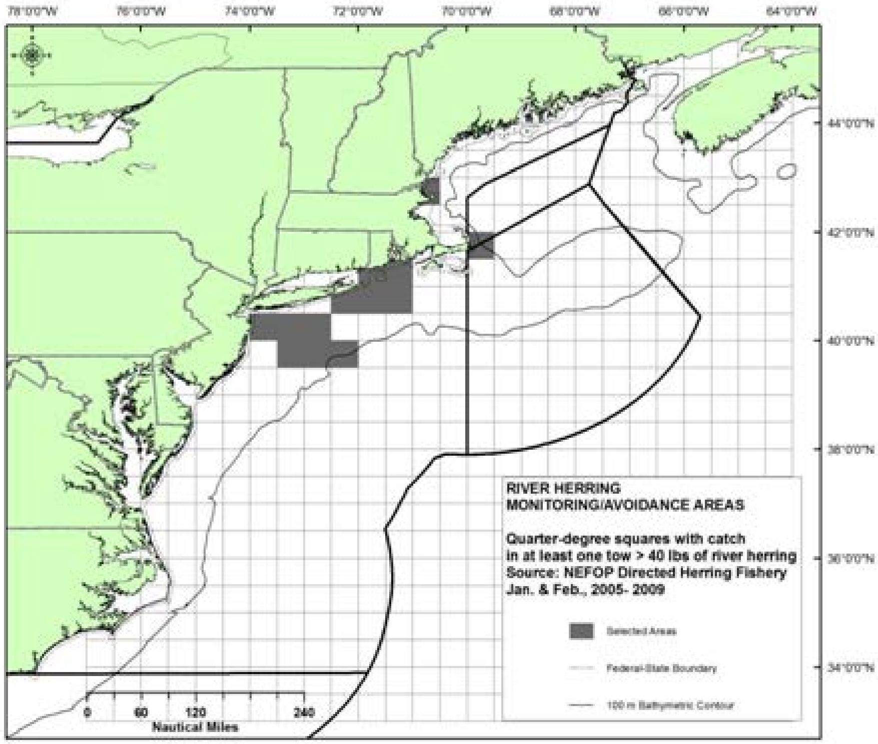


Figure 3 Alternative 2: River Herring Monitoring/Avoidance Areas March – April

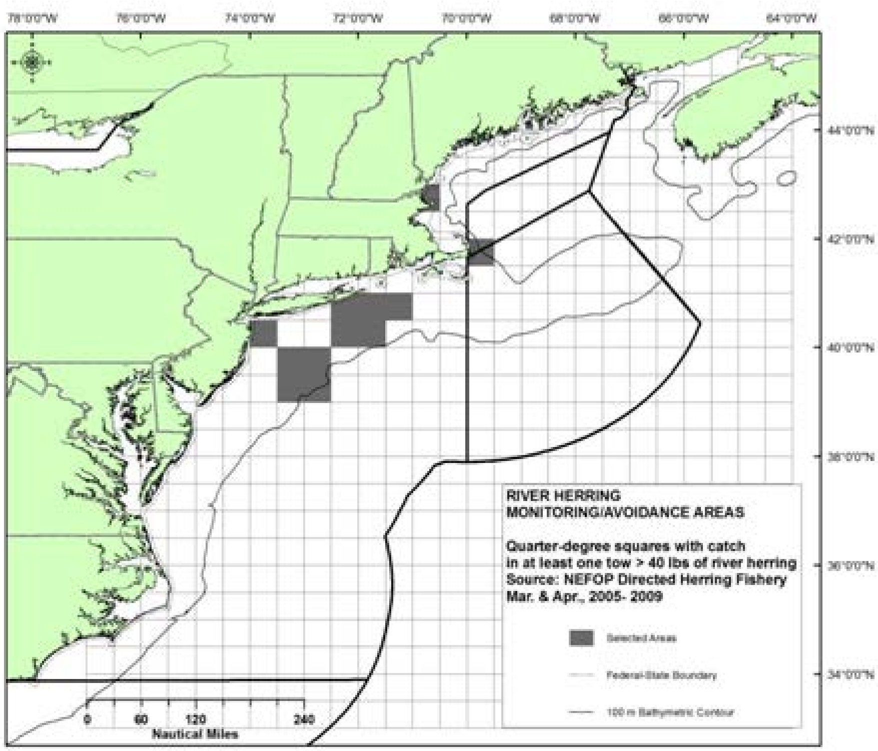


Figure 4 Alternative 2: River Herring Monitoring/Avoidance Areas May – June

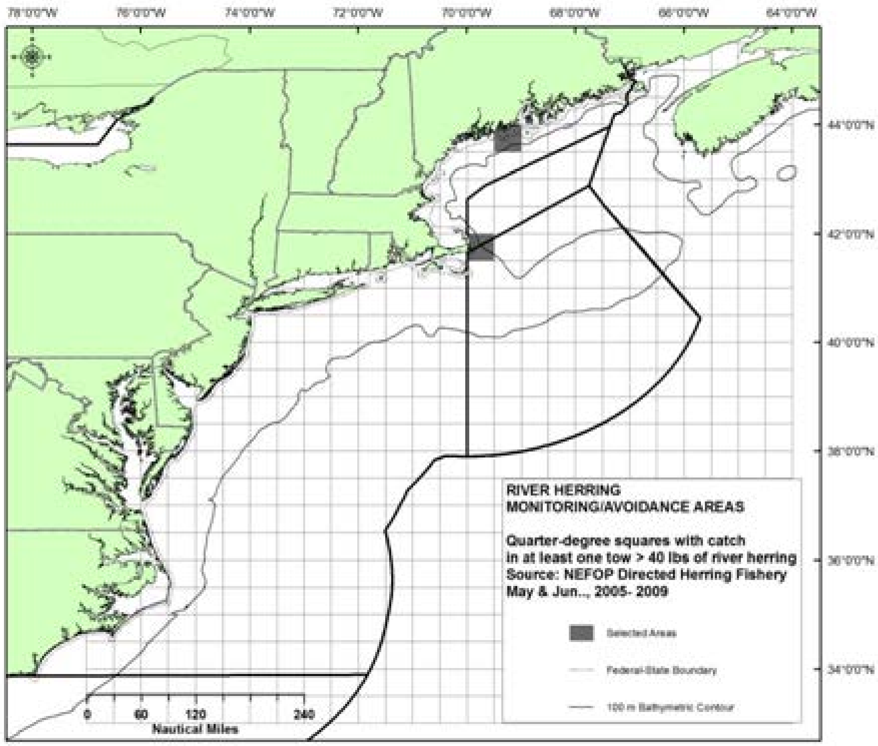


Figure 5 Alternative 2: River Herring Monitoring/Avoidance Areas July – August

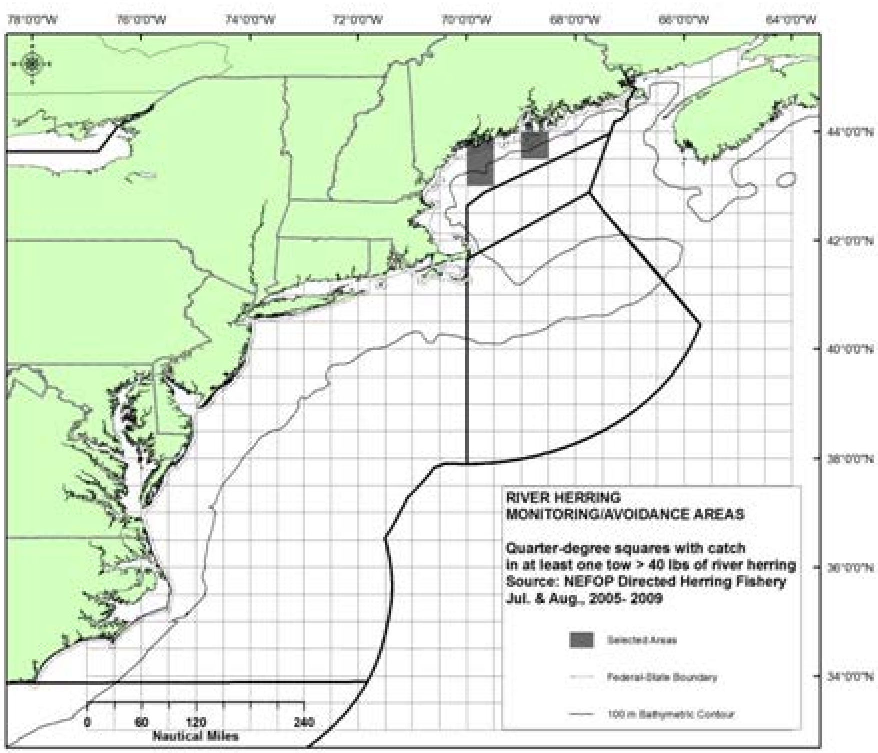


Figure 6 Alternative 2: River Herring Monitoring/Avoidance Areas September – October

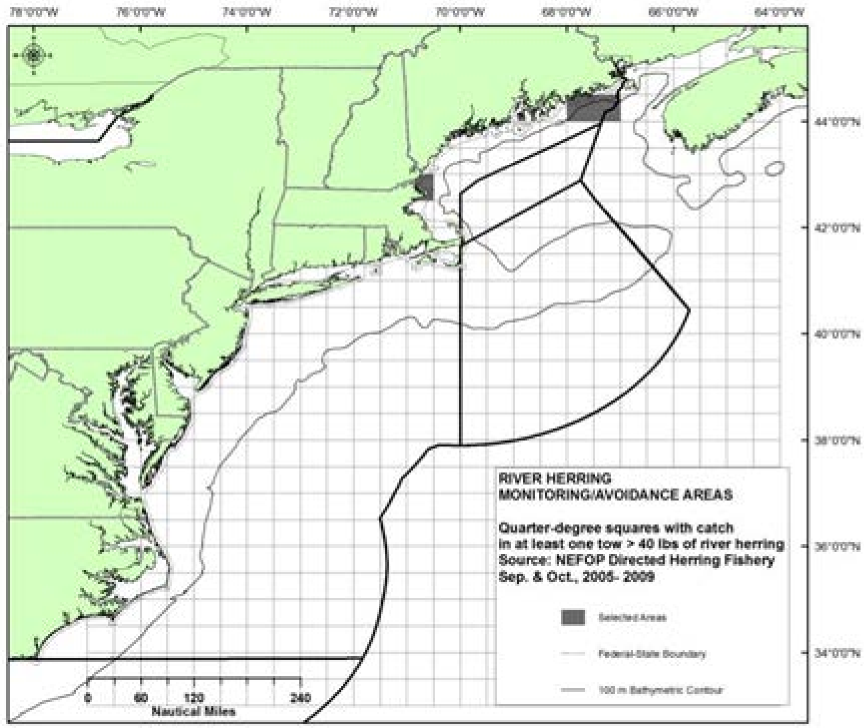
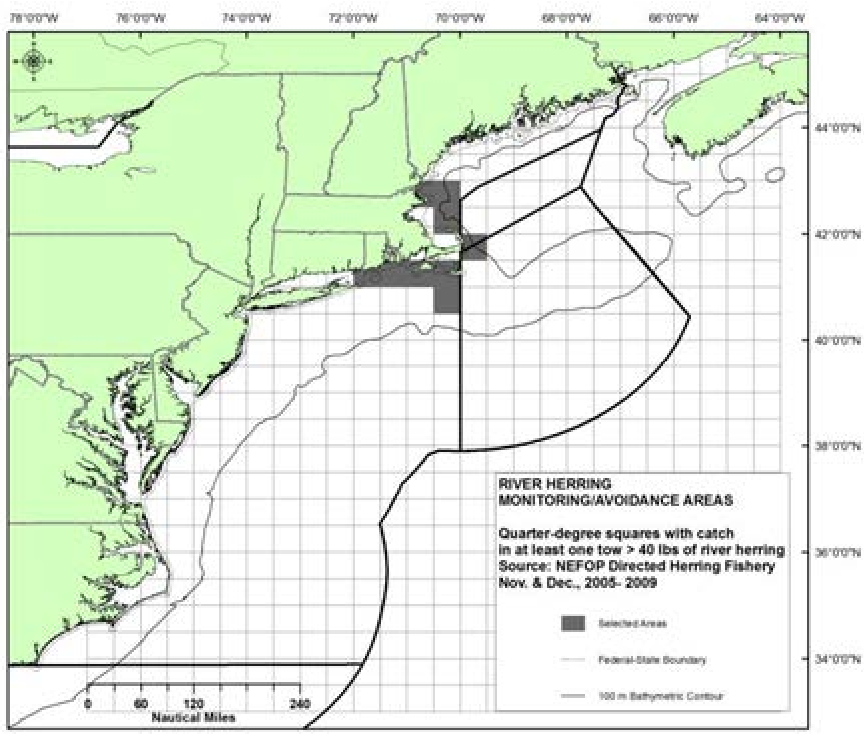


Figure 7 Alternative 2: River Herring Monitoring/Avoidance Areas November – December



3.3.2.2 Alternative 2: Management Options Under Consideration (Monitoring/Avoidance)

3.3.2.2.1 Option 1: 100% Observer Coverage

This option would require 100% observer coverage on any trips in the River Herring Monitoring/Avoidance Areas identified in this alternative. Atlantic herring vessels subject to this measure would be required to carry a NMFS-approved observer on any trip where fishing may occur in the River Herring Monitoring/Avoidance Areas.

Sub-Option A: **This option applies to limited access herring vessels only – Categories A/B/C when on a declared herring trip**. Vessels would be required to indicate their intention to fish in the River Herring Monitoring/Avoidance Areas when scheduling a NMFS-approved observer through the pre-trip notification system (see Section 3.1.4 of this document for a description of options under consideration to address trip notification requirements). To ensure 100% coverage, these vessels would be prohibited from fishing in the River Herring Monitoring/Avoidance Areas without a NMFS-approved observer on board.

Sub-Option B: **This option applies to <u>all</u> herring vessels – Limited Access Categories A/B/ C when on a declared herring trip, as well as Open Access Category D.** All herring vessels would be required to indicate their intention to fish in the River Herring Monitoring/Avoidance Areas when scheduling a NMFS-approved observer through the pre-trip notification system. Category D vessels would only be required to use the pre-trip notification system to schedule an observer if they intend to fish in a River herring Monitoring/Avoidance Area. To ensure 100% coverage, all herring vessels would be prohibited from fishing in the River Herring Monitoring/Avoidance Areas without a NMFS-approved observer on board.

3.3.2.2.2 Option 2: Apply Closed Area I Sampling Provisions

This option would apply management measures in River Herring Monitoring/Avoidance Areas similar to those for herring vessel access to Multispecies Closed Area I based on the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80). Under this option, the following provisions would apply to Atlantic herring vessels subject to this measure when fishing in the River Herring Monitoring/Avoidance Areas with a NMFS-approved observer on board:

- When fishing in a River Herring Monitoring/Avoidance Area with a NMFS-approved observer on board, vessels would be required to pump 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 bycatch 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.

Sub-Option A – Require 100% Observer Coverage: Atlantic herring vessels subject to this measure would be required to carry a NMFS-approved observer on any trip where fishing may occur in the River Herring Monitoring/Avoidance Areas. Vessels would be required to indicate their intention to fish in the River Herring Monitoring/Avoidance Areas when scheduling a NMFS-approved observer through the pre-trip notification system. To ensure 100% coverage, vessels would be prohibited from fishing in the River Herring Monitoring/Avoidance Areas without a NMFS-approved observer on board.

Sub-Option B – Less Than 100% Observer Coverage: Under this sub-option, observer coverage would be distributed on limited access herring vessels based on the provisions in Amendment 5 (see alternatives in Section 3.2.1). Atlantic herring vessels subject to this measure would be required to indicate their intention to fish in the River Herring Monitoring/Avoidance Areas when scheduling a NMFS-approved observer through the pre-trip notification system but would not be prohibited from fishing in the River Herring Monitoring Areas if a NMFS-approved observer is not deployed.

Sub-Option C: **This option applies to limited access herring vessels – Categories A/B/C when on a declared herring trip.**

Sub-Option D: **This option applies to all herring vessels – Categories A/B/C when on a declared herring trip, as well as Category D.**

3.3.2.2.3 Option 3: Trigger-Based Monitoring Approach

This option would apply additional management measures in River Herring Monitoring/Avoidance Areas when a specified river herring catch trigger is reached. The catch triggers apply to three general areas – Statistical Area 521 (Cape Cod, CC), the Gulf of Maine (GOM), and southern New England (SNE) – see Figure 8 below. When the catch trigger in a specified area(s) is reached, then one of the monitoring options described above (Option 1 or Option 2) will apply to the Monitoring/Avoidance Areas within that geographic area where the trigger is reached.

Sub-Options: River Herring Catch Triggers

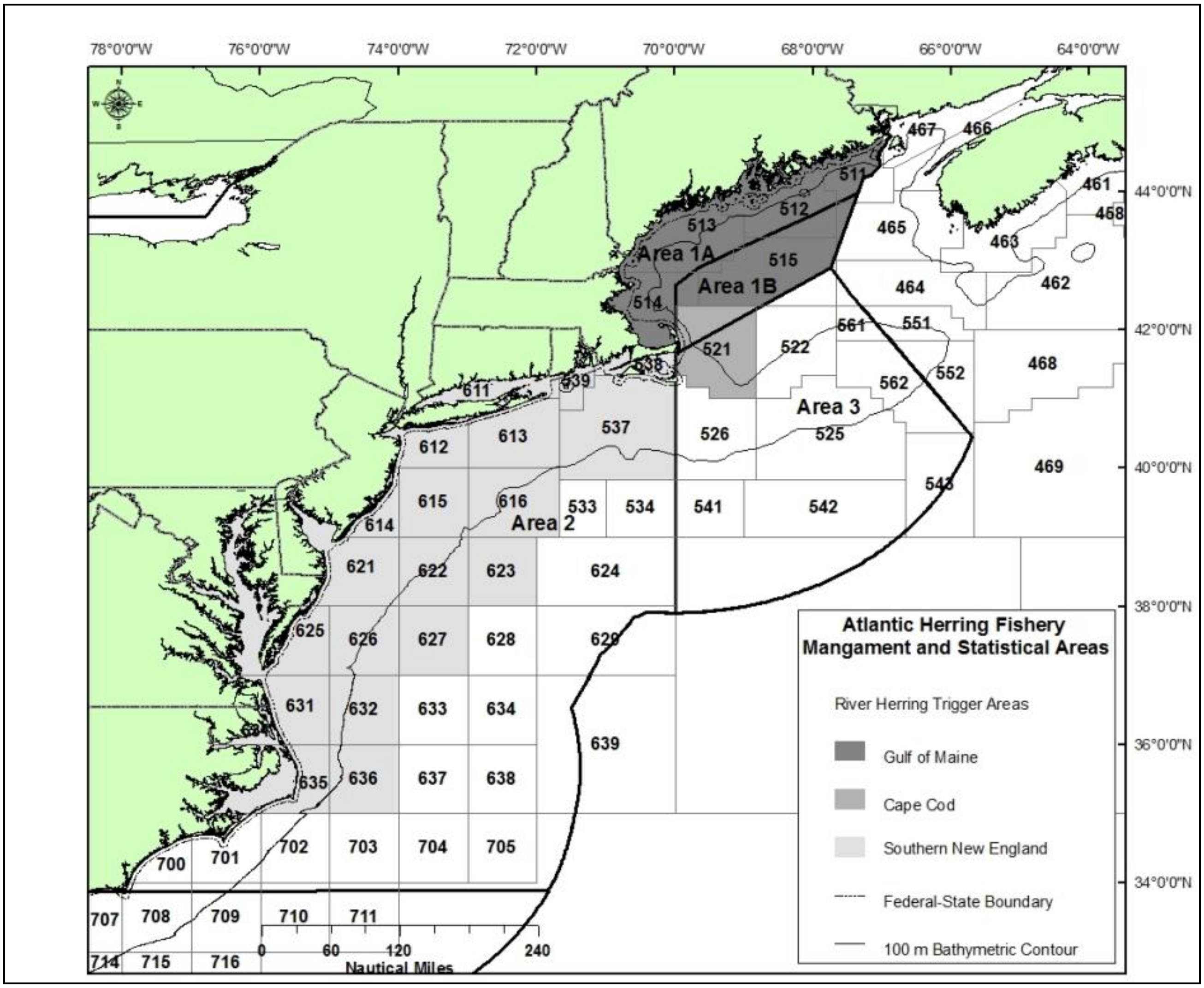
Several sub-options are under consideration for specifying the river herring catch triggers in each of the geographic areas identified in Figure 8. The sub-options are based on the Herring PDT's work to generate the best estimates of river herring removals in recent years (see Table 4 in Herring PDT Discussion Paper: *Developing River Herring Catch Cap Options in the Directed Atlantic Herring Fishery* in Appendix VII (Volume II)) and are summarized below in Table 4. The sub-options include river herring catch estimates based on the maximum, median, and mean annual estimate of river herring catch expanded from observer data from 2005-2009.

Estimates of river herring catch in thousands of pounds (± 2 standard errors) were calculated by the Herring PDT using *Method 2* stratified by gear (midwater trawls, bottom trawls, and purse seines), area (Gulf of Maine (GOM, Statistical Areas 511-514), Cape Cod (CC, Statistical Area 521), and Southern New England (SNE)), and year (2005, 2006, 2007, 2008, and 2009). *Method 2* is the Simple Expansion Method (see SBRM 5.4.2.3. Simple Expansion Method: mean discard per trip, pp 143) modified to include both kept and discarded river herring. These estimates were summed across gear types for each year and area combination. Then the maximum, median, and mean estimates of river herring catch were selected to form the sub-options (Table 4).

Table 4 Sub-Options for River Herring Catch Triggers (Pounds)

Area	SUB-OPTIONS		
	3A (Max)	**3B (Median)**	**3C (Mean)**
CC	1,159,700	93,400	269,600
GOM	294,000	92,400	127,100
SNE	729,500	585,000	478,500

Figure 8 River Herring Catch Trigger Areas (Shaded)



Monitoring the River Herring Catch Triggers – Reporting Options

During the fishing year, river herring catch in each of the trigger areas identified above will be monitored and estimated using observer data from all trips by herring vessels subject to this rule unless the vessel has declared out of the fishery (DOF) through VMS. Observed estimates of river herring catch will be expanded to an estimate of total river herring catch in each of the trigger areas. The estimation procedure will be developed by the NERO, in cooperation with the NEFSC and Council staff, and through consultation with the Council. The final calculation process will be provided on the NERO web page. Area-specific river herring catch estimates will be published on the NERO web page regularly.

Reporting Option 1: Report Total Catch by Trigger Area

In addition to reporting herring by herring management area through the ACL-monitoring system, herring vessels subject to this rule must report total catch (kept and discarded) by river herring catch trigger area so that the appropriate expansions can be made from the observed catch in those areas. For the purposes of this requirement, the **river herring catch trigger areas** are defined as the following statistical areas:

- Gulf of Maine (GOM) – Areas 511, 512, 513, 514, 515, 464, 465 (same as modified GOM haddock stock area established in Framework 46)
- Cape Cod (CC) – Area 521
- Southern New England (SNE) – Areas 537, 538, 539, 611, 612, 613, 614, 615, 616, 621, 622, 623, 625, 626, 627, 631, 632, 635, 636

Reporting Option 1 – Example Catch Report

This report is required by all limited access herring vessels on all declared herring trips. For each day of a declared trip, this report must be submitted by 9 AM the following day. Negative reports (0 lb) must be submitted when no fish were caught.

Note: VTR serial number must be the same number reported to the seafood dealer receiving the landings at the end of the trip. If you use multiple pages of the VTR on the trip, record the serial number from the first VTR page used.

Vessel Trip Report (VTR) Serial Number: ________________________
Date fish caught: Month (01-12) _____
Day (01-31) _____
Gear used to fish: (MWT, PS, BT) _____

SPECIES	AREA 1A	AREA 1B	AREA 2	AREA 3
Herring Kept (lb)	_______	_______	_______	_______
Herring Discarded (lb)	_______	_______	_______	_______

==

	GOM RH Area	CC RH Area	SNE RH Area
All Fish Kept (lb)	_______	_______	______
All Fish Discarded (lb)	_______	_______	______

Note: Reporting by river herring area is required for all limited access vessels. Include total lb of all herring and non-herring. GOM RH Area includes Stat Areas 464, 465, and 511 thru 515. CC RH Area is Stat Area 521. SNE RH Area includes Stat Areas 537, 538, 539, 611, 612, 613, 614, 615, 616, 621, 622, 623, 625, 626, 627, 631, 632, 635, and 636.

	GOM Haddock Area	GB Haddock Area
All Fish Kept (lb)	_______	_______

Note: Reporting by haddock area is only required for vessels using mid-water trawl gear in Areas 1A, 1B, and/or 3. Include total lbs of all herring and non-herring.

GOM Haddock Area includes Stat Areas 464, 465, and 511 thru 515.
GB Haddock Area includes Stat Areas 521, 522, 525, 526, 561, and 562.

Reporting Option 2: Report Total Catch by Statistical Area

Under this option, in addition to reporting herring by herring management area through the ACL-monitoring system, herring vessels subject to this rule must report total catch (kept and discarded) by statistical area so that the appropriate expansions can be made from the observed catch in those areas to monitor both the haddock catch caps (Framework 46) and any river herring catch trigger areas that may be established.

Reporting Option 2 – Example Catch Report

This report (example for Reporting Option 2) is required by all limited access herring vessels on all declared herring trips. For each day of a declared trip, this report must be submitted by 9 AM the following day. Negative reports (0 lb) must be submitted when no fish were caught.

Note: VTR serial number must be the same number reported to the seafood dealer receiving the landings at the end of the trip. If you use multiple pages of the VTR on the trip, record the serial number from the first VTR page used.

```
Vessel Trip Report (VTR) Serial Number: ________________________
Date fish caught: Month (01-12)            _____
              Day   (01-31)      _____
Gear used to fish: (MWT, PS, BT)      _____

SPECIES                    AREA 1A    AREA 1B    AREA 2     AREA 3

=================================================================
Herring kept (lbs)         _______    _______    _______    _______
Herring discarded (lbs)  _______ _______    _______    _______
=================================================================
```

Report all fish kept (herring and non-herring species) and the Stat Area in which the fish were caught. If fish were caught in multiple Stat Areas in one day, report the fish kept (lbs) in each Stat Area.

```
All Fish Kept (lbs)   _____ Stat/Chart Area ____

All Fish Kept (lbs)   _____ Stat/Chart Area ____

All Fish Kept (lbs)   _____ Stat/Chart Area ____
```

Management Measures That Apply When Trigger is Reached

When the river herring catch trigger in a specified area(s) is reached, then one of the monitoring options described above (Option 1 in Section 3.3.2.2.1 - 100% observer coverage, or Option 2 in Section 3.3.2.2.2 – Closed Area I sampling provisions) would apply to the River Herring Monitoring/Avoidance Areas within that geographic area where the trigger is reached. The additional monitoring measures would apply to all Monitoring/Avoidance Areas within the trigger area(s) for the remainder of the fishing year. Figure 9 – Figure 14 below illustrate which Monitoring/Avoidance Areas are associated with the river herring catch trigger areas.

For example, if the Gulf of Maine river herring catch trigger is reached in March, then the shaded quarter degree squares in the inshore Gulf of Maine shown in Figure 10 – Figure 14 would be subjected to increased monitoring/sampling during the months identified in the figures for the remainder of that fishing year. Similarly, if the southern New England river herring catch trigger is reached in August, then the shaded squares shown in the southern New England trigger area would be subject to increased monitoring during November and December (Figure 14– no closures in the southern New England area would occur during September/October as shown in Figure 13).

Figure 9 Alternative 2: River Herring Monitoring/Avoidance Areas Associated with Catch Trigger Areas for January – February

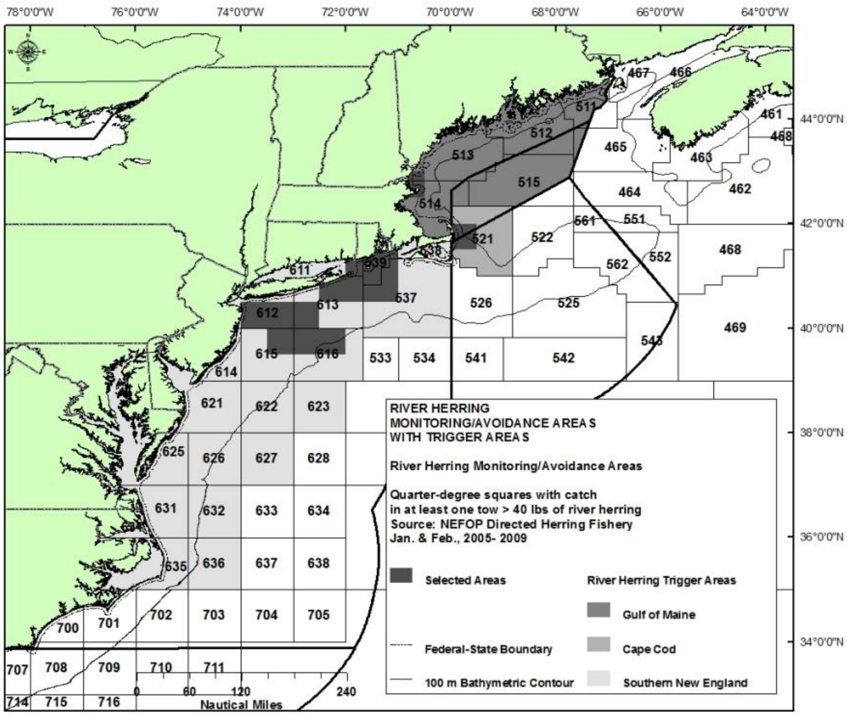


Figure 10 Alternative 2: River Herring Monitoring/Avoidance Areas Associated with Catch Trigger Areas for March – April

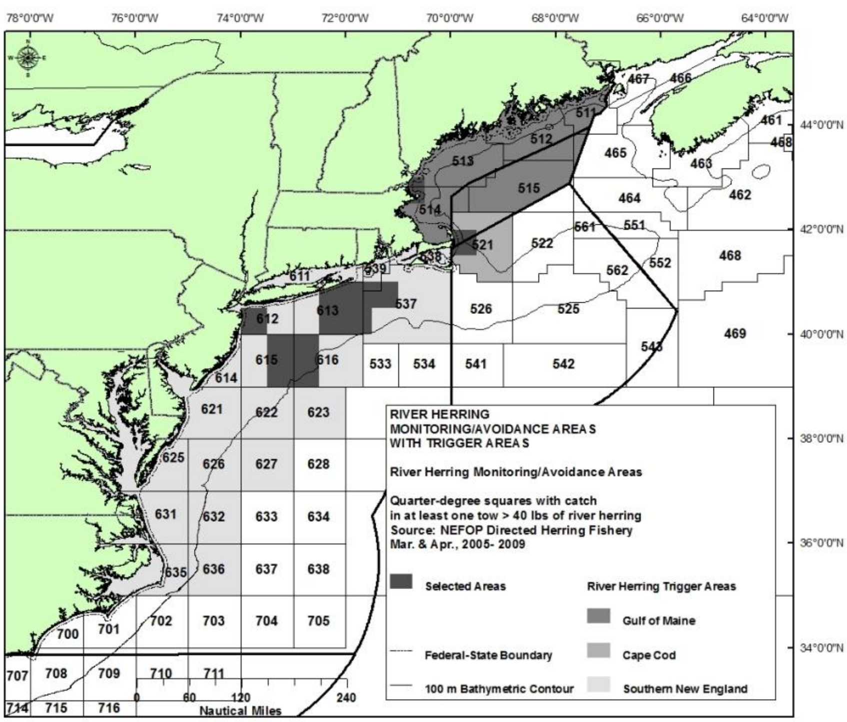


Figure 11 Alternative 2: River Herring Monitoring/Avoidance Areas Associated with Catch Trigger Areas for May – June

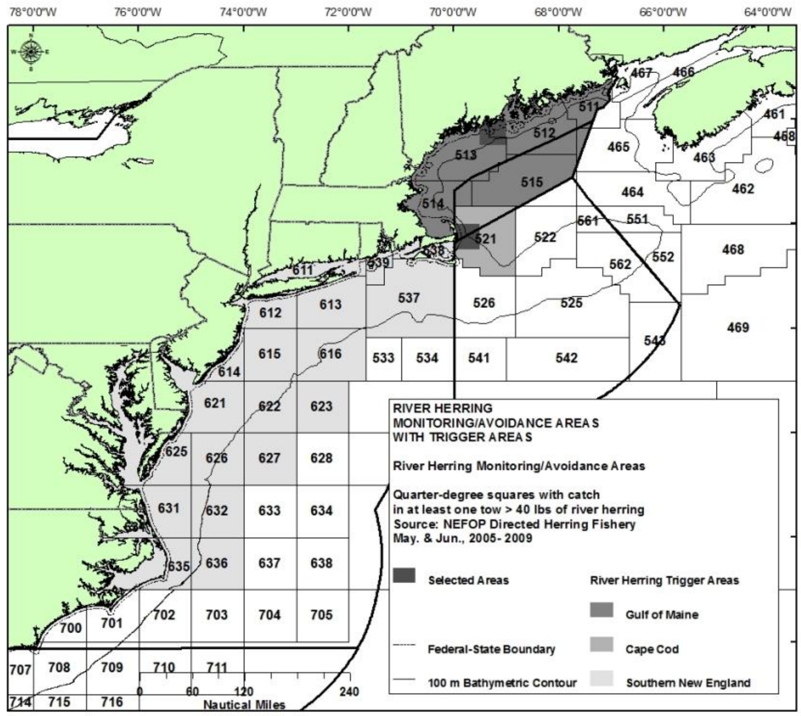


Figure 12 Alternative 2: River Herring Monitoring/Avoidance Areas Associated with Catch Trigger Areas for July – August

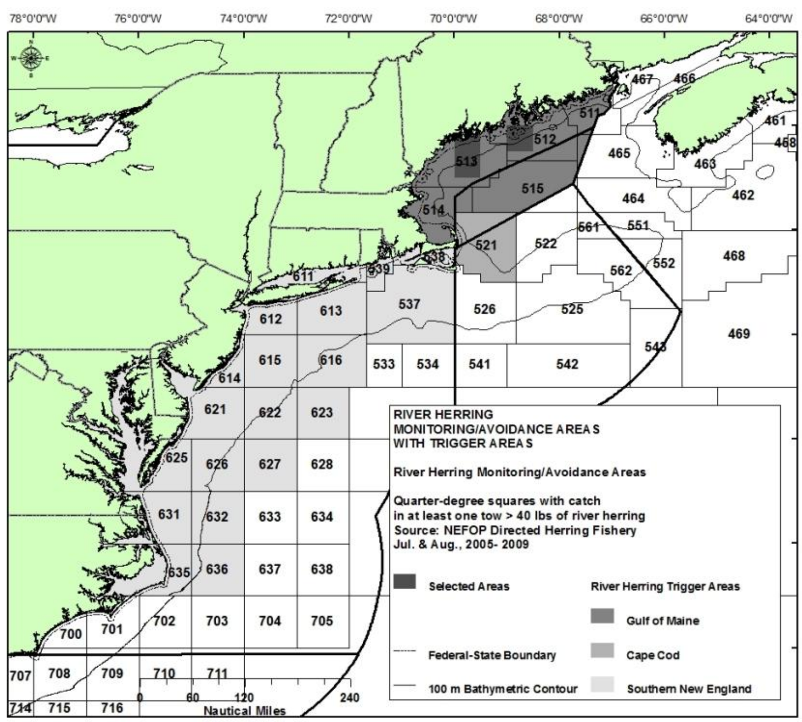


Figure 13 Alternative 2: River Herring Monitoring/Avoidance Areas Associated with Catch Trigger Areas for September – October

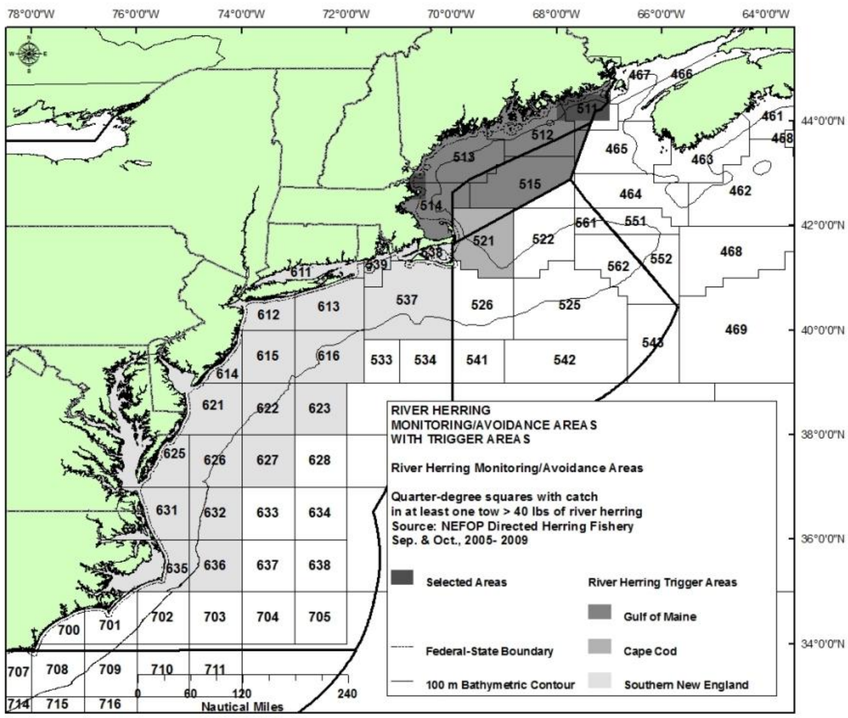
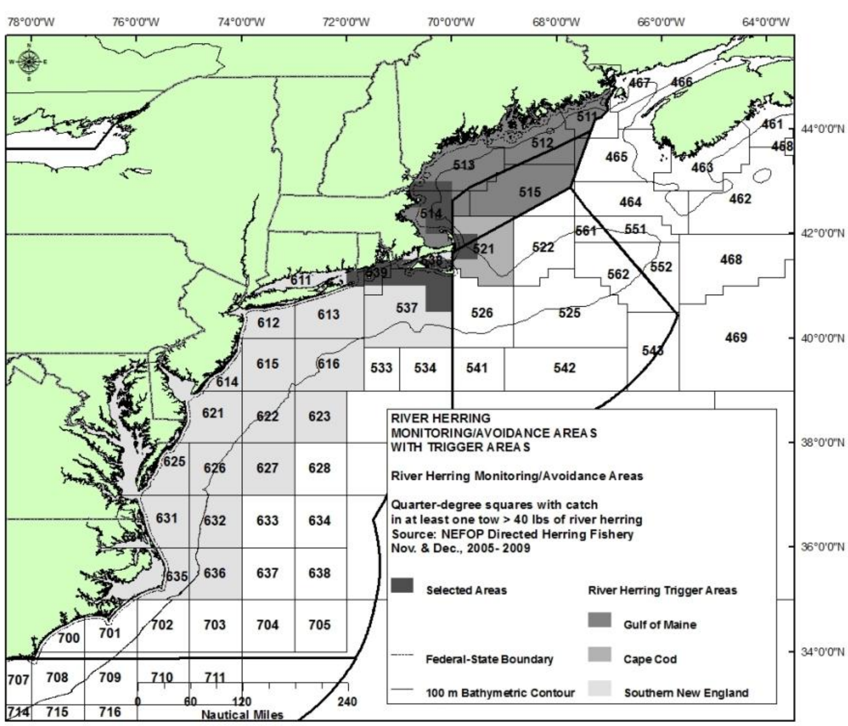


Figure 14 Alternative 2: River Herring Monitoring/Avoidance Areas Associated with Catch Trigger Areas for November – December



3.3.2.2.4 Option 4: Two-Phase Bycatch Avoidance Approach Based on SFC/SMAST/DMF Project

This option may be implemented as a stand-alone approach for addressing river herring bycatch in Amendment 5, or it may be implemented in combination with other measures/options under consideration.

This option would implement a two-phase river herring bycatch avoidance program developed in cooperation with the fishing industry, represented by the Sustainable Fisheries Coalition (SFC) working in partnership with Massachusetts Division of Marine Fisheries (MA DMF) and UMASS Dartmouth School of Marine Science and Technology (SMAST). The current (ongoing) SFC river herring bycatch avoidance project has been funded by the National Fish and Wildlife Foundation (NFWF, see additional information below).

Under this option, a long-term river herring bycatch avoidance strategy would be implemented in the Atlantic herring fishery through a two-phase approach:

1. **Phase I (Amendment 5) –**

   A. Identify Preliminary Bycatch Avoidance Areas (Section 3.3.2.1);

   B. Focus/increase monitoring/sampling in the Monitoring/Avoidance Areas (through Amendment 5 catch monitoring program and/or the additional management options proposed in Section 3.3.2.2);

   C. Establish mechanism for adjusting Monitoring/Avoidance Areas and implementing long-term river herring bycatch avoidance strategies in the future through a framework adjustment to the Herring FMP;

   D. Work with SFC, SMAST, and MA DMF to support the current project, encourage the collection of additional information, and promote the development of long-term bycatch avoidance strategies

   During the continued development, and upon the implementation of Amendment 5, the Council, through its staff and the Herring PDT, will continue to work with the SFC, SMAST, and MA DMF to evaluate progress related to the SFC river herring bycatch avoidance program. As details emerge and additional information becomes available, the PDT will update the Herring Committee/Council and assess various elements of the project, including data (nature, quality, and timeliness), and fleet compliance and communication. The herring PDT will work with the SFC/SMAST/DMF during this time to evaluate the appropriateness of the River Herring Monitoring/Avoidance Areas and will develop recommendations for any adjustments to those areas, which would occur during Phase II (see following).

2. **Phase II (2013 Framework Adjustment) –**

   Upon completion of the SFC bycatch avoidance project (late 2012), the Council will review the results and develop a framework adjustment to implement any additional bycatch avoidance strategies that it deems to be appropriate. If the SFC/SMAST/DMF project is successful, the Council may develop a framework adjustment during Phase II to implement some or all elements of the project as part of a long-term bycatch reduction strategy in the Atlantic herring fishery. During Phase II, the Council would:

A. Formally evaluate the SFC/SMAST/DMF project and its results (through the Herring PDT, Herring Committee, and Council, with input from project participants and the Herring Advisory Panel) upon the project completion (during 2013);

B. Receive recommendations from the Herring PDT and Herring Committee (with input from the AP) regarding the need for/appropriateness of follow-up action to implement a long-term strategy for river herring bycatch reduction through a framework adjustment (mid-late 2013);

C. Conduct an initial Framework Adjustment meeting during 2013 or 2014 – An initial framework meeting would be required by this amendment during 2013 or early 2014 in order to formally evaluate the results of the SFC/SMAST/DMF project and develop follow-up management action as necessary. During this process, and depending on the results of the SFC/SMAST/DMF project, the Council may determine that follow-up action is not necessary or appropriate. To emphasize the importance of this issue and express the Council's intent to follow-through with further consideration of management action, however, the initial framework meeting would be **required** in 2013 or early 2014 regardless of whether additional action is deemed necessary/appropriate.

D. Conduct a final Framework Adjustment meeting during 2013/2014 (optional, if the Council determines that a follow-up framework action is necessary/appropriate, based on the outcome of the SFC/SMAST project and the Herring PDT/Committee recommendations)

While it is unclear exactly what will result from the SFC/SMAST/DMF project, it is expected that some strategies for reducing bycatch in the fishery will emerge, possibly through a flexible system of communications to enact real-time "move-along rules." Consequently, elements to be specified in the Phase II framework adjustment (if the Council determines that a framework adjustment is appropriate) could include (but are not limited to):

- Adjustments to the River Herring Monitoring/Avoidance Areas;
- The mechanism and process for tracking fleet activity, reporting bycatch events, compiling data, and notifying the fleet of changes to the area(s);
- The definition/duration of "test tows," if test tows would be utilized to determine the extent of river herring bycatch in a particular area(s);
- The threshold for river herring bycatch that would trigger the need for vessels to be alerted and move out of the area(s);
- The distance that vessels would be required to move from the area(s); and
- The time that vessels would be required to remain out of the area(s).

The groundwork will be laid in this Draft EIS for this approach to be utilized as a bycatch management/avoidance measure in the future. The potential impacts of this option are discussed in Section 5.4 of this document. Management measures to address bycatch and bycatch monitoring are already included in the list of measures that can be implemented through a framework adjustment to the Herring FMP (CFR Section 648.206).

3.3.2.2.5 Options for Exemptions Under Alternative 2

Before selecting final management measures, the Council will review river herring bycatch data (provided in this document) and consider exemptions to the Options 1, 2, and 3 under Alternative 2 (described in this section, 3.3.2.2) for vessels participating in either the small mesh northern shrimp fishery (CFR 680.80 (a)(5)) or vessels fishing with mesh greater than 5.5 inches, or both. The Council is seeking public comment on this issue and may determine that either or both of these fisheries should be exempt from the river herring management options when it selects final management measures for Amendment 5.

3.3.3 Alternative 3: River Herring Protection

The management goal associated with this alternative is to protect river herring. This alternative includes seasonal closures that are intended to minimize river herring encounters in the herring fishery based on times/areas where the largest encounters with the fishery were observed between 2005 and 2009.

3.3.3.1 Identification of Protection Areas (Alternative 3)

The areas identified in this alternative will be considered River Herring Protection Areas. In Amendment 5, the Protection Areas will be 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 (Figure 15 – Figure 18). These areas can be modified in the future through a Herring FMP amendment, framework adjustment, or the herring fishery specifications process.

Under this alternative, no River Herring Protection Areas would be established in this amendment during May – August.

Figure 15 Alternative 3: River Herring Protection Areas January – February

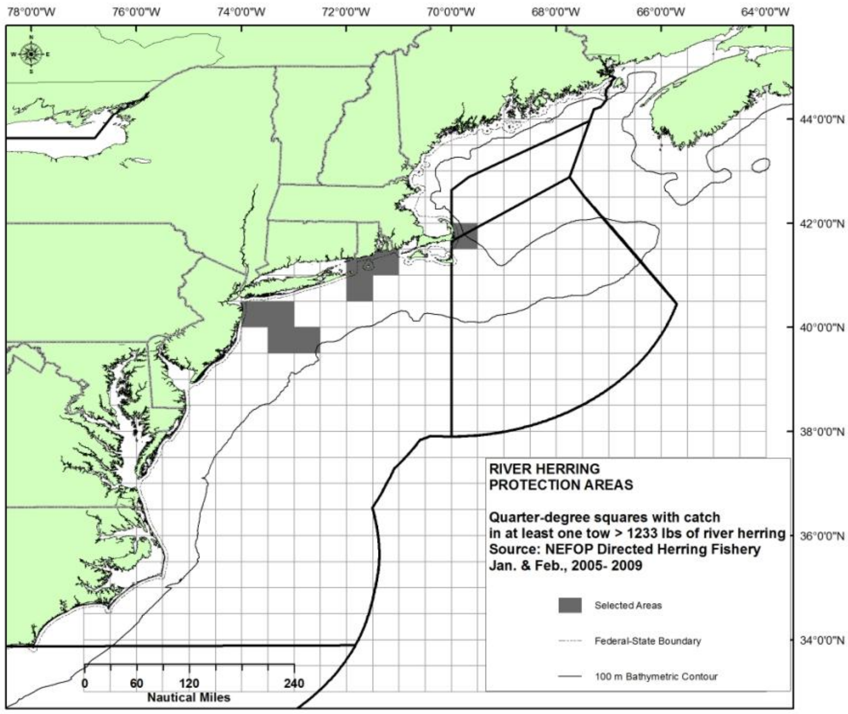


Figure 16 Alternative 3: River Herring Protection Areas March – April

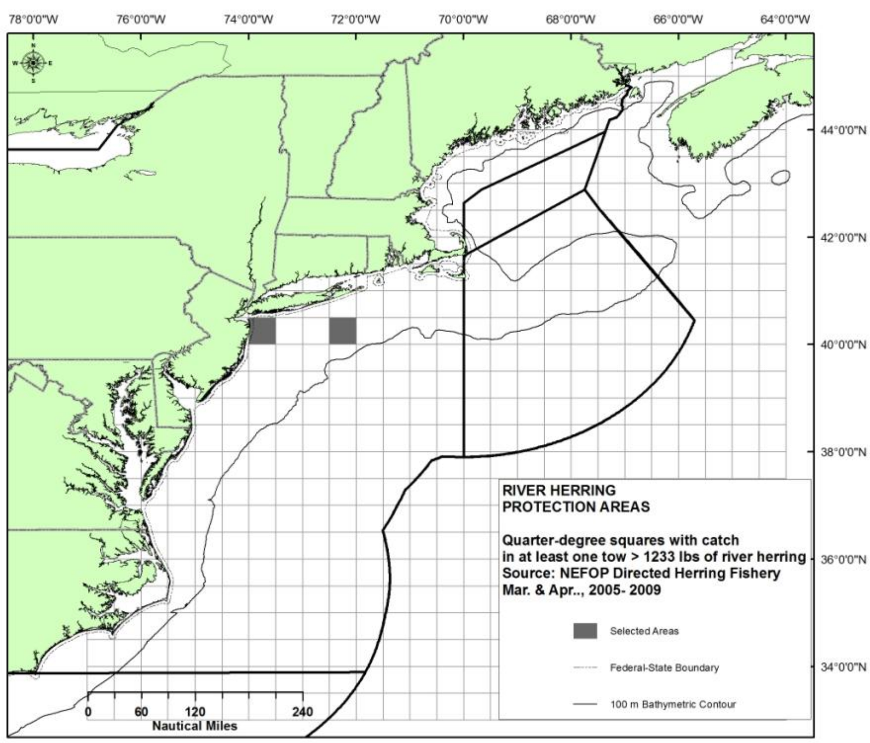


Figure 17 Alternative 3: River Herring Protection Areas September – October

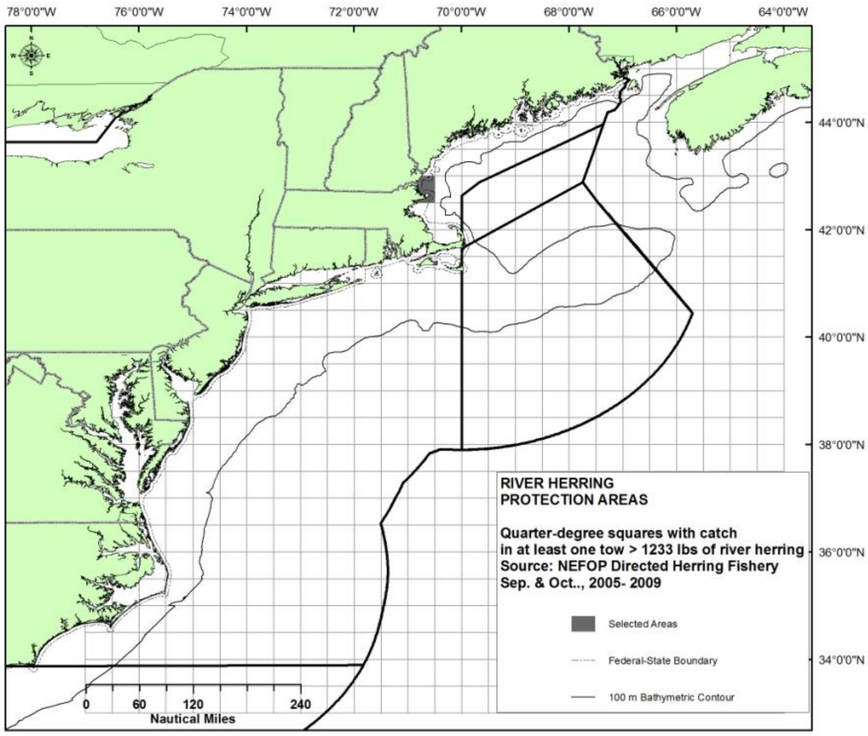
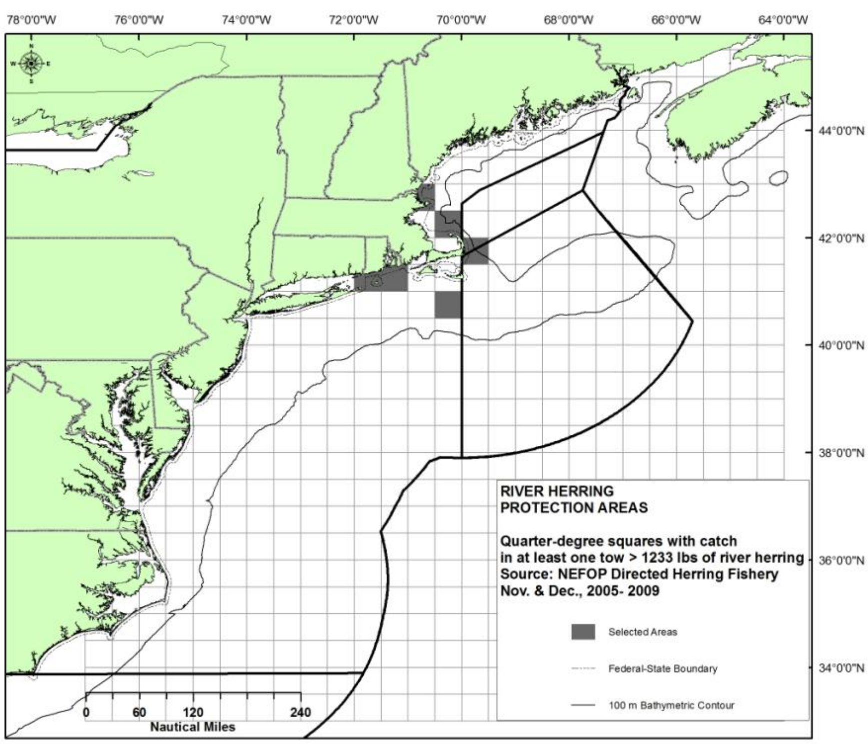


Figure 18 Alternative 3: River Herring Protection Areas November – December



3.3.3.2 Alternative 3: Management Options Under Consideration

3.3.3.2.1 Option 1: Closed Areas

This option would prohibit directed fishing for herring in the areas/times that are identified as River Herring Protection Areas. Under this option, all herring permit holders (Category A, B, C, and D) would be prohibited from fishing for, possessing, catching, transferring, or landing herring from the River Herring Protection Areas on all fishing trips. Vessels that possess A, B, C, or D herring permits and are fishing with mesh greater than 5.5 inches (and with no small mesh on board) would be exempt from the closed area provisions.

Sub-Option: **Mechanism for limited access herring vessels to declare out of the fishery for a period of time**

This option would prohibit directed fishing for herring in the areas/times that are identified as River Herring Protection Areas. Under this option, all herring permit holders (Category A, B, C, and D) would be prohibited from fishing for, possessing, catching, transferring, or landing herring from the River Herring Protection Areas on all fishing trips. Vessels that possess A, B, C, or D herring permits and are fishing with mesh greater than 5.5 inches (and with no small mesh on board) would be exempt from the closed area provisions. If a Category A, B, or C vessel declares out of the herring fishery (“DOF”) prior to leaving port, that vessel may fish in the RH Protection Areas but may not harvest, possess, or land herring on that trip (this provision would also apply to mackerel vessels that obtain a permit to allow them to catch more than the current open access allowance of 3 mt – see Section 3.1.6 for options under consideration).

3.3.3.2.2 Option 2: Trigger-Based Closed Areas

This option would close the River Herring Protection Areas identified in this alternative when a specified river herring catch trigger is reached. The areas that would be closed are the Protection Areas contained within the geographic range of the trigger areas. The catch triggers apply to three general areas – Statistical Area 521 (Cape Cod, CC), the Gulf of Maine (GOM), and southern New England (SNE) – see Figure 8 below.

Sub-Options: River Herring Catch Triggers

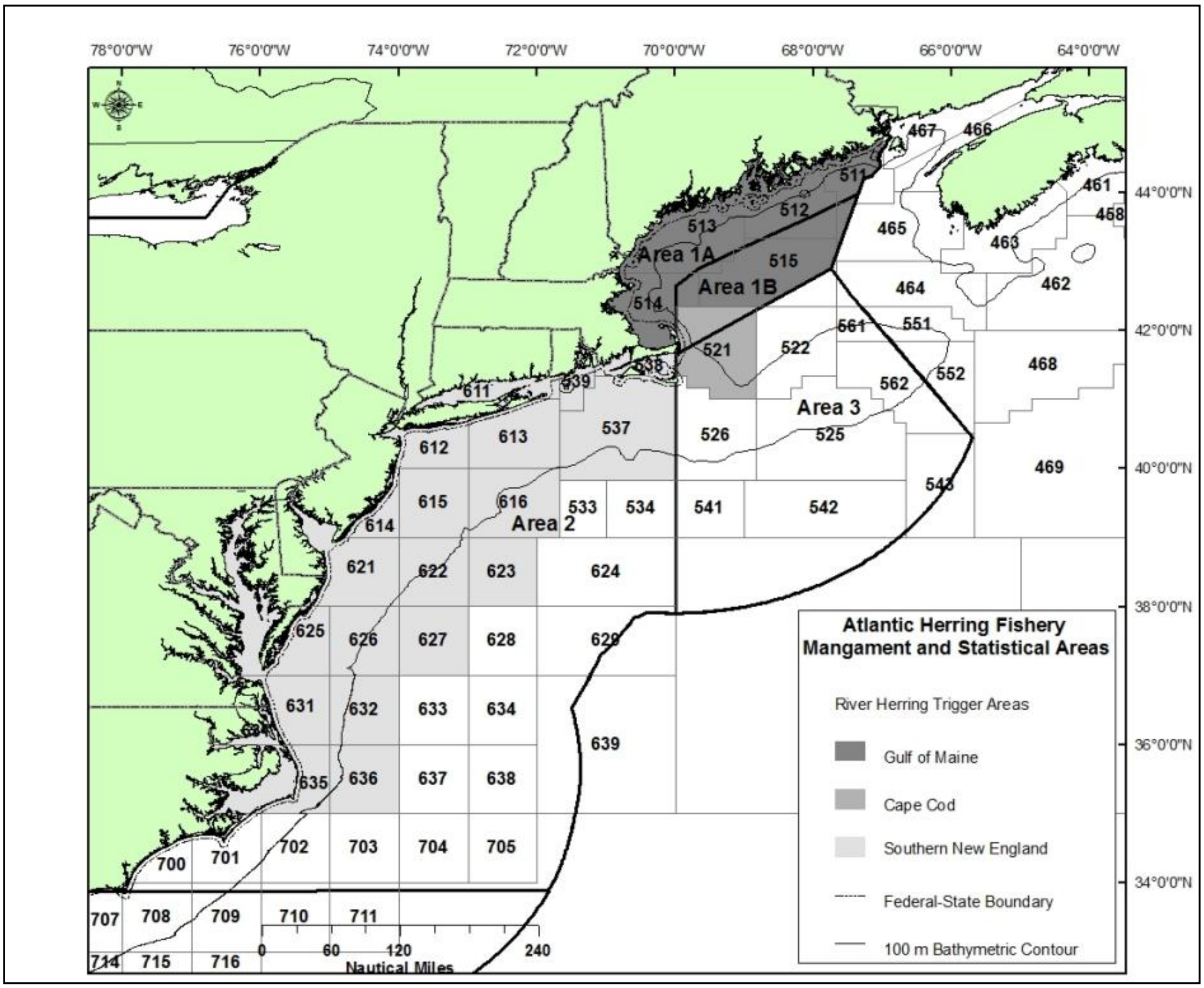
Several sub-options are under consideration for specifying the river herring catch triggers in each of the geographic areas identified in Figure 8. The sub-options are based on the Herring PDT’s work to generate the best estimates of river herring removals in recent years (see Table 4 in Herring PDT Discussion Paper: *Developing River Herring Catch Cap Options in the Directed Atlantic Herring Fishery* in Appendix VII (Volume II)) and are summarized below in Table 5. The sub-options include river herring catch estimates based on the maximum, median, and mean annual estimate of river herring catch expanded from observer data from 2005-2009.

Estimates of river herring catch in thousands of pounds (± 2 standard errors) were calculated by the Herring PDT using *Method 2* stratified by gear (midwater trawls, bottom trawls, and purse seines), area (Gulf of Maine (GOM, Statistical Areas 511-514), Cape Cod (CC, Statistical Area 521), and Southern New England (SNE)), and year (2005, 2006, 2007, 2008, and 2009). *Method 2* is the Simple Expansion Method (see SBRM 5.4.2.3. Simple Expansion Method: mean discard per trip, pp 143) modified to include both kept and discarded river herring. These estimates were summed across gear types for each year and area combination. Then the maximum, median, and mean estimates of river herring catch were selected to form the sub-options (Table 5).

Table 5 Sub-Options for River Herring Catch Triggers (Pounds)

Area	SUB-OPTIONS		
	3A (Max)	3B (Median)	3C (Mean)
CC	1,159,700	93,400	269,600
GOM	294,000	92,400	127,100
SNE	729,500	585,000	478,500

Figure 19 River Herring Catch Trigger Areas (Shaded)



Monitoring the River Herring Catch Triggers – Reporting Options

During the fishing year, river herring catch in each of the trigger areas identified above will be monitored and estimated using observer data from all trips by herring vessels subject to this rule unless the vessel has declared out of the fishery (DOF) through VMS. Observed estimates of river herring catch will be expanded to an estimate of total river herring catch in each of the trigger areas. The estimation procedure will be developed by the NERO, in cooperation with the NEFSC and Council staff, and through consultation with the Council. The final calculation process will be provided on the NERO web page. Area-specific river herring catch estimates will be published on the NERO web page regularly.

Reporting Option 1: Report Total Catch by Trigger Area

In addition to reporting herring by herring management area through the ACL-monitoring system, herring vessels subject to this rule must report total catch (kept and discarded) by river herring catch trigger area so that the appropriate expansions can be made from the observed catch in those areas. For the purposes of this requirement, the **river herring catch trigger areas** are defined as the following statistical areas:

- Gulf of Maine (GOM) – Areas 511, 512, 513, 514, 515, 464, 465 (same as modified GOM haddock stock area established in Framework 46)
- Cape Cod (CC) – Area 521
- Southern New England (SNE) – Areas 537, 538, 539, 611, 612, 613, 614, 615, 616, 621, 622, 623, 625, 626, 627, 631, 632, 635, 636

Reporting Option 1 – Example Catch Report

This report is required by all limited access herring vessels on all declared herring trips. For each day of a declared trip, this report must be submitted by 9 AM the following day. Negative reports (0 lb) must be submitted when no fish were caught.

Note: VTR serial number must be the same number reported to the seafood dealer receiving the landings at the end of the trip. If you use multiple pages of the VTR on the trip, record the serial number from the first VTR page used.

Vessel Trip Report (VTR) Serial Number: ________________________
Date fish caught: Month (01-12) _____
Day (01-31) _____
Gear used to fish: (MWT, PS, BT) _____

SPECIES	AREA 1A	AREA 1B	AREA 2	AREA 3
Herring Kept (lb)	_______	_______	_______	_______
Herring Discarded (lb)	_______	_______	_______	_______

==

	GOM RH Area	CC RH Area	SNE RH Area
All Fish Kept (lb)	_______	_______	______
All Fish Discarded (lb)	_______	_______	______

Note: Reporting by river herring area is required for all limited access vessels. Include total lb of all herring and non-herring. GOM RH Area includes Stat Areas 464, 465, and 511 thru 515. CC RH Area is Stat Area 521. SNE RH Area includes Stat Areas 537, 538, 539, 611, 612, 613, 614, 615, 616, 621, 622, 623, 625, 626, 627, 631, 632, 635, and 636.

	GOM Haddock Area	GB Haddock Area
All Fish Kept (lb)	_______	_______

Note: Reporting by haddock area is only required for vessels using mid-water trawl gear in Areas 1A, 1B, and/or 3. Include total lbs of all herring and non-herring.

GOM Haddock Area includes Stat Areas 464, 465, and 511 thru 515.
GB Haddock Area includes Stat Areas 521, 522, 525, 526, 561, and 562.

Reporting Option 2: Report Total Catch by Statistical Area

Under this option, in addition to reporting herring by herring management area through the ACL-monitoring system, herring vessels subject to this rule must report total catch (kept and discarded) by statistical area so that the appropriate expansions can be made from the observed catch in those areas to monitor both the haddock catch caps (Framework 46) and any river herring catch trigger areas that may be established.

Reporting Option 2 – Example Catch Report

```
This report (example for Reporting Option 2) is required by all
limited access herring vessels on all declared herring trips.  For
each day of a declared trip, this report must be submitted by 9 AM the
following day.  Negative reports (0 lb) must be submitted when no fish
were caught.

Note: VTR serial number must be the same number reported to the
seafood dealer receiving the landings at the end of the trip.  If you
use multiple pages of the VTR on the trip, record the serial number
from the first VTR page used.

Vessel Trip Report (VTR) Serial Number: ________________________
Date fish caught: Month (01-12)            _____
              Day   (01-31)     _____
Gear used to fish: (MWT, PS, BT)      _____

SPECIES                    AREA 1A    AREA 1B    AREA 2     AREA 3

================================================================
Herring kept (lbs)         _______    _______    _______    _______
Herring discarded (lbs)  _______ _______    _______    _______
================================================================
Report all fish kept (herring and non-herring species) and the Stat
Area in which the fish were caught.  If fish were caught in multiple
Stat Areas in one day, report the fish kept (lbs) in each Stat Area.

All Fish Kept (lbs)   _____Stat/Chart Area ____

All Fish Kept (lbs)   _____Stat/Chart Area ____

All Fish Kept (lbs)   _____Stat/Chart Area ____
```

Management Measures That Apply When Trigger is Reached

When the river herring catch trigger in a specified area(s) is reached, then the River Herring Protection Areas within that geographic area where the trigger is reached will be closed on a bimonthly basis. The closures will apply to all Protection Areas within the trigger area(s) for the remainder of the fishing year. Figure 20 – Figure 23 below illustrate which Protection Areas are associated with the trigger areas. For example, if the Gulf of Maine river herring catch trigger is reached in March, then the shaded quarter degree square in the inshore Gulf of Maine shown in Figure 22 would close during September and October, and the two square in the same trigger area shown in Figure 23 would close for November and December. Similarly, if the southern New England River Herring Catch Trigger is reached in August, then only the shaded squares shown in the southern New England trigger area would close in November and December (Figure 23 – no closures in the southern New England area would occur during September/October as shown in Figure 22).

Figure 20 Alternative 3: River Herring Protection Areas Associated with Catch Trigger Areas for January – February

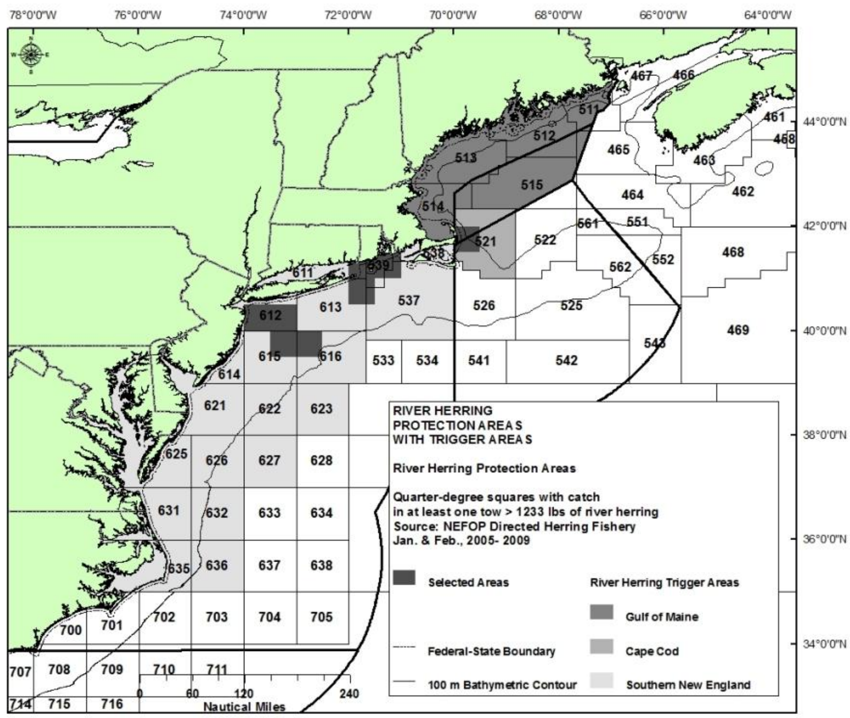


Figure 21 Alternative 3: River Herring Protection Areas Associated with Catch Trigger Areas for March – April

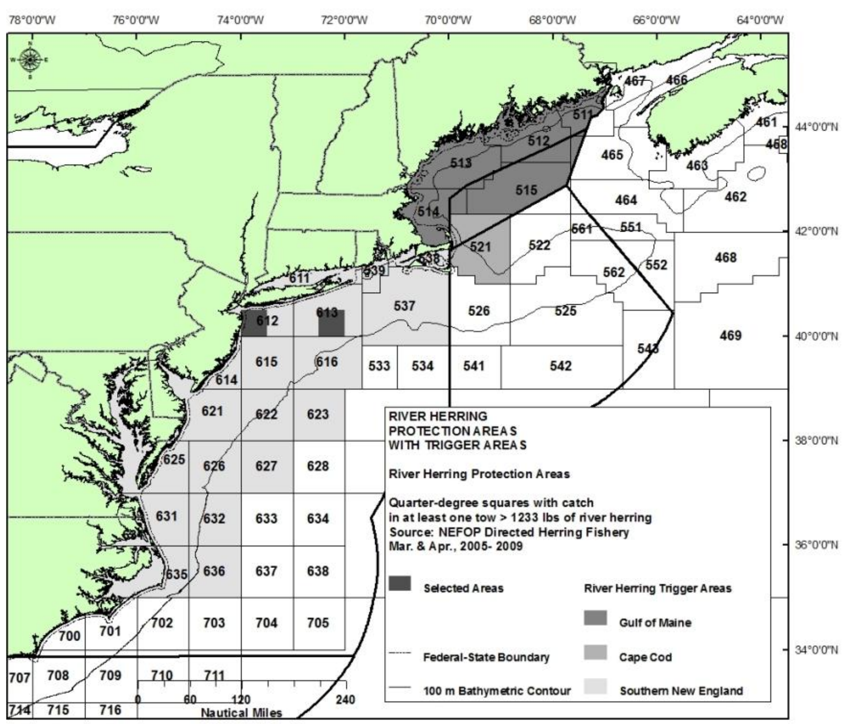


Figure 22 Alternative 3: River Herring Protection Areas Associated with Catch Trigger Areas for September – October

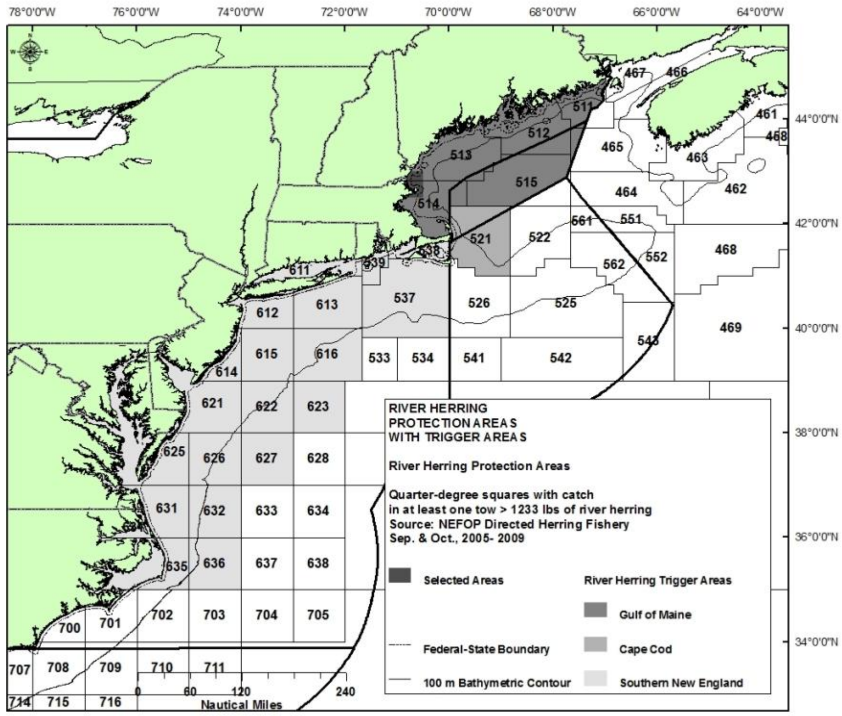
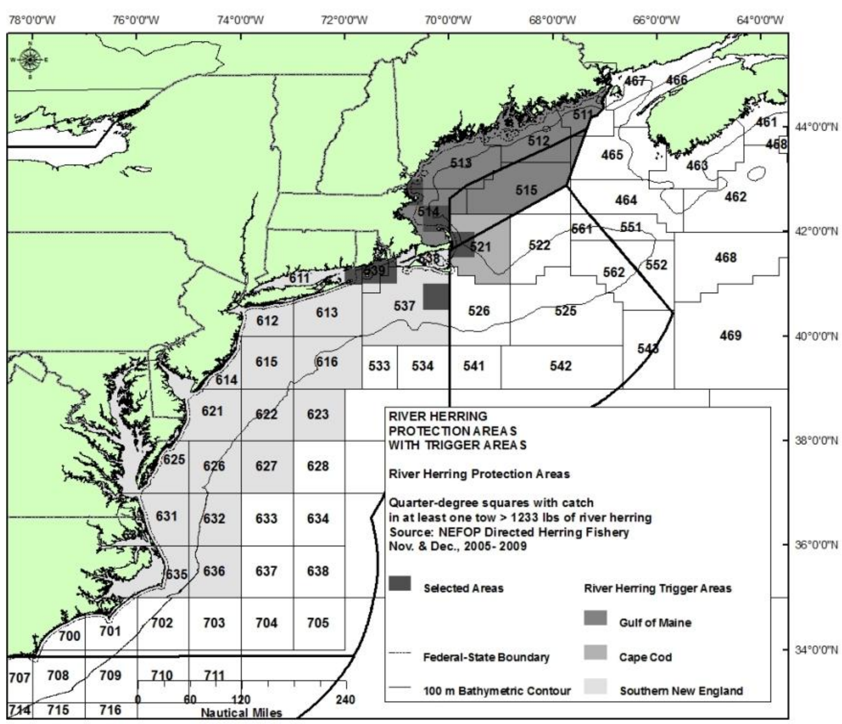


Figure 23 Alternative 3: River Herring Protection Areas Associated with Catch Trigger Areas for November – December



3.3.3.2.3 Options for Exemptions Under Alternative 3

Before selecting final management measures, the Council will review river herring bycatch data (provided in this document) and consider exemptions to the Options under Alternative 2 (described in this section, 3.3.3.2) for vessels participating in either the small mesh northern shrimp fishery (CFR 680.80 (e)) or vessels fishing with mesh greater than 5.5 inches, or both. The Council is seeking public comment on this issue and may determine that either or both of these fisheries should be exempt from the river herring management options when it selects final management measures for Amendment 5.

3.3.4 Mechanism for Adjusting/Updating River Herring Areas/Triggers

River herring management areas (for monitoring, avoidance, and/or protection) and/or river herring catch triggers (if established in this amendment) can be modified/updated through an amendment or framework adjustment to the Herring FMP. The areas and triggers should be reviewed by the Herring Plan Development Team every three years as part of the Atlantic herring fishery specifications process. Any modifications/adjustments, as deemed necessary by the Council, should accompany the specifications package (i.e., joint specifications/framework adjustment package). The MAFMC and ASMFC would be consulted during the adjustment process.

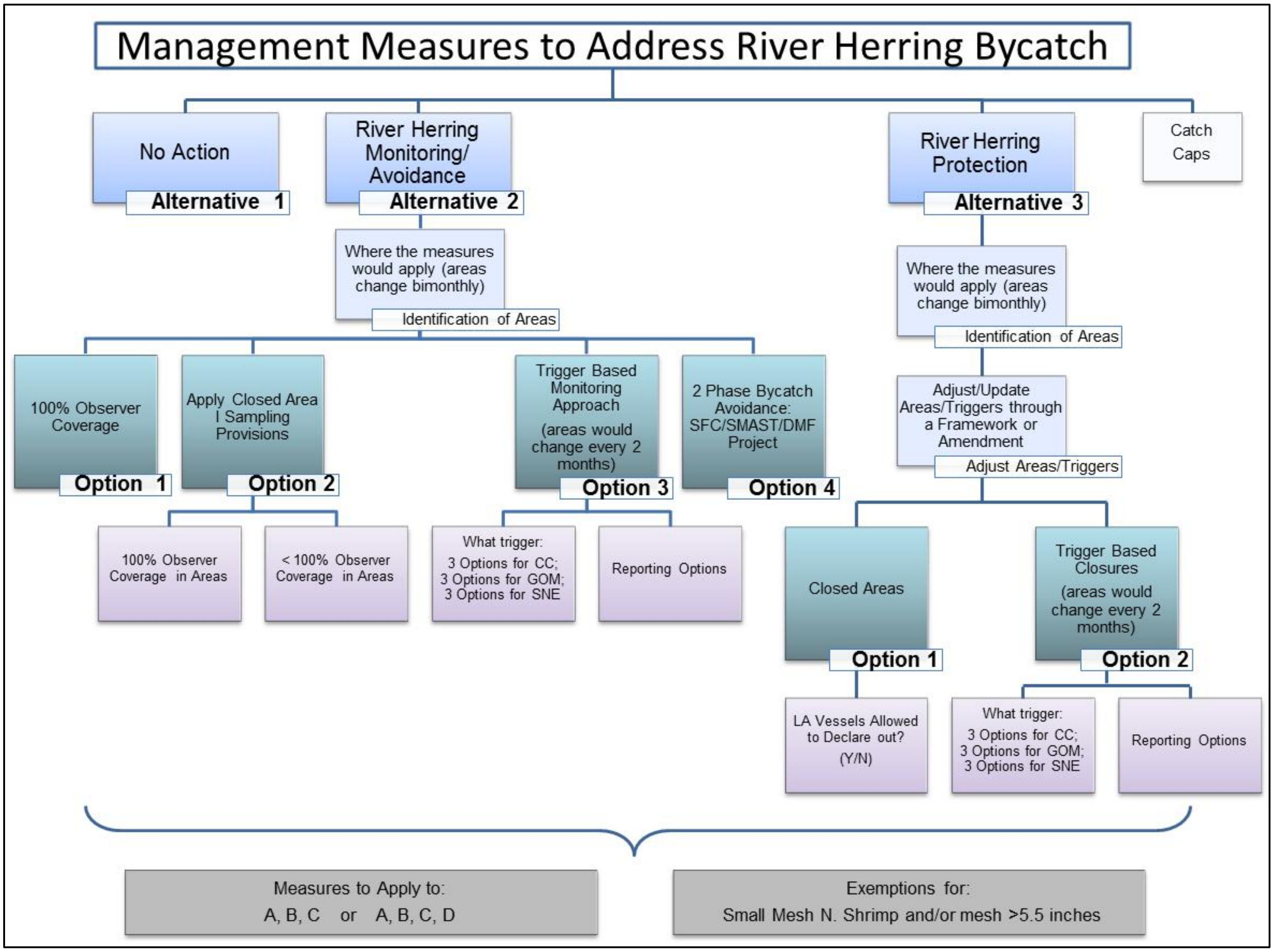
3.3.5 River Herring Catch Caps

The Council will consider establishing a river herring catch cap for the Atlantic herring fishery as one of several potential measures to reduce bycatch. The catch cap will be considered by the Council through a framework adjustment to the Herring FMP or the Atlantic herring fishery specifications process after the ASMFC completes its stock assessment.

3.3.6 Summary of Measures Under Consideration to Address River Herring Bycatch

Figure 24 provides an illustrative summary of the range of management alternatives/options under consideration in Amendment 5 to address river herring bycatch.

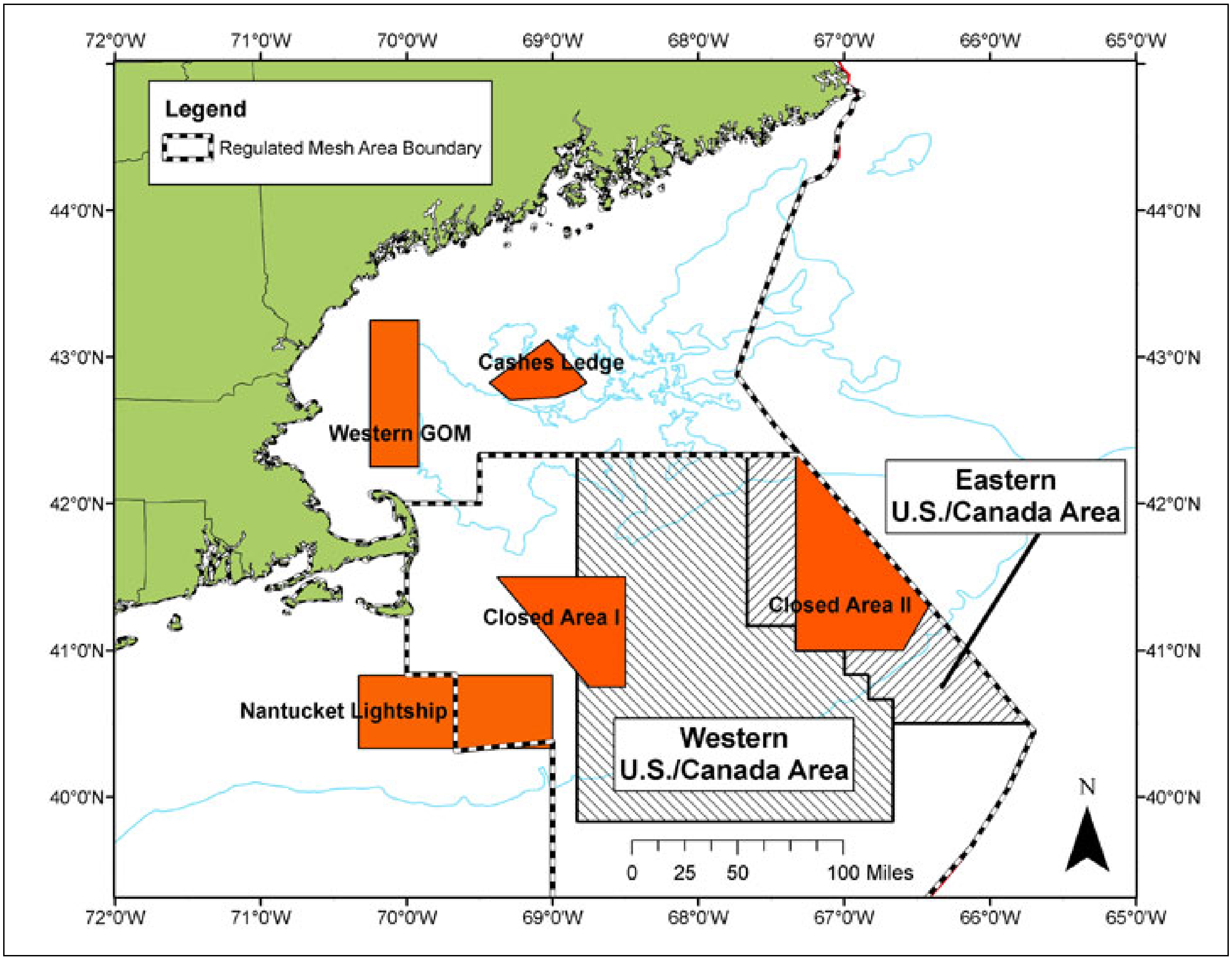
Figure 24 Summary of Amendment 5 Measures Under Consideration to Address River Herring Bycatch



3.4 MANAGEMENT MEASURES TO ADDRESS MIDWATER TRAWL ACCESS TO GROUNDFISH CLOSED AREAS

The alternatives under consideration to establish criteria for midwater trawl (single and paired) access to year-round groundfish closed areas are described in the following subsections.

Figure 25 Year-Round Multispecies Closed Areas (Solid Shading)



3.4.1 Alternatives 1 and 2

Alternative 1 – No Action

Under the no action alternative, current criteria for midwater trawl vessel access to the groundfish closed areas would be maintained. This includes access to the groundfish closed areas, with additional provisions for observer coverage and increased sampling in Closed Area I (based on the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80)) as well as provisions implemented through Framework 46 to the Northeast Multispecies (Groundfish) FMP.

Under the no action alternative, vessels issued a Federal herring permit and fishing with midwater trawl gear in Closed Area I must declare to NMFS their intent to fish in the closed area at least 72 hours prior to beginning a trip and carry onboard a NMFS-approved observer. Vessels fishing in Closed Area I with midwater trawl gear cannot release fish from the codend of the net, transfer fish to another vessel that is not carrying a NMFS-approved observer (e.g., an Atlantic herring at-sea processing vessel or an Atlantic herring carrier vessel), or discard fish at sea. In addition, all of the fish caught using midwater trawl gear in Closed Area I must be brought aboard the vessel and made available for sampling and inspection by the observer, except in the case of mechanical failure or spiny dogfish clog the net. However, if fish are released from the codend for any of these reasons, without being sampled by a NMFS-approved observer, the vessel must leave the Closed Area I and submit a Closed Area I Midwater Trawl Released Codend Affidavit to NMFS.

Vessels issued a Category A/B herring permit and on a declared herring trip, regardless of gear or area fished, and or a vessel issued a Category C permit and/or an Category D permit (open access) that fishes with midwater trawl gear in Areas 1A, 1B, and 3 are prohibited from discarding haddock at sea. Herring processors and dealers are required to separate out, and retain such haddock for at least 12 hours for inspection by authorized NMFS officers. These vessels can also possess and land up to 100 lb. of other NE multispecies. However, haddock or other NE multispecies separated from the herring catch may not be sold, purchased, received, traded, bartered, or transferred, or attempted to be sold, purchased, received, traded, bartered, or transferred for, or intended for, human consumption.

Alternative 2 – Pre-Closed Area I Provisions

Under this alternative, criteria for midwater trawl vessel access to the groundfish closed areas would be based on provisions prior to the implementation of the Closed Area I rule. Herring midwater trawl vessels would be allowed to access all of the year-round groundfish closed areas without further limitations (the haddock catch cap and 100-pound multispecies possession limit would still apply, consistent with the Framework 46 provisions implemented in September 2011).

Vessels issued a Federal herring permit would no longer be required to give 72 hours' notice before beginning a trip to the NMFS observer program, and would no longer be required to carry a NMFS-approved observer in order to fish in Closed Area I. In addition, there would no longer be any requirements for fish caught using midwater trawl gear to be brought on board the vessel and be sampled by an observer.

Vessels issued a Category A or B herring permit and on a declared herring trip, regardless of gear or area fished, and or a vessel issued a Limited Access Incidental Catch Herring Permit and/or an Open Access Herring Permit that fished with midwater trawl gear in Areas 1A, 1B, or 3 are still prohibited from discarding haddock at sea. Herring processors and dealers are required to separate out, and retain such haddock for at least 12 hours for inspection by authorized NMFS officers. These vessels can also still possess and land up to 100 lb of other NE multispecies. However, haddock or other NE multispecies separated from the herring catch may not be sold, purchased, received, traded, bartered, or transferred, or attempted to be sold, purchased, received, traded, bartered, or transferred for, or intended for, human consumption.

Because this alternative implements less restrictive management measures than current provisions, implementing this measure would require action under the Multispecies FMP, so Amendment 5 would need to serve as a joint groundfish action (Framework Adjustment to the Multispecies FMP).

3.4.2 Alternative 3: 100% Observer Coverage

This option would require herring midwater trawl (single and paired) vessels to carry a NMFS-approved observer on board on any trip in the groundfish year-round closed areas.

Midwater trawl vessels subject to this measure would be required to carry a NMFS-approved observer on any trip where fishing may occur in the year-round multispecies closed areas. Vessels would be required to indicate their intention to fish in the multispecies closed areas when scheduling an observer through the pre-trip notification system. To ensure 100% coverage, vessels would be prohibited from fishing in the closed areas without a NMFS-approved observer on board.

The Closed Area I sampling provisions (based on the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80)) and haddock catch cap/Framework 46 provisions would continue to apply under this alternative.

3.4.3 Alternative 4: Closed Area I Provisions

This alternative would apply the current provisions for midwater trawl vessels in Closed Area I to all of the groundfish year-round closed areas, based on the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80). Under this alternative, the following provisions would apply to midwater trawl (single and paired) vessels fishing in the groundfish year-round closed areas on any trips with a NMFS-approved observer on board (options for levels of observer coverage in the year-round groundfish closed areas are described below):

- When fishing in a groundfish year-round closed areas with a NMFS-approved observer on board, midwater trawl vessels would be required to pump 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 observer.
- Vessels may make short test tows in the area to check the abundance of target and bycatch 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 groundfish year-round closed area. The vessel may continue to fish but may not fish in the groundfish year-round closed area for the remainder of the trip.

Option 4A Require 100% Observer Coverage: Under this alternative/option, midwater trawl (single and paired) vessels would be required to carry a NMFS-approved observer on **all trips** where fishing may occur in the groundfish year-round closed areas. Vessels would be required to indicate their intention to fish in the groundfish year-round closed areas when scheduling a NMFS-approved observer through the pre-trip notification system. To ensure 100% coverage, midwater trawl vessels would be prohibited from fishing in the groundfish year-round closed areas without a NMFS-approved observer on board. The sampling provisions described above would apply on all trips in the year-round closed areas since 100% observer coverage in these areas would be required.

Option 4B Less Than 100% Observer Coverage: Under this alternative/option, observer coverage would be distributed on limited access herring vessels based on the provisions in Amendment 5 (see alternatives in Section 3.2.1, Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels). If the alternative for 100% observer coverage is adopted (Section 3.2.1.2), then this sub-option would only apply to midwater trawl vessels with open access permits. Midwater trawl vessels would be required to indicate their intention to fish in the groundfish year-round closed areas when scheduling a NMFS-approved observer through the pre-trip notification system but would not be prohibited from fishing in the groundfish year-round closed areas if an observer is not deployed (with the exception of Closed Area I). The sampling provisions described above would apply on all trips in the year-round closed areas with a NMFS-approved observer on board.

3.4.4 Groundfish Alternative 5: Closed Areas

This alternative closes the year-round groundfish closed areas to midwater trawl vessels participating in the herring fishery. Under this alternative, access to groundfish closed areas by midwater trawl vessels (single and paired) that are not declared out of the fishery (DOF) would be prohibited except with an experimental fishing permit (EFP).

The Council would strongly endorse experimental fisheries in the groundfish closed areas that include some or all the following provisions:

- Full observer coverage (one or more NMFS-approved observers per vessel, as necessary to ensure that every haul is observed)
- Electronic monitoring systems to augment observer data
  - Tow characteristics (i.e., total catch, GPS, height of foot-rope)
  - Video record of catch pre-sorted on deck for observer analysis
- Possible additional elements of EFP for groundfish closed area access
  - Pair trawling in closed areas prohibited
  - No more than 20 midwater trawl trips per closed area per fishing year
  - Fishing with net foot-rope less than 20 feet off the bottom prohibited
  - Monitoring protocols including mandatory reporting of vessel electronics information and shoreside gear inspections to determine the depth fished by midwater trawl gear and whether contact with the bottom has occurred
  - Groundfish bycatch triggers exclude vessels from access to the closed areas
    - Groundfish bycatch is detected in an amount greater than 100 pounds for any vessel trip – all midwater trawling in such closed area suspended for a minimum of 48 hours
    - Overfished stock – Regional Administrator determines bycatch to be 0.1% of TAC for stock – one year exclusion
    - Other groundfish – Regional Administrator determines bycatch to be 0.5% of TAC for stock – one year exclusion

3.5 ADDITIONAL MEASURES THAT CAN BE IMPLEMENTED THROUGH A FRAMEWORK ADJUSTMENT TO THE HERRING FMP

If any new management measures are adopted in Amendment 5, changes to those measures and related adjustments would be added to the list of measures that can be implemented through a framework adjustment to the Herring FMP in the future. For example, if the Council selects Alternative 2 to address river herring bycatch (Monitoring/Avoidance Areas and one of the options for monitoring catch in those areas), then adjustments to the Monitoring/Avoidance Areas and the management measures that pertain to those areas would be added to the list of measures that can be implemented through a framework adjustment in the future. During the comment period on the Draft EIS, the public should consider whether or not any of the new measures proposed in this amendment should be modified in the future through a framework adjustment. For the final Amendment 5 document and Final EIS, this section will be based on the management measures adopted by the Council.

Currently, this document proposes to add river herring catch caps as one measure that could be implemented in the future through a framework adjustment to the Herring FMP. The ability to do this will depend on whether or not the mechanism to establish river herring catch caps (Section 3.3.5) is adopted by the Council in this amendment. The Herring PDT provided a detailed discussion paper addressing the development of river herring catch caps, including a discussion of the potential challenges associated with implementing and monitoring, as well as the potential impacts of catch caps. The Herring PDT's discussion paper can be found in Volume II of this amendment (Appendix VII) and forms the basis for future development of river herring catch caps through a framework adjustment, or through the herring specifications process, as indicated in Section 3.3.5.

3.6 MANAGEMENT MEASURES CONSIDERED BUT REJECTED

The management alternatives under consideration in Amendment 5 have been developed by the Council, Herring Committee, Herring Advisory Panel, and Herring PDT from June 2008 (after scoping) until January 2011, when the Council approved the management alternatives for inclusion in the Draft EIS. Many different approaches were considered during this process, and the Council reviewed ideas and proposals developed by the AP, herring industry participants, and other interested members of the public. Development of the management alternatives proposed in this amendment was an iterative public process, during which several measures were eliminated from further consideration at this time. Those that were eliminated from further consideration are discussed below, along with the Council's rationale for eliminating them at this time.

It is important to note that although the measures described in this section have been eliminated from further consideration in Amendment 5, the Council may reconsider any of them in a future action for Atlantic herring. In some cases, details and preliminary analyses have already been conducted, making reconsideration of these measures in the future less burdensome prospect.

3.6.1 Measures to Address Quota Monitoring and Reporting

During development of Amendment 5 the Council two measures to address VMS reporting were removed; the first being a measure that would have required VMS reporting for every offload and transfer that occurred for limited access herring vessels possessing Category A, B, and C permits. The measure was considered to be unnecessarily burdensome and/or complicated, and at this time, options remain under consideration in the document for either daily reporting or trip-level reporting. The second measure considered would have required VMS on all carrier vessels greater than a certain size in length, for declaration purposes when they may be engaged in herring carrying activities. Information presented by the PDT, however, as well as the other options under consideration, suggests that this measure may not be necessary. A "dual option" was created to address this issue; the dual option would allow carriers to operate under status quo requirements (LOA) or use VMS to declare their activities and exempt themselves from the restrictions in the LOA.

The Council also considered and rejected two measures that would have addressed vessel-to-vessel transfers of Atlantic herring. In combination with measures still being considered in this amendment, the first measure that was rejected would have addressed transfer at sea provisions for Category D (Open Access) vessels by allowing vessels with open access Category D permits to transfer herring at sea, with provisions. The measure was rejected because the intent was not clear, nor was it clear how possession limits could be enforced. It was also considered to be status quo for the vessels under consideration. The other measure would have restricted transfers at sea (as defined in this amendment) to only be allowed on trips with a NMFS-approved observer on board. This measure was initially proposed by the NERO staff and was not supported by the Herring Committee.

There was also an option considered that would have created two open access permits for herring, one for all management areas, and another for Areas 2/3 only. The first permit would have adapted the current provisions for a Category D permit; the second would have been a new open access incidental catch permit that would have restricted fishing to Areas 2/3 only and allowed a 25 mt possession limit for herring for one landing per calendar day. This measure was rejected for consistency with corresponding mackerel measures with the MAFMC and to avoid complications with the many vessels that may be involved.

The Council also considered two alternatives to modify the current ACL/sub-ACL monitoring program for the Atlantic herring fishery, which were subsequently removed. The intent of the alternatives was to improve reporting compliance and the accuracy and timeliness of ACL/sub-ACL monitoring information.

Under the first alternative, ACLs and sub-ACLs would continue to be monitored through the Interactive Voice Response (IVR) reporting system, but the system would have been modified. In the first option under the first alternative, all limited access permit holders (Category A, B, and C) would have been required to submit an Atlantic herring catch report via the IVR system on a trip-by-trip basis, and there were four sub-options total. Two sub-options offered differing deadlines for reporting; within 24 hours or 6 hours of each offload or prior to starting the next fishing trip, whichever was less. The other two sub-options would have required that either open access permit holders (Category D) or open access permit holders that possess a Letter of Authorization (LOA) to transfer Atlantic herring at sea would be required to submit an Atlantic herring catch report via the IVR system on a trip-by-trip basis for any trips on which herring was caught (landed or discarded). The second option under the first alternative would have changed the IVR weekly reporting deadlines from Tuesday at midnight (current) to Sunday at midnight in order to provide better lead time for projections and management area closures.

The second alternative would have eliminated IVR call-in program and instead required VMS for catch reporting and quota monitoring for the purposes of monitoring the ACLs/sub-ACLs in the herring fishery. Two reporting requirements for the newly required VMS reporting were available in options under the alternative. The first option would have required daily VMS reporting, and the second option would have required a trip by trip reporting of Atlantic herring catch and discards. Both options would have applied to limited access herring vessels (Category A, B, and C) and would have required reporting the same information but on a different timescale.

The two alternatives to modify the current ACL/sub-ACL monitoring program for the Atlantic herring fishery were removed from consideration on September 8, 2011 when NMFS published the Final Rule in which new notification and reporting requirements for the Atlantic herring fishery were established. The new rules eliminated the need for the Council to further consider VMS catch reporting and/or modifications to the IVR reporting system in this amendment. The NMFS rule includes the following reporting provisions:

- Elimination of the weekly IVR reporting for limited access herring vessels (Category A/B/C) and implementation of the daily VMS catch reporting for all of these boats;
- Incorporation of all open access (Category D) vessels into a weekly IVR catch reporting program (not just those catching 2,000 pounds or more herring in a week); and
- Requirement for weekly VTRs from all herring vessels (instead of monthly).

3.6.2 Measures To Address Maximized Retention

The Committee/Council considered several different approaches to developing a maximized retention program for the herring fishery during the development of Amendment 5. After encountering many challenges with the options considered underneath it, however, the main alternative was eliminated from consideration. The alternative would have applied maximized retention for the limited access herring fishery (Categories A, B, and C).

Many of the challenges with the options included addressing the species to which the maximized retention program would apply, how non-permitted/unmarketable landings would be handled, how compliance with MR provisions would be verified, and whether or not the MR program would be phased-in to the fishery. More specifically, the options which were considered but rejected include:

- Two options that addressed the species to which maximized retention applies, one of which would have maximized the retention of all species, and another which considered species-based maximized retention. Under the first option, the vast majority of catch of all species on vessels would have been subject to MR provisions would be landed with two exceptions, and discarding at-sea would have been prohibited. Under the second option the Council would have selected the species to which MR provisions would apply from a list.
- Three options that addressed the likely requirement of landing certain species for which herring vessels have landing limits or are not currently permitted to land at all, along with fish that may not have been be marketable. Non-permitted landings would have included species for which a vessel is not permitted or authorized to land, landings for species that exceed trip limits or quotas and/or landings for species that are bigger/smaller than current size restrictions. All three options were determined to be too difficult to implement due to challenging species such as river herring, which are not allowed to be landed in some states. The options included:
    - An option which would have amended other FMPs and regulations to allow landings, in which a number of other Fishery Management Plans would be amended to modify limits or prohibitions which might affect herring vessels attempting to participate in a maximized retention program. For instance, the Multispecies FMP would have needed to be amended to change landings limits for all other groundfish species except haddock, which has a separate, fishery-wide cap. The complications associated with the measure, such as jurisdictional overlap which may occur for species managed by the Mid-Atlantic Fishery Management Council and Atlantic States Marine Fisheries Commission (ASMFC), and MAFMC and ASMFC, made this option too difficult to be considered feasible.
    - An option that would have required non-permitted/unmarketable catch to be treated in the same manner as haddock that is landed under the catch cap for the herring fishery, established in Framework 43 to the Multispecies FMP. The provisions for landing haddock under the cap include a prohibition for herring vessels from discarding haddock that has been brought on deck or pumped into the fish hold, a prohibition on herring vessels from selling haddock for human consumption, a prohibition for herring dealers from purchasing haddock from herring vessels for human consumption, and a requirement for herring processors to cull and report all haddock and to retain such haddock for 12 hours for inspection by enforcement officials. The option did not address regulatory issues associated with landing species above trip limits, quotas, and/or species for which the vessel is not permitted, and was therefore rejected from consideration.

- An option that would have required that vessels landing non-permitted catch under a maximized retention program be responsible for disposing of that catch once it is landed and documented (through reporting, portside sampling, etc.). Herring dealers and processors would have been required to separate, report, retain, and make available for inspection for 12 hours, all prohibited/non-marketable species in order to facilitate monitoring and enforcement of the maximized retention provisions, and it would have required that law enforcement officials be given access to inspect the culled/sorted catch. The option did not address regulatory issues associated with landing species above trip limits, quotas, and/or species for which the vessel is not permitted and was therefore rejected from consideration.

- Three options that would have verified compliance with the maximized retention provisions, including the option to require video-based electronic monitoring (VBEM), a VBEM/Observer hybrid option, and a <100% verification coverage option. The option to require VBEM would have required video-based electronic monitoring equipment to ensure compliance with MR provisions if such provisions are established in Amendment 5. Portside samplers would have certified and reported the weight and species composition of each landing which would have been compiled, audited, and summarized, and VBEM data would have been checked subsequently to reconcile landings against fishing activity to verify compliance with maximized retention requirements. Under the VBEM/Observer hybrid option a combination of VBEM and monitoring by at-sea observers would have been used to verify maximized retention. Potential sub-options could have included allowing industry to choose which verification vector to employ. Under the <100% verification coverage option, verification of maximized retention would not occur 100% of the time, and self-reporting would be relied upon for assurances that landed weight is equal to catch. These options were considered to be under-developed and infeasible due to difficulties in implementation.

- Three options that would have phased-in the implementation of maximized retention. The first would have been a temporal phase-in of MR provisions over two to four years, which would have included a gradual but steady reduction in the amount of at-sea discarding that is permitted. The second would have implemented a spatial phase-in of MR provisions, in which bycatch "hotspots" (for example, areas with river herring bycatch or groundfish closed areas) would have required maximized retention. Areas could be added/modified as additional data become available. The third option would have implemented a gradual phase-in of VBEM as the verification system for MR through pilot programs. These options were considered to be under-developed and infeasible due to difficulties in implementation.

- Two options that would have addressed non-permitted catch under maximized retention.
  - The first option would have required modified maximized retention, in which VBEM would be used to monitor minimal at-sea discards. Modifications to the at-sea components of a CMCP would have specified that any at-sea discards must be disposed of through a designated discard chute with monitoring through an additional camera close enough in range to distinguish species, and wide-angle deck-wide and rail-area cameras would have monitored pre-sorting, and imagery analysis would have been conducted. The option could have been applied for specific species for which no regulatory relief is possible and certain prohibited species, for instance marine mammals or birds. Two concerns were raised with this measure. The first concern was that current technology may not be able to accomplish the objectives of the measure, as it has not been tested in the fishery. The second was vessels would discard the non-permitted species if the electronic monitoring technology was on board. It was therefore considered not feasible at the time of the amendment.
  - The second option would have implemented landings caps by allowing the landing of non-permitted catch (for species to which maximized retention applies), including in excess of current trip limits, with such landings subject to the appropriate landings caps. Landings caps

for each species subject to maximized retention provisions would have been set annually by the Council based on either available observer and portside sampling data which would have documented bycatch of the species in question by herring vessels subject to maximized retention and would have been expanded upwards to account for expected effort in the fishery during the upcoming fishing year, or another option that was TBD. Once landed, the fish would have been counted against the landings cap and either haddock catch cap provisions would have applied to the sale of the catch that counts towards a landings cap, or the vessel would have been able to sell the fish to any dealer with a federal permit for the species in question. When the first species-based landings cap is reached, the directed fishery for Atlantic herring would have closed, and all vessels would have been limited to a possession limit of 2,000 pounds in all management areas. Both NERO and NEFMC staff expressed concerns that the measures above do not address regulatory issues associated with landing non-permitted species. The capping of landings and closing the fishery when the cap is reached also seemed somewhat inconsistent with the intent of a maximized retention program.

- Two options that would have verified compliance with maximized retention. The first would have utilized 100% Verification by At-Sea Observers; under the option, NMFS-approved observers would have certified compliance with maximized retention requirements and sampled any at-sea discards that did take place, but the vast majority of catch sampling would have been done dockside, as would the certified weighing or certified volumetric estimation of landed weight. This option was considered infeasible. Under the second, the Council would have developed standards and management measures to ensure compliance with maximized retention provisions. These standards would have been implemented in Amendment 5 and would have applied to all Category A and B vessels. This measure was carried over from one of the stakeholder proposals and is redundant, given the other options under consideration in the document.

Maximized retention across the fishery was ultimately placed in this considered but rejected section due to the complexity of the implementation issues with the various options listed above. Many of the species that would have been retained under these measures are managed under other FMPs or other management bodies (such as the MAFMC or NMFS for those species that are considered protected resources). The NMFS staff raised concerns about the difficulty in having to amend multiple FMPs to address these measures, as well as create a manner in which species could be retained despite their prohibition from being landed.

3.6.3 Measures to Address Portside Sampling

The Herring Committee/Council considered several different approaches to developing a portside sampling program for the herring fishery during the development of Amendment 5, all of which were eliminated by the January 2011 Council meeting. During the January 2011 meeting, the Council voted to remove the remaining portions of the Measures to Address Portside Sampling in favor of the proposed requirement for dealers to weigh all fish.

One of the options that was originally considered would have achieved Council-identified priority target levels of precision using a combination of at-sea and dockside sampling; however, the details of this option remained unclear during the development of the amendment. Different approaches would have been used to determine coverage levels for at-sea monitoring and portside sampling based on the objectives of both programs. Further analysis by the Herring PDT, however, indicated that the two programs could not be combined at the time and that the data generated by the two programs are not additive, and that different approaches should be used to determine coverage levels for at-sea monitoring and portside sampling based on the objectives of both programs.

One set of options addressed coverage levels for the portside sampling program. One option would have required <100% portside monitoring coverage without extrapolation, which would have meant that the coverage rate and coverage design would not have allowed for the extrapolation of observed landings across the entire fleet such that unobserved landings had a bycatch rate applied. Another option would have required a coverage level equal to the SBRM coverage. Another option would have required a coverage level to meet council priorities which would have entailed a 30% CV on catch/bycatch estimates for Atlantic herring and haddock, and a 20% CV on catch/bycatch estimates for river herring. In that option NMFS would have determined levels of coverage for portside sampling based on the level of observer coverage and the expected CVs that would result from the observer estimates, and portside sampling data would supplement the observer data. This option was considered in the context of developing a combination portside/at-sea sampling program. Further analysis by the Herring PDT indicated that the two programs could not be combined at this time and that the data generated by the two programs are not additive. Different approaches should be used to determine coverage levels for at-sea monitoring and portside sampling based on the objectives of both programs. Options were also considered to set portside sampling coverage less than 100% with extrapolation of bycatch estimates to the entire fishery. When the PDT expressed concern about requiring extrapolation, given the current variability associated with the data, the Herring Committee agreed that alternate approaches should be considered for portside sampling coverage levels, which were eventually rejected when the portside sampling program was removed from consideration.

Another set of options would have addressed the determination of qualified service providers for the portside sampling program. One of the options would have standardized the existing state portside sampling programs and incorporate them into the proposed action by certifying them as approved portside sampling program (PSP) vendors. Another would have implemented immediate or phased-in use of NEFOP observers as portside samplers for the proposed action, which would have essentially certified the NEFOP as a PSP vendor. A different option was to implement a single-service provider plan for PSP operations which could not be covered by shore-based observers employed by state or federal agencies. The final option addressing service providers would have implemented a multi-service provider plan for PSP operations which cannot be covered by shore-based observers employed by state or federal agencies. These four options were rejected when the decision was made to have this amendment be consistent with other FMPs, such as Scallops and Groundfish, by allowing multiple service providers. When the portside sampling program was removed by the Council, the multiple service provider requirements were no longer needed for the portside sampling program portion of the Amendment. These were similar to other FMPs except that Amendment 5 would have authorized the ASMFC States (ME-NJ) as approved service providers for Federal portside sampling programs.

As part of the portside sampling program, the Council considered several alternatives to verify catch estimates through a third party. The alternatives to confirm the accuracy of self-reported catch that were considered but rejected are described below.

The Committee/Council considered a set of alternatives that would have addressed the accuracy of self-reporting in the fishery using scales. A few of the options would have required the weighing of dealer trucks and/or transport vehicles as a condition of possessing a Federal dealer permit for Atlantic herring. The trucks would have been weighed either annually or before being loaded with herring as a baseline weight, and again after being loaded. The total weight of herring would have been calculated as the difference of the two weights and reported to the NMFS. The option would have required that all weights be taken by a Licensed Weighmaster, that the scale be inspected regularly, that any trucks utilizing containers on flatbed trucks have the containers present at the initial weighing, and that the required paperwork be present when needed at the weighing.

The options differed in the location and ownership of the scales that would have weighed the trucks and/or transport vehicles. The first option would have required the installation and use of the truck scales in all ports. This measure was considered infeasible due to the need for land, manipulation of lands, and structures needed to install the truck scale, as well as the financial implications. The second measure, which would have installed truck scales in specified ports, was also considered infeasible for the same reasons. The third option would have required the use of pre-existing scales owned by various parties in locations close to the ports of landing. This option was rejected for several reasons, including objections from the RO regarding the feasibility of the measure at that level and similar objections from the Advisory Panel regarding the cost and complications to the herring offloading and transport process. The measure also appeared to fail in support the goals of the catch monitoring program as it is established in this amendment.

Another option to address the accuracy of self-reporting option would have required flow scales and their use on herring vessels as a condition of possessing the limited access permit for limited access Category A, B, and C vessels, as well as herring carrier vessels. Flow scales are used in conveyor systems where there is a continuous flow of material, such as herring. Flow scales determine an accurate weight of total landings using a weight sensor that the fish pass over as they move down the conveyor belt. The option would have required accordance with a NMFS list of approved scale models, initial and annual inspections for all scales, daily at-sea scale tests, scale maintenance, retention of daily printed reports from the scales, and scale location on each vessel. This measure was rejected primarily due to the initial cost of the scales combined with the difficulty and cost in maintaining the scales thereafter. Although the scales have been used in the Fisheries of the Exclusive Economic Zone of Alaska, the Committee/Council considered that those fisheries operated differently and were subject to 100% observer coverage. Similar to the weighing of trucks and/or transport vehicles, the measure also appeared to fail in support the goals of the catch monitoring program as it is established in this amendment. For additional detailed information on the difficulties faced in implementing the use of flow scales and truck scales in the fishery, see the Council Staff discussion document (Appendix I, Volume II) entitled *Potential Applicability of Flow Scales, Hopper Scales, Truck Scales and Volumetric Measurement in the Atlantic Herring Fishery*.

In later drafts of the document, one alternative that was considered but rejected would have required the sealing and certification of vessel fish holds or the use of standard fish totes, depending on the option, to verify self-reporting. If the first option under the alternative had been chosen, it would have required that herring Limited Access Category A and B vessels and all herring carrier vessels seal and certify the volume of their fish holds using an accredited party such as the State Sealer of Weights and Measures. An independent third party from the portside sampling program would have then been required to conduct a “sounding” process, by which the sampler drops either a small weight connected to the end of a tape measure or similar device into the hold until it settles on top of the fish to obtain a more accurate estimate of catch. Under the second option Limited Access Category C vessels would have been required to do one of two sub-options. The first sub-option offered the vessel to either certify the volume of their fish holds (as was described for Category A/B vessels and carriers) or keep all herring stored independently if the vessel does not utilize a pump. The second sub-option would have required vessels to hold all herring caught in standard sized fish totes on all fishing trips. Weight verification of landings would have been conducted by an independent third-party as a part of the portside sampling program, as described for the first sub-option if the sealing and certification was chosen, or by a count of the standard fish totes which would then be multiplied by the number of totes to achieve weight verification under the second sub-option. The other alternative considered in later drafts of the document would have required herring dealers to have transport trucks sealed and certified, as well as had third party verification of resulting measurements in connection with the portside sampling program, similar to the first option under the first alternative.

When the portside sampling program was removed from consideration by the Council, it had been clarified from its original form. The sampling design was to be specified by NOAA Fisheries (through the NEFSC), in consultation with the Herring PDT, Council, and ASMFC, on an annual basis based on Council priorities set in Amendment 5. Approved portside sampling program service providers NOAA Fisheries would have worked together to ensure that vessels were met by samplers when specified by the priorities. The portside sampling and trip selection priorities were focused on sampling those offloads that had at-sea observers aboard or those which were subject to catch caps, collecting information for stock assessments including spawning condition, and on sampling trips that occurred in river herring monitoring/avoidance areas and groundfish closed areas. It had four options for target coverage levels (10%, 25%, 50%, and 100%) and the sampling protocol methods had been outlined for processing plants, the commercial catch sampling (for assessment purposes) as well as for whenever possible.

As was stated previously, the portside sampling program was ultimately removed from the document in favor of a requirement for dealers to weigh all fish. This removal was prompted in part by concern from the NMFS about the resources that were available to aid in the creation and running of a portside sampling program. Despite the potential options in the document in which the industry (vessels, dealers, or both) would provide the funding, the resources needed by NMFS to aid in the effort were limited, and the potential for the program to fail existed if the funding was insufficient, or if it were to become insufficient in the future.

3.6.4 Options to Maximize Sampling and Address Net Slippage

During the development of the Amendment 5 catch monitoring program, several additional options were considered to maximize sampling by NMFS-approved observers and address net slippage. Three options were eliminated from further consideration for maximizing sampling and three for addressing net slippage.

One of the options to maximize sampling would have been an interruption prohibition, in which the removal of the pump from the codend once pumping has been initiated would have been prohibited unless the vessel was able to lift the net from the water and demonstrate in a visible way that the codend was either empty or was re-pursed before being placed back in the water. This measure was deemed to be infeasible for many operations. The second option would have required vessels to lift the codend from the water to visibly demonstrate that it was empty prior to re-setting the net, but was also deemed to be infeasible for many operations. The third option would have been to determine (and apply) minimum portion of a slipped catch that would be required to be pumped on board a vessel to ensure complete sampling. If a minimum portion/threshold could have been determined, then the measure would have required sampling at that level for any slipped tows. The Herring PDT expressed concern about the feasibility of this measure because it was not clear how a percentage could be determined to ensure complete sampling from a slipped catch without further research and investigation, and the measure was not clear in its intentions. The PDT advised that fish may stratify in the net if it sits for any length of time, and that a study was needed to determine the appropriate percentages.

The Council also considered an option to require flow scales on processing vessels, but eliminated this option from consideration in Amendment 5 because there are currently no at-sea processing vessels in the fishery or expected to participate in the fishery in the near future. As a result, the Council determined that time and resources should be focused on more pressing issues related to catch monitoring in Amendment 5. The Council may address issues related to monitoring catch on at-sea processing vessels through a separate action in the future if the need arises.

As for measures to address net slippage, the first option would have set slippage caps, and Committee/Council considered and rejected a series of sub-options under that option, with the intent to better account for and minimize slippage events. Slippage caps would have been set annually by the Council for the entire fishery, and deductions would have been made based on slippage events documented by either a NMFS-approved observer or an adequate monitoring mechanism (VBEM, for example) in recent years. When the slippage cap was reached, the directed herring fishery in all management areas would have closed, and all vessels would have been limited to 2,000 pounds of herring. A series of sub-options could have been applied to this measure:

- Available information about slippage from observer data could have been expanded upwards to account for expected effort in the fishery during the upcoming fishing year.
- Available information about slippage from observer data could have been expanded upwards to account for expected effort in the fishery during the upcoming fishing year. The cap would have then been adjusted downwards based on the expected level of observer coverage for the upcoming fishing year (similar to the Framework 43 approach for setting the haddock catch cap).
- Available information about slippage could have been used to estimate the number of slippage events that may have been expected to occur across the fishery in the upcoming fishing year. An average estimate of slipped catch (based on observations in recent years) would have been applied to the number of slippage events to generate a total slippage cap.
- A sub-option that could have gradually reduced the slippage cap over time under any of the approaches described above for setting the cap (would have applied to all sub-options above).
- A deduction from the slippage cap that would have occurred every time a slippage event was documented by either a NMFS-approved observer or an adequate monitoring mechanism (VBEM, for example). When the slippage cap was reached, the directed herring fishery in all management areas would have closed, and all vessels would have been limited to 2,000 pounds of herring.
- An assumed tonnage for each slippage event would have been applied against an overall cap on slippage in the fishery under this sub-option. The assumed amount deducted for each slippage event would have been set at the current best estimate for the average tow in the fishery (approximately 65 mt). When the slippage cap was reached, the directed herring fishery in all management areas would have closed, and all vessels would have been limited to 2,000 pounds of herring.
- An estimated tonnage for each detected slippage event would be applied against an overall tonnage cap on slippage in the fishery under this sub-option. The estimated amount would have been based on an independent measure of the total weight of the slipped discards. Captain's estimates would not have been accepted. Therefore, this option have been only be practical in cases in which the VBEM dataset provided a clear and acceptable estimate of weight, or in which the vessel had additional EM technology such as catch-weight sensors in the CMCP, or in which a NMFS-approved observer happened to be aboard. Under this option, slippage events for which additional information to estimate slipped catch was not available from a third party would have been subject to the assumed tonnage application described in the option above. When the slippage cap was reached, the directed herring fishery in all management areas would have been closed, and all vessels would have been limited to 2,000 pounds of herring.

In general the Herring PDT did not support the establishment of slippage caps at the time of development and recommended that the measures be implemented through a framework adjustment in the future, as no statistically valid approach was in existence for estimating slippage or a slippage cap at that time. Some concerns from the Herring PDT include the worry that a slippage cap would only address a small proportion of "released catch" events and may be relatively ineffectual at motivating the herring fishery to take greater care to avoid non-target species; that developing a statistically valid method that addresses these issues may require months or years and involve resources beyond those immediately available to the

Herring PDT; that due to the expansion of the estimate of total slippage in the herring fishery from sampled slippage events collected by observers to the entire fishery, the resulting estimates will have some amount of error associated with them, the extent of which is unknown; and that the population level effects of slippage events are currently unknown, and the measure would therefore have an unknown relationship to total mortality for the herring complex.

Two other options that the Council/Committee considered for addressing net slippage would have implemented species specific landing caps. The first option would have applied *assumed* slippage event tonnage against species-specific slippage caps, and the second option would have applied *estimated* slippage event tonnage against species-specific slippage caps**.** Under both options, individual species-specific slippage caps would be set annually by the Council for each species identified for maximized retention, and the individual species slippage caps would be set at biologically-appropriate levels with consideration of economic and other concerns of all other fisheries targeting those species.

An assumed tonnage would have been applied against the herring sub-ACL for the management area in which the event occurs, *and* against each species-specific slippage cap for the first option, but an estimated tonnage would have applied for the second option. Under the first option, the assumed amount would have been set based on the current best estimate for the average tow in the fishery. Under the second option, the estimated amount would be based on some independent measure of the total weight of the slipped catch by species. Captain's estimates would not have been accepted. Therefore, this option would have only been practical in cases in which the VBEM dataset provided a clear and acceptable estimate of weight, or in which the vessel had additional EM technology such as catch-weight sensors in the CMCP, or in which a NMFS-approved observer happened to be aboard. In both options, when the first species-specific slippage cap was reached, the directed herring fishery in all management areas would have closed, and all vessels would have been limited to 2,000 pounds of herring.

After further consideration the first option was considered unrealistic based on time and resource restraints, and it was recommended that this option be eliminated. The second option was moved to the considered but rejected section because suspected or inferred slippage or discard events would still be subject to the assumed tonnage application because by definition, no actual data would exist for these events.

The Council/Committee also considered two potential consequences for quota or bycatch cap overages. Under the first option, if an at-sea discard caused an overage, or an at-sea discard event was suspected/inferred based on VBEM data or absence of data, and the event was known or suspected to have caused resulted in a quota or bycatch cap overage, then the offending vessel would have been suspended from the herring fishery for the following fishing year, and all other vessels would be forced to pay back the overage. The offending vessel also would have been forced to carry an at-sea observer at its own expense, in addition to participating in the maximized retention and dockside monitoring program under the proposed action, for an additional probationary year. This option was deemed problematic from a legal perspective. Under the second option, vessels would have been required to terminate their trips and return to port in the event that slippage event occurs due to the potential to compromise vessel safety and/or a mechanical failure. This option would have been applied on trips where slippage events can be documented with certainty (i.e., trips with either a NMFS-approved observer on board or other adequate monitoring mechanism like video technology). The Committee considered this measure to be punitive, and it was not expected to provide incentive to minimize slippage. The Committee was also concerned about the measure's potential to compromise safety when catch is brought on board in unsafe conditions in order to avoid trip termination.

3.6.5 Measures to Require Electronic Monitoring

The one option that was considered but rejected by the Council/Committee for requiring electronic monitoring was a measure that would have required a height or bottom contact sensors on Category A, B, and C trawl vessels to determine the amount of bottom contact of trawls during each tow. Under this option members of the midwater and pair trawl and purse seine sectors would have been responsible for working with NMFS to develop and test systems that can monitor bottom contact and report this data, via VMS or otherwise. The NERO office expressed concern about this measure, noting that it was not clear how the data would be collected or analyzed. Concerns were also raised by the Committee regarding the cost of the equipment and potential contact with the bottom, which could damage or remove it.

3.6.6 Measures to Require Catch Monitoring and Control Plans

During the development of the Amendment 5 catch monitoring alternatives, the Council considered measures that would require the industry to design and submit catch monitoring and control plans (CMCPs) to NMFS. CMCPs would have had the standards specified in the amendment which would have outline requirements for each CMCP and may have included the following: sorting and weighing all landings under the oversight of a portside sampler, notification requirements in advance of a landing, use of approved scales or other weighing techniques, provision of safe and convenient access points and sampling locations for observers/monitors/samplers, and procedures to ensure that no unobserved pre-sorting occurs, possibly including details regarding the installation and operation of a video-based electronic monitoring (VBEM) system if one is required. CMCPs would have covered all possible offload scenarios, and may have included cooperative arrangements with dealers and/or carriers and/or receivers of at-sea transfers (including USAP vessels if necessary and appropriate) or management measures to address river herring bycatch could also have been specified in the CMCP.

Options for CMCP provisions that were considered by the Council during the development of Amendment 5 include an option that would have determined which sectors of the fishery to which CMCP requirements could have applied. The other option would have defined the required elements of the CMCPs, such as an outline of fish handling procedures in detail, an explanation of how independently verifiable weight or volumetric conversion would have been attained for all species, an outline of the VBEM system to be operated and its installation specifications (if VBEM is a component of the catch monitoring program), an outline of the procedures for the portside component, or mandatory verification of compliance with maximized retention requirements.

It was intended that individual vessels/entities or groups of vessels/entities could develop/submit CMCPs. NMFS would review/approve CMCPs with input from the Council on an annual or semi-annual basis as part of the fishery permit renewal procedures. CMCP options were ultimately rejected from further consideration because of concerns expressed by the NMFS Regional Office about lack of clarity/detail in the proposed CMCP standards and the possibility of generating numerous different monitoring plans, which could cause significant enforcement/compliance problems. The proposed CMCP provisions appeared to be too open-ended and would allow for the potential for many different approaches to addressing some issues to be submitted by the industry.

3.6.7 Options for Funding

One alternative for funding the measures in Amendment 5 was to implement a set-aside, which would have been administered by mirroring the set-asides operated in other fisheries. One option under the alternative would have been to eliminate the research set-aside and replace it with the catch monitoring set-aside, with the sub-option of utilizing the set-aside specifically to fund a portside sampling program. Another option was to establish a catch monitoring set-aside in addition to the RSA, with the sub-option of utilizing the set-aside specifically to fund a portside sampling program PSP. A third option was to identify catch monitoring as a top priority for the RSA.

The first two options, which would have established a catch monitoring set-aside was rejected because NERO had expressed significant concerns about establishing an RSA-type process for funding a catch monitoring program. The NERO concerns were communicated to the Committee:

- The alternatives proposed in the document to fund catch monitoring through a set-aside are similar to the current research set-asides (RSAs). The RSA process is a competitive grants process administered by the Northeast Fisheries Science Center. Proposals are requested for research, and incoming proposals are reviewed and ranked by a technical body. With competitive grants awarded through this process, different entities will apply. For catch monitoring, it is important to ensure that only qualified entities apply, and it would be difficult to ensure a consistent monitoring program with multiple entities potentially competing for the available funds in any given year.
- Available funds to utilize under a catch monitoring set-aside would be limited and uncertain. Not all of the herring quotas are fully utilized. Set-asides have potential to be utilized only in areas where the quota is fully utilized and the fishery closes. The set-aside, therefore, would be limited to only the areas that close regularly (1A and possibly 1B) and could vary in amount from year to year depending on the total quota and the percentage selected for the set-aside. Overall, funds generated from the set-aside may not be significant.
- Timing is an important consideration. For a set-aside process to become effective, there is a one-year lag time to generate the funds. Timing is important for the fishery as well; there have been instances with past set-asides where fish were awarded but circumstances prevented those fish from being harvested and funds being generated. There are also substantial vessel costs associated with harvesting a set-aside; these costs must be factored into consideration of how much funding a set-aside could generate.
- Herring is a relatively low value fish. The costs of administering a set-aside program and harvesting fish under the set-aside may preclude the ability to generate a significant amount of funds.

The third option was sent to the considered but rejected section, but still could be implemented when the priorities for the RSA are set; there is no need to specify priorities for the RSA in this amendment. In addition, there are still two options in this amendment which would address the issue in part by prioritizing VBEM.

The Council also considered an option for catch monitoring in the herring fishery to be funded by federally permitted dealers. After some discussion with NMFS and NOAA General Counsel, the Council eliminated this option from consideration in Amendment 5 because it was vague and appeared to be infeasible since the vast majority of measures in Amendment 5 relate to monitoring catch at-sea. It is unclear how a mechanism could be established/structured to require dealers to fund at-sea catch monitoring on specific vessels (limited access) in the fishery.

3.6.8 Management Measures to Address River Herring Bycatch

The Committee/Council originally considered measures that would address river herring bycatch in the Atlantic herring fishery that would be applied to a series of river herring "hotspots", which were to be in quarter degree square increments. The alternatives considered had two purposes: (1) identifying the river herring hotspots (seasonal times and areas); and (2) management measures that will apply in the river herring hotspots.

In total there were three alternatives which identified the river herring hotspots. All three alternatives utilized a step-wise approach to identifying hotspots, whereby a first group of hotspots are identified bimonthly based on observer data from 2005-2009, coined Stage 1. The Stage 2 hotspots were identified based on criteria applied to the entire time series of NMFS bottom trawl survey data and an analysis method that involved the probability of occurrence in a tow in that data and a catch intensity measure, also in that data.

The Stage 1 hotspots were to be established upon the implementation of Amendment 5, and management measures to address river herring bycatch would have applied to the Stage 1 hotspots. The management measures to address river herring bycatch would have applied to the Stage 1 hotspots unless a specified trigger is reached, whereby a second group of hotspots, coined Stage 2, would become effective. If the Stage 2 hotspots were triggered, the management measures to address river herring bycatch would have applied to both Stage 1 and Stage 2 hotspots for the remainder of the fishing year.

All three alternatives to identify the river herring hotspots only varied from each other in that they considered three different amounts of river herring catch in a tow (on an observed "directed herring trip", which meant any trip that caught more than 2,000 pounds of Atlantic herring) that would have triggered the Stage 1 and Stage 2 hotspots: 40 pounds, 129 pounds, and 1,233 pounds.

The second set of alternatives that were the management measures to apply to the hotspots would have been applied when one of the three previously mentioned triggers were reached. There were eight alternatives that would have applied:

- A no action alternative, in which catch monitoring would only improve through other actions in Amendment 5;
- An action which would apply management measures in river herring hotspots similar to those for herring vessel access to Closed Area I based on the Final Rule for the Closed Area I provisions, published on November 2, 2009;
- An action the same as the previous, with the with the exception of the requirement for 100% observer coverage in the areas;
- An action that was coined the "move-along" rule, in which vessels would be prohibited to fish within a hotspot if the river herring bycatch in any tow within that hotspot were to exceed the threshold, with the requirement of 100% observer coverage in the hotspots to monitor river herring catch
    - Three thresholds for the move along rules (50 pounds per trip, 500 pounds per trip, and 2,000 pounds per trip) also considered as options, as well as two move-along closure time periods (one or two weeks);

- An action the same as the previous, with the with the exception of the requirement for 100% observer coverage in the areas, and priority was to be placed, to the extent possible, on deploying (NEFOP or other NMFS-approved) observers on trips that may fish in the river herring hotspots
    - The thresholds were only to apply to trips with observers on board;
- An action in which a bycatch avoidance program would have been implemented through a framework adjustment to the FMP, which would have been based on information provided by a similar Sustainable Fisheries Coalition Bycatch Avoidance Program once it had been completed, including information on the mechanism and process for tracking fleet activity, reporting bycatch events, compiling data, and notifying the fleet of changes to the hotspot area(s), the threshold for river herring bycatch that would trigger the need for vessels to be alerted and move out of the area(s), and the distance and time that vessels would be required to move from the area(s)
- An action that would have closed the river herring hotspots to fishing unless the vessels could have demonstrated river herring bycatch avoidance through catch monitoring and control plans (CMCP), in which NMFS would have reviewed/approved CMCPs with input from the Council on an annual or semi-annual basis as part of the fishery permit renewal procedure (See Section 3.6.6 for more information on CMCPs);
- An action that would have prohibited fishing for herring in Stage 1 River Herring Hotspots, removing the ability of vessels to fish for herring in the hotspots, thereby eliminating the need for Stage 2 hotspots.

In all eight of the considered measures to apply to the hotspots, transfers at sea would have been prohibited within the hotspots, and modifications to those management measures would have been allowed through a future framework adjustment to the herring FMP. There were also two options that could have applied to all eight of the measures, one of which would have meant that the measures would have applied to only Limited Access Category A, B, and C vessels when on a declared herring trip, and the second in which the measures would have applied to all herring vessels (Categories A, B, C, and D).

The Herring PDT was encouraged by the Committee and Council to streamline the alternatives, and the PDT agreed that the measures should be ecologically based, simple to understand, enforceable, and connected to the other management measures in Amendment 5. These four criteria had been raised by the Committee, Council, and PDT alike as issues with the alternatives as they have been described above. The issues were based on concerns that the data did not have the ability to predict what small amounts of movement by vessels out of a hotspot would produce, the complexity of the measures and the ability of all parties involved to understand them, safety issues that that resulted from the potential for observers to become enforcers when having to determine when the river herring triggers had been reached.

A restructuring of the hotspot alternatives was therefore recommended to the Committee by the Herring PDT, and the Herring Committee and Council utilized the restructuring in their decisions. The current measures under consideration in this document therefore reflect the outcome of further work on these alternatives to improve the measures to address river herring bycatch in the Atlantic herring fishery. For further information on this process and the current measures, see Volume II, Appendix IV, entitled "Herring PDT Analysis: Development of Measures to Address River Herring Bycatch."

After the restructuring, the two options for "move-along" rules (one considering 100% observer coverage and the considering less than 100% observe coverage) were removed from consideration by the Council. The removal was based on several problems that the NERO and Council staff had identified, including a significant delay (1-3 weeks) between when the vessel catches the river herring trigger amount and when NMFS can close the area where the trigger was located, as the measure would need to be implemented by the publication of notification in the Federal Register. The time-lags were also likely between when river herring may be encountered on a trip in an area to when a rule may be implemented to close the "move-along area", which in turn could have reduce the effectiveness of the move-along rule and create a significant administrative/regulatory burden. Implementation of multiple move-along rules within the same areas and the same time periods was also not likely to be feasible. Flexibility of the measure was also questioned, and the ability of fleets to organize, communicate, and manage its bycatch interactions in the most effective manner possible would not have been possible. For these reasons, the measures were removed from consideration.

3.6.9 Other Measures Considered but Rejected

The Committee/Council considered several different approaches to developing measures to establish criteria for midwater trawl vessel access to groundfish closed areas during the development of Amendment 5. One of the measures would have required 100% observer coverage for one year as a condition to gain further access to the closed areas when a vessel targeting herring in a groundfish closed area has regulated groundfish exceeding 1% of the catch of herring. The vessel would have been denied access for one year if the 1% bycatch allowance had been exceeded again. This measure was rejected because of due diligence issues raised by the NMFS Regional Office; if a vessel is able to show that it used reasonable care to prevent the offence from occurring, then access cannot be denied.

4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The Affected Environment is described in this document based on valued ecosystem components (VECs) that are identified specifically for Amendment 5. The VECs for consideration in Amendment 5 include: Atlantic Herring; Non-Target Species and Other Fisheries; Physical Environment and Essential Fish Habitat (EFH); Protected Resources; and Fishery-Related Businesses and Communities. VECs represent the resources, areas, and human communities that may be affected by the management measures under consideration in this amendment. VECs are the focus of an EIS since they are the "place" where the impacts of management actions are exhibited.

4.1 ATLANTIC HERRING

The NEFMC manages herring under the Atlantic Herring FMP. The stock is not overfished at this time and overfishing is not occurring. A complete description of the Atlantic herring resource can be found in Section 7.1 of the FSEIS for Amendment 1 to the Herring FMP. Updated information to supplement that presented in Amendment 1 can be found in Section 6.1 of the EA for Amendment 4 to the Herring FMP. The following subsections update information through 2010 where possible and summarize the stock status and recent biological information for Atlantic herring.

4.1.1 Distribution and Life History

The Atlantic herring, Clupea harengus, is 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^{o} – 9^{o} C (Munro 2002; Zinkevich 1967), but may overwinter at temperatures as low as 0^{o} C (Reid et al. 1999).

Spawning occurs in the summer and fall, starting earlier along the eastern Maine coast and southwest Nova Scotia (August – September) than in the southwestern Gulf of Maine (early to mid-October in the Jeffreys Ledge area) and Georges Bank (as late as November – December; Reid et al. 1999). Herring are synchronous spawners, with mature fish producing eggs once a year. Male and female herring grow at about the same rate and become sexually mature beginning at age 2, with most maturing by age 4 (O'brien et al. 1993, Munroe 2002). Growth rates vary greatly from year to year, and to some extent from stock to stock, and appear to be influenced by many factors, including temperature, food availability, and population size.

In the past, the herring resource along the east coast of the United States was divided into the Gulf of Maine and Georges Bank stocks (Anthony and Waring 1980). Currently, however, no methods are available to identify stock of origin for fish caught in the mixed stock fishery or during fishery-independent surveys. Consequently, herring from the Gulf of Maine and Georges Bank components are combined for assessment purposes into a single coastal stock complex.

4.1.2 Migration

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, which is described in greater detail in Amendment 1. Below are two more recent tagging projects which provide insight into the migration behavior of Atlantic Herring.

4.1.2.1 Maine DMR Tagging Project

In 2009, the results of the project presented in Amendment 1 were published (Kanwit and Libby, 2009), and are summarized below. The results show seasonal movements of Atlantic herring from Southern New England in the winter to Nova Scotia in the summer.

Between 2003 and 2006, a total of 85,561 T-bar tags were used to mark herring (Table 6); due to funding, however, the tagging did not occur at regular intervals. Herring were tagged in the GOM during the summer feeding and spawning period (July-October) and in SNE during the winter feeding period (January-April), as these are the times and areas where herring are assumed to have some residency.

Table 6 Number of Herring Tagged by Year, Spatial and Temporal Strata 2003-2006

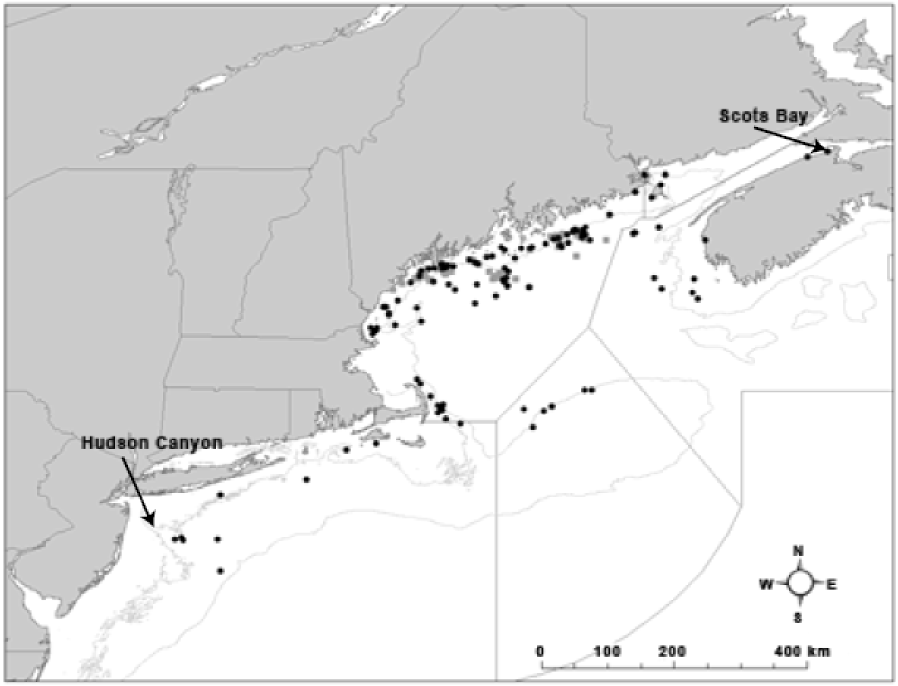
		Year				
Spatial strata	Temporal strata	2003	2004	2005	2006	Total
Gulf of Maine (GOM)	Summer Feeding/Spawning (SFS: July–October)	15 275	13 475	5 300	6 100	40 150
Southern New England (SNE)	Winter Feeding (WF: January–April)	4 536	5 875	20 000	15 000	45 411
Total		19 811	19 350	25 300	21 100	85 561

Source: Kanwit and Libby, 2009

Commercial purse seine vessels and midwater trawl vessels were used for the initial tagging, and a lottery system was used to entice fishermen to return tags. A seeding study was conducted to inform adjustments of reporting rates. Time and distance plots were first made with the resulting data, and adjustments for fishing effort were made.

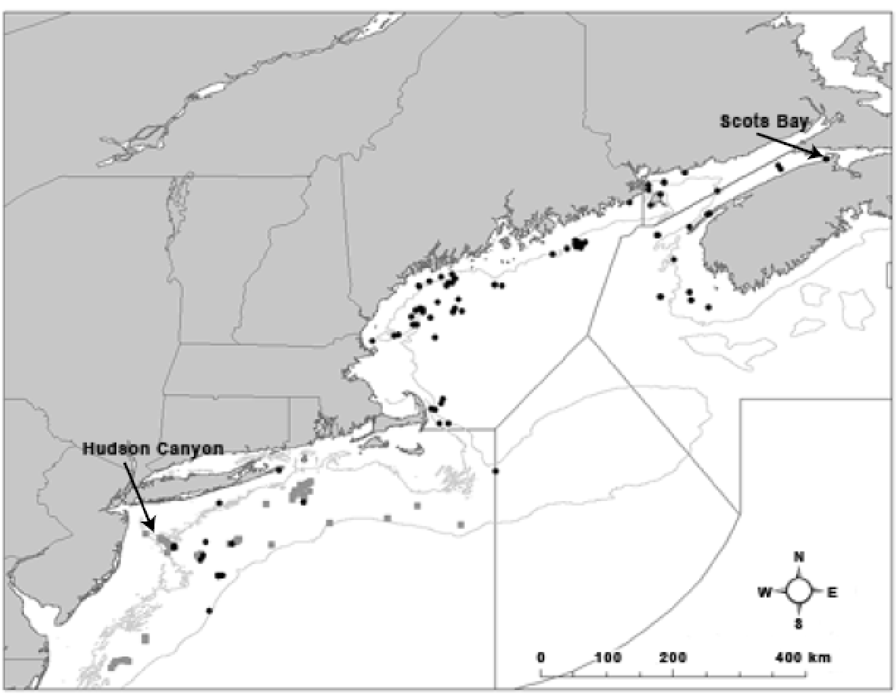
Tag returns occurred in a large range from as far North and East as Scots Bay in the Bay of Fundy to as far South and West as Hudson Canyon off the New York coast (Figure 26 and Figure 27).

Figure 26 Tagging locations (gray dots) and returns (black dots) from Atlantic herring released in the GOM during the summer feeding and spawning



Source: Kanwit and Libby, 2009

Figure 27 Tagging locations (gray dots) and returns (black dots) from Atlantic herring released in SNE during the winter feeding



Source: Kanwit and Libby, 2009

Fish that were tagged aboard purse seine vessels had a significantly different, although small, return rate from midwater trawls vessels; fish tagged on purse seine vessels were more likely to be returned.

The tag recoveries showed a clear pattern of short term residency during the summer feeding and spawning period, which was then followed by a long distance migration through time. Most were recaptured close to the point of release close to a year later in the GOM (only 6 recoveries were after one year at large, however). In comparison, those tagged in SNE during the winter feeding time period did not stay in the area for as long, but were back in the same area quicker than those released in the GOM. The fish released in the GOM traveled an average of 134 km with a minimum of 1 km and a maximum of 684 km; those released in SNE traveled and average of 362 km with a minimum of 2 km and a maximum of 1,008 km. This study concurs with several other studies in similar areas at similar times.

4.1.2.2 German Bank Spawning Ground Turnover Rates

In 2009, a joint project was undertaken by both the Herring Science Council and the Department of Fisheries and Oceans to investigating the average residency of Atlantic herring on spawning grounds during the spawning season. The latest report from the three year study covers the first year of tagging (2009); subsequent results from 2010 and the present year will be published at a later date.

Residency is defined as the length of time a herring takes to aggregate, spawn, leave, and for a new wave of herring to arrive. Previous to this study the assumption has been a 10-14 day residency, which is used to estimate Spawning Stock Biomass in assessments. A new study was warranted to better estimate sub-populations and to corroborate acoustic survey results.

In 2009, 10,338 Floy tags were deployed continuously during the spawning season on German Bank; 15 separate events took place from August to September. Herring were collected on commercial purse seine vessels and only ripe and running fish were tagged. 100-200 additional herring were retained for further information on length frequency and laboratory analysis. A lottery was utilized to encourage tag returns by fishermen, and returns were adjusted to account for effort.

The results showed a trend towards staying on the spawning grounds, with most fish being recaptured by the third week after release on the spawning grounds, and some fish remaining on the grounds for up to five weeks. Of a total of 10,338 tags released in 2009, 69 tags were recaptured, and 52% were recaptured in the first week, 78% by the second week, and 93% by the third week. No relationship was found between the distance travelled and the days at large. A regression analysis showed that the proportion of recaptures on the spawning grounds and the days at large were highly correlated.

4.1.3 Stock Definition

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. A more detailed description of this stock definition can be found in Amendment 1. A more recently completed thesis by Bolles (2006) used morphometrics to investigate mixing rates between these three spawning components during spawning times.

Truss network analysis, which is a systematic set of morphometric distances, was used in combination with image analysis and multivariate procedures to build on work done by Cadrin and Armstrong in 2001. Canadian herring were sampled using commercial purse seines, and Gulf of Maine and Georges Bank were sampled using mid water trawls. Sampling took place during the 2003 and 2004 summer and autumn spawning periods.

Results showed that Canadian herring could be more correctly classified than Gulf of Maine and Georges Bank herring. Some differences in morphological variables were observed between the eastern and western Gulf of Maine herring. The models produced by this work could be used in future research to better determine the mixing rates of the three spawning stock components in non-spawning times. This information may be reviewed if stock structure, as a larger topic, is explored in future benchmark stock assessments for herring.

4.1.4 Trends in Abundance and Biomass of the Atlantic Herring Resource

4.1.4.1 NMFS Trawl Survey – All Strata

The mean number of Atlantic herring per tow and mean weight per tow from the NMFS spring and fall research surveys for the entire Atlantic herring complex have been derived from the NEFSC trawl survey, which samples the range of the Atlantic herring resource in the U.S. Exclusive Economic Zone (EEZ). Mean numbers per tow for 2009 and more recent years have been calibrated from R/V Bigelow catches to equivalent R/V Albatross catches using season and length specific calibration factors. Mean weights per tow were calibrated similarly except with a single calibration factor common to all seasons and lengths (Miller et al. 2009).

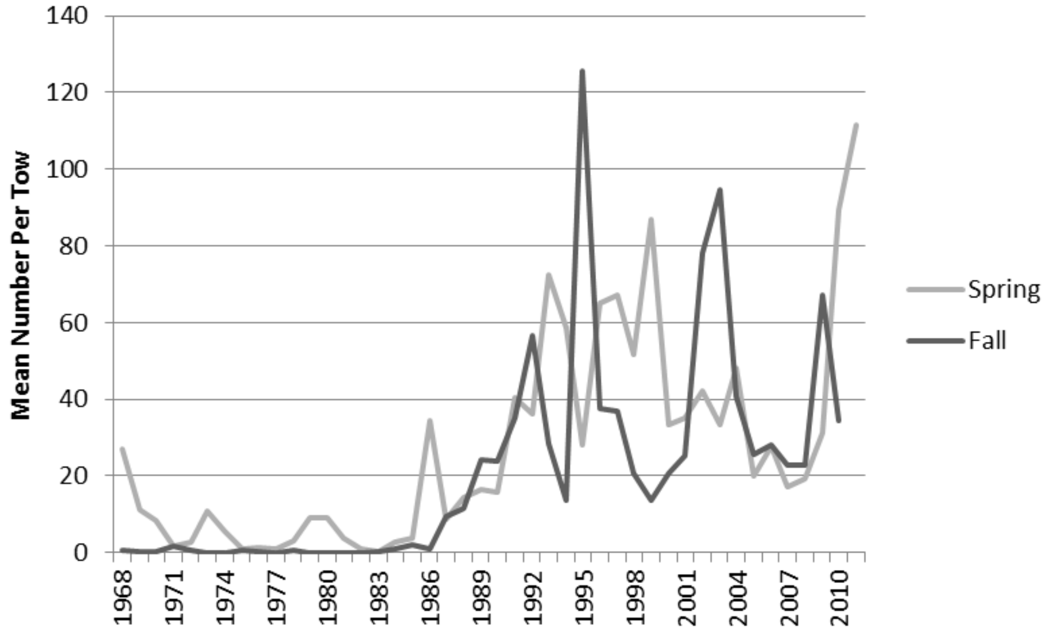
Table 7 summarizes data (mean weight per tow in kilograms and mean number per tow) from the NMFS spring and autumn bottom trawl surveys from 1990 – 2011. Figure 28 and Figure 29 represent the same data graphically.

Table 7 NMFS Trawl Survey – Herring Catch Per Tow (Mean Number and Weight in kg), 1990-2011

YEAR	SPRING SURVEY		AUTUMN SURVEY	
	number/tow	kg/tow	number/tow	kg/tow
1990	15.85	1.77	23.70	3.03
1991	40.52	4.54	35.17	5.47
1992	36.33	2.80	56.60	9.25
1993	72.43	7.65	28.48	4.65
1994	58.83	6.90	13.71	2.15
1995	28.10	3.08	125.75	13.12
1996	64.92	3.89	37.65	4.64
1997	67.27	4.26	37.06	4.87
1998	51.69	4.91	20.63	2.84
1999	86.95	9.72	13.52	1.84
2000	33.34	2.92	20.65	3.18
2001	35.07	3.35	25.33	3.69
2002	42.09	2.69	77.99	10.74
2003	33.41	3.46	94.76	6.24
2004	48.00	2.22	40.70	5.04
2005	19.87	1.49	25.70	3.37
2006	27.72	2.89	28.16	3.47
2007	17.33	1.72	22.97	3.16
2008	19.18	2.02	22.83	3.07
2009	31.30	10.10	67.19	6.65
2010	89.29	8.46	34.42	3.13
2011*	111.56	17.50	-	-

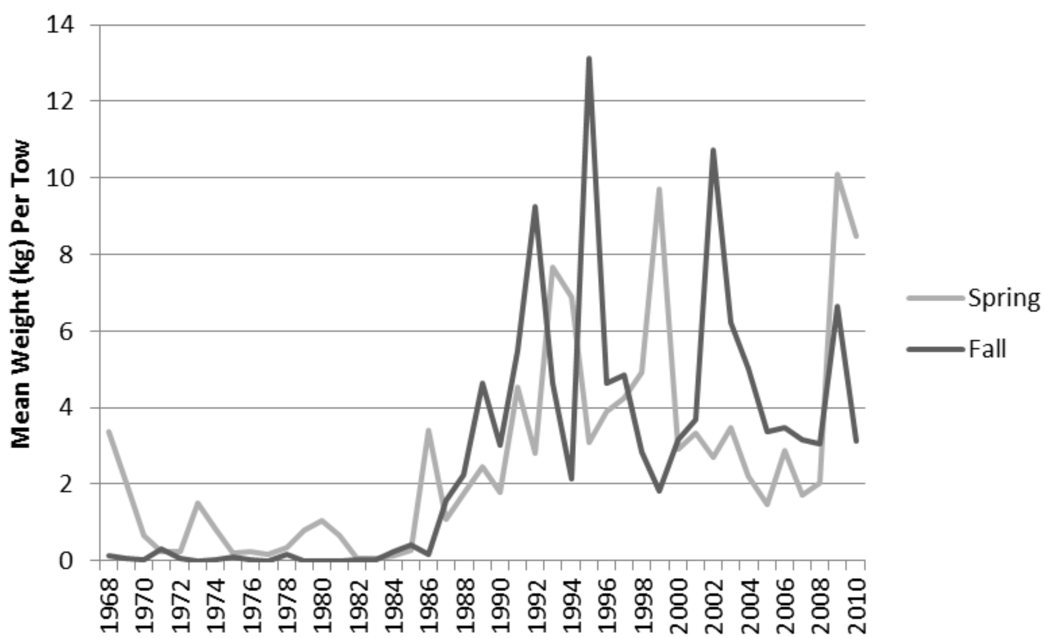
Source: NEFSC
**2011 numbers are preliminary*

Figure 28 Herring Mean Number Per Tow Indices from the NMFS Spring and Autumn Survey Through 2010



Source: NEFSC

Figure 29 Herring Mean Weight (kg) Per Tow Indices from the NMFS Spring and Autumn Survey Through 2010



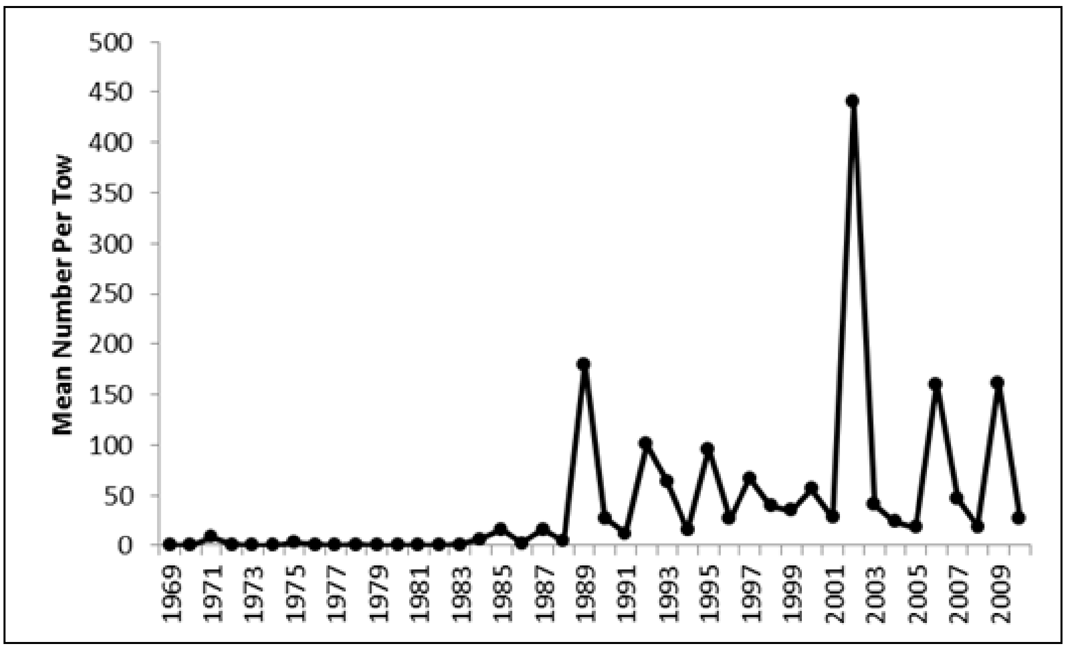
Source: NEFSC

4.1.4.2 NMFS Trawl Survey – Inshore Only

To examine trends in the inshore Gulf of Maine separately, NMFS survey strata 26, 27, and 38-40 were isolated because they include the majority of the area from this survey that represents the inshore Gulf of Maine. Similar to the calibration used for the analysis of the entire herring complex (Section 4.1.4.1), mean numbers per tow for 2009 and more recent years have been calibrated from R/V Bigelow catches to equivalent R/V Albatross catches using season and length specific calibration factors. Mean weights per tow were calibrated similarly except with a single calibration factor common to all seasons and lengths (Miller et al. 2009).

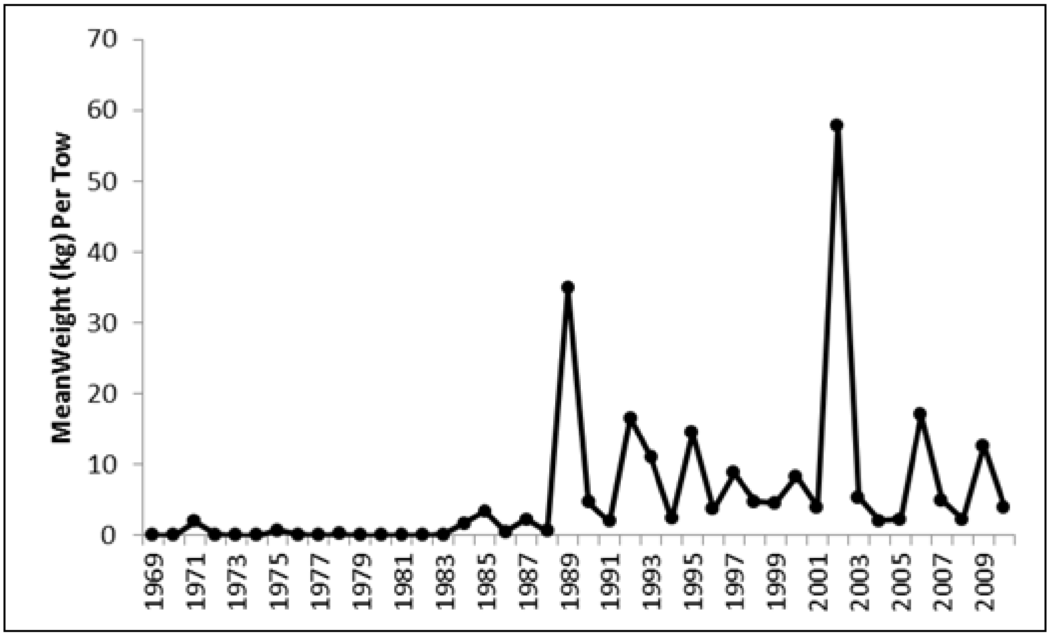
The NMFS fall survey and the spring survey were relatively flat, averaging very few fish per tow during the late 1960s through the early 1980s (Figure 30 – Figure 33). In the late 1980s, the spring indices increased significantly, and although variable, remained relatively high until 2005, when they dropped again. The spring indices increased again, however, from 2005 to present. Fall indices have remained highly variable since the 1980's, and the 2010 indices had a relatively low mean number per tow.

Figure 30 Herring Mean Number Per Tow Indices from the NMFS Autumn Bottom Trawl Survey Strata 26-27,38-40 (Inshore GOM Area), 1963-2010



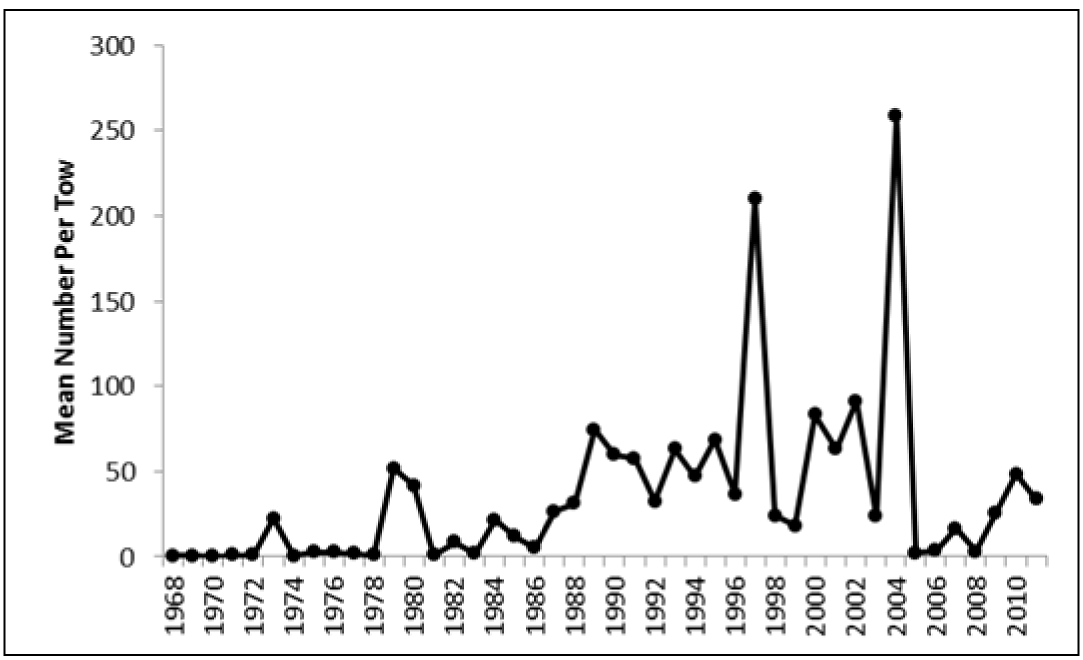
Source: NEFSC

Figure 31 Herring Mean Weight Per Tow (Kilograms) Indices from the NMFS Autumn Bottom Trawl Survey Strata 26-27,38-40 (Inshore GOM Area), 1963-2010



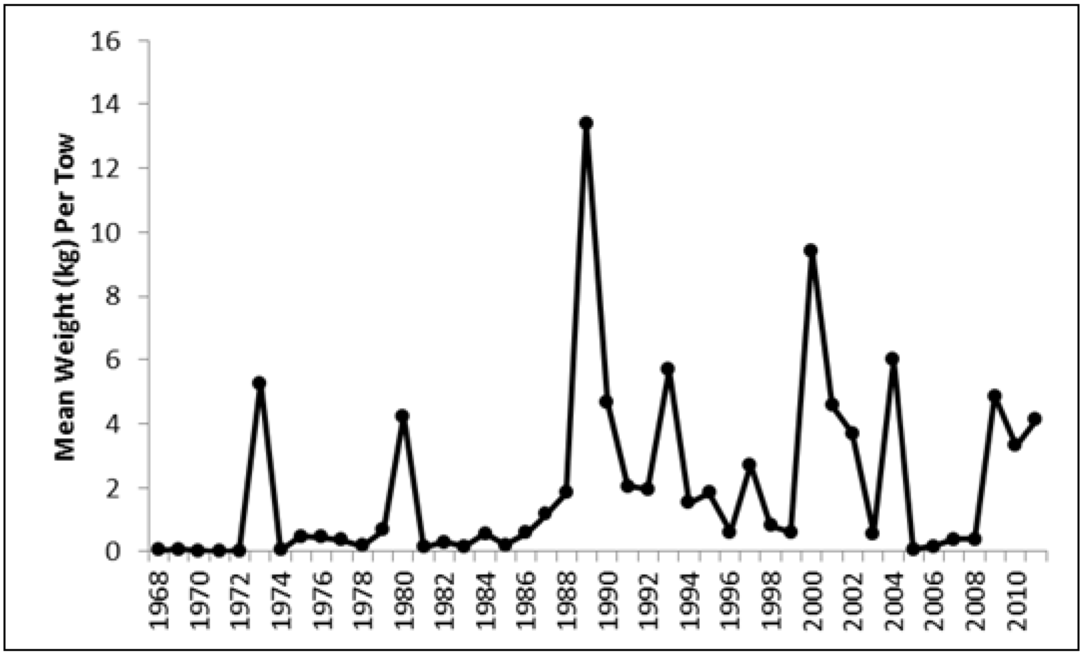
Source: NEFSC

Figure 32 Herring Mean Number Per Tow Indices from the NMFS Spring Bottom Trawl Survey Strata 26-27,38-40 (Inshore GOM Area), 1968-2011



Source: NEFSC

Figure 33 Herring Mean Weight Per Tow (Kilograms) Indices from the NMFS Spring Bottom Trawl Survey Strata 26-27,38-40 (Inshore GOM Area), 1968-2011



Source: NEFSC

4.1.4.3 MA DMF Inshore Trawl Survey

The Massachusetts Division of Marine Fisheries (MA DMF) research bottom trawl surveys (Strata 25-36) for spring and fall through 2010 were examined for trends in the inshore herring component. In general, the MA DMF inshore survey is dominated by young herring and does not track adult herring abundance. Thus, survey data are more useful as recruitment indices for this resource.

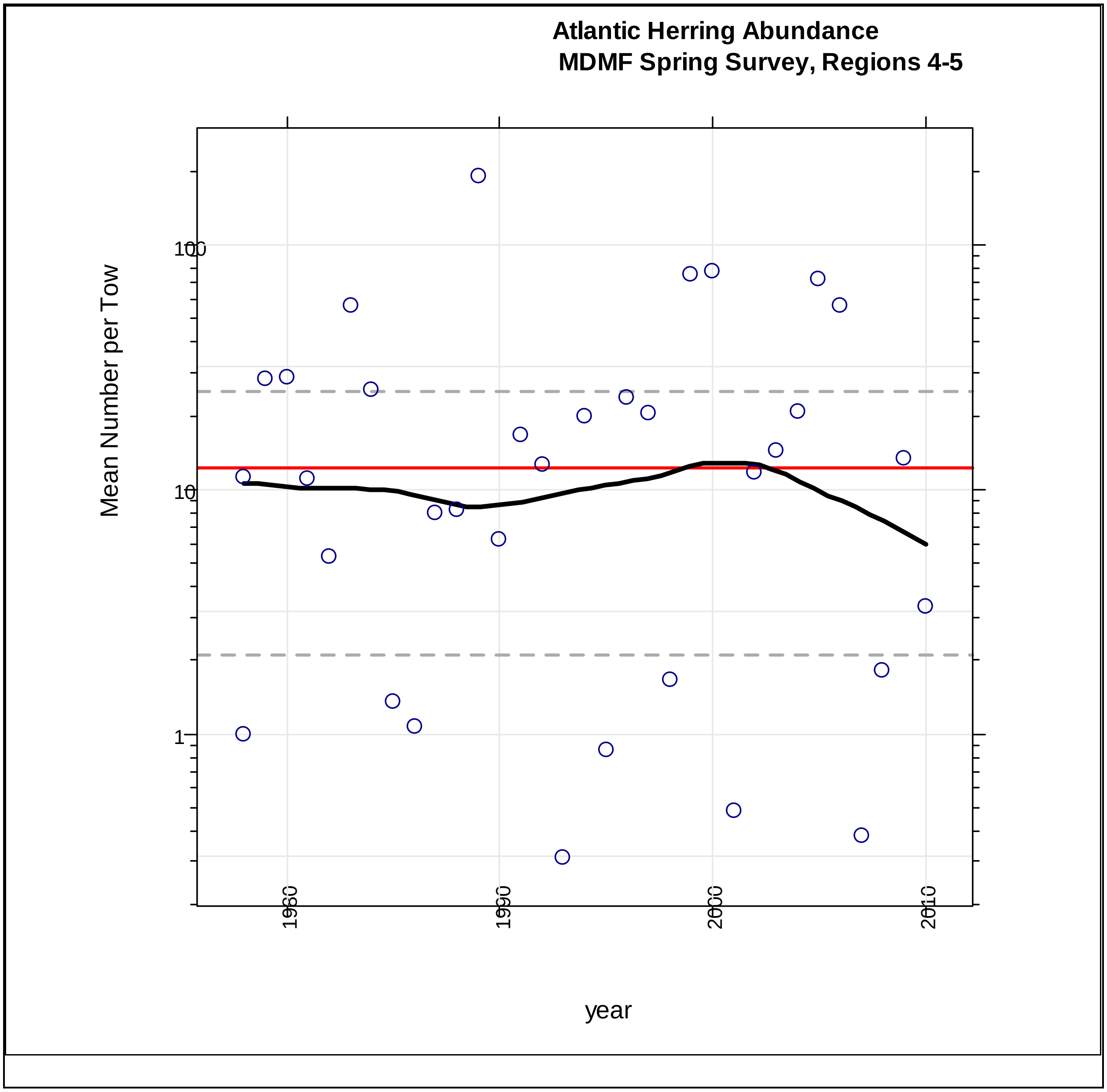
The fall and spring survey time series are highly variable, as may be expected for a pelagic species, and both indices are dominated by young herring (Figure 34 and Figure 35). The spring survey fluctuates without trend, although 2007 and 2008 were well below the 25th quantile (Figure 34). Note that the large increase in the fall 2003 index was heavily influenced by two very large tows in Region 4 (Cape Cod Bay). The relative abundance index was low in 2007 and 2008, with both years below the 25th quantile of the time series. The index ticked up to approximately the median in 2009.

The encounter rate for herring in the MA DMF inshore bottom trawl survey, as measured by the ratio of tows with herring to total tows, is shown in Figure 36. Both the spring and fall time series are highly variable and have fluctuated without trend for most of the time series. However, because herring is a schooling pelagic fish, the encounter rate index may be tracking the number of schools rather than abundance.

Both the relative abundance indices and the encounter rate indices are highly variable, making interpretation difficult. Perhaps the best use for these indices would be to watch for short runs that occur on either side of the inter-quartile range. Runs below the 25th quantile may indicate a trend of poor recruitment.

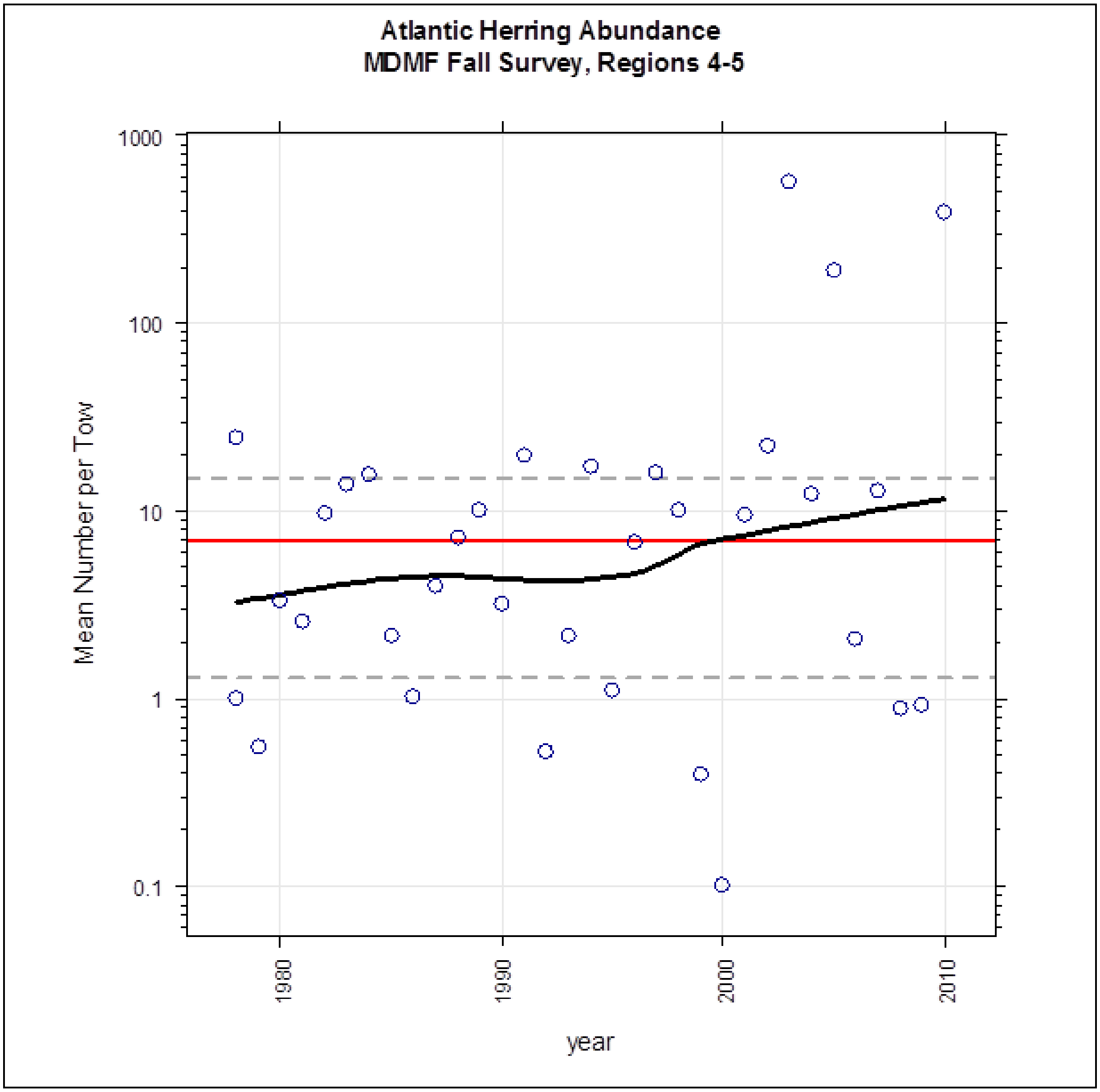
The time series of length frequency distributions for spring and fall surveys are shown in Figure 37 – Figure 40. These figures indicate high year to year variation in mean number per tow and demonstrate that the MA DMF indices are dominated by juveniles.

Figure 34 MA DMF Spring Survey Stratified Mean Number per Tow for Strata 25-36



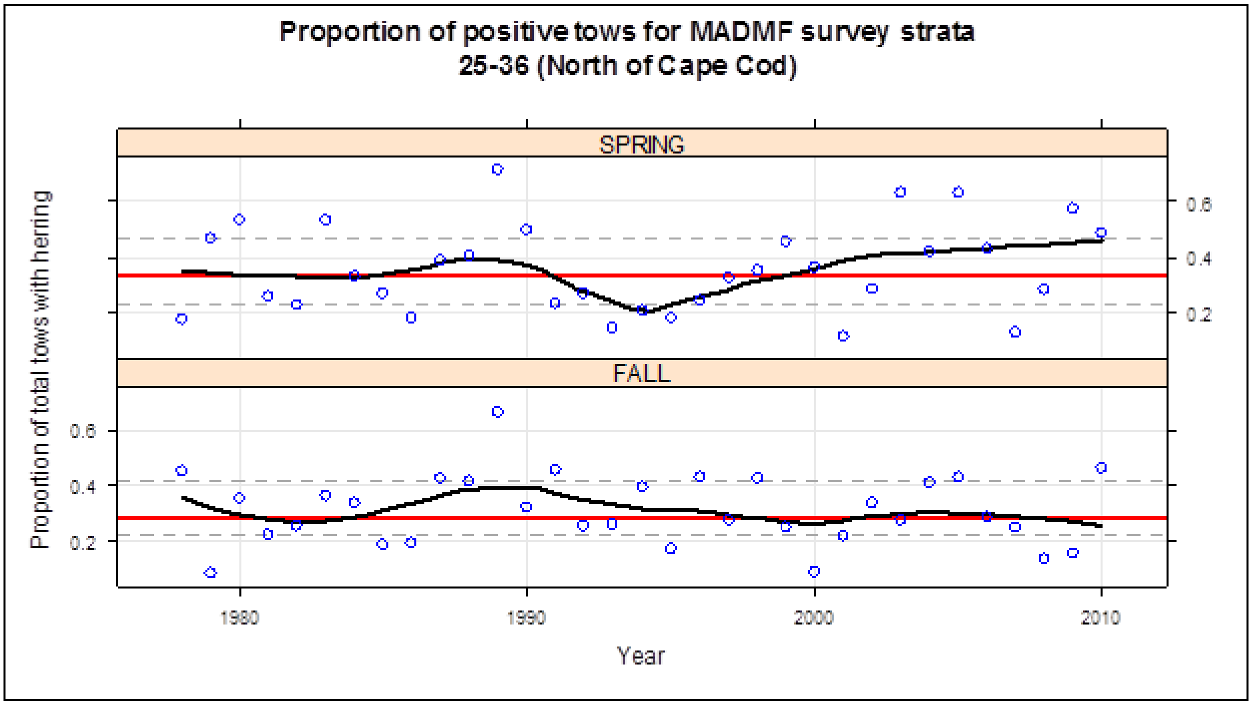
Source: MA DMF
The y-axis scale is logarithmic.
Solid black line is LOESS fit with span=0.6.
Solid red line is time series median and dashed lines delimit inter-quartile range.

Figure 35 MA DMF Fall Survey Stratified Mean Number per Tow for Strata 25-36



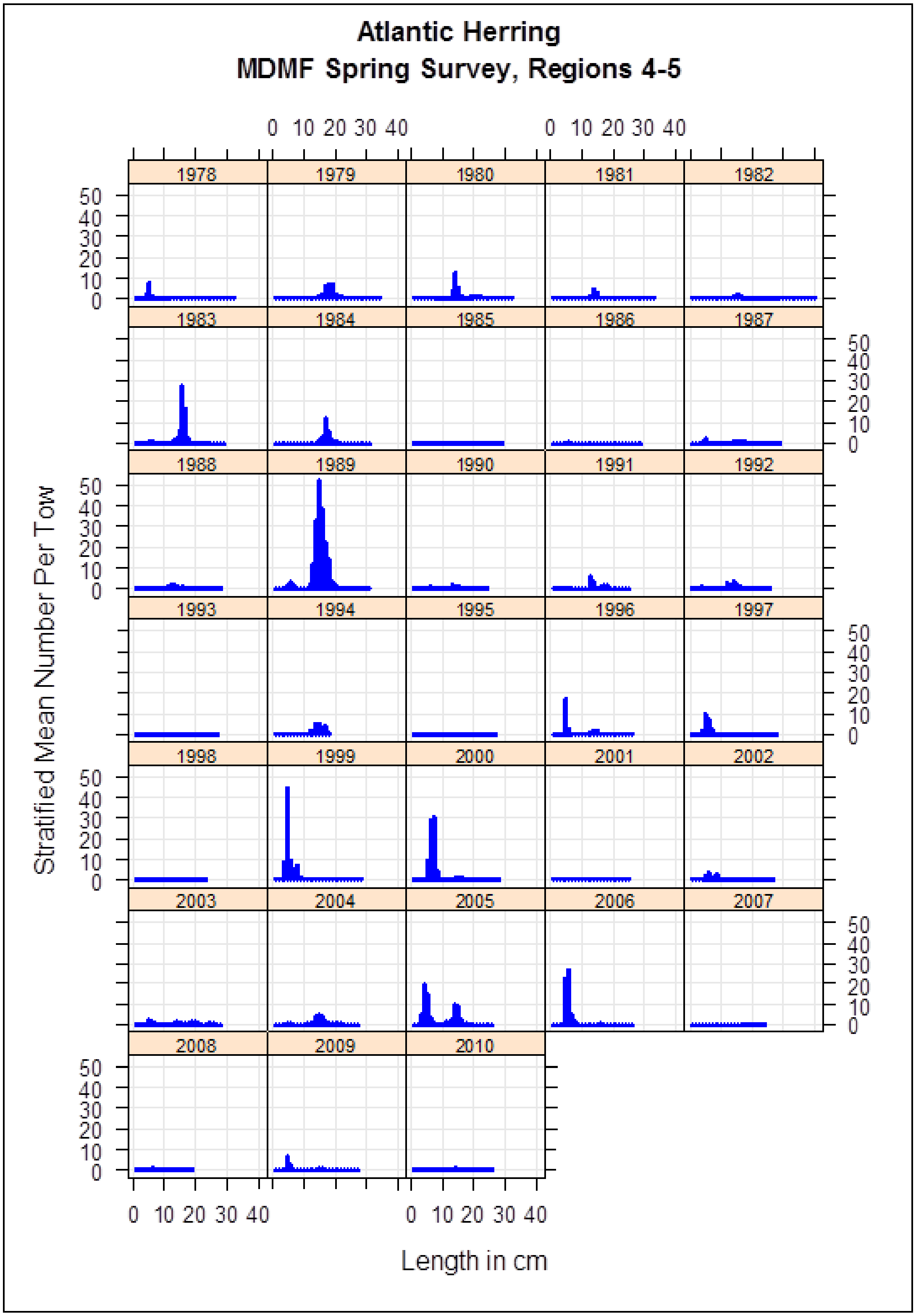
Source: MA DMF
Solid black line is LOESS fit with span=0.6.
Solid red line is time series median and dashed lines delimit inter-quartile range.

Figure 36 Number of MA DMF Spring (1978-2010) and Fall (1978-2010) Survey Tows That Encountered Herring as a Proportion of Total Tows for Strata 25-36



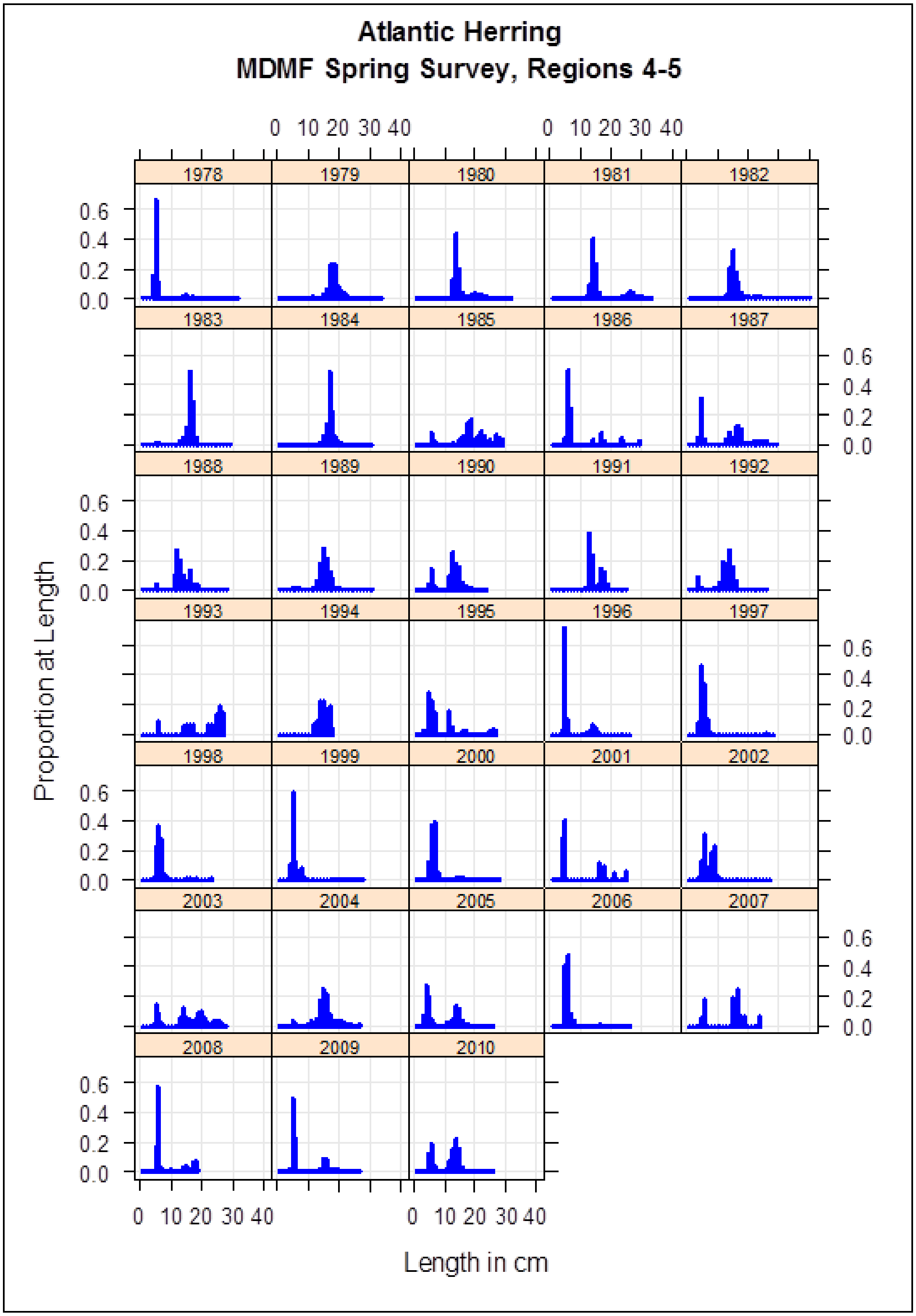
Source: MA DMF
Solid red line is LOESS fit with span=0.3 and degree=1.
Solid black line is time series median.
Dashed gray lines indicate 25th and 75th quantiles of the time series.

Figure 37 Stratified Mean Number per Tow at Length for MA DMF Spring Survey, 1978-2010



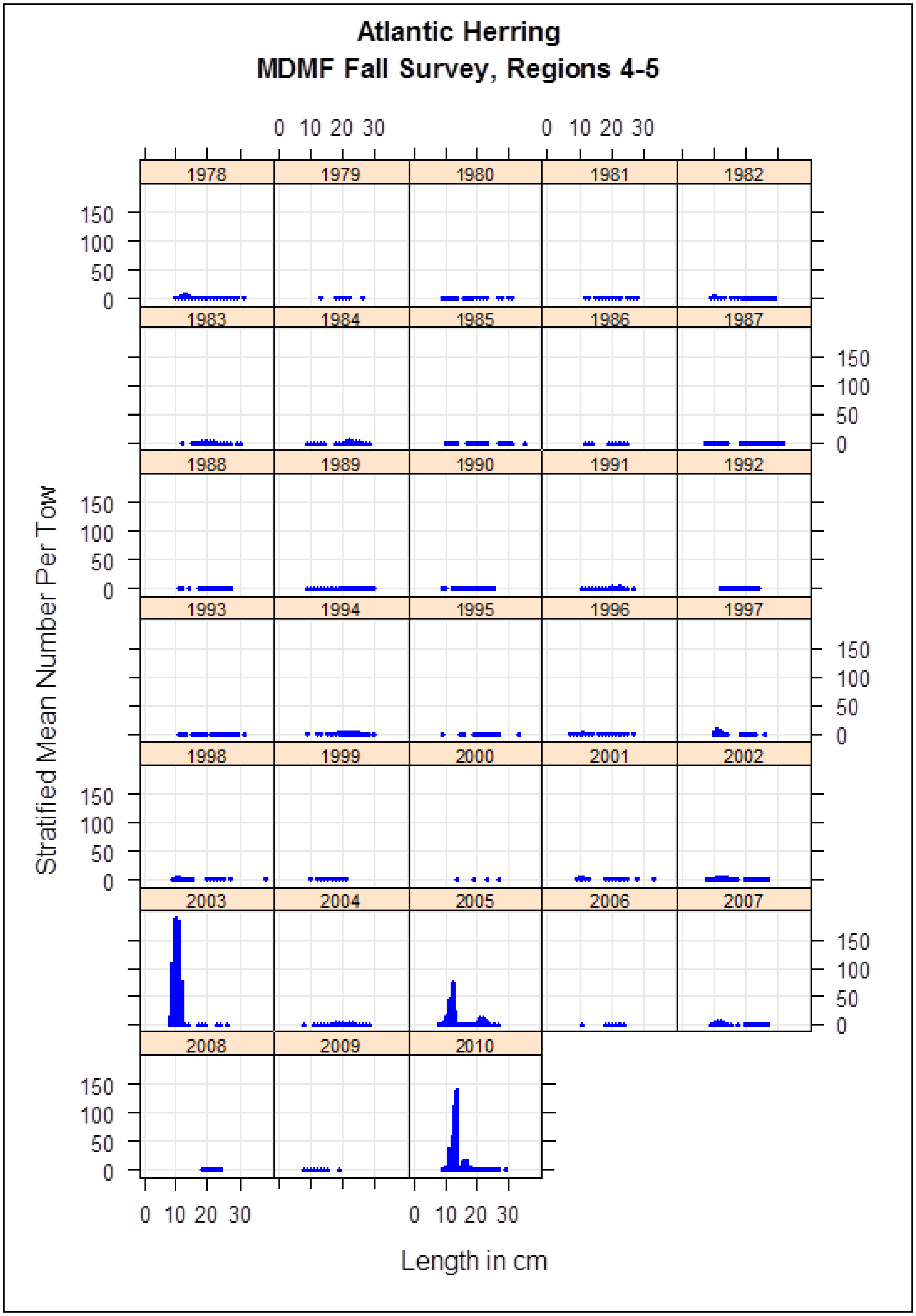
Source: MA DMF

Figure 38 Proportion of Mean Number per Tow at Length for MA DMF Spring Survey, 1978-2010



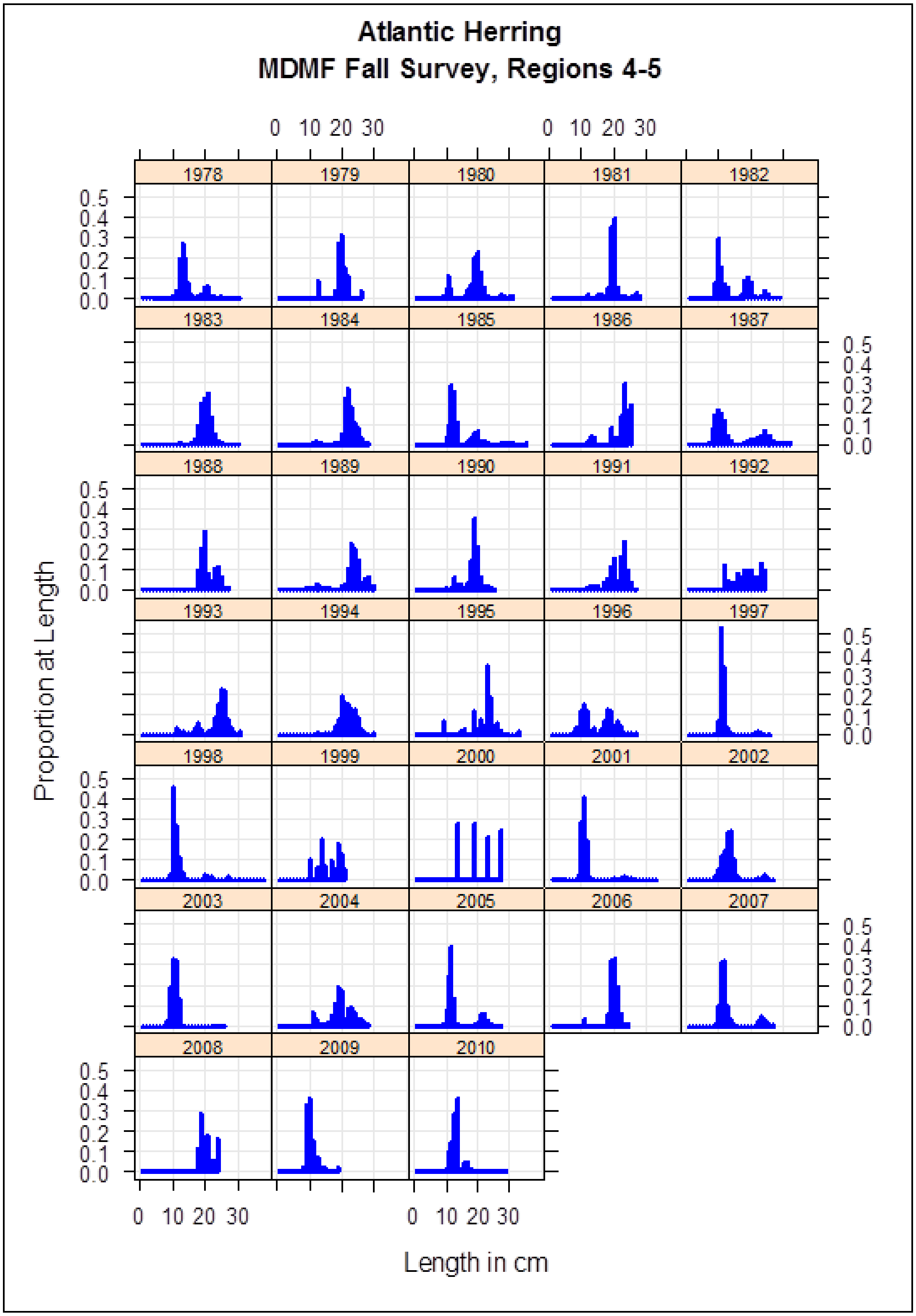
Source: MA DMF

Figure 39 Stratified Mean Number per Tow at Length for MA DMF Fall Survey, 1978-2010



Source: MA DMF

Figure 40 Proportion of Mean Number per Tow at Length for MA DMF Fall Survey, 1978-2010



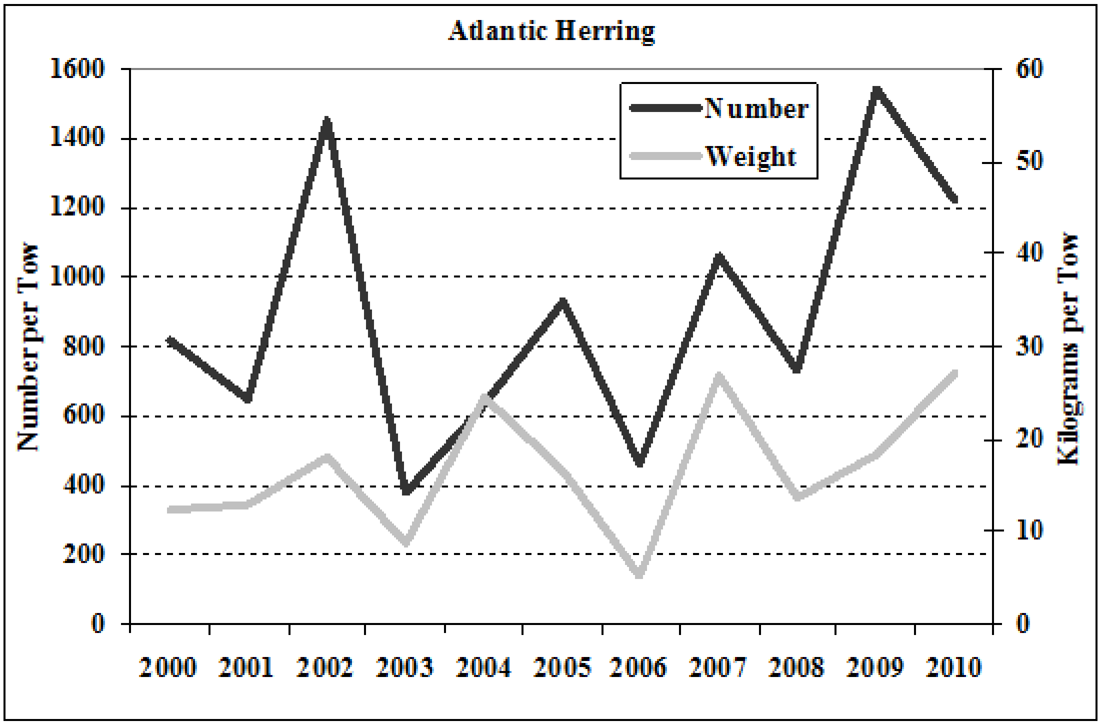
Source: MA DMF

4.1.4.4 ME DMR Inshore Trawl Survey

Since Fall 2000, Maine Department of Marine Resources (Maine DMR), in conjunction with the Gulf of Maine Research Institute and the State of New Hampshire, have been conducting an inshore bottom trawl survey. While this survey targets principal groundfish species from the NH/MA boarder to Canada, it regularly samples herring in many of its strata. Results from the fall and spring survey (Figure 41 and Figure 42) have been variable over the time series, and no trend is apparent.

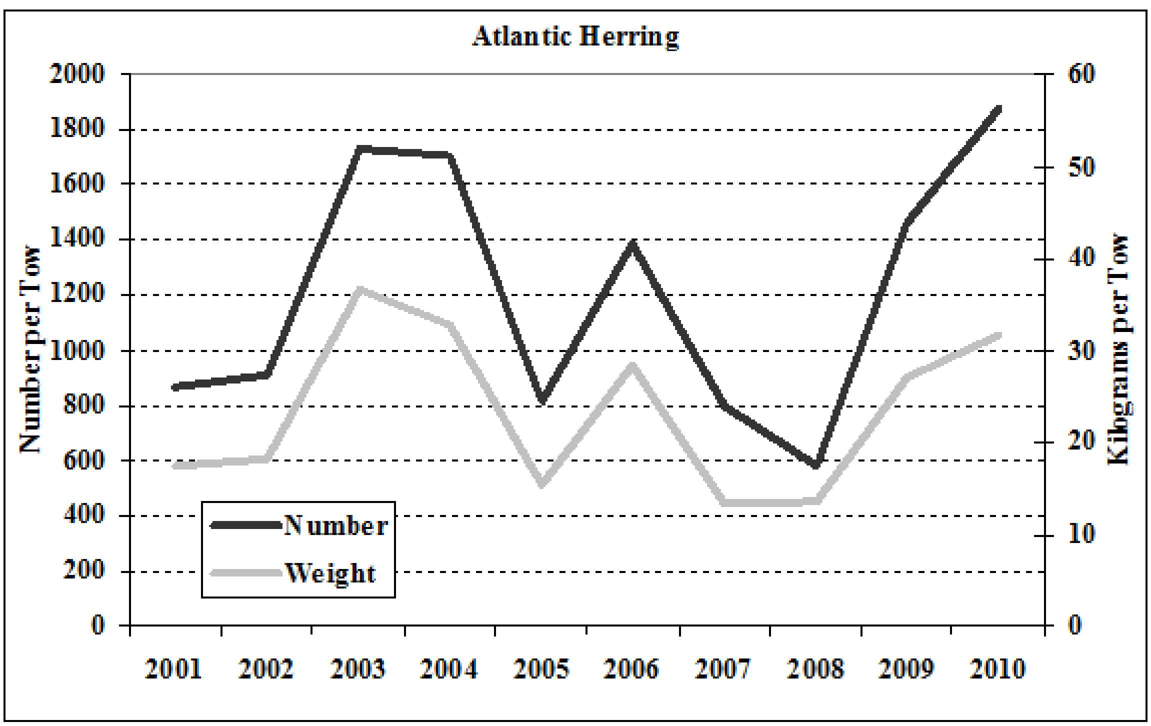
This is a ME/NH coast-wide bottom trawl survey, the results of which should not be viewed as an index of spawning stock biomass (SSB) for the inshore component of the herring resource. In fact, most of the fish sampled by this survey are age 1 fish. The length frequencies (Figure 43 and Figure 44) can be viewed as a recruitment index and is used to calibrate the NMFS trawl survey data for the TRAC. Similar to the MA DMF survey, this bottom trawl survey may provide an indication of pre-recruitment year class strength.

Figure 41 ME DMR Fall Inshore Bottom Trawl Survey Catch (# Fish) Per Tow



Source: ME DMR

Figure 42 ME DMR Spring Inshore Bottom Trawl Survey Catch (# Fish) Per Tow



Source: ME DMR

Figure 43 Length Frequencies for Herring Sampled by the ME DMR Fall Inshore Bottom Trawl Survey

Source: ME DMR

Figure 44 Length Frequencies for Herring Sampled by the ME DMR Spring Inshore Bottom Trawl Survey

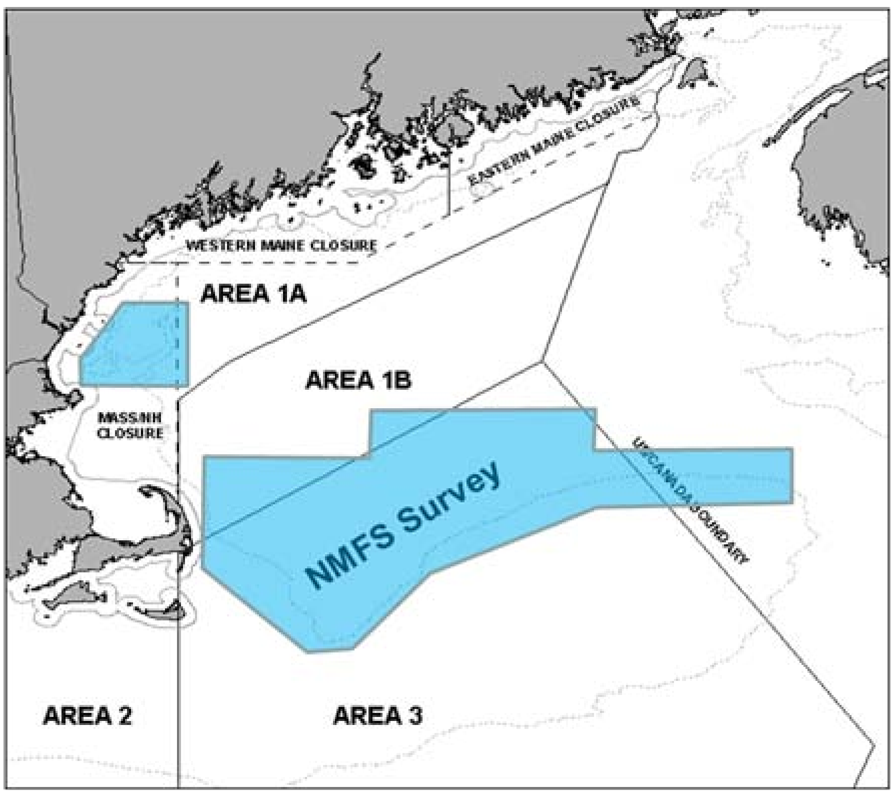
Source: ME DMR

4.1.4.5 Acoustic Surveys

Brief History

The NMFS NEFSC acoustic survey of the offshore component of the Atlantic herring population began in earnest in 1999 after about four years of initial pilot work. The survey covers the northern edge of George's Bank and Great South Channel from the 'northeast peak' to Cape Cod and was designed to sample aggregations of herring as they prepared to spawn in the fall (Figure 45). Initially the index of abundance was near historical highs, but beginning in 2002, the index of abundance from the acoustic survey declined approximately four-fold and remained relatively low through 2008 (Figure 46). This decline and low-level index, however, may not have reflected the true changes in abundance. The fundamental assumption of the acoustic survey is that the herring are congregating to spawn in and during the survey area and period. Atlantic herring spawning times and locations may have changed, but the survey area and timing remained relatively stable among years. If this is the case, the acoustic survey may not be achieving adequate spatial and temporal coverage. For this reason, the acoustic survey was not used in fitting recent Atlantic herring stock assessments (Shepherd et al., 2009).

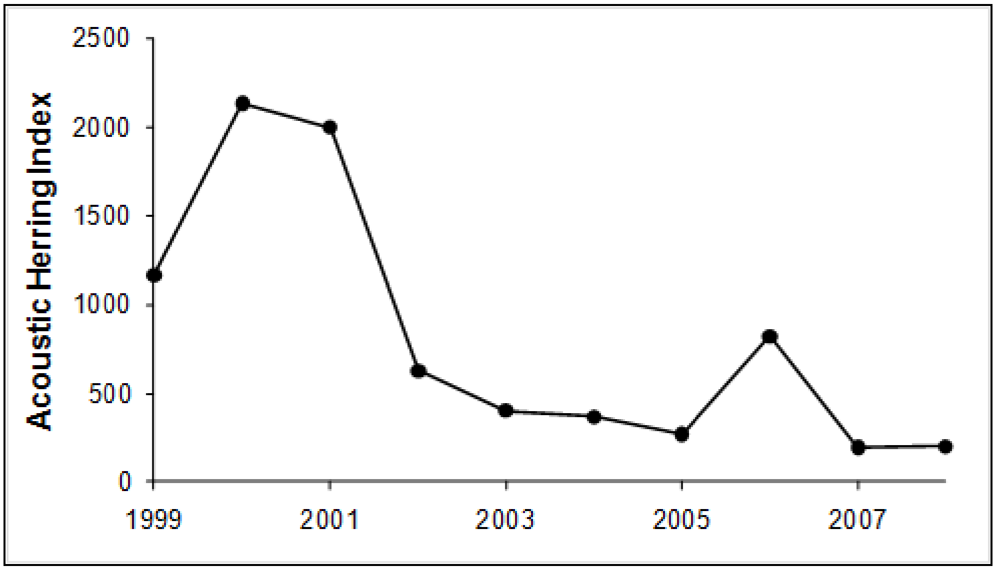
Figure 45 Survey Areas of the Atlantic Herring Acoustic Survey



Source: NEFSC

Surveys on Georges Bank and Jeffreys Ledge have been completed every year since 1999

Figure 46 Atlantic Herring Acoustic Index of Abundance on George's Bank During 1999-2008



Source: NEFSC

Ongoing Research

Several research projects are being conducted to address potential issues with the acoustic survey. Acoustic data have been collected during the annual fall bottom trawl surveys, but these data have never been analyzed to determine if a supplementary acoustic index of herring abundance could be developed. A technician has begun processing these data. Once complete, this project will provide a basis of comparison for the herring acoustic survey, and may serve as an additional index of abundance. Other biological data collected during the annual fall bottom trawl surveys may also be useful for evaluating temporal and spatial shifts in the occurrence of spawning herring. For example, comparing the proportion of herring at different stages of spawning among years and sampling stations may provide insight as to whether systematic changes have occurred in the spatial and temporal distribution of spawning events. This analysis will allow for the determination of whether the herring acoustic survey has adequately sampled over the course of any systematic changes in spawning events. A technician is in the process of conducting this and other analyses of biological data collected during the fall bottom trawl surveys.

A distribution of herring spawning time is calculated during the estimation of the annual NMFS NEFSC larval herring index. Combined with a numerical circulation model that will allow herring larvae to be tracked from sampling location backwards to hatch location, temporal and spatial patterns in herring spawning may be generated. These patterns could then be compared to the time and location of the acoustic survey in each year and a correction factor could be developed to adjust for any mismatches between the spawning patterns as derived from the larval index and the acoustic survey. A proposal based on this research has been submitted to the Fisheries and the Environment program and the project will be conducted by a team of scientists from NMFS NEFSC and Woods Hole Oceanographic Institute.

In addition to the formal research projects described above, NMFS is continually collaborating with other institutes to improve sampling capabilities. On-going collaborative projects include research and development of wide-band echo sounders and sonar systems that span spatial scales of sub-meters to thousands of square kilometers.

4.1.4.6 TRAC Stock Assessment – Summary of Stock Status

Since 1998, the Transboundary Resources Assessment Committee (TRAC) has reviewed stock assessments and projections necessary to support management activities for shared resources across the USA Canada boundary in the Gulf of Maine-Georges Bank region. These assessments are necessary to advise decision makers on the status of these resources and likely consequences of policy choices. The most recent TRAC update assessment of the Atlantic herring complex occurred in June 2009 in St. Andrew's New Brunswick. Atlantic herring were last assessed in a benchmark assessment in May 2006 (O'Boyle and Overholtz 2006). At the 2006 assessment meeting, it was agreed that the Age Structured Assessment Program (ASAP) Base model showed the least retrospective pattern and was the preferred approach amongst all the model formulations. The purpose of the 2009 update assessment meeting was to update both independent and dependent data, and use it in the established benchmark formulation to determine the current status of the Atlantic herring resource. A summary of the results of the updated TRAC can be found in Amendment 4.

Overfishing Definition – 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 B_{MSY} = 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 B_{MSY} (670,600 mt). Fishing mortality has remained relatively low since the early 1990s and averaged 0.17 during 1998-2008, which is below F_{MSY} (0.27).

4.1.4.7 Commercial Catch Sampling

Samples of Atlantic herring collected from the commercial catch are processed at the Maine Department of Marine Resources (ME DMR). Historically, samples were obtained from sardine canning plants, some of which transported fish from other states. NMFS port agents, fishery biologists in other states, and the Canadian Department of Fisheries and Oceans would also provide samples or data to the State of Maine. Recently, ME DMR has been given a grant from the Atlantic Coastal Cooperative Statistic Program (ACCSP) for a dedicated herring sampler. Normally, 4-8 samples are collected each month by statistical area harvested. However, more extensive sampling has occurred during foreign fishing or processing operations. Current sampling ratio is approximately one 50-fish sample per 500 mt.

Usually, between 175 and 250 samples are processed by ME DMR each year. Samples of 50 fish are processed for length (mm total length), weight (grams), sex, and, where applicable, sexual maturity and gonad stage, using standard procedures and criteria. From each sample, the sagittal otoliths are removed from two fish per centimeter group and embedded in plastic blocks for ageing. Periodic calibration of ageing procedure is conducted with NMFS' scientists. Data from commercial catch samples have been updated through the 2010 fishing year and are presented below.

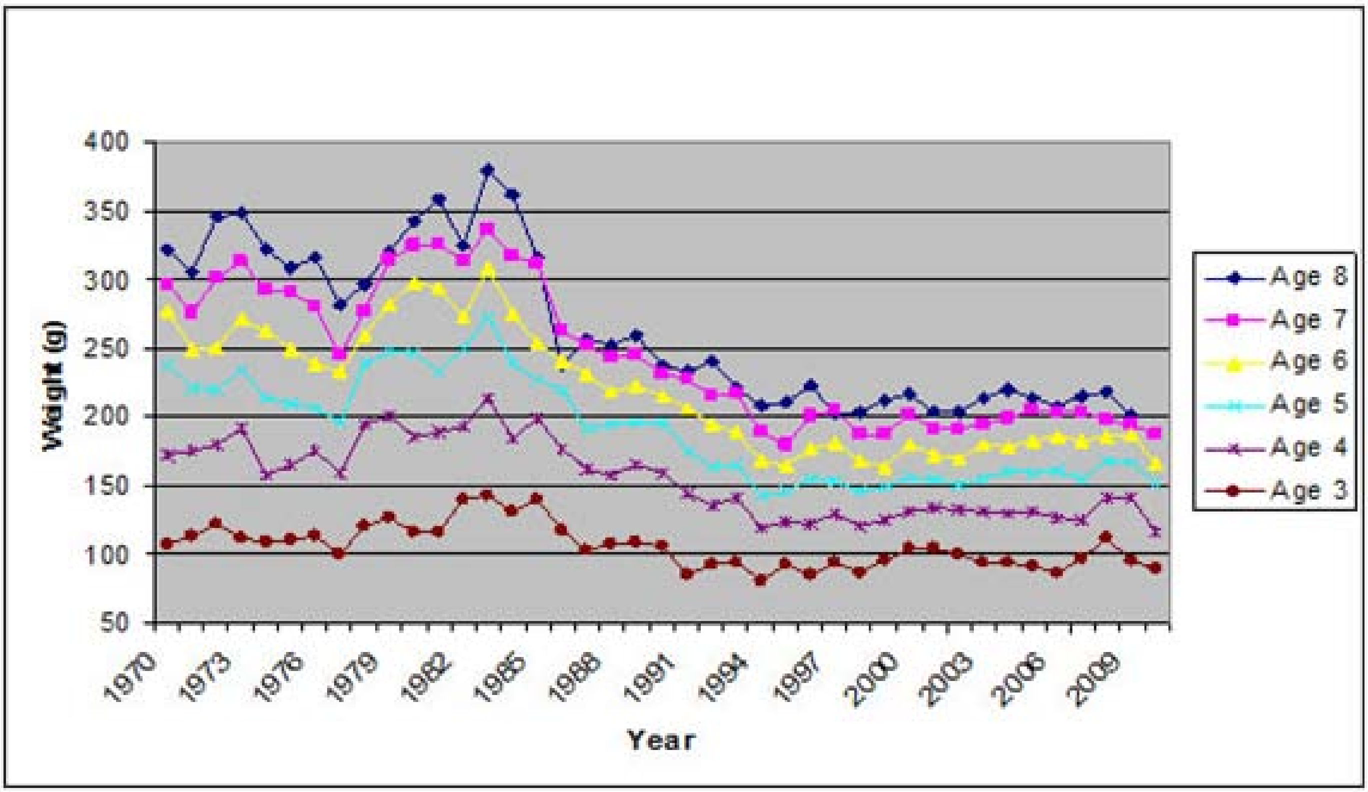
These data will be updated through 2011 and reviewed as part of the upcoming assessment for the Atlantic herring stock complex (Spring 2012). Any new information, if available, will be considered by the Council during the Atlantic herring fishery specification process.

Atlantic Herring Stock Complex

Resulting data for the Atlantic herring stock complex as a whole suggest a large reduction in weight at age since the late 1970s and early 1980s following the Georges Bank stock collapse from heavy foreign fishing (Figure 47). The reduction in both weight at age and length at age over time may have implications for the partial recruitment vector for this complex. While it is quite possible that density dependent factors may be involved (i.e., slower growth at higher stock sizes), other environmental factors also could attribute to the decline in weight at age (temperature fluctuations, food availability, for example). The reason for this reduction in weight at age in unknown. Consequently, these data should not be interpreted as a result of a reduction in available food, nor should the conclusion be reached that the complex is in danger of overpopulation. However, significant declines in weight at age over time are often attributed to density-dependent factors.

While the reduction in weight at age shown in Figure 47 is substantial, overall, weight at age for the stock complex is similar to, but slightly lower now than when the herring stock complex was considered to be at very high abundance during the 1960-1970 time period (not shown below). The recent trend in weight at age (1990-present) has been relatively flat with a slight decrease. However the most recent 3-year trend suggests fairly rapid declines for ages 4 to 6.

Figure 47 Total Weight at Age for the Atlantic Herring Stock Complex Through 2010



Source: ME DMR

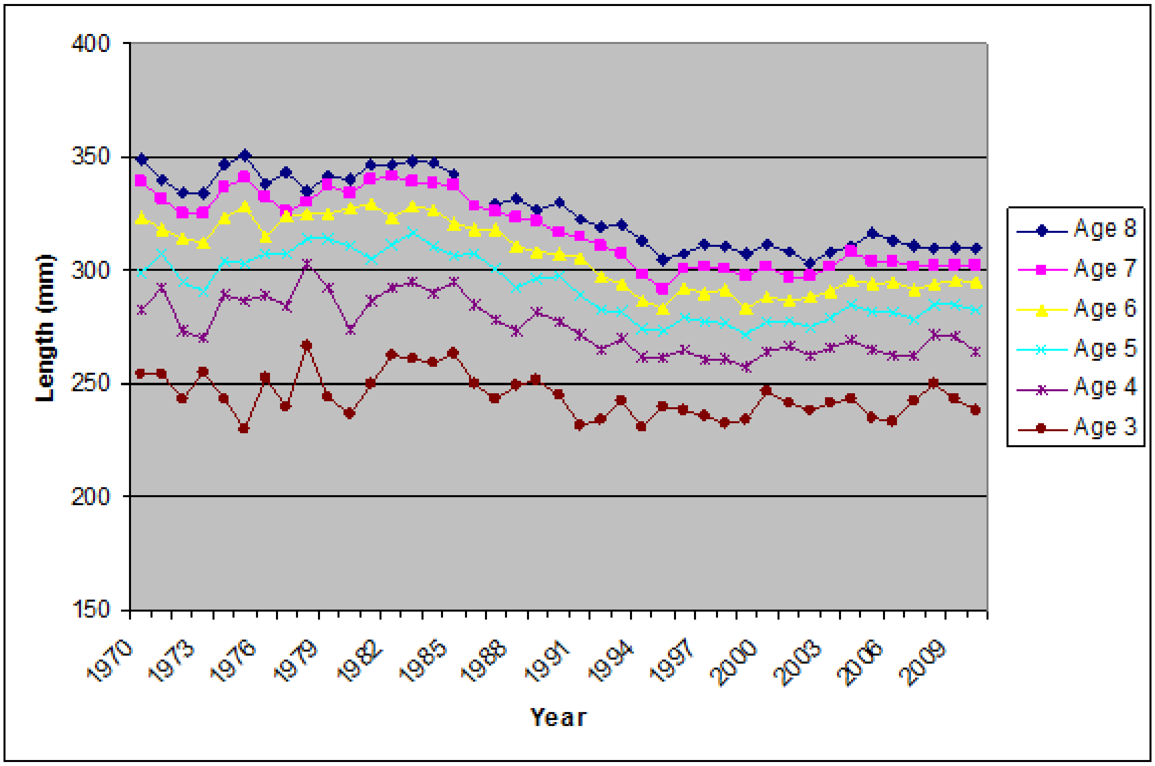
Inshore Spawning Component

Samples from the inshore spawning stock (adult sized fish, GSI > 0.10) are available through 2010 (Figure 48). Since the mid-1980s, a rather large drop in size (total length at age) is apparent, though recent years have experienced a more stable trend in lengths at age. This is consistent with trends observed for the overall stock complex (see above). The biggest change in length at age for the inshore component occurred from 1984 – 1994, and since that time, the trend has been rather flat. Similar to samples from the stock complex as a whole (above), there may be a slight trend downward in recent years, but the differences between recent years are likely within the range of variability given the smaller sample sizes.

These data will be updated through 2011 and reviewed as part of the upcoming assessment for the Atlantic herring stock complex (Spring 2012). Any new information, if available, will be considered by the Council during the Atlantic herring fishery specification process.

A decline in growth over time may indicate that density-dependent factors are at work for the inshore component. As such, it also suggests that a larger stock exists than was apparent during the mid-late 1980s. It should be noted that slower growth for individuals from the inshore component might be the result of increased stock size for the complex overall, or a change in environmental conditions affecting feed and/or growth of the different year classes. However, the declines over time that have been observed, especially from 1984-1994, are not necessarily consistent with changes in environmental conditions. In this case, the downward trend in length at age may be more suggestive of density-dependent factors at work, especially because the trend is also consistent with the overall upward trend in abundance apparent from the survey data. Similar to the overall complex, the inshore component is experiencing reduced growth, however the magnitude is much less then that see in the overall complex.

Figure 48 Total Length at Age for Inshore Spawners (>230 mm and > GSI 0.10) Through 2010



Source: ME DMR

4.1.4.8 Time Series Analysis and Historical Data

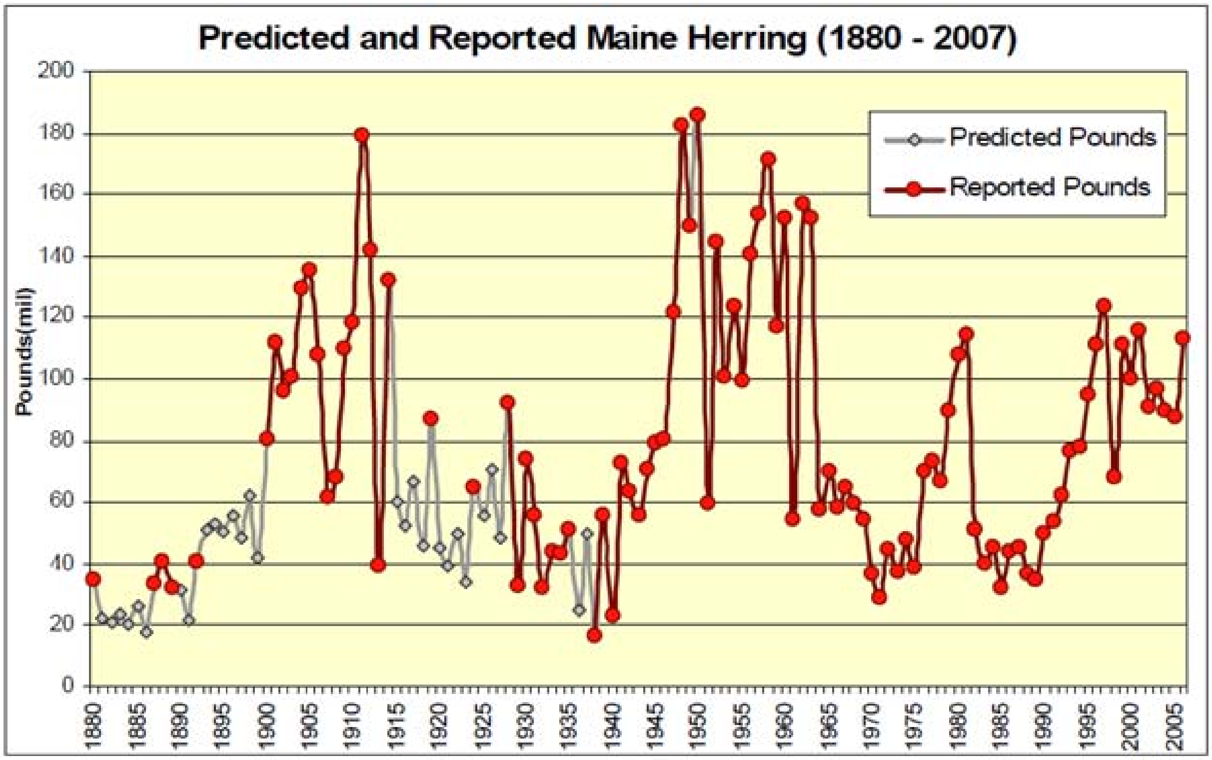
Information regarding long-term fishery patterns and potential relationships between the fishery and outside variables and events, such as temperature, was provided in a thesis in 2003 (Klein, 2003). Both quantitative and qualitative data and information for the Atlantic herring fishery were investigated. The thesis provided means by which qualitative data could be incorporated into statistical methods by utilizing Time Series Analysis.

First, the time series and qualitative time line were built utilizing fishery data (both electronic and paper sources) and information on salinity, sea surface temperature, socioeconomic data and industry events. Next, the data were modeled to determine underlying patterns, and intervention analysis was used to determine impacts of socioeconomic and industry events on the fishery (by comparing landings to qualitative literature). Finally, correlations between the fishery and oceanographic features were investigated.

Both a Maine herring time series and a Canadian herring time series were completed using the Backcasting method (Figure 49 and Figure 50 – see thesis for more detail), meaning that some values were predicted and some were from records (reported). The results of the ARIMA modeling (also described in the thesis) for Maine herring were statistically significant and revealed that the catch in one year could be, to some extent, explained by the catch in the previous two years. The pattern was not thought to be illogical; small pelagic fish populations that mature quickly are known to respond rapidly to fishing pressure. For the Canadian herring the same explanatory pattern was not established, and the next years catch were more dependent on an error term than previous years catch.

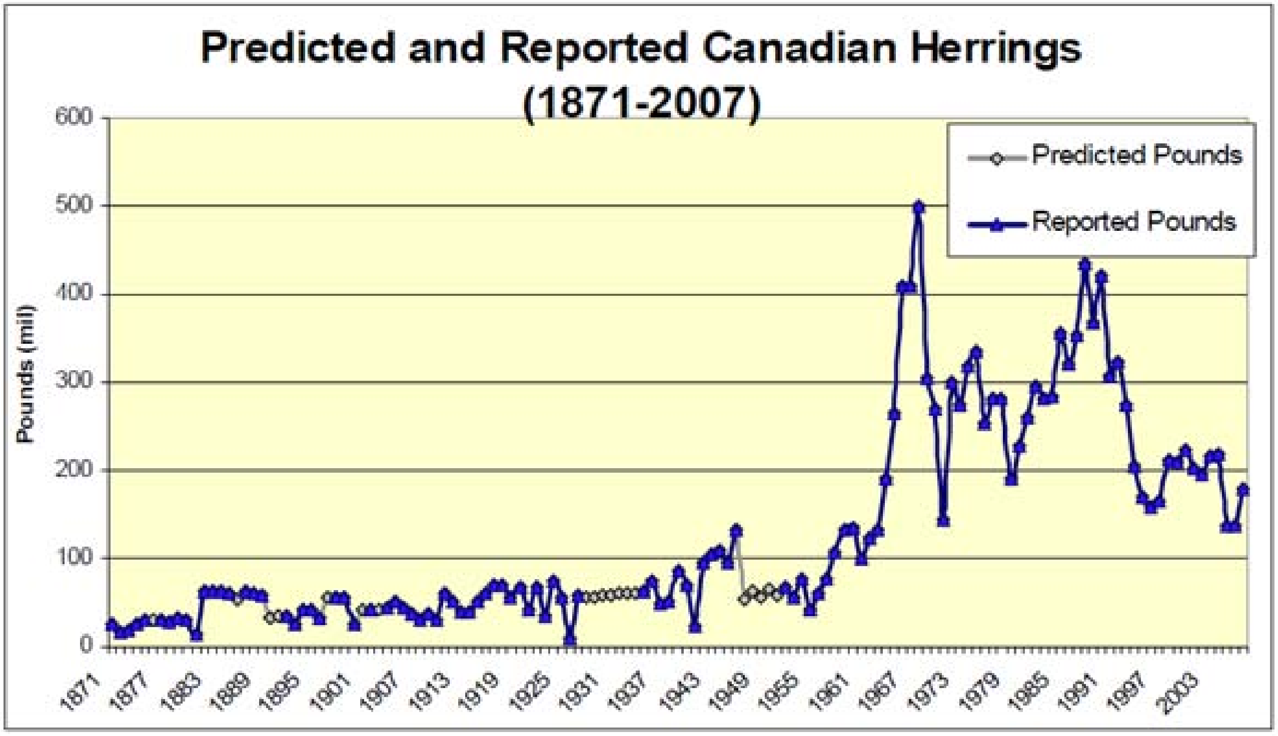
The study results also suggested that landings were not coupled with sea surface temperature and salinity, and that other environmental factor should be examined. The results were contrary to previous studies which have shown relationships between herring and the environment, but were not deemed conclusive.

Figure 49 Completed Maine Herring Time Series, Reported and Predicted Values, 1871-2007



Source: Klein, 2003

Figure 50 Completed Canadian Herring Time Series, Reported and Predicted Values, 1871-2007



Source: Klein, 2003

4.1.5 Importance of Herring as a Forage Species

This section serves to update and summarize available information on the role of herring as a forage species since the summary in Amendment 1.

To date, the Council, based on recommendations from its Herring PDT, has determined that the importance of herring as a forage species and the role of herring in the ecosystem is adequately addressed through analyses conducted as part of the benchmark stock assessment for Atlantic herring as well as through the specification-setting process and the SSC's determination of Acceptable Biological Catch, which includes a buffer for scientific uncertainty. Specifically, the role of herring in the ecosystem and the availability of herring as prey are two of several important considerations in the Council's ACL-setting process for the Atlantic herring fishery. During the development of the 2010-2012 herring fishery specifications, the Council considered factors identified by the SSC when setting ABC and accounting for scientific uncertainty, including recruitment, biomass projections, and the importance of herring as a forage species. The approach selected by the Council for specifying ABC for 2010-2012 provided for a technically-sound way to address annual variability in catch and fishing effort while remaining consistent with SSC advice and slightly more conservative than some approaches that were considered. Future stock assessments and specifications for the herring fishery will continue to address this important issue. More information on this process can be found in Amendment 4. Current assumptions as of the 2009 TRAC regarding natural mortality can also be found herein.

Information to quantify the importance of herring as a forage species is still lacking, however a series of new literature that describes the role of herring in the ecosystem has been published. Atlantic herring is considered a keystone prey species in the Northeast US shelf ecosystem. They are consumed by demersal and pelagic fish, marine mammals, and seabirds in addition to human exploitation. The role of fishes, mammals, and seabirds can be found in section 4.1.5.1, and more specific information on the role of herring as prey and bait can be found in Section 4.5.1.6 of this document.

An inclusive review of published literature pertaining to herring in an ecosystem context is presented below. Since the publishing of the papers presented, nothing new predator or prey relationships with Atlantic herring have been discovered. The NEFSC Ecosystem Assessment Program is currently working in conjunction with the Population Dynamics Branch and the Food Web Dynamics Program on consumption estimates of a whole range of herring predators, to ultimately aid in the calculation of M2 for Atlantic herring, as well as to better derive Atlantic herring biological reference points. The Program is also working on a series of other management strategy modeling, of which herring is just one species among many. The results of these models and analysis will be considered comprehensively in the 2012 Atlantic herring SAW/SARC.

4.1.5.1 Ecosystem Modeling (Mammals, Seabirds and Fish)

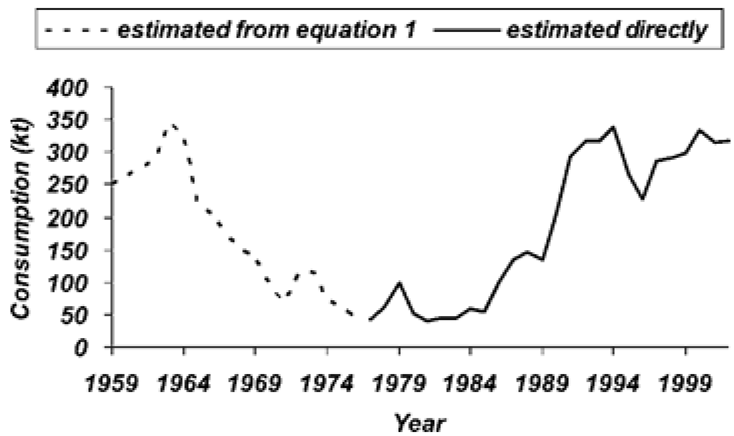
Overholtz and Link (2007) estimated the total annuals removal of herring from the ecosystem by predator species for the period 1977-2002, using different modeling approaches, assumptions, and data inputs, depending on the information available. Twelve demersal fish species were identified as important predators of herring, including eight species managed by NEFMC: Atlantic cod, pollock, silver hake, white hake, red hake, monkfish, winter skate, and thorny skate. Other demersal fish predators include spiny dogfish, summer flounder, bluefish, and sea raven. Other important predators of herring include marine mammals (fin, humpback, minke, and pilot whales, harbor porpoises, Atlantic white-sided dolphins, harbor seals and grey seals), large fish (bluefin tuna, shortfin mako sharks, and blue sharks), and seabirds (northern fulmar, black legged kittiwake, northern gannet, herring gull, great black-backed gull, and three types of shearwaters).

Between 1977 and 2002, total consumption of herring increased as herring abundance increased. Removals by demersal fish, which were evaluated based on trawl survey abundance indices and stomach content analyses, constituted the largest source of predation mortality for Atlantic herring, followed by marine mammal, large pelagic fish, and seabird removals. The importance of demersal fish predation is underscored by a decline in total herring consumption during the mid-late 1990s, when cod, spiny dogfish, and white hake were at low abundance. During the second half of the time series, removals by piscine, mammalian, and avian predators combined were estimated to be roughly three times greater than fishery removals (300,000 mt vs. 100,000 mt). The authors noted that herring are vulnerable to predation throughout their lifespan, unlike other fish species which have substantially reduced predation rates once they reach advanced size/age, and they emphasized the importance of considering removals due to predation during stock assessment.

Building on their work, Overholtz, Jacobson and Link (2008) utilized the values of consumption and their 80% confidence intervals to create new Biological Reference Points (BRPs) and estimate predation and fishing mortality on herring. Previous assessment work was also utilized and developed. The impact of predation mortality on the BRPs was also analyzed through several different methods.

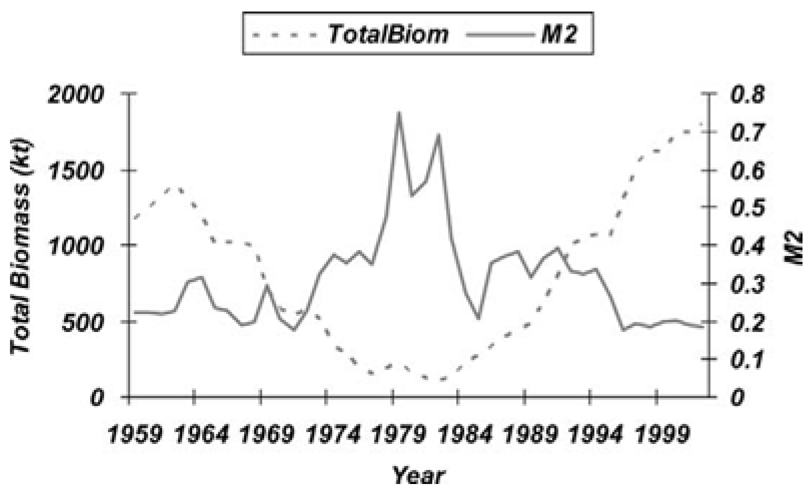
Overall, the authors estimated that predators often consumed more herring than the amount harvested by the fishery between 1959 and 2002, and that predation was likely important to the herring dynamics in the Gulf of Maine/Georges Bank area. Predation fell by more than two-thirds from 1964 to the late 1970's, but increased again by the early 1990s, peaking in 1994 (Figure 51). The large dip was the result of both predator consumption and fishing mortality falling during those years. Predation rates, as exhibited as a Predation Mortality Rate (M_2) an herring biomass were found to be opposing, with biomass at its lowest in the late 1970's and early 80's while M_2 peaked (Figure 52). The predation mortality rate was more stable when total biomass increased in the late 1990s.

Figure 51 Total Consumption of Gulf of Maine–Georges Bank Atlantic Herring by All Predators, Including Fishing, 1959–2002



Source: Overholtz et al 2008

Figure 52 Comparison of Atlantic Herring Biomass and Predation Mortality Rate (M_2) in the Gulf of Maine–Georges Bank Region, 1959–2002



Source: Overholtz et al 2008

The new BRPs, which account for the fishery and predation, were different than when there was no predation component; MSY_f was found to be 222 kt, $Bmsy_f$ was found to be 896 kt, and $Fmsy_f$ was found to be 0.25. With the assumption that the total biomass available is 1,452 kt, the available yield for the fishery was estimated to be 241 kt, with the possibility of the available yield to decrease in the future to 193 kt, should the marine mammal biomass increase as predicted at a rate of 3 kt per year. It was concluded that MSY reference points would be misleading if constant natural mortality was assumed when in actuality it was fluctuating, and it was recommended that M_2 be included in future analysis of prey fish dynamics.

4.1.5.2 Updated Information About Other Species Interactions

Tuna

While a direct link between tuna and herring abundance has not been conclusively determined, tuna are known predators of herring. A study by Bradford Chase (2002) examined the diets of 819 Atlantic bluefin tuna off the Atlantic continental shelf between the years of 1988 and 1992. The sampling occurred during the fishing season (July-October) and was conducted on commercial and recreationally caught tuna stomachs. The research showed that although the primary sustenance varied by region, Atlantic herring, in addition to sand lance, Atlantic mackerel, squid and bluefish, were a primary prey species. Atlantic herring were typically between the ages of 2 and 4 when preyed upon. Out of the 568 stomachs that contained prey, 167 contained herring, which is a 29% frequency of occurrence. The percent weight of those 167 stomachs was found to be 53% herring. These percentages were second only to sand lance in the study. When analyzed by location it was found that the percent frequency of occurrence and percent by weight was highest at Jaffreys Ledge (74% and 87%, respectively), and second highest at the Great South Channel (27% and 48%, respectively).

A study by Golet *et al* (2007) noted the decline in northern Bluefin tuna in the last decade, with fewer mature fish and a decline in the commercial catch quality, despite an abundance of herring for forage purposes. A numerical value for the physical condition of the northern Bluefin tuna was assigned through a multinomial logit model, which utilized fat and oil content, as well as fish shape. Fishermen's logbooks were utilized to gather the information, and the model predicted the probability that tuna would be in a certain quality grade. The study found a significant decline in the quality over time. The probability that a fish would be found in a lower Grade (C+) increased between 1991 and 2003, with a 68-75% chance that a fish caught in 2003 would be in that class, versus a 10-20% chance in the early 90's. By 2004 less than 1% of the commercial catch was comprised of a Grade B fish.

The authors suggested that the decline in quality could be a result of a decline in the amount, quality, or availability of herring in the Gulf of Maine during the tuna's five month feeding period in that area, as herring are the highest energy density prey in the region. As a counterpoint, however, they cite the 2003 stock assessment, which pointed to a large abundance of herring in the area during the study. One theory was therefore put forth that the energy density of the herring could have been in decline, which may have been forcing the tuna to expend more energy to catch the herring or switch to other forms of prey. An overall cause for the decline in tuna quality was therefore not able to be identified through the study, and cannot be directly linked to herring.

Cod, Haddock, Herring, and Skates

Fauchald (2010) describes the relationship between cod and herring as a potential relationship which has experienced hysteresis, or internal feedback, within the ecosystem in the North Sea. The author poses that herring are a substantial food source for cod, however the intense fishing pressure on cod has removed the predator control on herring by cod, and subsequently herring have begun to exert pressure on cod recruitment through predation on larvae and eggs. In order to examine this relationship, 44 years of data on cod recruitment and herring abundance were analyzed in conjunction with data on copepods, sea surface temperature and the size of cod stock.

The study determined that a combination of herring stock size and copepod abundance dictated the different aspects of the cod dynamics. Copepod abundance tended to explain year to year variations in the cod population while herring explained five-year time trends, specifically the low recruitment in the 1960's and now, as well as the high recruitment in the early 1990s as well as 1980. While the work did not occur in the Northeast region, the relationship of predation by both species on each other is one that could be potentially applied here.

In another study, McQuinn (2009) proposed that the rising trend in the western Newfoundland herring bottom trawl index was caused by an increase in the availability of herring biomass near the seafloor, made possible by the absence of cod predators. Consequently, the bottom trawls appear to have captured a change in the distribution of herring in the water column, and not a true change in abundance.

To determine this conclusion he utilized data from various trawl surveys and an acoustic survey and information from the Canadian DFOs analytical stock assessment. The bottom trawl indices were re-examined in two ways: through the construction of an ecosystem model and as a major element in ecosystems in relation to other fish population abundance. One of the other major points that the McQiuinn paper noted was the deficiencies in trawl survey data, and subsequent link to poor assessments of the role of herring in cod populations

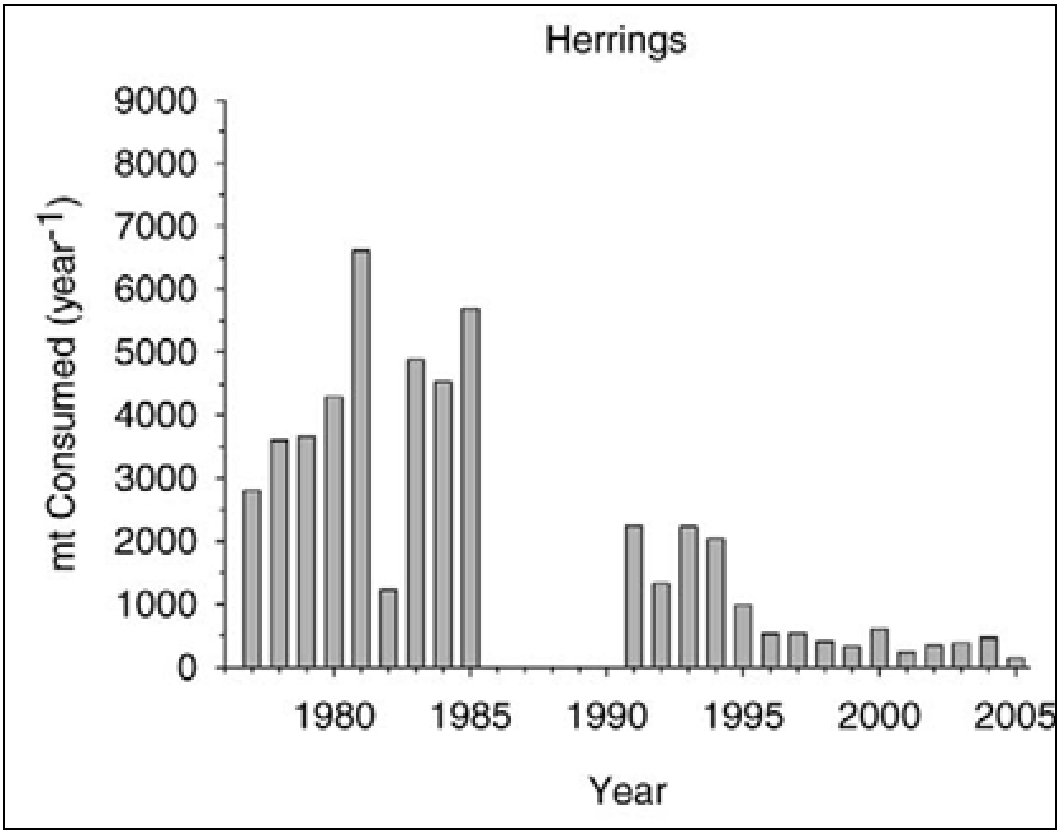
A study in press by Richardson et al demonstrates that haddock predation can have a substantial effect on the survival rate of Atlantic herring eggs. Numerous studies on both sides of the Atlantic have shown that haddock are the dominant predator of benthic herring eggs. The Richardson et al. study quantifies the impact of haddock predation on herring egg survival rates. An assumption of their methodology is that early stage larval herring abundance (an index of egg hatching) is a function of herring spawning stock biomass (i.e., an index of egg production) and herring egg survival rates from haddock predation

In the study it is estimated that egg survival rates has varied from about 70% in the early 1990s and 1970s to <2% currently. This variability depends on the size of the haddock population and the spawning stock biomass of herring. It is also proposed that egg predation by the abundant 2003 year class of haddock caused a substantial decline in herring egg survival rates starting in 2004, as indicated by a >90% decline in larval herring abundance. The low abundance of herring larvae has continued through the present. This low level of larval production in recent year may have a negative impact on the herring population.

The effect of herring consumption for skates was examined as a part of a larger study by Link and Sosebee (2008) on the consumption of skates as a predator in the northeast US Continental Shelf ecosystem. In the study seven species of skate were examined to determine consumption rates for each species as well as an overall skate consumption rate for consideration from an overall ecosystem perspective, although only three skate species were covered in detail in the publication. Data came from the NMFS bottom trawl survey, including the food habits collection data.

The individual species analysis found that for thorny skate, the majority of the prey removed was herrings (Clupeidae), silver hake, and "other fish". It was calculated that the thorny skate could remove up to 8,000 mt of these species in a given year, but 1981 was calculated to be the highest year of herring predation, with close to 7,000 mt consumed in that year (Figure 53). The consumption of all skates relative to the ecosystem analysis found that while herring have a large amount of biomass removed from the ecosystem by skates, the amount is small in comparison to the fishery removals (0.44 mt removals/fishery landings, where 1 indicates that more prey is consumed by skates than the fishery). The removal of herring by skates was also found to be low in comparison to the standing stock biomass and annual production (5.09×10^3, 2.04×10^6, and 7.55×10^5 mt, respectively).

Figure 53 Consumptive Removals of Herrings (Clupeidae) by Thorny Skate, 1976-2005



Source: Link and Sosebee (2008)

4.2 NON-TARGET SPECIES AND OTHER FISHERIES

4.2.1 Non-Target Species

"Non-target species" refers to species other than herring which are landed by federally permitted vessels while fishing for herring. These non-target species may be caught by the same gear while fishing for herring, and may be sold assuming the vessel has proper authorization or permit(s).

4.2.1.1 Standardized Bycatch Reporting Methodology

A summary of the Herring PDT's work with bycatch data from the SBRM (Standardized Bycatch Reporting Methodology) and the SBRM process can be found in the impacts discussion of the management measures (Section 5.2) More detailed discussion and analyses are provided in Appendix III, Volume II (*Detailed Analysis of Impacts of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels*).

4.2.1.2 Data from NMFS Sea Sampling (Observer) Program

The following summary tables have been provided by the NEFOP (Northeast Fisheries Observer Program) based on observer data from 2009-2010, unless otherwise noted.

Key for All Tables in this Section

- Years represent calendar years January 1 – December 31
- Otter trawl midwater (OTM), pair trawl midwater (PTM), and purse seine (PUR) data are reported for all haul data (including observed and unobserved hauls) recorded by observers
- Otter trawl finfish (OTF), or bottom trawl data are reported for observed hauls
- Observed pair trawl operations have been counted as one trip when only one observer was aboard two vessels or when only one vessel landed catch; those trips with an observer on both boats when both landed fish have been counted as two separate trips
- Permit Categories reflect Amendment 1 – A/B Limited Access All Areas, C Limited Access Incidental Catch, D Open Access Incidental Catch

Fish NK

A detailed description of fish, NK and herring, NK can be found in Section 5.3.2.1 of this document.

Species Grouping

In the following summary tables species groups were created to condense the number of species presented from 260 to 27 of the predominantly caught. Predominance was determined by descending order of catch weight:

- "Debris" includes shells, seaweed, eggs and bones
- "Dogfish" is predominantly composed of Spiny dogfish
- "Flounders" is predominantly composed of Winter, Summer, Yellowtail, and American Plaice
- "Other Fish" is predominantly composed of Croaker, Menhaden, Sea Raven, Bluefish, Hagfish, and Spotted Hake
- "Other Groundfish" is predominantly composed of Redfish

- “Other Invertebrates” is predominantly composed of sand dollar, sponge, and Horseshoe Crab
- “Other Fish” is predominantly composed of Winter and Little skates
- “Squid” is predominantly composed of *ilex*

Table 8 summarizes the NEFOP coverage rates for 2009 and 2010. The total percent coverage by herring weight was 39%. Compared to the coverage rates in prior years, the percent coverage for midwater trawl and purse seine vessels has never been as high.

Table 9 summarizes the coverage rates from the NEFOP for 2009 and 2010 by the Herring permit category and gear type covered in this section, which is divided by the months in each Quarter. For each count of observed trips in the table there is a corresponding table of catch and discards. For instance, there were 39 observed trips that took place between January and March on Category A paired midwater trawl vessels, the data from those 39 trips was used to create the summary presented in Table 10. There were no observed purse seine trips between January and March in both 2009 and 2010. The data for observed single midwater trips had to be combined for the periods between January and June as well as July and December for confidentiality reasons.

Table 8 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%

Source: NEFOP and VTR data

Table 9 Number of Observed Trips by Gear, Category, and Month

	Category	Mesh Size	Number of trips: January - June	Number of trips: July - December
Single and Paired Midwater Trawls	A/B	All	135	252
Purse Seine	A	All	28	73
Otter (Bottom) Trawl	A/B	Small	48	81
		Large	45	68
	C Only	Small	63	87
		Large	62	132
	D	Small	312	355
		Large	805	1,027
		Unknown	82	144

Table 10 summarizes the catch and discards of all species that were caught on 387 observed trips on paired and single midwater trawl vessels holding a Category A or B permit for 2009 and 2010, broken down by a half year time period. Fish NK represent fish that are pumped to a paired vessel without an observer onboard (kept catch), and fish that are discarded/released.

Table 10 Catch and Discards of All Species on Observed Trips, 2009-2010, Paired and Single Midwater Trawl, Permit Category A and B

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	659	42,457	43,116	58	79,194	79,252
BASS, STRIPED	114		114		20	20
BUTTERFISH	149	801	950	14	9,129	9,143
COD, ATLANTIC	106	158	264	1,198	3,224	4,422
Debris	965		965	3,896		3,896
Dogfish	128,824	15,955	144,779	301,602	14,353	315,955
FISH, NK	945,922	904,687	1,850,609	1,588,088	3,305,350	4,893,438
Flounders		3	3	12	498	510
HADDOCK	3,891	60,837	64,728	1,917	143,343	145,260
HAKE, RED (LING)	23		23	10	5,785	5,795
HAKE, SILVER (WHITING)	1,261	10,019	11,280	781	91,524	92,304
HAKE, WHITE		26	26	4	294	298
HERRING, ATLANTIC	79,227	30,567,937	30,647,163	118,033	80,286,031	80,404,064
HERRING, BLUEBACK	752	28,764	29,516	13	104,130	104,143
HERRING, NK	855	209,765	210,620	25,662	4	25,666
LOBSTER, AMERICAN				9	36	45
MACKEREL, ATLANTIC	62,239	11,864,308	11,926,547	204	792,744	792,948
MONKFISH (GOOSEFISH)		11	11	149	68	216
Other Fish	789	6,978	7,767	8,469	44,821	53,290
Other Groundfish	184		184	968	11,237	12,205
Other Invertebrates				239	249	488
POLLOCK	528	740	1,268	979	4,483	5,461
SCALLOP, SEA					79	79
SCUP	688	2,064	2,752		1,429	1,429
SHAD, AMERICAN	96	5,057	5,153	157	21,399	21,556
Skates	6	24	30	271	303	574
Squid	127	2,914	3,041	801	28,646	29,447
GRAND TOTAL	1,227,404	43,723,504	**44,950,908**	2,053,535	84,948,370	**87,001,905**

Table 11 summarizes the catch and discards of all species that were caught on 101 observed trips on purse seine vessels holding a Category A or B permit for 2009 and 2010, broken down by a half year time period. Herring, mackerel, haddock, dogfish and fish NK comprise the majority of observed catch.

Table 11 Catch and Discards of All Species on Observed Trips, 2009-2010, Purse Seine, Permit Category A and B

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE				1	549	550
BASS, STRIPED						
BUTTERFISH				3	100	103
COD, ATLANTIC						
Debris	0		0	1,210	486	1,696
Dogfish	1,960		1,960	19,976	13,625	33,601
FISH, NK	64,408	435,000	499,408	496,029	452,000	948,029
Flounders						
HADDOCK						
HAKE, RED (LING)						
HAKE, SILVER (WHITING)		44	44	2	3,581	3,583
HAKE, WHITE						
HERRING, ATLANTIC	838	2,309,791	2,310,629	3,532	9,354,536	9,358,068
HERRING, BLUEBACK	1	340	341	1	493	494
HERRING, NK	200	12	212	2,440	130,000	132,440
LOBSTER, AMERICAN	13		13			
MACKEREL, ATLANTIC	0	3,764	3,764	50	5,489	5,539
MONKFISH (GOOSEFISH)	3		3	12		12
Other Fish	4	6	10	3	40	43
Other Groundfish						
Other Invertebrates	0	11	11		133	133
POLLOCK				71		71
SCALLOP, SEA	2		2			
SCUP						
SHAD, AMERICAN					128	128
Skates	11		11			
Squid		60	60	1	2,750	2,751
GRAND TOTAL	67,442	2,749,028	**2,816,469**	523,329	9,963,910	**10,487,239**

Table 12 summarizes the catch and discards of all species that were caught on 113 observed trips on otter trawl (bottom) vessels holding a Category A or B permit utilizing large mesh for 2009 and 2010, broken down by a half year time period. Large mesh constitutes any mesh size greater than 5.5 inches.

Table 12 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category A and B, Large Mesh (>5.5 inch)

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	158		158	39		39
BASS, STRIPED	113	21	134	1,107		1,107
BUTTERFISH	19	15	34	860	148	1,008
COD, ATLANTIC	14,484	124,799	139,283	24,720	60,107	84,827
Debris	6,206		6,206	6,137		6,137
Dogfish	68,894	1,179	70,073	66,037	6,922	72,959
FISH, NK	787		787	340		340
Flounders	68,406	111,490	179,896	30,287	143,009	173,295
HADDOCK	20,883	888,056	908,938	3,896	650,201	654,097
HAKE, RED (LING)	2,176	13	2,189	2,667	4	2,670
HAKE, SILVER (WHITING)	1,840	150	1,990	5,257	735	5,992
HAKE, WHITE	270	29,449	29,719	779	34,739	35,518
HERRING, ATLANTIC	284		284	182		182
HERRING, BLUEBACK	1		1	17		17
HERRING, NK	2		2	13		13
LOBSTER, AMERICAN	6,782	15,798	22,579	6,476	8,689	15,165
MACKEREL, ATLANTIC	313	58	371	36		36
MONKFISH (GOOSEFISH)	10,974	136,183	147,156	3,537	92,083	95,621
Other Fish	21,521	1,500	23,021	21,270	1,404	22,674
Other Groundfish	11,601	33,849	45,450	4,650	36,954	41,604
Other Invertebrates	24,657	66	24,723	27,790	23	27,812
POLLOCK	208	170,684	170,892	716	86,497	87,213
SCALLOP, SEA	3,205	3,599	6,803	6,460	7,968	14,428
SCUP	2,315	982	3,297	1,707	8,144	9,850
SHAD, AMERICAN	164	6	170	74		74
Skates	599,676	212,522	812,198	393,239	507,627	900,866
Squid	311	29	341	2,895	15,340	18,235
GRAND TOTAL	866,249	1,730,445	**2,596,694**	611,184	1,660,594	**2,271,778**

Table 13 summarizes the catch and discards of all species that were caught on 129 observed trips on otter trawl (bottom) vessels holding a Category A or B permit utilizing small mesh for 2009 and 2010, broken down by a half year time period. Small mesh constitutes any mesh size less than 5.5 inches.

Table 13 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category A and B, Small Mesh (<5.5 inch)

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	358	1,136	1,494	259	1,481	1,740
BASS, STRIPED	7,808	125	7,933	1,354	138	1,492
BUTTERFISH	22,995	4,393	27,388	76,035	6,908	82,943
COD, ATLANTIC	90		90	11	1,371	1,382
Debris	7,258		7,258	3,517		3,517
Dogfish	71,254	6,743	77,997	64,080	10,452	74,532
FISH, NK	159		159	25,257		25,257
Flounders	7,000	2,126	9,126	11,494	5,238	16,732
HADDOCK				7		7
HAKE, RED (LING)	2,049	1,407	3,456	13,762	2,772	16,534
HAKE, SILVER (WHITING)	2,811	18,831	21,642	40,375	41,874	82,249
HAKE, WHITE	3		3	15		15
HERRING, ATLANTIC	14,126	465,279	479,405	93	196,347	196,440
HERRING, BLUEBACK	172	3,353	3,525	46	2,549	2,595
HERRING, NK		77,300	77,300	11,586	129	11,715
LOBSTER, AMERICAN	204	90	293	2,908	281	3,189
MACKEREL, ATLANTIC	15,920	1,125,075	1,140,994	411	772	1,183
MONKFISH (GOOSEFISH)	35	494	529	837	812	1,649
Other Fish	6,778	2,374	9,152	28,167	8,303	36,470
Other Groundfish	3,046	982	4,028	3,487	842	4,329
Other Invertebrates	5,886		5,886	6,625		6,625
POLLOCK	1		1			
SCALLOP, SEA		167	167	6,931	6,659	13,590
SCUP	13,997	2,152	16,149	12,522	27,149	39,670
SHAD, AMERICAN	824	1,666	2,490	334	35	369
Skates	17,271		17,271	30,058	784	30,842
Squid	24,621	4,607,508	4,632,128	113,130	5,531,787	5,644,917
GRAND TOTAL	224,663	6,321,199	**6,545,862**	453,299	5,846,681	**6,299,980**

Table 14 summarizes the catch and discards of all species that were caught on 194 observed trips on otter trawl (bottom) vessels holding a Category C permit utilizing large mesh for 2009 and 2010, broken down by a half year time period. Large mesh constitutes any mesh size greater than 5.5 inches. Information from observed trips taken by vessels which held both B and C permits was grouped with that taken from observed trips taken by vessels holding Category A and B permits.

Table 14 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category C, Large Mesh (>5.5)

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	27		27	7		7
BASS, STRIPED	6		6	1,149	92	1,241
BUTTERFISH	36	409	445	160	36	196
COD, ATLANTIC	14,435	71,335	85,770	8,326	171,385	179,711
Debris	9,239		9,239	10,034	33	10,067
Dogfish	22,168	1,327	23,495	80,550	14,945	95,495
FISH, NK	235		235	46		46
Flounders	31,589	149,463	181,052	39,191	136,071	175,262
HADDOCK	376	103,167	103,543	87	5,983	6,069
HAKE, RED (LING)	4,567	2,610	7,177	2,425	12	2,437
HAKE, SILVER (WHITING)	1,245	27,000	28,245	2,075	625	2,700
HAKE, WHITE	51	2,688	2,739	131	12,997	13,128
HERRING, ATLANTIC	139	4	143	715	200	915
HERRING, BLUEBACK	6		6	53		53
HERRING, NK						
LOBSTER, AMERICAN	5,623	9,991	15,614	9,542	8,774	18,316
MACKEREL, ATLANTIC	31	1,693	1,724	3		3
MONKFISH (GOOSEFISH)	2,833	25,028	27,861	4,961	39,313	44,274
Other Fish	10,788	771	11,559	19,493	3,872	23,365
Other Groundfish	2,696	1,835	4,530	1,537	2,648	4,185
Other Invertebrates	6,960	57	7,017	13,650	321	13,971
POLLOCK	3	15,264	15,267	266	16,895	17,162
SCALLOP, SEA	2,587	7,014	9,601	10,163	19,143	29,306
SCUP	2,998	28	3,025	2,241	2,003	4,244
SHAD, AMERICAN	13		13	42		42
Skates	309,917	118,661	428,577	307,423	223,235	530,658
Squid	348	102	449	1,572	479	2,050
GRAND TOTAL	428,915	538,444	**967,359**	515,840	659,062	**1,174,903**

Table 15 summarizes the catch and discards of all species that were caught on 150 observed trips on otter trawl (bottom) vessels holding a Category C permit utilizing small mesh for 2009 and 2010, broken down by a half year time period. Small mesh constitutes any mesh size less than 5.5 inches. Information from observed trips taken by vessels which held both B and C permits was grouped with that taken from observed trips taken by vessels holding Category A and B permits.

Table 15 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category C, Small Mesh (<5.5 inch)

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	86	39	125	1,698		1,698
BASS, STRIPED	3,495	3,547	7,041	3,724	402	4,126
BUTTERFISH	23,901	5,820	29,721	26,627	3,810	30,436
COD, ATLANTIC		48	48	127	59	186
Debris	3,913		3,913	1,189		1,189
Dogfish	116,992	6,623	123,615	59,678	9,993	69,671
FISH, NK	3,215	10	3,225	206	43	249
Flounders	27,950	28,107	56,057	21,516	14,727	36,243
HADDOCK	83		83	2,254		2,254
HAKE, RED (LING)	33,662	3,518	37,180	57,382	4,947	62,328
HAKE, SILVER (WHITING)	21,815	148,418	170,233	68,036	184,199	252,236
HAKE, WHITE	1,009	2,171	3,180	1,295	1,072	2,367
HERRING, ATLANTIC	1,733		1,733	6,198	1,888	8,085
HERRING, BLUEBACK	1,009	595	1,604	91		91
HERRING, NK	189	483	672	844		844
LOBSTER, AMERICAN	732	415	1,146	3,277	1,254	4,531
MACKEREL, ATLANTIC	1,825	1,741	3,566	354	669	1,023
MONKFISH (GOOSEFISH)	5,513	2,658	8,171	3,029	4,111	7,140
Other Fish	50,327	240,820	291,147	44,241	58,025	102,266
Other Groundfish	2,511	10,430	12,941	6,007	2,894	8,900
Other Invertebrates	3,450	19	3,468	3,204	4	3,208
POLLOCK	2		2	1		1
SCALLOP, SEA	12,228	86	12,314	57,065	10,775	67,840
SCUP	73,161	210,158	283,319	16,069	31,536	47,605
SHAD, AMERICAN	334	4	338	1,379		1,379
Skates	24,446	1,324	25,770	62,260	1,077	63,337
Squid	11,037	112,487	123,524	21,331	507,018	528,348
GRAND TOTAL	424,616	779,519	**1,204,135**	469,081	838,500	**1,307,581**

Table 16 summarizes the catch and discards of all species that were caught on 1,832 observed trips on otter trawl (bottom) vessels holding a Category D permit utilizing large mesh for 2009 and 2010, broken down by a half year time period. Large mesh constitutes any mesh size greater than 5.5 inches.

Table 16 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category D, Large Mesh (>5.5 inch)

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	698		698	1,272	6	1,278
BASS, STRIPED	5,826	129	5,955	6,446	126	6,572
BUTTERFISH	214	112	326	940	177	1,117
COD, ATLANTIC	264,180	1,562,992	1,827,172	147,369	1,235,412	1,382,781
Debris	244,138		244,138	194,306		194,306
Dogfish	546,797	9,683	556,480	594,996	46,153	641,149
FISH, NK	12,812	310	13,122	2,845	6	2,851
Flounders	632,261	2,280,465	2,912,726	659,033	2,715,370	3,374,403
HADDOCK	29,296	3,475,315	3,504,611	9,708	1,849,054	1,858,762
HAKE, RED (LING)	27,120	2,077	29,196	20,878	1,198	22,076
HAKE, SILVER (WHITING)	21,206	5,144	26,350	31,889	7,538	39,427
HAKE, WHITE	8,654	604,587	613,241	10,251	483,362	493,613
HERRING, ATLANTIC	1,188	97	1,285	4,983	41	5,024
HERRING, BLUEBACK	351	3	354	542	70	612
HERRING, NK	212		212	79		79
LOBSTER, AMERICAN	147,057	243,622	390,679	155,351	149,042	304,393
MACKEREL, ATLANTIC	1,074	105	1,179	216	248	463
MONKFISH (GOOSEFISH)	151,401	1,405,098	1,556,499	65,369	801,720	867,089
Other Fish	239,796	29,775	269,572	236,345	16,885	253,231
Other Groundfish	98,954	654,433	753,387	76,960	584,602	661,562
Other Invertebrates	236,750	16,413	253,162	274,274	165,126	439,400
POLLOCK	9,089	1,513,880	1,522,969	9,126	1,025,097	1,034,223
SCALLOP, SEA	229,373	245,853	475,227	155,326	185,966	341,293
SCUP	12,525	15,711	28,236	19,756	16,624	36,381
SHAD, AMERICAN	1,249	18	1,267	538	2	540
Skates	5,079,610	2,744,309	7,823,919	6,859,257	2,423,835	9,283,092
Squid	4,222	1,083	5,305	15,717	3,610	19,328
GRAND TOTAL	8,006,050	14,811,215	**22,817,265**	9,553,773	11,711,268	**21,265,041**

Table 17 summarizes the catch and discards of all species that were caught on 667 observed trips on otter trawl (bottom) vessels holding a Category D permit utilizing small mesh for 2009 and 2010, broken down by a half year time period. Small mesh constitutes any mesh size less than 5.5 inches.

Table 17 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category D, Small Mesh (<5.5 inch)

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	4,507	50	4,557	2,320	1,253	3,573
BASS, STRIPED	11,454	20,827	32,280	7,497	4,351	11,848
BUTTERFISH	46,878	23,419	70,297	153,637	22,142	175,779
COD, ATLANTIC	789	4,907	5,696	1,296	4,915	6,210
Debris	16,898		16,898	20,637		20,637
Dogfish	467,347	46,463	513,810	267,363	79,178	346,541
FISH, NK	321	180	500	14,411	201	14,612
Flounders	146,387	288,732	435,119	138,914	217,942	356,856
HADDOCK	3,645	698	4,343	2,453	150	2,603
HAKE, RED (LING)	79,003	29,553	108,555	132,724	63,749	196,473
HAKE, SILVER (WHITING)	74,400	699,548	773,948	203,669	762,013	965,682
HAKE, WHITE	395	2,228	2,623	1,660	3,297	4,957
HERRING, ATLANTIC	4,387		4,387	30,344	24,625	54,970
HERRING, BLUEBACK	496	3	499	3,308	4	3,312
HERRING, NK	527	234	761	5,658	10	5,668
LOBSTER, AMERICAN	4,730	3,994	8,723	11,996	6,965	18,961
MACKEREL, ATLANTIC	6,825	35,822	42,647	7,551	9,071	16,622
MONKFISH (GOOSEFISH)	10,513	15,271	25,784	8,165	16,128	24,293
Other Fish	201,059	448,531	649,590	197,169	426,806	623,975
Other Groundfish	30,583	49,105	79,687	21,635	5,364	26,998
Other Invertebrates	44,189	30,097	74,285	87,741	114,791	202,531
POLLOCK	88	2,741	2,829	60	4,003	4,063
SCALLOP, SEA	151,105	4,101	155,206	348,467	55,915	404,382
SCUP	153,452	321,170	474,622	48,880	66,428	115,308
SHAD, AMERICAN	1,044	472	1,516	2,789	174	2,963
Skates	232,277	55,787	288,065	479,644	23,060	502,704
Squid	32,133	407,033	439,165	93,040	1,334,612	1,427,652
GRAND TOTAL	1,725,430	2,490,964	**4,216,393**	2,293,029	3,247,143	**5,540,172**

Table 18 summarizes the catch and discards of all species that were caught on 226 observed trips on otter trawl (bottom) vessels holding a Category D permit utilizing an unknown mesh size for 2009 and 2010, broken down by a half year time period. An "unknown" mesh size means that the mesh size measurement is omitted from the data for one of various reasons.

Table 18 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category D, Unknown Mesh Size

	January - June			July-December		
Species	**Lbs Disc**	**Lbs Kept**	**Total Lbs**	**Lbs Disc**	**Lbs Kept**	**Total Lbs**
ALEWIFE	1,056		1,056	4		4
BASS, STRIPED	785	6,151	6,936	891	56	947
BUTTERFISH	10,163	1,651	11,814	52,202	1,782	53,984
COD, ATLANTIC	5,037	50,165	55,202	6,380	168,738	175,118
Debris	7,398		7,398	20,845		20,845
Dogfish	76,501	2,720	79,221	70,286	5,683	75,969
FISH, NK	692		692	71	13	84
Flounders	29,714	107,598	137,312	50,396	247,115	297,511
HADDOCK	1,113	129,386	130,499	441	220,562	221,003
HAKE, RED (LING)	9,279	1,720	10,999	3,638	429	4,067
HAKE, SILVER (WHITING)	12,986	54,335	67,321	22,783	8,922	31,705
HAKE, WHITE	270	12,339	12,609	948	38,697	39,645
HERRING, ATLANTIC	472		472	4,192		4,192
HERRING, BLUEBACK	137		137	68		68
HERRING, NK	31		31	101		101
LOBSTER, AMERICAN	7,694	11,198	18,892	13,421	12,006	25,427
MACKEREL, ATLANTIC	258	73	330	200	1,655	1,855
MONKFISH (GOOSEFISH)	9,408	57,268	66,676	6,995	84,388	91,383
Other Fish	48,645	14,534	63,179	40,925	4,312	45,236
Other Groundfish	5,518	13,449	18,968	4,824	72,227	77,051
Other Invertebrates	15,428	98	15,526	36,510	990	37,501
POLLOCK	112	29,615	29,728	1,419	95,750	97,169
SCALLOP, SEA	11,208	4,288	15,496	14,947	68,733	83,681
SCUP	8,794	30,865	39,660	3,315	5,476	8,791
SHAD, AMERICAN	437	18	455	452		452
Skates	205,469	128,663	334,132	578,559	200,325	778,884
Squid	855	28,996	29,850	14,779	139,293	154,073
GRAND TOTAL	469,460	685,130	**1,154,590**	949,593	1,377,151	**2,326,744**

4.2.1.3 State Observer Data

The ME DMR small mesh bottom trawl (SMBT) sampling project is funded for 40 sea days between 2011 and 2012 (December 2010-April 2011 and December 2011-April 2012). The State of ME has a Memorandum of Understanding (MOU) with NOAA that allows funds to be directed to NEFOP samplers so that data are collected in a manner that is consistent with NEFOP protocols. The State of ME also runs an observer sampling program under their own funds. A few SBMT trips were sampled in December 2010 and are included in the 2010 observer data being utilized by the PDT in Amendment 5, but the majority of the SMBT fishery and related sampling efforts by ME DMR occurred in early 2011, during the winter fishery (January – April).

A total of 14 trips have been observed within the Small Mesh Area 1 in the GOM during 2010 and 2011. Of these 14 trips, the total amount of river herring (comprising of Alewife and Blueback Herring) observed was 103 lbs. This is less than 1% of the total Atlantic herring landings in this fishery.

An additional 14 trips were observed during the winter fishery for Atlantic Herring in Area 2 in 2010. Similar to the GOM, of these 14 observed trips, less than 1% of river herring (4,645 lbs.) were observed with respect to the total landings of Atlantic herring.

During the summer of 2011, NMFS* conducted 20 (of 30) observed trips onboard small mesh bottom trawl vessels harvesting either Atlantic herring or silver hake (whiting) in the GOM. However, without accurate information on trip designation (i.e. a "herring" trip vs. a "whiting" trip), these extra trips cannot be included into the coverage rates for 2011, yet.
**Personal communication with Tad Beagley.*

Table 19 Total Number of Trips Observed for the Directed Atlantic Herring Fishery in Area 1A (Small Mesh Area 1) and Area 2 (Rhode Island)

	Observed			Trips Fished			
Year	**Area 1**	**Area 2**	**Total**	**Area 1**	**Area 2**	**Total**	**% Cover**
2010	8	14	22	123	166	289	7.61
2011	6	n/a	6	61	n/a	61	9.84
Total	14	14	28	184	166	350	

Table 20 Total Catch (Retained and Discards) in Pounds of Species Observed on SMBT Fishing Trips During 2010 and 2011 in Area 1A – Small Mesh Area 1

SPECIES	POUNDS CAUGHT
HERRING, ATLANTIC	73,229
DOGFISH, SPINY	16,392
HAKE, SILVER (WHITING)	15,106
HAKE ATLANTIC RED	2,712
PLAICE, AMERICAN	273
MACKEREL, ATLANTIC	234
BUTTERFISH	182
LOBSTER, AMERICAN	169
COD, ATLANTIC	161
HADDOCK	139
FISH, NK	69
ALEWIFE	66
SQUID, NK	47
HERRING, BLUEBACK	37
FLOUNDER, ATLANTIC WITCH (GREY SOLE)	29
FLOUNDER, WINTER	26
MONKFISH	24
SQUID, LOMG-FINNED	22
FLOUNDER, YELLOWTAIL	19
SHAD, AMERICAN	19
LUMPFISH	15
SKATE, LITTLE	12
FLOUNDER, FOURSPOT	11

Table 21 Total Catch (Retained and Discards) in Pounds of Species Observed on SMBT Fishing Trips During 2010 in Area 2

SPECIES	POUNDS CAUGHT
HERRING, ATLANTIC	778,809
HAKE, SILVER (WHITING)	6,400
HERRING, NK	6,163
ALEWIFE	4,413
SKATE, LITTLE	661
DOGFISH, SPINY	397
HERRING, BLUEBACK	232
MACKEREL, ATLANTIC	178
LOBSTER, AMERICAN	172
FLOUNDER, WINTER (BLACKBACK)	127
SHAD, AMERICAN	118
SCULPIN, LONGHORN	114
CRAB, SPIDER, NK	91
CRAB, TRUE, NK	79
COD, ATLANTIC	74
SKATE, WINTER (BIG)	66
OCEAN POUT	55
HAKE, NK	34

4.2.1.4 State Portside Sampling Programs

For more information on State Portside Sampling Programs, as well as Herring PDT analysis of the data produced, see the two papers "Comparison of (Landed) Bycatch Estimates from Portside and At-Sea Observer Sampling Programs in the Atlantic Herring fishery (July 2010)" and "A Comparison of Portside and At-Sea Sampling Methods of Estimating Bycatch in the Atlantic Herring Fishery", located in Appendix II of this document (Volume II).

ME DMR Portside Bycatch Survey

ME DMR's portside sampling program represents an opportunity to collect data in an inexpensive but efficient and accurate way. The program takes advantage of normal processing plant operations by quantifying bycatch that enters the facilities. Processing plants have to manually remove other species from the production line before the fish are sorted and cut or frozen. In normal operations, bycatch removed from the product is segregated into xactix bins or totes and removed from the processing floor at the end of each lot. Plants process one lot (fish caught by one vessel on a particular trip, delivered by truck or boat) at a time and then reset the plant in preparation for the next lot. Therefore, the bycatch removed from each lot can be documented and assigned to a catch location, gear type, date and a total lot amount. Additionally, the plants generally buy herring from vessels throughout the fishery and therefore cover multiple gear types, vessel sizes and individual fishing practices.

The survey sampling takes place at bait dealer and processing plants dewatering boxes in Maine, New Hampshire, Massachusetts, Rhode Island and New Jersey. A sampling level of five percent per sampler of the entire herring fishery is targeted. The mackerel fishery is sampled when herring samples are not available; this scenario is most likely to occur in the winter months when many of the herring vessels switch to the mackerel fishery. The samplers quantify bycatch from individual lots according to a NMFS specified protocol. The total weight of any observed bycatch are recorded along with species identification, total species weight, individual lengths and weights of all fish or a representative sub-sample.

Updated results for the ME DMR portside bycatch survey can be found in 4.1.4.4. A more extensive overview can be found in Amendment 1 to the Herring FMP. ME DMR funding for the portside and at-sea sampling program will be at approximately $300,000 for the year 2012, through a combination of Congressional allocation, and two grants through the Atlantic Coastal Cooperative Statistics Program (ACCSP) and National Fish and Wildlife Foundation, respectively. The same combination of grants is funding the program for 2011 with an approximate funding of $200,000.

MA DMF Portside Sampling

The goal of the MA DMF portside sampling program is to document commercial fishing activities and record and quantify catch composition (including size and age) of the fish landed by the Northwest Atlantic herring and mackerel fisheries. The objectives are to:

- Sample landings at the dock to acquire information on catch composition and other biological aspects of the Atlantic herring and Atlantic mackerel fisheries;
- Collaborate with Maine Department of Marine Resources (ME DMR) to implement consistent dockside sampling protocols and to increase the number of trips sampled;
- Collect biological information and samples to assist stock assessments; and
- Support the management of these fisheries by providing analyses of various state and federal fishery-dependent data (dealer landings, vessel trip reports, at-sea sampling, portside sampling)

The MA DMF portside sampling program is partially funded by a grant from the Atlantic Costal Fisheries Cooperative Management Act (ACFCMA). This grant encumbers funds for travel, supplies and salary for the field coordinator. In addition, MA DMF, has provided in-kind support by adding samplers based out of the New Bedford and Gloucester field stations. The term of the ACFCMA grant is for one year. Before the grant expires, MA DMF will pursue avenues to renew the grant and, if funding is not available from the same source, will seek additional funding to continue the program. Some additional funding for portside sampling by MA DMF has been provided by the National Fish and Wildlife Foundation (NFWF) to support the Sustainable Fisheries Coalition (SFC) river herring bycatch avoidance program

Updated results for the MA DMF portside bycatch survey can be found in 4.1.4.3. A more extensive overview can be found in Amendment 1 to the Herring FMP. Currently the DMF port sampling project has a grant through National Fish and Wildlife Foundation for $112,000, with $85,000 of matching funds, and runs through 6/2012.

4.2.1.5 Industry Initiatives

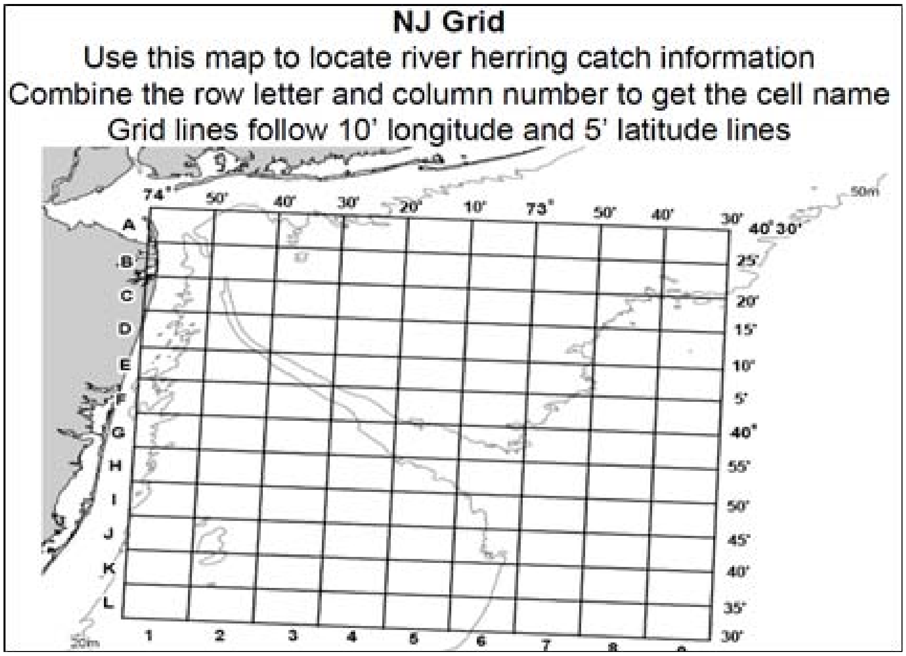
Information in this section provided by SMAST, MADMF, and SFC staff.

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 through a pilot project. 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, and depth are the initial variables that have been mapped on a monthly basis. The project will mainly use Northeast Fisheries Observer Program (NEFOP) midwater trawl and National Marine Fisheries Service (NMFS) bottom trawl datasets for alosine catch at sea information.

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 midwater 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 this Amendment 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 54).

Figure 54 SFC Grid Distributed to Captains to Communicate Bycatch Information

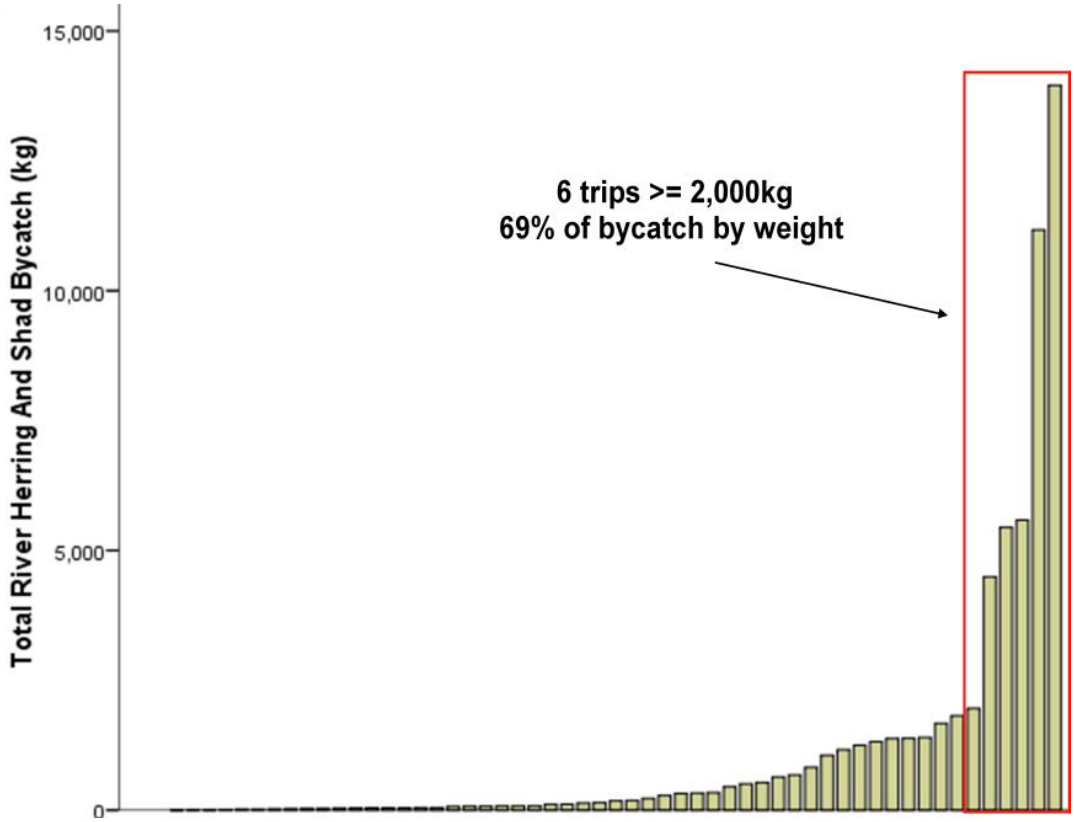


Source: SMAST

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 midwater 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. 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).

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 two 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 midwater 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 midwater 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 55). 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 55 Seventy Two Midwater Trawl Trips Sampled by MA DMF Portside Sampling, May 2008-July 2010

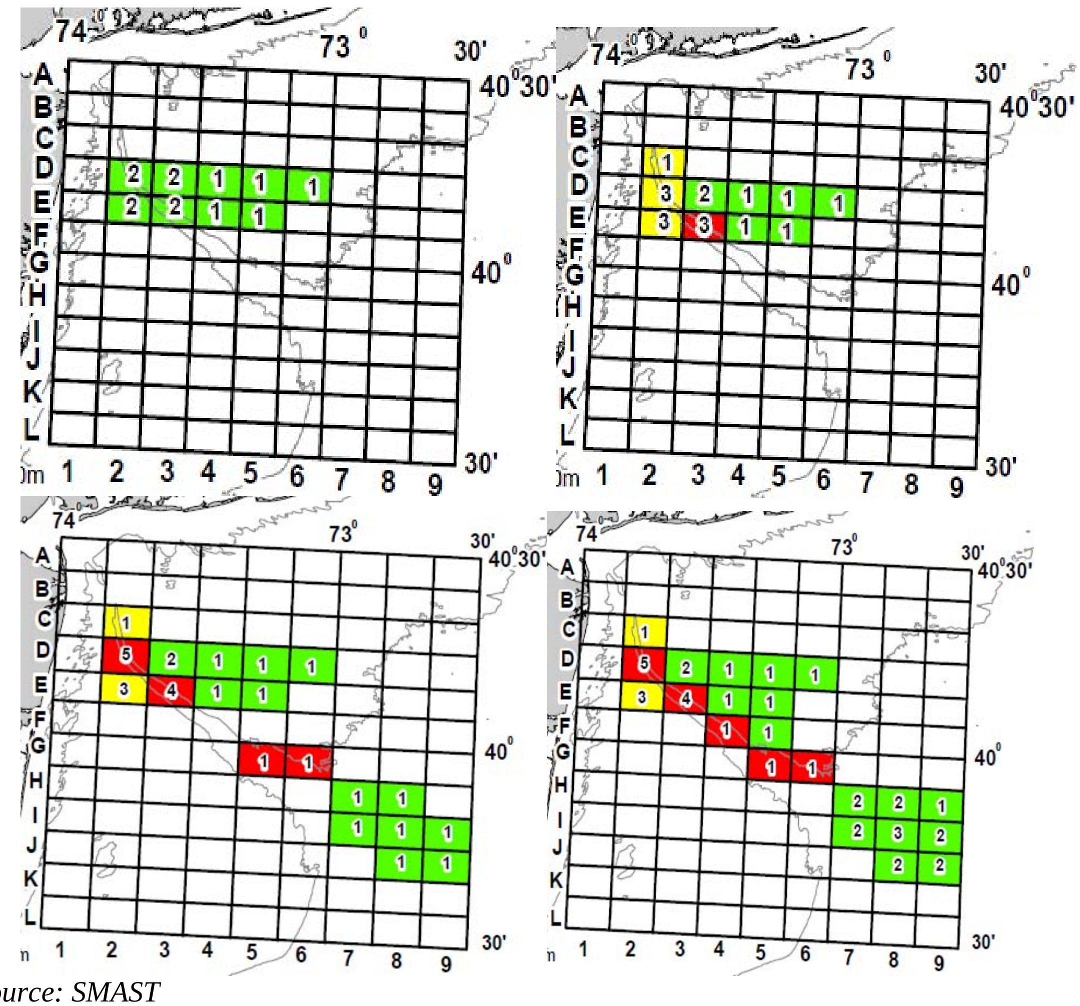


Source: SMAST
This information used to set the ratio thresholds used to classify areas as having high, moderate, or low bycatch.

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 56). 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 56). 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 56). 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. 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 56 Cumulative Bycatch Information; From Top Left: 2/1/11, 2/17/11, 3/2/11, 4/1/11



Source: SMAST

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.

4.2.2 Other Fisheries

For the purposes of this EIS, the term "other fisheries" refers to those fisheries which are directly affected or related to the operation of the Atlantic herring fishery; namely river herring, the Atlantic mackerel fishery, and the Northeast groundfish fishery. In the Atlantic herring fishery, river herring are bycatch species that are not landed when caught. Mackerel is a primary alternate species caught by herring vessels and is commonly landed. The Northeast groundfish fishery is a primary alternate fishery for some herring vessels, and the areas of operation of both fisheries overlap.

4.2.2.1 Shad and River Herring

As a non-target species in the Atlantic herring fishery, river herring are caught occasionally as a bycatch species but are not always discarded due to the high volume nature of the fishery; for example, discarding might take place in processing plants rather than at sea.

Based on 2009-2010 NEFOP observed trips only, river herring do not represent the majority of the bycatch composition in any of the Category vessels, and seem to be most prevalent in Quarters 1 and 4 for paired midwater trawls, Quarters 1 and 2 for single midwater trawls, and are rarely caught by purse seine vessels (see Section 4.2.1.2). Of the bottom trawl vessels the majority of river herring bycatch occurred on Category D vessels in Quarters 1, 2 and 3 and Category B and C in Quarters 1 and 4. Paired midwater trawls caught more river herring than bottom trawl vessels, however.

Life History
Shad and river herring are anadromous fish that spend the majority of their adult lives at sea, only returning to freshwater in the spring to spawn. Historically, shad and river herring spawned in virtually every river and tributary along the coast.

American shad
American shad stocks are river-specific; that is, each major tributary along the Atlantic coast appears to have a discrete spawning stock. The percentage of shad that survive to spawn more than once decreases from north to south. Shad that spawn in more northerly rivers may survive to spawn again (referred to as iteroparity), while shad native to the rivers south of Cape Fear, North Carolina die after spawning (referred to semelparity). Mature females (ages five and older) produce a large quantity of eggs that are released into the water column and are fertilized by mature males (ages four and older). American shad adults that are iteroparous return to the sea soon after spawning and migrate northward to summer feeding grounds in the Gulf of Maine, while the fertilized eggs are carried by river currents, develop into larvae which begin to feed four to seven days after hatching. Larvae drift downstream into tidal freshwater reaches of the spawning rivers, and gradually mature into juveniles. In early to late summer, juvenile shad migrate out of their nursery areas to the sea. Immature American shad will remain in the ocean for three to five years.

Table 22 shows the typical migration patterns, as determined by their locations during different months, for the various age classes of fish described above, by the state in which the migration is occurring. The columns are marked by "SA" (Some Activity), which denotes that some shad have been seen in the area during that time period, and "PA" (Peak Activity), denoting that the number of shad in the area are at a peak. The table indicates that the further north the rivers are, the later the fish will begin and conclude their migration during the year.

Table 22 Typical Migration Patterns and Locations for American Shad

		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

Alewife/Blueback Herring

Alewife and blueback herring are known as "river herring" and managed collectively by ASMFC. Alewife spawn in rivers, lakes, and tributaries from northeastern Newfoundland to South Carolina, but are most abundant in the Mid-Atlantic and the Northeast states. Blueback herring prefer to spawn in swift flowing rivers and tributaries from Nova Scotia to northern Florida, but are most numerous in waters from the Chesapeake Bay south. Mature alewife (ages three to eight) and blueback herring (ages three to six) migrate rapidly downstream after spawning. Larvae begin to feed three to five days after hatching, and transform gradually into the juvenile stage. Juveniles remain in tidal freshwater nursery areas in spring and early summer, but may also move upstream with the encroachment of saline water. As water temperatures decline in the fall, juveniles move downstream to more saline waters. Little information is available on the life history of juvenile and adult alewife and blueback herring after they emigrate to the sea as young-of-the-year or yearlings, and before they mature and return to freshwater to spawn.

Table 23 and Table 24 show the typical migration patterns, as determined by their locations during different months, for the various age classes of fish described above, by the state in which the migration is occurring. The columns are marked by "SA" (Some Activity), which denotes that some blueback or alewife have been seen in the area during that time period, and "PA" (Peak Activity), denoting that the number of blueback or alewife in the area are at a peak.

Table 23 Typical Migration Patterns and Locations for Blueback Herring

		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 24 Typical Migration Patterns and Locations for River Herring

		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

Population Management

The ASMFC Fishery Management Plan for Shad & River Herring, approved in 1985, was one of the very first FMPs developed by the ASMFC. Amendment 1 was adopted in 1998 and focuses on American shad regulations as well as and monitoring programs to improve data collection and stock assessment capabilities.

Amendment 2 to the ASMFC Interstate Fisheries Management Plan for Shad and River Herring was approved in 2009 and implemented a precautionary approach to river herring management. Amendment 2 requires states or jurisdictions to close all state fisheries by January 1, 2012, with exceptions for systems with a sustainable fishery. A sustainable fishery is defined as one that demonstrates that the river herring stock can support a commercial and/or recreational fishery without diminishing future stock reproduction and recruitment. Under Amendment 2, river herring from any state waters fishery may not be landed without an approved plan requesting State fishery proposals must contain 'sustainability targets' that are subject to Shad and River Herring Technical Committee (TC) review and Shad & River Herring Management Board (Board) approval. States with approved plans are required to submit annual updates of the achievement and maintenance of sustainability targets. The TC has reviewed proposals from Maine, New Hampshire, New York, North Carolina and South Carolina and the Board approved all plans. The 2012 sustainability plan deadline was implemented in order to allow states with a lengthy legislative process adequate time to develop and implement proposals. Figure 57 and Figure 58 show current state regulations as of May 2011 for both the commercial and recreational fisheries.

Figure 57 Current River Herring Regulations for Commercial Vessels

	SFMP Target	Season	Area Restrictions	Time Restriction	Gear Restrictions	Reporting	License	Effort Controls
ME	250 fish/acre	Yes		3 days / week escapement period		voluntary and mandatory	rights granted	Yes
NH	Harvest level that results in a harvest % that does not exceed 20% of the Great Bay Indicator Stock (provides 80% escapement level).		closures due to fishway proximity	no harvest on Wednesday	no mobile gear in state waters; restrictions on gill nets w/in inland waters	required	Yes	
MA	**Moratorium since 2005**							
RI	**Moratorium since 2006**							
CT	**Moratorium since 2002**							
NY	**Juvenile recruitment threshold**		Hudson River Only	Yes	Yes	Mandatory reporting	Yes	
NJ	**Moratorium beginning 2012**							
PA	**Moratorium beginning 2012**							
DE	**Moratorium beginning 2012**							
MD	**Moratorium beginning 2012**							
DC	**Moratorium beginning 2012**							
PRFC (bycatch fishery)	**Moratorium beginning 2012***							
VA	**Moratorium beginning 2012**							
NC	**Moratorium since 2007; 7,500 pound research set-aside; 4,000 pound limit and a permit holder restrictions (125 – 250 pounds) for the Chowan River**							
SC	**Exploitation rate and juvenile abundance**	Yes	Santee-Cooper Only		Yes	Yes	Yes	10 bushels or 250 pound / day limit
GA	**No fishery**							
FL	**No fishery**							

Source: ASMFC

Figure 58 Current River Herring Regulations for the Recreational Fishery

	Season	Time Closure	Closed Area	Gear Restrictions	Creel Limit
ME	Yes		unlawful to fish w/in 150 ft of dam w/fishway	Hook-and-line and dip net	12 fish/day for personal use
NH	Exter River - April 1 to June 30	No harvest on Wednesday on all rivers; Except Exeter River - harvest allowed Saturday and Monday only	closures due to fishway proximity		coastal net fishery - one tote/day
MA	**Moratorium since 2005**				
RI	**Moratorium since 2006**				
CT	**Moratorium since 2002**				
NY			Hudson River Only; not within 825 ft of dam	yes	10fish/day - individual anglers; 50 fish/boat
NJ	**Moratorium Beginning 2012**				
PA	**Moratorium Beginning 2012**				
DE	**Moratorium Beginning 2012**				
MD	**Moratorium Beginning 2012**				
DC	**Moratorium Beginning 2012**				
PRFC	**Moratorium Beginning 2012***				
VA	**Moratorium Beginning 2012**				
NC	**Moratorium since 2007**				
SC	Yes		Santee-Cooper River Only	hook and line and cast nets only	1 bushel / person / day
GA	No Fishery				
FL	No Fishery				

Source: ASMFC

In 2010, the Board approved Amendment 3, which revises American shad regulatory and monitoring programs in place under Amendment 1. The Amendment was developed in response to the 2007 American shad stock assessment, which found that most American shad stocks were at all-time lows and did not appear to be recovering. Amendment 3 is similar to the management program required for river herring. The Amendment prohibits state waters commercial and recreational fisheries beginning January 1, 2013, unless a state or jurisdiction has a sustainable management reviewed by the TC and approved by the Board. These management plans must be submitted to the TC for review by August 1, 2011. The Amendment 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 American shad fisheries meet this new definition of sustainability through the development of sustainability targets which must be achieved and maintained. The Amendment allows any river systems to maintain a catch and release recreational fishery. States and jurisdictions are also required to identify local significant threats to American shad critical habitat and develop a plan for mitigation and restoration.

Status of Stocks

A stock assessment for American shad was completed in 1997 and submitted for peer review in early 1998 based on new information and the Board recommended terms of reference. The 1998 assessment estimated fishing mortality rates for nine shad stocks and general trends in abundance for 13 shad stocks. A coastwide American shad stock assessment was completed and accepted in 2007 and found that American shad stocks are currently at all-time lows and do not appear to be recovering. Recent declines of American shad were reported for Maine, New Hampshire, Rhode Island, and Georgia stocks, and for the Hudson (NY), Susquehanna (PA), James (VA), and Edisto (SC) rivers. Low and stable stock abundance was indicated for Massachusetts, Connecticut, Delaware, the Chesapeake Bay, the Rappahannock River (VA), and some South Carolina and Florida stocks. Stocks in the Potomac and York Rivers (VA) have shown some signs of recovery in recent years. The 2007 report identified primary causes for stock decline as a combination of overfishing, pollution, and habitat loss due to dam construction. In recent years, coastwide harvests have been on the order of 500-900 mt, nearly two orders of magnitude lower than in the late 19th century. Given these findings, the peer review panel recommended that current restoration actions need to be reviewed and new ones need to be identified and applied. The peer review panel suggested considering multiple approaches including a reduction in fishing mortality, enhancement of dam passage, mitigation of dam-related fish mortality, stocking, and habitat restoration.

The last river herring stock assessment was completed in 1990, examining 15 river specific stocks. It concluded that five of the stocks were overfished with apparent recruitment failures, and another four stocks were not overfished but had declined in recent years. In 2008, a river herring stock assessment was initiated by the Board in response to concern over substantial population declines signaled by indicators of declining stocks in many rivers and in commercial landings. Preliminary results from the current stock assessment indicate that commercial landings are at historic lows and that recent trends in stock size were inconsistent. However, stocks in many river systems appear to have suffered declines. On a coastwide basis, decreases in the mean length and age of river herring were observed. The stock assessment is scheduled to be completed in 2011, with a peer-review planned for early 2012. The stock assessment will provide information on the river-by-river status of river herring. It may also include a coast-wide population assessment to determine a population size of the coastal stock.

Fishery Performance

Since the early 1800s, the American shad supported major commercial fisheries along the Atlantic coast and was one of the most valuable food fish of the U.S. Atlantic coast before World War II. The estimated U.S. Atlantic coast catch in 1896 was 50 million pounds, but it declined to approximately 10 million pounds per year between 1930 and 1960 and to about 2 million by 1976. Ocean harvest contributed about 11 % of total Atlantic coast landings in 1978; this contribution increased yearly to approximately 67% by 1996 as ocean landings increased and in-river landings declined. The closure of the ocean-intercept fishery in 2005 lowered the coastwide total landings of American shad. Total coastwide harvest has averaged approximately 540,000 pounds annually since 2005.

Based upon landings data provided in Compliance Reports from individual states and jurisdictions, 2010 in-river American shad landings totaled 554,663, a 12% increase from 2009 (490,108 pounds). Combined landings from North Carolina and South Carolina accounted for 71% of the commercial harvest in 2010. The remainder of the in-river commercial harvest came from New Jersey, Delaware, PRFC, Virginia and Georgia. In 2010 Maine, New Hampshire, Massachusetts, Rhode Island, New York, Pennsylvania, Maryland, DC and Florida reported no directed shad harvest in their state Compliance Reports. The National Marine Fisheries Service reported landings totaling 565,944 in 2010.
Each state is required to annually document that American shad ocean bycatch did not exceed 5% of the total landings (in pounds) on a per trip basis. Shad bycatch landings from ocean waters in 2010 comprised 8,546 pounds, or about 1.53% of the coastwide total.

River herring formerly supported significant commercial and recreational fisheries throughout their range. Fisheries were traditionally executed in rivers, estuaries, and coastal waters using weirs, traps, dip nets and gill nets. Commercial landings of river herring declined 95% from over 13 million pounds in 1985 to about 700 thousand pounds in 2005 (Table 26). In 2010, river herring landings were reported from Maine, New Hampshire, New York, New Jersey, Delaware, Maryland, the Potomac River Fisheries Commission, North Carolina, and South Carolina, totaling 2,052,601, a 9% increase from 2008 (landings from 2009 compliance reports totaled 1,885,984 pounds) and a continued increase since 2007. The majority of the landings (64%) were reported by the state of Maine, followed by South Carolina (24%) and Virginia (9%). Although recreational harvest data are scarce, most harvest is believed to come from the commercial industry.

Table 25 Commercial Shad Landings (lbs.) by State from Maine to New Jersey, 1970-2010

YEAR	ME	NH	MA	RI	CT	NY	NJ
1970					78,518	118,208	26,127
1971					109,182	86,320	18,144
1972					113,037	148,645	24,494
1973					116,847	122,517	20,231
1974					112,130	110,860	24,358
1975					75,071	114,942	38,556
1976					177,811	100,064	31,933
1977					150,777	94,712	60,873
1978	11,118		363		138,938	207,114	59,512
1979			544		93,804	236,507	40,280
1980	12,682	3,130	3,810	907	140,843	647,106	54,296
1981	41,096	2,540	7,575	14,243	147,284	307,768	59,286
1982	11,741	1,225	13,336	35,970	128,369	205,254	127,416
1983	17,554	1,542	6,124	10,660	193,234	223,353	90,811
1984	15,157	2,313	13,472	16,602	180,966	333,396	98,159
1985	7,258	3,311	10,115	41,187	182,347	385,498	108,093
1986	10,438	7,666	27,261	23,769	146,490	395,389	79,244
1987	11,975	18,734	18,507	47,129	151,457	315,607	92,852
1988	14,461	20,837	22,967	55,339	85,957	362,169	113,763
1989	21,091	13,882	6,178	19,038	82,680	230,656	188,698
1990	5,354	17,330	2,540	10,337	119,068	212,701	222,110
1991	903	8,584	289	12,617	68,167	161,325	184,817
1992	658	4,492	140	6,029	65,616	130,060	148,497
1993	0	2,971	181	18,394	43,955	66,202	154,063
1994	477	12,803	130	8,137	48,023	92,794	102,484
1995	173	13,862	206	12,683	27,958	119,437	132,328
1996	485	16,118	61	6,452	30,281	95,148	95,774
1997	88	11,538	341	16,674	41,279	84,900	106,474
1998	192	6,881	801	15,236	40,526	146,907	105,712
1999	77	1,667	101	20,076	20,219	97,631	121,009
2000	132	2,695	122	7,854	48,724	81,159	116,624
2001	216	368	477	30,777	26,869	60,170	122,543
2002	8		192	39,553	49,034	86,876	125,341
2003	2	1	503	17,548	50,407	61,098	107,036
2004	4	49	12	6,652	30,086	39,868	98,760
2005	88	3,877		191,312	69,333	90,932	25
2006				2,292	38,547	9,271	62,920
2007				783	51,572	50,040	58,981
2008					7,344	22,720	6,761
2009				176	40,998	10,204	2,660
2010	7,140				24,187	11,375	14,363

Source: ASMFC
Recreational numbers included where available

Table 26 Commercial River Herring Landings (lbs.) by State from Maine to New Jersey, 1960-2010

Year	ME	NH	MA	CT	RI	NY	NJ
1960	966,235	95,000	17,651,100		20,000	38,200	3,000
1961	1,278,895	100,000	20,838,200		6,000	33,800	16,500
1962	1,137,420	125,000	8,275,700		19,000	38,200	20,300
1963	898,100	150,000	11,735,100	129,300	3,400	32,300	3,400
1964	903,677	75,000	5,528,800	140,000	14,800	37,000	14,200
1965	1,615,460	125,000	6,935,300	210,000	24,100	23,600	21,500
1966	1,153,180	75,000	6,633,200	192,500	6,600	4,188,000	12,400
1967	1,255,897	65,000	5,431,900	185,500	23,400	4,400	9,000
1968	1,498,447	40,600	116,700	190,000	32,800	7,000	8,400
1969	1,404,055	37,500	100,000	214,900	10,600	9,200	5,100
1970	1,066,975	31,000	1,156,300	122,300	143,600	11,000	7,500
1971	1,406,720	25,000	222,300	25,000	52,600	68	9,500
1972	1,445,200	24,000	1,907,400	22,800	34,000	400	14,700
1973	1,680,954	21,500	695,400	14,300	15,100	21,600	7,000
1974	2,232,790		228,500	17,000	36,100	16,900	10,600
1975	1,626,670		1,716,900	25,200	41,500	15,300	9,300
1976	1,894,860		44,900	67,100	34,000	1,500	11,300
1977	2,091,850	210,000	131,800	61,300	35,300	6,000	10,600
1978	1,704,075	165,000	701,300	39,800	26,200	700	2,400
1979	1,329,615		52,300	62,700	11,700	1,000	6,600
1980	1,449,405		144,000	55,100	7,400	900	18,600
1981	1,408,720		84,000	52,700		64,900	13,800
1982	576,677	114,500	53,500	41,800	4,800	229,200	13,600
1983	370,868	115,216	93,100	37,500	6,100	24,700	2,200
1984	499,555	90,000	194,100	32,400	900	4,200	3,100
1985	723,310	61,300	46,600	38,900	400	150	4,800
1986	937,720	26,990	32,400	40,100		2,900	4,200
1987	539,143	19,550	32,500	21,400	2,600	2,765	5,200
1988	625,975	12,087	42,580	2,100		100	700
1989	625,765	11,200	255,700	1,600		500	800
1990	436,625		20,700	1,150			42,494
1991	361,480		20,300	1,200			9,994
1992	438,042	9,802	18,700	3,200			3,069
1993	165,375	2,676	18,900	2,440			2,659
1994	83,318			2,000			328
1995	2,940			14,044	403	209	795
1996	136,395			252	750	741	4,449
1997	281,977		180			6,317	4,515
1998	386,365	25,994				12,234	7,371
1999	312,375					6,051	1,377
2000	246,680			77,985	574	98,845	2,246
2001	646,660			20		39,293	3,915
2002	819,554				12	40,716	4,669
2003	613,385					40,076	3,667
2004	543,172		89			36,685	7,131
2005	341,311					26,984	4,326
2006	1,178,758					23,505	3,414
2007	740,915					28,571	223
2008	1,170,469	8,137					631
2009	1,383,130	9,443				83	
2010	1,334,515	7,392	31	36,232		17,142	1,517

Source: ASMFC; Recreational numbers included where available

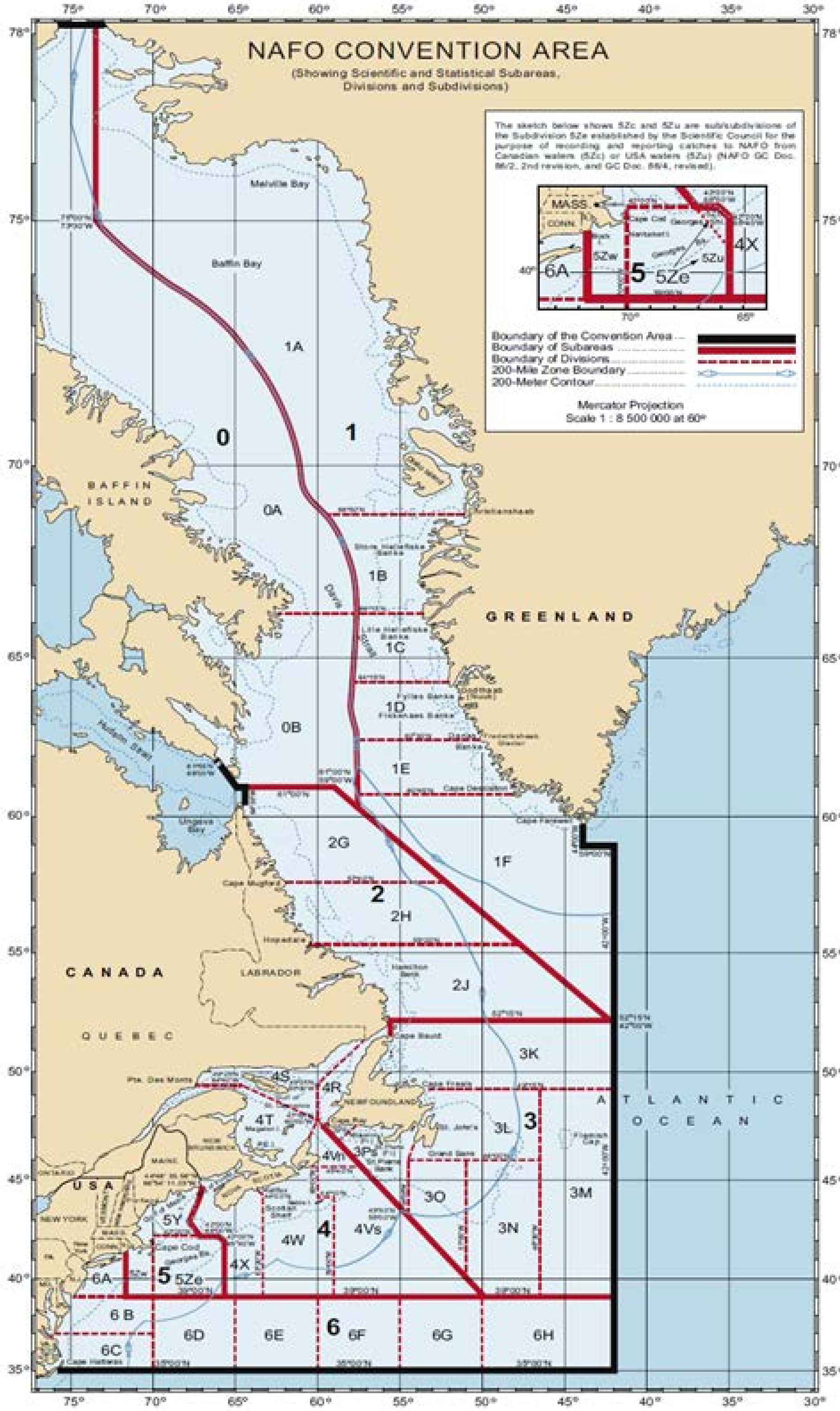
NAFO River Herring Catches, 1960-2009

The Northwest Atlantic Fisheries Organization (NAFO) is an intergovernmental fisheries science and management body founded in 1979, preceded by the International Commission of the Northwest Atlantic Fisheries (ICNAF), 1949-1978. Under the NAFO Convention, countries fishing within the (NAFO) Regulatory Area (RA) for certain NAFO managed species are required to report catches. The RA is an area outside of the coastal 200 NM limit and within the NAFO Convention Area (Figure 59). In 1983, the United States established its 200 NM limit EEZ. Prior to that time, several foreign fleets along with the US fished within the would-be US EEZ. These fleets reported catches to NAFO.

Taking a historical perspective on oceanic river herring catch, reported river herring (alewife and blueback herring) catches by the US and other counties were summarized using the NAFO database 21-A (Table 27, Figure 60). These included 1960-2009 catches reported in NAFO areas 5 and 6A-C, which generally overlap the Exclusive Economic Zone of the US Northeast (Figure 59). Reported catches from unknown areas and areas outside of NAFO areas were omitted. In addition, no river herring catches were reported for 6D, which overlaps the US EEZ. The NAFO database is available at http://www.nafo.int. Note that in the NAFO database, 'blueback shad' is the same as blueback herring.

Foreign countries catching river herring included Bulgaria, Germany, Spain, Poland, Romania, and Russia. Reported NAFO foreign river herring catch began in 1967 and ceased in 1990, peaking in 1973 at 36,154 mt with the majority of catch by Russia (former USSR). By comparison, the total catch for US and foreign vessels combined in 1973 was 37,192 mt. US river herring catch peaked in 1961 at 10,205 mt and again in 1973 at 10,797 mt. Prior to and following the establishment of the EEZ, river herring catches fell for both US and foreign countries. No river herring catches were reported from 1994-2001 and 2003-2006.

Figure 59 NAFO Convention Area



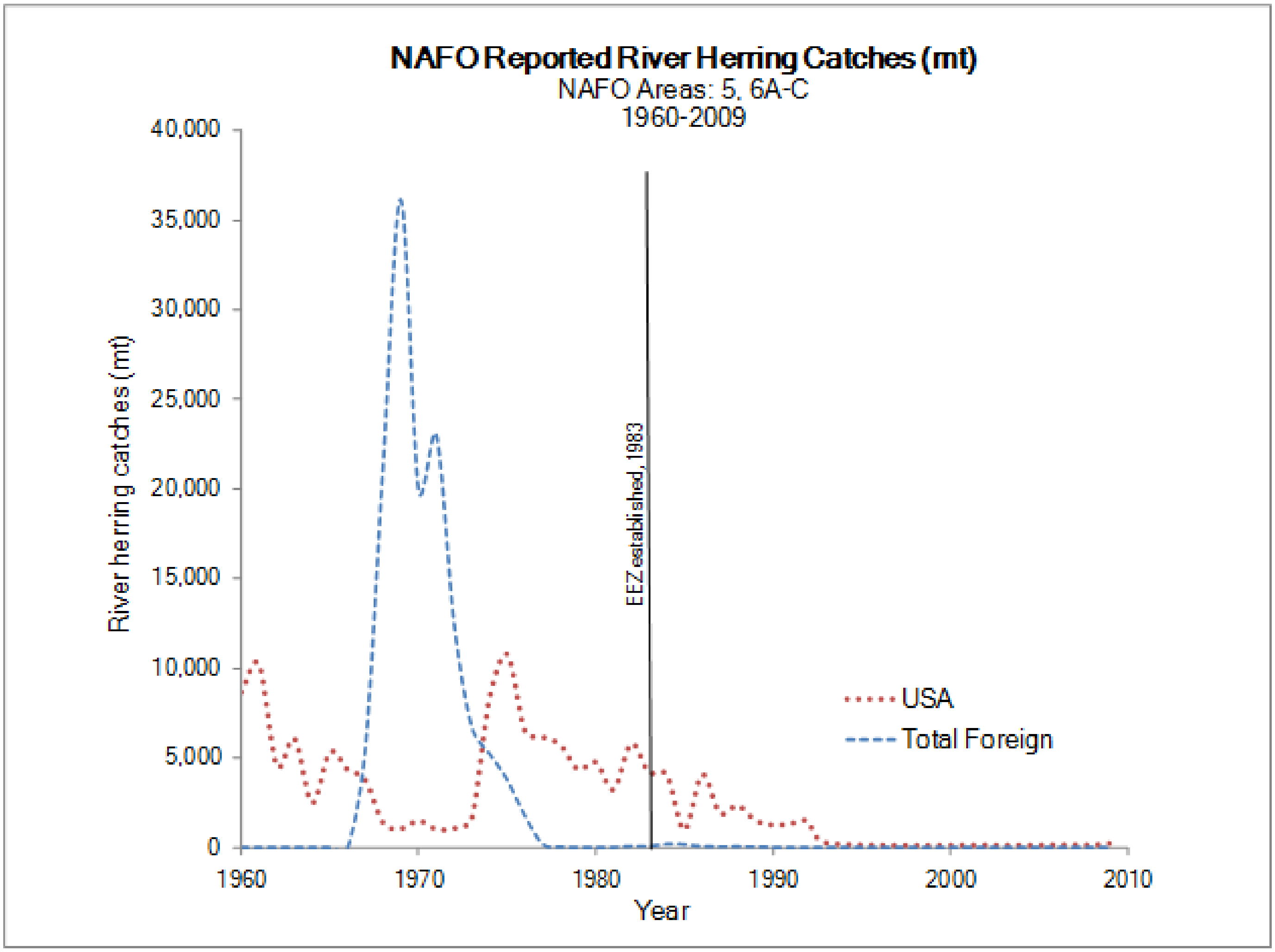
Source: NAFO, available at http://www.nafo.int/

Table 27 NAFO River Herring Catch by Country

	NAFO River Herring Catches (mt)								
	Country								
Year	Bulgaria	Germany	Spain	Poland	Romania	Russia	Total Foreign	USA	Total
1960	0	0	0	0	0	0	0	8669	8669
1961	0	0	0	0	0	0	0	10205	10205
1962	0	0	0	0	0	0	0	4572	4572
1963	0	0	0	0	0	0	0	6071	6071
1964	0	0	0	0	0	0	0	2485	2485
1965	0	0	0	0	0	0	0	5326	5326
1966	0	0	0	0	0	0	0	4344	4344
1967	0	0	0	0	0	5531	5531	3754	9285
1968	0	0	0	0	0	21235	21235	1368	22603
1969	514	113	0	0	0	35527	36154	1038	37192
1970	672	190	0	0	0	19089	19951	1493	21444
1971	1039	8409	0	2225	95	11289	23057	1005	24062
1972	512	3481	0	1888	0	6693	12574	1057	13631
1973	811	1630	0	3251	0	1065	6757	1563	8320
1974	773	2659	0	1088	252	473	5245	8293	13538
1975	553	2121	0	62	0	1039	3775	10797	14572
1976	256	1260	0	14	0	244	1774	6482	8256
1977	0	69	0	0	0	120	189	6162	6351
1978	0	0	11	0	0	21	32	5730	5762
1979	0	0	0	0	0	12	12	4358	4370
1980	0	0	2	1	0	0	3	4762	4765
1981	0	0	0	10	0	0	10	3215	3225
1982	0	0	0	81	0	0	81	5799	5880
1983	0	0	0	77	0	0	77	4184	4261
1984	0	8	0	198	0	0	206	4075	4281
1985	0	23	0	157	0	0	180	960	1140
1986	0	17	0	47	0	0	64	4058	4122
1987	0	27	0	22	0	0	49	1911	1960
1988	0	29	0	30	0	0	59	2337	2396
1989	0	23	0	24	0	0	47	1509	1556
1990	0	14	0	0	0	0	14	1237	1251
1991	0	0	0	0	0	0	0	1327	1327
1992	0	0	0	0	0	0	0	1456	1456
1993	0	0	0	0	0	0	0	250	250
2002	0	0	0	0	0	0	0	129	129
2007	0	0	0	0	0	0	0	143	143
2008	0	0	0	0	0	0	0	130	130
2009	0	0	0	0	0	0	0	231	231

Source: 1960-2009 catches reported in NAFO areas 5 and 6A-C, database 21-A, available at http://www.nafo.int/

Figure 60 NAFO River Herring Catches, 1960-2009



Source: 1960-2009 catches reported in NAFO areas 5 and 6A-C, database 21-A, available at http://www.nafo.int/

4.2.2.2 Atlantic Mackerel Fishery

The information in this section may be changed by actions in the proposed and developmental stage; this section will therefore be updated pending any final rule published in the *Federal Register*. Actions which are proposed and developing include:

- 2012 MSB Specifications (sets mackerel catch levels for 2012 using the new ACL/AM system) - Proposed rule expected in September 2011

A more detailed description of the Atlantic mackerel fishery can be found in the EIS for Amendment 11 to the Atlantic Mackerel, Squid, and Butterfish (MSB) FMP: http://www.mafmc.org/fmp/msb_files/msbAm11.htm. The overlap between the Atlantic herring and mackerel fisheries is important, as many of the same vessels and processing plants participate in both of these fisheries, and many of the participants are primarily or entirely economically dependent on these two fisheries. Section 4.5.1.3 of this document reports the average dependence on herring and mackerel by principal gear. Through the four years presented (2007-2010) pair trawl vessels and midwater trawl vessels were similarly dependent on herring and mackerel although pair trawl vessels were around 30% less dependent on herring than mackerel. Midwater trawl vessels were 20% less dependent on mackerel than herring, but by 2010 the difference was close to 50%. Most bottom trawl vessels are not significantly dependent on either herring or mackerel, while purse seine vessels were almost entirely reliant on herring and menhaden.

Unfortunately, species targeting data is sparse, and neither the dealer database nor the VTR database contains species targeting information. The NMFS Northeast Fisheries Observer Program (NEFOP) database does contain targeting information on the trip and haul level (however fishermen have reported to the Mid-Atlantic Fishery Management Council that until 2009-2010 they were not typically asked about targeting on a haul by haul level). Nonetheless, of the 128 observed hauls in 2007 targeting either mackerel or herring or both, 12% of them targeted both. Further supporting this concept, in the 2007 dealer data for the 995 trips landing greater than 20,000 pounds combined mackerel and/or herring, 13 percent of those trips landed both.

Net mesh sizes are also recorded on observer trips – observers take ten (10) random codend measurements and ten (10) random liner measurements with calipers and measured to the nearest millimeter. Many midwater trawl vessels use an outside bag (strengthener) with a large mesh and inside bag (liner) with the smaller mesh.

Between 2008 and 2010, there were a total of 117 observed mackerel tows that landed greater than or equal to 25,000 pounds of mackerel and that had usable information on mesh size. Of the 117 tows, almost all used liners and most liners (typically located inside the codend) used mesh between 1.25 and 1.75 inches (though some was as large as 3 inches). The codends themselves had mesh that ranged between 3 and 11 inches. Headrope lengths on the observed trips ranged between 150 and 600 feet. Some vessels also utilize strengtheners or chafing gear. Self-reported VTR information by the 10 vessels with the highest mackerel landings (accounting for 75% of landings in 2009) showed a similar pattern of effective mesh sizes with some additional smaller meshes (down to 0.5 inch) as well.

Population Management

The MAFMC manages Atlantic mackerel. For the 2012 fishing year, the MAFMC adopted an ABC of 80,000 mt per the recommendation of its Scientific and Statistical Committee (http://www.mafmc.org/committees/SSC/SSC_Report_11-12_May_%202010.pdf). After accounting for Canadian catch, the Council also specified recreational-commercial allocations and buffers for management uncertainty such that the effective proposed U.S. commercial quota for 2012 is 34,907 mt. This is much higher than 2011 landings (likely less than 1,000 mt) but also substantially lower than quotas as recently as 2010 (115,000 mt). The fishery is currently open access, but a new limited access program, detailed below, will be effective for Atlantic mackerel on March 1, 2012

Amendment 11 –Limited Access Program

Amendment 11 to the MSB FMP (76 FR 68642, November 7, 2011) implements a limited access system consisting of tiered limited access and an open access component. NMFS will be accepting applications for the limited access program until February 28, 2013, but will switch over to the new permit system on March 1, 2012. The qualifying criteria for the limited access component are a valid Federal Fisheries Permit for mackerel as of March 21, 2007 and a certain level of mackerel landings during a specified time period as detailed below:

- *Tier 1: At least 400,000 pounds landed in any one year 1997-2005*
- *Tier 2: At least 100,000 pounds landed in any one year 3/1/1994-2005*
- *Tier 3: At least 1,000 pounds in any one year 3/1/1994-2005.*
    - *Tier 3 would be capped for a maximum catch up to 7% of the commercial quota, set annually during the specifications process (no other allocations).*
- *Open Access: All other vessels.*

The MAFMC did consider qualifying vessels with Atlantic Herring permits for at least Tier 3, regardless of their landing records (if their records qualified them for a higher Tier they would receive that higher Tier). MAFMC staff found that although some herring boats catch mackerel, the amount was not substantial. A New England representative concurred that the 20,000 pounds afforded by the open access permit should be sufficient to cover mackerel catch for these vessels in the future. The MAFMC also noted that Tier 3 is allowed 100,000 pounds of mackerel per trip, which would be a substantial amount for a large number of vessels. The MAFMC therefore made the decision to not qualify all herring vessels for a Tier 3 LAP.

The number of vessels that are expected to qualify for each tier and associated trip limits are summarized below (Table 28). The resulting capacity estimate for the vessels expected to qualify for Atlantic mackerel permits was 107, 578 mt. The estimates for vessels in each Tier are based on analysis of unpublished NMFS dealer weighout data and all numbers are likely variable and subject to change:

Table 28 Summary of Mackerel Limited Access Program and Predicted Number of Qualifiers

Access Category	Years Used for Qualification	Threshold of Poundage Needed to Qualify	Vessels Predicted to Qualify	Initial Trip Limits (adjustable via Specifications)
Tier 1	1997-2005	400,000	29	None
Tier 2	1994-2005	100,000	45	135,000
Tier 3	1994-2005	1,000	329	100,000
Open Access	N/A	N/A	N/A	20,000

Source: MAFMC, unpublished NMFS dealer weighout data

Overall, it is predicted that there are about 403 vessels that will be given mackerel Limited Access Permits in Tiers 1-3. Of the 403, approximately 47 vessels have a limited access Category A, B, or C Atlantic herring permit (Table 29 – highlighted area). Approximately 18 A herring permits, 1 B permit, and 21 C herring permits are expected to get only mackerel open access permits.

Table 29 Limited Access Herring Permits Held by Potential Mackerel Limited Access Vessels

Total Herring Permits (2011)	41	4	42	1941	NA	NA
Herring Permits Category	A	B	C	D	Nothing	Total Mackerel Permits
Hering pemits categories broken down by likely mackerel tier qualification						
Tier 1	***20***	***0***	***4***	2	4	30
Tier 2	***0***	***1***	***3***	26	14	44
Tier 3	***3***	***2***	***14***	182	128	329
Open Access	18	1	21	1731	NA	NA

Source: MAFMC, unpublished NMFS dealer weighout and permit data

Amendment 11 sets initial trip limits for each tier, with all trip limits adjustable via specifications:

- *Tier 1: No trip limit*
- *Tier 2: 135,000 lb per trip or calendar day*
- *Tier 3: 100,000 lb per trip or calendar day*
- *Open access: 20,000 lb per trip or calendar day*

All permit categories are subject to a 20,000 lb trip limit during a closure of the mackerel fishery.

Stock Status

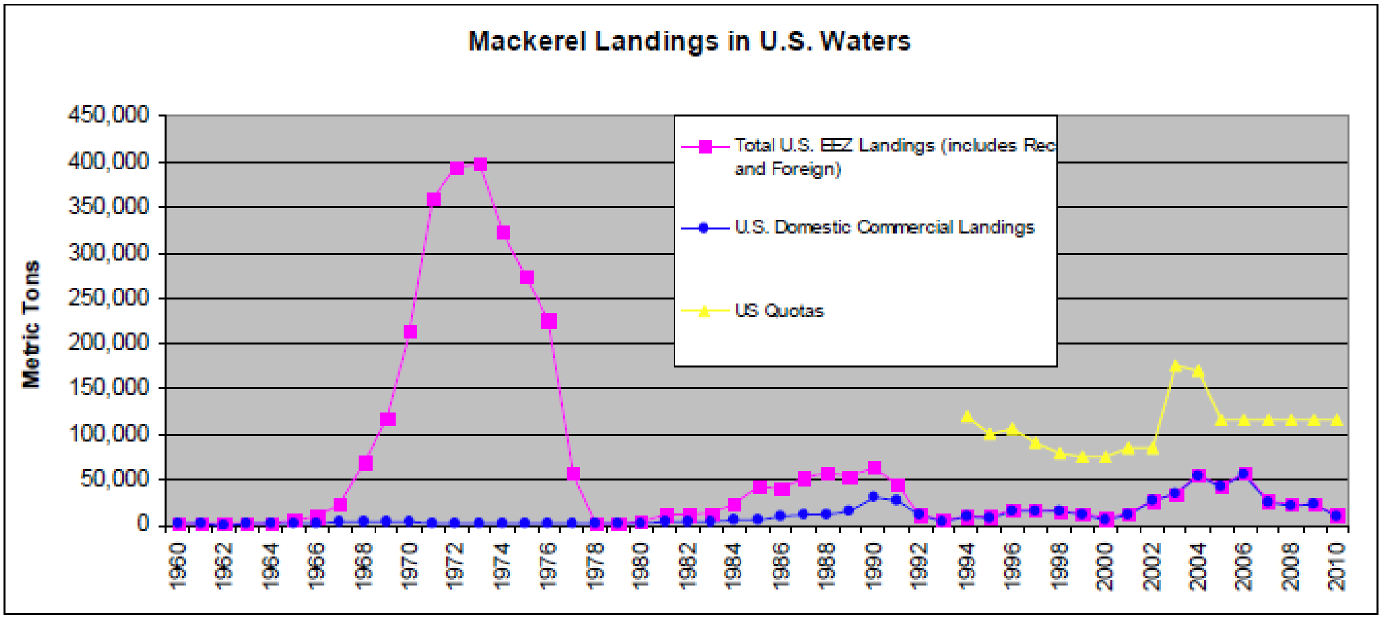
The status of mackerel is currently “unknown” with respect to both fishing mortality rates and stock size. The mackerel stock was last assessed in 2010 (utilizing data through 2008) via a joint U.S. – Canadian Transboundary Resource Assessment Committee (TRAC). The TRAC was unable to resolve uncertainties in the analyses to an acceptable degree so there are no accepted reference points. Various bureaucratic issues have left the official NMFS listing for mackerel as "not overfished" and "no overfishing" but these are not reflective of reality (the Mid-Atlantic Fishery Management Council is working with NMFS to have the designation updated).

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 over the most recent three years of data available at that time (2006-2008; 80,000 mt) until new information suggests a different amount is more appropriate. Results of the current TRAC assessment differ substantially from those in the 2005 NEFSC assessment, which indicated an increasing trend in SSB. If the 2005 assessment results had been adjusted for severe retrospective patterns, the adjusted results would have been similar to the current assessment results. Also, the current TRAC assessment results are consistent with the decreasing trend in SSB estimates in the Gulf of St. Lawrence during the past decade as derived from the egg surveys reported in the 2008 Canadian mackerel assessment.

Fishery Performance

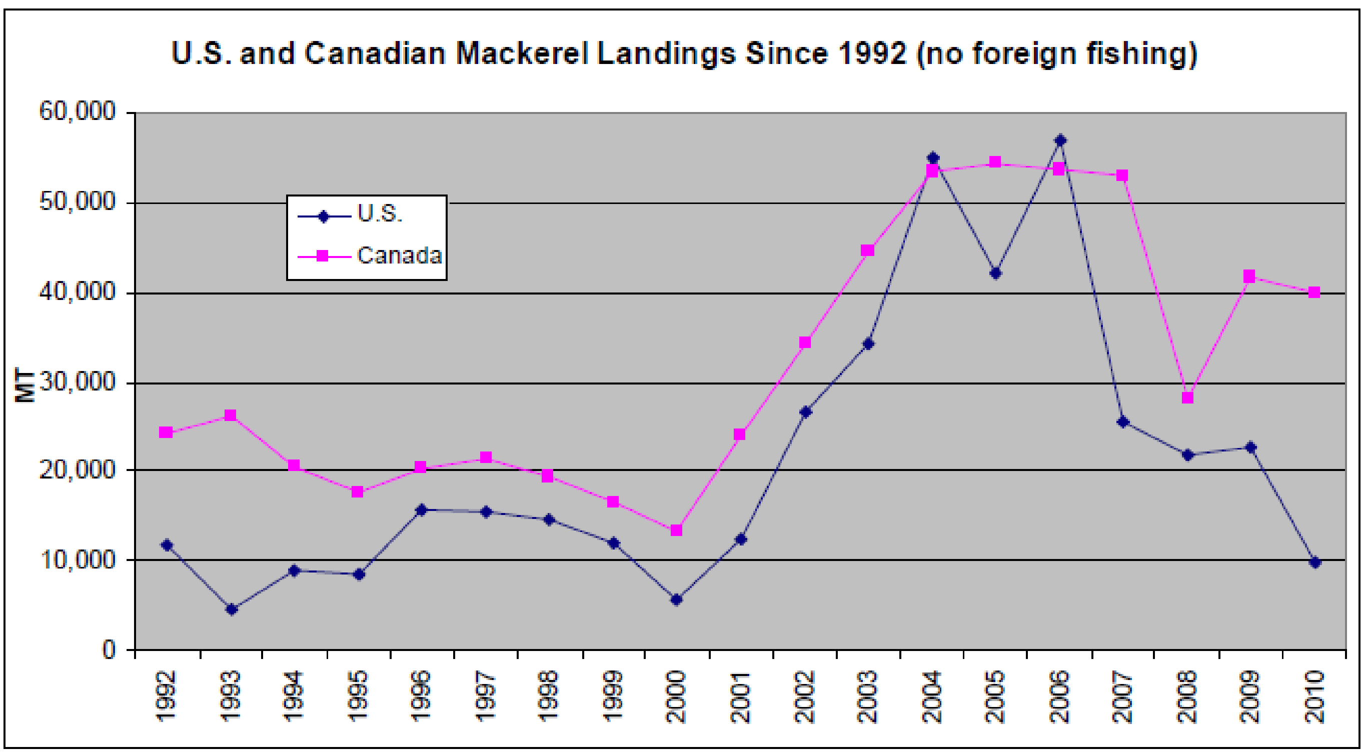
As Figure 61 and Figure 62 illustrate, catch in the fishery has varied substantially in the past 50 years. In the 1970’s foreign vessels came close to landing 400,000 mt of mackerel. In the early 1980s very little mackerel was caught, but by 1990 domestic boats were catching over 25,000 mt. Landings were relatively stable during the 90’s around 10,000 mt for domestic vessels, but the early 2000’s saw landings rise to around 50,000 mt before dropping off in recent years. 2011 was a particularly low year with less than 1,000 mt likely to be landed when the final annual landings are calculated. Canadian landings since 1992 are included in Figure 62.

Figure 61 Atlantic Mackerel Landings Within 200 Miles of the US Coast (2010 preliminary)



Source: TRAC 2010, unpublished NEFSC dealer reports

Figure 62 US and Canadian Atlantic Mackerel Landings (2010 preliminary)



Source: unpublished NEFSC dealer reports

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 30 lists the performance of the mackerel fishery (commercial and recreational together) compared to its DAH. There have been no quota overages. The gears used to catch mackerel have shifted from primarily bottom trawl before 2001 to primarily midwater trawl since 2001 (Table 31). Some aspects of mackerel management will change in 2012 with the implementation of ACLs/AMs but the basic approach of using hard quotas and in-season closures will remain. See the MAFMC's Omnibus Amendment or 2012 mackerel specifications for details: http://www.mafmc.org/fmp/omnibus.htm; and http://www.mafmc.org/fmp/msb_files/msbSpecs2012.htm respectively.

Table 30 Mackerel Quota Performance

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	10,656	115,000	9%

Source: Unpublished NMFS Dealer Reports

Table 31 Atlantic Mackerel Landings (%) by Gear

YEAR	TRAWL OTTER BOTTOM FISH	TRAWL OTTER MID	TRAWL OTTER MID PAIRED	Other
1982	71%	0%	1%	28%
1983	34%	0%	16%	51%
1984	44%	4%	14%	37%
1985	56%	0%	9%	34%
1986	87%	0%	0%	13%
1987	85%	0%	0%	15%
1988	91%	0%	0%	9%
1989	93%	0%	0%	7%
1990	90%	0%	0%	10%
1991	94%	3%	1%	2%
1992	96%	0%	0%	4%
1993	81%	10%	0%	9%
1994	94%	0%	0%	6%
1995	94%	1%	0%	6%
1996	85%	8%	0%	7%
1997	90%	4%	0%	6%
1998	83%	4%	9%	3%
1999	93%	1%	0%	6%
2000	81%	13%	0%	6%
2001	5%	92%	0%	3%
2002	15%	44%	39%	1%
2003	15%	50%	34%	1%
2004	13%	41%	36%	10%
2005	13%	20%	62%	5%
2006	18%	43%	34%	4%
2007	8%	58%	32%	3%
2008	13%	44%	42%	2%
2009	30%	25%	41%	4%
2010	28%	20%	42%	10%

Source: Unpublished NMFS Dealer Reports

4.2.2.3 Northeast Multispecies (Groundfish) Fishery

The overlap between the Northeast multispecies fisheries and the herring fishery is diverse; herring vessel operation overlaps in similar areas and times as multispecies vessel operation. As such, herring vessels encounter and some may land various groundfish species.

With respect to overlapping operation, Section 4.5.1 of this document reports the number of northeast multispecies permits (by category) held by herring vessels (by category). In all three years reported, herring Category D vessels hold permits in all Northeast Multispecies categories. By contrast, herring Category A, BC and C vessels hold multispecies Category A, J, K and some HB permits. Section 4.5.1.3 of this document reports the average dependence on herring and mackerel by principal gear. The Category A permit holders in the herring fishery are likely less dependent on multispecies, as their percent dependence is almost 70% on herring, mackerel and squid, and only 30% on the “other” category, which includes multispecies. Category C and D vessels, by contrast, are 85% and 97% dependent on the “other” category, which likely means a proportion of them are dependent on multispecies.

With respect to bycatch, haddock in particular are occasionally caught high in the water column, and the most recent Framework (46) modified the bycatch regulations for the herring fishery and is discussed in more detail below. Herring vessels were initially prohibited from catching groundfish when the Northeast Multispecies FMP was amended in 1996. There were also concerns that measures designed to reduce catches of groundfish by the herring fishery reduced the ability of the herring fishery to achieve optimum yield. These concerns led to herring vessels being allowed to fish in multispecies closed areas because the gear was not expected to catch groundfish. These two competing issues came to a head in 2005 when herring midwater trawl vessels caught haddock from a large haddock year class on George Bank. This led to the adoption of Framework Adjustment 43 to the Northeast Multispecies FMP in 2006. Framework 43 modified the restrictions for herring vessels so that herring fishing could continue on Georges Bank. This framework prohibited certain herring vessels from discarding haddock and limited possession of other groundfish to small amounts. It also adopted a cap on the amount of haddock that could be caught by certain herring vessels. The cap was set at 0.2 percent of the combined GB and GOM haddock target total allowable catch (TTAC). When the cap was reached, catches of herring from a large part of the GOM and GB areas were limited to 2,000 pounds per trip for all herring vessels.

General Fishery

The Northeast Multispecies FMP has been updated through a series of frameworks and amendments, the most recent being Framework 46 and Amendment 16. For more detailed descriptions of the fishery and the current management measures please refer to these documents.

The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, redfish, Atlantic wolffish, and ocean pout) off the New England and Mid-Atlantic coasts.

Haddock Stock Status/Landings

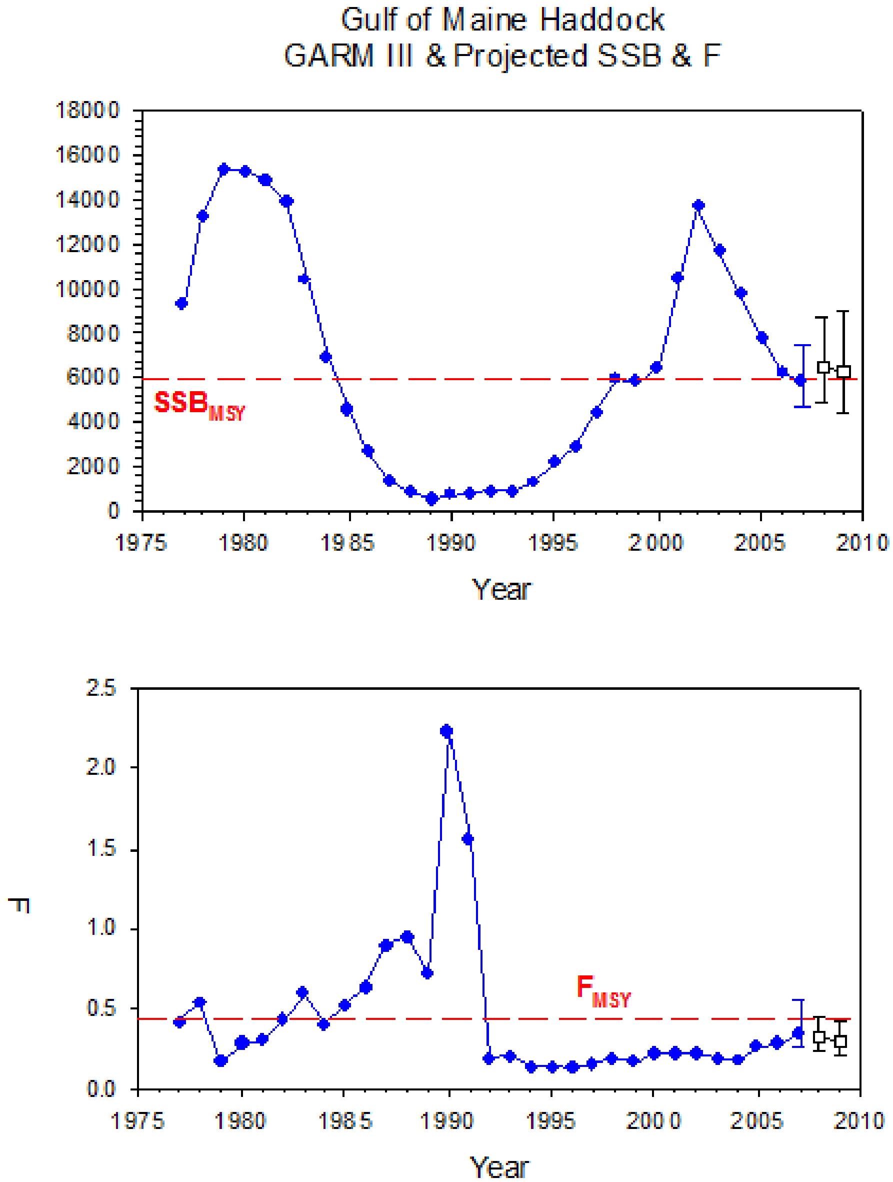
The GOM and GB haddock, *Melanogrammus aeglefinus*, is a commercially-exploited groundfish found in the northwest and northeast Atlantic Ocean. This demersal gadoid species is distributed from Cape May, New Jersey to the Strait of Belle Isle, Newfoundland in the northwest Atlantic, where a total of six distinct haddock stocks have been identified. Two of these haddock stocks are found in U.S. waters associated with Georges Bank and Gulf of Maine.

Haddock spawn over various substrates including rocks, gravel, smooth sand, and mud. Eggs are broadcast and fertilized near the bottom. Fertilized eggs are buoyant and remain in the water column where subsequent development occurs. Larvae metamorphose into juveniles in roughly 30 to 42 days at lengths of 2 to 3 cm. Small juveniles initially live and feed in the epipelagic zone. Juveniles remain in the upper part of the water column for 3 to 5 months. Juveniles visit the ocean bottom in search of food. Once suitable bottom habitat is located, juveniles settle into a demersal existence. Haddock do not make extensive seasonal migrations. In winter, haddock prefer deeper waters and tend to move shoreward in summer. Haddock are highly fecund broadcast spawners. Eggs are released near the ocean bottom in batches and fertilized by a courting male. After fertilization, haddock eggs become buoyant and rise to the surface water layer. In the Gulf of Maine, spawning occurs from early February to May, usually peaking in February to April. In the Gulf of Maine, Jeffreys Ledge and Stellwagen Bank are the two primary spawning sites. On Georges Bank, spawning occurs from January to June, usually peaking from February to early-April. Georges Bank is the principal haddock spawning area in the northeast U.S. continental shelf ecosystem. GB haddock spawning is concentrated on the northeast peak of Georges Bank.

Median age and size of maturity differ slightly between the GB and GOM haddock stocks. GARM III found that the Gulf of Maine fishery does not target haddock and is directed mostly at flatfish for which the fleet uses large square (6.5 in) mesh gear, which leads to reduced selectivity on haddock. The Gulf of Maine haddock have lower weights at age than the Georges Bank stock and the age at 50 percent maturity was also lower for Gulf of Maine as compared to Georges Bank haddock.

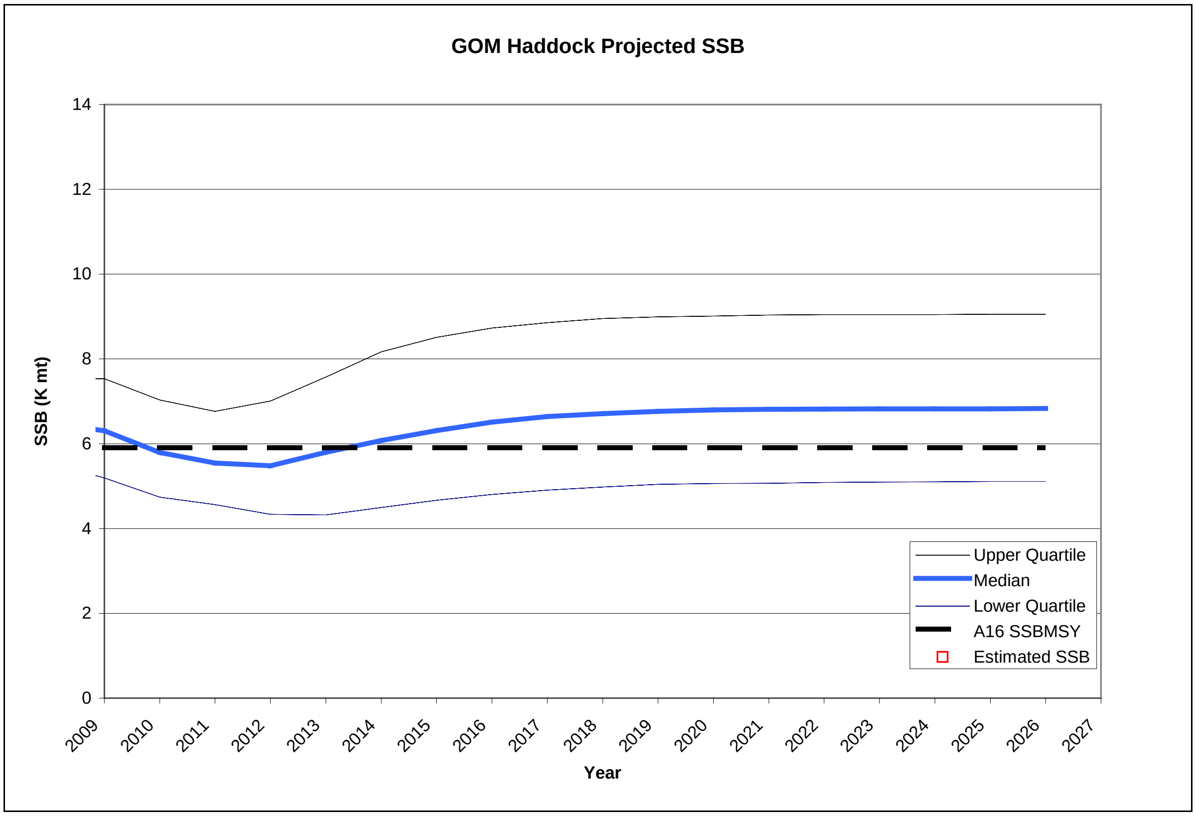
Based on the current assessment, the GOM haddock stock is not overfished and overfishing is not occurring. Spawning biomass increased from 1989 to 2002 and has decreased since then. Fishing mortality has been below F_{MSY} since 1992. No retrospective adjustment was made for Gulf of Maine haddock. Stock size is expected to fluctuate around SSB_{MSY} in the near term (Figure 63 and Figure 64) if fishing mortality is kept at 75 percent of $F_{MSY.}$

Figure 63 Gulf of Maine haddock spawning stock biomass (SSB) and fishing mortality (F) during 1977-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates



Projected SSB and F with 80% confidence intervals are shown with open squares.

Figure 64 – Projected GOM Haddock Stock Size

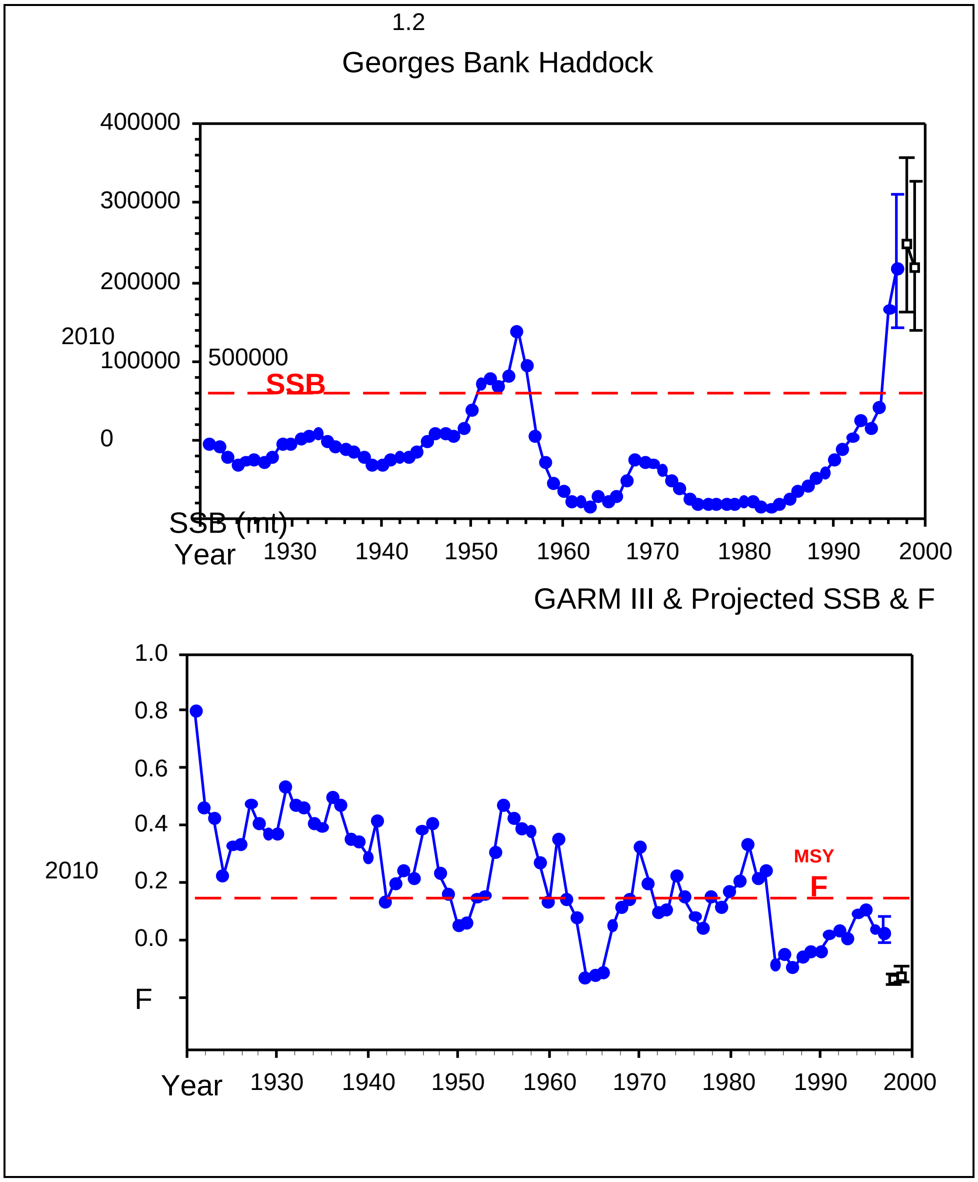


The GB haddock stock is a transboundary resource, which is co-managed with Canada. Substantial declines have recently occurred in the weights at age due to slower than average growth, particularly of the 2003 year-class. This is affecting productivity in the short-term. The growth of subsequent year-classes is returning to the earlier rates. The stock is not overfished and overfishing is not occurring.

Georges Bank haddock has been rebuilt to about twice B_{MSY}. Spawning biomass has increased since 1993. Fishing mortality has remained below F_{MSY} since 1995. The partial recruited strong 2003 year class made up most of the catch in 2007. No retrospective adjustment was made for Georges Bank haddock.

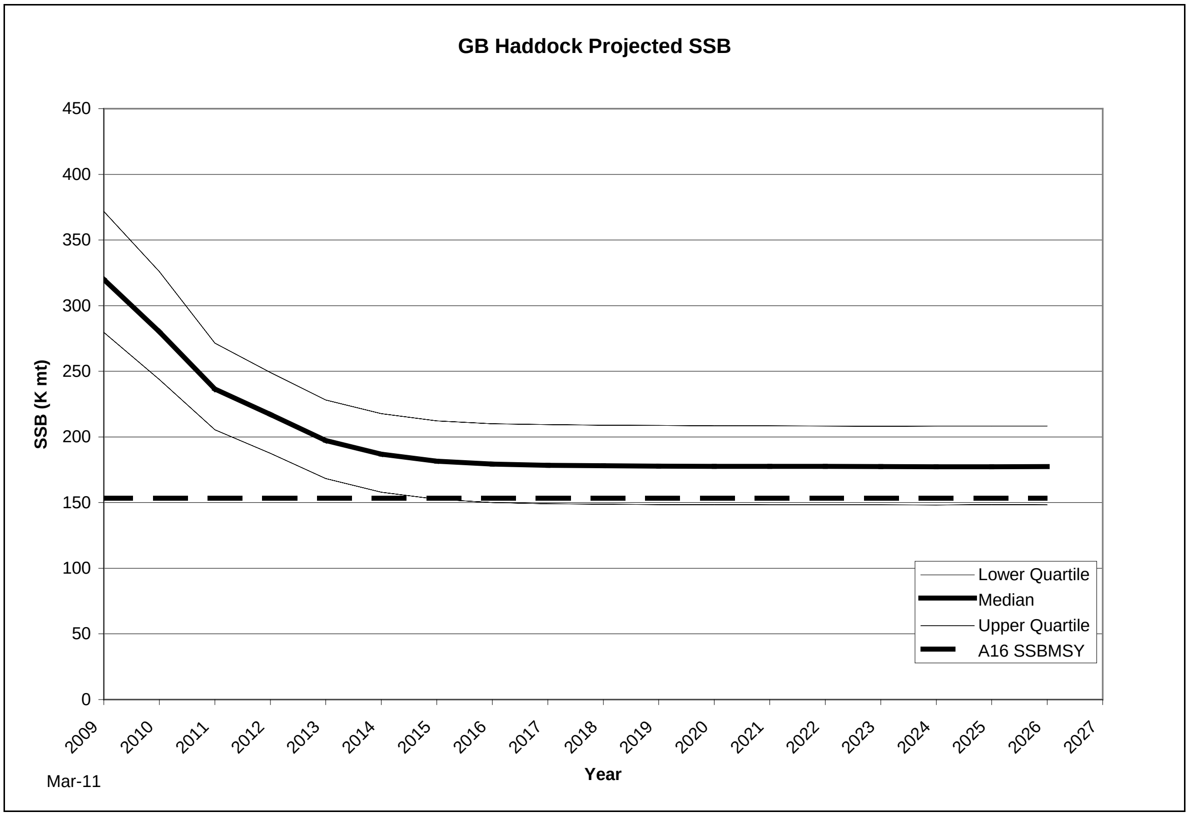
GB haddock stock size is projected to decline over the next few years if fishing mortality is kept at 75 percent of F_{MSY} . As the 2003-year class ages and the stock returns to more typical stock sizes (Figure 65 and Figure 66), near-term ABCs are also projected to decline. There are preliminary indications in recent NMFS and DFO surveys that the 2010 year class may be another large year class.

Figure 65 Georges Bank haddock spawning stock biomass (SSB) and fishing mortality (F) estimates during 1931-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates



Projected SSB and F with 80% confidence intervals are shown with open squares.

Figure 66 Projected GB Haddock Stock Size



Framework 46

In September 2011, NMFS implemented Framework 46 to the Multispecies (Groundfish) FMP, which modified the haddock catch cap provisions originally adopted in FW 43. The haddock catch cap provisions apply only to midwater trawl vessels with a herring permit because these vessels catch nearly all of the haddock caught by the herring fishery. Catches of haddock by midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 that are documented by at-sea observers will be extrapolated to an estimate of the total catch of haddock. Individual estimates would be developed for each haddock stock (GOM and GB haddock). The cap is applied based on the multispecies fishing year (May 1 through April 30).

The catch cap is set at one percent of the Acceptable Biological Catch (ABC) of each of the haddock stocks (Gulf of Maine and Georges Bank). If the haddock catch estimate extrapolated from observer reports exceeds a stock-specific cap, midwater trawl vessels will be limited to catching 2,000 pounds of Atlantic herring in a relevant area. If there is an overage of the cap, the cap for the following year will be reduced by the amount of the overage.

In order to monitor the cap, Framework 46 implemented some changes to the reporting requirements for midwater trawl vessels. In addition to the existing requirement to report herring catches by herring management area, midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 are now required to report total kept catch by haddock stock area and gear used. This information is needed to extrapolate observer information to an estimate of total haddock catch.

Other Groundfish Stock Status/Landings

The Groundfish Assessment Review Meeting (GARM III) conducted during October 2007 – August 2008 provided benchmark assessments for the 19 groundfish stocks managed under the Northeast Multispecies Fishery Management Plan. The GARM III process involved in-depth reviews of the data, models, biological reference points, and assessments of each of the 19 groundfish stocks at the time. This section summarizes the stock status in terms of biomass (B) or spawning stock biomass (SSB) and fishing mortality (F) through 2007 as reported in NEFSC (2008). Projected SSB and F were estimated in 2008 and 2009 for most of the age-based GARM assessments. The Georges Bank yellowtail assessment is update each year through the TRAC and pollock was assessed in 2010 during SARC 50.

Atlantic wolffish was added to the multispecies groundfish stock complex in A16. Wolffish was assessed in 2008 in the Data Poor Working Group (DPWG 2008). A range of knife edge maturity and selectivity assumptions were used to characterize stock status due to a general lack of biological data on this stock.

The GARM III results show which groundfish stocks were overfished or experiencing overfishing in 2007 (Table 32). A total of 13 stocks were overfished (B less than ½ B_{MSY}) while 6 stocks were not overfished. Similarly, a total of 13 stocks were experiencing overfishing (F greater than F_{MSY}) while 6 stocks were not experiencing overfishing. Eleven of the stocks are both overfished and experiencing overfishing. Pollock, witch flounder, Georges Bank (GB) winter flounder, Gulf of Maine (GOM) winter flounder and northern windowpane had deteriorated in status, while GOM cod improved. GOM cod was still experiencing overfishing but was no longer overfished. Four stocks (redfish, American plaice, GB haddock, and GOM haddock) were classified as not overfished and not experiencing overfishing. Note the GOM winter flounder status determination was uncertain and judged as likely overfished and probably experiencing overfishing.

Subsequent to GARM III, pollock was assessed in SAW 50 (2010). The stock was determined to be not overfished and not subject to overfishing. GB yellowtail flounder was also assessed by the TRAC in 2009 and 2010 and was determined to not be subject to overfishing in both years.

Of the 14 groundfish stocks assessed in GARM III using an analytical assessment model, seven (7) stocks exhibited retrospective patterns that were considered severe enough that an adjustment to the population numbers and fishing mortality in 2007 was deemed necessary before determining current stock status and subsequently conducting projections. Retrospective pattern adjustments were done one of two ways: either a split in the survey time series during the mid-1990s or an adjustment to the population numbers at age in the terminal year based upon a measure of the age-specific retrospective pattern during the past seven years. Only for American plaice and redfish were the population numbers adjusted. For the other five stocks (GB cod, GB yellowtail, witch flounder, GOM winter flounder, SNE winter flounder) the split survey was used. The remaining seven stocks were judged to have a mild retrospective pattern that did not require an adjustment.

Since GARM II, many stocks have exhibited long term declines in weights-at-age. Age-specific fishery selectivity has also shifted in many stocks to older age groups due to a combination of reduced growth, fishery management measures, and changing fishing practices. These trends were incorporated into the updated biological reference points for the 19 groundfish stocks, and as a consequence many of the newly-estimated biomass reference points are now lower and the fishing mortality reference points higher than those estimated in GARM II. However, a direct one-to-one comparison between the old and new BRPs is inappropriate because of these changes in weights and partial recruitment at age.

Analyses from an ecosystem basis suggest current biomass management targets (B_{MSY}) for GARM stocks are reasonable. The current targets compare favorably with the results of recent and historical studies in the region and are also in general agreement with results of many studies for other worldwide ecosystems. New summed BRPs for the GARM stocks are similar to BRPs from an aggregate surplus production model for these stocks. Aggregate model results suggest that the overall fishing mortality rate should be relatively low (F=0.15) to obtain MSY for this complex of GARM stocks.

Table 32 summarizes groundfish stocks based on GARM III results. There have been changes for GB yellowtail flounder and pollock; these changes are reported in the stock-specific discussions that follow. For other stocks, an estimate of current stock status is shown that is based on projecting forward from recent catch estimates.

Table 32 – Summary of Groundfish Stock Status in 2007

Stock	*Estimated F in 2007*	*Fmsy*	*Percent F Reduction to Fmsy*	*Biomass in 2007*	*Bmsy*	*Percent change in Biomass to achieve Bmsy*	*MSY*	*2007 Overfished Status*	*2007 Overfishing Status*
Georges Bank cod	0.303	0.247	18%	17,672	148,084	738%	31,159	Overfished	Overfishing
Gulf of Maine cod	0.456	0.237	48%	33,878	58,248	72%	10,014	Not Overfished	Overfishing
Georges Bank haddock	0.229	0.350	none	315,975	158,873	above Bmsy	32,746	Not Overfished	No Overfishing
Gulf of Maine haddock	0.346	0.430	none	5,850	5,900	1%	1,360	Not Overfished	No Overfishing
Georges bank Yellowtail	0.289	0.254	12%	9,527	43,200	353%	9,400	Overfished	Overfishing
Southern New England-Mid Atlantic Yellowtail	0.413	0.254	38%	3,508	27,400	681%	6,100	Overfished	Overfishing
Cape Cod-Gulf of Maine yellowtail	0.414	0.239	42%	1,922	7,790	305%	1,720	Overfished	Overfishing
American plaice	0.094	0.190	none	11,106	21,940	98%	4,011	Not Overfished	No Overfishing
Witch flounder	0.292	0.200	32%	3,434	11,447	233%	2,352	Overfished	Overfishing
Georges Bank winter flounder	0.282	0.260	8%	4,964	16,000	222%	3,500	Overfished	Overfishing
Gulf of Maine winter flounder	0.417	0.283	32%	1,100	3,792	245%	917	Overfished	Overfishing
Southern New England-Mid-Atlantic winter flounder	0.649	0.248	62%	3,368	38,761	1051%	9,742	Overfished	Overfishing
Acadian redfish	0.007	0.038	none	172,342	271,000	57%	10,139	Not Overfished	No Overfishing
white hake	0.150	0.125	17%	19,800	56,254	184%	5,800	Overfished	Overfishing
pollock [1,4]	10.975 [2]	5.66	48%	0.754 [3]	2	165%	11,320	Not Overfished	Overfishing
northern windowpane [1]	1.96	0.50	74%	0.24 [3]	1.4	483%	700	Overfished	Overfishing
southern windowpane [1]	1.85	1.47	21%	0.19 [3]	0.34	79%	500	Not Overfished	Overfishing
ocean pout [1]	0.38	0.76	none	0.48	4.94	929%	3,754	Overfished	No Overfishing
Atlantic halibut	0.065	0.073	none	1,300	49,000	3669%	3,500	Overfished	No Overfishing

[1] *Fmsy and Bmsy index proxies are listed for pollock, ocean pout, southern and northern windowpane.*

[2] *GARM III values are equal to the catch in 2007 / average 2006 & 2007 indices (Updated relative F using the average of 2006, 2007 & 2008 is 10.46).*

[3] *Index point estimates are in the table. Status determination is made using the 3 year average (pollock = 0.90, N windowpane = 0.53, S windowpane = 0.21 kg / tow).*

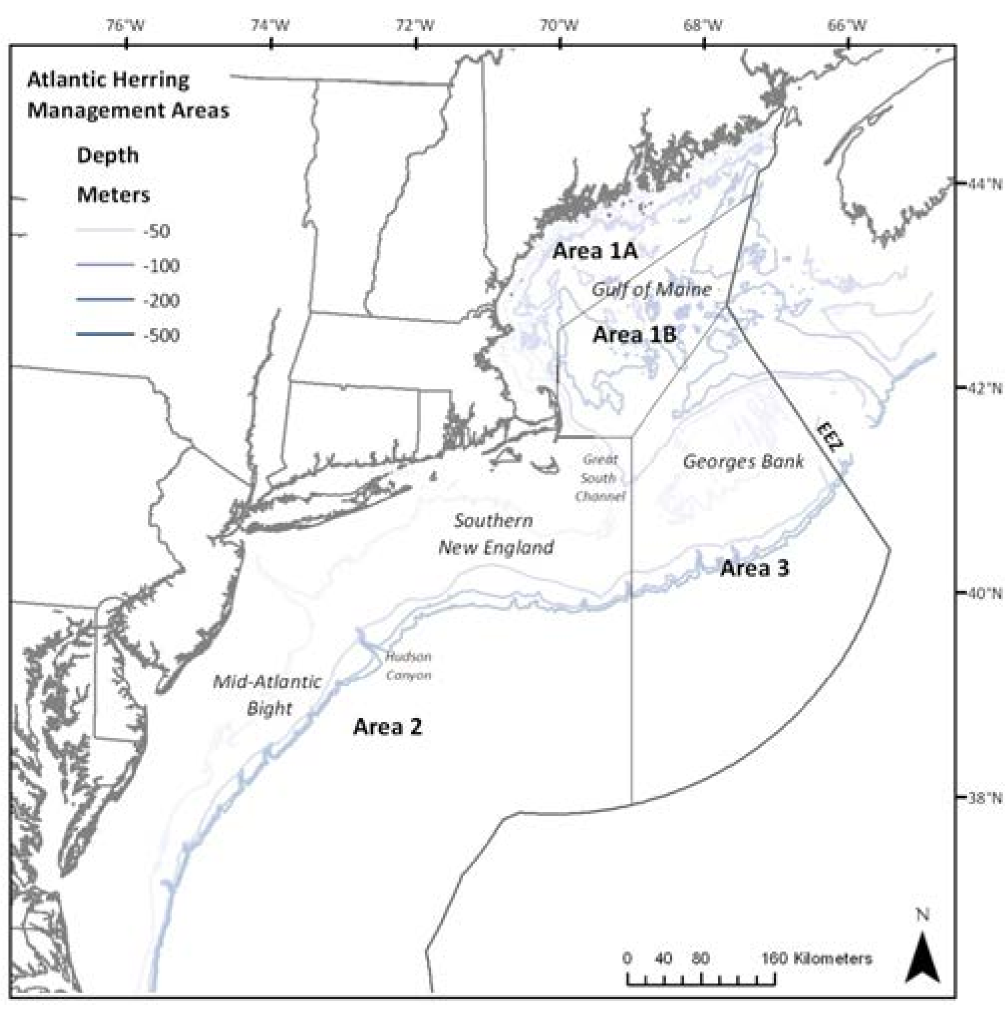
[4] *Note that after GARM III pollock was assessed at SAW 50 and was determined to be not overfished and not subject to overfishing.*

4.3 PHYSICAL ENVIRONMENT AND ESSENTIAL FISH HABITAT

4.3.1 Physical Environment

The Atlantic herring fishery is prosecuted in four areas defined as 1A, 1B, 2, and 3 (Figure 67). These areas collectively cover the entire northeast U.S. shelf ecosystem, which has been defined as the Gulf of Maine south to Cape Hatteras, North Carolina, extending from the coast seaward to the edge of the continental shelf, including offshore to the Gulf Stream (Sherman et al. 1996). Three distinct sub-regions, the Gulf of Maine, Georges Bank, and the southern New England/Mid-Atlantic region, are described below, based on a summary compiled for the gear effects technical memo authored by Stevenson et al. (2004). Roughly, Areas 1A and 1B cover the Gulf of Maine, Area 2 covers southern the New England/Mid-Atlantic region, and Area 3 covers Georges Bank.

Figure 67 Atlantic Herring Management Areas and the Northeast U.S. Shelf Ecosystem



4.3.1.1 Gulf of Maine

The Gulf of Maine is an enclosed coastal sea, bounded on the east by Browns Bank, on the north by the Nova Scotian (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank. The Gulf of Maine is a boreal environment and is characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. There are 21 distinct basins separated by ridges, banks, and swells. Depths in the basins exceed 250 m, with a maximum depth of 350 m in Georges Basin, just north of Georges Bank. High points within the Gulf of Maine include irregular ridges, such as Cashes Ledge, which peaks at 9 m below the surface.

Very fine sediment particles created and eroded by the glaciers have collected in thick deposits over much of the seafloor of the Gulf of Maine, particularly in its deep basins. These mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains. In the rises between the basins, other materials are usually at the surface. Unsorted glacial till covers some morainal areas, sand predominates on some high areas, and gravel, sometimes with boulders, predominates others. Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a depth of about 60 m. Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Gravel is most abundant at depths of 20 to 40 m, except off eastern Maine where a gravel-covered plain exists to depths of at least 100 m. Sandy areas are relatively rare along the inner shelf of the western Gulf of Maine, but are more common south of Casco Bay, especially offshore of sandy beaches.

The geologic features of the Gulf of Maine coupled with the vertical variation in water properties (e.g. salinity, depth, temperature) combine to provide a great diversity of habitat types that support a rich biological community. The most common groups of benthic invertebrates in the Gulf of Maine reported by Theroux and Wigley (1998) in terms of numbers collected were annelid worms, bivalve mollusks, and amphipod crustaceans. Biomass was dominated by bivalves, sea cucumbers, sand dollars, annelids, and sea anemones. Watling (1998) identified seven different bottom assemblages that occur on the following habitat types:

- Sandy offshore banks: fauna are characteristically sand dwellers with an abundant interstitial component;
- Rocky offshore ledges: fauna are predominantly sponges, tunicates, bryozoans, hydroids, and other hard bottom dwellers;
- Shallow (< 60 m) temperate bottoms with mixed substrate: fauna population is rich and diverse, primarily comprised of polychaetes and crustaceans;
- Primarily fine muds at depths of 60 to 140 m within cold Gulf of Maine Intermediate Water: fauna are dominated by polychaetes, shrimp, and cerianthid anemones;
- Cold deep water, muddy bottom: fauna include species with wide temperature tolerances which are sparsely distributed, diversity low, dominated by a few polychaetes, with brittle stars, sea pens, shrimp, and cerianthids also present;
- Deep basin, muddy bottom, overlaying water usually 7 to 8°C: fauna densities are not high, dominated by brittle stars and sea pens, and sporadically by a tube-making amphipods; and
- Upper slope, mixed sediment of either fine muds or mixture of mud and gravel, water temperatures always greater than 8°C: upper slope fauna extending into the Northeast Channel, where Maine Intermediate Water is described as a mid-depth layer of water that preserves winter salinity and temperatures, and is located between more saline Maine bottom water and the warmer, stratified Maine surface water. The stratified surface layer is most pronounced in the deep portions of the western Gulf of Maine.

Two studies (Gabriel 1992, Overholtz and Tyler 1985) reported common demersal fish species by assemblages in the Gulf of Maine and Georges Bank (other species were listed as found in these assemblages, but only the species common to both studies are listed):

- Deepwater/Slope and Canyon: offshore hake, blackbelly rosefish, Gulf stream flounder;
- Intermediate/Combination of Deepwater Gulf of Maine-Georges Bank and Gulf of Maine-Georges Bank Transition: silver hake, red hake, goosefish (monkfish);
- Shallow/Gulf of Maine-Georges Bank Transition Zone: Atlantic Cod, haddock, pollock;
- Shallow water Georges Bank-southern New England: yellowtail flounder, windowpane flounder, winter flounder, winter skate, little skate, longhorn sculpin;
- Deepwater Gulf of Maine-Georges Bank: white hake, American plaice, witch flounder, thorny skate; and
- Northeast Peak/Gulf of Maine-Georges Bank Transition: Atlantic cod, haddock, pollock.

4.3.1.2 Georges Bank

Georges Bank is a shallow (3 to 150 m depth), elongate (161 km wide by 322 km long) extension of the continental shelf that was formed during the Wisconsinian glacial episode. It is characterized by a steep slope on its northern edge and a broad, flat, gently sloping southern flank and has steep submarine canyons on its eastern and southeastern edges. It is characterized by highly productive, well-mixed waters and strong currents. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on Georges Bank. It is anticipated that erosion and reworking of sediments by the action of rising sea level as well as tidal and storm currents reduces the amount of sand and cause an overall coarsening of the bottom sediments (Valentine and Lough 1991).

Bottom topography on eastern Georges Bank is characterized by linear ridges in the western shoal areas; a relatively smooth, gently dipping seafloor on the deeper, easternmost part; a highly energetic peak in the north with sand ridges up to 30 m high and extensive gravel pavement; and steeper and smoother topography incised by submarine canyons on the southeastern margin. The central region of Georges Bank is shallow, and the bottom is characterized by shoals and troughs, with sand dunes superimposed within. The area west of the Great South Channel, known as Nantucket Shoals, is similar in nature to the central region of Georges Bank. Currents in these areas are strongest where water depth is shallower than 50 m. Sediments in this region include gravel pavement and mounds, some scattered boulders, sand with storm-generated ripples, and scattered shell and mussel beds. Tidal and storm currents range from moderate to strong, depending upon location and storm activity.

Oceanographic frontal systems separate water masses of the Gulf of Maine and Georges Bank from oceanic waters south of Georges Bank. These water masses differ in temperature, salinity, nutrient concentration, and planktonic communities, which influence productivity and may influence fish abundance and distribution.

Georges Bank has been historically characterized by high levels of both primary productivity and fish production. The most common groups of benthic invertebrates on Georges Bank in terms of numbers collected were amphipod crustaceans and annelid worms, and overall biomass was dominated by sand dollars and bivalves (Theroux and Wigley 1998). Using the same database, four macrobenthic invertebrate assemblages that occur on similar habitat type were identified (Theroux and Grosslein 1987):

- The Western Basin assemblage is found in comparatively deepwater (150 to 200 m) with relatively slow currents and fine bottom sediments of silt, clay, and muddy sand. Fauna are comprised mainly of small burrowing detritivores and deposit feeders, and carnivorous scavengers.
- The Northeast Peak assemblage is found in variable depth and current strength and includes coarse sediments, consisting mainly of gravel and coarse sand with interspersed boulders, cobbles, and pebbles. Fauna tend to be sessile (coelenterates, brachiopods, barnacles, and tubiferous annelids) or free-living (brittle stars, crustaceans, and polychaetes), with a characteristic absence of burrowing forms.
- The Central Georges Bank assemblage occupies the greatest area, including the central and northern portions of Georges Bank in depths less than 100 m. Medium-grained shifting sands predominate this dynamic area of strong currents. Organisms tend to be small to moderately large with burrowing or motile habits. Sand dollars are most characteristic of this assemblage.
- The Southern Georges Bank assemblage is found on the southern and southwestern flanks at depths from 80 to 200 m, where fine-grained sands and moderate currents predominate. Many southern species exist here at the northern limits of their range. Dominant fauna include amphipods, copepods, euphausiids, and starfish.

Common demersal fish species found on Georges Bank are offshore hake, blackbelly rosefish, Gulf stream flounder, silver hake, red hake, goosefish (monkfish), Atlantic cod, haddock, pollock, yellowtail flounder, windowpane flounder, winter flounder, winter skate, little skate, longhorn sculpin, white hake, American plaice, witch flounder, and thorny skate.

4.3.1.3 Southern New England/Mid-Atlantic Bight

The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream. The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England and generally includes the area of the continental shelf south of Cape Cod from the Great South Channel to Hudson Canyon. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, North Carolina. The shelf slopes gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100 to 200 m water depth) at the shelf break. In both the Mid-Atlantic Bight and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (Stevenson et al. 2004). Like the rest of the continental shelf, the topography of the Mid-Atlantic Bight was shaped largely by sea level fluctuations during past ice ages. Since that time, currents and waves have modified this basic structure.

The sediment type covering most of the shelf in the Mid-Atlantic Bight is sand, with some relatively small, localized areas of sand-shell and sand-gravel. On the slope, silty sand, silt, and clay predominate. Permanent sand ridges occur in groups with heights of about 10 m, lengths of 10 to 50 km and spacing of 2 km. The sand ridges are usually oriented at a slight angle towards shore, running in length from northeast to southwest. Sand ridges are often covered with smaller similar forms such as sand waves, megaripples, and ripples. Sand waves are usually found in patches of 5 to 10 with heights of about 2 m, lengths of 50 to 100 m, and 1 to 2 km between patches. The sand waves are usually found on the inner shelf and are temporary features that form and re-form in different locations, especially in areas like Nantucket Shoals where there are strong bottom currents. Because tidal currents southwest of Nantucket Shoals and southeast of Long Island and Rhode Island slow significantly, there is a large mud patch on the seafloor where silts and clays settle out.

Artificial reefs are another significant Mid-Atlantic Bight habitat, formed much more recently on the geologic time scale than other regional habitat types. These localized areas of hard structure have been formed by shipwrecks, lost cargoes, disposed solid materials, shoreline jetties and groins, submerged pipelines, cables, and other materials (Steimle and Zetlin 2000). In general, reefs are important for attachment sites, shelter, and food for many species. In addition, fish predators, such as tunas, may be attracted by prey aggregations or may be behaviorally attracted to the reef structure. Estuarine reefs, such as blue mussel beds or oyster reefs, are dominated by epibenthic organisms, as well as crabs, lobsters, and sea stars. These reefs are hosts to a multitude of fish, including gobies, spot, bass (black sea and striped), perch, toadfish, and croaker. Coastal reefs are comprised of either exposed rock, wrecks, kelp, or other hard material, and these are generally dominated by boring mollusks, algae, sponges, anemones, hydroids, and coral. These reef types also host lobsters, crabs, sea stars, and urchins, as well as a multitude of fish, including black sea bass, pinfish, scup, cunner, red hake, gray triggerfish, black grouper, smooth dogfish, and summer flounder. These epibenthic organisms and fish assemblages are similar to the reefs farther offshore, which are generally comprised of rocks and boulders, wrecks, and other types of artificial reefs. There is less information available for reefs on the outer shelf, but the fish species associated with these reefs include tilefish, white hake, and conger eel.

The benthic inhabitants of this primarily sandy environment are dominated in terms of numbers by amphipod crustaceans and bivalve mollusks. Biomass is dominated by mollusks (70 percent) (Theroux and Wigley 1998). Pratt (1973) identified three broad faunal zones related to water depth and sediment type:

- The “sand fauna” zone is dominated by polycheates and was defined for sandy sediments (1 percent or less silt) that are at least occasionally disturbed by waves, from shore out to a depth of about 50 m.
- The “silty sand fauna” zone is dominated by amphipods and polychaetes and occurs immediately offshore from the sand fauna zone, in stable sands containing a small amount of silt and organic material.
- Silts and clays become predominant at the shelf break and line the Hudson Shelf Valley supporting the “silt-clay fauna.”

Rather than substrate as in the Gulf of Maine and Georges Bank, latitude and water depth are considered to be the primary factors influencing demersal fish species distribution in the Mid-Atlantic Bight area. The following assemblages were identified by Colvocoresses and Musick (1984) in the Mid-Atlantic subregion during spring and fall (Other species were listed as found in these assemblages, but only the species common to both spring and fall seasons are listed).

- Northern (boreal) portions: hake (white, silver, red), goosefish (monkfish), longhorn sculpin, winter flounder, little skate, and spiny dogfish;
- Warm temperate portions: black sea bass, summer flounder, butterfish, scup, spotted hake, and northern sea robin;
- Water of the inner shelf: windowpane flounder;
- Water of the outer shelf: fourspot flounder; and
- Water of the continental slope: shortnose greeneye, offshore hake, blackbelly rosefish, and white hake.

4.3.2 Essential Fish Habitat (EFH)

EFH is defined by the Sustainable Fisheries Act of 1996 as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The following sections describe Atlantic herring EFH, EFH designations for other species that overlap with the herring fishery, herring as a prey species, and finally, herring gear and its potential to generate adverse effects on benthic EFH.

4.3.2.1 Atlantic Herring EFH

The EFH designation for Atlantic herring was developed as part of EFH Omnibus Amendment 1 in 1998. EFH Omnibus Amendment 2, which includes updates to the EFH designation for herring, as well as for other NEFMC-managed species, is currently in development. Based on the 1998 designation, which is currently in effect, EFH for Atlantic herring is described in as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated in Figure 68 through Figure 71 and in Table 33 and meet the following conditions:

Eggs: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine and Georges Bank as depicted in Figure 68. Eggs adhere to the bottom, forming extensive egg beds which may be many layers deep. Generally, the following conditions exist where Atlantic herring eggs are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are most often found in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring eggs are most often observed during the months from July through November.

Larvae: Pelagic waters in the Gulf of Maine, Georges Bank, and southern New England that comprise 90% of the observed range of Atlantic herring larvae as depicted in Figure 69. Generally, the following conditions exist where Atlantic herring larvae are found: sea surface temperatures below 16° C, water depths from 50 - 90 meters, and salinities around 32‰. Atlantic herring larvae are observed between August and April, with peaks from September through November.

Juveniles: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 70. Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 10° C, water depths from 15 - 135 meters, and a salinity range from 26 - 32‰.

Adults: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 71. Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 10° C, water depths from 20 - 130 meters, and salinities above 28‰.

Spawning Adults: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 71. Generally, the following conditions exist where spawning Atlantic herring adults are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are spawned in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring are most often observed spawning during the months from July through November.

All of the above EFH descriptions include those bays and estuaries listed in Table 33, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

Table 33 – EFH Designation of Estuaries and Embayments for Atlantic Herring

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay		m,s	m,s	m,s	
Englishman/Machias Bay	s	m,s	m,s	m,s	s
Narraguagus Bay		m,s	m,s	m,s	
Blue Hill Bay		m,s	m,s	m,s	
Penobscot Bay		m,s	m,s	m,s	
Muscongus Bay		m,s	m,s	m,s	
Damariscotta River		m,s	m,s	m,s	
Sheepscot River		m,s	m,s	m,s	
Kennebec / Androscoggin Rivers		m,s	m,s	m,s	
Casco Bay	s	m,s	m,s	s	
Saco Bay		m,s	m,s	s	
Wells Harbor		m,s	m,s	s	
Great Bay		m,s	m,s	s	
Merrimack River		M	m		
Massachusetts Bay		s	s	s	
Boston Harbor		s	m,s	m,s	
Cape Cod Bay	s	s	m,s	m,s	
Waquoit Bay					
Buzzards Bay			m,s	m,s	
Narragansett Bay		s	m,s	m,s	
Long Island Sound			m,s	m,s	
Connecticut River					
Gardiners Bay			s	s	
Great South Bay			s	s	
Hudson River / Raritan Bay		m,s	m,s	m,s	
Barnegat Bay			m,s	m,s	
Delaware Bay			m,s	s	
Chincoteague Bay					
Chesapeake Bay				s	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).
These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury et al. 1994; Stone et al. 1994).

Figure 68 – EFH Designation for Atlantic Herring Eggs

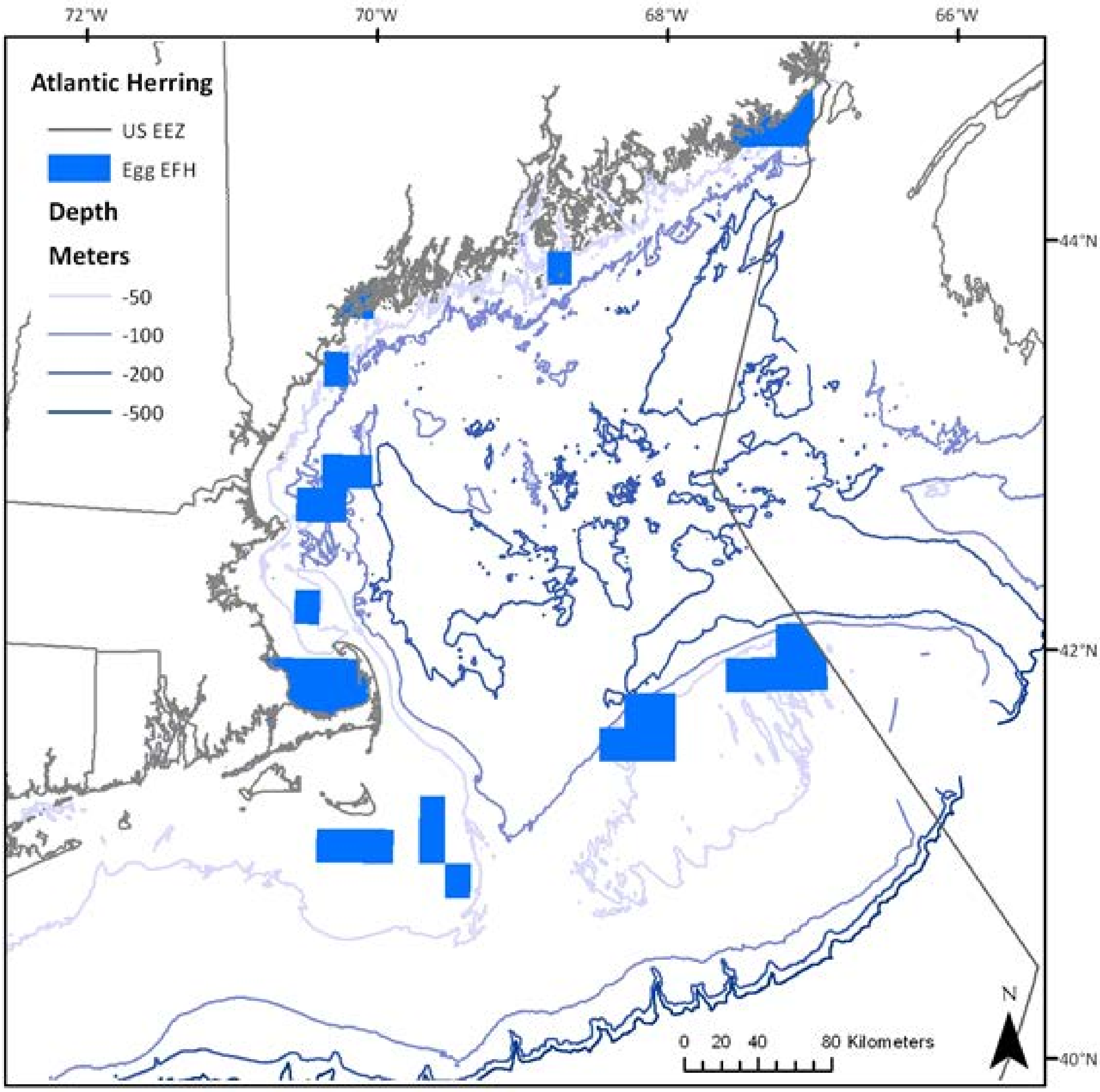


Figure 69 – EFH Designation for Atlantic Herring Larvae

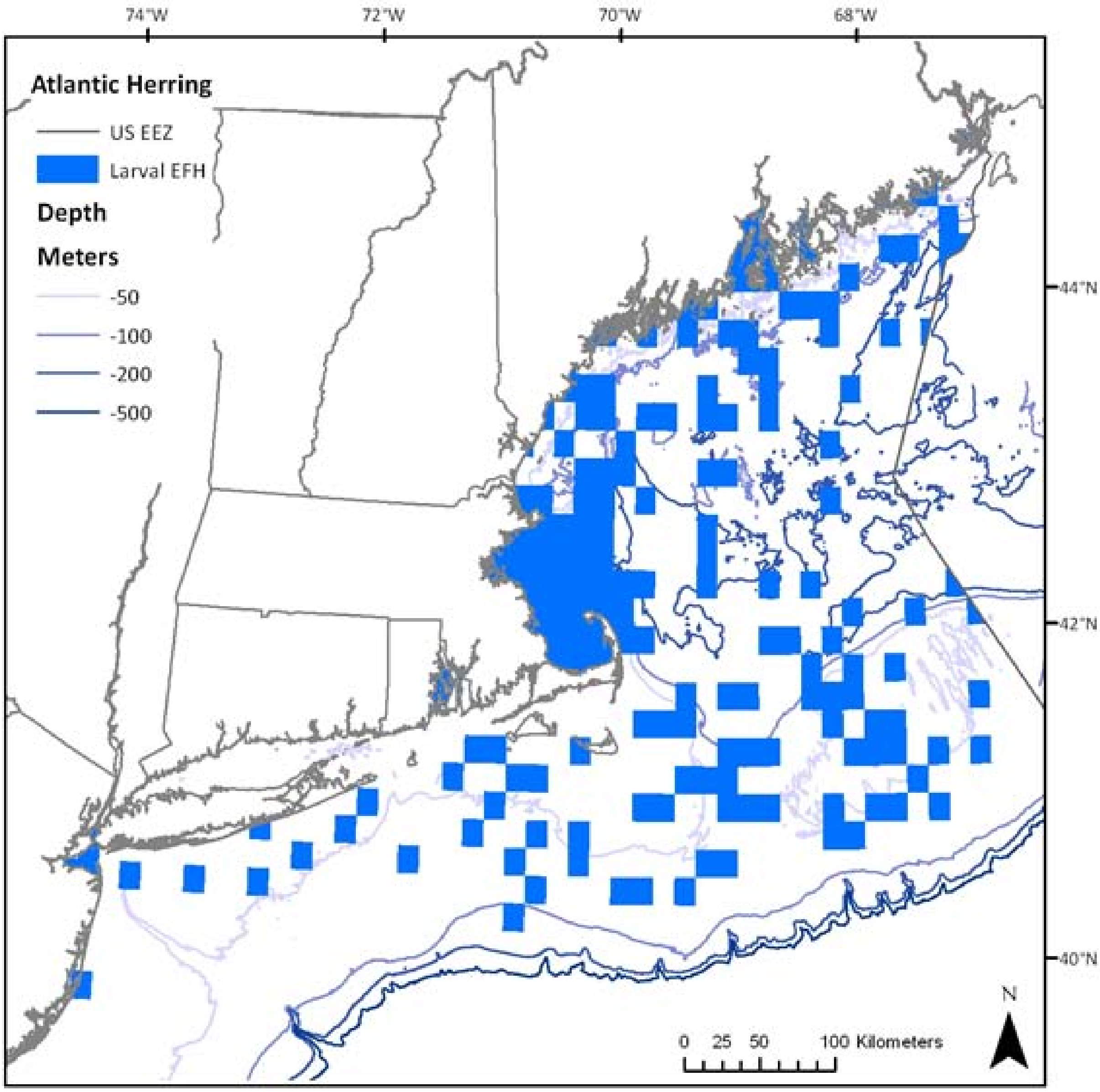


Figure 70 – EFH Designation for Atlantic Herring Juveniles

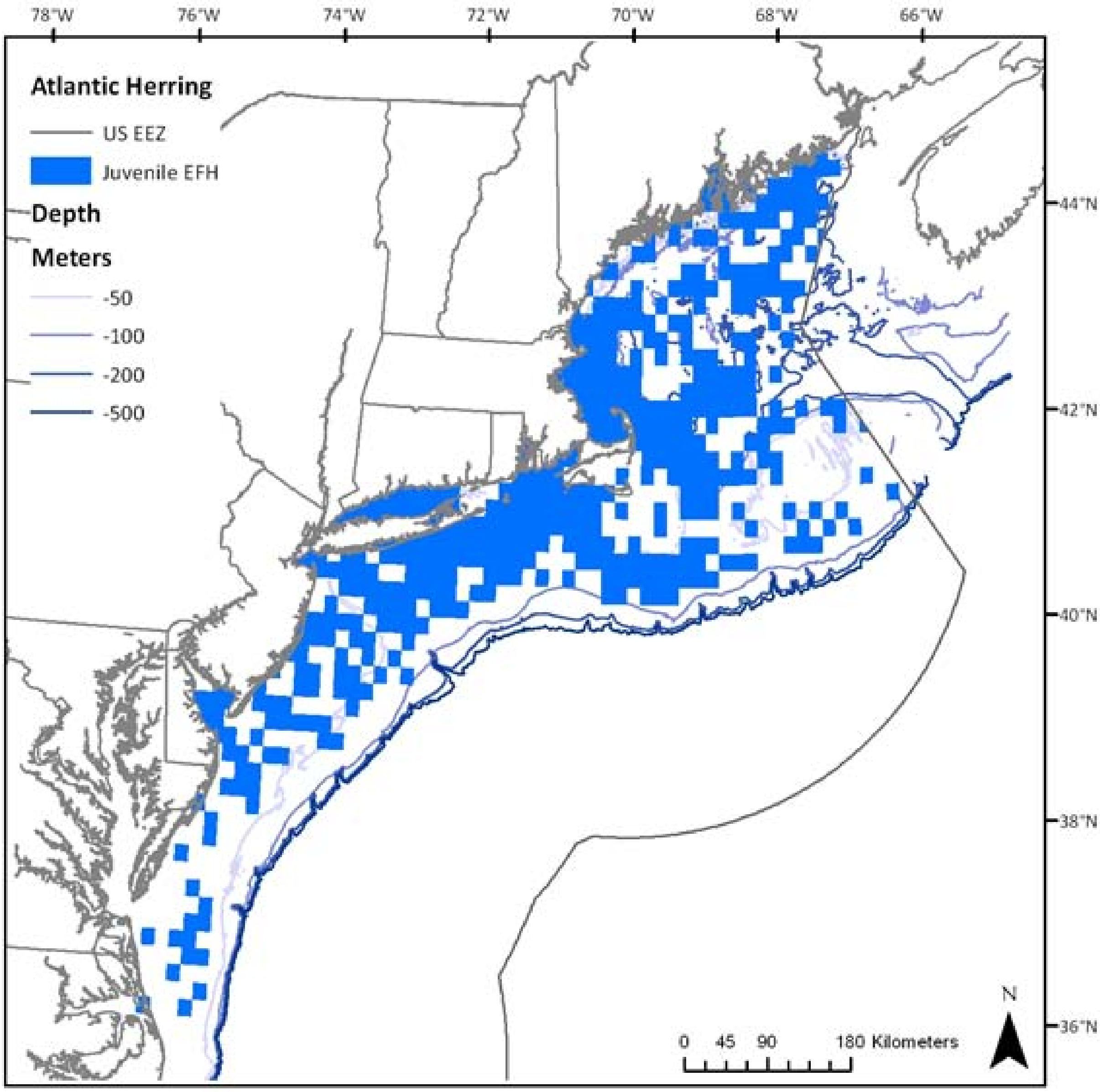
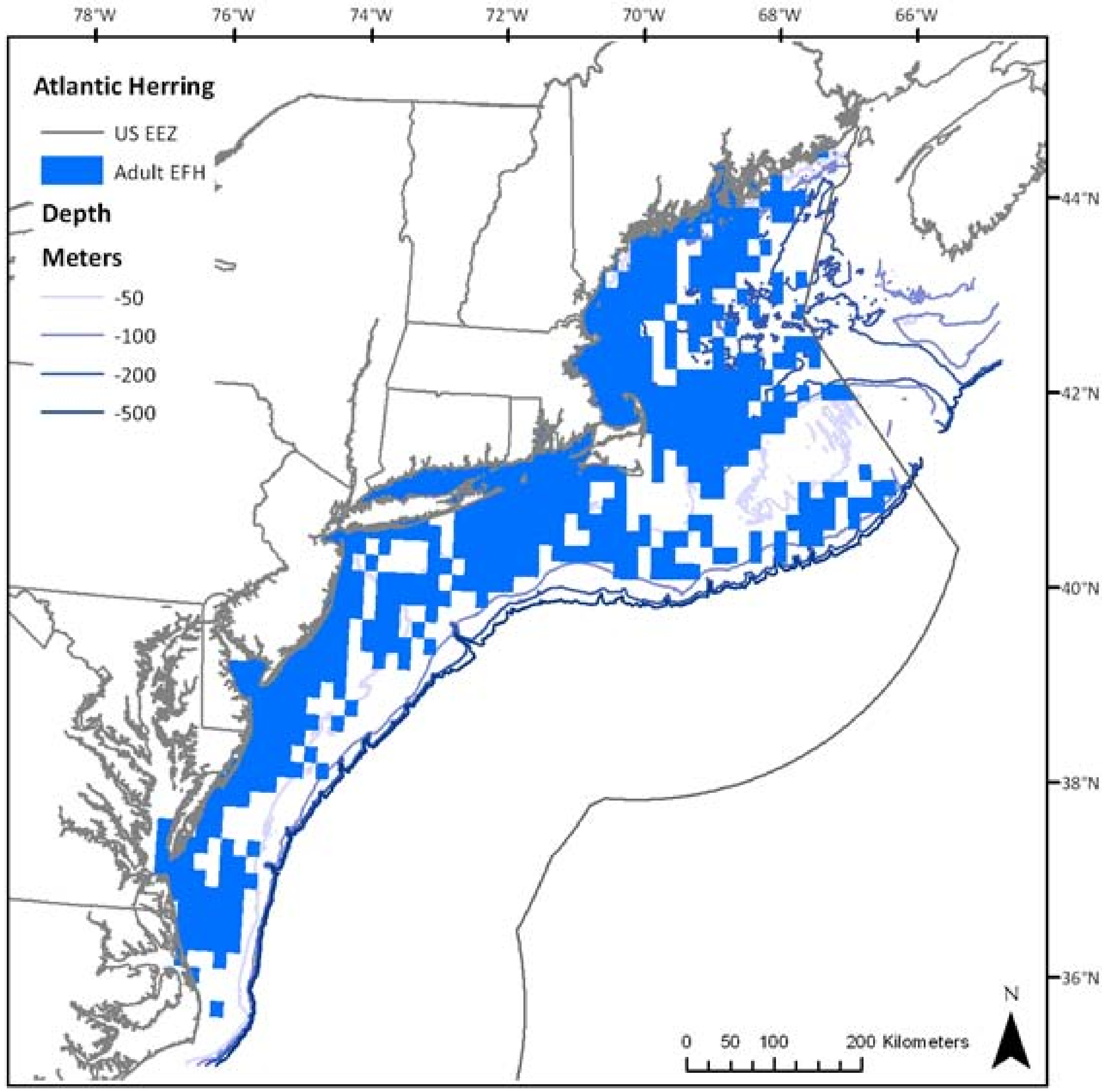


Figure 71 – EFH Designation for Atlantic Herring Adults



EFH for Other Species

The environment that could potentially be affected by the Proposed Action has been identified as EFH for benthic life stages of species that are managed under the Northeast Multispecies FMP; Atlantic sea scallop; monkfish; deep-sea red crab; northeast skate complex; Atlantic herring; summer flounder, scup, and black sea bass; tilefish; squid, Atlantic mackerel, and butterfish; Atlantic surfclam and ocean quahog FMPs. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and Federal waters throughout the Northeast U.S. Shelf Ecosystem. EFH descriptions of the general substrate or bottom types for all the benthic life stages of the species managed under these FMPs are summarized in Table 34. Full descriptions and maps of EFH for each species and life stage (except Atlantic wolffish) are available on the NMFS Northeast Region website at http://www.nero.noaa.gov/hcd/index2a.htm.

Table 34 – Demersal Species/Lifestages for Which Designated EFH Overlaps with the Atlantic Herring Fishery, Listed Alphabetically by Common Name

Species	*Life Stage*	*Geographic Area of EFH*	*Depth*	*Seasonal Occurrence*	*EFH Description*
American plaice	juvenile	GOME and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass. Bay to Cape Cod Bay, MA	45 - 150		Bottom habitats with fine grained sediments or a substrate of sand or gravel
American plaice	adult	GOME and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass. Bay to Cape Cod Bay, MA	45 - 175		Bottom habitats with fine grained sediments or a substrate of sand or gravel
Atlantic cod	juvenile	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	25 - 75		Bottom habitats with a substrate of cobble or gravel
Atlantic cod	adult	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	10 - 150		Bottom habitats with a substrate of rocks, pebbles, or gravel
Atlantic halibut	juvenile	GOME, GB	20 - 60		Bottom habitats with a substrate of sand, gravel, or clay
Atlantic halibut	adult	GOME, GB	100 - 700		Bottom habitats with a substrate of sand, gravel, or clay
Atlantic salmon	juvenile	Rivers from CT to Maine: Connecticut, Pawcatuck, Merrimack, Cocheco, Saco, Androscoggin, Presumpscot, Kennebec, Sheepscot, Ducktrap, Union, Penobscot, Narraguagus, Machias, East Machias, Pleasant, St. Croix, Denny's, Passagassawaukeag, Aroostook, Lamprey, Boyden, Orland Rivers, and the Turk, Hobart and Patten Streams; and the following estuaries for juveniles and adults: Passamaquoddy Bay to Muscongus Bay; Casco Bay to Wells Harbor; Mass. Bay, Long Island Sound, Gardiners Bay to Great South Bay. All aquatic habitats in the watersheds of the above listed rivers, including all tributaries to the extent that they are currently or were historically accessible for salmon migration.	10 – 61		Bottom habitats of shallow gravel/cobble riffles interspersed with deeper riffles and pools in rivers and estuaries, water velocities between 30 - 92 cm/s

Table 34 continued.

Atlantic sea scallop	juvenile	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	18 - 110		Bottom habitats with a substrate of cobble, shells, and silt
Atlantic sea scallop	adult	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	18 - 110		Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand
Atlantic surfclam	juvenile	Eastern edge of GB and the GOME throughout Atlantic EEZ	0 - 60, low density beyond 38		Throughout substrate to a depth of 3 ft within federal waters, burrow in medium to coarse sand and gravel substrates, also found in silty to fine sand, but not in mud
Atlantic surfclam	adult	Eastern edge of GB and the GOME throughout Atlantic EEZ	0 - 60, low density beyond 38	Spawn summer to fall	Throughout substrate to a depth of 3 ft within federal waters
Barndoor skate	juvenile	Eastern GOME, GB, Southern NE, Mid-Atlantic Bight to Hudson Canyon	l0 - 750, mosty < 150		Bottom habitats with mud, gravel, and sand substrates
Barndoor skate	adult	Eastern GOME, GB, Southern NE, Mid-Atlantic Bight to Hudson Canyon	l0 - 750, mosty < 150		Bottom habitats with mud, gravel, and sand substrates
Black sea bass	juvenile	Demersal waters over continental shelf from GOME to Cape Hatteras, NC, also includes estuaries from Buzzards Bay to Long Island Sound; Gardiners Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound, and James River	1 – 38	Found in coastal areas (April to December, peak June to November) between VA and MA, but winter offshore from NJ and south; estuaries in summer and spring	Rough bottom, shellfish and eelgrass beds, manmade structures in sandy-shelly areas, offshore clam beds, and shell patches may be used during wintering
Black sea bass	adult	Demersal waters over continental shelf from GOME to Cape Hatteras, NC, also includes estuaries: Buzzards Bay, Narragansett Bay, Gardiners Bay, Great South Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound, and James River	20 - 50	Wintering adults (November to April) offshore, south of NY to NC; inshore, estuaries from May to October	Structured habitats (natural and manmade), sand and shell substrates preferred
Clearnose skate	juvenile	GOME, along shelf to Cape Hatteras, NC; includes the estuaries from Hudson River/Raritan Bay south to the Chesapeake Bay mainstem	0 – 500, mostly < 111		Bottom habitats with substrate of soft bottom along continental shelf and rocky or gravelly bottom
Clearnose skate	adult	GOME, along shelf to Cape Hatteras, NC; includes the estuaries from Hudson River/Raritan Bay south to the Chesapeake Bay mainstem	0 – 500, mostly < 111		Bottom habitats with substrate of soft bottom along continental shelf and rocky or gravelly bottom

Table 34 continued.

Golden crab	juvenile	Chesapeake Bay to the south through the Florida Straight (and into the Gulf of Mexico)	290 - 570		Continental slope in flat areas of foraminifera ooze, on distinct mounds of dead coral, ripple habitat, dunes, black pebble habitat, low outcrop, and soft bioturbated habitat
Golden crab	adult	Chesapeake Bay to the south through the Florida Straight (and into the Gulf of Mexico)	290 - 570		Continental slope in flat areas of foraminifera ooze, on distinct mounds of dead coral, ripple habitat, dunes, black pebble habitat, low outcrop, and soft bioturbated habitat
Haddock	juvenile	GB, GOME, middle Atlantic south to Delaware Bay	35 - 100		Bottom habitats with a substrate of pebble and gravel
Haddock	adult	GB and eastern side of Nantucket Shoals, throughout GOME, *additional area of Nantucket Shoals, and Great South Channel	40 - 150		Bottom habitats with a substrate of broken ground, pebbles, smooth hard sand, and smooth areas between rocky patches
Little skate	juvenile	GB through Mid-Atlantic Bight to Cape Hatteras, NC; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 137, mostly 73 - 91		Bottom habitats with sandy or gravelly substrate or mud
Little skate	adult	GB through Mid-Atlantic Bight to Cape Hatteras, NC; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 137, mostly 73 - 91		Bottom habitats with sandy or gravelly substrate or mud
Monkfish	juvenile	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, all areas of GOME	25 - 200		Bottom habitats with substrates of a sandshell mix, algae covered rocks, hard sand, pebbly gravel, or mud
Monkfish	adult	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, outer perimeter of GB, all areas of GOME	25 - 200		Bottom habitats withsubstrates of a sandshell mix, algae covered rocks, hard sand, pebbly gravel, or mud
Ocean pout	juvenile	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, and Cape Cod Bay	< 50	Late fall to spring	Bottom habitats in close proximity to hard bottom nesting areas
Ocean pout	adult	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, Boston Harbor, and Cape Cod Bay	< 80		Bottom habitats, often smooth bottom near rocks or algae
Ocean quahog	juvenile	Eastern edge of GB and GOME throughout the Atlantic EEZ	8 - 245		Throughout substrate to a depth of 3 ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras

Table 34 continued.

Ocean quahog	adult	Eastern edge of GB and GOME throughout the Atlantic EEZ	8 - 245	Spawn May to December with several peaks	Throughout substrate to a depth of 3 ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras
Offshore hake	juvenile	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	170 - 350		Bottom habitats
Offshore hake	adult	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	150 - 380		Bottom habitats
Pollock	juvenile	GOME, GB, and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay to Waquoit Bay; Long Island Sound, Great South Bay	0 – 250		Bottom habitats with aquatic vegetation or a substrate of sand, mud, or rocks
Pollock	adult	GOME, GB, southern NE, and middle Atlantic south to New Jersey and the following estuaries: Passamaquoddy Bay, Damariscotta R., Mass Bay, Cape Cod Bay, Long Island Sound	15 – 365		Hard bottom habitats including artificial reefs
Red crab	juvenile	Southern flank of GB and south the Cape Hatteras, NC	700 - 1800		Bottom habitats of continental slope with a substrate of silts, clays, and all silt-clay-sand composites
Red crab	adult	Southern flank of GB and south the Cape Hatteras, NC	200 - 1300		Bottom habitats of continental slope with a substrate of silts, clays, and all silt-clay-sand composites
Red drum	juvenile	Along the Atlantic coast from Virginia through the Florida Keys	< 50	Found throughout Chesapeake Bay from September to November	Utilize shallow backwaters of estuaries as nursery areas and remain until they move to deeper water portions of the estuary associated with river mouths, oyster bars, and front beaches
Red drum	adult	Along the Atlantic coast from Virginia through the Florida Keys	< 50	Found in Chesapeake in spring and fall and also along eastern shore of VA	Concentrate around inlets, shoals, and capes along the Atlantic coast; shallow bay bottoms or oyster reef substrate preferred, also nearshore artificial reefs
Red hake	juvenile	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass. Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan Bay, and Chesapeake Bay	< 100		Bottom habitats with substrate of shell fragments, including areas with an abundance of live scallops
Red hake	adult	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass. Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan Bay, Delaware Bay, and Chesapeake Bay	10 - 130		Bottom habitats in depressions with a substrate of sand and mud

Table 34 continued.

Redfish	juvenile	GOME, southern edge of GB	25 - 400		Bottom habitats with a substrate of silt, mud, or hard bottom
Redfish	adult	GOME, southern edge of GB	50 - 350		Bottom habitats with a substrate of silt, mud, or hard bottom
Rosette skate	juvenile	Nantucket shoals and southern edge of GB to Cape Hatteras, NC	33 - 530, mostly 74 - 274		Bottom habitats with soft substrate, including sand/mud bottoms, mud with echinoid and ophiuroid fragments, and shell and pteropod ooze
Rosette skate	adult	Nantucket shoals and southern edge of GB to Cape Hatteras, NC	33 - 530, mostly 74 - 274		Bottom habitats with soft substrate, including sand/mud bottoms, mud with echinoid and ophiuroid fragments, and shell and pteropod ooze
Scup	juvenile	Continental shelf from GOME to Cape Hatteras, NC includes the following estuaries: Mass. Bay, Cape Cod Bay to Long Island Sound; Gardiners Bay to Delaware Inland Bays; and Chesapeake Bay	(0 - 38)	Spring and summer in estuaries and bays	Demersal waters north of Cape Hatteras and inshore on various sands, mud, mussel, and eelgrass bed type substrates
Scup	adult	Continental shelf from GOME to Cape Hatteras, NC includes the following estuaries: Cape Cod Bay to Long Island Sound; Gardiners Bay to Hudson R./ Raritan Bay; Delaware Bay and Inland Bays; and Chesapeake Bay	(2 -185)	Wintering adults (November to April) are usually offshore, south of NY to NC	Demersal waters north of Cape Hatteras and inshore estuaries (various substrate types)
Silver hake	juvenile	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass. Bay to Cape Cod Bay	20 – 270		Bottom habitats of all substrate types
Silver hake	adult	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass. Bay to Cape Cod Bay	30 – 325		Bottom habitats of all substrate types
Smooth skate	juvenile	Offshore banks of GOME	31 – 874, mostly 110 - 457		Bottom habitats with a substrate of soft mud (silt and clay), sand, broken shells, gravel and pebbles
Smooth skate	adult	Offshore banks of GOME	31 – 874, mostly 110 - 457		Bottom habitats with a substrate of soft mud (silt and clay), sand, broken shells, gravel and pebbles
Spanish mackerel, cobia, and king mackerel	juvenile	South Atlantic and Mid-Atlantic Bights			Sandy shoals of capes and offshore bars, high profile rock bottoms and barrier island oceanside waters from surf zone to shelf break, but from the Gulf Stream shoreward

Table 34 continued.

Spanish mackerel, cobia, and king mackerel	adult	South Atlantic and Mid-Atlantic Bights			Sandy shoals of capes and offshore bars, high profile rock bottoms and barrier island oceanside waters from surf zone to shelf break, but from the Gulf Stream shoreward
Spiny dogfish	juvenile	GOME through Cape Hatteras, NC across the continental shelf; continental shelf waters south of Cape Hatteras, NC through Florida; also includes estuaries from Passamaquoddy Bay to Saco Bay; Mass. Bay and Cape Cod Bay	10 - 390		Continental shelf waters and estuaries
Spiny dogfish	adult	GOME through Cape Hatteras, NC across the continental shelf; continental shelf waters south of Cape Hatteras, NC through Florida; also includes estuaries from Passamaquoddy Bay to Saco Bay; Mass. Bay and Cape Cod Bay	10 - 450		Continental shelf waters and estuaries
Summer flounder	juvenile	Over continental shelf from GOME to Cape Hatteras, NC; south of Cape Hatteras to Florida; also includesestuaries from Waquoit Bay to James R.; Albemarle Sound to Indian R.	0.5 – 5 in estuary		Demersal waters, on muddy substrate but prefer mostly sand; found in the lower estuaries in flats, channels, salt marsh creeks, and eelgrass beds
Summer flounder	adult	Over continental shelf from GOME to Cape Hatteras, NC; south of Cape Hatteras to Florida; also includes estuaries from Buzzards Bay, Narragansett Bay, Conn. R. to James R.; Albemarle Sound to Broad R.; St. Johns R., and Indian R.	0 - 25	Shallow coastal and estuarine waters during warmer months, move offshore on outer continental shelf at depths of 150 m in colder months	Demersal waters and estuaries
Thorny skate	adult	GOME and GB	18 - 2000, mostly 111 - 366		Bottom habitats with a substrate of sand, gravel, broken shell, pebbles, and soft mud
Tilefish	Juveniles and adults	Shelf break, submarine canyon walls, and flanks from Georges Bank to Cape Hatteras	Bottom temps between 9-14° C (generally 100-300 m)		Cohesive clay sediments for burrowing; rocks, boulders, and clay ledges
White hake	adult	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Cape Cod Bay	5 - 325		Bottom habitats with substrate of mud or fine grained sand
White hake	juvenile	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Cape Cod Bay	5 - 225	May to September	Pelagic stage - pelagic waters; demersal stage - bottom habitat with seagrass beds or substrate of mud or fine grained sand
Windowpane flounder	juvenile	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Chesapeake Bay	1 - 100		Bottom habitats with substrate of mud or fine grained sand

Table 34 continued.

Windowpane flounder	adult	GOME, GB, southern NE, middle Atlantic south to Virginia - NC border and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Chesapeake Bay	1 - 75		Bottom habitats with substrate of mud or fine grained sand
Winter flounder	juvenile	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	0.1 – 10 (1 - 50, age 1+)		Bottom habitats with a substrate of mud or fine grained sand
Winter flounder	adult	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	1 - 100		Bottom habitats including estuaries with substrates of mud, sand, grave
Winter skate	juvenile	Cape Cod Bay, GB, southern NE shelf through Mid-Atlantic Bight to North Carolina; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 37, mostly < 111		Bottom habitats with substrate of sand and gravel or mud
Winter skate	adult	Cape Cod Bay, GB southern NE shelf through Mid-Atlantic Bight to North Carolina; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 371, mostly < 111		Bottom habitats with substrate of sand and gravel or mud
Witch flounder	juvenile	GOME, outer continental shelf from GB south to Cape Hatteras	50 - 450 to 1500		Bottom habitats with fine grained substrate
Witch flounder	adult	GOME, outer continental shelf from GB south to Chesapeake Bay	25 - 300		Bottom habitats with fine grained substrate
Yellowtail flounder	juvenile	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass. Bay to Cape Cod Bay	20 - 50		Bottom habitats with substrate of sand or sand and mud
Yellowtail flounder	adult	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass. Bay to Cape Cod Bay	20 - 50		Bottom habitats with substrate of sand or sand and mud

Table 35 – Listing of Sources for current EFH Designation Information*

Species	*Management authority*	*Plan managed under*	*EFH designation action*
American plaice	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Atlantic cod	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Atlantic halibut	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Atlantic herring	NEFMC	Atlantic Herring	EFH Omnibus/Atlantic Herring FMP
Atlantic salmon	NEFMC	Atlantic salmon	EFH Omnibus/Atlantic Salmon FMP
Atlantic sea scallop	NEFMC	Atlantic Sea Scallop	EFH Omnibus/Atlantic Sea Scallop A9
Atlantic surfclam	MAFMC	Atlantic Surfclam Ocean Quahog	Atlantic Surfclam Ocean Quahog A12
Atlantic wolffish	NEFMC	NE Multispecies	Amendment 16
Barndoor skate	NEFMC	NE Skate Complex	Original NE Skate Complex FMP
Black sea bass	MAFMC	Summer Flounder, Scup, and Black Sea Bass	Summer Flounder, Scup, and Black Sea Bass A12
Clearnose skate	NEFMC	NE Skate Complex	Original NE Skate Complex FMP
Golden crab	SAFMC	Golden Crab	Golden Crab FMP A1
Haddock	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Little skate	NEFMC	NE Skate Complex	Original NE Skate Complex FMP
Monkfish	NEFMC, MAFMC	Monkfish	EFH Omnibus/Monkfish A1
Ocean pout	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Ocean quahog	MAFMC	Atlantic Surfclam Ocean Quahog	Atlantic Surfclam Ocean Quahog A12
Offshore hake	NEFMC	NE Multispecies	NE Multispecies A12
Pollock	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Red crab	NEFMC	Red Crab	Original Red Crab FMP
Red drum	ASMFC/SAFMC	ASMFC Red Drum FMP	SAFMC Habitat Plan
Red hake	NEFMC	NE Multispecies	NE Multispecies A12
Redfish	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Rosette skate	NEFMC	NE Skate Complex	Original NE Skate Complex FMP
Scup	MAFMC	Summer Flounder, Scup, and Black Sea Bass	Summer Flounder, Scup, and Black Sea Bass A12
Silver hake	NEFMC	NE Multispecies	NE Multispecies A12
Smooth skate	NEFMC	NE Skate Complex	Original NE Skate Complex FMP
Spanish mackerel, cobia, and king mackerel	SAFMC/GMFMC	Coastal Migratory Pelagics	Coastal Migratory Pelagics FMP A10
Spiny dogfish	MAFMC/NEFMC	Spiny Dogfish	Original Spiny Dogfish FMP
Summer flounder	MAFMC	Summer Flounder, Scup, and Black Sea Bass	Summer Flounder, Scup, and Black Sea Bass A12
Thorny skate	NEFMC	NE Skate Complex	Original NE Skate Complex FMP
Tilefish	MAFMC	Tilefish	Tilefish FMP Amendment 1
White hake	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Windowpane flounder	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Winter flounder	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Winter skate	NEFMC	NE Skate Complex	Original NE Skate Complex FMP
Witch flounder	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11
Yellowtail flounder	NEFMC	NE Multispecies	EFH Omnibus/NE Multispecies A11

*Current as of May 2011

4.3.2.2 Herring Gear Types and Their Interaction with Habitat

Usage of different gear types to prosecute the herring fishery has shifted over time: fixed gear dominated the fishery in the 1960s, purse seines became the dominant gear type in the 1980s and early 1990s, and since the mid-1990s, the fishery is prosecuted primarily by midwater trawl (single and paired) vessels. All offshore directed fishing for herring (Area 3) occurs through the use of midwater trawls and pair trawls. The use of purse seine gear in the fishery in the inshore Gulf of Maine has increased since the 2007 implementation of the Area 1A seasonal purse seine/fixed gear only area, as a few vessels are converting to purse seine gear to prosecute the summer fishery. The increased use of small mesh bottom trawl gear in the Atlantic herring fishery in recent years is discussed in Section 4.5.1 of this document.

The purse seine is a deep nylon mesh net with floats on the top and lead weights on the bottom. Rings are fastened at intervals to the lead line and a purse line runs completely around the net through the rings (see GMRI web site www.gmri.org). One end of the net remains in the vessel and the other end is attached to a power skiff or “bug boat” that is deployed from the stern of the vessel and remains in place while the vessel encircles a school of fish with the net. Then the net is pursed and brought back aboard the vessel through a hydraulic power block. Purse seines vary in size according to the size of the vessel and the depth to be fished. Most purse seines used in the New England herring fishery range from 30 to 50 meters deep (100-165 ft) (NMFS 2005). Purse seining is a year round pursuit in the Gulf of Maine, but is most active in the summer when herring are more abundant in coastal waters. Purse seines are mostly utilized at night, when herring are feeding near the surface. This fishing technique is less successful when fish remain in deeper water and when they do not form “tight” schools.

Weir and stop seining are traditional fishing techniques associated with the tending of inshore coves in Maine (NEFMC 1999). They are the principal gears used in the inshore herring fishery along the Maine coast. These fishing gear types occur entirely within State waters, and therefore are not regulated under a Federal FMP.

Midwater trawls are used to capture pelagic species throughout the water column between the surface and the seabed. Midwater trawls used in the New England Atlantic herring fishery are generally nylon rope trawls with very large meshes in the forward portion of the net that become progressively smaller toward the rear of the net, sometimes called the “brailer.” For nets used on single boats, the net is spread horizontally with two large metal doors positioned in front of the net. As the trawler moves forward, the doors, and therefore the net, are forced outward. Once the net is deployed, changes in its position in the water column (height above the bottom) are made by increasing or decreasing the speed of the vessel or by bringing or letting out trawl wire. An electronic sonar system mounted in the mouth of the net allows the fisherman to continually monitor the size of the net opening and the height of the net above the bottom during each tow. The footrope of the net is usually weighted with short lengths of chain in order to keep the mouth of the net open. In most cases, two heavy weights are attached forward of the net to cables that extend from the net opening to the trawl doors, and there is no ground gear (e.g., “cookies”) attached to the footrope. Tows typically last for several hours, and catches are large. The fish are usually removed from the net while it remains in the water alongside the vessel by means of a pump. Only larger fish (bycatch or incidental catch) are sorted by the crew as the fish are pumped into the vessel holds.

“Pair trawls” used in the New England Atlantic herring fishery are designed identically as single boat midwater trawls, but do not have doors, since the net is spread by the two vessels. The nets are often larger than single-boat midwater trawls because the combined towing power of two vessels exceeds that of a single vessel.

The current regulatory definition of midwater trawl gear is: *Midwater trawl gear means trawl gear that is designed to fish for, is capable of fishing for, or is being used to fish for pelagic species, no portion of which is designed to be or is operated in contact with the bottom at any time. The gear may not include discs, bobbins, or rollers on its footrope, or chafing gear as part of the net.*

Herring midwater trawls are not designed to fish on the bottom and do not normally contact the bottom, although information provided by herring fishermen indicates that the footrope, the belly of the net, and/or the weights do occasionally contact the bottom. Sometimes, when herring are in deep water near the bottom, midwater trawls are intentionally fished close to or in contact with the bottom. This occurs primarily in southern New England and the Mid-Atlantic during the winter (January-March); it may also occur in certain places on Georges Bank. The use of midwater trawls near or on the bottom generally only occurs on smooth mud and sand substrate, since bottom contact in more complex, rocky habitats (which are more common in the Gulf of Maine) causes the footrope to "hang up" and causes serious damage to the net. Damaged nets require costly repairs, and that provides an incentive to fishermen to avoid bottom contact. The trawl doors do not contact the bottom. Because the herring in the rear of the net remain alive during the tow, even when it is full of herring, the brailer normally floats free of the seafloor when fishing near the bottom.

4.3.3 General Statement About Impacts on Physical Environment and EFH (Background)

The impacts of the management measures under consideration in Amendment 5 on the physical environment and EFH are evaluated throughout this document and discussed in Section 5.0. The following information provides some perspective on "baseline" conditions for the physical environment and EFH, including characterization of the effects of the herring fishery on habitat. This information is important to consider as a baseline for evaluating the potential impacts of additional management measures or regulatory changes in the fishery.

Since 1996, the MSA has included a requirement to evaluate the potential adverse effects of fisheries, including the Atlantic herring fishery, on EFH for the species managed by the FMP (in this case, herring) and on the EFH of other species. The EFH final rule specifies that measures to minimize adverse effects should be enacted when these effects are estimated to be 'more than minimal' and 'not temporary in nature'.

For any fishery, we assume that the magnitude of adverse effects resulting from the fishery's operations is generally related to (1) the location of fishing effort, because habitat vulnerability is spatially heterogeneous, and (2) the amount of fishing effort, specifically the amount of seabed area swept or bottom time. To the extent that adoption of a particular alternative would shift fishing to more vulnerable habitats, and/or increase seabed area swept, adoption would be expected to cause an increase in habitat impacts as compared to no action. If adoption of an alternative is expected to reduce seabed area swept or cause fishing effort to shift away from more vulnerable into less vulnerable habitats, a decrease in habitat impacts would be expected. The magnitude of an increase or decrease in adverse effects relates to the proportion of total fishing effort affected by a particular alternative.

An assessment of the potential adverse effects of the directed Atlantic herring commercial fishery on EFH for Atlantic herring and other federally-managed species in the Northeast region of the U.S. was conducted as part of an EIS that evaluated impacts of the Atlantic herring fishery on EFH (NMFS 2005). This analysis was included in Appendix VI, Volume II of the FSEIS for Amendment 1 to the Atlantic Herring FMP. It found that midwater trawls and purse seines do occasionally contact the seafloor, and particularly in certain areas and at certain times of year when adult herring form pre-spawning aggregations near the bottom, these gears may adversely impact benthic habitats utilized by a number of federally-managed species, including EFH for Atlantic herring eggs. However, after reviewing all the available information, the conclusion was reached that if the quality of EFH is reduced as a result of this contact, the impacts are minimal and/or temporary and, pursuant to MSA, do not need to be minimized, i.e., that there was no need to take specific action at that time to minimize the adverse effects of the herring fishery on benthic EFH. This conclusion also applied to pelagic EFH for Atlantic herring larvae, juveniles, and adults, and to pelagic EFH for any other federally-managed species in the region.

Potential shifts in adverse effects are discussed for each of the alternatives proposed in this action. These assessments are qualitative, as changes in the direction and magnitude of fishing effort in response to management actions can be difficult to predict. The conclusions reached regarding the habitat impacts of individual management measures being considered in this action should be viewed in the context of the overall impacts that the herring fishery has on seabed habitats described above. To reiterate, ***previous analyses have concluded that adverse effect to EFH that result from operation of the herring fishery do not exceed the more than minimal or more than temporary thresholds***.

In summary, it can be concluded that the herring fishery continues to have no more than minimal and temporary adverse effects on EFH. This is based on the previous finding that the fishery, as it existed in 2005, was not having more than a minimal or temporary impact on EFH and that there have not been any significant changes in this fishery since then that have caused this determination to change.

4.4 PROTECTED RESOURCES

There are numerous protected species that inhabit the environment within the Atlantic Herring FMP management unit, and that, therefore, potentially occur in the operations area of the fishery. These species are afforded protection under the Endangered Species Act of 1973 (ESA; i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA), and are under NMFS' jurisdiction. As listed in Table 36, 13 marine mammal, sea turtle, and fish species are classified as endangered or threatened under the ESA; the remaining species in Table 36 are protected by the MMPA and are known to interact with the herring fishery. Non ESA-listed species protected by the MMPA that utilize this environment and have no documented interaction with the herring fishery will not be discussed in this statement.

4.4.1 Species Present in the Area

Table 36 lists the species, protected either by the ESA, the MMPA, or both, that may be found in the environment that would be utilized by the fishery. Table 36 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. Atlantic sturgeon and cusk are known to occur within the action area of the herring fishery.

Table 36 Species Protected under the ESA and MMPA that may Occur in the Operations Area for the Atlantic Herring Fishery

Species	Status
Cetaceans	
North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Bottlenose dolphin (*Tursiops truncatus*)[b]	Protected
Sea Turtles	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered[c]
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Cusk *(Brosme brosme)*	Candidate
Atlantic sturgeon *(Acipenser oxyrinchus)*	Proposed
Alewife (*Alosa pseudoharengus*)	Candidate
Blueback Herring (*Alosa aestivalis*)	Candidate
Pinnipeds	
Harbor seal (*Phoca vitulina*)	Protected
Gray seal (*Halichoerus grypus*)	Protected
Harp seal (*Phoca groenlandicus*)	Protected
Hooded seal (*Cystophora cristata*)	Protected

Notes:

[a] MMPA-listed species occurring on this list are only those species that have a history of interaction with similar gear types within the action area of the Atlantic Herring Fishery, as defined in the 2010 List of Fisheries.

[b] Bottlenose dolphin (*Tursiops truncatus*), Western North Atlantic coastal stock is listed as depleted.

[c] Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

Atlantic sturgeon has been proposed for listing under the ESA at this time, as well. A status review for Atlantic sturgeon was completed in 2007. NMFS has concluded that the U.S. Atlantic sturgeon spawning populations comprise five DPSs (ASSRT, 2007). The Gulf of Maine DPS of Atlantic sturgeon is proposed to be listed as threatened, and the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon are proposed as endangered. On October 6, 2010 (75 FR 61872 and 75 FR 61904), NMFS proposed listing five populations of Atlantic sturgeon along the U.S. East Coast as either threatened or endangered species. A final listing rule is expected in early 2012.

Atlantic sturgeon from any of the five DPSs could occur in areas where the herring fishery operates. (Stein et al. 2004a, ASMFC 2007), however none have been documented in gear used by the herring fishery. This submitted draft document has been submitted before the anticipated date of a final listing determination for Atlantic sturgeon. However, the conference provisions of the ESA apply to actions proposed to be taken by federal agencies once a species is proposed for listing (50 CFR 402.10). Therefore, this EA includes information on the anticipated effects of the action on Atlantic sturgeon.

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. NMFS has initiated review of recent stock assessments, bycatch information, and other information for these candidate and proposed species. The results of those efforts are needed to accurately characterize recent interactions between fisheries and the candidate/proposed species in the context of stock sizes. Final determinations on the proposed listings are expected in early 2012. Any conservation measures deemed appropriate for these species will follow the information reviews. Please note that once a species is proposed for listing the conference provisions of the ESA apply (see 50 CFR 402.10).

4.4.2 Species Potentially Affected

It is expected that the sea turtle, cetacean, and pinniped species discussed below have the potential to be affected by the operation of the herring fishery. Background information on the range-wide status of sea turtle and marine mammal species that occur in the area and are known or suspected of interacting with fishing gear (demersal gear including trawls, gillnets, and longline types) can be found in a number of published documents. These include sea turtle status reviews and biological reports (NMFS and USFWS 1995; Marine Turtle Expert Working Group (TEWG) 1998, 2000; NMFS and USFWS 2007a, 2007b; Leatherback TEWG 2007), recovery plans for ESA-listed cetaceans and sea turtles (NMFS 1991, 2005; NMFS and USFWS 1991a, 1991b; NMFS and USFWS 1992), the marine mammal stock assessment reports (e.g., Waring et al. 2006; 2007; 2009, 2010), and other publications (e.g., Clapham et al. 1999, Perry et al. 1999, Best et al. 2001, Perrin et al. 2002).

Additional ESA background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents including recent sea turtle (NMFS and

USFWS 1995, TEWG 2000, NMFS SEFSC 2001, NMFS and USFWS 2007a), loggerhead recovery team report (NMFS and USFWS 2008), status reviews and stock assessments, Recovery Plans for the humpback whale (NMFS 1991), right whale (NMFS 1991a, NMFS 2005), right whale EIS (August 2007), fin and sei whale (NMFS 1998b), and the marine mammal stock assessment report (Waring et al. 2010) and other publications (e.g., Perry et al. 1999; Clapham et al. 1999; IWC 2001 a). A recovery plan for fin and sei whales is also available and may be found at the following web site http://www.NOAAFisheries.noaa.gov/prot_res/PR3/recovery.html (NOAA Fisheries unpublished).

4.4.2.1 Sea Turtles

Loggerhead, leatherback, Kemp's ridley, and green sea turtles occur seasonally in southern New England and Mid-Atlantic continental shelf waters north of Cape Hatteras, North Carolina. In general, turtles move up the coast from southern wintering areas as water temperatures warm in the spring (James et al. 2005a, Morreale and Standora 2005, Braun-McNeill and Epperly 2004, Morreale and Standora 1998, Musick and Limpus 1997, Shoop and Kenney 1992, Keinath et al. 1987). The trend is reversed in the fall as water temperatures cool. By December, turtles have passed Cape Hatteras, returning to more southern waters for the winter (James et al. 2005a, Morreale and Standora 2005, Braun-McNeill and Epperly 2004, Morreale and Standora 1998, Musick and Limpus 1997, Shoop and Kenney 1992, Keinath et al. 1987). Hard-shelled species are typically observed as far north as Cape Cod whereas the more cold-tolerant leatherbacks are observed in more northern Gulf of Maine waters in the summer and fall (Shoop and Kenney 1992, STSSN database http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp).

On March 16, 2010, NMFS and USFWS published a proposed rule (75 FR 12598) to divide the worldwide population of loggerhead sea turtles into nine DPSs, as described in the 2009 Status Review. Two of the DPSs were proposed to be listed as threatened and seven of the DPSs, including the Northwest Atlantic Ocean DPS, were proposed to be listed as endangered. NMFS and the USFWS accepted comments on the proposed rule through September 13, 2010 (75 FR 30769, June 2, 2010). On March 22, 2011 (76 FR 15932), NMFS and USFWS extended the date by which a final determination on the listing action will be made to no later than September 16, 2011. This action was taken to address the interpretation of the existing data on status and trends and its relevance to the assessment of risk of extinction for the Northwest Atlantic Ocean DPS, as well as the magnitude and immediacy of the fisheries bycatch threat and measures to reduce this threat. New information or analyses to help clarify these issues were requested by April 11, 2011.

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.

In general, sea turtles are a long-lived species and reach sexual maturity relatively late (NMFS SEFSC 2001; NMFS and USFWS 2007a, 2007b, 2007c, 2007d). Sea turtles are injured and killed by numerous human activities (NRC 1990; NMFS and USFWS 2007a, 2007b, 2007c, 2007d). Nest count data are a valuable source of information for each turtle species since the number of nests laid reflects the reproductive output of the nesting group each year. A decline in the annual nest counts has been measured or suggested for four of five western Atlantic loggerhead nesting groups through 2004 (NMFS and USFWS 2007a), however, data collected since 2004 suggests nest counts have stabilized or increased (TEWG 2009). Nest counts for Kemp's ridley sea turtles as well as leatherback and green sea turtles in the Atlantic demonstrate increased nesting by these species (NMFS and USFWS 2007b, 2007c, 2007d).

4.4.2.2 Large Cetaceans

The most recent Marine Mammal Stock Assessment Report (SAR) (Waring et al. 2010) reviewed the current population trend for each of these cetacean species within U.S. EEZ waters, as well as providing information on the estimated annual human-caused mortality and serious injury, and a description of the commercial fisheries that interact with each stock in the U.S. Atlantic. Information from the SAR is summarized below.

The western North Atlantic baleen whale species (North Atlantic right, humpback, fin, sei, and minke) follow a general annual pattern of migration from high latitude summer foraging grounds, including the Gulf and Maine and Georges Bank, to low latitude winter calving grounds (Perry et al. 1999, Kenney 2002). However, this is an oversimplification of species movements, and the complete winter distribution of most species is unclear (Perry et al. 1999, Waring et al. 2010). Studies of some of the large baleen whales (right, humpback, and fin) have demonstrated the presence of each species in higher latitude waters even in the winter (Swingle et al. 1993, Wiley et al. 1995, Perry et al. 1999, Brown et al. 2002, Patrician et al. 2009). Blue whales are most often sighted on the east coast of Canada, particularly in the Gulf of St. Lawrence, and occurs only infrequently within the U.S. EEZ (Waring et al. 2010).

For North Atlantic right whales, the available information suggests that the population is increasing at a rate of 2.1 percent per year during 1990-2005, and the total number of North Atlantic right whales is estimated to be at least 361 animals in 2005 (Waring et al. 2010). The minimum rate of annual human-caused mortality and serious injury to right whales averaged 2.8 per year during 2004 to 2008 (Waring et al. 2010). Of these, 0.8 per year resulted from fishery interactions.

The North Atlantic population of humpback whales is estimated to be 11,570, although the estimate is considered to be negatively biased (Waring et al. 2010). The best estimate for the Gulf of Maine stock of humpback whales is 847 whales (Waring et al. 2010). The population trend was considered positive for the Gulf of Maine population, but there are insufficient data to estimate the trend for the larger North Atlantic population. Based on data available for selected areas and time periods, the minimum population estimates for other western north Atlantic whale stocks are 3,269 fin whales, 208 sei whales, 440 blue whales, 3,539 sperm whales, and 6,909 minke whales (Waring et al. 2010). Insufficient data exist to determine trends for any other large whale species.

The ALWTRP was revised with publication of a new final rule (72 FR 57104, October 5, 2007) that is intended to continue to address entanglement of large whales (right, humpback, and fin) in commercial fishing gear and to reduce the risk of death and serious injury from entanglements that do occur.

On October 5, 2010, NOAA's Fisheries Service (NMFS) published a notice of a 90-day petition finding and notice of 12-month determination in the Federal Register. NMFS was already conducting an ongoing analysis and evaluation of new information not available at the time of the original 1994 critical habitat designation prior to the receipt of this petition. Three critical habitat areas currently exist, established in 1994, two of which occur in the northeast region: feeding grounds in Cape Cod Bay and the Great South Channel.

4.4.2.3 Small Cetaceans

Numerous small cetacean species (dolphins; pygmy and dwarf sperm whales; pilot and beaked, whales; and the harbor porpoise) occur within [the area from Cape Hatteras through the Gulf of Maine]. Seasonal abundance and distribution of each species in [Mid-Atlantic, Georges Bank, and/or Gulf of Maine] waters varies with respect to life history characteristics. Some species primarily occupy continental shelf waters (e.g., white sided dolphins, harbor porpoise), while others are found primarily in continental shelf edge and slope waters (e.g., Risso's dolphin, pilot whales), and still others occupy all three habitats (e.g., common dolphin, spotted dolphins, striped dolphins). Information on the western North Atlantic stocks of each species is summarized in Waring et al. (2010).

With respect to harbor porpoise, the most recent Stock Assessment Reports show that the number of harbor porpoise takes (928 animals/year from 2004-2008) exceed this stocks Potential Biological Removal (PBR) level calculated for this species (703 animals) and is therefore a strategic stock. Observer information collected from January 2005 to June 2006 has indicated an increase in porpoise bycatch throughout the geographic area covered by the Harbor Porpoise Take Reduction Plan (HPTRP) in both the Gulf of Maine and Mid-Atlantic regions and in monkfish gear specifically (NMFS, Discussion Paper on Planned Amendments to the Harbor Porpoise TRP 2007). The Harbor Porpoise Take Reduction Team developed options to reduce takes, and NMFS published a proposed rule on July 21, 2009 (74 Federal

Register 36058) with four alternatives including no action. The comment period on this rule ended on August 20, 2009 and the final rule was published on February 19, 2010 (75 Federal Register 7383).

The following changes were implemented in the 2010 amendments to the HPTRP:

New England

- Expand the size of the Massachusetts Bay Management Area, as well as pinger use to include November;
- Establish the Stellwagen Bank Management Area and require pingers from November 1 through May 31;
- Establish the Southern New England Management Area where pingers are required from December 1 through May 31; and
- Establish the Cape Cod South Expansion Consequence Closure Area and Coastal Gulf of Maine Consequence Closure Area. These areas would be closed to gillnetting for two to three months if harbor porpoise bycatch levels are too high.

Mid-Atlantic

- Establish the Mudhole South Management Area, with a seasonal closure and gear modifications for large and small mesh gear;
- Modify the northern boundary of the waters off New Jersey Management Area to intersect with the southern shoreline of Long Island, NY at 72° 30' W longitude; and
- Modify tie-down spacing requirement for large mesh gillnets in all Mid-Atlantic management areas (waters off New Jersey, Mudhole North and South, and Southern Mid-Atlantic Management Areas).

The Atlantic Trawl Gear Take Reduction Team (ATGTRT) was organized in 2006 to implement a plan to address the incidental mortality and serious injury of long-finned pilot whales, short-finned pilot whales, common dolphins, and Atlantic white-sided dolphins in several trawl gear fisheries. In lieu of a TRP, the ATGTRT agreed to develop an Atlantic Trawl Gear Take Reduction Strategy (ATGTRS). The 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 also identifies several potential voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals. These voluntary measures are as follows:

- Reducing the numbers of turns made by the fishing vessel and tow times while fishing at night; and
- Increasing radio communications between vessels about the presence and/or incidental capture of a marine mammal to alert other fishermen of the potential for additional interactions in the area.

4.4.2.4 Pinnipeds

Of the four species of seals expected to occur in the area, harbor seals have the most extensive distribution with sightings occurring as far south as 30° N (Katona et al. 1993, Waring et al. 2010). Gray seals are the second most common seal species in U.S. EEZ waters, occurring primarily in New England (Katona et al. 1993; Waring et al. 2010). Pupping for both species occurs in both U.S. and Canadian waters of the western north Atlantic with the majority of harbor seal pupping likely occurring in U.S. waters and the majority of gray seal pupping in Canadian waters, although there are at least three gray seal pupping colonies in U.S. waters as well. Harp and hooded seals are less commonly observed in U.S.

EEZ waters. Both species form aggregations for pupping and breeding off eastern Canada in the late winter/early spring, and then travel to more northern latitudes for molting and summer feeding (Waring et al. 2010). Both species have a seasonal presence in U.S. waters from Maine to New Jersey, based on sightings, stranding, and fishery bycatch (Waring et al. 2010).

4.4.2.5 Atlantic Sturgeon DPSs

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 TC 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 TC 2007, Dunton et al. 2010). As noted in Section 7.4.1, 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).

There is no documented bycatch of Atlantic sturgeon in midwater trawls and herring purse-seine gear, which makes up the majority of the herring fishing effort. Otter trawl gear is known to capture Atlantic sturgeon and has been known to be used in the herring fishery. However, otter trawl gear make up a very small percentage of the herring fishery effort and it is highly unlikely that this gear would interact with any Atlantic sturgeon.

4.4.2.6 Species Not Likely to be Affected

The Gulf of Maine (GOM) Distinct Population Segment (DPS) of anadromous Atlantic salmon was initially listed by the USFWS and NMFS (collectively, the Services) as an endangered species on November 17, 2000 (65 FR 69459). A subsequent listing as an endangered species by the Services on June 19, 2009 (74 FR 29344) included an expanded range for the GOM DPS of Atlantic salmon

Presently, the GOM DPS includes all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River. Included are all associated conservation hatchery populations used to supplement these natural populations; currently, such conservation hatchery populations are maintained at Green Lake National Fish Hatchery (GLNFH) and Craig Brook National Fish Hatchery (CBNFH). Coincident with the June 19, 2009 endangered listing, NMFS designated critical habitat for the GOM DPS of Atlantic salmon (74 FR 29300; June 19, 2009). The critical habitat designation for the GOM DPS includes 45 specific areas occupied by Atlantic salmon at the time of listing that include approximately 19,571 km of perennial river, stream, and estuary habitat and 799 square km of lake habitat within the range of the GOM DPS and in which are found those physical and biological features essential to the conservation of the species. The entire occupied range of the GOM DPS in which critical habitat is designated is within the State of Maine.

The action being considered in the EA is not likely to adversely affect shortnose sturgeon, the Gulf of Maine distinct population segment (DPS) of Atlantic salmon, hawksbill sea turtles, blue whales, or sperm whales, all of which are listed as endangered species under the ESA. Shortnose sturgeon and salmon belonging to the Gulf of Maine DPS of Atlantic salmon occur within the general geographical areas fished by the herring fishery, but they are unlikely to occur in the area where the fishery operates given their numbers and distribution. Therefore, none of these species are likely to be affected by the herring fishery. The following discussion provides the rationale for these determinations. Although there are additional species that may occur in the operations area that are not known to interact with the specific gear types that would be used by the herring fleet, impacts to these species are still considered due to their range and similarity of behaviors to species that have been adversely affected.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. Shortnose sturgeon can be found in rivers along the western Atlantic coast from St. Johns River, Florida (although the species is possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (i.e., south of Chesapeake Bay), while some northern populations are amphidromous (NMFS 1998). Since the herring fishery would not operate in or near the rivers where concentrations of shortnose sturgeon are most likely found, it is highly unlikely that the fishery would affect shortnose sturgeon.

The wild populations of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S. - Canada border are listed as endangered under the ESA. These populations include those in the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. Juvenile salmon in New England rivers typically migrate to sea in May after a 2- to 3-year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn. Results from a 2001 post-smolt trawl survey in Penobscot Bay and the nearshore waters of the Gulf of Maine indicate that Atlantic salmon post-smolts are prevalent in the upper water column throughout this area in mid- to late May. Therefore, commercial fisheries deploying small-mesh active gear (pelagic trawls and purse seines within 10 m of the surface) in nearshore waters of the Gulf of Maine may have the potential to incidentally take smolts. However, it is highly unlikely that the approval of this EA would affect the Gulf of Maine DPS of Atlantic salmon given that operation of the herring fishery would not occur in or near the rivers where concentrations of Atlantic salmon are likely to be found and herring fishing gear used by the fleet operates in the ocean at or near the bottom rather than near the water surface. Thus, this species is not considered further in this EA.

The hawksbill turtle is uncommon in the waters of the continental U.S. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands. There are accounts of hawksbills in south Florida and individuals have been sighted along the east coast as far north as Massachusetts; however, east coast sightings north of Florida are rare (NMFS 2009a). Since operation of the herring fishery would not occur in waters that are typically used by hawksbill sea turtles, it is highly unlikely that its operations would affect this turtle species.

Blue whales do not regularly occur in waters of the U.S. EEZ (Waring et al. 2010). In the North Atlantic, blue whales are most frequently sighted in the St. Lawrence from April to January (Sears 2002). No blue whales were observed during the Cetacean and Turtle Assessment Program (CeTAP) surveys of the mid- and north Atlantic areas of the outer continental shelf (CeTAP 1982). Calving for the species occurs in low latitude waters outside of the area where the herring fishery operates. Blue whales feed on euphausiids (krill) that are too small to be captured in fishing gear. Given that the species is unlikely to occur in areas where the herring fishery operates, and given that the operation of the fishery would not affect the availability of blue whale prey or areas where calving and nursing of young occurs, the Proposed Action would not be likely to adversely affect blue whales.

Unlike blue whales, sperm whales do regularly occur in waters of the EEZ. However, the distribution of the sperm whales in the EEZ occurs on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring et al. 2006). In contrast, the herring fishery would operate in continental shelf waters. The average depth of sperm whale sightings observed during the CeTAP surveys was 1792 m (CeTAP 1982). Female sperm whales and young males almost always inhabit open ocean, deep water habitat with bottom depths greater than 1000 m and at latitudes less than 40° N (Whitehead 2002). Sperm whales feed on large squid and fish that inhabit the deeper ocean regions (Perrin et al. 2002). Given that sperm whales are unlikely to occur in areas (based on water depth) where the herring fishery would operate, and given that the operation of the fishery would not affect the availability of sperm whale prey or areas where calving and nursing of young occurs, the Proposed Action would not be likely to adversely affect sperm whales.

Although large whales and marine turtles may be potentially affected through interactions with fishing gear, it is likely that the continued authorization of the herring fishery should not have any adverse effects on the availability of prey for these species. Right whales and sei whales feed on copepods (Horwood 2002, Kenney 2002). The herring fishery would not affect the availability of copepods for foraging right and sei whales because copepods are very small organisms that would pass through herring fishing gear rather than being captured in it. Humpback whales and fin whales also feed on krill as well as small schooling fish (e.g., sand lance, herring, mackerel) (Aguilar 2002, Clapham 2002). The TRAC Status Report of 2006 suggests that although predator consumption estimates have increased since the mid-1980's, the productive potential of the herring stock complex has improved in recent years. The proposed management measures may provide a benefit to the protected resources by providing a greater quantity of food available. Moreover, none of the turtle species are known to feed upon herring.

4.4.3 Interactions Between Gear and Protected Resources

Commercial fisheries are categorized by NMFS based on a two-tiered, stock-specific fishery classification system that addresses both the total impact of all fisheries on each marine mammal stock as well as the impact of individual fisheries on each stock. The system is based on the numbers of animals per year that incur incidental mortality or serious injury due to commercial fishing operations relative to a stock's Potential Biological Removal (PBR) level (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). Tier 1 takes into account the cumulative mortality and serious injury to marine mammals caused by commercial fisheries while Tier 2 considers marine mammal mortality caused by the individual fisheries; Tier 2 classifications are used in this EA to indicate how each type of gear proposed for use in the Proposed Action may affect marine mammals. Table 37 identifies the classifications used in the List of Fisheries (LOF) for FY 2011 (50 CFR 229), which are broken down into Tier 2 Categories I, II, and III).

Table 37 Descriptions of the Tier 2 Fishery Classification Categories

Category	Category Description
Tier 2, Category I	A commercial fishery that has frequent incidental mortality and serious injury of marine mammals This classification indicates that a commercial fishery is, by itself, responsible for the annual removal of 50 percent or more of any stock's potential biological removal (PBR) level.
Tier 2, Category II	A commercial fishery that has occasional incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is one that, collectively with other fisheries, is responsible for the annual removal of more than 10 percent of any marine mammal stock's PBR level and that is by itself responsible for the annual removal of between 1 percent and 50 percent, exclusive of any stock's PBR.
Tier 2, Category III	A commercial fishery that has a remote likelihood of, or no known incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is one that collectively with other fisheries is responsible for the annual removal of: a. Less than 50 percent of any marine mammal stock's PBR level, or b. More than 1 percent of any marine mammal stock's PBR level, yet that fishery by itself is responsible for the annual removal of 1 percent or less of that stock's PBR level. In the absence of reliable information indicating the frequency of incidental mortality and serious injury of marine mammals by a commercial fishery, the Assistant Administrator would determine whether the incidental serious injury or mortality is "remote" by evaluating other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, qualitative data from logbooks or fisher reports, stranding data, and the species and distribution of marine mammals in the area or at the discretion of the Assistant Administrator.

Interactions between gear and a given species occur when fishing gear overlaps both spatially and trophically with the species' niche. Spatial interactions are more "passive" and involve unintentional interactions with fishing gear. Trophic interactions are more "active" and occur when protected species attempt to consume prey caught in fishing gear and become entangled in the process. Spatial and trophic interactions can occur with various types of fishing gear used by herring fishery through the year. Large and small cetaceans and sea turtles are more prevalent within the operations area during the spring and summer, although they are also relatively abundant during the fall and would have a higher potential for interaction with herring vessels during these seasons. Although harbor seals may be more likely to occur in the operations area between fall and spring, harbor and gray seals are year-round residents; therefore, interactions could occur year-round. The uncommon occurrences of hooded and harp seals in the operations area are more likely to occur during the winter and spring, allowing for an increased potential for interactions during the winter.

Although interactions between deployed gear and protected species would vary, all the species identified in the following table have the potential to be affected by the operation of the herring fishery. The herring fishery is prosecuted by midwater trawl gear (single), paired midwater trawls, purse seines, stop seines and weirs. A full description of the gear used in the fishery is provided in the Amendment 1 FSEIS. Only the first three are considered to be primary gears in the Atlantic herring fishery. Weirs and stop seines are responsible for a only a small fraction of herring landings (see Amendment 1 FSEIS), operate exclusively within State waters and are not regulated by the Federal FMP, and therefore will not be discussed further in this document relative to protected species. It should be noted, however, that both gear types have accounted for interactions with protected species, notably right, humpback and minke whales, and harbor porpoise, as well as harbor and gray seals. Animals, particularly pinnipeds, may be released alive.

Table 38 Marine Mammals Impacts Based on Herring Gear (based on 2011 List of Fisheries)

Fishery		Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category	Type		
Tier 2, Category II	Mid-Atlantic mid-water trawl (including pair trawl)	546	Bottlenose dolphin, WNA offshore Common dolphin, WNA Long-finned pilot whale, WNA Risso's dolphin, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA
Tier 2, Category II	Northeast mid-water trawl (including pair trawl)	953	Harbor seal, WNA Long-finned pilot whale, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA
Tier 2 Category II	Gulf of Maine Atlantic herring purse seine	>7	Harbor seal, WNA Gray Seal, WNA
Tier 2, Category III	Gulf of Maine herring and Atlantic mackerel stop seine/weir	Unknown	Gray seal, Northwest North Atlantic Harbor porpoise, GME/BF Harbor seal, WNA Minke whale, Canadian East Coast White-sided dolphin, WNA

Due to the remote likelihood of interactions denoted by the List of Fisheries designations for the purse seine fishery and stop seines and weirs, discussion of these fisheries will only be where necessary. This discussion, as well as that in Amendment 1, will instead focus on the proposed measures and associated midwater trawl activities.

Given the target species of this fishery and because herring is a primary prey species for seals, porpoises and some whales, levels of protected species interactions with the fishery are likely for the mid-water and pair trawl. The NOAA Fisheries Northeast Fisheries Science Center incidental take reports are published on the Northeast Fisheries Science Center website -http://www.nefsc.noaa.gov/femad/fishsamp/fsb/. A number of takes have occurred in the past four years by the midwater trawl fishery, as indicated in Table 39.

Table 39 Number of Incidental Takes Recorded by Fisheries Observers

Protected Species Encountered	2011 (To August)	2010	2009	Total
Grey Seal	10	5	1	6
Harbor Seal	3	4	1	5
Common Dolphin		1		1
Dolphin Unk.		1		1
Mammal Unk.		1		1
Seal Unk.	8	1		1

Although the incidents are isolated to observed herring trips, the table indicates that grey seals and harbor seals are the most likely to be taken in the herring fishery. Both gray and harbor seals are distributed inshore during the period of highest activity in the herring fishery, from May through October. Interactions are most likely to occur in Area 1A. Although these species have had documented interactions with the herring purse seine/fixed gear fishery, the animals, if observed, are often released alive.

4.4.4 Actions to Minimize Interactions with Protected Species

To minimize potential impacts to certain cetaceans, herring vessels would be required to adhere to measures in the ALWTRP, although the gear regulated are seldom used in the directed herring fishery. This was developed to reduce the incidental take of large whales, specifically the right, humpback, fin, and minke whales in certain Category I or II commercial fishing efforts that utilize traps/pots and gillnets. The ALWTRP calls for the use of gear markings, area restrictions, and use of weak links, and neutrally buoyant groundline. Fishing vessels would be required to implement the ALWTRP in all areas where gillnets were used. In addition, the HPTRP would be implemented in the Gulf of Maine to reduce interactions between the harbor porpoise and gillnets; the HPTRP implements gear specifications, seasonal area closures, and in some cases, the use of pingers (acoustic devices that emit a loud sound) to deter harbor porpoises and other marine mammals from approaching the nets. Gillnets are not used in the herring fishery, however.

4.5 FISHERY-RELATED BUSINESSES AND COMMUNITIES

4.5.1 Fishery-Related Businesses

The U.S. Atlantic herring fishery occurs over the Mid-Atlantic shelf region from Cape Hatteras to Maine, including an active fishery in the inshore Gulf of Maine and seasonally on Georges Bank. The Atlantic herring winter fishery is generally prosecuted south of New England in management Area 2 during the winter (January-April), and oftentimes as part of the directed mackerel fishery. There is significant overlap between the herring and mackerel fisheries in Area 2 and in Area 3 during the winter months, although catches in Area 3 tend to be relatively low. The herring summer fishery (May-August) is generally prosecuted throughout the Gulf of Maine in Areas 1A, 1B and in Area 3 (Georges Bank) as fish are available. Restrictions in Area 1A (including ASMFC days out measures implemented in response to quota reductions) have pushed the fishery in the inshore Gulf of Maine to later months (late summer). Fall fishing (September-December) tends to be more variable and dependent on fish availability; the Area 1A quota is always fully utilized, and the inshore Gulf of Maine fishery usually closes sometime around November. As the 1A and 1B quotas are taken, larger vessels become increasingly dependent on offshore fishing opportunities (Georges Bank, Area 3) when fish may be available.

4.5.1.1 IVR and VTR Landings

Until very recently, the Atlantic herring fishery has been monitored using catch data provided by federally permitted fishing vessels weekly through an interactive voice response (IVR) system and supplemented by other data sources where IVR data are not available. IVR data were compared to federal and state dealer data each week and dealer reports are used to supplement the IVR when necessary. These supplements include data from non-federally permitted inshore fisheries when provided by state agencies or from other sources. Although vessels are also required to report catches with vessel trip report (VTR) forms, near real-time data has been obtained through the IVR system allowing the sub-ACLs to be monitored. ACL overages for each fishing year are tallied during the following fishing year using VTR data, for all vessels (including those that catch small amounts of herring incidentally and do not report through the IVR system).

Regulations specified that the owner or operator of any vessel issued a limited access Atlantic herring permit (Category A, B, C) must submit an Atlantic herring catch report via the IVR system each week, regardless of how much herring is caught (including weeks when no herring is caught), unless exempted from this requirement by the Regional Administrator. In addition, the owner or operator of any vessel issued an open access permit for Atlantic herring that catches 2,000 pounds of Atlantic herring on any trip in a week must submit an Atlantic herring catch report via the IVR system for that week as required by the Regional Administrator.

The IVR system required vessel owners/operators to submit herring catch reports through the IVR system even during weeks when the vessel may not have fished and/or may not have caught any herring. These are considered "negative reports," i.e., reports of zero catch. Negative IVR reports ensure that catch data are more complete and affirm an action relative to vessels' fishing activity during any given week. Negative reports help to resolve potential problems with "missing" data; for example, if a vessel has been submitting herring catch reports through the IVR system and does not fish or catch herring for several weeks, the negative reports allow database managers to know that the vessel did not fish or catch herring during those weeks, versus making assumptions about the vessel's fishing activity and/or applying a proxy level of catch for the vessel's missing reports. Data gaps must be addressed in a timely fashion in order to use the IVR system for real-time quota monitoring, so if negative reports are not filed, it is less clear whether the available data accurately characterize catch in the fishery for quota monitoring purposes.

**NMFS issued rulemaking in September 2011 to eliminate IVR reporting for limited access herring vessels and require daily VMS catch reporting. The new requirements are reflected in the "no action" or status quo options described in this document.*

The Atlantic herring fishery specifications process was revised in Amendment 4 to the Herring FMP to meet the new requirements in the 2007 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act, including the specification of an overfishing level and standards for setting catch limits that consider both scientific and management uncertainty. The 2010-2012 specifications included substantial reductions in the available yield and management area sub-ACLs across the herring fishery. Through the new specifications process, optimum yield (OY) for the herring fishery was reduced from 145,000 mt to 91,200 mt (Table 40). All management area sub-ACLs consequently decreased, and the Area 1A sub-ACL was reduced by 41% from 45,000 metric tons in 2009 to 26,546 metric tons for 2010-2012. The Area 1B sub-ACL was reduced by more than 50%. The revised specifications process still requires that the directed herring fishery be closed in any management area when 95% of the sub-ACL is projected to be reached.

Table 40 2010-2012 Atlantic Herring Fishery Specifications (Metric Tons)

SPECIFICATION	2010-2012 ALLOCATION (MT)	Previous (2009) Allocation
OFL	**145,000 (2010) 134,000 (2011) 127,000 (2012)**	N/A
ABC	**106,000**	194,000
Stock-wide ACL/U.S. OY	**91,200**	145,000
Sub-ACL Area 1A	**26,546**	45,000
Sub-ACL Area 1B	**4,362**	10,000
Sub-ACL Area 2	**22,146**	30,000
Sub-ACL Area 3	**38,146**	60,000

Table 41 summarizes Atlantic annual Atlantic herring catch from IVR reports from 2000-2010.

Table 42 summarizes annual Atlantic herring catch by management area, as reported through the IVR system from 2001-2010. Table 43 provides IVR catches by management area for the 2010 fishing year as a percentage of the sub-ACL for the area. The 2010 fishing year saw a great reduction in the amount of Atlantic herring caught in the U.S. fishery, as IVR catches totaled 67,296 metric tons, down 35% from the 2009 catch. Herring catch has been trending downward since the implementation of the Atlantic Herring FMP and throughout the time series of IVR reporting. The most recent five-year average herring catch (85,604 mt 2006-2010) is 15% lower than the previous five-year average catch (100,912 mt 2001-2005).

Overall, the 2010 IVR reports totaled 67,296 mt of herring across all management areas, which represents about 74% of the total ACL for the U.S. fishery (91,200 mt). About half of the 2010 herring catch was taken from the GOM (Area 1A and 1B), and the other half was taken in Areas 2 and 3. In 2010, the Area 1A and 1B sub-ACLs were fully utilized; also, the Area 1B fishery was the first to close on September 14, 2010, and after a premature closure and re-opening by NMFS, the Area 1A fishery eventually closed on November 17, 2010. IVR totals suggest that there was a sub-ACL overage in Area 1A and Area 1B during the 2010 fishing year; VTR data will be tallied during 2011 to determine the final overage amounts, if any, and any corresponding overage deductions (accountability measures) will be factored into the 2012 specifications. Final 2010 catch totals will be provided by NMFS when available. The 2010 catch of herring was approximately 65% of the 2009 catch and the lowest catch since the current FMP was implemented in 1999.

Table 41 Total IVR Landings of Atlantic Herring, 2000-2010

Year	Total IVR Landings (MT)
2000	107,387
2001	121,569
2002	91,831
2003	100,544
2004	93,722
2005	96,895
2006	98,710
2007	78,103
2008	81,017
2009	102,896
2010	67,296

Table 42 Herring IVR Catch (Metric Tons) by Management Area, 2001-2010

Year	Area 1A	Area 1B	Area 2	Area 3	Total
2001	58,370	8,866	17,160	37,174	**121,569**
2002	59,263	7,355	10,673	14,540	**91,831**
2003	61,867	5,271	12,530	20,876	**100,544**
2004	59,857	9,043	12,917	11,905	**93,722**
2005	61,570	7,873	14,423	13,029	**96,895**
2006	59,980	13,008	21,277	4,444	**98,710**
2007	46,852	6,859	14,763	9,629	**78,103**
2008	41,857	8,104	19,256	11,800	**81,017**
2009	43,588	1,796	28,066	29,446	**102,896**
2010	27,113	5,990	18,763	15,430	**67,296**

Table 43 IVR Herring Catch for 2010 Fishing Year

Management Area	IVR Catch (mt)	% of Sub-ACL
Area 1A (Jan 1st – May 31st)	0	0
Area 1A (June 1st – Dec 31st)	27,113	102% of 26,546
Area 1A TOTAL	27,113	102% of 26,546
Area 1B	5,990	137% of 4,362
Area 2	18,763	85% of 22,146
Area 3	15,430	40% of 38,146
Total	**67,296**	**74% of 91,200**

**Any final sub-ACL overages for the 2010 fishing year will be tallied during the 2011 fishing year using data from all herring permit holders.*

In 2010, the Atlantic herring fishery approached the haddock bycatch cap for the first time. In order to avoid reaching that cap, fishing vessels may have stopped fishing in those areas, leading to lower landings in Area 3. The haddock bycatch cap primarily impacted limited access Category A vessels which use midwater trawl and pair trawl gear. Table 44 shows that very little herring was reported from Area 3 in the last 12-14 weeks of the fishing year; as a result, only 40% of the Area 3 sub-ACL was utilized during 2010.

Table 44 Weekly IVR Catch Reports (IVR) by Management Area (Metric Tons) for Last 18 Weeks of 2010 Fishing Year

WEEK	IVR CATCH REPORTS (MT)				
	AREA 1A	AREA 1B	AREA 2	AREA 3	TOTAL
35	358			355	713
36	472	1,446		419	2,337
37	83	1,358		55	1,496
38	1,205	1,062			2,267
39	1,342			931	2,273
40	185			454	639
41	1,859				1,859
42	3,860				3,860
43	1,367				1,367
44	859				859
45	5,202				5,202
46	1,555				1,555
47	1,315		1,289		2,604
48			208	182	390
49	4,120		53		4,173
50			1,567	55	1,622
51			1,113		1,113
52			843		843

Differences between the VTR and IVR reporting systems have been discussed by the PDT in previous year, and Table 45 highlights those differences with up-to-date yearly data. In 2009, the reporting difference for VTR was only 86 mt less than IVR, but in 2006, VTR reports showed a catch that was 3,332 mt higher than that reported in the IVR system.

Table 45 Herring VTR (Metric Tons), IVR (Metric Tons), and Comparative Difference, 2006-2010

Year	Total VTR Landings (MT)	Total IVR Landings (MT)	Difference (VTR-IVR, MT)
2006	102,042	98,710	3,332
2007	76,518	78,103	-1,585
2008	82,925	81,017	1,908
2009	102,810	102,896	-86
2010	65,742	67,296	-1,554

Source: NMFS VTR databases, May 2011
2010 Data is preliminary

Table 46 summarizes the Atlantic herring catch estimates by year and management area that were utilized by NMFS for quota/sub-ACL monitoring from 2001-2010. Catch estimates for 2001-2006, the first six years under quota management implemented through the Atlantic Herring FMP, is based on IVR data. Catch for 2007-2009 is based on IVR data supplemented with dealer data. Catch estimates for the 2010 fishing year are based on landings data obtained from dealer reports supplemented with VTRs and discard data from extrapolated observer data. During 2008 and 2009, quotas for Areas 1A and 1B were reduced for a research set-aside, established in Amendment 1. The RSA for Area 1A was 1,350 mt, and the RSA for Area 1B was 300 mt.

Since the implementation of Amendment 1, quota overages (shaded rows in Table 46) have been relatively infrequent and minor in scale. Overages have only occurred in Areas 1A and 1B. In terms of magnitude, the largest overage under quota management occurred in Area 1B during the 2006 fishing year, where 3,000 mt additional herring were caught (about 6.6 million pounds). Some of this overage may have been attributable to mis-reporting of management area fished and may have been addressed through the area boundary changes implemented in Amendment 1. Because of the high volume and seasonal nature of the fishery and restrictions on fishing times (days out, spawning restrictions), recent quota overages have tended to occur primarily in the most active areas of the fishery and in years when substantial reductions in quota have been implemented.

Table 46 Atlantic Herring Catch by Year and Management Area, 2001-2010

YEAR	AREA NAME	CATCH (MT)	QUOTA (MT)	QUOTA CAUGHT
2001	1A	59,228	60,000	99%
2001	1B	8,870	10,000	89%
2001	2	17,163	50,000	34%
2001	3	37,546	50,000	75%
2002	1A	59,078	60,000	98%
2002	1B	7,356	10,000	74%
2002	2	10,675	50,000	21%
2002	3	14,543	50,000	29%
2003	1A	61,516	60,000	103%
2003	1B	5,271	10,000	53%
2003	2	13,835	50,000	28%
2003	3	20,985	60,000	35%
2004	1A	60,095	60,000	100%
2004	1B	9,044	10,000	90%
2004	2	12,992	50,000	26%
2004	3	11,074	60,000	18%
2005	1A	61,102	60,000	102%
2005	1B	7,873	10,000	79%
2005	2	14,203	30,000	47%
2005	3	12,938	50,000	26%
2006	1A	59,989	60,000	100%
2006	1B	13,010	10,000	130%
2006	2	21,270	30,000	71%
2006	3	4,445	50,000	9%
2007	1A	49,992	50,000	100%
2007	1B	7,323	10,000	73%
2007	2	17,268	30,000	58%
2007	3	11,236	55,000	20%
2008	1A	42,257	43,650	97%
2008	1B	8,671	9,700	89%
2008	2	20,881	30,000	70%
2008	3	11,431	60,000	19%
2009	1A	44,088	43,650	101%
2009	1B	1,799	9,700	19%
2009	2	28,032	30,000	93%
2009	3	30,024	60,000	50%
2010	1A	28,424	26,546	107%
2010	1B	6,001	4,362	138%
2010	2	20,831	22,146	94%
2010	3	17,573	38,146	46%

Source: NMFS.

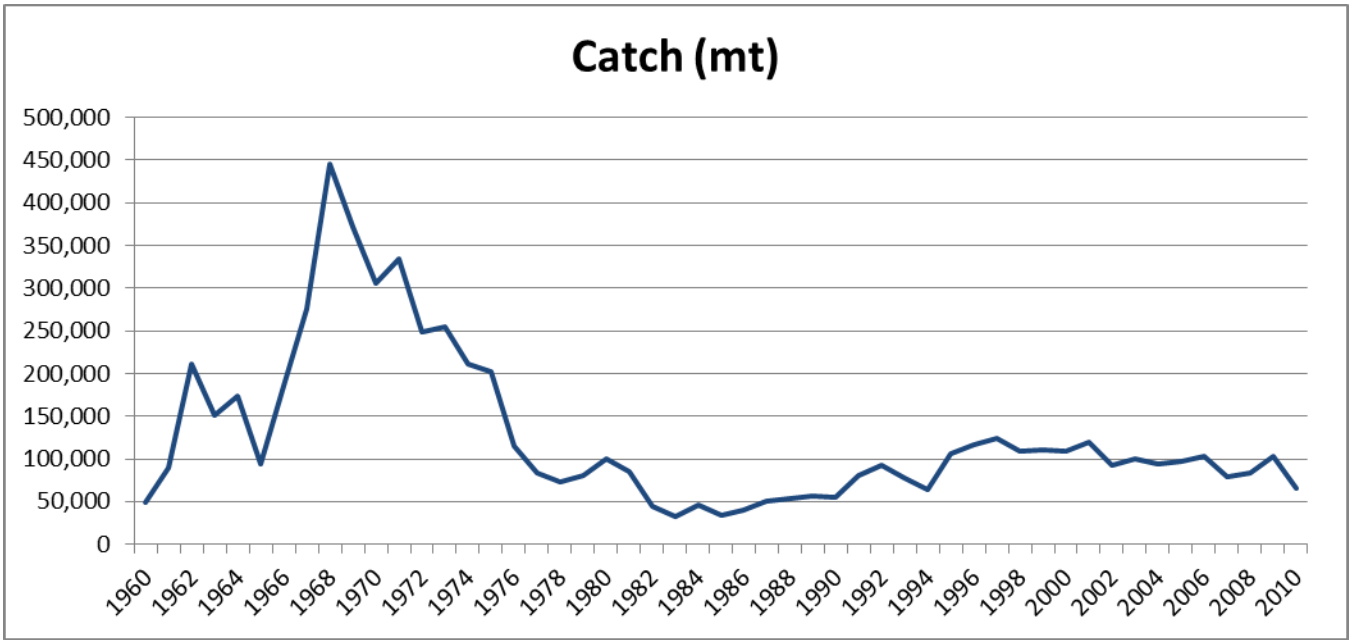
Table 47 has been updated from Amendment 1 through 2010 to include the most recent VTR data. From 2007 to 2009 the average landings were 88,351 mt; landings increased during this time period. From 2009 to 2010, however, there was a 36% decrease in the landings, due to a concurrent decrease in the stockwide ACL to 91,000 mt. According to the IVR catch data (Table 43), however, 74% of the ACL was caught. The landings in 2010 are the lowest on record since 1994, when VTR began. Information in 1994 is likely not complete due to the beginning of the reporting requirement, however. Total landings are expected to remain similar in the years 2011 and 2012, the remaining years covered under the current Specifications Package. The extended time series of herring VTR data are also graphically represented in Figure 72.

Table 47 Total Landings (Metric Tons) of Atlantic Herring from VTR data, 1960-2010

Year	Catch (mt)	Year	Catch (mt)
1960	49,320	**1986**	40,219
1961	89,634	**1987**	49,957
1962	210,924	**1988**	53,617
1963	151,440	**1989**	55,842
1964	173,639	**1990**	55,406
1965	94,600	**1991**	80,165
1966	185,200	**1992**	92,749
1967	275,764	**1993**	76,880
1968	445,656	**1994**	63,701
1969	371,155	**1995**	106,185
1970	306,423	**1996**	117,275
1971	333,692	**1997**	123,845
1972	248,526	**1998**	108,428
1973	254,500	**1999**	110,800
1974	210,502	**2000**	108,818
1975	202,643	**2001**	120,025
1976	115,338	**2002**	93,157
1977	83,612	**2003**	100,836
1978	72,732	**2004**	95,069
1979	81,048	**2005**	97,222
1980	99,445	**2006**	102,820
1981	85,622	**2007**	78,765
1982	44,448	**2008**	83,384
1983	33,230	**2009**	102,905
1984	46,660	**2010**	66,198
1985	33,352		

Source: NMFS VTR databases, May 2011
2010 Data are preliminary.

Figure 72 Total Landings (Metric Tons) of Atlantic Herring from VTR data, 1960-2010



Source: NMFS VTR databases, May 2011
2010 Data are preliminary.

4.5.1.2 Vessels and Crew

Amendment 1 to the Herring FMP established a limited access program in the herring fishery. There are four permit categories: 1) limited access permit for all management areas (Category A); 2) limited access permit for access to Areas 2 and 3 only (Category B); 3) limited access incidental catch permit for 25 mt per trip (Category C); and 4) an open access incidental catch permit for 3 mt per trip (Category D). Category A and B vessels comprise the majority of the directed Atlantic herring fishery. Many of the Category A, B, and C vessels are also active in the Atlantic mackerel fishery (managed by the MAFMC).

Table 48 summarizes the number of federally permitted Atlantic herring vessels by Amendment 1 permit category and length. There were 101 vessels with limited access permits during the 2010 fishing year. The majority of participants in the directed Atlantic herring fishery are Category A and B vessels. There was a reduction of three vessels (from 49 to 46) in the limited access directed fishery (Categories A and B) in 2010 from the previous year, possibly due to substantial cuts in herring catch limits in the 2010-2012 specifications (see following subsections for more information). There are 55 limited access incidental catch permit holders in the fishery, and over 2,000 open access permit holders.

Table 48 Number of Vessels by Atlantic Herring Permit Category, 2008-2010

		Year		
		2008	2009	2010
Herring Permit Category	A	45	45	42
	B	5	4	4
	C	58	55	55
	D	2,409	2,394	2,258

Source: NMFS Permit databases, May 2011

As Table 49 demonstrates, in 2010, 30 out of the 46 vessels (65%) that held a Category A or B herring permit (limited access directed fishery) were "active," meaning they landed herring within that year. Twenty seven percent (27%) of Category C vessels (limited access incidental catch) landed herring in 2010, while only 4% of Category D permits landed herring in 2010. However, the number of D permits that landed herring increased significantly in 2010 to 94, up from 67/68 in 2009/2008 respectively.

Table 49 "Active" vs. "Latent" Vessels by Category, 2008-2010

	2008			2009			2010		
Category	Total # of Vessels	Active Vessels	Difference	Total # of Vessels	Active Vessels	Difference	Total # of Vessels	Active Vessels	Difference
A/B	50	30	20	49	31	18	46	30	16
C	58	10	48	55	13	42	55	15	40
D	2,409	68	2,341	2,394	67	2,327	2,258	94	2,164

Note: Active is defined in the above table as having landed one pound or more Atlantic herring during that fishing year.

Many herring vessels also hold permits from 16 other federally regulated species (Table 50). The open access, herring Category D permit holders hold the most permits in other fisheries, particularly Bluefish, Spiny Dogfish, Monkfish, Northeast Multispecies, Squid/Mackerel/Butterfish and Skate. Percent dependence on other species is discussed later in this document. Many of the A and B vessels hold general category permits for other species.

Table 50 Number of Other Federal Permits Held by Herring Category Permit Held, 2008-2010

Fishery	Category	2008				2009				2010			
		A	BC	C	D	A	BC	C	D	A	BC	C	D
Bluefish	1	39	5	47	2,159	40	4	45	2,153	38	4	45	2,035
	2			2	435			3	459			3	448
Black Sea Bass	1	13	5	36	555	12	4	33	565	12	4	33	548
	2			1	429			2	438			2	437
Spiny Dogfish	1	42	5	50	2,115	43	4	49	2,172	41	4	49	2,066
Summer Flounder	1	16	5	40	710	17	4	37	728	16	4	37	704
	2			1	444			2	468			2	455
General Category Scallop	A	2		5	217	3		5	246	3		5	238
	B	2		4	79	2		6	106	2		6	100
	C	9	1	16	181	11	2	15	223	10	2	16	211
American Lobster	1	16	5	46	840	18	4	43	849	16	4	43	815
	2				20				21				20
	A1	2		10	465	3		11	456	3		11	429
	A2	1	1	8	213	1	1	8	209	1	1	8	202
	A3				58			1	56			1	56
	A4				38				39				39
	A5				19				19				20
	A5W				10				12				12
	A6			2	38			2	39			2	37
	AOC			2	114			2	104			2	103
Monkfish	A	1			12	1			14	1			14
	B				35				34				35
	C	8	1	11	267	8	1	11	270	7	1	11	261
	D	5		22	264	8	1	20	269	7	1	20	256
	E	26	2	20	1,517	23	2	20	1,496	22	2	19	1,415
	F		2									1	2
	H				1				1				1

Source: NMFS Permit databases, May 2011

Table 50 Number of Other Federal Permits Held by Herring Category Permit Held, 2008-2010, continued

Fishery	Category	2008				2009				2010			
		A	BC	C	D	A	BC	C	D	A	BC	C	D
Northeast Multispecies	A	12	5	39	821	14	4	37	819	13	4	36	787
	C				9				10				7
	D				45				43				42
	E	1		2	33	2		2	33	1		2	33
	F				19				21			1	17
	HA	1			64	1			70	1			63
	HB	13		2	734	11		3	746	10		3	693
	I				357				374				360
	J	4		9	221	4		8	225	4		8	227
	K	23		10	764	19		10	749	19		10	711
Ocean Quahog	6	27	2	26	647	26	1	25	636	24	1	23	595
	7				13				12				12
Atlantic Deep Red Sea Crab	A	28	4	35	1,443	29	3	35	1,417	28	3	35	1,405
	B				3				3				3
	C												1
Limited Access Scallop	2	4		5	190	5		5	193	4		5	195
	3				1				1				1
	5			5	41			4	40			4	41
	6	1		1	23	1		1	28	1		1	25
	7				9				10				9
Scup	1	14	5	38	579	13	4	35	590	13	4	35	564
	2			1	425			2	450			2	433
Surf Clam	1	27	2	27	660	26	1	26	643	24	1	24	598
Scallop	1A	14		4	818								
	1B	13	3	17	320								
Skate	1	34	5	50	1,980	33	4	47	1,987	31	4	47	1,898
Squid/Mackerel/Butterfish	1	14	5	35	292	13	4	32	301	13	4	32	285
	2			1	424			2	445			2	437
	3	24	1	24	1,671	27	1	24	1,658	25	1	22	1,584
	4	40	5	48	1,887	42	4	46	1,892	40	4	47	1,795
	5	12	3	17	43	11	2	15	43	11	2	15	42
Tilefish	1					35	4	40	1,813	35	4	41	1,773
	2							2	141			2	181
	B				3				3				
	C		2		13		1		10				
	D	36	3	44	1,861	35	3	40	1,635				

Source: NMFS VTR databases, May 2011

Currently the Mackerel fishery is open access. Amendment 11 to the Squid-Mackerel-Butterfish (SMB) FMP, which would implement a Limited Access Program, will not be implemented until September of 2011 at the earliest, after which all vessels will have a year-long opportunity to apply for a permit in one of the four proposed MSB Categories. Table 51 approximates of the number of permitted herring vessels which are likely to apply for a Mackerel limited access permit, and is shown with the potential limited access categories being considered in Amendment 11.

Table 51 Number of Estimated Federally Permitted Herring Vessels (Category A, B, C) Projected to Get Mackerel Limited Access Permits

		Herring Permit Category		
		A	B	C
Mackerel Limited Access Category	Tier 1	20	0	5
	Tier 2	0	1	5
	Tier 3	3	2	14
	Open Access	18	1	25
	Total	31	4	49

Source: MAFMC

4.5.1.3 Economic Factors

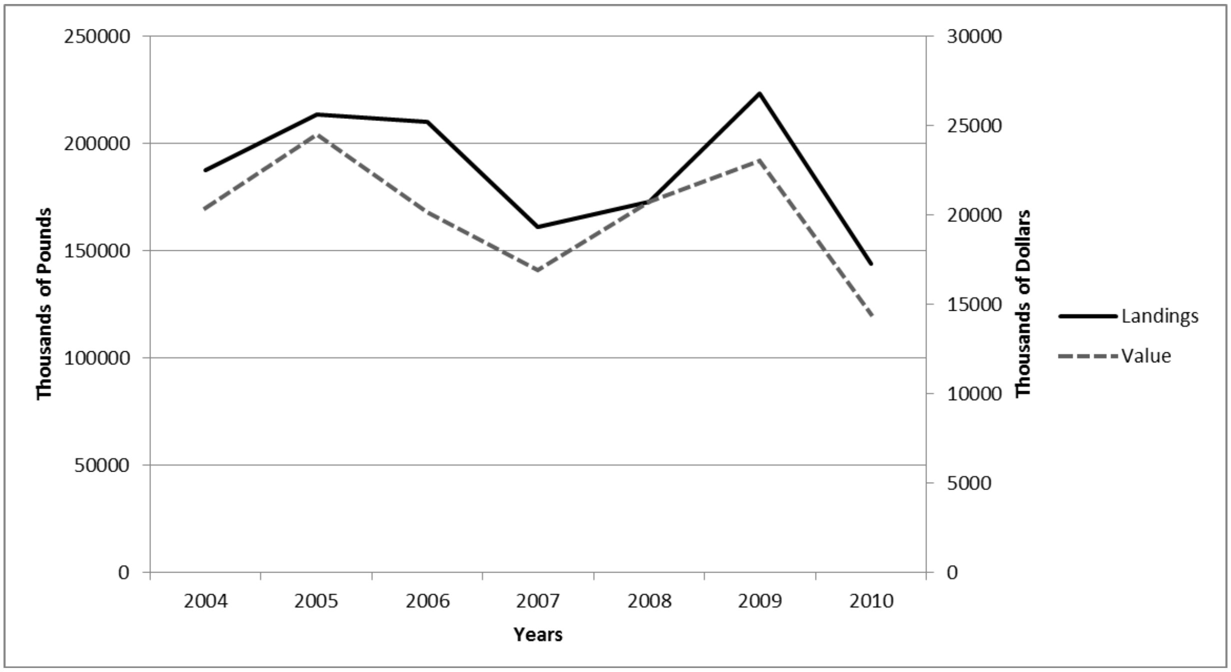
The information provided in this section is based on herring VTR and Dealer data through 2010, however 2010 data are preliminary at the time of this writing; final 2010 catch totals will be provided by NMFS when available. Where noted, economic values have been adjusted for inflation using the Bureau of Labor Statistics Producer Price Index for Unprocessed Finfish, with the base set to January 2009.

Figure 73 contains the total annual landings, in thousands of pounds, and value, in thousands of 2009 dollars, on a yearly scale. There is a slight downward trend, although 2005 and 2009 showed a slight increase from 2004 and 2008, respectively. Fishery value peaked in 2005 at a little over 27 million dollars for the over 200 million pounds landed, however landings peaked in 2009. In 2010, there were 143,666,029 pounds of Atlantic herring were sold by federally permitted dealers for a total ex-vessel value of $17,918,000. This represents a 22% decrease in revenues from the 2009 fishing year, primarily due to the implementation of the 2010-2012 fishery specifications, which included significant reductions in herring catch limits.

Figure 74 shows the total landings, in thousands of pounds, and the average real price per pound, in dollars, from 2005 to 2010, on a monthly time scale. Prices are cyclical and tend to be higher in the summer months and lower during the winter. This may be related to demand for herring as bait in the lobster fishery.

Categories A and B vessels specialize in small pelagics (herring, mackerel, and squid) while most of the C and D vessels catch herring either incidentally or seasonally in smaller amounts.

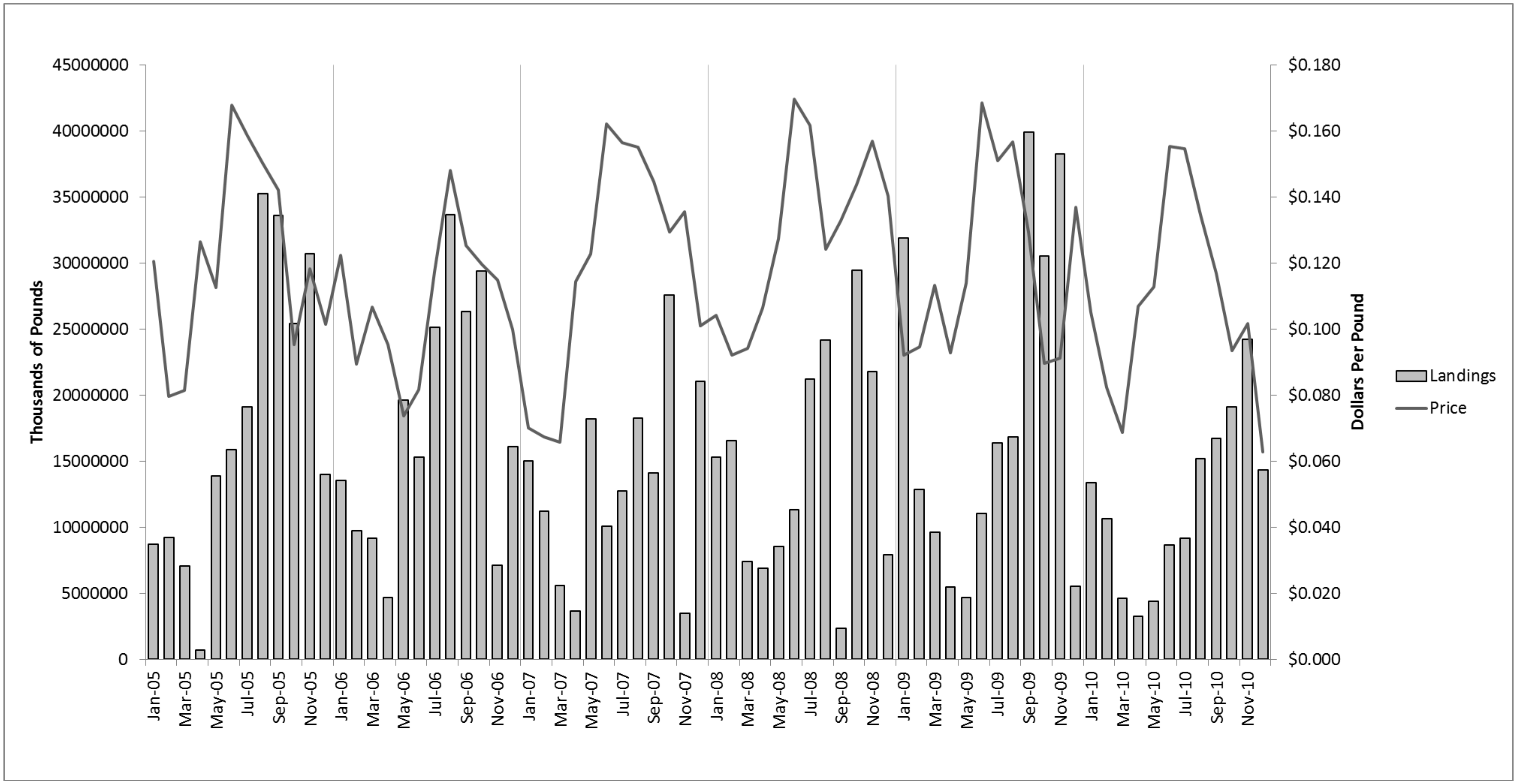
Figure 73 Total Annual Landings (Thousands of Pounds) and Value of Herring (Thousands of 2009 Dollars), 2004 -2010



Source: Dealer data
Numbers above have been adjusted for inflation based on 2009 data.

Table 52 reports revenue, in thousands of dollars, and landings, in thousands of pounds, broken down by species, and the permit category to which the boat belonged from 2007 to 2010. For 2007, vessels were classified into the "new" Amendment 1 limited access categories (A/B/C/D), instead of the pre-Amendment 1 (1/2) categories.

Figure 74 Total Landings (Thousands of Pounds) and Average Price Per Pound (Dollars), 2005 - 2010



Source: Dealer data
Numbers above have been adjusted for inflation based on 2009 data

Table 52 Total Revenue (Thousands of Nominal Dollars) and Landings (Thousands of Pounds), by Species Caught and Vessel Category, 2007-2010

		Herring		Menhaden		Mackerel		Squid		Other	
	Category	Revenue	Landings	Revenue	Landings	Revenue	Landings	Revenue	Landings	Revenue	Landings
2007	A and B	19,102	167,077	364	6,300	6,908	60,690	9,739	22,745	12,850	8,142
	C	245	1,726	658	10,189	41	133	1,968	2,535	13,483	8,414
	D	457	4,745	1,383	21,096	362	3,350	16,583	20,304	485,582	190,375
2008	A and B	21,723	182,606	1,598	16,482	6,162	48,438	10,845	29,138	11,385	7,529
	C	26	152	791	11,959	47	150	4,172	7,014	20,054	12,451
	D	129	1,000	2,286	28,508	139	601	18,745	22,733	483,974	192,250
2009	A and B	23,919	225,651	361	3,752	8,409	49,135	10,008	34,813	10,778	6,196
	C	183	1,112	530	7,632	62	226	3,778	4,875	18,856	13,525
	D	33	215	1,359	17,334	217	923	14,802	21,205	481,273	195,363
2010	A and B	18,449	142,627	451	4,518	3,158	21,103	11,591	30,549	15,857	9,331
	C	322	1,655	673	10,291	44	157	3,170	4,593	21,725	13,896
	D	150	916	1,237	16,350	84	322	12,974	15,007	550,708	195,078

Source: Dealer data
The species category "Other" includes any other federally permitted species besides herring, menhaden, mackerel and squid.

The dependence of Category A and B vessels on small pelagics is illustrated in Table 53, which reports the fraction of revenue for the four permit Categories from 2007 to 2010. Category C vessels derived at 81.9% of their total revenues from species which were not small pelagics, while category D vessels derived over 97% of their revenue from those species. Clearly, the Category C and D vessels are not relying on the herring fishery for a large fraction of their fishery income – herring composes 1.9% and 0.2% of total revenue for those two permit categories.

Table 53 Percent Dependence of Herring Vessels on Different Species by Category, Calculated Using Revenue

		2007	2008	2009	2010	Average Across All Years
Category A	Herring	36%	44%	49%	44%	43%
	Menhaden	1%	3%	1%	2%	2%
	Mackerel	19%	14%	13%	7%	13%
	Squid	12%	15%	14%	18%	15%
	Other	32%	25%	23%	30%	27%
Category B	Herring	*C	*C	17%	13%	13%
	Menhaden	*C	*C	*C	*C	0%
	Mackerel	5%	1%	*C	0%	2%
	Squid	38%	42%	40%	29%	37%
	Other	45%	49%	41%	57%	48%
Category C	Herring	2%	0%	2%	3%	2%
	Menhaden	2%	3%	3%	2%	2%
	Mackerel	0%	0%	0%	0%	0%
	Squid	7%	13%	12%	13%	11%
	Other	88%	84%	83%	82%	84%
Category D	Herring	0%	0%	0%	0%	0%
	Menhaden	0%	0%	0%	0%	0%
	Mackerel	0%	0%	0%	0%	0%
	Squid	2%	2%	2%	2%	2%
	Other	97%	97%	97%	97%	97%

Source: Dealer data
The species category "Other" includes any other federally permitted species besides herring, menhaden, mackerel and squid.
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

Between 2007 and 2010, the majority of herring was landed in Massachusetts, Maine, New Jersey, and Rhode Island. Table 54 characterizes each state that fish were landed in from vessels that held a herring permit by the species landed and year, by showing the revenue and landings for each. Massachusetts landed the most herring, and Maine had the second highest landings in all years. Menhaden caught by herring permit holders were landed primarily in New Jersey, and mackerel caught by herring permit holders were landed primarily in Massachusetts. Squid landed by herring permit holders was caught primarily in New Jersey and Rhode Island.

Table 54 Total Revenue (Thousands of Dollars) and Landings (Thousands of Pounds) of All Species by Landed States and Species, 2007-2010

		2,008		2,009		2,010	
		Revenue	Landings	Revenue	Landings	Revenue	Landings
CT	Herring	*C	*C	*C	*C	*C	*C
	Menhaden	*C	*C	*C	*C	*C	*C
	Mackerel	17	83	33	119	12	39
	Squid	562	488	497	484	662	554
	Other	12,211	5,004	11,772	5,671	12,381	5,771
MA	Herring	11,702	100,864	12,399	130,778	7,986	69,574
	Menhaden	1,780	15,264	871	9,240	676	6,843
	Mackerel	4,064	37,511	3,498	31,324	1,358	12,394
	Squid	1,543	1,596	1,112	1,242	1,606	1,374
	Other	264,674	102,846	263,253	104,692	328,976	110,172
ME	Herring	9,001	71,133	8,793	69,275	9,103	59,267
	Menhaden	279	2,744	45	467	*C	*C
	Mackerel	2	18	2	6	34	183
	Squid	6	7	*C	*C	1	1
	Other	19,270	13,779	16,804	12,277	19,347	13,210
NH	Herring	120	979	350	3,306	430	3,730
	Menhaden	0	0	0	0	0	0
	Mackerel	3	19	6	21	2	7
	Squid	1	1	0	0	0	0
	Other	13,497	7,522	13,828	8,617	15,614	7,471
NJ	Herring	404	6,256	1,176	13,261	227	3,701
	Menhaden	2,573	38,556	1,210	17,622	1,662	24,097
	Mackerel	1,308	8,857	1,998	10,071	428	4,392
	Squid	8,273	23,902	7,177	28,256	7,619	21,721
	Other	88,232	21,222	87,647	24,712	101,870	24,000
NY	Herring	4	25	4	21	2	13
	Menhaden	8	49	10	58	8	54
	Mackerel	43	167	44	141	23	90
	Squid	5,480	5,617	4,713	4,494	4,525	4,013
	Other	22,768	11,219	30,272	13,456	18,882	12,029
RI	Herring	645	4,495	1,412	10,331	1,167	8,854
	Menhaden	*C	*C	*C	*C	0	0
	Mackerel	910	2,534	3,103	8,588	1,415	4,422
	Squid	17,826	27,011	14,917	25,762	12,770	20,422
	Other	29,266	26,862	24,002	23,248	25,624	24,955

Source: Dealer data
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

Table 55 summarizes the top ports of landed herring by the total revenue generated in 2007, 2008, 2009, and 2010. Gloucester is the highest port of landing in every year, and Rockland, Portland and New Bedford trade off as the second, third, and fourth highest ports of landing through the years. It is important to note that some ports were not reported in the list due to issues of confidentiality.

Table 55 Top Ports of Landing (State and City) and Total Revenue (Thousands of Dollars), 2007-2010

2007		
MA	GLOUCESTER	4,594
ME	ROCKLAND	4,242
MA	NEW BEDFORD	2,585
ME	PORTLAND	2,087
ME	PROSPECT HARBOR	1,652
ME	STONINGTON	1,048
RI	POINT JUDITH	474
ME	PORT CLYDE	434
MA	FALL RIVER	273

2008		
MA	GLOUCESTER	7,481
MA	NEW BEDFORD	4,129
ME	ROCKLAND	3,583
ME	PORTLAND	2,564
ME	STONINGTON	1,667
ME	PORT CLYDE	588
RI	POINT JUDITH	322
MA	FALL RIVER	87

2009		
MA	GLOUCESTER	7,791
MA	NEW BEDFORD	3,997
ME	PORTLAND	3,337
ME	ROCKLAND	2,473
ME	STONINGTON	995
RI	POINT JUDITH	714
ME	PROSPECT HARBOR	667
MA	FALL RIVER	593
ME	PORT CLYDE	335

2010		
MA	GLOUCESTER	5,553
ME	PORTLAND	4,253
ME	ROCKLAND	3,144
MA	NEW BEDFORD	2,167
ME	STONINGTON	438
RI	POINT JUDITH	365
MA	FALL RIVER	262
ME	PROSPECT HARBOR	177

Source: Dealer and VTR data. Only those ports that had more than 3 vessels land herring or 3 or more dealers purchasing herring are reported.

Share System:

As in most fisheries in the country, the crew members of vessels do not receive a set wage; instead, they are compensated through the share system. Currently, crew share is usually 30-40%, and there is some variability in the way expenses are paid. For example, sometimes the variable costs are deducted “off the top.” In this case variable costs are subtracted from gross revenues and crew receives their share of those net proceeds. In other systems, the crew receives their share of gross revenues minus all of the variable costs. Approximately 15 years ago, the shares were divided evenly with 50% to the owner, 50% split among the crew. Slowly, however, that ratio has changed.

4.5.1.3.1 Limited Access Vessels

4.5.1.3.1.1 Category A/B Vessels (2008-2010)

The following section provides information on Category A and Category B permit holding vessels, with data summarized from 2008 to 2010. To protect confidentiality, Category B permit holders have been grouped with Category C permit holders in some places. Data from 2010 are preliminary, and will be updated when possible.

Table 56 summarizes the vessel length of Category A and B permit holders for 2008, 2009, and 2010. Slightly over 60% of A and B permit holders are boats that are larger than 80 feet in length, about 21% of the vessels are mid-range in size. Category A vessels are primarily land most of their fish in Massachusetts and Maine (Table 57). These are the states with shoreside infrastructure (processing plants) that supports the herring fishery. Category B vessels (limited access directed fishery in Areas 2 and 3 only) and Category C vessels (limited access incidental catch) tend to identify principal ports throughout mid-coast Maine, New Hampshire, southern New England, and the Mid-Atlantic region.

Table 56 Distribution of Herring Vessel Length for Category A and B Vessels, 2008-2010

	Category A and B		
Vessel Length	2008	2009	2010
<60	8	7	7
60-80	12	11	10
>80	32	31	29
Total	52	49	46

Source: NMFS Permit data

Table 57 Number of Category A and B Herring Vessels by Permit Category and Principal Port, 2008-2010

	Category A			Category B		
	2008	2009	2010	2008	2009	2010
CT Total						
MA Total	**19**	**18**	**15**			
BOSTON	1					
GLOUCESTER	7	7	5			
NEW BEDFORD	9	9	8			
WOODS HOLE	2	2	2			
ME Total	**10**	**12**	**13**			
HARPSWELL	1					
OWLS HEAD		1	1			
PORTLAND	3	5	4			
PROSPECT HARBOR	1	1	1			
ROCKLAND	2	2	3			
ROCKPORT			1			
SOUTHWEST HARBOR	1	1	1			
STONINGTON	1	1	1			
VINALHAVEN	1	1	1			
NH Total	**2**	**2**	**2**			
NEWINGTON	2	2	2			
NJ Total	**8**	**5**	**5**			
CAPE MAY	8	5	5			
NY Total						
RI Total	**4**	**4**	**5**	**5**	**4**	**4**
DAVISVILLE	2	2	2			
NEWPORT				2	1	1
NORTH KINGSTOWN			1			
POINT JUDITH	2	2	2	3	3	3

Source: NMFS Permit data

Table 58 and Table 59 summarize the average crew size, based on VTR reported crew sizes, by the home port listed in permit data and the gear used as listed in the VTR data, respectively. Crew sizes for Category A and B permit holders rage from 4 people to 10 people.

Table 58 Average Crew Size (Including Captain) by Home Port for Category A and B Vessels, 2008-2010

		2008	2009	2010	Average Across Years
MA	BOSTON	6	6	6	6
	GLOUCESTER	6	6	6	6
	NEW BEDFORD	5	5	5	5
	Average for MA	6	6	6	6
ME	BATH	6	5	4	5
	CUNDYS HARBOR	6	6	6	6
	HAMPDEN	7	7	7	7
	OWLS HEAD		5	4	5
	PORTLAND	6	6	6	6
	Average for ME	6	6	6	6
NH	NEWINGTON	6	5	5	6
	Average for NH	6	5	5	6
NJ	CAPE MAY	4	5	5	5
	Average for NJ	4	5	5	5
RI	DAVISVILLE	10	10	10	10
	NEWPORT	4	3	3	3
	POINT JUDITH	4	4	4	4
	Average for RI	5	4	5	5

Source: NMFS VTR data

Table 59 Average Crew Size (Including Captain) by Gear Category (A and B), 2008-2010

		2008	2009	2010
Category A	OTF	6	5	6
	OTM	5	6	5
	PTM	5	5	5
	PUR	6	7	6
	Average Across A Gears	**6**	**6**	**5**
Category B	OTF	4	4	3

Source: NMFS VTR data

Table 60 characterizes the landings for Category A and BC permit holders by gear type and area fished from VTR data.

Table 60 Atlantic Herring Landings (Thousands of Pounds) for Federally Permitted Herring Vessels by Area Fished, Gear Type and Permit Category (A and B), 2008– 2010

		2008		2009		2010	
		A	BC	A	BC	A	BC
Area 1A	OTTER TRAWL,MIDWATER	2,506		4,565		4,643	
	PAIR TRAWL,MIDWATER	32,496		41,838		34,280	
	POT, HAG	C*					
	POT,LOBSTER					C*	
	SEINE, PURSE	52,840		47,641		15,415	
Area 1B	OTTER TRAWL,MIDWATER	2,984		C*		2,279	
	PAIR TRAWL,MIDWATER	11,574		3,494		7,708	
	SEINE, PURSE	5,575		1,395		2,140	
Area 2	OTTER TRAWL,BOTTOM,FISH	3,125	1,305	5,949	3,144	6,057	1,624
	OTTER TRAWL,MIDWATER	1,214		3,446		3,259	
	PAIR TRAWL,MIDWATER	43,535		47,756		29,221	
Area 3	OTTER TRAWL,BOTTOM,FISH			C*			
	OTTER TRAWL,MIDWATER	2,113		5,218		9,670	
	PAIR TRAWL,MIDWATER	22,851		60,259		26,765	
	SEINE, PURSE					C*	

Source: NMFS VTR data
BC permits are vessels that had both B and C permits during the same year; C permits are vessels that only had a C permit during a year.
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

Table 61 shows the landings of Category A vessels by gear type, as a percentage of total herring landings. Category BC only used bottom trawls from 2008-2010, and is not reported in the table. Purse seiners typically use the inshore areas (1A, 1B) while trawl gear can fish in all Areas. In 2010, participants indicated that herring in Area 1A held "tight to the bottom" making them unavailable to purse seines. Pair trawl (midwater) has dominated landings in Area 1B, Area 2 and Area 3 for all three of the years depicted. However, this gear type also experienced large declines in landings in 2010 compared to 2009.

Table 61 Category A Atlantic Herring Landings by Gear Type, as a Percent of Category A Herring Landings and Total Herring Landings, 2008-2010

	2008		2009		2010	
	% of Category A Landings	% of 2008 Total Herring Landings	% of Category A Landings	% of 2009 Total Herring Landings	% of Category A Landings	% of 2010 Total Herring Landings
OTTER TRAWL,BOTTOM,FISH	2%	2%	3%	3%	4%	4%
OTTER TRAWL,MIDWATER	5%	5%	6%	6%	14%	14%
PAIR TRAWL,MIDWATER	61%	60%	69%	68%	69%	67%
SEINE, PURSE	32%	32%	22%	22%	12%	12%
Category A % of Total Herring Landings		99%		98%		97%

Source: NMFS VTR data
Some gears and percentages omitted for confidentiality.

Table 62 reports the landings of Category A and BC permit holders, summarized by the species caught (not including herring, see Table 60 for herring landings) and the area in which they were fished for. Category A permit holders caught mackerel, menhaden and squid primarily in Area 2, and Category BC permit holders caught squid and "Other" species primarily in Area 2.

Table 62 Herring Category A and B/C Vessel Landings by Species, 2008-2010

		2008		2009		2010	
		A	BC	A	BC	A	BC
Area 1A	Mackerel					*C	
	Menhaden	5,017		*C			
	Squid					*C	
	Other	366		12		47	
Area 1B	Mackerel					*C	
	Other	604				521	
Area 2	Mackerel	36,735	45	46,355	88	20,909	8
	Menhaden	11,465		3,740		4,518	
	Squid	24,294	1,868	29,589	1,136	29,348	1,089
	Other	1,506	1,635	79,684	1,307	2,584	1,645
Area 3	Mackerel	11,813		2,532		*C	
	Squid	2,831	145	3,625	380	34	77
	Other	1,818	318	6,156	380	3,802	295

Source: NMFS VTR data
B/C permits are vessels that had both B and C permits during the same year; C permits are vessels that only had a C permit during a year.
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

4.5.1.3.1.2 Category C Vessels (2008-2010)

The following section provides information on Category C permit holding vessels, with data summarized from 2008 to 2010. Data from 2010 are preliminary, and will be updated when possible.

Table 63 summarizes the vessel length of Category C permit holders for 2008, 2009, and 2010. The majority of these vessels are less than 80 feet in length, although the distribution is split between those vessels that are smaller than 60 feet and those that fall between 60 and 80 feet. Category C vessels (limited access incidental catch) tend to identify principle ports throughout mid-coast Maine, New Hampshire, southern New England, and the Mid-Atlantic region (Table 64).

Table 63 Distribution of Herring Vessel Length for Category C Vessels, 2008-2010

	Category C		
Vessel Length	2008	2009	2010
<60	21	22	23
60-80	29	26	25
>80	8	7	7
Total	58	55	55

Source: NMFS Permit data

Table 64 Number of Category C Herring Vessels by Principal Port, 2008-2010

	Category C		
Row Labels	2008	2009	2010
CT Total	**2**	**2**	**2**
MYSTIC	1	1	1
NEW LONDON	1	1	1
MA Total	**9**	**8**	**7**
BRANT ROCK	1	1	1
FAIRHAVEN	1	1	1
GLOUCESTER	3	2	2
NEW BEDFORD	3	3	2
NEWBURYPORT	1	1	1
ME Total	**9**	**10**	**10**
EAST HARPSWELL	1	2	2
NEW HARBOR	2	2	2
PORTLAND	2	2	2
SACO	1	1	1
SOUTH BRISTOL	3	3	3
NH Total	**6**	**6**	**6**
HAMPTON	1	1	1
PORTSMOUTH	2	2	2
RYE	2	2	2
SEABROOK	1	1	1
NJ Total	**11**	**9**	**9**
CAPE MAY	10	8	8
WILDWOOD	1	1	1
NY Total	**5**	**5**	**5**
GREENPORT	1	1	1
MONTAUK	4	4	4
RI Total	**13**	**12**	**13**
NEWPORT	2	1	1
POINT JUDITH	11	11	12

Source: NMFS Permit data

Table 65 and Table 66 summarize the average crew size, based on VTR reported crew sizes, by the home port listed in permit data and the gear used as listed in the VTR data, respectively. Crew sizes for Category C permit holders rage from two to five people, the larger crews tending to come from ports in Massachusetts, New Jersey and New York.

Table 65 Average Crew Size (Including Captain) by Home Port for Category C Vessels, 2008-2010

		2008	2009	2010	Average Across Years
MA	GLOUCESTER	4	4	4	4
	NEWBURYPORT			3	3
	ROCKLAND		3	3	3
	Average for MA	4	4	4	4
ME	NEW HARBOR		5		5
	SOUTH BRISTOL		5	5	5
	Average for ME		5	5	5
NH	HAMPTON	2	2	3	2
	PORTSMOUTH	2		2	2
	RYE	2	2	2	2
	SEABROOK	2		2	2
	Average for NH	2	2	2	2
NJ	CAPE MAY	3		4	4
	Average for NJ	3		4	4
NY	MONTAUK	3	4	4	4
	Average for NY	3	4	4	4
RI	POINT JUDITH	2	2	2	2
	Average for RI	2	2	2	2

Source: NMFS Permit and VTR data

Table 66 Average Crew Size (Including Captain) by Gear Type for Category C Vessels, 2008-2010

	2008	2009	2010
OTF	2	3	3
PUR		5	5
Average Across Gears	**2**	**3**	**3**

Source: NMFS VTR data

Table 67 characterizes the landings for Category C permit holders by gear type and area fished from VTR data. Some vessels used multiple gear types for fishing, and this designation was necessary to show vessel general vessel activity in the different herring areas.

Table 67 Atlantic Herring Landings (Thousands of Pounds) for Category C Vessels by Area Fished and Gear Type, 2008 – 2010

		2008	2009	2010
Area 1A	OTTER TRAWL,BOTTOM,FISH	122	140	68
	OTTER TRAWL,BOTTOM,SHRIMP	*C	141	113
	SEINE, PURSE		629	950
Area 1B	OTTER TRAWL,BOTTOM,FISH	*C		
Area 2	OTTER TRAWL,BOTTOM,FISH	23	196	522
Area 3	OTTER TRAWL,BOTTOM,FISH		*C	*C

Source: NMFS VTR data
**C denotes a value for which less than three (3) boats reported, and cannot be reported for confidentiality reasons.*

Table 68 shows the landings by gear type as a percentage of total herring landings. Category C vessels, primarily caught herring using bottom trawl gear in 2008 and purse seine gear in 2009 and 2010. This suggests that Category C permit holders regarded the exclusion of the midwater and pair trawl vessels from Area 1 as an opportunity to increase their participation in the herring industry.

Table 68 Category C Atlantic Herring Landings by Gear Type, as a Percent of Category C Herring Landings and Total Herring Landings, 2008-2010

	2008		2009		2010	
	% of Category C Landings	% of 2008 Total Herring Landings	% of Category C Landings	% of 2009 Total Herring Landings	% of Category C Landings	% of 2010 Total Herring Landings
OTTER TRAWL,BOTTOM,FISH	97%		31%		36%	
OTTER TRAWL,BOTTOM,SHRIMP	3%		13%		7%	
SEINE, PURSE			57%		57%	1%
Category C % of Total Herring Landings						1%

Source: NMFS VTR data
Some gears and percentages omitted for confidentiality. C permits are vessels that only had a C permit during a year.

Table 69 reports the landings of Category C permit holders, summarized by the species caught (not including herring, see Table 60 for herring landings) and the area in which they were fished for. Category C permit holders caught menhaden, squid, and "Other" species primarily in Area 2, although some "Other" were caught in areas 1A and 3.

Table 69 Herring Category C Vessel Landings by Species, 2008-2010

		2008	2009	2010
Area 1A	Mackerel		2	
	Menhaden	430	430	
	Squid	2	4	
	Other	2,297	436	1
Area 1B	Mackerel	1		
	Squid	2		
	Other	343		361
Area 2	Mackerel	128	194	110
	Menhaden	11,529	7,202	10,291
	Squid	6,672	4,856	4,421
	Other	8,237	12,252	8,224
Area 3	Mackerel	21	31	47
	Squid	338	16	202
	Other	1,574	47	2,838

Source: NMFS VTR data
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

4.5.1.3.2 Open Access Vessels (Category D) (2008-2010)

The following section provides information on Category D permit holding vessels, with data summarized from 2008 to 2010. Data from 2010 are preliminary, and will be updated when possible.

Table 70 summarizes the vessel length of Category D permit holders for 2008, 2009, and 2010. About 73 percent of the vessels that hold Category D permits are smaller than 60 feet in length, however there are still over 200 vessels that are greater than 80 feet in length. Unlike Categories A-C, Category D vessels (open access incidental catch) are numerous and participate in a wide variety of fisheries throughout the Northeast Region (Table 71).

Table 70 Distribution of Herring Vessel Length for Category D Vessels, 2008-2010

	Category D		
Vessel Length	2008	2009	2010
<60	1762	1761	1656
60-80	422	411	377
>80	225	222	225
Total	2409	2394	2258

Source: NMFS Permit data

Table 71 Number of Category D Herring Vessels by Principal Port State, 2008-2010

	Category D State Total		
	2008	2009	2010
CT	46	42	39
MA	902	912	865
ME	339	333	297
NH	122	120	116
NJ	361	351	331
NY	226	234	234
RI	152	149	138

Source: NMFS Permit data

Table 72 and Table 73 summarize the average crew size, based on VTR reported crew sizes, by the home port listed in permit data and the gear used as listed in the VTR data, respectively. Crew sizes for Category D permit holders rage from 1 to 4 people, smaller on average than Categories A, B or C.

Table 72 Average Crew Size (Including Captain) by Home Port for Category D Vessels, 2008-2010

		2008	2009	2010	Average Across Years
CT	NEW LONDON	4			4
	NOANK		2	1	1
	STONINGTON		2		2
	Average for CT	4	2	1	2
MA	BOSTON	3	3	2	2
	FALMOUTH			3	3
	GLOUCESTER	4	3	2	3
	NEWBURYPORT			3	3
	PROVINCETOWN	2		1	2
	ROCKPORT	2	2	2	2
	SCITUATE	2	2	2	2
	Average For MA	3	3	2	3
ME	BASS HARBOR			2	2
	BIDDEFORD	3		3	3
	BREMEN		4	2	2
	CAMP ELLIS	2		2	2
	CUNDYS HARBOR			2	2
	ISLESFORD	1	1	1	1
	JONESPORT	2	2	2	2
	KENNEBUNKPORT	2			2
	KITTERY	2		3	2
	PORTLAND		3		3
	SACO			3	3
	SMALL POINT	3	3		3
	SOUTH BRISTOL		2		2
	VINALHAVEN		4	4	4
	WELLS HARBOR			1	1
	WESTPOINT		2	3	2
	YORK		2		2
	YORK HARBOR	2			2
	Average for ME	2	2	2	2
NH	NEW CASTLE			2	2
	PORTSMOUTH	1	1	1	1
	RYE			1	1
	SEABROOK	2	2	2	2
	Aveage for NH	2	2	2	2
NJ	BARNEGAT LIGHT	2	2	2	2
	BARNEGATE LIGHT	2	2	2	2
	BELFORD	2	2	2	2
	BELMAR		2		2
	BRIGANTINE		1	1	1
	CAPE MAY			4	4
	HEISLERVILLE	1	1	1	1
	LAVALLETTE	3	2	2	2
	LITTLE EGG HARBOR	1			1
	MANAHAWKIN	1			1
	POINT PLEASANT	2	2	2	2
	POINT PLEASANT BEACH	2	2	2	2
	TOMS RIVER		3		3
	WARETOWN		2	2	2
	Average for NJ	2	2	2	2
NY	CENTER MORICHES	1	1	1	1
	EAST HAMPTON	1	1		1
	EAST QUOGUE	1		1	1
	FREEPORT	1	1	1	1
	HAMPTON BAYS	2	2	2	2
	ISLAND PARK		2		2
	MONTAUK	3	3	2	2
	NEW YORK	2	2	2	2
	SHINNECOCK	2	2	3	2
	Avearage for NY	1	2	2	2
RI	WAKEFIELD	4		4	4
	Average for RI	4		4	4

Source: NMFS Permit data

Table 73 Average Crew Size (Including Captain) by Gear Type for Category D Vessels, 2008-2010

	2008	2009	2010
OTF	2	2	2
OTM		2	1
PUR	5	4	2
Average Across Gears	**2**	**2**	**2**

Source: NMFS Permit and VTR data

Table 74 characterizes the landings for Category D permit holders by gear type and area fished from VTR data. Category D vessels only land a small amount of herring.

Table 74 Atlantic Herring Landings (000's of pounds) for Category D Vessels by Area Fished and Gear Type, 2008 – 2010

		2008	2009	2010
Area 1A	GILL NET,SINK	2	5	1
	HAND LINE/ROD & REEL			
	OTHER GEAR			*C
	OTTER TRAWL, BEAM		4	
	OTTER TRAWL, RUHLE			*C
	OTTER TRAWL,BOTTOM,FISH	145	98	251
	OTTER TRAWL,BOTTOM,SHRIMP	8	4	493
	OTTER TRAWL,MIDWATER			*C
	POT,LOBSTER	*C	*C	1
	SEINE, PURSE	765	35	74
	TRAP	6	7	11
Area 1B	OTTER TRAWL,BOTTOM,FISH			*C
	SEINE, PURSE	*C		
Area 2	DREDGE,SCALLOP,SEA			*C
	GILL NET,DRIFT,LARGE MESH			
	GILL NET,RUNAROUND			2
	GILL NET,SINK	3	4	5
	HAND LINE/ROD & REEL		1	
	OTTER TRAWL,BOTTOM,FISH	34	37	74
	OTTER TRAWL,BOTTOM,SHRIMP			*C
	POT,CRAB		*C	
	POT,FISH			*C
Area 3	HAND LINE/ROD & REEL			*C
	OTTER TRAWL,BOTTOM,FISH	*C		*C

Source: NMFS VTR data
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

Table 75 shows the landings by gear type as a percentage of total herring landings. Category D vessels only land a small amount of herring using a wide variety of gears.

Table 75 Category D Atlantic Herring Landings by Gear Type, as a Percent of Category D Herring Landings and Total Herring Landings, 2008-2010

	2008		2009		2010	
	% of Category D Landings	% of 2008 Total Herring Landings	% of Category D Landings	% of 2009 Total Herring Landings	% of Category D Landings	% of 2010 Total Herring Landings
GILL NET,SINK	1%		4%		1%	
HAND LINE/ROD & REEL			1%			
OTTER TRAWL, BEAM			2%			
OTTER TRAWL,BOTTOM,FISH	18%		69%		35%	
OTTER TRAWL,BOTTOM,SHRIMP	1%		2%		54%	
SEINE, PURSE	80%		18%		8%	
TRAP	1%		4%		1%	
Category D % of Total Herring Landings						

Source: NMFS VTR data
Some gears and percentages omitted for confidentiality.

Table 76 reports the landings of Category D permit holders, summarized by the species caught (not including herring, see Table 60 for herring landings) and the area in which they were fished for. Category D permit holders caught mackerel, menhaden, squid and other species in all areas, but caught relatively little in Area 1B.

Table 76 Herring Category D Vessel Landings by Species, 2008-2010

		2008	2009	2010
Area 1A	Mackerel	44	46	75
	Menhaden	*C	25	
	Squid	27	20	260
	Other	31,466	91	
Area 1B	Mackerel			3
	Menhaden		*C	
	Squid		2	
	Other	13,074	3	12,553
Area 2	Mackerel	243	583	86
	Menhaden	28,350	17,308	16,356
	Squid	20,464	21,013	13,748
	Other	88,941	38,904	95,304
Area 3	Mackerel	313	297	159
	Squid	2,220	176	1,131
	Other	58,860	514	56,835

Source: NMFS Permit and VTR data
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

4.5.1.3.3 VMS Utilization

Table 77 summarizes the number of herring permits which utilized VMS in the year 2010, broken down by the Category permit and the number of other multispecies permits held. Herring Category A, B and C vessels are required to have VMS. Category D does not, however, and of the 88 Category D vessels that reported herring catch on their VTRs in 2010, only 11 vessels actively used VMS.

Table 77 2010 Herring Permits by Category and Herring/Multispecies Combinations

Herring Permit Category	Herring Only	Herring with Multispecies Limited Access		Herring with Mults Open Access**	Total
		A*, D*, E*, F*	C**, HA**	HB, I, J, K	
A	8	14	1	19	42
B***	0	4	0	0	4
C****	0	39	0	12	51
D	144	887	71	1,144	2,246
Total	152	944	72	1,175	2,343

* VMS and weekly VTR required

** Weekly VTR required; No VMS

*** All B permitted vessels also have a C permit

**** Does not include C permits that are associated with B permits

Source: NERO

4.5.1.3.4 VTR Landings for All Federally Permitted Herring Vessels

Table 78 characterizes the fishing days, number of trips taken, and thousands of pounds landed by the area that was fished, the Category permit held, and the year. The number of fishing days for Category D vessels increased considerably between 2008 and 2010, likely due to changes in regulations of other fisheries, such as Amendment 16 to the Multispecies FMP. The number of trips and days fell in 2009 in Area 1B for Category A vessels but rebounded in 2010, while rising in Area 2 in 2009.

Table 79 characterizes the fishing days, number of trips taken, and thousands of pounds landed by the area that was fished, the gear type, and the year. Area 2 has seen an increase in the number of bottom and midwater trawls fishing in the area, and Area 1B has had the number of purse seines fishing within vary over the last three years. Area 2 and 3 has had fluctuating numbers of vessels fishing within them over the past three years.

Table 78 Herring Trips, Days, and Herring Landed (thousands of pounds) by Area Caught and Category Permit, 2008-2010

		Area 1A			Area 1B			Area 2			Area 3		
		2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010
Category A	Days at Sea	727	768	703	153	80	181	797	930	748	230	523	435
	Number of Trips	275	279	250	57	25	51	182	249	171	53	119	105
	000's of Pounds Landed	88,392	94,043	54,417	20,133	5,534	12,127	47,874	57,152	38,538	24,964	65,673	36,576
Category BC	Days at Sea							34	67	55			
	Number of Trips							31	62	48			
	000's of Pounds Landed							1,305	3,144	1,624			
Category C	Days at Sea	98	133	193	7			83	112	152		10	12
	Number of Trips	98	108	140	2			43	50	74		3	3
	000's of Pounds Landed	126	910	1,132	*C			23	196	522		*C	*C
Category D	Days at Sea	194	141	382	1		3	324	406	444	12		10
	Number of Trips	186	129	376	1		1	257	334	334	2		3
	000's of Pounds Landed	927	154	834	*C		*C	37	43	89	*C		*C

Source: NMFS VTR data
BC permits are vessels that had both B and C permits during the same year; C permits are vessels that only had a C permit during a year.
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons.*

Table 79 Herring Trips, Days, and Herring Landed (thousands of pounds) by Area Caught and Gear Type, 2008-2010

		Area 1A			Area 1B			Area 2			Area 3		
		2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010
Bottom Trawl	Days at Sea	227	149	280	7		3	516	600	743	12	25	20
	Number of Trips	227	138	269	2		1	264	362	336	2	5	4
	000's of Pounds Landed	267	239	320	*C		*C	4,487	9,327	8,278	*C	200	1
Midwater Trawl	Days at Sea	17	46	32	31	13	40	49	129	75	22	64	103
	Number of Trips	4	18	11	10	3	10	11	22	18	5	13	24
	000's of Pounds Landed	2,506	4,565	4,643	2,984	*C	2,279	1,214	3,446	3,259	2,113	5,218	9,670
Pair Trawl	Days at Sea	222	203	298	71	46	103	562	634	405	208	444	330
	Number of Trips	66	79	89	27	13	26	131	162	97	48	104	80
	000's of Pounds Landed	32,496	41,838	33,644	11,574	3,494	7,708	43,535	47,756	29,221	22,851	60,259	26,765
Purse Seine	Days at Sea	498	578	464	52	21	38						2
	Number of Trips	211	215	205	21	9	15						1
	000's of Pounds Landed	53,605	48,304	16,439	5,606	1,395	2,140						*C

Source: VTR data

BC permits are vessels that had both B and C permits during the same year; C permits are vessels that only had a C permit during a year.

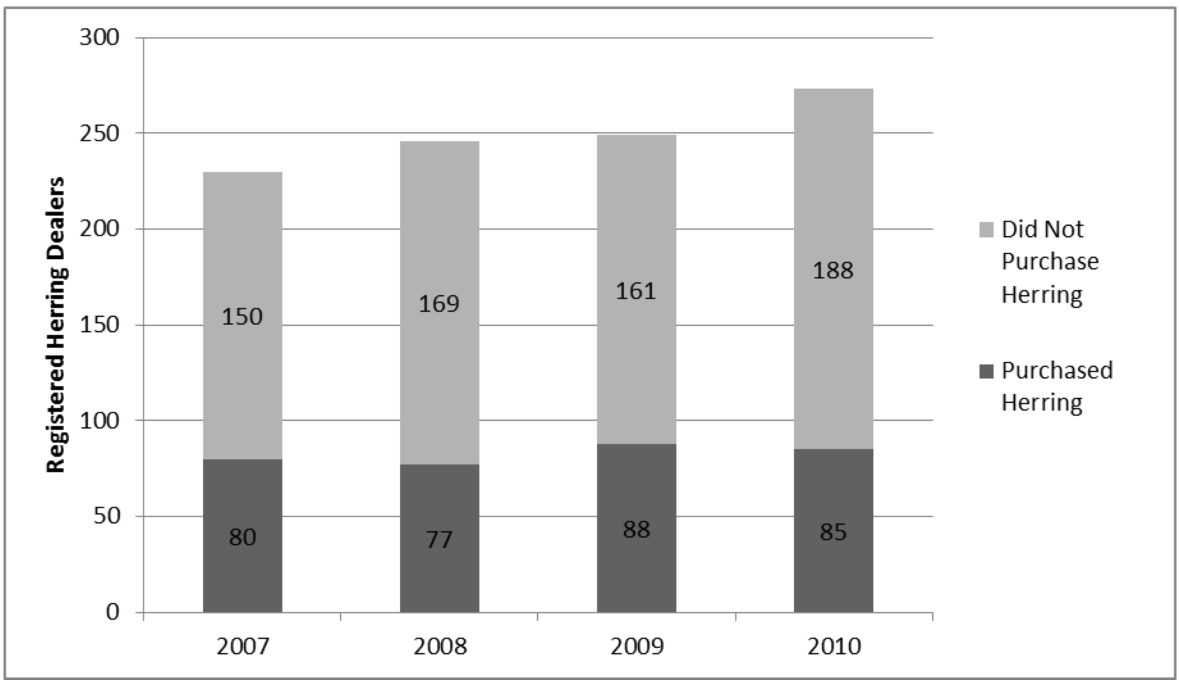
**C denotes a value for which less than 3 boats reported, and cannot be reported for confidentiality reasons*

4.5.1.4 Herring Dealers and Carriers

4.5.1.4.1 Number of Dealers

Federally permitted dealers must be permitted to sell different species of fish by selecting that species in their dealer permit application form; there is no cost select any or species in this application. Figure 75 illustrates the number of dealers registered by the amount that did and did not purchase herring. Between 2007 and 2010, the number of registered herring dealers increased from 230 to 273. The number of permitted dealers which purchased herring increased from 80 to 85. Table 80 shows the number of active herring dealers by the state of registration that have purchased herring at least once since the year 2000.

Figure 75 Number of Federally Permitted Dealers Registered as Herring Dealers, by Purchase Status, 2007-2010



Source: NMFS Dealer data

Table 80 Yearly Number of Federally Permitted Dealers Who Purchased Herring, by State of Registration

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CT							1				1
DE								1	1		
MA	4	4	7	8	7	8	8	12	9	13	10
MD	2		2	1	1		2	1	1	1	1
ME	18	41	39	42	38	45	46	49	44	53	50
NC						1		1			1
NH	2	1	1	3	3	2	2	2	2	2	3
NJ	1	3	3	2	4	5	6	5	4	3	4
NY	1	4	3	3	12	11	10	11	15	14	15
RI	9	6	5	6	7	8	8	9	7	8	7
VA		1	1		2	1			1		
Total	37	60	61	65	74	81	83	91	84	94	92

Source: NMFS Dealer data

Table 81 shows the revenue and landings, by state, of herring purchased by dealers from 2007 to 2010. Table 82 shows the percent of herring dealers that purchased herring by the state that they purchased herring and the state in which they are registered. For instance, in 2010, dealers that were registered in Massachusetts bought 90% of their total herring purchases from landings within the state of Massachusetts, but purchased 7% of their herring from landings in Maine. They purchased no herring from New Jersey or New York, and 2% of their herring purchased was from landings that occurred within the state of Rhode Island. For the most part dealers purchased herring where were landed in their state , but Massachusetts and Maine had some out-of-state purchases. The significant numbers of dealers in Maine likely reflects the numbers and dispersal of small lobster fishing communities along the Maine coast that rely on herring as lobster bait.

Table 81 Revenue (thousands of dollars) and Landings (thousands of pounds) Purchased by Federally Permitted Dealers, by state of purchase

		MA	ME	NH	NJ	NY	RI
2007	Revenue	94	65	1	7	0	5
	Landings	12	8	0	1	0	1
2008	Revenue	133	62	3	14	0	10
	Landings	8	9	0	0	0	1
2009	Revenue	72	56	3	4	0	8
	Landings	38	33	1	2	0	4
2010	Revenue	372	254	8	30	0	30
	Landings	0	0	0	0	0	0
	Total Revenue	671	437	15	55	0	53
	Total Landings	58	49	1	4	0	6

Source: NMFS Dealer data
The 2007 data may have accuracy problems due to dealer serial numbering being un- or misreported.

Table 82 Percent of Herring Purchased by Federally Permitted Dealers, by State of Registration, 2007-2010

2007		State of Purchase						
		MA	ME	NJ	NY	RI	Other	Total Revenue
State of Registration	MA	**82%**	9%	0%	0%	9%	0%	4,603
	ME	22%	**75%**	0%	0%	2%	1%	10,585
	NJ	2%	0%	**98%**	0%	0%	0%	421
	NY	2%	0%	1%	**98%**	0%	0%	18
	RI	1%	0%	0%	0%	**99%**	0%	372
	Other	32%	24%	0%	0%	0%	**44%**	118

2008		State of Purchase						
		MA	ME	NJ	NY	RI	Other	Total Revenue
State of Registration	MA	**91%**	7%	0%	0%	2%	0%	7,188
	ME	29%	**69%**	0%	0%	1%	0%	11,161
	NJ	6%	0%	**89%**	0%	0%	4%	468
	NY	0%	0%	0%	**99%**	0%	1%	36
	RI	8%	0%	0%	0%	**92%**	0%	330
	Other	56%	15%	0%	0%	0%	**29%**	255

2009		State of Purchase						
		MA	ME	NJ	NY	RI	Other	Total Revenue
State of Registration	MA	**96%**	2%	0%	0%	2%	0%	8,439
	ME	27%	**70%**	0%	0%	3%	1%	10,594
	NJ	0%	0%	**100%**	0%	0%	0%	1,168
	NY	12%	0%	0%	**88%**	0%	0%	24
	RI	5%	0%	0%	0%	**95%**	0%	603
	Other	50%	17%	0%	0%	0%	**33%**	468

2010		State of Purchase						
		MA	ME	NJ	NY	RI	Other	Total Revenue
State of Registration	MA	**90%**	7%	0%	0%	2%	0%	5,576
	ME	22%	**77%**	0%	0%	1%	0%	10,414
	NJ	0%	0%	**99%**	0%	1%	0%	246
	NY	0%	0%	9%	**91%**	0%	0%	9
	RI	2%	0%	0%	0%	**98%**	0%	630
	Other	7%	16%	0%	0%	0%	**77%**	279

Source: NMFS Dealer data
The state category "Other" includes the states of Connecticut, Delaware, Maryland, North Carolina, New Hampshire, and Virginia, to protect confidentiality.
Total revenue for each state is also presented for perspective on the percentages.

4.5.1.4.2 Number of Carrier Vessels

The Letters of Authorization (LOAs) issued by NMFS for the Atlantic herring fishery currently allow an unlimited amount of herring (or the amount allowed by the vessels' herring permit) to be transferred at-sea (a) from herring catcher vessels to carriers; (b) between federally permitted herring vessels; and (c) from herring catcher vessels to non-permitted vessels for personal use as bait (Section 3.1.3.1).

Table 83 shows the total number of vessels that received Letters of Authorization by the year and type of authorization. In the year 2010, there were 50 carrier exemptions, doubling the number issued in 2006. Table 84 shows the VTR reports that indicated carrier activity had occurred. Activity was down from 58 reports in 2009 to 49 in 2010. Vessels can be issued both exemption types within one fishing year.

The list of vessels wanting to engage in carrier activities will change from year to year, and some of the vessels with Category D permits may already have VMS required by multispecies and scallop permits. Table 83 and Table 86 illustrate this point, and also demonstrate the overlap between exemption types. The number of D vessels with LOAs increased from 11 in 2008 to 21 in 2010. These tables also illustrate the number of smaller vessels (less than 50 feet) already have VMS, required by the herring permit that they possess.

Table 83 Total Herring Vessels that Received a Letter of Authorization (LOA) by Year and Type of Exemption

FISHING_YEAR	EXEMPTION_TYPE	Total
2006	HERRING CARRIER	6
2006	HERRING TRANSFER AT SEA	19
2006 Total		**25**
2007	HERRING CARRIER	16
2007	HERRING TRANSFER AT SEA	27
2007 Total		**43**
2008	HERRING CARRIER	13
2008	HERRING TRANSFER AT SEA	26
2008 Total		**39**
2009	HERRING CARRIER	18
2009	HERRING TRANSFER AT SEA	23
2009 Total		**41**
2010	HERRING CARRIER	15
2010	HERRING TRANSFER AT SEA	35
2010 Total		**50**

Source: NMFS permit data

Table 84 Total VTR Herring Carrier Reports by Year; Only Herring Carrier Activity That Was Reported

YEAR	Total
2007	46
2008	33
2009	58
2010	49
Total	186

Table 85 Vessel Permit and Size Information for Herring Vessels Carrying LOAs, 2009

	LOA EXEMPTION TYPE			VESSEL SIZE		HERRING PERMIT CATEGORY		
Vessel	Herring Carrier	Herring Transfer At Sea	Total	Length	Gross Tons	A	C	D
1		1	1	42	20			1
2		1	1	40	15			1
3		1	1	45	4		1	
4		1	1	36	10			1
5		1	1	42	23			1
6	1		1	42	23			1
7		1	1	51	22		1	
8		1	1	34	12			1
9	1		1	42	5			1
10		1	1	40	22			1
11	1	1	2	38	20			1
12		1	1	42.4	23		1	
13		1	1	44	24		1	
14	1		1	56	45		1	
15	1		1	44	36			1
16		1	1	53	47			1
17	1		1	59	60			1
18		1	1	58	66	1		
19	1	1	2	113	165	1		
20	1		1	72	116		1	
21	1		1	57	106	1		
22	1	1	2	79	170	1		
23		1	1	117	197	1		
24	1	1	2	81.3	187	1		
25	1		1	97	164	1		
26		1	1	78	176	1		
27	1		1	123	199	1		
28	1	1	2	97.5	193	1		
29	1	1	2	130	199	1		
30	1		1	96.9	152	1		
31		1	1	109	189	1		
32	1	1	2	141	195	1		
33	1	1	2	130	199	1		
Total	**18**	**23**	**41**			**15**	**6**	**12**

Source: NMFS Permit data

Table 86 Vessel Permit and Size Information for Herring Vessels Carrying LOAs, 2010

	LOA EXEMPTION TYPE			VESSEL SIZE		HERRING PERMIT CATEGORY		
Vessel	Herring Carrier	Herring Transfer At Sea	Total	Length	Gross Tons	A	C	D
1		1	1	42	20			1
2		1	1	40	15			1
3		1	1	45	30		1	1
4		1	1	36	10			1
5		1	1	36	5			1
6		1	1	42	23			1
7		1	1	43	20			1
8		1	1	46	5			1
9		1	1	23	2			1
10		1	1	51	22		1	
11		1	1	38	17			1
12		1	1	44	21			1
13	1	1	2	38	20			1
14		1	1	35	17			1
15		1	1	42.4	23		1	
16	1		1	65	57			1
17		1	1	50	30			1
18		1	1	50.6	47			1
19	1		1	44	36			1
20		1	1	53	47			1
21		1	1	50	67			1
22	1		1	50	64			1
23		1	1	58	66	1		
24		1	1	79	101		1	
25	1	1	2	113	165	1		
26		1	1	76	112			1
27	1		1	72	116		1	
28	1		1	57	106	1		
29	1	1	2	79	170	1		
30	1	1	2	117	197	1		
31		1	1	81.3	187	1		
32	1	1	2	78	176	1		
33	1	1	2	123	199	1		
34	1	1	2	97.5	193	1		
35	1	1	2	130	199	1		
36		1	1	101	197	1		
37		1	1	109	189	1		
38		1	1	141	195	1		
39	1	1	2	101	476	1		
40	1	1	2	130	199	1		
Total	**15**	**35**	**50**			**15**	**5**	**21**

Source: NMFS Permit data

4.5.1.5 Herring Processors

4.5.1.5.1 Cape Seafoods (Gloucester, MA)

The following information was provided by a representative of Cape Seafoods in August 2011. It includes the views of the company's representative on how the company has been affected by herring management:

Cape Seafoods is a purpose built facility for landing, handling and processing herring and mackerel. The company, formed in June 2001, is located on the Jodrey State Pier in Gloucester Massachusetts, leasing space from the Commonwealth of Massachusetts. Due to lower volume throughput, the company is negotiating a reduction of 50 percent of the space currently being occupied.

Adjacent to the processing plant, the company operates a cold store and blast freezers. Cape Seafoods has been receiving the vast majority of its supplies of fresh herring and mackerel from three midwater trawlers, namely F/V Challenger, F/V Endeavour and F/V Voyager, owned and operated by an associate company, Western Sea Fishing Company, Inc. At this time, due to over precautious quota reductions, restrictive by-catch caps and scientifically unsupportable "gear type" area restrictions, the vessel owners have decided to offer the F/V Voyager for sale. This has resulted in a number of lost jobs. The factory and the cold store are continuing to operate with fewer employees and lower pay rates for existing staff.

Processing Operations and Capacity

Herring represents approximately 75 percent of the volume handled each year. The fresh fish is pumped from the vessels' refrigerated seawater (RSW) tanks directly into the plant for processing or for sales into the various bait markets. As part of the processing, fish are graded by size into a number of different weight categories prior to freezing.

Cape Seafoods ships some frozen production in refrigerated shipping containers. These containers are hauled by local trucking companies to the cold store for loading by local lumpers. Once loaded, the containers are trucked back to the Boston shipping terminal for loading onto container ships.

Markets

There is a substantial demand from domestic lobster and tuna bait markets for fresh, salted and frozen herring. The bait department at Cape Seafoods operates seasonally and supplies both fresh and frozen bait to local lobster and tuna fishermen. Atlantic herring, processed by Cape Seafoods, also supplies a number of established export markets.

Employment

There were 20 to 25 crew members on the three dedicated fishing vessels operated by Western Sea Fishing Company. This has been reduced to 15 people because of the pending sale of one of the vessels. Western Sea Fishing Company employs 4 people full-time in vessels' management, maintenance and administration. Cape Seafoods employs 14 full-time individuals on a year-round basis. These year-round employees are all local area residents who have had their hourly pay rates, and number of hours worked per week, reduced during these difficult times.

Cape Seafoods and Western Sea Fishing Company use local area suppliers for such things as loading containers, electrical maintenance, building modifications, packaging supplies, fork lift operators, skilled plant operators, food and fuel for the vessels, trucking, freezing and cold storage.

4.5.1.5.2 Lund's Fisheries, Incorporated (Cape May, NJ)

Established in 1954, Lund's Fisheries, Inc. produces, imports, and trades fisheries products from around the world. The company's primary products include Atlantic mackerel, Atlantic herring, Boston loligo squid, California loligo squid, illex squid, Atlantic croaker, sea trout, porgy or scup, butterfish, bluefish, menhaden, monkfish, sea scallops, and conch.

The Lund's facility, located on the water in Cape May, NJ, is one of the largest seafood processing facilities on the Eastern Seaboard. With over 1,200 feet of waterfront the facility has a minimum of 15 vessels landing fish on a daily basis. Lund's produces for local fresh markets such as Boston, New York, Philadelphia, and Baltimore and freezes product for both domestic and export markets, as they become available. The Lund's facility is equipped with blast freezers capable of freezing up to 500 metric tons of fish per day. Lund's is also equipped with automated packing equipment specifically designed for pelagic fish, which allows the company to process 450 metric tons of whole round fish per day (Lund's Fisheries website, www.lundsfish.com).

One of Lund's affiliated companies is "Shoreline Freezers" that provides public cold storage for seafood and agricultural products. Another affiliated company is Sun Coast Calamari in Oxnard, California, which produces 200 metric tons of frozen California Squid per day.

Mackerel, when it is available to the local fleets, is an important product for Lund's, as the plant is equipped to handle about 30,000 mt during the January-April season. The plant also processes several mt of herring annually, although recent management measures including the GOM midwater trawl ban and conservative haddock catch cap volumes have combined to make herring less available to the plant in some years. Mackerel and herring are the focus of operations from January – April, with squid, scallops and a variety of finfish becoming more important for the remainder of the year. During times of full production, the plant employs about 100-150 individuals. About 65-70 of the employees are full-time, and most laborers live within a 30 mile radius of Cape May, NJ (Lund's, personal communication).

It is important to note that the information provided, including estimates of production, capacity, and employment, have not been verified by the Herring PDT through any independent sources of information.

4.5.1.5.3 Natural Pearl Essence (Engelhard Corporation, Eastport, ME) Closed

The last commercial natural pearl essence plant in the world closed in 2007 when the Engelhard Corporation was bought by BASF, the German chemical company. Natural pearl essence was extracted from the scales of Atlantic herring and used to add a pearl effect (a satiny luster that creates a soft, cloud-like luster) to shampoo, fingernail polish and other personal care products and cosmetics.

The Eastport Port Authority is under contract to purchase the BASF property on Broad Cove, but in the meantime, BASF has approved use of their property for transporting the base units that will eventually hold tide turbines planned for Cobscook Bay (French, 2011).

4.5.1.5.4 The Northern Pelagic Group (NORPEL, New Bedford, MA)

In April 2011, NORPEL temporarily closed its operation and sent one of the fishing vessels it had leased back to the West Coast (F/V Dona Martita). All but two employees were laid off. A letter to the NEFMC from the principals of NORPEL, Cape Seafoods (Gloucester) and the Maritime Terminal (New Bedford) indicated that the closure was due to the impact of the closure of Area 1A to trawlers in the summer and the strict haddock bycatch limits that made it impossible to harvest herring for fear of too great a bycatch of haddock. . In late October 2011, some herring was being landed by independent vessels at NORPEL for processing with the help of temporary employees.

The following information was provided by NORPEL and Maritime International Inc. during 2003 when the companies were optimistic about their future. It is provided as a baseline, indicating what has transpired since the company's opening, including what steps the company took to develop their operation for full capacity and the benefits it hoped to offer New Bedford.

The Northern Pelagic Group, LLC (NORPEL) is a pelagic processing plant based in New Bedford, Massachusetts that opened its doors on December 30, 2002, six months after construction of the facility began. Its partners are U.S. citizens, with experience in U.S. east and west coast fisheries development and marketing. Business planning for the facility started in January/February 2002. Prior to becoming a pelagic processing facility, the property on which NORPEL is located was a lumber yard/home repair store.

NORPEL is 100% dependent on pelagic fisheries (herring – 70% – and mackerel). Since inception, approximately $10 million has been invested in the development of the freezing facility, including recent investment in 2004 of $3.5 million to expand the capacity of the facility. This does not include investment of approximately $12 million associated with NORPEL'S two dedicated fishing vessels, F/V Dona Martita and Nordic Explorer, which were relocated in the Fall of 2002 from the west coast and refit for the herring and mackerel fisheries. These vessels were critical elements in the NORPEL business plan to ensure the NORPEL facility had a committed supply of herring on which to base its operations. This base of supply is augmented by other "vessels of opportunity" which can choose to make deliveries to the plant. However, without these dedicated vessels, NORPEL would not have been able to finance the investment in shoreside processing of pelagics, and without them would be facing substantial difficulty to operate profitably in the future. An additional $5 million had been previously invested by Maritime International, Inc., NORPEL's dedicated cold storage and stevedoring provider, with improvements to docks, cold storage facilities and the property infrastructure to accommodate NORPEL and their plans.

In general, NORPEL's processing operations are composed of about 70% herring and 30% mackerel. Processing herring can be a year-round business, while processing mackerel occurs primarily during the peak season, January – April. NORPEL began freezing mackerel in early January 2003. During the peak mackerel season in 2003, NORPEL was receiving some fish from about eight vessels in the area. NORPEL began freezing herring in June 2003, and since then has purchased herring from 10 vessels, both midwater trawl and purse seiners.

NORPEL processes herring for both the food and bait markets but concentrates the majority of its operations on the food market. While NORPEL is capable of processing herring on a year-round basis, there is some seasonality associated with obtaining a food-grade product. In the spring, when the fish are "feedy," the product is less desirable. The feed tends to react in the stomachs of the fish, causing the stomach linings to burst when they defrost. May is a relatively slow month in terms of processing herring for the food market. To address this issue, and reduce potential histamine issues associated with fish older than 24 hours since harvest, NORPEL has been investing heavily in research to retard the effects of these phenomena, which appears to be related to temperature control and hold water circulation. The company is making progress with innovative handling techniques designed to minimize, if not eliminate, the problem. If successful, this will add value to the product and reduce the need to have "fresh" fish (caught and delivered within 24 hours).

NORPEL estimates that with the influence of seasonality and market conditions, the plant could process fish about 200 of 365 days in a year. The plant is designed to run 24 hours a day so that it can operate in conjunction with the cyclical nature of the fishery. The processing capacity of the plant is currently about 450 tons per day. NORPEL estimates that it could process about 30,000-35,000 mt of fish during 2005, possibly 40,000 mt depending on fish availability, weather, and market conditions.

Committing vessels to serve the plant is a key element of NORPEL's long-term business strategy. Two dedicated midwater trawl vessels are committed to the plant through cross ownership: (1) 163 feet in length with a 400 ton hold capacity and (2) 120 feet in length with a 300 ton hold capacity. These two vessels came to New Bedford from the West Coast in October/November 2002 as part of NORPEL's business plan for consistently supplying product to the new facility. These vessels possess federal permits for the Atlantic herring and squid/mackerel/butterfish fisheries. These vessels entered the herring and mackerel fisheries after the control dates were established in both fisheries.

The plant supplements its purchases of product with fish primarily from overages on other vessels (extra fish for which other vessels cannot find a market), which NORPEL sees as advantageous to everyone involved because the fish are utilized. The plant purchases herring caught in all herring management areas. Since inception, herring has been delivered from all management areas generally in the following proportions: 1A (20%), 1B (40%), 2 (10%) and 3 (30%). Area 1A/B is currently an important element of NORPEL's supply base, especially in 2004 given the bycatch of juvenile haddock experienced in Area 3.

Processing Operations

Vessels that catch herring for food markets hold the fish in refrigerated sea water (RSW) tanks (30-31°F) until the fish can be graded at the NORPEL facility. RSW tanks are critical to ensure a food-grade product. If the fish are considered to be acceptable for the food market, then NORPEL purchases them, places them in their own specially designed land RSW tanks (30-31° F), grades them to size, packs them into custom poly-coated cartons, and freezes them. In 2004, NORPEL doubled its on-site storage capacity of fresh fish, to ten large RSW holding tanks, which are computer-controlled and capable of holding nearly 600 mt.

There are also blast freezers located in an adjacent facility to supplement operations if larger fish (mackerel) are purchased. The adjacent cold storage facility (Maritime International Inc.) is capable of holding nearly 6,000 mt of processed product to help facilitate on-time deliveries according to customer's schedules.

Once frozen in blocks, the fish are packed into cartons (boxes) of 20-25 kg in size on a conveyor system. The conveyor packs about 15 boxes per minute and one pallet every three minutes. The packing machine operates with two people.

Markets

NORPEL processes herring and mackerel for food markets worldwide. On a global basis, the U.S. fisheries for pelagic species like herring and mackerel are small but growing. Since NORPEL and Cape Seafoods were constructed in Massachusetts in 2001-2002, U.S. production of small pelagics has increased by 50%, and Massachusetts has become the leading east coast producer of small pelagics. That increase is important to hold market share since NORPEL is competing with foreign operations plants that are supplied by enormous pelagic fisheries (West Africa, for example).

The distance between the processing facility in New Bedford and the customers located throughout the world presents some difficulties for the plant. It can take 2-3 weeks for the customer to receive the product once the plant processes it. However, once NORPEL freezes a food-grade product, it has about a 12-month shelf life. In addition, NORPEL's relationship with Maritime International in New Bedford has helped to minimize problems associated with long-distance shipment (see below).

Employment And Economy

NORPEL has provided a boost to the economy in the fishing community of New Bedford. It employs 80-90 individuals over the course of a year, the majority of whom live in or near the community. Approximately 40 employees work each shift (two shifts/day) when the plant is operating at capacity, and this number varies based on the amount of product that needs to be processed at any given time. About 90-95% of the employees are of Central American descent (Guatemala, San Salvador). Eight individuals work for the processing facility full-time (engineers, managers). The plant offers competitive wages to its employees enabling them to support their families.

In addition, the two dedicated fishing vessels employ five crew members each and purchase food, fuel, and other supplies from local businesses. The captains and crew members of the two vessels are local residents, some of whom participated in fisheries on the West Coast for a period of time and have now come back to their home communities. Estimates of annual expenditure by the NORPEL dedicated vessels are $6 million per vessel on local services and supplies.

Future Plans

NORPEL's future plans include purchasing horizontal plate freezers for larger fish (mackerel) and specialty products. Since the 2004 $7 million expansion of RSW tanks and freezing capacity, there are no plans for additional significant expansion of the plant, primarily because the size of the property and the current facility make a significant expansion unrealistic. NORPEL plans to continue to process herring and mackerel on a year-round basis and expand its markets to match the current processing capabilities of the plant.

Maritime International

Much of the processed product from NORPEL is shipped overseas via Maritime International Inc., which is located adjacent to the processing facility in New Bedford. Overseas shipment occurs in high cube refrigerated containers designed to hold the product at the optimal temperature of –18 degrees Fahrenheit (0°C) to ensure freshness. Maritime International can arrange for either containerized cargo shipments or bulk/tramper carriage of nearly 4,000 mt per shipment. Clients can select either service based on the amount of cargo or product they require.

During the scoping process for Amendment 1, Maritime International provided estimates of financial expenditures associated with NORPEL cargo vessel loading operations. The estimates provided by Maritime International were based on one cargo vessel remaining in port for three days and spending money in the community for transportation, restaurants and entertainment, doctors, propane suppliers, and other associated industries. Estimates of expenditures associated with pilot boat operators, vessel agents, customs agents, lift trucks, courier services, and other items required to prepare the cargo ship for transport were also provided. With a potential of 15 cargo vessels per year, Maritime International estimated expenditures of at least $3.2 million in addition to those associated with processing, storage, container shipments, and local distribution.

In April, 2011, anticipating the potential permanent closure of NORPEL, Maritime International estimated that 89 to 93 jobs (warehousemen, stevedores, teamsters, shuttle truck drivers would be lost) and direct annual economic impact would be about $2.2 million.

NORPEL – Summary Information

Processing Operations:	Approximately 70% herring, 30% mackerel
Plant Capacity:	Approximately 450 tons per day, 200 days per year (60,000 tons)
Current Operations:	30,000-40,000 mt
Plant Employment:	80 individuals, 6 full-time 10 crew members for 2 fishing vessels

4.5.1.5.5 Seafreeze, Ltd.

The information presented below was partially based on a May 2004 site visit to the plant at Davisville, (North Kingston) RI and follow up phone calls carried out by individual PDT members. Some additional information was obtained from the company website in 2011. The Herring PDT wishes to thank the individuals at Sea Freeze Ltd for contributing the following information and helping the PDT provide a more comprehensive description of the current herring fishery and the importance of the herring fishery to the lobster industry. It is important to note that the information provided below, including estimates of production, capacity, and employment, have not been verified by the Herring PDT through any independent sources of information.

Seafreeze is the largest producer of sea-frozen fish on the east coast of the United States. It supplies sea-frozen and land-frozen fish to domestic and international markets including bait products to longline fleets. Seafreeze's two dedicated freezer trawlers are among the largest freezer trawlers on the east coast. At sea freezing produces a very high quality product, as the product is not damaged during loading and unloading. Catch is then marketed nationally and worldwide. Fishing operations target illex and loligo squid, mackerel, herring and to a lesser degree, butterfish. The vessels are approximately 150 ft in length with a holding capacity of approximately 280 mt and a daily freezing capacity of 50 mt per day.

Domestic sales account for approximately 30% of total sales and 70% are international. Internationally, Eastern Europe and Asia are two important regions that purchase from Seafreeze. Atlantic mackerel is sold to companies in Canada as baitfish and Illex squid is sold nationally as baitfish for the groundfish, swordfish and tuna fisheries as well as for crab and lobster bait. Zoos and aquariums also purchase Seafreeze products as feed for other species.

Illex squid and mackerel are the mainstay of the business accounting for approximately 80% of revenue. Although herring is the least financially valuable of the species it is nevertheless important to the business due to its year round availability and due to the fact that access to it continues after other fisheries have closed. In this respect, herring, for Seafreeze, is an important back-up fishery when other fisheries become unavailable.

Seafreeze began its operations in 1985 when it was initially a fishing operation with just a few employees. This company operated one of the first successful US freezer trawlers in the region and over time, cold storage facilities were added and later enlarged (current capacity 7,000 mt). The plant does not include any processing facilities, nor is it invested in the distribution of product. Operations are limited to catching, cold storing and marketing whole fish. The cold storage is used primarily for catch from the dedicated freezer trawlers though from time to time, other vessels unload and store here. Currently, the plant employs approximately 60 people including 10 administrative and managerial staff, 20 crew working rotating shifts, and 15 individuals that work in the storage facility (packing, loading etc.). These employees work full time and employment is generally stable year round. Employee turnover is generally low and when it occurs it is often due to crew seeking land based positions for personal reasons (family time etc.).

The seasonal operation of the plant is as follows:

Illex squid – May to October

Mackerel – January to May

Loligo squid – September to May

Herring – Year-round

Product supply is lowest during the spring and fall. As a result, these months are dedicated to vessel repairs and maintenance. Sales and distribution occur year-round.

Plant location was selected because of its access to transport mechanisms. The plant is accessible by deep-water port and rail access. Rail access is slower than other forms of distribution but it is significantly cheaper. The plant exists largely independent of the surrounding community (North Kingston). Employees live regionally, though not necessarily locally. Some local distribution of bait occurs in summer months and vessel fuel is purchased locally along with food for the crew. Some of the gear used on the trawlers is produced and repaired on site by a company that rents space from Seafreeze.

Representatives stated that more and more time is being dedicated to involvement in the management of the species each year. In the past, a small percentage of time was spent on management concerns (attending meetings, etc.), now as much as 50% of key staff time is spent investing in this aspect of the business. Representatives stated that this is one of the new costs of doing business in an increasingly regulated environment.

Regulations in the Loligo fishery were cited as having impacts on the business. Tighter regulations in this fishery has meant that Seafreeze has had to replace this product with other fish as current restrictions make this fishery less attractive for larger vessels. Also, regulations in other fisheries (such as groundfish) have meant that shifts are occurring between fisheries that also impact on business. Seafreeze representatives suggested that it is important in this regulatory environment to diversify where possible and not be too dependent on any one species.

Cold storage

In 2005 Seafreeze completed an addition to their cold storage facility, increasing capacity to about 23 million pounds. This has allowed the company to operate as a public cold storage facility. They can load and unload reefer vessels (trampers), refrigerated containers, refrigerated railcars and trucks. Currently they load 40 to 90 high capacity refrigerated rail cars annually.

Sea Freeze – Summary Information

Operations: Sea frozen fish and cold storage facilities
Plant Capacity: 7,000 mt of cold storage space

Current Operations (approximate numbers per year)

- Illex – 6,000 mt

- Mackerel – 6,000 mt
- Herring – 2,000 mt
- Loligo – 1,000 mt

Employment: 60 full time employees total; 20 fishermen – on rotating shifts, others divided between storage facility and administrative functions

4.5.1.6 Utilization of Herring in Other Fisheries

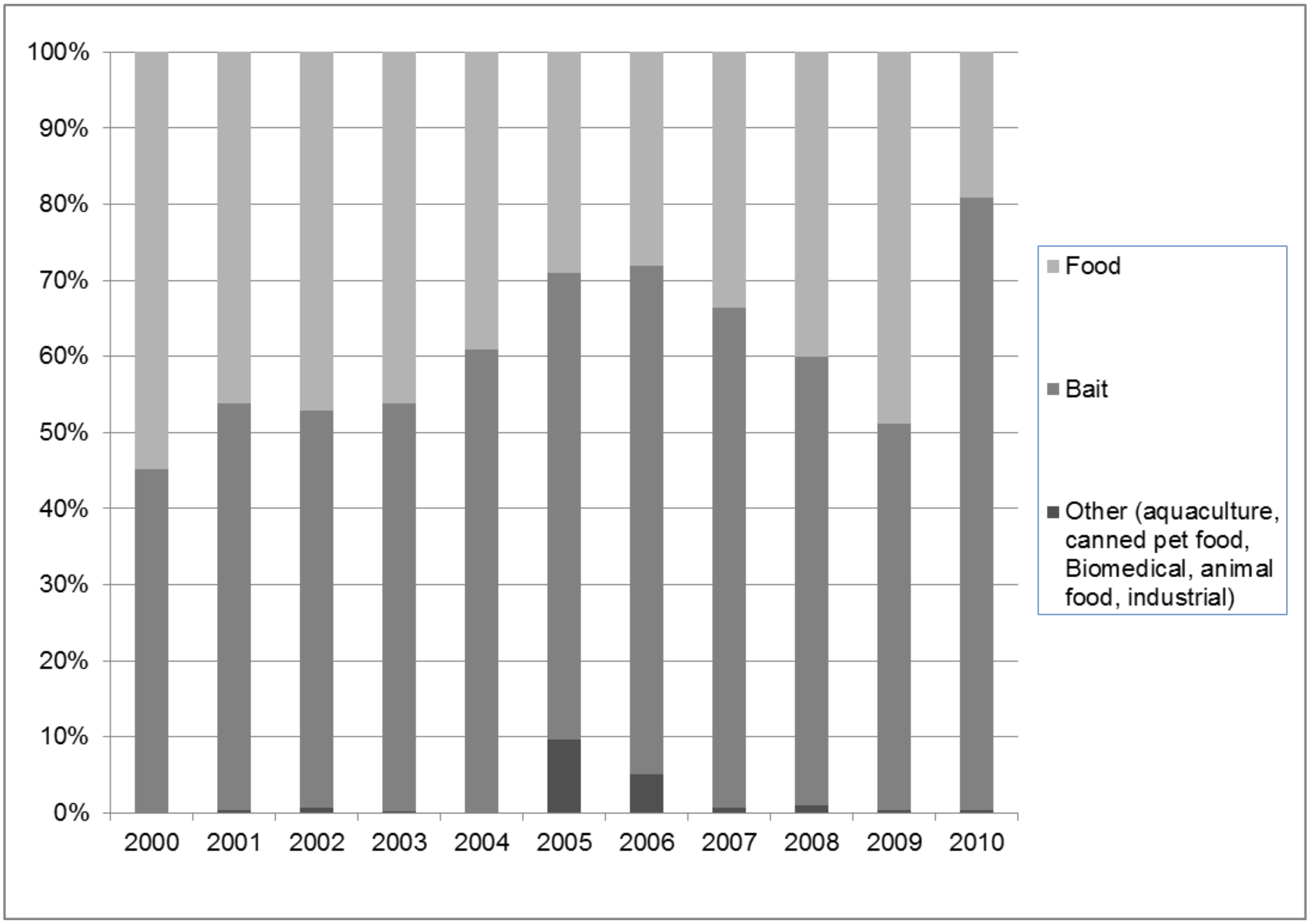
4.5.1.6.1 Bait

Herring is currently used for many fisheries, such as the lobster industry (regional), tuna and various recreational fisheries. The locations and processing and selling techniques also vary. For a more detailed description of herring as bait, and some the various ways in which herring are processed and sold, see Amendment 1 and Appendix I of this document (Volume II), respectively. A full description of herring bait dealers can also be found in Amendment 1, and updated descriptions of the bait dealers can be found below.

The bait industry has changed tremendously in the last seven years resulting in a much more centralized distribution structure. Generally the herring used for bait goes through a large wholesale dealer to smaller dealers and lobster wharfs along the coast. The wholesale dealers generally have facilities where they sort, barrel, freeze and store bait for redistribution.

A large proportion of herring catch is used as bait. NMFS collects ex-vessel prices and does not systematically collect information about bait prices. Figure 76 provides the percentage of reported herring landings utilized for bait and food from the dealer database during 2000-2010. Since 2001, more than 50% of herring landings are sold for bait on an annual basis. Herring landings that were used as bait increased steadily from 2000 to 2006, from less than 50% to over 70%. From 2007 -2009, the percentage of herring being used as bait decreased to approximately 50%, however in 2010 over 80% of the herring catch was used as bait. A small amount of the herring catch is used for non-food and non-bait purposes; this peaked in 2005 at nearly 10% and has declined steadily since that time.

Figure 76 Percentage of Herring Landings Reported for Food and Bait Usage 2000-2010



Source: NMFS Dealer Data

4.5.1.6.1.1 American Lobster Fishery

The lobster industry (particularly in Maine) depends greatly on herring bait to sustain itself. Small-scale truckers, bait shop owners, and related business all participate in the commercial bait venture. Bait can be delivered dockside from trucks traveling up and down the coast. In the past, trucks picked up the bait from canneries and community sites up and down the coast to service smaller bait shops or lobster fishing 'gangs' (Acheson 1987). The canneries are gone now, but herring is still delivered to important lobster communities. Island bound and coastal isolated lobster fishermen may also pick up bait directly off vessels, or have it brought out on ferries. In recent years, the shift has been towards vessels landing directly to island ports. A small proportion of lobster bait was supplied by the freezer plants in Massachusetts (Cape Seafoods and NORPEL). With both freezer plants in relative hiatus, however, it is unclear that they are the source of bait in 2011.

While bait choices vary with individual fishermen's preferences and fishery, lobster vessels in the State of Maine are perhaps the most dependent on herring for bait. Recently, however, pogies (menhaden) have also proved popular. Major dealers in Maine offer herring, pogies, redfish and flounder, haddock, carp racks, tuna heads, and Pacific rock fish, all with varying prices ranging from fifteen cents to 44 cents. In part due to the ASMFC limits on landing days, much of the herring is salted and frozen. Initially, lobstermen found the frozen product to be difficult to handle, but according to reports from dealers, they have adjusted. Lobster vessels in Massachusetts and New Hampshire also depend on herring for bait, but this dependency on herring decreases in more southern areas.

Fishery Description

The fishery for American lobster, *Homarus americanus*, is one of the top fisheries on the Atlantic coast of the US, with landings of close to 96.6 million pounds and valued at close to $299.5 million in 2009. Maine and Massachusetts together produced more than 92% of the total national landings. This represents an increase in landings but a decrease in value from 2008. Landings typically occur in inshore areas, and the species is managed jointly by the ASMFC and NOAA. The ASMFC manages the state waters (from 0 to 3 miles from shore), and NMFS manages from state water to the EEZ (3 to 200 miles from shore). Lobsters are most abundant inshore from Maine through New Jersey, with abundance declining from north to south, while offshore they occur from Maine through North Carolina. A more detailed description of the lobster industry can be found in Amendment 1 to the Atlantic Herring FMP.

Relevant Updated Regulations

Today, American lobster is managed under Amendment 3, which provides the flexibility to make changes to the management program through addenda, allowing resource and fishery concerns to be addressed promptly. Seven lobster management Areas are created through Amendment 3, as well as a Lobster Conservation Management Team (LCMT) for each management area. Made up of industry representatives, the LCMTs are responsible for recommending changes to their management plans. Since 1999 15 addenda to Amendment 3 have been approved. The documents for each addenda can be found at the Commission's website, www.asmfc.org. Major provisions within the Amendment and addendum include those such as: minimum and maximum carapace; length; maximum trap limits; prohibition on the possession of buried lobsters (lobster with eggs); prohibition on possession of lobster meat and lobster parts; trap configuration requirements; prohibition on spearing lobsters; prohibition on possession of female v-notched lobsters; limits on landings with non-trap gear, limits to entry into the fishery. Other addendum, such as the most recent Addendum XVI, address new reference points for each lobster stocks, based on recommendations from the Technical Committee and the Peer Review Panel from the 2009 stock assessment.

Stock Assessment/Landings

The resource is managed as three separate stocks: the Gulf of Maine (GOM), Georges Bank (GB), and Southern New England (SNE). The 2009 peer reviewed stock assessment (ASMFC, 2009) utilized a new model which incorporated lobster size and a broader range of data. It found that the GOM and GB stocks were experiencing record stock abundance and recruitment, while the SNE stock was experiencing low abundance and poor recruitment. While the success of the GOM and GB stocks meant that they were not depleted, and overfishing was not occurring, the Panel recommended that the ASMFC be prepared to impose restrictions should recruitment decline. The Panel also noted that productivity has been lower in the past, and warned that current levels of fishing would not be sustainable if recruitment were to decline again.

The assessment further found that the GOM supports the largest fishery, constituting approximately 76% of the U.S. landings between 1981 and 2007, while GB constitutes the smallest portion of the U.S. fishery, averaging 5%. Landings in the GOM averaged 33,000 mt from 2000-2007, and increased dramatically from 1990 to 2006. Landings in GB almost doubled between 2003 and 2007, with a high of 2,400 mt landed in 2005.

The SNE stock was determined to be depleted, although overfishing was not occurring. Abundance indices were determined to be at or near series lows. The distress experienced by the SNE stock was further examined in a Technical Committee Recruitment Failure in the SNE Stock (ASMFC, 2010) report, as additional monitoring information became available. The additional information indicated that the stock was continuing to fall lower than the assessment. The Technical Committee suggested that a combination of environmental and biological changes, as well as continued fishing was leading the stock to experience a recruitment failure. This recruitment failure was in turn preventing the stock from rebuilding.

SNE has the second largest fishery, accounting for 19% of the U.S. landings between 1981 and 2007. Contrary to GB and GOM, the landings in SNE increased between the 1980's and 1990's, and reached a peak in 1997 of 9,935 mt. It was in 1999 that the fishery began to experience a decline, with landings only accounting for 9% of the U.S. landings.

4.5.1.6.1.2 Tuna Fishery

The tuna fishery depends on herring as one bait source utilized for capturing tuna, and is known to feed on herring as well (Section 4.1.5.2). The tuna fishery itself landed an average of 49,908 thousand pounds of total tuna between the years 2004 and 2008, with the majority of catch being comprised of Albacore, Bigeye, and Yellowfin tuna. The importance of the tuna fishery to the US in 2009 can be seen in Table 87. A total of over 199 thousand metric tons was caught by commercial vessels in and out of US waters, which represents 267,777 thousand dollars' worth of tuna. The percentage of tuna caught within the 200 mile EEZ is a little under 11%, or 68,185 thousand dollars. The US canned167.5 thousand metric tons of tuna, without accounting for tuna canned in oil, in 2009.

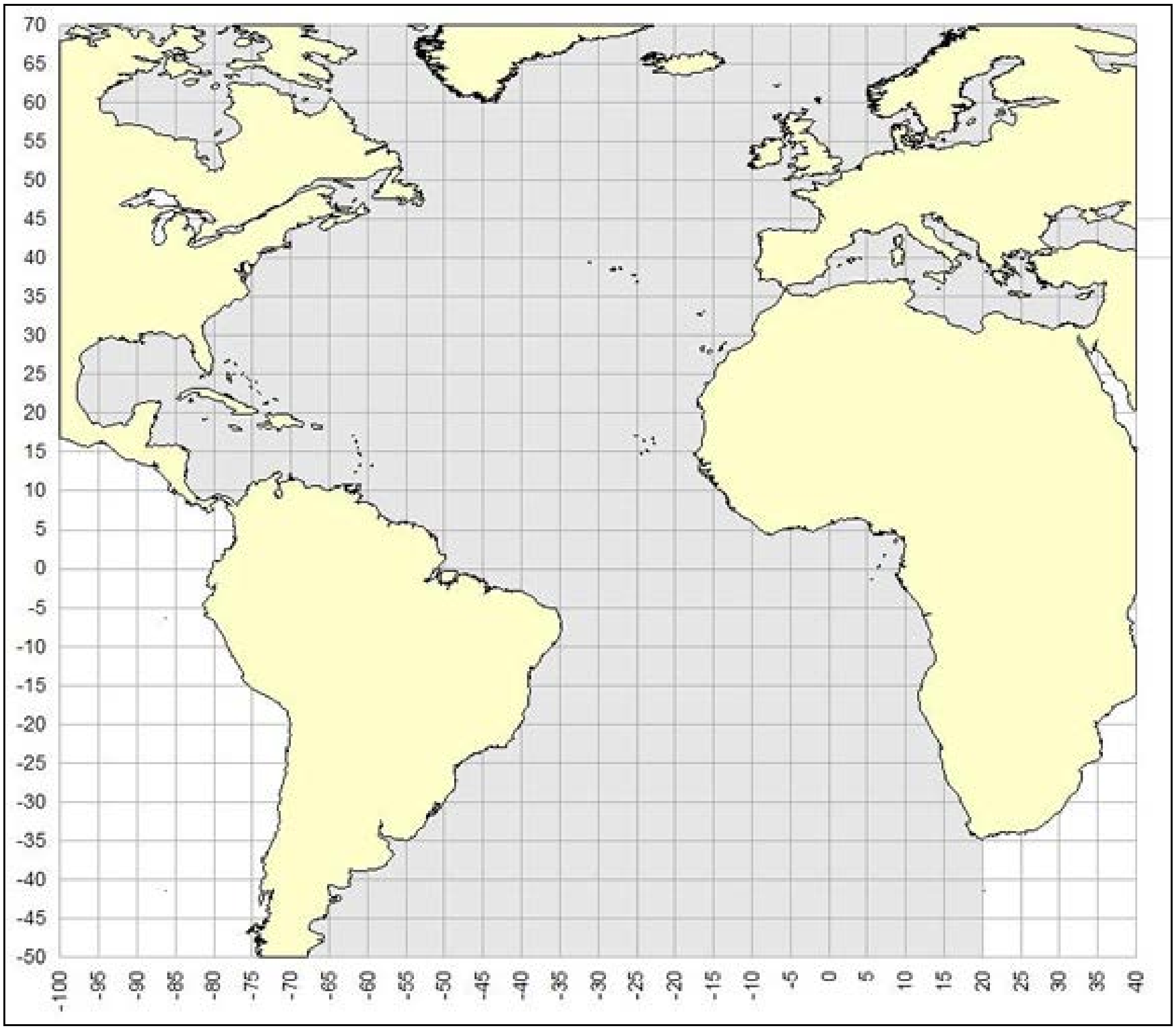
Table 87 Commercial Landings of Total Tuna by Location, 2009

	0 to 3 miles from US shores	3 to 200 miles from US shores	High Seas or off foreign Shores	Total US Landings
Metric Tons	526	18,024	180,682	199,232
Thousands of Dollars	1,065	67,120	199,592	267,777

Source: Fisheries of the United States (2009)
Total tuna includes Albacore, Bigeye, Bluefin, Little tunny, Skipjack, Yellowfin, and Unclassified tuna.

Tuna in the US are jointly managed by NOAA and the International Commission for the Conservation of Atlantic Tunas (ICCAT) in the Atlantic Ocean and adjacent seas. The following information has been obtained from the ICCAT website, http://www.iccat.es/en/introduction.htm, and further information can be found therein. The Convention entered formally into force in 1969, and has three official languages: English, French and Spanish. There are 48 Contracting Parties, including the US, Canada, and various other nations from the UN , Africa, and Asia. The study and management of tuna and tuna-like species can only be undertaken by ICCAT, in accordance with the Convention ICCAT also compiles bycatch information caught during tuna fishing in the Convention area. Figure 77 illustrates the ICCAT Convention area.

Figure 77 The International Commission for the Conservation of Atlantic Tunas (ICCAT) Convention area



Source: www.iccat.es

There are over 30 species of tuna managed ICCAT, including: Atlantic bluefin (*Thunnus thynnus thynnus*), skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), albacore (*Thunnus alalunga*) and bigeye tuna (*Thunnus obesus*); swordfish (*Xiphias gladius*); billfishes such as white marlin (*Tetrapturus albidus*), blue marlin (*Makaira nigricans*), sailfish (*Istiophorus albicans*) and spearfish (*Tetrapturus pfluegeri*); mackerels such as spotted Spanish mackerel (*Scomberomorus maculatus*) and king mackerel (*Scomberomorus cavalla*); and, small tunas like black skipjack (*Euthynnus alletteratus*), frigate tuna (*Auxis thazard*), and Atlantic bonito (*Sarda sarda*).

Six main species are caught by US fisheries; Albacore, Bigeye, Bluefin, Little Tunny, Skipjack, and Yellowfin, and all seem to be experiencing a downward trend in stock size as fishery effort has increased. Similarly, all 6 have been experiencing difficulty in producing a stock assessment that does not suffer from uncertainty due to lack of data. According to the North Atlantic 2009 ICCAT Albacore stock assessment, the spawning stock size had declined in 2007 to one third of the peak levels that were estimated in the late 1940's. The Committee further concluded that it is likely that the stock was below the maximum sustainable yield (MSY) level and the stock had remained below B_{MSY} since the late 1060s.

The 2010 Bigeye tuna assessment showed a slightly similar trend, but the Committee noted that while data quality continued to improve, considerable uncertainty in the stock status and productivity of the Bigeye still exist. Large declines in biomass and increases in mortality were evident, particularly in the 1990's, when fishing mortality was high. With the decline in the previous five or six years, there have been possible biomass increases, and replacement yield for 2011 was estimated to be at around MSY.

The Atlantic Bluefin 2010 ICCAT stock assessment was limited by a lack of data, and the Committee noted that historical fishery performance data would likely not be improved, and that therefore the assessment should be modified in future iterations. A similar trend to the two previous tuna was found, however, with spawning stock biomass declining since the 1970's, with increasing fishing pressure on age 2-5 fish. Older ages felt a decrease in fishing effort but a rapid increase in the 1990's, and recent recruitment levels remain uncertain. The Little tunny is such a data poor species that ICCAT has not performed a stock assessment on it or its 12 other small tuna species that it is lumped with.

The last ICCAT stock assessment for skipjack tuna was created in 2008, although another may occur in 2012. Skipjack is a typically tropical or sub-tropical species that exhibit continuous spawning and differences in growth by region. Making assessments even more difficult, the effort on the skipjack is not directed, and so data is variable. Conclusions for both the Eastern and Western stock were therefore difficult to create, but it was generally thought that neither was suffering from over exploitation.

For Yellowtail tuna, the last stock assessment was also in 2008, with another scheduled to take place in 2010. Between the age structured and production model, results varied. The age structured model suggested that overfishing had occurred in recent years, and the production model suggested that overfishing had been occurring and that the stock was overfished during those years. Both models indicated that overfishing was not occurring in 2006, however, the Committee urged consideration of uncertainty in both models.

4.5.1.6.1.3 Recreational Fisheries/Other

Of the many recreational fisheries that exist in the Northeast, several depend on herring as a source of bait as well as a source of food for the fish that they hunt (Section 4.1.5). The following review of recreational fisheries comes from the fisheries of the United States, which offers a comprehensive overview of recreational fisheries in the US. A full breakdown of the different recreationally fished species by year and weight is offered therein, as well as by distance from shore and by number of live releases.

The recreational fisheries serve many purposes for the residents of the Atlantic Coast states. In 2009 there were close to 44 million trips that caught over 198 million fish, trips which serviced nearly 6.4 million residents. Over 31% of those trips were made in the waters managed by the NEFMC. Commonly caught fish on the trips that occurred in federally managed waters include black sea bass, summer flounder, Atlantic cod, dolphinfish, and bluefish. 62% of all the prior mentioned trips were ones in which the fishing was done mostly in inland waters.

States stand to benefit from recreational activity as well. In 2009, the state of New Jersey, New York, and Massachusetts had the most number of angler trips, with 5,444 trips; 4,917 trips, and 3,603 trips, respectively. Connecticut had 1,462 trips; while Maine had 1,014, and Rhode Island 1,042. The state of New Hampshire had the fewest, with 414 trips. The numbers of trips taken in 2008 were similar in magnitude by state. The trend in states is similarly mimicked in the number of finfish both harvested and released by recreational fishermen in 2008 and 2009, however Connecticut was much closer in ranking to Massachusetts.

Due to the eclectic nature of the fisheries entailed in the recreational community there is no one management body that oversees all recreational fisheries. Instead, there is a mixture of management from the NMFS, NEFMC, MAFMC, ASMFC, and state agencies that are not divided by the value of the resource. For instance, some stocks such as black sea bass are managed by the ASMFC and represent 1,022 mt of harvest in 2008 and 1,269 mt in 2009. Atlantic cod, however, are managed under the NEFMCs Groundfish FMP, and represent 1,905 mt of recreational catch in 2008 and 1,677 mt in 2009. The MAFMC manages bluefish, which were worth 8,717 mt of recreational catch in 2008 and 6,290 mt in 2009. There are a wide range of bodies that assess the health and status of the stocks that are recreationally fished as well. For more information on a specific recreational species, determine the management body that oversees the species and refer to their staff and website.

There are multiple forms of data on recreational fisheries available. For the Fisheries of the United States (2009), the data was gathered through state and regional logbook programs, a coastal household telephone survey, a telephone survey of for-hire fishing vessel operators, and a field intercept survey of completed angler fishing trips. Amendment 16 to the Groundfish FMP utilized data that came from the Marine Recreational Information Program (MRIP, formerly the MRFSS) and recreational party/charter logbook data. The party/charter mode logbook data can be used to characterize numbers of participating vessels, trips, and passengers.

The MRIP provides a source for catch statistics including harvested and released catch, distance from shore, size distribution of harvested catch, catch class (numbers of fish per angler trip), and seasonal distribution of harvested catch. The MRIP is a relatively new initiative from NMFS which is focused on counting and reporting marine recreational catch and effort. The point of MRIP is to provide the detailed, timely, scientifically sound estimates that fisheries managers, stock assessors and marine scientists need to ensure the sustainability of ocean resources, as well as address head-on stakeholder concerns about the reliability and credibility of recreational fishing catch and effort estimates.

4.5.1.6.2 Bait Dealers

4.5.1.6.2.1 Beaver Enterprises Inc. (Rockland, ME))

Two years ago, Beaver Enterprises Inc., founded in 1975, sold their plant to Linda Bean, a lobster dealer. Beaver is no longer in the lobster bait business, but instead focuses on selling salt to herring operations all over the region including in Rockland and Kittery, ME, Gloucester, MA and Rhode Island. The salt business is easier than the herring business because salt “keeps” whereas herring deteriorates quickly.

Beaver is probably the largest salt purveyor in the region for the fishing industry. The owner started small but was able to grow large enough quickly enough to develop “buying power”. He buys directly from the three largest producers, Morton, Cargill’s and US Salt. Beaver Enterprises averages deliveries of 2 trailer-truck loads per day of salt.

Without herring, Beaver Enterprises would be out of business. Herring fishermen have always salted their product. Typically, of 400 pounds of barreled herring, 80 pounds is salt (i.e., 20% of herring bait weight is salt). The ASMFC landing days restrictions has increased salt demand.

The cost of overhead is higher than it was in the past with the need for cold storage, plus bait is more expensive, as is the cost of fuel. It is harder for the “little guys,” who used to be able to make a day’s pay with one truckload of fish, for example.

Beaver Enterprises does do some fish hauling. For example, they recently transported a ton of pogies (22 vats) from Lund's (Cape May, NJ) to O'Hara's (Rockland, ME), spending $1000 in fuel. (Wayne Stinson 2011, personal communication)

4.5.1.6.2.2 Channel Fish (Boston, MA)

Channel Fish is located in East Boston and was incorporated in 1963. The company operates a processing plant that deals mainly in gurry/offal that is bought, ground, frozen and sold to cat food companies. Channel Fish also buys herring and sells bait to lobster dealers and lobstermen, though the majority goes to dealers. In the past, they were more heavily involved in the herring fishery but currently a smaller percentage of their business is associated with or dependent on herring. Herring is purchased from a number of different vessels including midwater trawlers and some seiners. They own five trucks and buy herring from Rockland, Portland, Gloucester and New Bedford as the boats follow the migration of the fish. The company has a pier, pump-out facility and dewatering box, so anticipates having vessels land at their facility in the near future.

When it is available, the company also handles mackerel that is packaged and frozen for human consumption. Menhaden, primarily from New Jersey, is also purchases and sold for use as a baitfish. Product is sold domestically and internationally. Channel Fish has approximately 60 full-time, year-round employees. Though the company rarely attends Management Council meetings, they communicate with Council and Herring Committee members on a regular basis.

(Updated 8/26/11, personal communication.)

4.5.1.6.2.3 Port Clyde Lobster (Port Clyde, ME)

In 2007 Linda Bean purchased Bay Lobster Company, renaming it Port Clyde Lobster. Trained by the prior owner, Linda's company bought 400,000 pounds of lobster in the first year. The following year, Ms. Bean bought 1 million pounds of lobsters from a supplier on Vinalhaven. She also invested in a small, unique lobster processing plant in Richmond (Sagadahoc County) and in 2009, bought a 28,000 sq. ft. seafood processing plant in Rockland that she converted to a lobster processing facility.

The value-added product she has developed includes lobster stew and an herbed lobster roll (sold at summer stands in Freeport and Rockland, from a lobstermobile at five Maine state fairs, five "Perfect Maine" cafes in Freeport, Camden, Portland (Maine), Del Ray Beach, Florida and St. Thomas (US Virgin Islands). In addition, a takeout on Nantasket Beach, Massachusetts, was licensed).

In 2010 Bean bought Inland Seafoods of Atlanta's wharf and business on Vinalhaven and purchased a total of 3.1 million pounds of lobster. Wal-Mart also began to sell Bean's first frozen seafood product: cooked, in-shell cocktail claws, frozen and pre-scored for easy shell removal, produced by the Rockland plant.

Bean's company tags their lobsters to identify the dock from which they were purchased. Along with two others, Ms. Bean established the Fund for the Advancement of Sustainable Maine Lobster to help pay for Marine Stewardship Council's certification of Maine lobster as sustainable.

In 2011, the company introduced additional value-added lobster products, has begun to process Maine shrimp in the winter and has branched out to selling other unique Maine products, as well as expanded licensing to new locations.

The company employs over 200. Part of the company's responsibilities includes purchasing bait and fuel to sell to the lobstermen who provide lobsters to the business.

4.5.1.6.2.4 Purse Line Bait (Sebasco Estates, ME)

Purse Line Bait has been trucking and barreling lobster bait since approximately 1993. Herring is purchased from both seiners and trawlers in Maine and Massachusetts, pogies from New Jersey, redfish and other species from around New England. The fish is trucked to their main facility in Sebasco Estates, ME where it is salted and barreled, then sold to approximately 40 lobster buyers in the region between Harpswell, ME and Rockland, ME. Purse Line has two freezer facilities, one in Sebasco and another in Harpswell, where about 2 million pounds of product can be stored for the times when no product is coming in. Americold Cold Storage in Portland, ME is used for overflow.

Eighty-five percent of their sales are to lobster buyers with the remaining percent sold off dump trucks. Of an approximate total of 20 million pounds in overall sales per year, 12 million are herring, 5 million are pogies and 3 million are redfish and other species.

In addition to purchasing from the vessels, Purse Line Bait also purchases herring from Cape Seafoods in Gloucester, MA, O'Hara in Rockland, ME and from other sources. Purse Line Bait owns 10 trucks, employs approximately 8 or 9 people full-time, year around and 4 or 5 more seasonally.

(Updated 6/17/11)

4.5.1.6.2.5 Sunshine Seafoods (Stonington, ME)

Sunshine Seafoods, Inc. operated for approximately 20 years out of Stonington, Maine. It was primarily a lobster dealer, buying and selling lobster in the U.S. and abroad. The business was sold, but probably due to the economic crash, went bankrupt and the original owners reopened as Sunshine Seafoods LLC.

Currently a small fraction (about 5%) of its business comes from sales to the Maine tourist market that typically runs from May to December. The majority of its business is dependent on lobster sales to Canada. Sunshine Seafoods also deals in bait herring, buying wholesale from a local dealer or occasionally directly from a herring vessel. About 5% of its business is derived from sales of herring for lobster bait largely to the same lobstermen who sell them lobsters. Sunshine Seafoods employs one person year-round.

(Updated 8/26/11, personal communication)

4.5.1.6.3 Non-Consumptive Utilization (Whale Watching and Other Ecotourism)

The effect of herring as a forage species on whales and other marine mammals and birds in the New England area is a key issue for non-consumptive utilization of Atlantic herring, and therefore the whale watching and bird watching industry. If fewer marine mammals or birds are in the area to observe, fewer boats and tours will be able to be supported in the industry. Furthermore, whales and some sea birds are known to respond to prey availability, and may become increasingly difficult to find. The number of marine mammals needed to support the industry is unknown, but economic data on the whale watching industry does exist.

An economic study by O'Conner *et al* (2009) characterized the whale watching industry in New England as being worth $30 million (revenue/year), with a growth rate of -3% a year (Table 88). Over 1 million people a year are said to go on trips, and the number of operators is around 30 (although it is not clear if charter vessels are included in the estimate). Main ports of sail include Massachusetts, Maine, New Hampshire and Rhode Island, and Stellwagen Bank National Marine Sanctuaries is one of the more popular destinations. Ticket prices are around $40 for adults and $30 for children on a 4 hour cruise. Up to 400 passengers can fit on some vessels.

Table 88 Summary of New England Whale Watching Statistics, 1998 and 2008

Year	Number of whale watchers	AAGR	Number of operators	Direct expenditure	Indirect expenditure	Total expenditure
1998	1,240,000	N/A	36	$30,600,000	$76,650,000	$107,250,000
2008	910,071	-3%	31	$35,000,000	$91,000,000	$126,000,000

Source: O'Conner et al (2009)

An economic study by Lee (2009) noted that the industry runs through the late spring to the early fall, with fin, humpback, and minke whales being the most commonly sighted. Whales tend to congregate on large oceanographic features, which is where schooling fish can be found. A good portion of a whale watching trip involves finding the whales, which results in spent fuel. If schools of herring were to stop schooling or reduce in number and whales were to subsequently stop congregating, the whale watching industry could be affected by the extra expenditure of fuel to find them, even if whales are present in the area.

4.5.2 Canadian Herring Fisheries

Catch of the Gulf of Maine/Georges Bank Atlantic herring stock complex in Canadian waters consists primarily of fish caught in the New Brunswick (NB) weir fishery. Previously the Herring FMP assumed that 20,000 mt of fish from the inshore component of the Atlantic herring resource was taken annually from the NB weir fishery. In the most recent Atlantic Herring Specifications Package for 2009-2012, which facilitated transition to an ACL/AM framework mandated by the reauthorized MSA with Amendment 4 to the Herring FMP, 14,800 mt was deducted from the ABC to account for potential catch of Atlantic herring in the NB weir fishery.

The language in Amendment 1 provides the flexibility to reconsider the assumption of Canadian catch and adjust according to trends in the fishery as a part of the specifications package. The new, lower deduction was based on recent trends in catch and represented the average 2+ landings from 1999-2008 when eliminating the highest year of the time series – 2007 – and the lowest year of the time series – 2008. The 2+ catch was selected for consistency with the TRAC assessment, which is based on 2+ biomass only, and the average was chosen because the mean represents the average expected value over the time series; moreover the 2009 NB weir catch at the time (through September 28, 2009) was about 3,143 mt and the mean 2+ catch from the NB weir fishery from 1995-2008 was 16,300 mt.

The specification package also implemented a new provision that allocated an additional 3,000 mt of herring to Area 1A in November for the remainder of the fishing year based on the level of catch in the New Brunswick (NB) weir fishery. In the provision, NMFS is to monitor the NB weir fishery landings, which are made available by Canada's Department of Fisheries and Oceans (DFO) on a close to real-time basis (within 2 weeks). If, by considering landings through October 15 of each year, NMFS determines that less than 9,000 mt has been taken in the NB weir fishery, NMFS is to allocate an additional 3,000 mt to Area 1A, to be made available to the directed herring fishery during November and through the remainder of the fishing year (until it is harvested). This specification was implemented to provide additional opportunity for fishing in Area 1A if catch in the NB weir fishery is substantially less than the deducted amount (14,800 mt), while still minimizing the likelihood that ABC would be exceeded. In 2010 the he 9,000 mt limit was exceeded in the NB weir fishery, and subsequently Area 1A did not receive the additional allocation.

Table 41 shows the landings from all Canadian fisheries from 1963-2010, including the "Non-Stock 4Xs N.B. Weir and Shutoff" landings, which generally represents the catch from the NB weir fishery. For the most part shutoffs are not located in the same areas as weirs, and landings from shutoffs are through to be from the 4WX stock component. Landings range from the highest of 44,112 tons, which occurred in 1989 to the lowest of 4,031 tons, which occurred in 2009. Landings since 1990 vary widely, with peaks in 1990 at 38,778 tons, 1997 and 1998 around 20,000 tons, and 2007 at 30,944 tons. Troughs in landings occurred in 1996, which had landings of 15,913 tons and 2003 had landings of 9,003 tons. The overall trend in landings since 1990 has been downward, however, and landings from 2000 have dropped from 20,209 mt in 2001 to 4,031 mt in 2009, but increased in 2010 back to 10,958 mt.

Table 89 Historical series of nominal and adjusted annual landings (t) by major gear components and seasons of the 4WX herring fishery, 1963-2010

Year^	4W Winter Purse Seine	4Xs Fall&Winter Purse Seine	4Xqr Summer Purse Seine	4X Summer Gillnet	4Xr Nova Scotia Weir	4WX Stock Nominal Landings	4WX Stock Adjusted Landings*	4WX Stock TAC	Non-Stock 4Xs N.B. Weir & Shutoff	4VWX Coastal Nova Scotia	Offshore Scotian Shelf Banks	Total 4VWX Adjusted Landings
1963		6,871	15,093	2,955	5,345	30,264	30,264		29,366		3,000	62,630
1964		15991	24,894	4,053	12,458	57,396	57,396		29,432		2,000	88,828
1965		15,755	54,527	4,091	12,021	86,394	86,394		33,346		6,000	125,740
1966		25,645	112,457	4,413	7,711	150,226	150,226		35,805		2,000	188,031
1967		20,888	117,382	5,398	12,475	156,143	156,741		30,032		1,000	187,773
1968		42,223	133,267	5,884	12,571	193,945	196,362		33,145		18,000	247,507
1969	25,112	13,202	84,525	3,474	10,744	137,057	150,462		26,539		121,000	298,001
1970	27,107	14,749	74,849	5,019	11,706	133,430	190,382		15,840		87,000	293,222
1971	52,535	4,868	35,071	4,607	8,081	105,162	129,101		12,660		28,000	169,761
1972	25,656	32,174	61,158	3,789	6,766	129,543	153,449		32,699		21,000	207,148
1973	8,348	27,322	36,618	5,205	12,492	89,985	122,687		19,935		14,000	156,622
1974	27,044	10,563	76,859	4,285	6,436	125,187	149,670		20,602			170,272
1975	27,030	1,152	79,605	4,995	7,404	120,186	143,897		30,819			174,716
1976	37,196	746	58,395	8,322	5,959	110,618	115,178		29,206			144,384
1977	23,251	1,236	68,538	18,523	5,213	116,761	117,171	109,000	23,487			140,658
1978	17,274	6,519	57,973	6,059	8,057	95,882	114,000	110,000	38,842			152,842
1979	14,073	3,839	25,265	4,363	9,307	56,847	77,500	99,000	37,828			115,328
1980	8,958	1,443	44,986	19,804	2,383	77,574	107,000	65,000	13,525			120,525
1981	18,588	1,368	53,799	11,985	1,966	87,706	137,000	100,000	19,080			156,080
1982	12,275	103	64,344	6,799	1,212	84,733	105,800	80,200	25,963			131,763
1983	8,226	2,157	63,379	8,762	918	83,442	117,400	82,000	11,383			128,783
1984	6,336	5,683	58,354	4,490	2,684	77,547	135,900	80,000	8,698			144,598
1985	8,751	5,419	87,167	5,584	4,062	110,983	165,000	125,000	27,863			192,863
1986	8,414	3,365	56,139	3,533	1,958	73,409	100,000	97,600	27,883			127,883
1987	8,780	5,139	77,706	2,289	6,786	100,700	147,100	126,500	27,320			174,420
1988	8,503	7,876	98,371	695	7,518	124,653	199,600	151,200	33,421			233,021
1989	6,169	5,896	68,089	95	3,308	83,557	97,500	151,200	44,112			141,612
1990	8,316	10,705	77,545	243	4,049	102,627	172,900	151,200	38,778			211,678
1991	17,878	2,024	73,619	538	1,498	97,010	130,800	151,200	24,576			155,376
1992	14,310	1,298	80,807	395	2,227	100,227	136,000	125,000	31,967			167,967
1993	10,731	2,376	81,478	556	2,662	98,464	105,089	151,200	31,573			136,662
1994	9,872	3,174	64,509	339	2,045	80,099	80,099	151,200	22,241			102,340
1995	3,191	7,235	48,481	302	3,049	62,499	62,499	80,000	18,248			80,747
1996	2,049	3,305	42,708	6,340	3,476	58,068	58,068	57,000	15,913	1,450	11,745	87,176
1997	1,759	2,926	40,357	6,816	4,019	56,117	56,117	57,000	20,552	2,340	20,261	99,270
1998	1,405	1,494	67,433	2,231	4,464	77,027	77,027	90,000	20,091	4,120	5,591	106,829
1999	1,235	4,764	64,432	1,660	5,461	77,552	77,552	105,000	18,644	5,618	12,646	114,460
2000	1,012	4,738	78,010	823	701	85,284	85,284	100,000	16,829	4,283	2,182	108,578
2001	0	4,001	62,004	1,857	3,708	71,570	71,570	78,000	20,209	6,006	12,503	110,288
2002	367	5,257	69,894	393	1,143	77,054	77,054	78,000	11,874	10,375	7,039	106,342
2003	0	8,860	79,140	439	921	89,360	89,360	93,000	9,003	9,162	998	108,523
2004	0	5,659	69,015	225	3,130	78,029	78,029	83,000	20,686	6,924	4,165	109,804
2005	0	2,601	43,487	566	2,245	48,899	48,899	50,000	13,055	6,311	5,263	73,528
2006	0	930	45,002	719	2,508	49,159	49,159	50,000	12,863	6,566	9,809	78,397
2007	0	1,847	46,045	1,334	1,130	50,356	50,356	50,000	30,944	5,240	5,385	91,925
2008	0	2,000	50,022	15	2,524	54,561	54,561	55,000	6,447	3,704	918	65,631
2009	0	2,807	50,802	117	387	54,113	54,113	55,000	4,031	9,783	9,088	77,015
2010	0	2,787	41,345	204	1,198	45,534	45,534	55,000	10,958	5,575	11,862	73,929

^Annual landings by purse seiners are defined for the period from October 15 of the preceding year to October 14 of the current year.

*Adjusted totals includes misreporting adjustments for 1978-84 (Mace 1985) and for 1985-93 (Stephenson 1993, Stephenson et al 1994)

All landings by other gear types are for the calendar year.

Source: Canadian DFO, 1963-73 Offshore Scotian Shelf landings from Stephenson et al. (1987)

The same trend can also be seen in the NB weir landings, which are presented separately in Table 90, from 1978 to 2009. Compared to the joint weir/shutoff landings the weir landings were less. The trends are similar, however, and the landings vary from 7,858 tons in 1978 to 387 tons in 2009. Highs occurred in late 1980's and late 1990's. In the past 10 years landings started low, at 683 tons and peaked in 2004 to 3,708. Overall, weir landings decline sharply from 3,708 tons in 2001 to 387 tons in 2009.

Table 90 Monthly Nova Scotia weir landings (t) for 1978 to 2009

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Total
1978				1	490	3,704	2,990	239	46	111	198	79	7,858
1979					811	3,458	1,418	420	39	136	57		6,339
1980					69	647	1,271	395					2,383
1981					50	437	983	276	37		41		1,824
1982					16	267	468	195	172	12			1,130
1983				2	286	141	188	208	53		18		896
1984					113	1,032	736	602	220				2,702
1985					378	1,799	1,378	489			11		4,055
1986					385	403	71	704	390	5			1,957
1987					1,503	2,526	1,215	1,166	367				6,776
1988					1,217	2,976	1,696	1,204	386				7,480
1989					340	1,018	870	843	226				3,296
1990					208	973	1,482	879	538	52			4,132
1991				3	23	149	719	342	262				1,498
1992					35	659	405	754	371				2,224
1993					226	908	608	867	53				2,662
1994					111	736	499	519	180				2,045
1995					236	1,255	1,059	470	29				3,049
1996					430	1,267	1,232	358	188				3,476
1997					70	1,874	1,739	271	65				4,019
1998					1,304	1,677	390	359	317				4,048
1999					1,958	1,513	547	488	31				4,537
2000						16	151	326	191				683
2001					105	1,439	1,565	391	207				3,708
2002					23	95	240	558	228				1,143
2003					98	126	68	344	284				921
2004						667	873	1,370	219				3,130
2005				11	84	731	472	828	118				2,245
2006					195	138	414	1,447	182	115			2,491
2007					26	11	290	579	224				1,130
2008						1,136	381	836	171				2,524
2009						110	233	44	0				387
NS Average Catch (t)				5	385	1,090	852	604	200	72	65	79	3,108
NS Minimum Catch (t)				1	16	11	68	44	0	5	11	79	387
NS Maximum Catch (t)				11	1,958	3,704	2,990	1,447	538	136	198	79	7,858

Source: Canadian DFO

Table 91 summarizes the number of active weirs and the average catch per weir from 1978-2010. The NB weir fishery that catches fish from the Atlantic herring stock complex; the Nova Scotia (NS) weir fishery primarily catches herring from a different stock. The number of active weirs in NB has declined steadily from 208 in 1987 to 38 in 2009. The number of weirs was reduced by almost half between 2008 and 2009, and by more than two-thirds since 2001. Catch per weir in NB has remained relatively constant, however, with lower values in 1984 and 1985 as well as 2008 and 2009, but increased in 2010.

Table 91 Annual catch (t), number of active weirs and the catch per weir (t) for New Brunswick and Nova Scotia weirs from 1978 to 2010

	Annual Catch (t)			No. Active Weirs			Catch per weir (t)		
Year	NB	NS	Total Catch	NB	NS	Total No.	NB	NS	Average
1978	33,599	7,858	41,458	208	31	239	162	253	173
1979	32,579	6,339	38,918	210	27	237	155	235	164
1980	11,066	2,383	13,449	120	29	149	92	82	90
1981	14,968	1,824	16,793	147	28	175	102	65	96
1982	22,181	1,130	23,311	159	19	178	140	59	131
1983	12,568	896	13,464	143	23	166	88	39	81
1984	8,353	2,702	11,056	116	13	129	72	208	86
1985	26,718	4,055	30,774	156	14	170	171	290	181
1986	27,516	1,957	29,473	105	18	123	262	109	240
1987	26,621	6,776	33,397	123	21	144	216	323	232
1988	38,235	7,480	45,715	191	21	212	200	356	216
1989	43,520	3,296	46,817	171	20	191	255	165	245
1990	39,808	4,132	43,940	154	22	176	258	188	250
1991	23,717	1,498	25,216	143	20	163	166	75	155
1992	31,981	2,224	34,206	151	12	163	212	185	210
1993	31,328	2,662	33,990	145	10	155	216	266	219
1994	20,618	2,045	22,662	129	11	140	160	186	162
1995	18,228	3,049	21,277	106	10	116	172	305	183
1996	15,781	3,476	19,257	101	12	113	156	290	170
1997	20,396	4,019	24,415	102	15	117	200	268	209
1998	19,529	4,048	23,577	108	15	123	181	270	192
1999	19,063	4,537	23,600	100	14	114	191	324	207
2000	16,376	683	17,058	77	3	80	213	228	213
2001	20,064	3,708	23,772	101	14	115	199	265	207
2002	11,807	1,143	12,950	83	9	92	142	127	141
2003	9,003	921	9,924	78	8	86	115	115	115
2004	20,620	3,130	23,750	84	8	92	245	391	258
2005	12,639	2,245	14,884	76	10	86	166	225	173
2006	11,641	2,491	14,132	89	6	95	131	415	149
2007	30,145	1,130	31,275	97	8	105	311	141	298
2008	6,041	2,524	8,565	76	8	84	79	315	102
2009	3,603	387	3,990	38	7	45	95	55	89
2010	10,671	1,198	11,868	77	8	85	139	150	140
Average	20,939	2,968	23,907	120	15	135	172	211	175

Source: Canadian DFO

4.5.3 Communities

4.5.3.1 Communities Introduction and Background

This section summarizes available fishery, social, economic, and cultural information about *communities of interest* for Amendment 5 to the Herring FMP – that is, communities most engaged in the herring fishery that may be affected by the Amendment 5 management measures. Information contained in this section is useful for assessing the economic, social, and community impacts of the Amendment 5 management measures and helps to meet the Council's legal requirements under the Magnuson-Stevens Fishery Conservation and Management Act (M-S Act) and the National Environmental Policy Act (NEPA) as well as other applicable laws.

NEPA requires Federal agencies to consider the interactions of natural and human environments, and the impacts on both systems of any changes due to governmental activities or policies. This consideration is to be done through the use of "a systematic, interdisciplinary approach, which will ensure the integrated use of the natural and social sciences ... in planning and decision-making," [NEPA section 102(2)(a)]. Unquantified environmental amenities and values must be considered and weighed on par with technical and economic considerations. Unquantified amenities and values include such factors as angler satisfaction, job satisfaction and an independent life-style for commercial fishermen, and the opportunity to see species, such as salmon, in the wild for the non-consumptive user of marine fishery resources. Technical considerations include the management of fishing gears and enforceability of regulations.

NEPA specifies that the term "*human environment*" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment [40 CFR 1508.14]. When analyses predict that a fishery management action or policy will have a significant effect on the human environment, a detailed Environmental Impact Statement (EIS), including results of various analyses, must be prepared. The Herring Amendment 5 development process consequently requires the development of an EIS.

The M-S Act has reflected the NEPA approach in the National Standards for fishery management. The "prohibition on overfishing" standard (NS1), "use of best available scientific information" standard (NS2), and the "fair and equitable allocation" standard (NS4) are examples of this. Where a "system for limiting access to the fishery in order to achieve optimum yield" [M-S Act section 303(b)(6)] is deemed necessary, the M-S Act requires the Secretary of Commerce and the Council to consider in depth the economic and social impacts of the system. In 1990, the M-S Act was amended further and required that an FMP must assess, specify, and describe the likely effects of conservation and management measures on participants in the affected fishery, and the effects on participants in other fisheries that may be affected directly or indirectly [M-S Act section 303(a)(9)].

In the 1996 amendments to the M-S Act, Congress added provisions directly related to social and economic factors for consideration by Councils and NMFS. National Standard 8 of the M-S Act states that:

> **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 sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.**

National Standard 8 requires the consideration of impacts on fishing communities. Section 316 of M-S Act defines a fishing community as:

> *"A community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community."*

Current guidance on National Standard 8 defines a community as a town or city, a geographic unit that might fit the Census Bureau's definition of a "place." It is important to note that fishing communities are not bounded or separated from the commerce and institutional apparatus of the larger cities and towns in which they are located. In fact, most fishing communities rely on a rather complicated network of business and social ties that extend well beyond the boundaries of their communities and often into other fishing communities in the region. For the purposes of consistency, however, the communities that are described and assessed in this amendment are place-based (cities and towns).

In terms of the terms "substantially dependent" and "substantially engaged," some have suggested, for example, that "substantial dependence" be measured in terms similar to the US Department of Agriculture's criteria for determining whether rural communities are dependent on agriculture or logging. The Economic Research Service of the USDA, for example, classifies counties as "farming dependent" based on a certain percentage of economic activity (labor and proprietor income). Some of the sources of data to consider in making determinations of fishing dependence are thus supplied in current guidance, such as landings information or numbers of participants, and the sociocultural importance of the fishery. With respect to determining whether a community is "substantially engaged" in the harvesting or processing of a fishery, existing guidance does not provide clear criteria. While the application of a percentage of economic income activity may be one appropriate way to determine "substantial dependence," there may be other valid criteria. For example, criteria for "substantial dependence" could be based on a minimum level of activity (landings, vessels, etc.), the presence of a particular type of infrastructure (processing facilities, auctions, State fish piers, etc.), and/or a level of fishing activity (revenues, time spent fishing, etc.) (See Amendment 13 to the Northeast Multispecies FMP for additional discussion). The approach used in this document to identify fishing communities that are "substantially engaged" in fishing, particularly in the herring fishery, utilizes these additional criteria.

Herring Communities

In this document, for the purposes of gaining a better perspective on the nature of the Atlantic herring fishery and the character of the affected human environment, a broader interpretation of *fishing community* has been applied to include almost all communities with a substantial involvement in or dependence on the Atlantic herring fishery. In terms of National Standard 8, some of the communities identified in this section may not fit the strict interpretation of the criteria for substantial dependence on fishing. The fishing communities that meet the legal definition (as promulgated through National Standard 8) are likely to be considered a subset of the broader group of *communities of interest* that are engaged in the herring fishery and identified in this document.

Because herring is widely used as bait for the lobster fishery, especially in Maine, it is not practical to identify every community with substantial involvement in the lobster fishery (and consequently some level of dependence on the herring fishery) for assessment in this document. Instead, some of the *communities of interest* were selected, in part, because of their involvement in or dependence on the lobster fishery; assessment of the impacts of the Amendment 1 measures on these communities should provide enough context to understand the potential impacts on any community with substantial involvement in the lobster fishery. Parallels can be drawn between the communities that are identified in this section and other similar communities engaged in the lobster fishery.

National Standard 8 requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. "Sustained participation" is interpreted as continued access to the fishery within the constraints of the condition of the resource.

In summary, a full range of impact assessments – ecological, economic, and social – are necessary not only to meet MSFCMA and NEPA requirements, but also to improve the Council's decision-making process.

4.5.3.2 Amendment 5 Communities of Interest

The purpose of identifying *communities of interest* is to ensure that more thorough consideration is given to the potential impacts on those communities, which are *most* involved in the herring fishery and/or most important to the operation of the herring fishery as a whole. This helps the Council to better meet the requirements of NEPA as well as National Standard 8 to the MSFCMA. Note that some communities have been grouped together to acknowledge geographic proximity as well as similarities in terms of participation in and dependence on the herring fishery.

Unlike some other fisheries in the region (multispecies, for example), the herring fishery is a smaller, more discrete fishery whose participating vessels and communities are easier to identify. *Communities of Interest* for Amendment 1 to the Herring FMP were selected because they meet at least one (and more than one in most cases) of the following five criteria:

1. **Atlantic herring landings averaging at least 10,000,000 pounds (4,536 mt) per year from 1997-2008, or anticipated landings above this level based on interviews and documented fishery-related developments.**

When this criterion was selected for Amendment 1, landings of 10,000,000 pounds (4,536 mt) in a year indicated a relatively substantial degree of participation in the herring fishery, since 10,000,000 pounds equated to 7.5% of the Area 1A and 3 TACs; 45.4% of the Area 1B TAC; and 9% of the Area 2 TAC.

With lower ACLs associated with Amendment 5, 10,000,000 pounds equates to 17% of Area 1A's ACL; 100% of the Area 1B's ACL; 20% of the Area 2's ACL; and 12% of Area 3's ACL. Only five ports or port clusters in the region landed over 120,000,000 pounds in the 12 years: Gloucester and New Bedford in Massachusetts; Portland and Rockland in Maine; and the southern Rhode Island ports (Narragansett, Newport and North Kingston).

When The FSEIS for Amendment 1 was written, the criteria anticipated potentially higher landings because shoreside facilities for the Atlantic herring fishery were considered "developing" in some areas. Shoreside processing plants had opened in Gloucester and New Bedford that had capacity for receiving and processing large volumes of herring and other pelagic species. The development of these two facilities and the potential to increase landings in the communities where these facilities were located was recognized.

Landings data alone, however, are not adequate to identify all of the communities that are engaged in the herring fishery. Because the fishery is a high-volume fishery, the most active participating vessels are relatively large, and many vessels come into port "loaded down" with herring. When landing large volumes of fish, herring vessels generally require larger, deep-water ports to ensure that they can land safely without running aground. Consequently, large volumes of herring landings tend to be concentrated in a relatively small number of ports.

A transportation network is essential for distributing herring throughout the region from herring vessels to processing facilities, bait facilities, and lobster vessels, all of which are engaged in and dependent on the herring fishery to varying degrees. In some cases, processing facilities and other infrastructure dependent on herring are located in communities with few or no landings of herring, but these facilities employ many individuals and are important social and economic components of the fishery. As a result, it is necessary to consider criteria other than landings to identify the *communities of interest* in this amendment.

2. Infrastructure dependent in part or whole on Atlantic herring.

Infrastructure for the Atlantic herring fishery includes:

- Shoreside processing facilities for food production (whole frozen);
- Shoreside processing facilities for bait production (salting, etc.);
- At-sea processing facilities (freezer vessels); and
- Trucking and other essential services for distributing fish.

Infrastructure and the opportunity to capitalize on available markets for herring are important elements of the fishery. For the most part, infrastructure in this fishery, whether shoreside or at-sea, is dedicated solely to serving the small pelagic fisheries (herring and mackerel, primarily). Very few elements of the infrastructure are engaged in other fisheries such as multispecies, monkfish, or scallops. The investments that have been made in the infrastructure for the Atlantic herring fishery reflect a long-term commitment to this fishery.

As previously noted, the number of ports that are capable of accommodating large herring vessels that land large volumes of fish is relatively small. A transportation network is essential to ensuring that herring are distributed as rapidly as possible to processing and other facilities. Trucking and transportation services are therefore a critical element of the infrastructure for this fishery.

The last sardine cannery in the U.S. closed in 2010. It had relied on herring for 100% of its operation. For the most part, the whole frozen processing facilities rely on a combination of herring and mackerel for 100% of their operations. No Joint venture (JV) and internal waters processing (IWP) operations at-sea have received quota in the Atlantic herring fishery in recent years.

3. Dependence on herring as lobster and/or tuna bait.

Atlantic herring is important bait for the lobster and tuna fisheries, as well as for other primarily recreational fisheries (striped bass, for example). In fact, herring is the bait of choice in the State of Maine, particularly for their critical lobster fishery. Consequently, consideration of a community's dependence on herring for bait purposes is essential, as any changes to the supply of herring bait in some areas could produce negative impacts across other fisheries such as the lobster and tuna fisheries. In other words, management measures in this amendment that may affect the supply of bait could result in multiplier effects throughout the numerous coastal communities that depend largely on herring bait.

Another consideration related to dependence on herring bait is the importance of herring as a forage fish for many species and the overall role of herring in the ecosystem. Individuals from communities that are dependent on herring for bait have expressed concern about the supply of herring for forage purposes and the need to maintain an adequate amount of herring in the ocean as prey for other valuable (commercial and recreational) species. Including dependence on herring as bait as a criterion for identifying communities of interest in this amendment provides an opportunity to consider the importance of herring as forage as well as any social and community impacts related to this issue.

While it is not feasible to identify every community that depends on herring for bait as a *community of interest* in Amendment 5, several communities were identified based on an exceptionally high degree of dependence on herring for bait. Assessment of the impacts of the Amendment 5 measures on these selected communities provides context to understand the potential impacts on any community that depends on herring for bait. Parallels can be drawn between the communities that are identified in this section and other similar communities engaged in the lobster, tuna, striped bass, and other recreational fisheries.

4. Geographic isolation in combination with some level of dependence on the Atlantic herring fishery.

Geographic isolation is an important consideration for communities that exhibit dependence on the Atlantic herring fishery. In general, dependence on fishing and opportunities to seek alternatives to fishing decrease as the geographic isolation of a community increases. The isolation of some coastal communities (those in Downeast Maine, for example) has clearly contributed to the dependence of these communities on the marine environment. Communities that are more geographically isolated and dependent on herring in some way may proportionately be more affected by management measures that decrease the supply of herring or opportunities in the fishery. Since transportation is such an important element of the herring fishery, the lack of major thoroughfare in geographically isolated communities may exacerbate problems associated with changes in supply and opportunities in the fishery.

5. Utilization of Atlantic herring for value-added production.

Since the closing of the sardine cannery in Prospect Harbor in 2010 and the sale of Engelhard Corporation in Eastport that had processed herring scales for pearl essence, there is currently no value-added production associated with herring. In the future, processing herring for pickling or other products for specialty markets is feasible. As the FEIS for Amendment One noted, value-added production suggests that a facility may have invested in niche or specialty markets for the fishery, which may be more sensitive to changes in supply. Reports on the closing of the cannery in Prospect Harbor suggest that this is the case (Seelye, 2010).

Based on the five criteria described above, the following *communities of interest* are identified for the purposes of analysis in this amendment:

1. **Portland, Maine**
2. **Rockland, Maine**
3. **Stonington/Deer Isle, Maine**
4. **Vinalhaven, Maine**
5. **Lubec/Eastport, Maine**
6. **Sebasco Estates, Maine**

7. **NH Seacoast – Newington, Portsmouth, Hampton/Seabrook**
8. **Gloucester, Massachusetts**
9. **New Bedford, Massachusetts**
10. **Southern Rhode Island – Point Judith, Newport, North Kingstown**
11. **Cape May, New Jersey**

Profiles of these communities, including important demographic and social information, are provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. In some cases, the groups of communities identified above have been disaggregated so that information specific to certain communities can be provided and so that important details about individual communities are not lost.

4.5.3.2.1 Portland, Maine

A detailed profile of Portland, Maine, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Portland's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

One of the most important fishing associations in Portland is the Portland Fish Exchange. Opened in 1986, it was the first display fish auction in the United States. According to the Fish Exchange website, it offloads and auctions approximately 90% of Maine's annual regulated groundfish catch (Portland Fish Exchange, 2011). Currently the auction receives landings in the mornings and auctions the fish at eleven on Sunday and at noon, Monday through Thursday. In addition, it holds an evening auction in the winter for Northern shrimp.

Other fishing associations in Portland include Maine Urchin Harvesters Association and the Associated Fisheries of Maine (AFM).

Other Fishing-Related Institutions

Coastal Enterprises Inc. (CEI) is a private, nonprofit Community Development Corporation and Community Development Financial Institution. The goal of CEI's Fisheries and Working Waterfront Programs is to foster the sustainable development of Maine's fisheries and fishing communities by making investments, initiating projects, supporting policies and assisting marine-related enterprises with goals that encompass the economy, the environment and equity (Coastal Enterprises, Inc, 2011).

Gulf of Maine Research Institute (GMRI) is a non-profit marine science center located in Portland. Their "work strengthens five essential elements that define an enduring relationship with the ocean: healthy ecosystem, sustainable industries, vibrant communities, abundant opportunities and inspired children." (GMRI, 2011)

Seafarers Friend is a non-denominational Christian organization that assists fishermen and other seafarers at three New England ports: Boston, Portsmouth, and Portland (for more information visit www.seafarersfriend.org). They also visit ships in Salem, MA and soon Searsport, ME. The Maine Fishermen's Monument Commission has a website to expand fundraising for a monument honoring Maine's commercial fishing heritage (www.mainefisermensmonument.com, 2011).

Physical

The city of Portland has infrastructure that provides full access to and within the city. Portland has its own international airport, and it has several transportation options within and to the city. Amtrak, public buses, and interstate and state highway systems provide public access to the city. Public transit within the city includes a bus and a streetcar system.

Commercial

Portland's landings come primarily from the large mesh groundfish species and from lobster. In 2009, 37.3 million pounds were landed with a value of $16.6 million, a decrease in value from 2008 when 35.1 million pounds were landed with a value of $22.6 million.

Several facilities in Portland process lobsters including Cozy Harbor Seafood, Inc. (For more information visit website at http://www.cozyharbor.com/). and Inland Seafood that buys 7 to 9 million pounds of lobster annually (Mainebiz, 2011).

In 2002, there were a total of 500 moorings, berthings, slips, and tie-ups for commercial and recreational fishermen, of which 30% were used by commercial fishermen in Bath. A 2002 report on Working Waterfronts in Maine recorded 271 commercial harvesters. At the time, Portland had 22 commercial private and public waterfront facilities, of which nine are dedicated to commercial fishing use. Retention of commercial fishing access is considered a challenge, with development pressures, increased competition from tourism/recreational use, and deterioration of infrastructure reported as threats to the commercial fishing access (CEI, 2002).

Both the number of vessels home-ported and number of vessels registered with owner's living in Portland slightly decreased between 1997 and 2003. The dollar value of landings remained relatively stable, while the level of fishing by landed port in Portland significantly dropped in 2003 relative to the six years prior.

Landings by Species

Table 92 Portland Dollar Value by Species 1997-2008

	Annual Average 1997-2008	2002 only
Largemesh*	$14,367,294	15,517,209
Lobster	$13,377,239	17,014,768
Monkfish	$4,465,720	4,990,587
Other	$235,234	795,540
Herring	$3,069,730	1,968,563
Scallops	$63,209	36,073
Smallmesh**	$38,087	9,685
Skates	$38,919	53,516
Tilefish	$14,407	0
MSB	$120,615	10,653
Dogfish	$20,091	5
Sfscupbsb	$11,181	66
Bluefish	$172	278

** Largemesh Groundfish: cod, winter flounder, witch flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and pollock*
*** Smallmesh Multi-Species: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting)*

Vessels by Year

Table 93 Portland Vessel Permits/Landings Values 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port value (millions of $)	Landed port Value (millions of $)
1997	122	50	14	43
1998	105	44	12	35
1999	123	53	15	42
2000	118	45	16	45
2001	109	39	15	34
2002	110	43	15	40
2003	117	42	15	27
2004	109	40	18	35
2005	107	47	15	35
2006	101	43	13	28
2007	105	55	10	25
2008	94	45	11	24
2009	100	49	11	18
2010	95	44	15	19

Recreational

Recreational fishing companies based in Portland (or South Portland) include: Go Fish Charters**,** Fishing With Matt and Josh, Maine Fishing Charter and Morning Flight Charters. Boat charters and fishing excursions are available (Go Fish Charters, 2011). First Olde Port Trolley Fleet offers whale watches and sunset cruises.

Subsistence

Information on subsistence fishing in Portland is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Portland is an important community involved in the Atlantic herring fishery. It meets several criteria identified in Section 4.5.3.2 of this document (communities of interest): #1 (herring landings), #2 (herring-related infrastructure), and #3 (lobster/tuna bait dependence). Several lobster bait dealers and a pumping station for offloading herring are located in Portland. Portland's infrastructure includes major highways, shipping terminals, and an airport. The port also provides many additional fishing-related services including ice, fuel, and vessel maintenance/repair services.

Taking a six-year average (2005-2010), Portland ranked third in herring landings in the region (29,773,919 pounds) but in 2010, with a decrease in landings in New Bedford, moved to second place.

4.5.3.2.2 Rockland, Maine

A detailed profile of Rockland, Maine, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. This reference also includes information about Sprucehead Island and Port Clyde, two fishing communities located adjacent to Rockland. Rockland's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

The Island Institute, located in Rockland, promotes ecological research to help conservation efforts of 15 Maine island communities, which includes research on fisheries, especially that of lobster fisheries (Island Institute, 2011).

Led by the Island Institute, the Working Waterfront Coalition formed in 2003 to advocate for state legislation that could help preserve the state's dwindling working-waterfront access. The Coalition's efforts led to the November 2005 passage of the Working Waterfront Access Pilot Program (WWAPP), a $2 million state bond fund that provided grants to fishing families, municipalities, cooperatives and businesses to help them purchase working-waterfront property. The WWC also advocated successfully for a statewide designation of working-waterfront property as coming under a "current use" taxation rate instead of being assessed for its development value (Island Institute, 2011)

Until mid-2004, the Conservation Law Foundation (CLF) had an office based in Rockland, but it is now located Brunswick.

Fishing Associations

Apart from the Maine Lobstermen's Association whose members come from virtually all coastal communities, no active fishing associations were identified for Rockland in secondary data sources.

Commercial

According to the landings data collected on federally managed species, Rockland's commercial fishery is primarily based on the herring and lobster fisheries. According to *Fisheries of the United States-2009*, landings in Rockland totaled 29.6 million pounds in 2008 and 21.4 million pounds in 2009 (NOAA, 2010) For the 6-year period, 2005-2010, the annual average for herring landings in Rockland was 27,546,362 pounds.

In 2002, there were a total of 675 moorings, berthings, slips, and tie-ups for commercial and recreational fishermen, of which commercial fishermen in Rockland used 4%. The city had 21 commercial private and public waterfront facilities, of which two were dedicated to commercial fishing use. Commercial fishing access is not perceived as a problem, but both issues of development pressures and the decline in the commercial fishing industry are reported as threats to commercial fishing access (CEI, 2002).

Table 94 Rockland Dollar Value by Species 1997-2008

	Annual average 1997-2008	**2002 only**
Herring	3,160,804	1,403,932
Lobster	4,630,274	2,498,980
Other	763,830	141,078
Largemesh	97,393	67,925
Scallop	606	151,842
Monkfish	58,991	36,206
Skates	423	347

Table 95 Rockland Vessel Permits/Landings 1997-2010

ROCKLAND Year	# Vessels home ported	# Vessels (owner's city)	Home port value ($100,000)	Landed port value ($100,000)
1997	42	17	29.6	72.7
1998	32	16	13.3	64.4
1999	28	14	14.3	39.1
2000	29	14	10.6	82.1
2001	32	15	9.8	64.2
2002	30	13	9.1	43
2003	26	15	14.3	44
2004	32	18	43	84
2005	30	14	55	74
2006	22	9	61	128
2007	19	11	46	96
2008	19	9	54	48
2009	19	10	42	106
2010	17	9	45	106

Recreational

There are a number of recreational fishing companies that are based in Knox County, close to Rockland (ME DMR, 2006). These include Holy Mackerel Charters in Owls Head and Captain Fred T. Griego in Camden.

Subsistence

No information has been obtained at this time on subsistence fishing.

Atlantic Herring Fishery

Rockland is an important community involved in the Atlantic herring fishery. It meets several criteria identified in Section 4.5.3.2 of this document (communities of interest): #1 (herring landings), #2 (herring-related infrastructure), and #3 (lobster/tuna bait dependence). To a lesser extent, it meets criteria #4 (geographic isolation). Several lobster bait dealers, large and small, and a pumping station for offloading herring are located in Rockland. In addition, there are freezer facilities to store lobster bait and ice services in Rockland. The port also provides other fishing-related services. Ferry service provides transportation to Vinalhaven and other nearby island communities.

At an average of 27,546,362 pounds, Rockland ranked fourth in herring landings in the region over the six-year period 2005-2010, though 2009 and 2010 landings were noticeably lower.

4.5.3.2.3 Stonington, Maine

A detailed profile of Stonington, Maine, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Stonington's involvement in fisheries is summarized below. The neighbor communities of Stonington and Deer Isle may be considered representative, sharing characteristics with many other small, somewhat isolated communities in Maine dependent on herring for lobster bait.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

Committed to building marine stewardship at a local, community level, Penobscot East Resource Center was founded in 2003 in Stonington as an outgrowth of The Stonington Fisheries Alliance. In 2005, Ted Ames, Penobscot East's vice-chair, was awarded a MacArthur Fellowship. The Center has numerous collaborators and partners in the region (Penobscot East Resource Center, 2011) including the Northwest Atlantic Marine Alliance (NAMA) (for more information, see the website: www.namanet.org) and Cobscook Bay Resource Center (for more information see website: www.cobscook.org).

Other associations include Stonington Lobster Cooperative, Stonington Fisheries Alliance, Downeast Lobstermen's Association in Deer Isle, Deer Isle-Stonington Shellfish Committee, and Island Fishermen's Wives Association.

Fishery Assistance Centers

Island Fishermen's Wives Association has provided support to the families of the commercial fishing industry for over 15 years.

Other Fishing-Related Institutions

The Maine Sea Grant Program, the School of Marine Sciences, and the Lobster Institute, all located in Orono, ME, are involved in Stonington fisheries (Maine Sea Grant Program, 2011). The Commercial Fisheries News, the premiere monthly fishing industry newspaper for the Atlantic coast, is located in Stonington (For more information see the website: http://www.fish-news.com/cfn/) The Lobster Zone Council (Zone C) is empowered to set trap limits and other management techniques on a zone-by-zone basis, subject to the oversight of the state's Department of Marine Resources (ME DMR, 2011)

Commercial

In 2009, recorded annual fisheries landings for Stonington totaled 14.8 million pounds with a landed value of $26.5 million (NOAA, 2010).

The Maine purse seine fleet consists of five vessels with principal ports of Addison, Prospect Harbor, Rockland, and Stonington. This sector made 340 trips and landed 20,256 mt of herring in 2003. The majority of the landings were from vessels with a port designation of Rockland or Stonington. Ninety five percent of the landings by this sector came from Area 1A (adjacent to Stonington) in 2003. Eighty two percent of the total revenues for this sector came from Atlantic herring in 2003. Maine had the highest reported landings (46%) in 2003, followed by Massachusetts (38%), New Hampshire (8%), and Rhode Island (7%).

Landings by Species

Table 96 Stonington Dollar Value by Species 1997-2010

Catch	Annual Average 1997-2008	2002
Lobster	24,943,249	19,907,431
Other	1,051,836	965,252
Herring	29,522	509,804
Scallops	163,992	241,417
Largemesh*	100,720	106,910
Monkfish	3,947	2,446
Smallmesh	46	0

** Largemesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and pollock*

Vessels by Year

Table 97 Stonington Vessels Permits/Landings 1997-2010

Year	# Vessels home ported	# Vessels (Owner's city)	Home port Value ($)	Landed port Value ($)
1997	44	36	653,135	10,718,821
1998	44	33	506,533	9,739,864
1999	46	33	270,941	9,123,045
2000	49	35	234,698	18,003,137
2001	52	33	509,830	16,616,914
2002	59	40	429,571	21,733,899
2003	65	44	413,737	20,544,254
2004	71	45	320,936	22,421,527
2005	79	51	905,326	32,325,429
2006	76	48	404,453	34,327,204
2007	70	42	601,570	28,891,240
2008	68	39	10,311,136	27,521,636
2009	67	39	10,124,741	26,819,689
2010	68	38	14,707,059	16,976,794

Recreational

No recreational charter boats are listed by the Division of Marine Resources as based in Stonington, but there are several nearby (in Hancock County) (ME DMR, 2006).

Subsistence

Information on subsistence fishing in Stonington is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Stonington is involved in the Atlantic herring fishery primarily through its dependence on herring for lobster bait. It meets criteria #3 (lobster/tuna bait dependence) and #4 (geographic isolation) identified in Section 4.5.3.2 of this document (communities of interest). Stonington and Deer Isle may be considered representative communities, sharing characteristics with many other small, somewhat isolated communities in Maine dependent on herring for lobster bait.

Stonington reported an annual average of herring landings for the six-year period 2005-2010 of 8,575,217 pounds, though there was a precipitous drop in landings in 2010 to just under 3 million pounds.

4.5.3.2.4 Deer Isle, Maine

A detailed profile of Deer Isle, Maine, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Deer Isle's involvement in fisheries is summarized below. Neighbors Stonington and Deer Isle may be considered representative communities, sharing characteristics with many other small, somewhat isolated communities in Maine dependent on herring for lobster bait.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

Fishing associations are Downeast Lobstermen's Association in Deer Isle, Deer Isle-Stonington Shellfish Committee, and Island Fishermen's Wives Association.

Fishery Assistance Centers

As noted above, the Island Fishermen's Wives Association has provided support to the families of the commercial fishing industry for over 15 years.

Other Fishing Related Institutions

The Maine Sea Grant Program, the School of Marine Sciences, and the Lobster Institute all located in Orono, ME, are involved in Stonington and Deer Isle fisheries (Maine Sea Grant Program, 2011) Lobster Zone Council (Zone C) is empowered to set trap limits and other management techniques on a zone-by-zone basis, subject to the oversight of the state's Department of Marine Resources (ME DMR, 2011).

Commercial

The Conary Cove Lobster Company located in Deer Isle is wholesale and retail vendor of seafood. In 2002 recorded annual landings for Maine totaled 197 million pounds with a landing value of $279.4 million (NOAA Fisheries, 2010). Commercial fisheries landings in 2010 were 251,299,375 pounds with a value of $450.6 million (ME DMR, 2008). Deer Isle annual landing value for 2002 was $376,994 including an annual lobster landing value of $361,105. In 2003, the value of landings at dealer-reported port was $896,389.

Landings by Species

Table 98 Deer Isle Dollar Values by Species

Catch	Annual Average 1997-2008	2002
Lobster	2,984,573	316,105
Scallops	61,374	0
Other	58,124	60,889

Vessels by Year

Table 99 Deer Isle Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port value ($)	Landed port value ($)
1997	10	19	0	4,253,859
1998	10	19	0	6,233,997
1999	11	23	80,812	7,699,074
2000	12	23	581	2,142,604
2001	13	29	0	0
2002	24	41	0	0
2003	17	34	0	0
2004	27	53	0	0
2005	27	55	0	0
2006	23	49	0	0
2007	26	53	0	0
2008	27	54	0	0
2009	27	54	0	0
2010	29	55	0	0

Recreational

No listings specifically cite Deer Island, but the state's Division of Marine Resources offers several businesses nearby (in Hancock County) (ME DMR, 2006).

Subsistence

Information on subsistence fishing in Deer Isle is either not available through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Deer Isle is involved in the Atlantic herring fishery primarily through its dependence on herring for lobster bait. It meets criteria #3 (lobster/tuna bait dependence) and #4 (geographic isolation) identified in Section 4.5.3.2 of this document (communities of interest). Stonington and Deer Isle may be considered representative communities, sharing characteristics with many other small, somewhat isolated communities in Maine dependent on herring for lobster bait.

4.5.3.2.5 Vinalhaven, Maine

A detailed profile of Vinalhaven, Maine, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Vinalhaven's involvement in fisheries is summarized and additional information collected by Herring PDT members is provided below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

Vinalhaven Fishermen's Coop supplies their lobstermen owner-operators with bait and fuel and distributes their lobsters to customers throughout the world (Vinalhaven Fisherman's Co-op, 2011)

The bait company, Alfred Osgood, is a member of The Maine Lobstermen's Association (MLA, 2010)

Fishery Assistance Centers

The Island Fishermen's Wives Association supports the fishing community in many ways: school programs and scholarships, emergency financial assistance to fishing people and their families; ongoing commitment to preserve the fishing heritage and educating the public about the industry; survival and safety education with help from the US Coast Guard (Island Fishermen's Wives Association, 2011)

Commercial

The majority of landings in Vinalhaven are lobster. Two hundred lobster bo ats are clustered in Vinalhaven's Carver's Harbor and four lobster-buying stations are nearby (Island Institute, 2011). In 2006, there were 304 commercial licenses issued to Vinalhaven residents.

Maine's Department of Marine Resources reported in 2003 that 19,758,705 pounds of lobster were landed in Knox County; in 2010 there were 24,559,336 pounds landed, valued at $79,900,141. Two purse seiners landed herring for bait in Vinalhaven in 1999 (Hall-Arbor et al, 2001). There is also some crab, shrimp, and scallop fishing but no finfishing, apart from baitfish (pers. comm.).

The number of vessels home-ported in Vinalhaven increased from 1997 to 2004, and then fell. Since 1997 the homeport value has decreased by more than half while the landed port value increased from $13 million in 1997 to $30 million in 2005, but fell to $20 million in 2010.

There were no processing plants in Vinalhaven in 2004, however the town previously had a processing plant that they leased out to a private company known as "Claw Island"; it had 70 employees, and ran 3 8-hour shifts, which processed crabs or shrimp in winter, and lobster in summer. In 2000, Claw Island was bought out and after encountering too many problems operating the processing plant on the island, it moved to South Portland (Claw Island, 2011).

Vinalhaven has several packaging companies that ship lobster to Portland and other inland locations for processing and distribution (pers. comm.). They include: Vinalhaven Lobster Co. which packages lobster and ships inland to Portland for processing and Vinalhaven Fishermen's Co-op which operates as a wholesale lobster distributor (Vinalhaven Fisherman's Co-op, 2011). Vinalhaven has three wholesale companies: Linda Bean's Perfect Maine, Inland Seafood and Alfred Osgood (MLA, 2010)

In 2010, Inland Seafood Co. sold their wharf to Linda Bean's Perfect Maine. The wharf is now known as Americanus wharf, one of two owned by Bean in Vinalhaven. The real estate transfer included an agreement to preserve a certain percentage of lobsters for Inland Seafood Company, which processes lobster at their facility in Portland (Mainebiz News Staff, 2010)

Landings by Species

Table 100 Vinalhaven Value by Species 1997-2008

Species	Average Annual Value in Dollars for 1997-2008	Value in Dollars for 2002
Lobster	20,741,325	20,100,439
Herring	597,309	326,398
Other Species	403,058	888,465

Source: Maine Lobstermen's Association

Vessels by Year

Table 101 Vinalhaven Vessel Permits/Landings Value Between 1997 and 2010

Year	# Vessels Home ported	#Vessels (owner's city)	Home port Value ($)	Landed port Value ($)
1997	55	58	0	0
1998	54	56	0	0
1999	59	60	0	0
2000	59	58	1,766,609	12,379,840
2001	58	60	1,036,243	18,571,121
2002	62	65	644,067	21,322,045
2003	60	60	763,276	22,055,061
2004	66	66	1,203,341	28,905,797
2005	59	60	2,629,449	30,116,633
2006	61	62	1,731,409	21,647,435
2007	47	48	2,150,598	23,297,454
2008	47	48	0	0
2009	47	48	0	0
2010	46	46	10,872,100	19,694,161

Recreational

Only nine recreational boats are registered in Vinalhaven and these are apparently privately owned. One company offers boat rides and seabird cruises.

Subsistence

Information on subsistence fishing in Vinalhaven is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Vinalhaven is an important community involved in the Atlantic herring fishery primarily because of its significant dependence on lobster bait. It meets several criteria identified in Section 4.5.3.2 of this document (communities of interest): #2 (herring-related infrastructure), #3 (lobster/tuna bait dependence), and #4 (geographic isolation). Several lobster bait dealers, including floating stations and a co-op, are located in Vinalhaven, as the majority of year-round residents participate in the lobster fishery. Ferry service provides transportation between Vinalhaven and Rockland.

Vinalhaven ranked ninth in herring landings in 2004 (2,674 mt) and tenth cumulatively from 1995-2004 (24,779 mt).

Additional Community Information

The following information on Vinalhaven was supplied by a variety of the individuals when three members of the Herring PDT visited in July 2004.

Vinalhaven is an island of 15 x 5 miles with a year-round population of 1,200 people that swells to 5,000-6,000 in the summer. Knox County is the highest producer/harvester of lobsters in the State of Maine, and one-third of the lobsters landed in Knox County are from Vinalhaven. Approximately 200 lobster boats are based on Vinalhaven, with five buying stations on the island of which two are remote stations (floating docks). Lobstermen on the island are said to be doing well financially. The conversion to plastic-coated steel traps, formation of co-ops, upgrading to new more efficient boats, and other adaptations have helped.

Bait is a driving force in the lobster industry. Vinalhaven has an enormous demand for herring and is almost wholly dependent on the delivery of bait by O'Hara's F/V Starlight. Some bait is also delivered by the carrier Double Eagle and F/V Western Sea. About 4,000 tons of bait is used annually by lobstermen on Vinalhaven. Shafmaster has recently opened a buying station on Vinalhaven, working with 16 boats. They want to prove that they can service these 16 (constant supply of bait) before taking on additional vessels. When they started, they were bringing bait over on the ferry, now a carrier brings bait to the station.

The ferry from Rockland is too small to transport sufficient bait, particularly at the height of the season, which coincides, with the height of the tourist season (nor, it was said, would the steamship authority appreciate the smell if large quantities were transported). The mail, UPS, food, and cars have priority on the ferry. There is little storage capacity on the island, so if the F/V Starlight is unable to make a bait delivery for a few days, island lobstermen are forced to tie-up. Since the F/V Starlight does not fish on the weekend, most of the buying stations have little bait available on Monday morning. Bait dealers on Vinalhaven pay a higher price for bait than dealers on the mainland.

Lobster boats from Vinalhaven used to stay out fishing until 9 p.m.; now, most boats go out earlier, fish harder, and return by 6 p.m. (trap limits and faster boats have also affected their workload). Access to salted bait makes the timing easier. In the past, lobstermen's wives would pick up the fresh bait at 4 a.m.; now, barrels can be delivered between 9 a.m. and 2 p.m., and lobstermen bait up on their own schedule. If bait were to become unavailable or if the lobster population "crashed," it would be the young lobstermen who would be most vulnerable. They have never known hard times or a shortage of lobsters, so they may not save money for slow times or otherwise engage in financial planning. Property values have increased substantially since 1999, as have property taxes. Several interviewees anticipate that when the groundfish biomass increases, the lobster population will diminish since groundfish prey on juvenile lobsters.

The island has one grocery store, one gas station, one bank and a small health clinic. It also has a new grade/high school with classrooms equipped with up to date technology. The women are an important part of the labor force, especially since most of the men are out on the boats. Approximately 50 to 60 women work with the lobsters on shore, mainly part-time. They sell bait, buy lobsters, load trucks, etc. Apart from jobs at the school, alternative jobs are limited to construction/carpentry, plumbing, and electrical work, outside of the seasonal tourism trade. There is very little ethnic diversity on the island.

Inland Wholesale Lobster (Vinalhaven, ME)

Inland provides the lobster boats that sell to the company with bait and fuel. Approximately 38 boats work with Inland each year. The company has a "chilled" bait room to maintain higher quality bait. Inland tries to keep a few extra days' worth of bait in storage as a cushion, but it is not unusual to run out. When bait is scarce, only their regular 38 boats are provided with bait. It is in the company's interest to make sure the lobstermen who sell lobsters to them, have bait available at all times.

Vinalhaven Fishermen's Cooperative

The co-op has 70 members with 40 vessels and 15 employees (6 year-round). Members make one payment of $200 for a co-op share and an annual membership fee of $200. A volunteer Board of Directors (natives of Vinalhaven) handles most policy, though major decisions such as building a new wharf require a general meeting. Members of the co-op are required to make the majority of their income from fishing and each member has one vote. Members are not required to sell to the co-op, but the dividends are based on the profit divided by the number of pounds each boat lands. In general, the existence of the co-op benefits even the fishermen who are not members since it "sets the price" for the other buyers. Furthermore, the dividend paid by the co-op to its members often dictates the amount other buyers give as bonuses to their regular customers/suppliers.

The co-op provides:

- access to the waterfront, parking, and storage space;
- bait and fuel (they have their own gas station); and
- better prices for the lobsters.

Co-ops were started because lobstermen felt that the middlemen were taking advantage of them. Choice of dealer has to do with financial incentives, quality of bait, location, history with the dealer (e.g., family ties). Some people do not like the loss of privacy associated with the co-op since members must give their records to the board and bookkeeper; however, information is confidential, apart from these individuals.

There are twenty-four fishermen's cooperatives in Maine among whom there is an informal collaboration (when in the best interest of the fishermen):

- Beals-Jonesport Lobster Co-Op
- Bremen Lobster Pound Coop
- Corea Lobster Cooperative
- Cranberry Isles Fishermen's Co-op
- Dropping Springs Lobster co
- Fishermen's Heritage Lobster Coop

- Friendship Lobster Coop
- Georgetown Fishermen's Coop
- Interstate Lobster Coop
- Isle au Haut Lobstermen's Assoc
- Lobstermen's Co-op
- New Harbor Fishermen's Coop
- North End Lobster Coop
- Pemaquid Fishermen's Coop
- Pine Point Fisherman's Coop
- Port Clyde Fisherman's Coop
- So. Maine Lobstermen's Association
- South Bristol Fishermen's Co-op
- Spruce Head Fishermen's Coop
- Stonington Lobster Cooperative
- Swan's Island Fishermen's Co-op
- Vinalhaven Fishermen's Coop
- Winter Harbor Lobster Cooperative

4.5.3.2.6 Lubec/Eastport, Prospect Harbor (Gouldsboro), and Bath, Maine

Lubed/Eastport, Prospect Harbor, and Bath, Maine were included in the FEIS written for Amendment 1 to the Herring FMP because all fulfilled four criteria for "communities of interest": #2 (herring-related infrastructure), #3 (lobster/tuna bait dependence), #4 (geographic isolation), and #5 (value-added production), but since then all three have lost their value-added production.

Until 2006, a pearl essence processing plant that derived its pearl essence from herring scales was located in Eastport (Engelhard Corp); however, BASF Catalysts LLC, a German chemical company, bought out Engelhard. Though Lubec does meet several criteria identified in in Section 4.5.3.2 of this document (communities of interest): #2 (herring-related infrastructure), #3 (lobster/tuna bait dependence), #4 (geographic isolation), and #5 (value-added production), it can be considered similar to other small, representative ports that do rely in part on the herring industry. No herring landings were reported in Lubec/Eastport in 2004.

Bath lost the second to last sardine cannery in the United States in 2005 when Stinson/Bumblebee consolidated their cannery operations to Prospect Harbor.

Similarly, a pumping station for offloading herring and the last remaining sardine cannery operated in Prospect Harbor until 2010. Without the value-added production, Prospect Harbor also may be considered similar to other small ports with a herring dependency associated with the need for lobster bait and geographic isolation.

4.5.3.2.7 Sebasco Estates, Maine

Sebasco Estates is a small village within the town of Phippsburg – a subdivision of Sagadahoc County (According to the Phippsburg Postmaster, Sebasco Estates is primarily a PO box address, with people having Sebasco Estates zip codes living side by side with those having Phippsburg zip codes. Few data are available for Sebasco Estates alone, so Phippsburg will be the primary referent, with additional Sebasco Estates specific data supplies as available.) The town of Phippsburg also includes the villages of Phippsburg, Parker Head, Popham Beach, West Point, and Sebasco. A detailed profile of Phippsburg, Maine, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Phippsburg's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Governmental

Fishery Involvement in Government

The attention the town's Comprehensive Plan affords commercial fishermen suggests that Phippsburg's local government appreciates the commercial fishing industry. The town has a Town Landing Committee that includes at least two commercial fishermen. The Committee is advisory to the Selectmen who promulgate rules. Phippsburg also has a Harbor Commission and Shellfish Committee that all take an active part in commercial fishery matters. In 2006, the Chair Selectman of Phippsburg was Proctor Wells, a commercial fishermen and Mike Young, town administrator, designed and currently maintains the website for the Maine's Fishermen's Forum (pers comm).

Fishery Assistance Centers

There are currently no fishery assistance centers in Phippsburg. However, the formation of a fishermen's Co-op is an idea that is being discussed by town leaders and the fishing industry.

Other Fishing-Related Institutions

Commercial

West Point and Sebasco have the greatest number of commercial, water-dependent users, followed to a lesser degree by Small Point Harbor and Popham Harbor. The town itself controls a limited amount of waterfront property with shore access suitable for marine related business. Sebasco Harbor is the largest harbor in Phippsburg. The north side of the harbor is used extensively by commercial fishermen and has 11 commercial piers and numerous small private piers. There is one commercial boat yard with marine railway/mobile boatlift and a commercial bait business. Small Point Harbor has a large number of commercial vessels year round. Mooring space is full during the summer-season. There is a fish pier and 15-boat marina at Hermit Island and a fishermen's cooperative pier at Small Point. West Point Harbor has seven commercial/private fish piers and one service pier for gas/diesel fuel.

Landings by Species

Table 102 Phippsburg Dollar Values by Species 1997-2008

Species	Annual Average 1997-2008	2002
Lobster	3,293,402	1,570,922
Other Species	614,981	370,501
Large Mesh	34,989	27,002
Monkfish	9,995	3,370
Skates	158	33
Herring	2,540	

Vessels by Year

Table 103 Phippsburg Vessels Permits/Landings Values 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port Value ($)	Landed port Value ($)
1997	9	19	221,629	388,083
1998	9	34	53,827	0
1999	8	38	10,117	0
2000	7	38	8,564	0
2001	6	38	0	439,372
2002	5	39	0	1,971,828
2003	5	41	0	716,851
2004	53	53	199,072	4,487,468
2005	49	48	306,258	5,289,081
2006	45	44	0	0
2007	44	43	0	0
2008	43	41	975,454	1,614,263
2009	42	42	0	0
2010	40	39	0	0

Recreational

Phippsburg supports a large recreational fishing fleet. In fact, the town encourages recreational shellfishing. There are also some businesses that take tourists on fishing excursions.

Subsistence

Information on subsistence fishing in Phippsburg is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Sebasco Estates/Phippsburg is an important community involved in the Atlantic herring fishery primarily due to its dependence on herring for lobster bait. It is another suitable "representative community," sharing characteristics similar to many other small communities in Maine that are dependent on the herring fishery through its involvement in the lobster fishery. Several lobster bait dealers, large and small, located in this area rely on herring catches to supply their customers. In addition, the bait dealers are actively engaged in the trucking of herring from landing sites to purchase sites.

4.5.3.2.8 Newington, New Hampshire

Newington is a small town bounded by Great Bay, Little Bay and the Piscataqua River with a population of 753 at the time of the 2010 Census (U.S. Census, 2010). A detailed profile of Newington, New Hampshire, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Newington's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

<u>Fishing Associations</u>

In 2003 Little Bay Lobster Company and two Canadian affiliates, Island Marine Products, Inc. and Ferguson's Lobster Company, established a cooperative headquartered in Newington, New Hampshire. They advertise a commitment to "marine stewardship and environmental practices to ensure a sustainable resource and healthy oceans." (Little Bay, 2011)

<u>Fishery Assistance Centers</u>

Information on assistance centers in Newington is either unavailable through secondary data collection or it does not exist.

<u>Other Fishing Related Institutions</u>

Information on other fishing related institutions in Newington is either unavailable through secondary data collection it does not exist.

Commercial

In 2002, recorded annual landings for New Hampshire totalled 23.2 million pounds with a landed value of $16.7 million (Fisheries of the United States, 2002) In 2009, the annual landings for the state totalled 13,885 thousand pounds (6,298 metric tons) valued at $17.8 million (NOAA Fisheries, 2010) Newington's annual landed value for 2002 was of $7.1 million including an annual lobster landing value of $6.1 million, and an annual herring landing value of $777,640. In 2002, the value of landings at dealer-reported port was of $7.1 million.

Herring landings in Newington for 2005 were robust though not as high as in 2002, fell in 2006, decreased further in 2008 and 2009, and started to rebuild in 2010.

The North of Cape Cod midwater trawl fleet (pair and single) consists of 15 vessels with principal ports of Gloucester MA, Newington NH, New Harbor ME, Portland ME, Rockland ME, and Vinalhaven ME. This sector made 720 trips and landed 62,145 metric tons of herring in 2003. Maine had the highest reported landings (46%) in 2003, followed by Massachusetts (38%), New Hampshire (8%), and Rhode Island (7%).

A commercial fishery for American lobster is very active in Great Bay Estuary and beyond. Little Bay Lobster Company of Newington was founded in 1980. The company specializes in the harvesting of Atlantic offshore lobster (out to 200 miles) from the Gulf of Maine and Georges Bank (Little Bay, 2011).

Other commercial fisheries in the Great Bay estuary include herring, baitfishing for alewives, mummichogs (*Fundulus sp.*) and tomcod using gillnets, seines and minnow traps; trapping for eels, and angling and dip netting for smelt.

In the early 1980s, there were four commercial shellfish aquaculture operations in the Great Bay Estuary, engaged in the culture of indigenous (Eastern) oysters, the European flat oysters and hard clams (*Mercenaria mercenaria*). As of April 2010, three commercial oyster farms in the estuary and three mussel operations in the Atlantic Ocean were licensed by the state. In 2009, the state issued 1,400 recreational licenses for harvesting soft shell clams and oysters. An additional 1,300 people age 68 and older are allowed to harvest for free. But, a cut in the state budget may shut down all commercial and recreational shellfishing because the state would not meet the federal standards to test the water to ensure the shellfish are safe to eat (Love, 2011).

A commercial summer flounder hatchery and nursery, GreatBay Aquaculture, founded in 1995, produces millions of juveniles for growout in commercial locations and research institutes. The company's operations are based in a warehouse on the Public Services of New Hampshire (PSNH) power generation site in Newington, NH and are entirely indoors, using sophisticated recirculating and biofiltration technology to grow fish in land based tanks. It is the first commercial summer flounder operation in the U.S. They have since diversified to cod, sea bass and cobia (Great Bay Aquaculture, 2011), . GBA collaborates on various university research projects to improve finfish aquaculture, including on effort investigating polyculture of Atlantic cod and porphyra (Nori).

Landings by Species

Table 104 Newington Dollar Value by Species 1997-2008

Catch	Annual Average 1997-2008	2002
Lobster	6,575,221	6,105,127
Herring	431,303	777,640
Other	126,945	308,915
Monkfish	7993	281
Largemesh *	1,820,311	0
Skates	49	0

** Largemesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and pollock.*

Vessels by Year

Table 105 Newington Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port value ($)	Landed port value ($)
1997	6	8	29,602	0
1998	7	8	25,340	0
1999	7	10	8,132	0
2000	8	12	23,673	45,17,859
2001	9	11	39,708	8,671,224
2002	9	12	3,003	7,191,963
2003	9	14	0	8,129,839
2004	3	16	0	0
2005	2	17	0	0
2006	2	12	0	0
2007	1	12	0	0
2008	10	14	0	0
2009	11	12	0	0
2010	11	11	0	0

Recreational

Large oyster beds within the Great Bay estuary are harvested recreationally (Great Bay National Estuarine Research Reserve, 2011). The Great Bay Estuary also supports a diverse community of resident, migrant, and anadromous fishes, many of which are pursued by recreational fishermen. The main species sought are striped bass, bluefish, salmon, eels, tomcod, shad, smelt, and flounder. Cast or bait fishing is done from the shore in many places including the bridges crossing the estuary, and ice fishing is popular in the tidal rivers. Recreational fishing in salt water does not require a license except for smelt in Great Bay Estuary; trout, shad and salmon in all state waters; and for any fish species taken through the ice. Another important recreational fishing activity is trap fishing for lobsters.

Subsistence

Information on subsistence fishing in Newington is either available through primary data collection or the practice does not exist.

Atlantic Herring Fishery

Newington is an important community involved in the Atlantic herring fishery. It meets several criteria identified in in Section 4.5.3.2 of this document (communities of interest): #1 (herring landings), #2 (herring-related infrastructure), and #3 (lobster/tuna bait dependence). Several lobster bait dealers, large and small, and a pumping station for offloading herring are located in Newington. In addition, there are freezer facilities to store lobster bait in Newington. The port also provides other fishing-related services and is nearby major transportation routes.

Newington ranked fifth in herring landings in 2004 (5,660 mt) and 12th cumulatively from 1995-2004 (16,805 mt,).

4.5.3.2.9 Portsmouth, New Hampshire

A detailed profile of Portsmouth, New Hampshire, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Portsmouth's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishery Involvement in Government

The City of Portsmouth created a Fishermen's Committee in 2008. The following year, the Committee unveiled its "New Hampshire Seafood Fresh and Local" brand, furthering its goal of promoting and advancing the region's fishing industry and area businesses by educating the public about the benefits of purchasing seafood locally and directly.

Fishery Assistance Centers

For twenty-five years, Portsmouth Fisherman's Cooperative provided fuel, ice and unloading services to the local, small-scale fishing community. In 2002, the Cooperative closed, though reopened for a time, closing for good in 2008 (Schmitt, 2002)The Northeast Consortium, created with the support and leadership of U.S. Senator Judd Gregg (R-N.H.), committed resources to fund the Portsmouth co-op staff to facilitate partnerships between the co-op and researchers in 2005.

Yankee Fishermen's Cooperative in nearby Seabrook, founded in 1990, has 61 members, some of whom were former members of Portsmouth Fishermen's Co-op.

Other Fishing Related Institutions

Physical

Portsmouth has an extensive public transportation infrastructure including rail, ferry, and bus transportation.

High Liner Foods (National Sea Products), a Canadian company, has a processing plant in Portsmouth that employed about 250 people in 2001 (Community Development Department, 2011) It imports and processes frozen fish into breaded products for the wholesale and retail markets.

Commercial
The primary fishing done by Portsmouth fishermen is large mesh groundfish and monkfish. Large mesh groundfish were the most valuable landings in Portsmouth during the 1997-2003 period. Additionally, monkfish, lobster, and sea scallops account for a large portion of the value. In 2002, sea scallop landings appeared to be very high while lobster was rather low.

The number of home-ported vessels has varied between 1997-2003. In 1997 there were 54 vessels that increased to a high of 63 vessels in 2001, only to decrease back to 54 vessels in 2003. Thus, overall change has been minimal in this time period. Landed value by vessels home ported in Portsmouth steadily increased from $2.8 million in 1997 to $4.7 million in 2003. Landed value at the port of Portsmouth remained relatively stable between the years of 1997 and 2003.

Landings by Species

Table 106 Portsmouth, Average Annual Value of Landings by Species

Species	Annual Average Value 1997-2008 ($)	2002 ($)
Large Mesh Groundfish	1,820,311	1,656,320
Monkfish	1,072,451	1,377,046
Lobster	1,442,007	225,911
Sea Scallops	177,733	668,956
Dogfish	98,032	22,920
Herring	55,640	2,850
Small Mesh Multi-Species	12,332	3,295
Skates	4,092	3,834
Bluefish	2,731	983
Butterfish, Mackerel, and Squid	1,911	331

Vessels by Year

Table 107 Portsmouth Vessel Permits/Landings Value 1997-2010

Year	# Of vessels Home ported	# Vessels (Owner's city)	Home port value ($)	Landed port Value ($)
1997	54	26	2,867,809	4,476,980
1998	44	20	2,875,939	3,421,488
1999	45	18	3,338,685	3,900,793
2000	62	21	5,156,955	5,456,999
2001	63	22	6,386,029	4,909,069
2002	59	25	4,340,580	4,146,607
2003	54	21	4,735,506	4,309,797
2004	68	25	4,899,357	2,884,931
2005	64	20	18,201,382	5,554,531
2006	62	18	14,125,508	4,860,632
2007	66	22	12,367,300	3,768,336
2008	47	17	5,072,961	3,529,142
2009	44	14	3,587,458	3,702,399
2010	48	14	3,497,953	4,677,645

Recreational

Portsmouth supports a large recreational fishing industry. Numerous companies are available for deep-sea fishing (www.portsmouthnh.com) Many of these companies also offer whale watching and day cruises.

Subsistence

Information of subsistence fishing in Portsmouth is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Portsmouth is somewhat involved in the herring fishery through its dependence on herring for lobster and tuna bait. The port is centrally located with a good transportation infrastructure and provides other fishing-related services.

Portsmouth ranked 13th in herring landings in 2004 (800 mt) and 11th cumulatively from 1995-2004 (18,060 mt).

4.5.3.2.10 Hampton, New Hampshire

A detailed profile of Hampton, New Hampshire, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Hampton's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

The Yankee Fishermen's Cooperative (61 members) in Seabrook is the landing site and central wholesaling facility for the small local fleet that includes groundfish fishermen, lobstermen, tuna fishermen and shrimpers (Yankee Fishermans Cooperative, 2010). The Co-op provides a number of services for its members including bait, ice, cold storage and discounted goods from the Co-op store (Hampton Library, 2011). The Co-op has successfully diversified to improve marketing initially by offering a Northern shrimp Community Supported Fishery (CSF) in 2010, then offering CSF shares in whole finfish and lobster.

Fishery Assistance Centers

Information on assistance centers in Hampton is either unavailable through secondary data collection or it does not exist.

Other Fishing Related Institutions

The Recreational Fishing Alliance is a national, grassroots political action organization representing individual sport fishermen and the sport fishing industry (Recreational Fishing Alliance, 2011). Since 1998, the Coastal Conservation Association (CCA) of New Hampshire has worked to "promote, protect and enhance the present and future availability of coastal resources for the benefit and enjoyment of the general public." It is an organization composed of recreational fishermen and other users of marine resources and that addresses conservation issues nationally and at the state level (Costal Conservation Association of New Hampshire, 2009).

Commercial

Most of the commercial fishermen in Hampton are members of the Yankee Fisherman's Cooperative (Co-op) that is located in Seabrook Harbor (Hampton Library, 2011). The Co-op provides a number of services for its members, including bait, ice, cold storage, marketing, and discounted goods from the Co-op store.

Hampton Harbor has about a 183 moorings, 52 of which are classified as commercial. There are also a number of part-time fishermen that use the harbor. Depending on the season, a fisherman might fish for a variety of species – groundfish in the spring, shrimp in the winter, and finfish in the summer or fall. Lobsters may be taken year round, though stocks are more abundant in the late spring, summer and fall. Because of the federal limits on catch for groundfish, some of the fishermen only go lobstering.

In 2002 recorded annual landings for New Hampshire totaled 23.2 million pounds with a landing value of $16.7 million (Fisheries of the United States, 2002). In 2009, annual landings were lower in volume at 13.9 million pounds (6,298 metric tons) but a slightly higher value of $17.8 million. Hampton annual landing value for 2002 was of $124,136 including an annual lobster landing value of $121,784 significantly higher than the average between 1997-2003. In 2002, the value of landings at dealer-reported port was $123,761, and the landed value of home-ported vessels was $1.4 million.

The commercial industry in Hampton/Seabrook estuary is very active, and the wholesalers and retailers of seafood are primarily located in Hampton. The Yankee Fisherman's Cooperative Pier in Hampton Harbor has a seafood processing facility that handles both shellfish and finfish where landings from Seabrook are also processed. Other commercial fisheries in the Hampton/Seabrook estuary include herring, baitfishing for alewives, mummichogs (*Fundulus sp.*) and tomcod using gillnets, seines and minnow traps; trapping for eels, and angling and dip netting for smelt.

Landings by Species

Table 108 Dollar Value by Federally Managed Groups of Landings in Hampton

Catch	Annual Average 1997-2008	2002
Lobster	1266	121,784
Largemesh *	53614	27
Scallops	2654	0
Monkfish	1856	

* *Largemesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and pollock*

Vessels by Year

Table 109 Hampton Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port value ($)	Landed port Value ($)
1997	42	26	900,990	0
1998	37	23	1,096,890	0
1999	43	25	786,680	0
2000	43	25	1,284,983	0
2001	45	29	1,195,246	84,232
2002	49	31	1,359,713	124,136
2003	47	33	1,394,132	123,761
2004	56	37	0	0
2005	51	34	0	0
2006	44	29	0	0
2007	46	31	0	0
2008	49	32	0	0
2009	49	28	1,793,068	544,672
2010	47	29	1,508,335	325,756

Recreational

There are numerous tourist-related businesses including sport fishing, whale watching, windjammers/charter sailing, and harbor tours/day cruises (Hampton Area Chamber of Commerce, 2011). Recreational shellfishing is allowed in the harbor area under limited conditions on weekends from November to May. Most of the shellfish activity occurs on the Hampton/Browns Confluence Flat, Common Island Flat, and Middle Ground Flat. The latter two are in Seabrook Harbor. There is no commercial shellfishing permitted in New Hampshire (Hampton Library, 2011).

Several charter boat companies in Hampton Harbor carry fishing parties to inshore waters for clams and to the offshore waters to pursue cod, flounder, mackerel, and other fish. Another important recreational fishing activity is trap fishing for lobsters.

Subsistence

Information on subsistence fishing in Hampton is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Hampton is somewhat involved in the herring fishery through its dependence on herring for lobster and tuna bait. Only 2 mt of herring were reported to have been landed in Hampton in 2004.

4.5.3.2.11 Seabrook, New Hampshire

A detailed profile of Seabrook, New Hampshire, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Seabrook's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

The Yankee Fishermen's Cooperative (61 members) in Seabrook is the landing site and central wholesaling facility for the small local fleet (Yankee Fisherman's Cooperative, 2010). The New Hampshire Commercial Fishermen's Association–"Monitors, participates and contributes to concerns and issues regarding the commercial fishing industry of New Hampshire. Disseminates information amongst its members and acts in a proactive manner on behalf of the commercial fishing industry. Conducts an annual beach clean up of lobster gear. Assists in transition of fishing industry due to changing regulatory action." (New Hampshire Department of Environmental Services, 2011).

Fishery Assistance Centers

Information on fishery assistance centers in Seabrook is either unavailable through secondary data collection or it does not exist.

Other Fishing-Related Institutions

The Recreational Fishing Alliance is a national, grassroots political action organization representing individual sport fishermen and the sport fishing industry (The Recreational Fishing Alliance, 2011). The Coastal Conservation Association (CCA) is an organization composed of recreational fishermen and that addresses conservation issues nationally and at the state level. It was formed in 1998 in New Hampshire (Costal Conservation Association of New Hampshire, 2009).

Commercial

In 2002, recorded annual landings for New Hampshire totaled 23.2 million pounds with a landing value of $16.7 million (NOAA Fisheries, 2003) By 2008, landings were less than half at 10,951 million pounds; through the landing value was $20,789 million. In 2009,13,885 million pounds were landed, valued at $17,775 million (NOAA Fisheries, 2010).

Seabrook annual landing value for 2002 was of $1.9 million including an annual large mesh fish landing value of $1.2 million. The lobster landing value in 2002 represented 37.7% of the 1997-2003 average, and the monkfish landing value in 2002 represented 22.3% of the 1997-2003 average. In 2002, the value of landings at dealer-reported port was of $1,9 million, and the landed value of home-ported vessels was of $506,697.

The commercial industry in Hampton/Seabrook estuary is very active. However, most the wholesalers and retailers of seafood are located in Hampton. The Yankee Fisherman's Cooperative Pier in Hampton Harbor has a seafood processing facility that handles shellfish and finfish landings from both Seabrook and Hampton (Yankee Fisherman's Cooperative, 2010).

Other commercial fisheries in the Hampton/Seabrook estuary include herring, baitfishing for alewives, mummichogs (*Fundulus sp.*) and tomcod using gillnets, seines and minnow traps; trapping for eels, and angling and dip netting for smelt.

Landings by Species

Table 110 Seabrook Dollar Value by Species 1997-2008

Catch	Average 1997-2008	2002
Largemesh*	363,227	1,273,459
Lobster	384,577	258,069
Monkfish	3,8630	158,605
Other	425,464	76,034
Smallmesh**	29,721	74,135
Scallops	9,666	48,501
Dogfish	18,753	14,980
Skates	1,218	2,230
Bluefish	1,161	1,227
MSB	1,943	856
Herring	2,906	16

** Largemesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and Pollock*
*** Smallmesh Multi-species: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting)*
**** MSB: Butterfish, Mackerel, and Squid*

Vessels by Year

Table 111 Seabrook Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port Value ($)	Landed port value ($)
1997	38	30	671,422	0
1998	30	23	747,358	0
1999	28	25	506,697	0
2000	31	29	759,818	0
2001	38	32	806,533	0
2002	37	31	838,476	1,908,112
2003	33	29	817,311	2,095,779
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0

Recreational

There are numerous tourist-related activities including sport fishing, whale watching, windjammers/charter sailing, and harbor tours/day cruises. These companies include: Eastman's Deep Sea Fishing, and GTAT Sea Charters LLC (Portsmouthnh.com, 2011).

Subsistence

Information on subsistence fishing in Seabrook is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Seabrook is somewhat involved in the herring fishery through its dependence on herring for lobster and tuna bait. Seabrook ranked 17th in herring landings in 2004 (96 mt).

4.5.3.2.12 Gloucester, Massachusetts

A detailed profile of Gloucester, Massachusetts, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Gloucester's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

The Gloucester Fishermen's Association, Gloucester Lobstermen's Association and the Fishermen's Wharf Association are located in Gloucester. The Massachusetts Fishermen's Partnership, established in Gloucester in 1995, is an umbrella organization for fishermen of any sector within the Massachusetts fishing industry (Massachusetts Fishermen's Partnership, 2011).

Fishery Assistance Centers

The Fishing Partnership Health Plan provided access to health care coverage to thousands of fishermen and their family members from 1997 until it began phasing out its insurance program in 2011 (Fishing Partnership Health Plan, 2011). The Partnership is currently in transition, but anticipates continuing advisory work with fishing communities.

Other Fishing-Related Institutions

The Gloucester Fishermen's Wives Association (GFWA) was founded in 1969 by the wives of Gloucester fishermen. In 2001, they constructed a memorial statue to the fishermen's wives of Gloucester (The Gloucester Fishermen's Wives Association, 2011). In 2010, with the help of the Northwest Atlantic Marine Alliance (NAMA) they started Cape Ann Fresh Catch, a community-supported fishery (Cape Ann Fresh Catch, 2011).

The Northeast Seafood Coalition, an industry and community organization focused on the development of reasonable regulations, reviews of the scientific basis for management, and education of the public, is based in Gloucester.

A permit bank was established with mitigation funds paid by two companies who have constructed Liquid Natural Gas (LNG) terminals off of Gloucester. Permit Banks allow entities such as groups of fishermen, states and even nonprofit organizations to purchase fishing permits on the open market and then lease the quota from these permits back to target fishermen, often at below-market prices.

Commercial

Although there are threats to the future of Gloucester's fishery (see "History" above and "Future" below), the fishing industry remains strong in terms of reported landings. In 2009 Massachusetts landed 356 million pounds (161,490 metric tons) of seafood valued at almost $400 million (NOAA Fisheries, 2010). In the same year, Gloucester's commercial fishing industry had the nation's 10th highest landings in pounds (122.3 million) and the nation's eleventh highest landings value ($50.4 million) (NOAA Fisheries, 2010).

In 2002, Gloucester had the highest landings value of lobster in Massachusetts with the state-only landings worth $2 million and the combined state and federal landings recorded from federally permitted vessels was just over $10 million. Some of the increase in lobster landings has been attributed to Maine vessels that are not allowed to land trawler caught lobsters in their home state. The total number of vessels home-ported increased slightly from 1997 to 2003, but there was a slight reduction for the years 1998, 1999, and 2000. The size distribution of the vessels has also changed.

Landings by Species

Table 112 Landings in Pounds for State-Only Permits in Gloucester

Catch	Pounds landed in 2003
Cod**	4,727,220
Haddock**	2,576,252
Lobster***	2,035,442
Monkfish	587,186
Pollock	503,396
Crab***	178,842
White Hake	171,061
Skate	155,138
Winter Flounder	151,782
Atlantic Mackerel	136,441
Yellowtail Flounder	125,855
Soft Shell Clam*	89,558
Bluefish**	63,446
Red Hake	37,016
Striped Bass**	35,475
Gray Sole (Witch)	25,639
Sea Herring	23,800
Dab (Plaice)	15,754
Cusk	8,672
Wolffish	5,964
Razor Clam*	3,148
Conch*	1,430
Menhaden	700
Whiting	642
Redfish	528
Periwinkles*	400
Bay Scallop*	350
Fluke**	115
Mussels*	100
Halibut	38
Grand Total	11,661,391

Asterisks indicate data sources: Zero: MA DMF has 2 gear-specific catch reports: Gillnet & Fish Weirs. All state-permitted fish-weir and gillnet fishermen report landings of all species via annual catch reports. NOTE: Data for these species do not include landings from other gear types (trawls, hook & line, etc.) and therefore should be considered as a subset of the total landings. (Massachusetts Division Marine Fisheries).
One (*): All state-permitted fishermen catching shellfish in state waters report landings of all shellfish species to us via annual catch reports. NOTE: These data do not include landings from non-state-permitted fishermen (federal permit holders fishing outside of state waters), nor do they include landings of ocean quahogs or sea scallops.)
Two (**): These species are quota-managed and all landings are therefore reported by dealers via a weekly reporting phone system (IVR).
Three (***): All lobstermen landing crab or lobster in MA report their landings to us via annual catch reports.

Table 113 Gloucester Vessel Landings Average Annual Value 1997-2008

	Average Annual 1997-2008 $	2010 only $
Largemesh	23,200,868	31,500,110
Lobster	8,974,730	10,570,800
Monkfish	4,145,420	3,179,896
Herring	4,720,598	5,675,276
Smallmesh	724,254	361,174
Scallops	741,788	437,464
Dogfish	440,359	512,914
Butmacsq	1,398,580	642,491
Skates	101,016	312,300
Bluefish	23,321	20,779
Surfoq	42,109	73,127
Sfscupbsb	1,534	348
Tilefish	43,856	0
Other	35,467	3,001,890

Vessels by Year

Table 114 Gloucester Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port value (Millions of $)	Landed port value (Millions of $)
1997	277	216	15	23
1998	250	196	18	28
1999	261	199	18	26
2000	261	202	20	42
2001	295	230	19	38
2002	319	247	21	41
2003	301	225	22	28
2004	303	227	25	43
2005	292	222	35	46
2006	285	216	35	48
2007	306	239	32	47
2008	312	240	38	54
2009	320	245	36	50
2010	316	223	39	56

Recreational

The outer harbor has several mooring areas used primarily by recreational boats (Harbormasters.org, 2011http://www.harbormasters.org/). Eastern Point Yacht Club, founded in 1923, maintains a large mooring field just inside the Dog Bar breakwater. The City of Gloucester has 20 transient moorings in Southeast Harbor and many private moorings situated around Ten Pound Island. Freshwater Cove, on the western shore of the Outer Harbor, also contains private moorings. The shoreline of the Outer Harbor is dotted with private docks and piers. (The inner harbor is used primarily by the commercial fleet.) Both commercial and recreational boats use Smith Cove for mooring and dockage. The Annisquam River is a well-traveled waterway connecting Gloucester Harbor with Ipswich Bay. Cape Ann Marina and Gloucester Marina, located at the southern end of the river, provide dockage for several hundred commercial and recreational boats. There are numerous moorings just outside the channel limits all along the river, and many private docks and piers exist along its shore. Lobster Cove is located inside the Ipswich Bay entrance of the Annisquam River and contains an extensive mooring area, the Annisquam Yacht Club, Lobster Cove Market and Marina and many smaller private docks.

Eight companies are listed on a Cape Ann website as running fishing charters out of Gloucester (a reduction of two since 2006) (www.cape-ann.com, 2011)

Subsistence

Information on subsistence fishing in Gloucester is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Gloucester is an important community involved in the Atlantic herring fishery. It meets several criteria identified in in Section 4.5.3.2 of this document (communities of interest): #1 (herring landings), #2 (herring-related infrastructure), #3 (lobster/tuna bait dependence), and #5 (value-added production). Several lobster bait dealers and a pumping station for offloading herring are located in Gloucester. In addition, Cape Seafoods, one of the largest processors of herring for frozen export, is located at the State Pier and owns several dedicated pelagic fishing vessels. Gloucester's infrastructure includes shipping terminals and access to major highways and nearby airports. The port also provides many additional fishing-related services including ice, fuel, and vessel maintenance/repair services.

Gloucester was the top-ranked port for herring landings in 2004 (26,891 mt) and cumulatively from 1995-2004 (227,579 mt).

During the 300 years of fishermen's residence in Gloucester before the first beam trawler was built in Bath, Maine in 1918, fishermen caught cod and other favored species with baited hooks. Herring was often the bait of choice. With more than 400 schooners regularly sailing from Gloucester in the early 1800s, carrying thousands of fishermen who worked with hooks and lines, the clam-flats could not supply the insatiable market for bait, so fishermen turned to herring (Garland, 1995).

In the late 1960s and 1970s, the distant water fleets of USSR, German Democratic Republic and nine other countries were joined by Gloucester fishing boats in harvesting herring on Georges Bank. The pressure led to the collapse of the stocks and no commercial landings for 15 years. Eventually, however, the stocks began to rebuild.

In 1993, the Conservation Law Foundation indicated that with research, planning and investment, Gloucester could successfully return to an emphasis on herring. By October 1996, Gloucester appeared poised to take advantage of the healthy herring stocks. Eleven companies and/or organizations formed the Gloucester Herring Corporation and each put up funds to match for a $400,000 grant from US Economic Development Agency (EDA) to explore the potential for herring in Gloucester. The challenge was to increase the harvest of herring; expand and improve shoreside facilities; and open the global market to Gloucester herring.

Redevelopment of the Herring Fishery

A variety of efforts were made to develop the full range of commercial activities: harvesting, processing and marketing to both bait and food markets. One major initiative in 1996 planned to allow a Dutch company to build a facility on the State Fish Pier that would work with the F/V Atlantic Star, a 369-foot factory trawler. A grassroots organization, Gloucester Initiatives, with the help of Congress successfully blocked this effort, arguing that a fleet of medium-sized vessels and local processing plants along the Atlantic coast should be cautiously developed in order to sustainably harvest, process and market herring and mackerel while maintaining a traditional fisheries "way of life."

Herring as Bait

In Gloucester, herring for bait plays a very important role in both the commercial and recreational industries. As prey, the herring attract a plethora of whales to Jefferies Ledge and Stellwagen Bank upon which the whale watch industry depends. At least five companies in Gloucester and Rockport run whale watches. In addition, Gloucester lobster fishermen depend on the harvested herring as bait for their traps and tuna fishermen use herring as bait for their lines.

Vessel Specialization

The small and medium sized vessels that dominate Gloucester's fleet have not moved into the harvesting of herring to the extent anticipated. When groundfish regulations limited the numbers of days-at-sea and large closed areas were established, many believed that herring would provide a supplement to incomes cut by the groundfish management regime. However, the low price of herring and the need for refrigerated seawater (RSW) to retain quality has led to a specialization by larger vessels (100-foot range) dedicated to pelagics (herring and mackerel). Smaller vessels were advised not to try to retrofit their vessels with RSW systems because this would have negative impacts on stability. Rolling closures and the closure of Area 1A to trawlers during summer months further confirmed the challenges for small boats to engage in targeted herring fishing. There are a few smaller vessels that do include herring as part of their mix of targeted species.

Star Fisheries

Star Fisheries is a family-owned business that opened Gloucester's display auction. To avoid any appearance of impropriety, the family is no longer personally involved in the buying and selling of groundfish. They did however decide to retain their option for the handling of herring and mackerel since the auction is not working with pelagic species. In 2005, they packed mackerel for the first time since the opening of the auction in 1999.

4.5.3.2.13 New Bedford, Massachusetts

A detailed profile of New Bedford, Massachusetts, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. New Bedford's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

There are several fishing associations that aid the fishing industry in New Bedford, such as the Fisheries Survival Fund, established in 1998 to ensure the long-term sustainability of the Atlantic sea scallop fishery (Fisheries Survival Fund, 2011), U.S. North Atlantic Spiny Dogfish Association, the American Scallop Association, processors and support businesses related to the sea scallop industry (For more information, see website www.american-scallop-association.com), and the Commercial Anglers Association. The Offshore Mariner's Wives Association includes a handful of participants that organize the annual "Blessing of the Fleet."

Massachusetts Marine Fisheries Institute is dedicated to promoting sustainable fisheries through education and research. It is a collaborative partnership between the Massachusetts Division of Marine Fisheries and the Department of Fisheries Oceanography at the University of Massachusetts Dartmouth School for Marine Science and Technology, emphasizing interdisciplinary research and close cooperation with active fishermen (MMFI, 2011).

Fishing Assistance Centers

Shore Support was the primary fishing assistance center in New Bedford from 2000 to 2010, but is no longer in existence (Hall-Arbor, 2001). For a number of years, the New Bedford Fishermen and Families Assistance Center, established with emergency funding in response to major changes in fishing regulations promoted job retraining and provided other help to fishing families. In 1997, the Fishing Partnership Health Plan was established that not only helped fishing families to obtain subsidized health care, but also had a staff involved in other outreach efforts. The FPHP announced in May 2011 that the costs are unsustainable and the health care plan will cease on June 30, 2011. Staff will remain available to help fishing families transition to other health insurance programs, as well as provide services such as access to fishing vessel safety training (Gains, 2011).

Other Fishing-Related Organizations

There are several other fishing related organizations and associations that are vital to the fishing industry such as the Fisheries' Survival Fund (Fairhaven), the New Bedford Fishermen's Union, and New Bedford Mayor Scott Lang's Seafood Council.

In addition, Saving Seafood is a non-profit corporation funded by the seafood industry that conducts media and public outreach on behalf of the seafood industry, as well as communications to keep industry members aware of issues and events of concern (Saving Seafood, 2011).

Commercial

The fishing industry in New Bedford has consistently experienced decadal change. In the 1980s fishermen reaped high landings and bought new boats. Then in the 1990s they experienced a dramatic decrease in groundfish catches, a vessel buyback program, and strict federal regulations in attempts to rebuild the depleted fish stocks. A new decade brought more changes for the fishing industry. By 2000 and 2001 New Bedford was the highest value port in the U.S. (generating $150.5 million in dockside revenue) (For more information see website www.fishresearch.org). Revenues have continued to rise, generating $249.2 million in 2009 (NOAA Fisheries, 2010). New Bedford's most successful fishery for the last decade has been scallops, followed by groundfish.

In 1999, New Bedford had approximately 44 fish wholesale companies, 75 seafood processors and some 200 shoreside industries (Hall-Arbor, 2001). Maritime International, also located in New Bedford, has one of the largest U.S. Department of Agriculture-approved cold treatment centers on the East Coast. In 2005 the terminal received approximately 25 vessels a year. Each vessel carried about 1,000 tons of fish (Maritime International, Inc, 2011).

Landings by Species – State Only Permits

Table 115 Landings in Pounds for State-Only Permits in New Bedford in 2003

Species	Pounds landed
Cod**	6,311,413
Haddock**	5,949,880
Lobster***	1,168,884
Scup**	593,394
Fluke**	480,165
Crab***	315,395
Loligo Squid**	207,769
Striped Bass**	189,055
Quahog (littleneck)*	147,249
Monkfish	137,300
Conch*	136,276
Skate	121,522
Quahog (cherrystone)	113,341
Black Sea Bass**	113,071
Pollock	65,500
Quahog (Chowder)*	64,999
Bluefish**	44,045
Quahog (mixed)*	11,513
Red Hake	10,100
Cusk	1,880
Illex Squid**	1,305
Soft Shell Clam*	985
Dab (Plaice)	870
Dogfish**	537
Winter Flounder	500
Yellowtail Flounder	383
Gray Sole (Witch)	200

Asterisks indicate data sources: Zero: MA DMF has 2 gear-specific catch reports: Gillnet & Fish Weirs. All state-permitted fish-weir and gillnet fishermen report landings of all species via annual catch reports. NOTE: Data for these species do not include landings from other gear types (trawls, hook & line, etc.) and therefore should be considered as a subset of the total landings. (Massachusetts Division Marine Fisheries).

Landings by Species – Federal Permits

Table 116 New Bedford Average Annual Value 1997-2008

Catch	1997-2008 Average ($)	2002 ($)
Scallops	156,996,744	96,577,150
Largemesh	34,041,406	40,950,557
Monkfish	10,308,258	6,545,695
Surfoq	10,571,831	6,772,070
Other	4,516,185	5,285,072
Lobster	5,973,191	6,395,289
Skates	2,829,983	1,420,409
SFSCUPBSB	1,735,904	1,040,050
Red crab	1,015,717	1,948,522
MSB	2,330,872	782,113
Smallmesh	1,393,381	871,565
Herring	1,607,356	738
Dogfish	95,344	9,415
Bluefish	13,038	13,361
Tilefish	2,886	0

Vessels by Year

Table 117 New Bedford Vessel Permits/Landings Values 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port value ($)	Landed port value ($)
1997	244	162	80,472,279	103,723,261
1998	213	137	74,686,581	94,880,103
1999	204	140	89,092,544	129,880,525
2000	211	148	101,633,975	148,806,074
2001	226	153	111,508,249	151,382,187
2002	237	164	120,426,514	168,612,006
2003	245	181	125,788,011	166,680,126
2004	255	180	160,643,818	206,431,754
2005	275	196	205,246,945	136,500,469
2006	279	201	191,018,177	281,716,674
2007	278	212	183,142,718	267,261,329
2008	280	218	185,820,356	239,889,326
2009	273	220	182,559,938	246,198,425
2010	262	210	225,763,117	303,964,574

Recreational

Five companies are listed in a New Bedford visitor's guide as offering the public recreational fishing excursions including boat charters, though two of these are actually across the harbor in Fairhaven and one is in E. Wareham (New Bedford Area Visitor Guide, 2011).

Subsistence

Information on subsistence fishing in New Bedford is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

New Bedford is an important community involved in the Atlantic herring fishery. It meets several criteria identified in in Section 4.5.3.2 of this document (communities of interest): #1 (herring landings), #2 (herring-related infrastructure), #3 (lobster/tuna bait dependence), and #5 (value-added production). Several lobster bait dealers and a pumping station for offloading herring are located in New Bedford. In addition, NORPEL, considered one of the largest processors of herring for frozen export, is located in New Bedford and was leasing several dedicated pelagic fishing vessels. NORPEL, however, in 2011 is in limbo with most staff dismissed and at least one of the leased vessels has returned to the West Coast. New Bedford's infrastructure includes shipping terminals (Maritime International) and access to major highways and nearby airports. The port also provides many additional fishing-related services including ice, fuel, and vessel maintenance/repair services.

New Bedford ranked fourth in herring landings in 2004 (7,791 mt) and seventh cumulatively from 1995-2004 (31,089 mt,). Herring landings in New Bedford increased significantly with the establishment of the NORPEL plant, but the plant is currently (June 2011) closed.

4.5.3.2.14 Point Judith, Rhode Island

A detailed profile of Point Judith, Rhode Island, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Point Judith's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

The Commercial Fisheries Center of Rhode Island was founded to preserve commercial fishing as a profession, culture, and way of life through promoting the sustainability of the resource (Rhode Island Science & Technology Advisory Council, 2011).

Members include:

- RI Party and Charter Boat Association
- Point Judith Fishermen's Memorial Foundation
- Point Judith Fishermen's Scholarship Foundation
- Atlantic Offshore Lobstermen's Association
- Ocean State Fishermen's Association

- Rhode Island Commercial Fishermen's Association
- Rhode Island Lobstermen's Association
- Rhode Island Shellfisherman's Association
- RI Monkfishermen's Association
- Sakonnet Point Fishermen's Association
- Commercial Fisheries Research Foundation
- Eastern New England Scallop Association

The American Seafood Institute, a nonprofit established in 1982, provides assistance to the fishing industry in exporting product overseas.

Fishing Assistance Centers

Although based in Providence, the Rhode Island Science and Technology Advisory Council, launched in 2005, is working to increase RI's research and development capacity, etc. acts as an informational clearinghouse, among other activities, including information on Requests for Proposals for collaborative fisheries research (Rhode Island Science & Technology Advisory Council, 2011). Commercial Fisheries Research Foundation of Rhode Island has been administering federal funding for cooperative fisheries research since 2008 under the Southern New England Collaborative Research Initiative (SNECRI) program.

Founded in 1964, the Rhode Island Marine Trades Association represents all aspects of the marine industry. Member companies and organizations are dedicated to the growth in recreational boating and the creation of jobs for our industry in an environmentally friendly, safe and responsible way (Rhode Island Marine Trades Association, 2011).

The Point Club is the largest organized fishing vessel mutual insurance club on the East Coast. In 2006, it started subsidizing the cost of adding selected new safety equipment on fishing vessels.

Commercial

In 2003, the number of commercial vessels in Pt. Judith was 224 (RI DEM, 2003). Vessels ranged from 45-99 feet, with most being ground trawlers. Of these, 55 were between 45 and 75 feet, and 17 over 75 feet (Hall-Arbor, 2001). In 2001, Point Judith was ranked 16th in value of landings by port (fourth on the East Coast). In 2009, Point Judith landed 39.9 million pounds of fish (ranked 23rd in the nation), valued at $32.4 million (ranked 20th in the nation) (NOAA Fisheries, 2010).

RI Department of Environmental Management holds title over the majority of the land and Narragansett has worked with the State to create protection for the port for commercial fishing and other maritime uses. RI DEM regards the commercial fishing industry as the priority use for the port (Rhode Island Sea Grant, 2011).

The state's marine fisheries are divided into three major sectors: shellfish, lobster, and finfish. The shellfish sector includes oysters, soft shell clams, and most importantly, quahogs. The lobster sector is primarily comprised of the highly valued American lobster with some crabs as well. The finfish sector targets a variety of species including winter, yellowtail and summer flounder, tautaug, striped bass, black sea bass, scup, bluefish, butterfish, squid, whiting, skate, and dogfish. A wide range of gear including otter trawl nets, floating fish traps, lobster traps, gill nets, fish pots, rod and reel, and clam rakes are used to harvest these species. The state was issuing about 4,500 commercial fishing licenses at the time of this report (Hall-Arber, 2001).

Landings by Species

Table 118 Narragansett (Point Judith) Average Annual Dollar Value of Landings by Species 1997-2008

	Annual Average 1997-2008	2002 only
Lobster	11,803,812	8,116,261
MSB	12,046,408	8,804,396
Sfscupbsb	5,859,644	4,603,074
Smallmesh	2,998,544	1,760,782
Monkfish	2,845,219	2,315,556
Largemesh	2,861,395	2,637,144
Other	2,839,344	2,162,004
Skates	771,819	598,998
Herring	528,394	66,637
Scallops	1,772,585	79,899
Tilefish	203,104	0
Bluefish	126,648	139,695
Dogfish	52,684	56,891
Red crab	8,111	135

Vessels by Year

Table 119 Narragansett (Point Judith) Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port Value ($)	Landed Port value ($)
1997	21	61	5,629,991	0
1998	25	55	5,926,038	0
1999	27	60	7,650,042	0
2000	32	61	7,902,294	0
2001	30	62	6,194,920	0
2002	29	53	7,935,212	0
2003	30	52	9,314,990	0
2004	183	50	37,385,954	35,363,351
2005	191	51	39,502,317	38,208,292
2006	187	49	41,633,642	46,793,527
2007	194	46	37,109,056	36,735,513
2008	183	41	37,206,023	37,026,703
2009	178	38	32,041,429	32,361,145
2010	175	38	32,399,902	31,857,371

Recreational

Rhode Island marine waters also support a sizable recreational fishing sector. While accurate data on this component is lacking, it is estimated that in the year 2000, some 300,000 saltwater anglers, most from out-of-state, made 1 million fishing trips. This indicates that the recreational component is significant both in terms of the associated revenues generated (support industries) and harvesting capacity.

Subsistence

No information has been obtained at this time on subsistence fishing.

Atlantic Herring Fishery

Point Judith is marginally involved in the Atlantic herring fishery; landings of herring in Point Judith were much higher in the early 1990s; this may be due to increased participation in the Atlantic mackerel fishery. Several lobster bait dealers are located in Point Judith, and some herring is trucked to Maine from Point Judith for processing.

Point Judith ranked 10th in herring landings in 2004 (2,129 mt) and fourth cumulatively from 1995-2004 (71,289 mt).

4.5.3.2.15 Newport, Rhode Island

A detailed profile of Newport, Rhode Island, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Newport's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

There are several fishing associations that aid the fishing industry in Newport. The Ocean State Fishermen's Association is located in Barrington; the Rhode Island Commercial Fishermen's Association, as well as the Rhode Island Lobstermen's Association are in Wakefield. The State Pier 9 Association and Atlantic Offshore Fishermen's Association are involved in the Newport's fishing industry (Hall-Arbor, et al., 2001).

Other Fishing-Related Institutions

The Seamen's Church Institute is an organization that brings soup around to the docks for workers and fishermen.

Commercial

In 2002, recorded annual landings for Rhode Island totaled 103.5 million pounds with a landing value of $64.2 million, with catches of Atlantic herring and Atlantic mackerel at 12.7 and 20.9 million pounds landed (NOAA Fisheries, 2003). Newport's annual landed value for 2002 was $7.5 million including an annual lobster landed value of $2.6 million, which represented about 11.7% of the 2002 state annual landings.

The South of Cape Cod midwater trawl fleet (pair and single) consists of eight vessels with principal ports of New Bedford, MA; Newport, RI; North Kingstown, RI; and Point Judith, RI. This sector made 181 trips and landed 17,189 mt of herring in 2003. Maine had the highest reported landings (46%) in 2003, followed by Massachusetts (38%), New Hampshire (8%), and Rhode Island (7%).

Infrastructure

State Pier Number 9 is owned and maintained by the State. The pier is zoned commercial/industrial and is managed by RI DEM to be principally a fishing pier. Only commercial fishing vessels are allowed to tie up at the pier and the two-finger pier on the southern side. Most of the fishing vessels are lobster boats and draggers. The pier also provides space for gear storage, net mending and offloading (RI Sea Grant, 2011).

Long Wharf is city owned and designated for commercial fishing boat dockage but the water is shallow and no longer practical for most vessels. Fishing boats sill tie up on the Southside of Aquidneck Lobster pier.

Landings by Species

Table 120 Newport Dollar Values of Landings by Species 1997-2008

	Average Annual 1997-2008	2002 only
Other Species	561,091	85,085
L Mesh	955,647	428,723
S Mesh	158,038	134,958
Dogfish	28,833	724
Scallops	2,813,895	5,475,872
Lobster	3,288,484	733,090
Tilefish	7,929	0
Monkfish	888,672	293,733
Herring	82,262	3,044
Bluefish	11,418	7,198
Skates	156,108	1,42,389
MSB	1,342,883	554,339
Sfscupbsb	7,697	620,404

Vessels by Year

Table 121 Newport Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port Value ($)	Landed port Value ($)
1997	52	13	5,130,647	7,598,103
1998	52	16	6,123,619	8,196,648
1999	52	14	6,313,350	8,740,253
2000	59	14	6,351,986	8,296,017
2001	52	15	5,813,509	7,485,584
2002	55	17	6,683,412	7,567,366
2003	52	16	7,859,242	9,082,560
2004	53	16	6,031,391	8,402,598
2005	56	17	6,170,896	14,279,861
2006	48	19	7,080,630	20,821,160
2007	46	20	6,583,056	12,366,585
2008	44	16	5,262,698	6,765,771
2009	41	17	5,220,885	7,162,190
2010	40	18	6,045,216	6,786,625

Recreational

Information on recreational fishing in Newport is either unavailable through secondary data collection or the practice does not exist.

Subsistence

Information on subsistence fishing in Newport is either unavailable through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

Newport is marginally involved in the Atlantic herring fishery. Newport ranked 15th in herring landings in 2004 (313 mt) and 17th cumulatively from 1995-2004 (3,757 mt).

4.5.3.2.16 North Kingstown, Rhode Island

A detailed profile of North Kingstown, Rhode Island, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. North Kingstown's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

Rhode Island Fishermen's Alliance's "mission is to educate the consumer and make a stand against these regulations that will ultimately destroy the fishing industry and our access to fresh local caught seafood" (Rhode Island Fishermen's Alliance, 2011). Rhode Island Commercial Fishermen's Association formed in 2000 and located in Wakefield includes fishermen, dealers, suppliers and others. The goals of the association are to reach consensus on issues, improve working relationships with state and local officials, harvest fish sustainably, obtain quota for Rhode Island fishermen, and have impute in management regulations. Other associations with membership in North Kingstown include Rhode Island Lobstermen's Association (Rhode Island Lobstermen's Association, 2011), Rhode Island Shellfishermen's Association, Ocean State Fisherman's Association, Ocean State Aquaculture Association, and Rhode Island Salt Water Anglers Association (Rhode Island Saltwater Anglers, 2011).

Fishery Assistance Centers

Information on fishery assistance centers in North Kingstown is either unavailable through secondary data collection or does not exist.

Other Fishing-Related Institutions

The American Seafood Institute, an offshoot of R.I. Seafood Council, was formed in 1982 for overseas promotion and export assistance programs (Hall-Arbor, 2001).

Commercial

In 2002 recorded annual landings for Rhode Island totaled 103.6 million pounds with a landing value of $64.2 million (NOAA Fisheries, 2003). By 2009, quantities had decreased to 84l5 million pounds with a value of $61.6 million (NOAA Fisheries, 2010). North Kingstown's annual landing value for 2002 was $7.1 million including an annual herring landing value of $1.2 million, and an annual lobster landing value of 744,757. In 2002, the value of landings at the dealer-reported port was of $7.1 million.

The South of Cape Cod midwater trawl fleet (pair and single) consists of eight vessels with principal ports of New Bedford MA, Newport RI, North Kingstown RI, and Point Judith RI. This sector made 181 trips and landed 17,189 mt of herring in 2003. Maine had the highest reported landings (46%) in 2003, followed by Massachusetts (38%), New Hampshire (8%), and Rhode Island (7%).

Landings by Species

Table 122 North Kingstown Dollar Values of Landings by Species 1997-2008

Catch	Annual Average 1997-2008	2002
Other	1,370,816	4,824,312
Herring	849,529	1,244,586
Lobster	366,807	744,757
MSB*	9,616,464	301,531
Sfscupbsb**	66,046	28,141
Monkfish	16,725	1,307
Scallops	26,006	982
Bluefish	1,054	568
Smallmesh***	5,224	542
Largemesh****	4,048	540
Skates	168	0

** MSB: Butterfish, Mackerel, and Squid*
*** Sfscupbsb: Summer Flounder, Scup, and Black Sea Bass*
**** Smallmesh Multispecies: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting)*
***** Largemesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and pollock*

Vessels by Year

Table 123 North Kingston Vessel Permits/Landings Value 1997-2010

Year	# Vessels Home ported	# Vessels (Owner's city)	Home port Value ($)	Landed port Value ($)
1997	3	23	0	12,666,980
1998	2	20	0	9,322,636
1999	3	21	0	6,992,943
2000	3	23	0	8,522,877
2001	2	21	0	9,754,132
2002	2	22	0	7,147,266
2003	2	20	0	8,513,069
2004	19	24	12,981,061	16,682,612
2005	18	23	11,420,269	13,716,149
2006	18	22	10,593,598	12,994,377
2007	18	23	6,643,201	10,241,467
2008	17	21	7,361,281	10,751,288
2009	13	16	8,802,325	11,751,273
2010	14	18	6,645,654	9,784,945

Recreational

Narragansett Bay attracts a variety of recreational fishermen. These fishermen fish a variety of species including quahogs, bluefish and striped bass. A report (no longer available on the web) from University of Rhode Island's Graduate School of Oceanography said that Rhode Island recreational anglers spent $138,737,000 in 1998. In 2010, approximately 49,974 individuals bought Recreational Salt Water Fishing licenses (Rhode Island or federal).

Subsistence

Information on subsistence fishing in North Kingstown is either not available through secondary data collection or the practice does not exist.

Atlantic Herring Fishery

North Kingstown is involved in the Atlantic herring fishery primarily through its involvement in the bait fishery. Several lobster bait dealers and freezer facilities are located in North Kingstown, and some herring is trucked to Maine from North Kingstown for processing.

North Kingstown ranked 12th in herring landings in 2004 (1,065 mt) and fifth cumulatively from 1995-2004 (69,094 mt).

4.5.3.2.17 Cape May, New Jersey

A detailed profile of Cape May, New Jersey, including important social and demographic information, is provided in "Community Profiles for the Northeast US Fisheries", by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. Cape May's involvement in fisheries is summarized below.

Involvement in Northeast Fisheries

Institutional

Fishing Associations

Garden State Seafood Association in Trenton is a statewide organization of commercial fishermen and fishing companies, related businesses and individuals working in common cause to promote the interests of the commercial fishing industry and seafood consumers in New Jersey (Garden State Seafood Association, 2011). The Recreational Fishing Alliance, a national, grassroots political action organization representing recreational fishermen and the recreational fishing industry on marine fisheries issues, has members in Cape May.

Fishery Assistance Centers

In 1984 Cape May County received a $500,000 EDA grant to help the commercial fishing industry. The Revolving Fishing Loan Program that allows boat owners to borrow money at a lower interest rate than is available from banks is still in existence.

Other Fishing-Related Institutions

Information has not yet been collected regarding other fishing related institutions in Cape May.

Commercial

At the Southernmost tip of New Jersey – and almost as far South as Washington, DC – the combined port of Cape May/Wildwood is the largest in New Jersey and one of the largest on the East Coast. The center of fish processing and freezing in New Jersey, Cape May/Wildwood is the homeport to some of the largest vessels fishing on the Atlantic coast and has led the way in developing new fisheries and new domestic and international markets for New Jersey seafood. Major Cape May fisheries focus on squid, mackerel, fluke, sea bass, porgies, lobsters and menhaden. In addition to these, Wildwood boats are also in the surf clam/ocean quahog fisheries. Like many Jersey Shore communities, much of Cape May's and Wildwood's economies are dependent on seasonal tourism – which is dependent both on the weather and the overall state of the economy. The year-round character of commercial fishing is a major factor in keeping these communities going in the off-season (Garden State Seafood Association, 2011).

In 2002, recorded annual landings for New Jersey totaled 162.2 million pounds with a landing value of $112.7 million (NOAA Fisheries, 2003). Cape May annual landing value for 2002 was $28.2 million including an annual scallop landing value of $19.8 million. In 2009 Cape May-Wildwood's annual landing was 63.9 million pounds, down from 82.9 million pounds in 2008. However, the value of the landings was 73.7 million in 2008, 73.4 million in 2009 (NOAA Fisheries, 2010). The herring landing value in 2002 represented 6% of the 1997-2003 average. In 2002, the value of landings at dealer-reported port was of $28.3 million, and the landed value of home-ported vessels was of $34.5 million. Between 1997 and 2003 home ported vessels number increased from 109 to 129.

Landings by Species

Table 124 Cape May Dollar Values of Landings by Species 1997-2008

Catch	Annual Average 1997-2008	2002
Scallops	36,587,620	19,806,595
MSB*	8,185,054	3,281,558
Sfscupbsb**	2,208,790	1,391,629
Other	2,220,645	1,488,759
Surfoq***	490,246	1,796,269
Lobster	554,044	340,381
Monkfish	348,774	107,474
Herring	315,261	55,871
Smallmesh****	21,857	2,778
Bluefish	23,346	23,628
Skates	11,144	16,272
Dogfish	5,650	0
Largemesh*****	9,796	37,711
Tilefish	963	2,938

Source: NMFS Landings and Permit databases
** MSB: Butterfish, Mackerel, and Squid*
*** Sfscupbsb: Summer Flounder, Scup, and Black Sea Bass*
**** Surfoq: Surf Clam and Ocean Quahog*
***** Smallmesh Multi-species: red hake, ocean pout, mixed hake, black whiting, silver hake (whiting)*
****** Largemesh Groundfish: cod, winter flounder, yellowtail flounder, American plaice, sand-dab flounder, haddock, white hake, redfish, and pollock*

Vessels by Year

Table 125 Cape May Vessel Permits/Landings Value 1997-2010

Year	# Vessels home ported	# Vessels (owner's city)	Home port Value ($)	Landed port Value ($)
1997	109	73	27,687,667	23,636,983
1998	105	68	27,614,763	25,770,007
1999	106	72	29,153,706	22,353,284
2000	116	74	30,488,271	23,936,235
2001	116	71	32,923,798	27,155,864
2002	118	72	34,529,920	28,312,296
2003	129	78	42,696,341	36,368,698
2004	142	84	64,995,256	60,629,161
2005	170	93	76,020,057	63,152,544
2006	193	94	71,926,998	34,636,597
2007	203	95	80,942,293	52,886,077
2008	188	93	75,458,775	69,388,147
2009	182	91	77,559,019	67,331,992
2010	175	99	91,120,004	76,641,507

Recreational

The Cape May County Charter and Party Boat Association has more than 85 charter and party boats that can take anglers ocean and bay fishing all year long (Cape May County, 2006). Striper fishing charters are a major attraction in New Jersey and anglers flock to the Jersey coast year after year from regions around the world to experience the fall striper runs New Jersey is famous for (www.fintalk.com, 2011).

Subsistence

Information on subsistence fishing in Cape May is either available through primary data collection or the practice does not exist.

Atlantic Herring Fishery

Cape May is involved in the Atlantic herring and other pelagic fisheries. A pumping station for offloading herring and a processing plant are located in Cape May. Lund's Fisheries, a processor of herring and mackerel, is located in Cape May and owns several dedicated pelagic fishing vessels. The port also provides many additional fishing-related services including ice, fuel, and vessel maintenance/repair services.

Herring landings in New Jersey were 68,301,000 pounds in 2007, went up to 80,610,000 pounds in 2008 and down to 72,709,000 pounds in 2009 and lower still to 56,306,000 pounds in 2010.

5.0 ENVIRONMENTAL CONSEQUENCES OF MANAGEMENT ALTERNATIVES UNDER CONSIDERATION

The impacts of the management alternatives under consideration in Amendment 5 are assessed and discussed relative to each of the valued ecosystem components (VECs) described in the Affected Environment (Section 4.0).

Much of the detailed analyses to support the development of the alternatives under consideration in Amendment 5 was provided by the Herring PDT and forms the basis for determining the potential impacts of the measures on each of the VECs. The complete analyses and supporting technical documents are included in the appendices to this amendment (Volume II) and are summarized below and incorporated by reference where appropriate.

5.1 IMPACTS OF PROPOSED ADJUSTMENTS TO FISHERY MANAGEMENT PROGRAM (SECTION 3.1)

The Council is considering a range of management alternatives to enhance the Atlantic herring fishery management program in general; measures under consideration in this section include proposed regulatory definitions, administrative/general provisions, changes to reporting requirements, trip notification requirements, and open access permit provisions. The potential impacts of these measures/options on the VECs identified in this amendment are discussed in the following subsections.

5.1.1 Impacts of Regulatory Definitions and Administrative/General Provisions (Sections 3.1.1 and 3.1.2)

Options Under Consideration:

- No Action (Status Quo)
- Regulatory Definitions for *Transfer at Sea* and *Offload*
- Clarify that vessels working cooperatively in a multi-vessel operation are limited to the vessels' most restrictive possession limit
- Eliminate the VMS power down provision for limited access herring vessels
- Establish a new At-Sea Herring Dealer Permit

The Council may ultimately select a combination of the above options. In any case where an option is not selected, the no action option (status quo) will continue to apply.

Because these measures are largely administrative in nature, their impacts on the Amendment 5 VECs are expected to be relatively minor and are discussed collectively in this section.

The regulatory definitions and administrative/general provisions proposed in Amendment 5 relate to the overall goal of the amendment, which is to improve catch monitoring and ensure compliance with the MSA. They also relate indirectly to the first objective, which is to implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery (to the extent that they clarify provisions and are intended to improve compliance/enforcement).

5.1.1.1 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action option relative to the proposed adjustments to the fishery management program and administrative/general provisions would not be expected to affect the status of the herring resource, and the no action option is expected to have a neutral impact on herring. Some of the indirect long-term benefits from the options under consideration would not be realized under the no action option; as discussed below, the options are expected to have low positive impacts on the resource.

The options under consideration include new regulatory definitions and/or a suite of administrative/general provisions. Because all of these options are administrative in nature, they are very unlikely to affect the amount of herring available for harvest, fishing effort, or fishing behavior. The impacts of these options are likely to yield no direct impacts to the Atlantic herring resource.

There may, however, be some indirect positive impacts on the herring resource from implementing the proposed changes. The proposed regulatory definitions and administrative/general provisions may reduce the likelihood for errors reporting, and consequently, in the calculation of catch statistics. If catch statistics improve by implementing the proposed adjustments, then management uncertainty may be reduced (uncertainty about catch estimates is a component of management uncertainty). Ultimately, improving catch reporting could lead to better catch data for stock assessments and may also reduce scientific uncertainty. This will lead to more effective long-term management of the resource and therefore result in minor indirect benefits. Relative to taking no action, impacts of the options under consideration relate to the following:

- Regulatory Definitions for *Transfer at Sea* and *Offload* – clarifying regulatory definitions may reduce any ambiguity related to the options under consideration in Section 3.1.3 (Measures to Address Carrier Vessels) and any other relevant management measures, which, in turn, may reduce the likelihood for misallocating or double counting herring catches;
- Clarify that vessels working cooperatively in a multi-vessel operation are limited to the vessels' most restrictive possession limit – this measure was proposed by NMFS for consideration in Amendment 5 and may improve enforcement of herring possession limits in multi-vessel operations;
- Eliminate the VMS power down provision for limited access herring vessels – this provision is proposed for consistency across limited access management programs in the Northeast Region, and to improve the enforceability of catch monitoring;
- Establish a new At-Sea Herring Dealer Permit – establishing this permit may reduce any ambiguity related to the options under consideration in Section 3.1.3 (Measures to Address Carrier Vessels) and improve reporting of herring catch by dealers and carrier vessels. It may reduce instances where

catch is mistakenly attributed to a carrier vessel on a dealer report and then cannot be matched to a vessel trip report (VTR).

Overall, because of the administrative nature of the options proposed in this section and the resulting benefits from reducing errors in reporting, the impacts on the Atlantic herring resource should be *low positive* relative to taking no action.

5.1.1.2 Impacts on Non-Target Species and Other Fisheries

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment). Because of the nature of the measures under consideration in this section, selection of the no action option relative to the proposed regulatory definitions and administrative/general provisions would not be expected to affect non-target species and other fisheries.

All of the options considered in this section are administrative and are very unlikely to affect the amount of herring available for harvest, fishing effort, or fishing behavior. The options also focus on provisions related to fishing for Atlantic herring and do not address, directly or indirectly, issues related to the catch of non-target species or other fisheries. Therefore, it is highly likely that there would be no impacts to non-target species and other fisheries expected from any of the options under consideration in this section, with regards to the no action option. The impacts on non-target species and other fisheries are considered *neutral*.

5.1.1.3 Impacts on Physical Environment and EFH

The measures considered in this section include updates to definitions of ‘transfer at sea’ and ‘offload’, clarification about possession limits for vessels fishing cooperatively, changes to VMS requirements, and changes to dealer permitting. None of the options being considered are expected to affect the amount or location of herring fishing effort. Thus, none of the proposed measures would have any adverse effects on EFH. The no action option would maintain status quo, and because the impacts of the measures are likely to be neutral, there is no expected difference between the no action option and the measures presented with respect to EFH. Thus, none of the proposed measures would have any adverse effects on EFH.

5.1.1.4 Impacts on Protected Resources

The change in regulatory definitions, operation requirements, and dealer permits are administrative in nature from the standpoint of protection and monitoring of protected resources in the area; therefore they are not likely to have any effect on protected resources. The no action option would maintain status quo, and because the impacts of the measures are likely to be negligible, there is no expected difference between the no action option and the measures presented with respect to protected resources in the area.

5.1.1.5 Impacts on Fishery-Related Businesses and Communities

Because of the administrative nature of the measures under consideration in this section, selection of the no action option relative to the proposed regulatory definitions and administrative/general provisions would not be expected to affect fishery-related businesses and communities. Some of the indirect long-term benefits from the proposed definitions and administrative/general provisions would not be realized under the no action option, but, as discussed below, the provisions under consideration are expected to have low positive impacts on fishery-related businesses and communities.

As discussed in Section 5.1.1.1, the proposed regulatory definitions and administrative/general provisions may contribute to reducing the likelihood for errors in the calculation of catch statistics. As reporting and compliance improves, management uncertainty may be reduced (uncertainty about catch estimates is a component of management uncertainty). More specifically:

- Regulatory Definitions for *Transfer at Sea* and *Offload* – clarifying regulatory definitions may reduce any ambiguity related to the options under consideration in Section 3.1.3 (Measures to Address Carrier Vessels) and any other relevant management measures, which, in turn, may reduce the likelihood for misallocating or double counting herring catches;
- Clarify that vessels working cooperatively in a multi-vessel operation are limited to the vessels' most restrictive possession limit – This measure was proposed by NMFS for consideration in Amendment 5 and may improve enforcement of herring possession limits in multi-vessel operations. The impacts of this measure on fishery-related businesses and communities is neutral;
- Eliminate the VMS power down provision for limited access herring vessels – This provision is proposed for consistency across limited access management programs in the Northeast Region, and to improve the enforceability of catch monitoring in the herring fishery. The Enforcement Committee met on May 8, 2009 to discuss issues related to the development of this amendment and provide preliminary input. At that time, the Enforcement Committee agreed by consensus to support eliminating the VMS power down provision because it would make provisions for herring limited access vessels consistent with other limited access vessels and would enhance enforcement of the herring regulations.
- Establish a new At-Sea Herring Dealer Permit – Establishing this permit may reduce ambiguity related to the options under consideration in Section 3.1.3 (Measures to Address Carrier Vessels) and improve catch reporting by requiring a report for each purchase (including at-sea purchases). It will, however, increase the reporting burden for vessels that obtain this permit. Section 5.1.2.1.5 of this document (Impacts of Measures to Address Carrier Vessels on Fishery-Related Businesses and Communities) provides information about the number of vessels engaged in carrying activities.

Ultimately, improving catch reporting could lead to better catch data for stock assessments and may also reduce scientific uncertainty over the long-term. To the extent that scientific and management uncertainty can be reduced, additional yield can be made available to the herring fishery. The long-term impacts of reducing scientific and management uncertainty are positive for fishery-related businesses and communities. For the most part, though, all of the options considered in this section are administrative and are very unlikely to affect the amount of herring available for harvest, fishing effort, or fishing behavior. Therefore, impacts on fishery-related businesses and communities associated with implementing any of the options considered in this section are expected to be very minor, and relative to taking the no action option, should be *low positive*, due to the potential minor improvements to catch reporting.

5.1.2 Impacts of Measures to Address Carrier Vessels and Transfers of Atlantic Herring At-Sea (Sections 3.1.3)

5.1.2.1 Impacts of Measures to Address Carrier Vessels

Options Under Consideration:

- Option 1: No Action (Status Quo)
- Option 2: Require VMS on Carrier Vessels for Declaration Purposes and Eliminate Seven-Day Enrollment Period (Section 3.1.3.2.2)
- Option 3: Dual Option for Carriers – Use VMS for Declaration Purposes and Eliminate Seven-Day Enrollment Period or Status Quo (Section 3.1.3.2.3)

5.1.2.1.1 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action option relative to the measures to address carrier vessels would not be expected to affect the status of the herring resource, and the no action option is expected to have a neutral impact on herring.

The measures to address carrier vessels are intended to provide more flexibility to vessels engaging in carrying activities. Option 1 would require a VMS on all carrier vessels, allowing these vessels to declare in and out of carrying activities on a trip-by-trip basis. For those vessels that already have VMS units on board, there would likely be no cost increase to using that unit to declare into the herring fishery as a carrier vessel. Herring limited access vessels are currently required to declare into the herring fishery at the start of every trip. This action would not increase the VMS submissions, but would only change the nature of the declaration from declaring HER-HER to HER-CAR or something similar. Option 2 provides the carrier with the choice of complying with current requirements or using a VMS for declaration purposes. Section 5.1.2.1.5 (Impacts of Measures to Address Carrier Vessels on Fishery-Related Businesses and Communities) suggests that a small number of vessels may be affected by these options if they choose to purchase a VMS. Because these options are largely administrative in nature and do not impact removals of Atlantic herring from the fishery, no additional impacts on the herring resource are expected, and because the impacts of the measures under consideration are likely to be *neutral*; there is no difference expected between the no action option and the options proposed for carrier vessels with respect to the Atlantic herring resource.

5.1.2.1.2 Impacts on Non-Target Species and Other Fisheries

The no action option (Option 1) would maintain status quo, and no additional impacts are expected on non-target species and other fisheries. Because the impacts of the measures are likely to be neutral (see below), there is no measureable difference expected between the no action option and the options proposed for carrier vessels with respect to the non-target species and other fisheries.

The measures to address carrier vessels are intended to provide more flexibility to vessels engaging in carrying activities. Option 1 would require a VMS on all carrier vessels, allowing these vessels to declare in and out of carrying activities on a trip-by-trip basis. For those vessels that already have VMS units on board, there would likely be no cost increase to using that unit to declare into the herring fishery as a carrier vessel. Herring limited access vessels are currently required to declare into the herring fishery at the start of every trip. This action would not increase the VMS submissions, but would only change the nature of the declaration from declaring HER-HER to HER-CAR or something similar. Option 2 provides the carrier with the choice of complying with current requirements or using a VMS for declaration purposes. Section 5.1.2.1.5 (Impacts of Measures to Address Carrier Vessels on Fishery-Related Businesses and Communities) suggests that a small number of vessels may be affected by these options if they choose to purchase a VMS. The measures proposed in this section are largely administrative in nature and are not likely to affect removals of non-target species on vessels engaged in the herring fishery. Therefore, relative to the no action option, the impacts are expected to be *neutral*.

5.1.2.1.3 Impacts on Physical Environment and EFH

The carrier vessel measures in this section are not likely to influence the amount or location of herring fishing effort and, thus, would likely have no adverse effects on EFH. Therefore, relative to the no action alternative, the impacts are expected to be *neutral*.

5.1.2.1.4 Impacts on Protected Resources

From the standpoint of protection and monitoring of protected resources in the area, the change in VMS regulations (Options 2 and 3) are administrative in nature; therefore they are not likely to have any effect on protected resources. The no action option (Option 1) would maintain status quo, and because the impacts of the measures are likely to be neutral, there is no expected difference between the no action option and the measures presented with respect to protected resources in the area.

5.1.2.1.5 Impacts on Fishery-Related Businesses and Communities

The impacts of the proposed options to address carrier vessels are expected to be positive for vessels engaged in this activity, and overall, the impacts are expected to be insignificant across fishery-related businesses and communities affected by Amendment 5. For those vessels that already have VMS units on board, there would likely be no cost increase to using that unit to declare into the herring fishery as a carrier vessel. Herring limited access vessels are currently required to declare into the herring fishery at the start of every trip. This action would not increase the VMS submissions, but would only change the nature of the declaration from declaring HER-HER to HER-CAR or something similar.

Option 1 (No Action): Under the no action option, there is a minimum enrollment period of seven calendar days for vessels that obtain an LOA from NMFS to carry Atlantic herring. While operating under a valid LOA, such vessels are exempt from any herring possession limits associated with the herring vessel permit categories. Herring carrier vessels under an LOA may not possess, transfer, or land any species except for Atlantic herring (except that they may possess Northeast multispecies transferred by vessels issued either a Category A or B permit, consistent with the applicable possession limits for such vessels). The impacts on fishery-related businesses and communities are expected to be neutral from this option, as the measures just described will remain in place.

Options 2/3: While the status quo would maintain current measures, Options 2 and 3 may produce some positive impacts for vessels engaged in carrying activities because they increase flexibility and opportunities for these vessels during the time they are enrolled in herring carrying activities.

Option 2 would require a VMS on all carrier vessels, so this option may have more of an economic impact, if there are carrier vessels that do not currently utilize a VMS and would be required to purchase/maintain one in order to carry herring. Currently, all Category A, B, and C herring vessels are required to be equipped with a VMS because of VMS requirements for limited access vessels. Category A, B, and C vessels would have little pecuniary costs associated with using the VMS to declare into the fishery. The only costs for these vessels would be may be a slightly increased administrative burden, which should be small. However, the VMS provision would reduce administrative burden and regulatory costs by eliminating the seven-day enrollment period for these vessels.

Only Category D vessels that do not currently use VMS will be affected by Option 2. There may be small impacts to the Category D vessels that are not currently equipped with a VMS. Information about herring carrier vessels can be found in Section 4.5.1.3.3 of this document (Affected Environment). In 2010, there were 15 vessels that obtained a LOA from NMFS to engage in herring carrying activities (down from 18 vessels in 2009). A total of 49 reports were submitted for carrying activities by these vessels in 2010. The number of Category D (open access) vessels engaging in carrying activities increased in 2010, and the information presented in the Affected Environment suggests that about **20** Category D vessels that have obtained carrying LOAs in the past may not be using VMS units. 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, that would add to the costs.

Carrier vessels would have increased flexibility so that they could declare what activity they would be engaging in on a trip-by-trip basis rather than being required to remain in one activity a week at a time. One of the most frequently lamented impacts of regulations in any fishery is the restriction on participants' ability to make quick changes in their choice of species to pursue, gear to use, and trip schedule. While this option would not remove all restrictions on such choices, it would allow carrier vessels to have more rather than less flexibility at the trip level. This flexibility could also benefit herring-dependent communities since the vessels would presumably base their choices on the needs of their community-based dealers and/or buyers.

Option 3 provides flexibility for vessels to either choose to obtain a VMS and eliminate the minimum seven-day enrollment period, or stay with the status quo (seven-day minimum) and not utilize VMS. Option 3 will have similar impacts on carrier vessels to Option 2; however, these impacts should be smaller because vessels may choose between the seven-day enrollment period with current LOA restrictions and using VMS to declare as a carrier vessel.

Category D vessels without a VMS would be allowed to carry herring without installing a VMS if they choose. For smaller vessels with (possibly) more limited funds, the LOA option would allow them to continue work as a carrier without increasing their costs. This is likely to be appreciated in communities with fewer alternative employment options and lower incomes.

Overall, in comparison to the no action option, both Options 2 and 3 have the potential to create *low negative and low positive* impacts for fishery related businesses and communities. Under both options, positive impacts are likely to result from the increased flexibility and opportunities, as discussed above, but they would remain small in magnitude. On the other hand, the VMS burdens, also discussed above for Option 2, may create a low negative impact; however the impacts would similarly be small because of the small number of vessels that the option is likely to affect.

5.1.2.2 Impacts of Measures to Address Transfers of Atlantic Herring At-Sea (Section 3.1.3.3)

NMFS has indicated that the current provisions and allowances for transfers of herring at sea are problematic and present a challenge when trying to resolve differences between databases and/or ensure completeness of Atlantic herring catch/landings data. The Council is therefore considering options to reduce/restrict the transfer of Atlantic herring at-sea.

Options Under Consideration:

- Option 1: No Action (Status Quo)
- Option 2: Restrict Transfers At-Sea to Only Vessels with Category A or B Limited Access Herring Permits (Section 3.1.3.3.2)
- Option 3: Prohibit Transfers At-Sea to Non-Permitted Vessels (Section 3.1.3.3.3)

The measures to address transfers of herring at-sea relate to the overall goal of Amendment 5 to implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery, as they are intended to improve reporting compliance, reduce double-counting, and further ensure accurate accounting of all catch in the herring fishery.

5.1.2.2.1 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action option relative to the measures to address transfers at sea would not be expected to affect the status of the herring resource, and the no action option is expected to have a neutral impact on herring. Some of the indirect long-term benefits from the options under consideration would not be realized under the no action option, but, as discussed below, the options are expected to have very minor positive impacts on the resource.

The two options proposed to address transfers of Atlantic herring at-sea (Options 2 and 3) are not expected to directly impact the Atlantic herring resource, primarily because only small amounts of herring are transferred at-sea (see herring fishery and vessel information presented in Section 4.5.1 of this section), and the options are not expected to affect total removals of Atlantic herring from the fishery. The only difference between Option 2 and Option 3 is the number of vessels that would be restricted by the transfer-at-sea limitations.

In comparison to the no action option, there may be some indirect positive impacts on the herring resource from implementing one of the options under consideration. The measures to address transfers at sea are intended to improve accounting of herring catch by requiring that vessels making transfers have federal herring permits, thus subjecting them to VTR reporting requirements. If catch statistics improve by implementing one of the options to address transfers at sea, then management uncertainty may be reduced (uncertainty about catch estimates is a component of management uncertainty). Ultimately, improving catch reporting could lead to better catch data for stock assessments and may also reduce scientific uncertainty. This will lead to more effective long-term management of the resource. Therefore, the impacts of the options under consideration on the Atlantic herring resource may be *low positive*.

5.1.2.2.2 Impacts on Non-Target Species and Other Fisheries

Because transfer at sea activity represents a very small component of the fishery (see supporting information presented in Section 5.1.2.2.5 below), the impacts of the no action option on non-target species and other fisheries are expected to be neutral, and the impacts of selecting one of the options to limit transfers at sea on non-target species and other fisheries are not expected to be measurably different than the no action option. The options proposed to address transfers of Atlantic herring at-sea are not likely to have a measurable impact on non-target species and other fisheries, as the amount of herring harvested is not likely to change under these options. The only difference between Options 2 and 3 is the number of vessels that would be restricted by the transfer-at-sea limitations. Therefore the impacts, when compared to the no action option, are likely to be *neutral*.

5.1.2.2.3 Impacts on Physical Environment and EFH

The transfer at sea measures in this section are intended to improve accounting of herring catch by requiring that vessels making transfers have federal herring permits, thus subjecting them to VTR reporting requirements. None of these measures are therefore likely to have any adverse effects on EFH, and relative to the no action alternative, the impacts are expected to be *neutral* in nature.

5.1.2.2.4 Impacts on Protected Resources

The restriction of transfers at-sea (Options 2 and 3) are not likely to impact the amount or the location of effort put forth by the fishery; therefore they are not likely to have any effect on protected resources. Although monitoring of the fishery may improve through the restriction of transfers, most species classified as protected would not be influenced. The transfers under consideration occur after the protected species have been separated from the catch of herring. The no action option (Option 1) would therefore maintain status quo, and because the impacts of the measures are likely to be *neutral*, there is no expected difference between the no action option and the measures presented with respect to protected resources in the area.

5.1.2.2.5 Impacts on Fishery-Related Businesses and Communities

Option 1 (No Action): No additional impacts on fishery-related businesses and communities are expected under the no action option, as current management measures to limit impacts fishery related businesses and communities would remain in place. Information presented below suggests that this activity represents a very small fraction of the Atlantic herring fishery.

Option 2: Fishing vessels must record if fish is "Sold to another vessel for bait or retained for bait." There are no data available for only fish which is sold to another vessel for bait. Based on the VTR information provided in Table 126, very little Atlantic herring is recorded as "sold to another vessel bait or retained for bait." Between 2005 and 2010, an average of 0.21% of all caught Atlantic herring was either transferred for bait or retained as bait.

Table 126 VTR-Reported Herring Catch (Pounds) Sold At-Sea/Retained as Bait

	No. Vessels	"Bait" either kept or sold at sea	All VTR Reported Landings	Percent "Bait"
2005	15	180,527	214,338,587	0.08%
2006	16	224,151	226,678,651	0.10%
2007	29	1,146,795	173,647,134	0.66%
2008	15	117,572	183,896,188	0.06%
2009	20	169,183	226,884,852	0.07%
2010	30	588,387	145,940,841	0.40%
		2,426,615	1,171,386,253	**0.21%**

This option is the most restrictive option under consideration to limit transfers of herring at sea and would impact three groups of vessels: Category C vessels and Category D vessels that are not operating under a Carrier LOA would be prohibited from receiving herring at-sea. In addition, vessels that currently don't possess any herring permit would be prohibited from receiving herring at-sea. Category C or D vessels operating under a Carrier LOA would be exempt from this measure and would, therefore, not be impacted by these regulations. Pair trawl vessels would also not be impacted by this provision.

Option 2 may reduce opportunities for Category C and D vessels to participate in the herring fishery by limiting their ability to transfer herring at sea (unless they are carrying herring or participating in a pair trawl operation). Because of the high cost of fuel, the requirement to return to port in order to land their catch could negatively impact herring-related businesses that have only C or D permits. Typically, smaller vessels lack refrigerated seawater (RSW) systems, so the retention of high-quality herring depends on their ability to transfer their catch to vessels with RSW or return quickly to port. Consequently, this option could increase costs for Category C and D vessels and may limit their flexibility. Further, if the proposed definition for transfer at-sea is adopted in Amendment 5 (see Section

3.1.1), this could hamper multi-vessel purse seine operations, limiting not only opportunities for C and D vessels, but constraining the A and B permitted vessels with whom they might otherwise have worked.

The impacts of this option are therefore expected to be *low negative* for the Category C and D vessels that may be affected, with regards to the no action alternative. If requirements for carrier vessels are modified in Amendment 5 to allow for more flexibility (Options 2 and 3 for carrier vessels, proposed in Section 3.1.3.2), then more Category C/D vessels may be able to operate periodically as carriers, thereby reducing the negative impact of this option. The impacts of this option in comparison to Option 3are likely to be slightly more, as discussed below.

Option 3: This option is less restrictive than Option 2; all Category C and D vessels would be allowed to receive herring at-sea for personal use. Because permit Category D is an open access permit category, this option is minimally restrictive. Any vessel which wishes to receive herring can apply for, and obtain, an open access D permit.

However, it is slightly more restrictive than the no action option and will create additional reporting/compliance burdens for vessels that wish to receive herring at-sea and do not have a Federal herring permit. Vessels currently with no Federal permits (recreational vessels, for example) will be required to obtain a permit for herring and comply with all related reporting requirements (including VTR and other applicable requirements implemented in this amendment).

Option 3 may improve reporting compliance as requiring a federal permit of some sort by all vessels engaged in the transfer activity reduces the likelihood that some herring catch, even in small amounts, will not be documented. However, this measure would require that vessels with no Federal permits (recreational vessels, for example) obtain a permit for herring and comply with all related reporting requirements. The Enforcement Committee met on May 8, 2009 to discuss issues related to the development of this amendment and provide preliminary input. At that time, the Enforcement Committee provided the following comments regarding the measures to address transfers at-sea:

- **Option 3:** Prohibiting transfers to non-herring permit vessels is not enforceable. However, concern was expressed about the number of lobster and recreational vessels that may be affected by this option.

Under Option 3, there may be vessels that choose not to obtain a herring permit and be subject to the reporting requirements in order to transfer/receive herring at sea. The once common practice of transferring a bucket of bait between herring fishing boats and recreational vessels or others wishing to obtain herring for use as bait has become a much less frequent occurrence. Nevertheless, Option 3 could curtail this activity completely. Because the frequency has diminished, the negative impacts on herring-related businesses are likely to be small; however, the proposed restriction expresses bureaucratic concern over small-scale events that have, in the past, promoted positive interaction between commercial and recreational fishermen, thus potentially reducing or eliminating community-building opportunities.

Overall, the impacts of this option are therefore expected to be *low negative* for all vessels that may be affected, with regards to the no action alternative.

5.1.3 Impacts of Trip Notification Requirements (Section 3.1.4)

The Council is considering options to modify/extend pre-trip and pre-landing notification requirements to all limited access herring vessels in Amendment 5.

Options Under Consideration:

- Option 1: No Action (Status Quo)
- Option 2: Modify and Extend the Pre-Trip Notification Requirements – extend pre-trip notification system and add a gear declaration to pre-trip VMS notifications (Section 3.1.4.2)
- Option 3: Extend Pre-Landing Notification Requirement (Section 3.1.4.3)

In addition to the overall goal to implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery, the measures proposed in this section relate to the following goals/objectives of the Amendment 5 catch monitoring program:

1. To create a cost effective and administratively feasible program for provision of accurate and timely records of catch of all species caught in the herring fishery;
2. Develop a program providing catch of herring and bycatch species that will foster support by the herring industry and others concerned about accurate accounts of catch and bycatch, i.e., a well-designed, credible program;
3. Design a robust program for adaptive management decisions;

The call-in requirement for vessels to request an observer before leaving port was established in response to concerns about haddock bycatch and the establishment of the haddock catch cap in the herring fishery (Framework 40B to the Multispecies FMP) and currently applies only to vessels subject to the haddock catch cap. Although developed for a very specific purpose, this requirement has been helpful to the Observer Program to determine the schedule of observer coverage and know better where and when herring trips will occur. It also helps NMFS to estimate and target specific levels of coverage in the fishery during the fishing year. If the notification program is set up in the most efficient manner, it can help to reduce operating costs for the observer program, as fishing trips are more predictable and less time is spent determining when/where observed trips should occur. If the expectation is that all herring vessels should be observed during some or all of their fishing operations, then the trip notification requirements could assist the Observer Program in deploying observers in the most efficient way across the entire fishery while minimizing the burden on the vessels. The proposed modifications to the current program (options for notification, timing) would both improve efficiency and reduce the burden on the industry.

Herring PDT Comments

- **Option 3:** Extending the VMS pre-landing requirement to all limited access herring vessels encountering herring on a trip would have been a more effective provision if the catch monitoring program developed in this amendment included a dockside monitoring/sampling program. However, extending the VMS pre-landing requirement may still facilitate enforcement and could provide consistency regarding vessels that would be subject to pre-trip and pre-landing notification requirements and may reduce the complexities associated with declarations into/out of the fishery. The notification can still facilitate the deployment of dockside samplers through State programs, to the extent that States can work with NMFS to coordinate sampling throughout the fishery.

5.1.3.1 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

The Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The Atlantic herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action option relative to the proposed trip notification requirements would not be expected to affect the status of the herring resource. Some of the indirect (minor) benefits from the proposed requirements would not be realized under the no action option, as discussed below.

Both Options 2 and 3, which propose trip notification requirements for limited access herring vessels in Amendment 5, should not affect removals from the fishery, so no direct impacts on the herring resource are expected. While there are no direct impacts on the herring resource anticipated by the trip notification requirements under consideration, the measures are being considered as part of a larger catch monitoring program for the Atlantic herring fishery. If catch statistics improve, management uncertainty may be reduced (uncertainty about catch estimates is a component of management uncertainty). Ultimately, improving catch reporting could lead to better catch data for stock assessments and may also reduce scientific uncertainty. This will lead to more effective long-term management of the resource. More specifically:

- Modifying and extending the pre-trip notification requirements to all limited access herring vessels through the PTNS and VMS declarations (Option 2) would help to ensure timely deployment of observers to the limited access vessels in the fishery and would facilitate enforcement;
- Extending the pre-landing notification requirements to all limited access herring vessels (Option 3) would facilitate both enforcement and portside sampling of the fishery (State, Federal, or other).

Thus, relative to the no action option, if one or both of these options are implemented in Amendment 5, data collected via the observer program, a portside sampling program, or any sampling program for the fishery may be more likely to achieve management goals (e.g., CV targets on discard estimates). Subsequently, management uncertainty may be reduced (uncertainty about discard estimates is a component of management uncertainty) and long-term management of the herring resource may improve. Overall, therefore, there is likely to be a *low positive* impact of Options 2 and 3, if they are adopted.

5.1.3.2 Impacts on Non-Target Species and Other Fisheries

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment). Because the no action option for trip notification requirements maintains the status quo, selection of the no action option would not be expected to result in any additional impacts on non-target species and other fisheries.

Extending the pre-trip and pre-landing notification requirements may improve allocation of observers and help ensure the timely sampling of the limited access Atlantic herring fishery. Modifying and extending the pre-trip notification requirements to all limited access herring vessels through the PTNS and VMS declarations (Option 2) is intended to help ensure timely deployment of observers to the limited access vessels in the fishery and facilitate enforcement. Extending the pre-landing notification requirements to all limited access herring vessels (Option 3) is intended to facilitate both enforcement and portside sampling of the fishery (State, Federal, or other). Thus, under the options for trip notification requirements, particularly Option 2, data collected via the observer program may be more likely to achieve management goals (e.g., CV targets on catch estimates of non-target species).

Any improvements in data resulting from the trip notification options would relate only to catch in the limited access herring fishery, which represents a very small component of data utilized to formally assess the status of non-target species; these improvements would likely not impact the outcome of future stock assessments for non-target species. In comparison to the no action option, therefore, the impacts on non-target species are expected to be *neutral*. Consequently, there is no measureable difference expected between the no action option and the options proposed for trip notification requirements relative to non-target species and other fisheries.

5.1.3.3 Impacts on Physical Environment and EFH

The trip notification measures in this section are intended to improve allocation of observers and help ensure the timely sampling of the Atlantic herring fishery, but they would not influence the amount or location of herring fishing effort. Thus, they are not likely to have any adverse effects on EFH, in comparison to the no action option.

5.1.3.4 Impacts on Protected Resources

From the standpoint of protection and monitoring of protected resources in the area, the change in pre-trip notifications (Options 2 and 3) are administrative in nature; therefore they are not likely to have any effect on protected resources. While monitoring of the herring resource may improve slightly, the same magnitude of improvements would not likely result for protected resources. Thus, as the no action option (Option 1) would maintain status quo, and because the impacts of the measures are likely to be neutral, there is no expected difference between the no action option and the measures presented with respect to protected resources in the area.

5.1.3.5 Impacts on Fishery-Related Businesses and Communities

Option 1 (No Action): This option maintains the status quo and does not impose any additional reporting or notification requirements on participants in the fishery. There are therefore no additional impacts on fishery-related businesses and communities expected under the no action option. However, under the no action option, any impacts on fishery-related businesses and communities (low positive, discussed below) from the options under consideration would not be realized.

Options 2 and 3: The intent of the trip notification requirements is to incorporate all of the Atlantic herring fishery into the notification system to (1) better inform the NEFOP of when/where herring fishing activity may occur and assist in the effective deployment of observers and (2) notify enforcement of when vessels may land and assist in the deployment of dockside monitors or samplers (if appropriate and/or necessary). While Category C vessels may not target herring as much or as often, many of these vessels also participate in the Atlantic mackerel fishery, and the measures proposed in this amendment should improve consistency with mackerel regulations as well. Category D vessels would not be subject to this requirement unless they obtain the proposed open access permit for limited access mackerel vessels fishing in Areas 2/3 (Section 3.1.6), in which case they would be treated like a Category C vessel for the purposes of notification and reporting requirements. While there are no significant impacts on fishery-related businesses and communities expected by these options, the impacts are expected to be a low positive over the long-term, relative to taking no action (for reasons discussed below). Both Options 2 and 3 are likely to be similar enough in overall benefit that when compared to each other, neither will have a larger impact than the other.

Extending the pre-trip and pre-landing notification requirements may improve allocation of observers and help ensure the timely sampling of the Atlantic herring fishery. Thus, data collected via the observer program may be more likely to achieve management goals (e.g., CV targets on discard estimates). Subsequently, management uncertainty may be reduced (uncertainty about discard estimates is a component of management uncertainty) and long-term management of the herring fishery may improve. Ultimately, this could lead to better catch data for stock assessments and may also reduce scientific uncertainty over the long-term. To the extent that management uncertainty can be reduced, additional yield can be made available to the fishery. The long-term impacts of reducing management uncertainty are positive for fishery-related businesses and communities.

Option 2: Relative to the no action option, the impacts of this option on fishery-related businesses and communities are expected to be minor. The current requirement is for all vessels issued a Category A (All Areas Limited Access) or Category B (Areas 2/3 Limited Access) Permit fishing on a declared herring trip with midwater trawl or purse seine gear regardless of area fished, as well as Categories C and D (Limited Access Incidental Catch and Open Access) vessels fishing with midwater trawl gear in Areas 1A, 1B, or 3 to notify the observer program at least 72 hours in advance of starting any trip. In 2011, it was estimated that 42 out of 97 limited access vessels are already required to notify the observer program. This option would require the other 55 limited access vessels (Category C vessels) to notify the observer program through the Pre-Trip Notification System prior to starting a trip. While this option isn't likely to cost the vessel anything other than time, it may be an inconvenience as a vessel will have to wait for either an observer or a waiver from the observer program before starting a trip. Because vessels would be required to use the pre-trip notification system (PTNS) prior to any trip where the operator may harvest, possess, or land Atlantic herring, the number of notifications will increase. The pecuniary economic impacts on the herring fishery are expected to be minimal and on the order of additional 1-2 telephone calls per trip. Any economic impacts to the herring fishery will be through increased administrative and regulatory burden.

Option 2 simplifies pre-trip notification requirements for many vessels. This could increase the vessels' flexibility since they will not restrict their notification only to trips where they have planned to target herring and since all limited access vessels will be required to use the PTNS. The potential negative impact of this requirement is that observers may be assigned to vessels that do not end up catching or possessing herring, thus changing the percentage of observed trips in the directed herring fishery and reducing the effectiveness of observer allocations/deployments. There could be negative impacts on fishery-related businesses and communities depending on how observer coverage is funded and what the impacts of the funding options are (see Section 3.2.1). However, the proposed requirements for details to be provided through the PTNS (Section 3.1.4.2) should help to reduce negative impacts because the additional information should facilitate the deployment of observers on vessels that are targeting herring. Adding a pre-trip VMS gear declaration for all limited access vessels is helpful to ensure compliance and facilitate enforcement of gear-based management measures (midwater trawl access to groundfish closed areas, for example). Adding a gear designation to the pre-trip VMS declaration is not likely to impact fishery-related businesses or communities.

Option 3: This notification requirement removes ambiguity and makes the pre-landing notification a routine matter. It is unlikely to have negative impacts on herring-related businesses or communities. The current requirement is for all vessels issued a Category A (All Areas Limited Access) or Category B (Areas 2/3 Limited Access)Permit fishing on a declared herring trip with midwater trawl or purse seine gear regardless of area fished, as well as Categories C and D (Limited Access Incidental Catch and Open Access) vessels fishing with midwater trawl gear in Areas 1A, 1B, or 3 to notify the National Marine Fisheries Service Office of Law Enforcement (via VMS) of the time and place of offloading at least 6 hrs. prior to crossing the VMS demarcation line on your return trip to port, or, for vessels that have not fished seaward of the VMS demarcation line, at least 6 hours prior to landing.

In 2011, it was estimated that 42 out of 97 limited access vessels are already required to send in a pre-landing notification using their VMS units. This option would require the other 55 limited access vessels (Category C vessels) to fill out the pre-landing notification form on their VMS units when on a declared herring trip. Each pre-landing notification form costs a minimum of $0.60 per submission. On average, limited access herring vessels are estimated to take 24 trips per vessel per year. Therefore, the increase in cost would be at a minimum $15 annually for each vessel. It takes approximately two minutes to submit the pre-landing notification, which would cost each vessel approximately 48 min. annually. Considering the low costs of this option compared to the benefit for enforcement purposes, Option 3 would likely have a low positive impact compared to the no action option.

5.1.4 Impacts of Reporting Requirements for Federally Permitted Dealers (Section 3.1.5)

Options Under Consideration:

- Option 1: No Action (Status Quo)
- Option 2: Require Federally Permitted Herring Dealers to Accurately Weigh All Fish (Section 3.1.5)
    - *Option 2A:* require dealers to annually document how the composition of a mixed catch may be estimated
    - *Option 2B:* require dealers to document how the composition of a mixed catch may be estimated for every landings submission
    - *Option 2C:* require dealers to obtain vessel representative confirmation of SAFIS transaction record at first point of sale

The proposed reporting requirements for dealers relate to the overall goal of Amendment 5 to develop an amendment to the Herring FMP to improve catch monitoring and ensure compliance with the MSA, and the first objective of the amendment to implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery.

5.1.4.1 Background – General Analysis of Impacts

The impacts of the dealer reporting requirements under consideration in Amendment 5 are addressed below in a general sense and then subsequently addressed briefly relative to each VEC identified in the Amendment 5 Affected Environment (Section 4.0).

Option 1 is the no action alternative and represents the status quo. Currently dealers are required to report the weight of fish purchased to NMFS . The methods dealers use to determine the weight of fish purchased vary and can include weighing fish on scales and/or using volumetrics to determine the weight of fish.

In 2007, there were 230 federally-permitted Atlantic herring dealers, and by 2010 there were 273 dealers, all of which have the potential to be affected by Option 2. Federally-permitted dealers, however, become Atlantic herring dealers by selecting the species on their permit application form, which is an option that presents no extra cost. Of the 273 Atlantic herring dealers in 2010, only 92 purchased herring. Those that were not registered may or may not choose to register as herring dealers in the next application process, depending on the perceived impact that may result from the requirements implemented through this option. It is not clear if all federally permitted dealers would be held to the proposed requirements, or if only the registered herring dealers would be impacted. The analysis of impacts is further complicated by federally permitted dealers that are not currently registered as *herring* dealers, but who purchased herring in the last three years. The measures proposed in this amendment are intended to clarify reporting requirements for dealers and reduce the occurrence of this in the future.

The spatial extent of the impacts resulting from this measure is also difficult to determine. The location of Federally-permitted dealers that purchased herring ranges from North Carolina to Maine, but the highest impacted States may be Maine and Massachusetts, as they are the States with the highest number of dealers who purchased herring and have the highest revenue generated by their dealers. Dealers registered in Maine and Massachusetts, however, purchased 77% and 90% of their herring from the States in which they were registered in 2010, so other states such as Rhode Island may also be affected.

In addition to the range of dealers to which the proposed requirements may apply, there are also numerous ways in which federally permitted Atlantic herring dealers may comply with Option 2. Therefore, for the purposes of this analysis, **four examples** have been created to evaluate the possible responses of the federally permitted herring dealers to Option 2, which range in the austerity of the reaction.

Example 1 and Example 2 are meant to illustrate the potential impacts of the proposed requirement if federally permitted herring dealers chose to utilize scales to comply with the action. Example 1 describes the impacts of hopper scales, and Example 2 describes the impacts of truck scale utilization in the fishery.

Appendix I in Volume II (*Discussion Paper: Potential Applicability of Flow Scales, Hopper Scales, Truck Scales and Volumetric Measurement in the Atlantic Herring Fishery*) provides a full description of hopper scales and truck scales, as well as the potential costs, benefits, and potential downfall of the various scales that could be used. These examples characterize a potentially higher change in the fishery as a result of the measure, in comparison to the first example. The cost of scales can vary dramatically, however. The use of an already existing truck scale can cost as little as $10, but the distance to reach it may be great (two ports had scales more than an hour away and another four ports did not have reachable scales). 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 may use trucks in the transport of fish, however, and water weight can add to the total truck weight significantly, depending on where the scale is located. 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. Dealers would need to decide on a location or locations for both types of scales, and in the case of hopper scales, some may decide to require that vessels carry the hopper scales to avoid the cost.

If either Sub-Options 2A or 2B were chosen in conjunction with this measure, then dealers may choose to create a method for separation of catch before the fish were weighed. Alternatively, any range of methods for determining catch composition could be used post weighing (i.e. visual, sub sampling, etc.) as the Sub-Options require no specific form of composition estimate, just a recording of the methods utilized (yearly or on by landing submission). Depending on the method used, the additional effort that will be required could range from significant or barely adding to the processing time. The resulting percentage from the method used could be used in conjunction with the overall weight to determine the weights of each species. Sub-Option 2C would not require any additional weighing or estimation work in this scenario, but would require additional administrative work for vessel owners or operators after the catch has been weighed.

Example 3 would entail dealers complying with the action by utilizing volumetric estimation to determine the weight of all fish. Volumetric estimation could be conducted in a number of ways, one of which is already applied in the state of Maine and is described in Appendix I in Volume II (*Discussion Paper: Potential Applicability of Flow Scales, Hopper Scales, Truck Scales and Volumetric Measurement in the Atlantic Herring Fishery*). The State of Maine requires that all vessels have their holds measured by the State Department of Weights and Measures to volumetrically certify the amount of fish that the vessel can contain. Once that process has been completed, dealers could employ a weight on a string, which would be lowered into the hold to determine the level of the fish, and therefore the estimated volume, which in turn could be converted into an approximate weight.

Another way to volumetrically estimate the weight of all fish would be to fill a bait container that is utilized in the process of transporting herring on land with herring and weigh the container. The estimated weight, based on the volume of fish contained therein, could be expanded to serve as the weight of any box of fish of a similar size. Similarly, the makers of the bait container could supply this information. If the state of Maine example is followed, then the cost could range from $350 for a 100 hogshead vessel to $600 dollars if a Marine Surveyor completed a similar task. If a manufacturer provides the dealer with the average weight of a fish container, or if one dealer weighs a widely-used bait container on an existing scale and distributes the estimation of weight, there would be no additional costs associated with Example 3. This example characterizes the lowest overall impact as very little, if any, as the change in the behavior of federally permitted dealers and vessels would be less in comparison to the following examples. The efficacy of this example, however, may be compromised by the varying weight of fish through the fishing season, if the same conversion from volume to weight is used. The estimates may therefore not be an improvement over Option 1 (status quo).

In this example, if either Sub-Options 2A or 2B were chosen in conjunction with this measure, then dealers could creating a method for estimation of the composition of catch that could occur before or after the volumetric estimate was conducted; either way the estimation could be calculated from the estimate of percentages of bycatch and the volumetric estimate. Similar to examples 1 and 2, any range of methods for determining catch composition could be used (i.e. visual, sub sampling, etc.) as the Sub-Options require no specific form of composition estimate, just a recording of the methods utilized (either yearly or on by landing submission). Depending on the method used, the additional effort that will be required could range from significant or barely adding to the processing time. Sub-Option 2C would not require any additional estimation work in this scenario, but would require additional administrative work for vessel owners or operators after the catch had been estimated.

Example 4 is one that may occur in tandem with the prior three examples, as it illustrates the potential change in behavior surrounding herring processor plants. Processing plants have two mechanisms for processing herring: running the herring through a dewatering box and selling it as bait, and bringing the herring into the facility for processing. Appendix I in Volume II provides a full description of a processing plant and the process that herring follow. If the herring are being sold as bait, then they are subject to the same process that herring experience in most other ports, and Examples 1 through 3 would be applicable ways for processors to comply with the measure, and this would be the same with the Sub-Options. If herring are brought into the facility for processing, however, a few changes may need to be made. Currently, landed bycatch is sorted out and discarded in two phases of the herring processing, and the bycatch is discarded while the herring are weighed accurately for packaging purposes. To comply with the requirements proposed in Sub-Option 2A and 2B processors may decide to utilize the same scales used to weigh the herring, or they may choose a method similar to those presented in Examples 1 through 3. The cost of the extra time and effort are therefore difficult to quantify, and while utilizing the same scales used to weigh the herring would cut costs, there would be added time and effort by employees. Additional administrative work for vessel owners or operators would also be required under Sub-Option 2C, as the SAFIS reports would need to be confirmed or potentially contradicted.

Table 127 Summary of Examples Used to Characterize Impacts of Dealer Reporting Options

Example	1: Truck Scales	2: Hopper Scale	3: Volumetric Estimation	4: Processors
Potential Requirements	Ranges from finding an already existing truck scale close to the port to having permanent space in a port for a scale	May need space on individual vessels or on land for the scale to be located; may need additional time for scale to weigh all fish	May need a service to volumetrically certify vessel or a scale to estimate average bait container weight	May need more space and time for sorting
Potential Cost	$10 to $100,000 or more per scale or port	$20,000 to $50,000 or more per scale, port, or vessel	$0 - $600 or more per vessel	Unknown
Potential Efficacy	Some scales less effective than others; water weight varies; not all fish are transported via trucks	Precise so long as water is removed completely	May be reduced by the variation in herring weights over the season/not dissimilar to Option 1 (status quo)	Herring accurately weighed; bycatch could be weighed similarly or using a similar method to Examples 1-3

5.1.4.2 Impacts on Atlantic Herring

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action option relative to dealer reporting requirements would not be expected to affect the status of the herring resource. Some of the indirect benefits from the proposed dealer reporting requirements would not be realized under the no action option, but, as discussed below, the measures under consideration are expected to have low positive impacts on the Atlantic herring resource.

As Option 2 does not require dealers to use any particular method to accurately weigh all fish, dealers are unlikely to change their behavior under Option 2, in comparison to the no action option. Option 2 has the potential to improve the calculation of catch statistics and quantification of landed bycatch if used in concert with a port-side sampling program to determine catch composition, however. Since no such portside program is currently under consideration, this option will likely not have any effect on the herring resource. Overall, therefore, Option 2 is likely to have a neutral impact in comparison to Option 1.

The addition of Sub-Options 2A and 2B may not impact the reporting to any large extent as they provide only a slight improvement in reporting over Option 1. As was explained above, there is no requirement to estimate the relative composition of the catch in a specific way, there is only a requirement to document it in Sub-Options 2A and 2B. It is therefore dependent on the dealer to determine what method they will use. The newly documented information is not likely to be used in a stock assessment but may improve understanding of the harvesting of the resource and therefore the impact would likely be a low positive.

This low positive impact may also result from Sub-Option 2C. Sub-Option 2C is designed to identify erroneous data discrepancies between dealer and vessels reports. The measure 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. The exact methodology is still being developed, but whether or not a vessel's owner/operator indicated data issues could be made available to dealer as vessel confirmation of the dealer report.

In the 2012 Herring ACL proposed rule (76 FR 79610, December 22, 2011), NMFS described issues with reporting errors. As NMFS was reviewing the 2010 herring data, and comparing individual VTRs with individual dealer reports, it resolved data errors resulting from misreporting. Common dealer reporting issues were: Missing dealer reports; incorrect or missing VTR serial numbers; incorrect or missing vessel permit numbers; and incorrect dates. VTRs had similar errors. Common VTR reporting issues were: Missing VTRs; missing or incorrect dealer information; incorrect amounts of landed herring; incorrect dates; and missing or incorrect statistical area. Because the quality of herring landings data is affected by unresolved data errors; in the proposed rule, NMFS encouraged vessel owner/operators and dealers to double check reports for accuracy and ensure reports are submitted on a timely basis.

For in-season monitoring, NMFS uses vessel reports supplemented by dealer reports (when vessels reports are missing or in error). Sub-Option 2C would provide a tool to help identify and resolve erroneous data discrepancies between vessel and dealer reports. Having discrepancies between these data sets resolved quickly would likely improve the quality of data used by NMFS to monitor landings against management area sub-ACLs and may help reduce the likelihood that the FMP's overage payback AM would be triggered. For year-end catch determinations, NMFS uses dealer reports supplemented by VTRs. Again, having discrepancies between these data sets resolved quickly would likely help the year-end data reconciliation process.

While all three Sub-Options have differing requirements for reporting, the overall impact to the herring resource is likely to be minimal, as none substantially change the way information on the resource is gathered.. Overall all three Sub-Options may create a *low positive* impact on the Atlantic herring resource in comparison to the Option 1.

5.1.4.3 Impacts on Non-Target Species and Other Fisheries

Option 2 may have a similar impact on groundfish, mackerel, and river herring to that of Atlantic herring. Option 2 does not require dealers to use any particular method to accurately weigh all fish, and therefore dealers are unlikely to change their behavior under Option 2, in comparison to the no action option. Overall, therefore, Option 2 is likely to have a neutral impact in comparison to Option 1.

Sub-Options 2A and 2B would require the method of the separation of species to be reported either annually or for every landings submission. There is no requirement to estimate the relative composition of the catch in a specific way, there is only a requirement to document it in Sub-Options 2A and 2B. It is therefore dependent on the Dealer to determine what method they will use. The newly documented information is not likely to be used in a stock assessment but may improve understanding of catch of groundfish, mackerel, river herring, or other non-target species in the herring fishery. The impact of Sub-Options 2A and 2B is therefore expected to be a low positive. This low positive impact may also result from Sub-Option 2C, for the same reporting requirement improvements. While all three Sub-Options have differing requirements for reporting, the overall impact to the herring resource is likely to remain the same, as none are likely to improve the gathered information on the resource substantially. Overall, all three Sub-Options may create a low positive impact on the Atlantic herring resource in comparison to the Option 1.

5.1.4.4 Impacts on Physical Environment and EFH

The reporting measures in this section would require dealers to either accurately weigh all fish by species, or to specify how such values are estimated if the catch is not separated. None of these measures are likely to have any adverse effects on EFH, in comparison to the no action option.

5.1.4.5 Impacts on Protected Resources

If Option 2 were selected by the Council, the new requirement for herring dealers to "accurately weigh all fish" is not likely to affect protected resources. Although monitoring of the fishery will increase in all of the sub-options under consideration (Options 2A – 2C), the catch composition estimation will likely be performed once vessels have landed their catch and after they have had a chance to sort out any protected resources that may have been incidentally captured. The no action option (Option 1) would likely maintain status quo, and because the impacts of the measures are likely to be neutral, there is no expected difference between the no action option and the measures presented with respect to protected resources in the area.

5.1.4.6 Impacts on Fishery-Related Businesses and Communities

The no action option maintains status quo conditions for dealer reporting requirements and would not impose any additional requirements or restrictions on herring dealers. There are therefore no additional impacts on fishery-related businesses and communities expected from the no action option.

Option 2 does not require dealers to use any particular method to accurately weigh all fish, and therefore dealers are unlikely to change their behavior under Option 2, in comparison to the no action alternative. Therefore, Option 2 is likely to have a neutral impact in comparison to Option 1.

Sub-Options 2A, 2B, and 2C would likely have a low negative impact as a result of the extra time and effort involved in filling out more reports, particularly for Sub-Option 2C, which would require vessel representative confirmation of dealer reports. Sub-Option 2C may be the most burdensome compared to the other Sub-Options, as if records were to be disputed by the vessel owner/operator, then the time and effort involved with correcting these numbers with NMFS could be larger, depending on the composition of the dispute. For example, a missing "0" in a dealer may be easily disputed and corrected among the three parties (dealer, vessel owner/operator, and NMFS) but if the numbers were disputed for other reasons, such as the dealer wanting to pay less money for the quantity of fish purchased, then the debate could be lengthy. These requirements may also foster negative attitudes toward management, particularly with Sub-Option 2C, by increasing the reporting burden felt by dealers and vessel owners.

Conversely, if erroneous data discrepancies between the vessel and dealer reports resulted in a management area to be closed to directed fishing prematurely, there would be a potential loss in revenue associated with those data errors. If data discrepancies resulted in a management area being closed to directed fishing too late, and the management area sub-ACL was exceeded, there would a potential future loss in revenue associated with the FMP's overage payback provision. Sub-Option 2C would provide a tool to help identify and resolve erroneous data discrepancies between vessel and dealer reports. Having discrepancies between these data sets resolved quickly would likely improve the quality of data used to monitor against area sub-ACLs and could be an economic benefit to industry participants.

Overall, relative to no action, Sub-Options 2A and 2B may have a low negative impact on industry participants due to the regulatory burden of documenting how catch composition is estimated while Sub-Option 2C may have a low positive impact on industry participants, despite an increased regulatory burden, if it helps minimize any loss of revenue due to erroneous data discrepancies in the vessel and dealer reports used to track herring landings against management area sub-ACLs.

5.1.4.7 Summary of Impacts (Sub-Options)

A summary of the potential impact of the proposed sub options for dealers under the requirement to weigh all fish, relative to the VECs identified in Amendment 5, is presented in Table 128.

Table 128 Summary of Impacts of Dealer Reporting Sub-Options

VEC	*Sub-Option 2A*	*Sub-Option 2B*	*Sub-Option 2C*
Atlantic Herring	Low Positive	Low Positive	Low Positive
Non-Target Species and Other Fisheries	Low Positive	Low Positive	Low Positive
EFH	Neutral	Neutral	Neutral
Protected Resources	Neutral	Neutral	Neutral
Fishery Related Businesses and Communities	Low Negative/ Neutral	Low Negative/ Neutral	Low Negative and Low Positive

5.1.5 Impacts of Changes to Open-Access Permit Provisions for Limited Access Mackerel Vessels in Areas 2/3 (Section 3.1.6)

The Council is considering two options, in addition to the no action option, to increase the herring possession limit for limited access mackerel vessels fishing in Areas 2/3 that did not qualify for a limited access herring permit.

5.1.5.1 Background

Options Under Consideration:

- Option 1: No Action (Status Quo)
- Option 2: Increase Open Access Possession Limit to 20,000 Pounds in Areas 2/3 for Vessels that Also Possess a Federal Limited Access Mackerel Permit (Section 3.1.6.2)
- Option 3: Increase Open Access Possession Limit to 10,000 Pounds in Areas 2/3 for Vessels that Also Possess a Federal Limited Access Mackerel Permit (Section 3.1.6.3)

The limited access program for the Atlantic mackerel fishery is based on a multi-tiered approach to a limited access permit structure, with each tier specifying different criteria for limited access qualification. Proposed qualification for different limited access mackerel permits was proposed, in part, to address the overlap between the herring and mackerel fisheries and minimize problems that may result if herring vessels do not receive limited access permits for mackerel. The potentially-impacted vessels are identified are discussed below.

The overlap between the Atlantic herring and mackerel fisheries is universally recognized as an important fishery management issue that the Council has always intended to accommodate in the most appropriate manner. If the Category D vessels have not been targeting mackerel or taking trips where they may encounter a mix of herring and mackerel (and/or other species) more recently (for a variety of reasons), VTR records may not reflect a bycatch problem at this time and may not fully characterize the potential for this problem to exist in the future. The industry has stated that these vessels have not been fishing for mackerel as much in recent years because (1) they are smaller vessels, and the mackerel fishery shifted into offshore areas; and (2) concerns about encountering herring in quantities larger than 3 mt on "mixed" trips and consequently being in violation of the herring possession limit have influenced their decisions about taking these trips at all.

The measures under consideration to increase the open access possession limit for limited access mackerel vessels in Areas 2/3 relate to the overall goal of the amendment, which is to improve catch monitoring and ensure compliance with the MSA. These measures are intended to minimize regulatory discarding and therefore specifically address National Standard 9 (minimize bycatch and bycatch mortality).

The Council created the open access possession limit permit to minimize the potential for directed herring fisheries to develop while still providing controlled opportunities for vessels in other fisheries to catch small amounts of herring and minimize their bycatch. Decisions regarding increased opportunities in these areas should be made with adequate consideration of overall fleet capacity and the long-term effects of over-capacity. Moreover, if additional opportunities for directed fishing in Areas 2/3 result from an increase in the open access possession limit, new vessels could create fishing history in these areas. This is a very important consideration if quota allocation programs are going to be developed for the herring fishery. Increasing the open access possession limit to a level that allows for directed fishing and the establishment of any substantial amount of fishing history could increase the number of participants to be considered in a sector allocation or individual quota allocation program, should the Council choose to develop one in the future.

When selecting final measures for Amendment 5, the Council may determine that one of the above options should apply only to vessels with specific limited access mackerel permits.

Herring PDT Analysis/Comments

During the development of the options under consideration in Amendment 5, the Herring PDT analyzed available data to determine the current extent of herring bycatch (discards) by limited access mackerel vessels. The PDT offered the following comments and recommendations regarding the development of management options to address this issue in Amendment 5:

- Available fishery data do not indicate that the current 3 mt possession limit of herring for open access permit holders is problematic at this time (see below); it does not appear to be resulting in bycatch/regulatory discards for vessels fishing in any of the management areas and reporting their herring landings and discards through the logbooks.

Table 129 summarizes the 2008 herring permit category and the average herring landings for vessels that participated in the mackerel fishery during 2008, based on vessel trip reports (VTRs). According to Table 129, every vessel that landed more than 1,000 mt of Atlantic mackerel during 2008 qualified for and obtained a limited access directed fishery permit to fish in all management areas for herring (Category A). These vessels are therefore allowed to fish for and land herring in unrestricted amounts until a TAC is reached in a management area and the area closes. All other vessels with mackerel landings (183) reported less than 1,000 mt total for the fishing year. Nine of these vessels qualified for an unrestricted herring limited access permit for all areas (Category A), three qualified for unrestricted limited access permits in Areas 2/3 only (Category B), and 10 vessels qualified for limited access incidental catch permits with a 25 mt possession limit restriction.

There were 128 Category D vessels that reported mackerel landings during the 2008 fishing year to date; these vessels did not qualify for a limited access permit but obtained the open access incidental catch permit with an associated herring possession limit of 3 mt. While it is possible that some individual trips may have encountered larger amounts of herring, the Category D vessels landed one (1) metric ton of herring, on average, in 2008. It is important to keep in mind that this analysis considers activity during the 2008 fishing year through July 2008 only, and there is likely to be additional fishing activity in the mackerel fishery towards the end of the year (December).

Table 129 Amendment 1 Permit Category for Vessels with Reported Mackerel Landings in 2008

2008 Mackerel Landings		2008 Herring Permit Category					
		A	B	C	D	None	Total
< 1,000 mt	Number of Vessels	9	3	10	128	33	183
	Avg 2007 Herring Landings (mt)	2,166	266	0	1	0	398
1,000 - 2,000 mt	Number of Vessels	7					7
	Avg 2007 Herring Landings (mt)	989					989
2,000 - 4,000 mt	Number of Vessels	3					3
	Avg 2007 Herring Landings (mt)	1,163					1,163
Total number of vessels		19	3	10	128	33	193
Overall Avg 2007 Herring Landings (mt)		1,541	266	0	1	0	515

This analysis will be updated for the Amendment 5 Final EIS.

Additional information and analyses were provided to the Herring Committee and the Council by the Herring PDT during the development of the options under consideration in this amendment; this information can be found in previous Amendment 5 Discussion Documents (2009 and 2010). The PDT offered the following additional comments:

- The overlap between the Atlantic herring and mackerel fisheries is universally recognized as an important fishery management issue that the Council has always intended to accommodate in the most appropriate manner. If the Category D vessels have not been targeting mackerel or taking trips where they may encounter a mix of herring and mackerel (and/or other species) more recently (for a variety of reasons), VTR records may not reflect a bycatch problem at this time and may not fully characterize the potential for this problem to exist in the future. The industry has stated that these vessels have not been fishing for mackerel as much in recent years because (1) they are smaller vessels, and the mackerel fishery shifted into offshore areas; and (2) concerns about encountering herring in quantities larger than 3 mt on "mixed" trips and consequently being in violation of the herring possession limit have influenced their decisions about taking these trips at all.
- Although the sub-ACLs are not fully utilized in Areas 2 and 3 at this time, the Council created the open access possession limit permit in Amendment 1 to minimize the potential for directed herring fisheries to develop while still providing controlled opportunities for vessels in other fisheries to catch small amounts of herring and minimize their bycatch. Decisions regarding increased opportunities in these areas should be made with adequate consideration of overall fleet capacity and the long-term effects of over-capacity.
- Moreover, if additional opportunities for directed fishing in Areas 2/3 result from an increase in the open access possession limit, new vessels could create fishing history in these areas. This is a very important consideration if quota allocation programs are going to be developed for the herring fishery. Increasing the open access possession limit to a level that allows for directed fishing and the establishment of any substantial amount of fishing history could increase the number of participants to be considered in a sector allocation or individual quota allocation program, should the Council choose to develop one in the future.

5.1.5.2 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The Atlantic herring resource is not overfished, and overfishing is not occurring. ACLs and sub-ACLs are set and monitored based on total catch, including both landings and discards. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action option relative to the proposed changes to open-access permit provisions for limited access mackerel vessels would not be expected to affect the status of the herring resource. No additional impacts on the herring resource are expected if the no action option is selected.

Relative to the Option 1 (no action), the impacts of the two options under consideration to increase the open access possession limit for limited access mackerel vessels in Areas 2/3 on the Atlantic herring resource should be *neutral* because the fishery will continue to be managed through ACLs and sub-ACLs, which include both landings and discards. The potential impact on individual stock components is more difficult to predict, as the stock components are not assessed individually at this time, and the impact will depend on the timing of the fishery and stock component mixing, which remains uncertain. By increasing the open access possession limit for some mackerel vessels fishing in Areas 2/3, the proposed options may increase the amount of herring harvested in these areas since the sub-ACLs in Areas 2/3 are not fully utilized at this time. Consequently, the sub-ACLs in these areas may be more readily achieved under the options being considered. Because of the general high-volume nature of the herring fishery, the difference between increased herring harvest under Option 2 (20,000 pounds) and Option 3 (10,000 pounds) is likely insignificant. Ultimately, all removals are controlled by the sub-ACLs in the management areas, therefore resulting in a neutral impact on the herring resource under the no action option.

The options under consideration are intended to minimize the potential for regulatory discarding of Atlantic herring by limited access mackerel vessels that did not qualify for a limited access herring permit. Preliminary analyses of data during the development of Amendment 5 suggested that herring discards in the mackerel fishery are currently low (see previous discussion in background, Section 5.1.5.1), so the extent to which they may be minimized under the proposed options is unclear, and the differences between the impacts of the two options are not measurable at this time. The Herring PDT may update this analysis and explore this issue further in the Final EIS for Amendment 5, following implementation of the limited access program for the mackerel fishery. Again, however, assuming discards continue to be monitored/reported, all catch – landings and discards – is managed under the ACLs and sub-ACLs for the Atlantic herring fishery, so the impacts of the options on the Atlantic herring resource should be *neutral*.

5.1.5.3 Impacts on Non-Target Species and Other Fisheries

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment). Because the no action option maintains the status quo, there are no additional impacts expected on non-target species and other fisheries. Any regulatory discarding of herring that occurs on limited access mackerel vessels with open access herring permits may continue to occur, and any negative impacts of that activity may continue to be experienced by the affected vessels in the mackerel fishery.

Relative to taking no action (Option 1), Options 2 and 3 create a potential for increased fishing activity and perhaps increased directed fishing for herring in Areas 2/3, most likely during times when river herring bycatch is of greater concern. While the herring fishery is managed by sub-ACLs that limit the overall harvest in each management area, the sub-ACLs are not always fully utilized in Areas 2 and 3 (although more so in current/recent years), so there may be potential for effort in these areas to increase beyond recent levels. Because of uncertainty associated with variability in the distribution of non-target species and seasonality/effort shifts in the Atlantic herring fishery, the impacts of Options 2 and 3 on non-target species and other fisheries are *unknown*.

The impacts of Options 2 and 3 on non-target species and other fisheries will depend, in part, on how many vessels/which tiers the Council agrees to apply these options to, as well as whether or not additional measures are implemented to monitor or manage the catch of non-target species in the times and areas where vessels with the new mackerel permit may fish. Section 5.1.5.6 (Impacts on Fishery-Related Businesses and Communities) provides some perspective on the number of vessels in the mackerel fishery that may be affected by Options 2 and 3. However, the impacts of these options on non-target species relate *more* to where/when fishing effort is applied and *less* to the number of affected vessels; therefore, the specific impacts remain *unknown*.

5.1.5.4 Impacts on Physical Environment and EFH

The permit-related measures in this section would create a new open-access herring permit type for use by limited access mackerel fishery participants operating in Areas 2 and 3, with a higher possession limit of 20,000 lb (Option 2) or 10,000 lb (Option 3).

Herring PDT examinations of available data do not indicate that the current 3 mt (6,614 lb) possession limit is a problem for mackerel vessels (i.e. there do not appear to be large amounts of regulatory discards), but there is an indication from industry members that this lower possession limit influences fishing behavior (specifically, that these vessels avoid fishing in areas where herring and mackerel co-occur in southern New England). Thus, implementation of either Option 2 or Option 3 could result in a change in the amount or location of fishing effort in the mackerel fishery. However, as noted in the Impacts on Fishery-Related Businesses and Communities section, less than 2% of mackerel landings during 2008-2010 were by vessels that had a category D herring permit, i.e., vessels that were subject to the 3 mt possession limit for Atlantic herring. Although many mackerel vessels have a category D herring permit, most of these are in tier 3 of the proposed mackerel limited access permit scheme, and the landings for all tier 3 vessels are capped at 7% of the overall mackerel quota. Thus, while the increased possession limit would potentially apply to many vessels, the effort and landings of these vessels are likely to be limited, and any increase in bottom contact resulting from this alternative would have no more than a minimal adverse impact on benthic EFH when compared to Option 1 (no action).

5.1.5.5 Impacts on Protected Resources

In comparison to the No Action Option (Option 1), both options may potentially increase the impact to protected resources. Options 1 and 2 may have the potential to increase incidental bycatch or encounters with some protected resources by the mackerel fishery, such as harbor, hooded and harp seals, due to the increase in effort. While the herring fishery is managed by sub-ACLs that limit the overall harvest in each management area, the sub-ACLs are not yet fully utilized, so there is potential for effort in these areas to increase beyond recent or current levels. Although not directly correlated, the greater the fishing effort, the more interactions with protected species may occur. Option 3 would likely have a slightly larger chance of encounter with protected resources than Option 2. As was stated above, however, the current possession limit of herring for open access permit holders is 3 mt, which is not problematic at this time. The magnitude of the increase in trips that would be taken would not likely be large, however, as it is Category D vessels that have not been taking trips where they may encounter a mix of herring and mackerel that may begin to do so. Furthermore, the measures are not likely to shift effort to areas outside the typical operating fishing grounds of the mackerel and herring fisheries, thereby not increasing the chance that a more diverse range of protected resources. Therefore the overall impact to protected resources is likely to be negative but inconsequential.

5.1.5.6 Impacts on Fishery-Related Businesses and Communities

This measure is being considered specifically for Category D vessels that may possess a limited access mackerel permit. Category A/B/C vessels should not be directly affected by these options. If Category D vessels qualify for and obtain the new permit proposed in this section (any option), they would be treated like a Category C vessel for the purposes of notification and reporting requirements. This means that they would be subject to trip notification requirements and additional reporting requirements for limited access herring vessels that may be implemented in Amendment 5. Overall, the impacts of these options on the affected vessels are expected to be positive in comparison to the no action option, because of increased fishing opportunities and potential reductions in regulatory discards of herring.

Option 1 (No Action): In general, there are no additional impacts on fishery-related businesses and communities expected under the no action option because the current regulations that allow mackerel catch would stay in place. Available fishery data do not indicate that the current 3 mt possession limit of herring for open access permit holders is problematic at this time; it does not appear to be resulting in bycatch/regulatory discards for vessels fishing in any of the management areas and reporting their herring landings and discards through the logbooks (see Section 4.5.1). However, if the mackerel fishery grows, the regulatory discard of herring as a result of the open access possession limit may also increase for some vessels, a situation that could negatively impact herring-related businesses and communities. In this case, under the no action option, the positive impacts of either Option 2 or Option 3 on fishery-related businesses and communities would not be realized.

Option 2 (20,000 pounds):

The impacts of this option on fishery-related businesses and communities is expected to be positive in comparison to the no action option, and more positive than Option 3, as it will allow for more mackerel catch. Creation of a new permit category with a 20,000 pound possession limit could decrease the occurrence of regulatory discards and increase revenues for vessels that qualify for this permit category. From 2008-2010, approximately 98% of mackerel landings were landed by vessels which also held a Category A herring permit. Over the same time, approximately 1.1-1.4% of mackerel landings were landed by vessels which held a Category D herring permit. Therefore, the number of potentially impacted trips is likely to be small: the vast majority of mackerel are landed by vessels which already hold a Category A permit and are not subject to the 3 mt possession limit.

Table 130 describes the anticipated mackerel limited access vessels and the Atlantic herring permits which are held (based on 2010 data). Currently, there are a total of 244 vessels with Herring Category D (open access) permits which are projected to qualify for a Limited Access mackerel permit; however most of these vessels would qualify for a Tier 3 Mackerel permit. While many vessels may qualify, these vessels account for only a small amount of herring catch.

In recent years, about 95% of all Atlantic mackerel landed has been landed by vessels that are expected to qualify for a Tier 1 mackerel limited access permit. Based on the analysis of 2010 data, there are expected to be about two Tier 1 mackerel vessels with a Category D herring permit and three Tier 1 mackerel vessels with no herring permit.

Table 130 Herring Permits Held by Anticipated Vessels Qualifying for Mackerel Limited Access Permits

		Herring Permit Category				
		A	**B**	**C**	**D**	**None**
Mackerel Tier	**1**	20	0	5	2	3
	2	0	1	5	26	12
	3	3	2	15	216	93

Note: Data are preliminary; implementation of the mackerel limited access program is pending.

There may be impacts to current Category A permit holders through additional competition in the herring market; however, these are likely to be small given the low levels of mackerel landings by vessels which might be in the new permit category and the low proposed possession limits for herring.

Option 2 creates a form of reciprocity between limited access herring fishery participants and limited access mackerel fishery participants. Since each are likely to catch the other's targeted species as bycatch/incidental catch, the equity issue may be resolved by permitting similar levels of non-directed catch in both fisheries. The restriction to Areas 2/3, the proposed possession limit, and reporting requirements assure that the ACLs will not be breached by allowing mackerel boats increased possession limits of herring. Mackerel vessels that may qualify and choose to obtain the new open access permit for herring would have the burden of increased notifications and reporting (the requirements would be the same as those for Category C herring vessels). To the extent that the mackerel vessels' herring landings increase herring availability, prices could be depressed. On the other hand, increased herring landings at the processing plants that lack product could benefit both the plants (and their workers) and the communities. Overall, the impacts of Option 2 are expected to be positive for fishery-related businesses and communities.

Option 3 (10,000 pounds): Creation of a new permit category with a 10,000 pound possession limit could decrease the occurrence of regulatory discards and increase revenue for vessels that qualify for this permit category. Impacts of this option are likely to be similar as those discussed above under Option 2 (20,000 pounds), but slightly less catch will be allowed, and therefore the benefits may be slightly less. When compared to the no action option, however, the impacts of Option 3 are likely to be positive.

5.2 IMPACTS OF ALTERNATIVES TO ALLOCATE OBSERVER COVERAGE ON LIMITED ACCESS HERRING VESSELS (SECTION 3.2.1)

This section addresses the potential impacts of the management alternatives under consideration to allocate observer coverage on limited access herring vessels (Categories A/B and C). A detailed analysis of the potential impacts of the management alternatives under consideration Appendix III of this document (*Detailed Analysis of Impacts of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels*, Volume II). The following discussion provides a comprehensive summary of the impacts of the alternatives under consideration on the five VECs identified in Amendment 5.

5.2.1 Background

5.2.1.1 Alternatives Under Consideration

A complete description of the alternatives/options under consideration to allocate observer coverage on limited access herring vessels can be found in Section 3.2.1 of this document. A summary table is provided on p. 39.

Alternative 1: No Action

Alternative 2: Require 100% Observer Coverage on Limited Access Herring Vessels

Alternative 3: Require SBRM Coverage Levels as Minimum Levels

Alternative 4: Allocate Observer Coverage Based on Council-Specified Targets/Priorities

Funding Options

Option 1: No Action

Option 2: Federal and Industry Funds

Options for Observer Service Providers

Option 1: No Action

Option 2: States Authorized as Service Providers

5.2.1.2 Development of Analysis

The Herring PDT began working on analyses related to the allocation of observer coverage in the Atlantic herring fishery in 2009, as the Committee and Council continued to discuss issues and develop the details of the alternatives for Amendment 5. Much of the PDT's preliminary work/analysis during 2009 and 2010 informed decision-making and the development of the details of the Amendment 5 alternatives. The complete analysis provided by the Herring PDT is contained in Appendix III, Volume II (*Detailed Analysis of Impacts of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels*). As discussed below, additional information and analyses can be found in Appendix II (*Herring PDT Portside Sampling/Sea Sampling Data Analysis)*.

As an important step in this analysis, the Herring PDT reviewed in detail all available catch/bycatch sampling data for the Atlantic herring fishery. A preliminary analysis was conducted to examine similarities and differences between bycatch data collected by observers versus portside samplers (see Appendix IIA in Volume II). The PDT formed a working group to examine all available data from overlapping portside/sea sampling trips in detail to investigate differences between the data sets and discuss sampling methodologies. Understanding the reasons for the differences between portside and at-sea estimates will improve the overall understanding of the data and increase the usefulness of future data collected through both programs. The working group met informally between PDT meetings during 2010 and 2011 to wade through the details of the sampling data and develop general approaches to analyses prior to full PDT meetings.

The PDT continued to discuss data issues and conducted a second review of the sampling data in early/mid 2011, to further investigate sampling and bycatch estimation methods from both the at-sea and portside sampling programs, to consider the intensity of sampling, to gain a better understanding of how variation in the system may be influencing the analyses. This second phase of the PDT assessment (see Appendix IIB in Volume II) will frame the recommendations in Amendment 5 regarding how portside sampling data can continue to be utilized to improve catch monitoring and bycatch estimation in the herring fishery. In general, the analysis shows that there is better agreement than previously thought between the two programs with respect to river herring bycatch estimation, although problems exist with specific portside methods. It will be important to identify and consider the strengths and weaknesses of both programs in order to determine the best way to combine the programs and generate the most precise estimate of bycatch, especially since a large component of the "bycatch" in this fishery is landed. However, sea sampling remains the best method for estimating bycatch and provides important information about catch and the operation of the fishery that cannot be generated from a portside sampling program.

During 2011, Council staff worked with NMFS NERO staff and the Herring PDT to review available data and develop/analyze potential management alternatives that capture the Council's intent with respect to the range of alternatives that was approved in January 2011. To streamline the Amendment 5 document and promote ease of understanding, several elements of the Amendment 5 measures were "packaged" into the range of alternatives that will be incorporated into the Draft EIS. As such, a few notable changes have been made to the management alternatives since the January 2011 version:

- When the Council approved the range of alternatives for Amendment 5, it eliminated alternatives that proposed to establish a Federal portside sampling program for the herring fishery from further consideration at this time. As a result, the ***Funding Options*** only apply to catch monitoring at-sea and have been incorporated into the alternatives described in this document.
- The fifth option approved by the Council for consideration in January is intended to improve the accuracy of river herring bycatch estimates by overlaying a seasonal stratification of SBRM-allocated observer days.. The Herring PDT explored this option and attempted to develop analyses to illustrate such an approach. However, the details of this approach could not be developed at this time because of data limitations (see additional discussion below). While this option no longer appears as a stand-alone alternative, Council staff and the PDT have incorporated the Council's intent into the range of alternatives under consideration to allocate observer days (for example, some of the alternatives propose to include a PDT process to supplement the SBRM process, to consider the allocation of additional observer days to address river herring priorities identified by the Council).

Several different management measures/options were approved by the Council in January 2011 to address the allocation of observer coverage in the Atlantic herring fishery. **These measures have now been developed into *Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels* (Section 3.2.1).** Each management alternative under consideration includes measures/options that:

1. Establish targets/priorities for annually allocating observer coverage sea days on limited access herring vessels (Categories A/B/C when on a declared herring trip);
2. Specify a process through which the distribution of observer days is evaluated and considered annually by the Council relative to other priorities and funding needs;

3. Specify a funding source (and any related provisions) for observer days that may be required beyond those that can be funded using Federal resources; and
4. Establish provisions for utilizing observer service providers and authorizing waivers, if necessary.

Once the general range of alternatives was approved in January 2011, the Herring PDT began to develop a more focused method of evaluating the approaches under consideration and assessing the potential impacts on the Atlantic herring fishery. The PDT discussed possible levels of coverage to consider in the context of the management options the Council had identified. Several options in the document focus on methodologies for determining observer coverage levels from the Standardized Bycatch Reporting Methodology (SBRM). The Council has also developed an option that would require observer coverage to be at a level that would allow for catch estimates to be generated for herring and haddock with a 30% coefficient of variation (CV) and river herring with a 20% CV (i.e., more precise).

5.2.1.3 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. The SBRM can be viewed as the combination of sampling design, data collection procedures and analyses used to estimate bycatch and allocate observer coverage across 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 purpose of the SBRM amendment is to:

- Explain methods and processes by which bycatch is currently monitored and assessed
- Determine whether the current methods/processes need to be modified and/or supplemented
- Establish standards for precision of bycatch estimates for all Northeast Region fisheries, thereby documenting the SBRM

The SBRM Amendment addresses:

- Bycatch reporting and monitoring mechanisms
- Analytical techniques and allocation of at-sea observers
- SBRM performance standard
- Review and reporting process
- FWA and provisions for annual specifications
- Prioritization process
- Provisions for industry-funded observers and observer set-aside programs

A more detailed discussion regarding the SBRM can be found in Appendix III (Volume II).

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.

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.

5.2.1.4 Precision Versus Accuracy

An important consideration regarding the alternatives to allocate observer coverage on limited access herring vessels relates to understanding precision targets. CVs (coefficients of variation) provide a convenient way to compare the relative uncertainty of two estimates (lower is better), but they must be interpreted carefully. Assuming a normal distribution, ***doubling*** the CV produces the approximate 95% confidence interval. For example, a CV of ***0.30*** for a bycatch estimate (or 30%) means that if the data could be re-sampled or re-collected, the resulting new estimate would be within **±** ***60%*** of the original estimate 95% of the time (the other 5% of the time the new estimate would be more than 60% different). Also, by not including certain sources of uncertainty (e.g. within-tow variability from basket sampling, fish stratification, other factors), the true uncertainty is even greater than what is suggested by SBRM calculations of CV.

- The Council is clearly interested in generating both precise and accurate estimates of catch and bycatch in the Atlantic herring fishery. The SBRM methodology relies on a ratio estimator, which carries an inherent bias that is inversely proportional to the sample size (i.e. more samples yields a smaller bias). Despite this slight bias, the ratio estimator is still desirable because it uses information about the total amount of catch to minimize the uncertainty surrounding the bycatch estimate. However, for this benefit to occur there has to be a positive relationship between the amount of bycatch and the total amount of catch. If this relationship does not exist, then the ratio estimator may not be an appropriate method of estimating bycatch in this fishery.

- There are costs associated with increasing the precision of bycatch estimates resulting from observer data. A more precise (lower target CV) estimate will require more sea days or observer trips. When observed bycatch events are infrequent yet highly variable, the additional sampling coverage required may be substantial. This tradeoff between precise estimates and the cost of sampling coverage must be thoroughly explored when designing an appropriate observer program and prioritizing available resources. It is important to consider, especially with respect to river herring bycatch, the relative costs and benefits of a very precise estimate. For example, Table 11 in Appendix III (*Detailed Analysis of Impacts of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels*, see appendix in Volume II) shows that the GOM Purse Seine fleet removed 4,548 lbs of river herring in 2010 (3% of total removals by the directed herring fishery). The CV of this estimate is relatively high at 0.72. The spatial analysis suggests provided by the Herring PDT during the development of the measures to address river herring bycatch suggests that this segment of the fleet has been observed to have only minor encounters with river herring (see more detailed information in Volume II, Appendix IV, Herring PDT Analysis: Development of Measures to Address River Herring Bycatch). Therefore, increasing the precision for this strata would require more observer coverage but may provide only minimal improvements in the overall precision of river herring bycatch estimates.
- The PDT acknowledges the challenges associated with determining coverage levels and allocating limited sampling resources to achieve target CVs in all strata, particularly in the herring fishery where variability is significant both spatially and temporally. Moreover, the management measures proposed in Amendment 5 could require some sub-areas within the SBRM strata to require observer coverage, consequently moving the entire system away from a random stratified design and towards a more systematic sampling approach designed to meet certain objectives, which should be more clearly specified in the document. This will complicate the development of options designed to achieve target levels of precision across all strata in the fishery. Some bycatch problems can be moving targets, varying seasonally or annually due to regulations, environmental factors, and species abundance. Over the long-term, the process for optimizing the allocation of observer resources requires flexibility and adaptability.

5.2.2 Impacts on Atlantic Herring

5.2.2.1 Impacts of Alternative 1 (No Action) on Atlantic Herring

The no action alternative would allocate observer coverage on limited access herring vessels through the current optimization/allocation process, based on the Omnibus Standardized Bycatch Reporting Methodology (SBRM) amendment. 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.

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The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action alternative in this case is not likely to affect removals of Atlantic herring from the fishery, and the impacts of the no action alternative on the herring resource are expected to be neutral.

There may, however, be positive impacts on the herring resource from implementing one or more of the alternatives under consideration; while the benefits to the resource may be difficult to quantify with respect to each of the alternatives under consideration, they would not be realized under the no action alternative. Long-term benefits to the herring resource could result from increased observer coverage, increased sampling, a reduction in unobserved catch, and an increase in the accuracy of catch estimates that result from observer sampling. As catch information improves, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. The quantification of previously unaccounted mortality could improve the data used in assessments, thereby decreasing scientific uncertainty, albeit to an unknown degree. In addition, reducing the likelihood for errors in the calculation of catch statistics through increased sampling could reduce management uncertainty (uncertainty about catch estimates is a component of management uncertainty) and management of the herring fishery may improve.

5.2.2.2 Impacts of Alternative 2 (100% Observer Coverage) on Atlantic Herring

Alternative 2 proposes to require NMFS-approved observers on every trip taken by limited access herring vessels unless they are declared out of the fishery through VMS. This is the "most restrictive" of the alternatives under consideration and would require the greatest amount of observer coverage.

All of the alternatives related to allocating observer coverage on limited access herring vessels have the potential to improve the precision of estimates of catch, discards, and/or landed bycatch. The alternatives are not expected to affect total removals from the Atlantic herring fishery, so over the long-term, increased observer coverage on limited access herring vessels may only have marginal effects on herring abundance. Direct impacts on the herring resource are therefore expected to be minimal.

There are, however, indirect benefits to the Atlantic herring resource that could result from increased observer coverage, increased sampling, a reduction in unobserved catch, and an increase in the accuracy of catch estimates that result from observer sampling. As catch information improves, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. The quantification of previously unaccounted mortality could improve the data used in assessments, thereby decreasing scientific uncertainty, albeit to an unknown degree. In addition, reducing the likelihood for errors in the calculation of catch statistics through increased sampling could reduce management uncertainty (uncertainty around catch estimates is a component of management uncertainty) and management of the herring fishery may improve.

The funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers are not expected to impact the herring resource. Funding Option 1 includes only federal funds and represents the status quo. However, it is important to acknowledge that the coverage levels desired under this alternative (100%) may not be achieved under Funding Option 1. Funding Option 2 could have a negative impact if the quality of data collected by at-sea observers is compromised by using independent service providers. However, the intent with respect to these alternatives is to increase sea sampling for the limited access herring fishery based on the standards and protocols developed by the Northeast Fisheries Observer Program (NEFOP) so that any additional data collected by service providers would be comparable to NEFOP data. It is expected, and recommended by the NEFOP, that States adhere to the same standards and protocols if the option is selected to authorize states in Amendment 5 as service providers.

Development of an industry-funded observer program under Funding Option 2 will require clear and concisely documented goals, objectives and standards. An industry-funded observer program would require NMFS approval of an observer service provider based upon the published standards. The service provider requirements/standards proposed in this amendment are consistent with those utilized in other industry-funded programs in the Northeast Region. The proposed provisions for service providers and authorizing waivers would only be necessary under Funding Option 2. Under Funding Option 2, the industry-funded program would require further development of the specific objectives of data collection, and data quality standards to be incorporated and merged with current and existing data collection and monitoring programs. Observer data would be delivered to the NEFOP for data editing, auditing, archiving and quality assurance control. Training of observers and data processing standards would be developed by the NEFOP, in order to provide consistency across data collection. If the option is selected to authorize States as service providers under Funding Option 2, standards and protocols should be consistent as well. Therefore, the impact of the funding options and options related to utilizing service providers on the Atlantic herring resource are expected to be neutral.

Overall, the benefits to the Atlantic herring resource would likely be greatest under Alternative 2 relative to the other alternatives because it proposes the highest level of observer coverage and increases the likelihood of better documenting herring catch. Alternative 2, with respect to the no action alternative, is also likely to have a *positive* impact. The selection of permit categories to which the observer allocation alternatives may apply (A/B versus A/B/C) is not likely to affect this determination because Category A and B vessels land 98-99% of all herring in a given fishing year (see information presented in Section 4.5.1 of this document (Fishery-Related Businesses).

5.2.2.3 Impacts of Alternative 3 (Require SBRM Levels at a Minimum) on Atlantic Herring

Alternative 3 proposes to require SBRM levels at a minimum for the fleets that most represent the limited access herring fishery: *New England Midwater Trawl, Mid-Atlantic Midwater Trawl, and New England Purse Seine.*

Benefits to the Atlantic herring resource related to increased observer coverage are discussed in the previous subsection under Alternative 2 and relate to Alternative 3 to the extent that this alternative would increase observer coverage beyond current/recent levels, and to the extent that the fleets affected by this alternative are inclusive of limited access herring vessels. Recent SBRM coverage levels are provided below. The relationship between the SBRM fleets and the limited access herring vessels is discussed in Section 5.2.6.4 of this document (Impacts of Alternative 3 on Fishery-Related Businesses and Communities).

Recent SBRM Coverage Levels

Table 131 summarizes the number of Northeast Fisheries Observer Program (NEFOP) and Vessel Trip Report (VTR) trips and percentage observer coverage, by the 52 SBRM fleets for the SBRM 2009 (July 2007 – June 2008), 2010 (July 2008 – June 2009), and 2011 (July 2009 – June 2010) years. Dark shading in Table 131 indicates fleets that were not considered or fleets with no NEFOP trips in the annual SBRM analyses. Light shading indicates confidential data. Recent coverage levels for the fleets in Table 131 that would be affected by this alternative are shown in lines 26 (New England Purse Seine), 35 (Mid-Atlantic Midwater Trawl), and 36 (New England Midwater Trawl). It is not clear if/how Alternative 3 would increase observer coverage beyond current/recent levels.

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Table 131 Number of NEFOP and VTR Trips and Percentage Observer Coverage for SBRM 2009, 2012, and 2011 Years

						SBRM 2009						SBRM 2010						SBRM 2011					
						NEFOP			% Coverage			NEFOP			% Coverage			NEFOP			% Coverage		
Row	Gear Type	Access Area	Trip Category	Region	Mesh Group	FISH	PSPP	VTR	FISH	PSPP	Pilot	FISH	PSPP	VTR	FISH	PSPP	Pilot	FISH	PSPP	VTR	FISH	PSPP	Pilot
1	Longline	OPEN	all	MA	all	3	3	132	2.3	2.3	P			139			P			151			P
2	Longline	OPEN	all	NE	all	92	92	1,076	8.6	8.6		87	88	872	10.0	10.1		119	119	1,043	11.4	11.4	
3	Hand Line	OPEN	all	MA	all		1	3,584		<0.1	P			3,182			P		1	3,485		<0.1	P
4	Hand Line	OPEN	all	NE	all	3	3	2,094	0.1	0.1	P	12	14	2,427	0.5	0.6		13	15	2,295	0.6	0.7	
5	Otter Trawl	OPEN	all	MA	sm	187	188	4,151	4.5	4.5		150	150	3,831	3.9	3.9		277	282	3,805	7.3	7.4	
6	Otter Trawl	OPEN	all	MA	lg	168	170	6,090	2.8	2.8		120	122	6,144	2.0	2.0		201	204	5,689	3.5	3.6	
7	Otter Trawl	OPEN	all	NE	sm	67	67	3,656	1.8	1.8		124	129	3,259	3.8	4.0		268	271	3,668	7.3	7.4	
8	Otter Trawl	OPEN	all	NE	lg	672	674	11,392	5.9	5.9		814	815	10,308	7.9	7.9		829	835	10,395	8.0	8.0	
9	Scallop Trawl	AA	GEN	MA	all	5	5	93	5.4	5.4	P	2	2	84	2.4	2.4	P			124			P
10	Scallop Trawl	AA	LIM	MA	all	2	2	14	14.3	14.3	P			5			P			11			P
11	Scallop Trawl	OPEN	GEN	MA	all	10	10	804	1.2	1.2	P	19	19	890	2.1	2.1	P	6	6	455	1.3	1.3	P
12	Scallop Trawl	OPEN	LIM	MA	all			84			P			36			P			36			P
13	Otter Trawl, Ruhle	OPEN	all	NE	lg									6			P	27	27	9	*	*	
14	Otter Trawl, Haddock Separator	OPEN	all	NE	lg													54	55	13	*	*	
15	Shrimp Trawl	OPEN	all	MA	all			862			P			944			P			443			P
16	Shrimp Trawl	OPEN	all	NE	all	16	16	2,706	0.6	0.6		10	10	1,453	0.7	0.7		16	16	2,533	0.6	0.6	
17	Floating Trap	OPEN	all	MA	all									21			P			16			P
18	Floating Trap	OPEN	all	NE	all									138			P			111			P
19	Sink, Anchor, Drift Gillnet	OPEN	all	MA	sm	15	313	1,960	0.8	16.0		13	218	1,668	0.8	13.1		6	169	1,883	0.3	9.0	P*
20	Sink, Anchor, Drift Gillnet	OPEN	all	MA	lg	12	79	839	1.4	9.4		4	78	1,064	0.4	7.3	P*	27	147	1,506	1.8	9.8	
21	Sink, Anchor, Drift Gillnet	OPEN	all	MA	xlg	33	120	2,906	1.1	4.1		47	126	2,419	1.9	5.2		59	103	2,097	2.8	4.9	
22	Sink, Anchor, Drift Gillnet	OPEN	all	NE	sm	3	3	80	3.8	3.8		2	2	55	3.6	3.6	P			28			P
23	Sink, Anchor, Drift Gillnet	OPEN	all	NE	lg	150	326	8,147	1.8	4.0	P	238	378	8,846	2.7	4.3		412	506	9,468	4.4	5.3	
24	Sink, Anchor, Drift Gillnet	OPEN	all	NE	xlg	173	246	3,679	4.7	6.7		107	155	3,184	3.4	4.9		235	271	3,399	6.9	8.0	
25	Purse Seine	OPEN	all	MA	all	1	1	227	0.4	0.4	P			211			P			214			P
26	Purse Seine	OPEN	all	NE	all	20	22	343	5.8	6.4		26	33	300	8.7	11.0		25	38	216	11.6	17.6	
27	Scallop Dredge	AA	GEN	MA	all	152	152	916	16.6	16.6		116	116	853	13.6	13.6		4	5	75	5.3	6.7	P
28	Scallop Dredge	AA	GEN	NE	all	75	75	190	39.5	39.5		56	56	105	53.3	53.3				3			P
29	Scallop Dredge	AA	LIM	MA	all	70	70	409	17.1	17.1		99	101	392	25.3	25.8		28	28	350	8.0	8.0	
30	Scallop Dredge	AA	LIM	NE	all	127	127	313	40.6	40.6		132	132	214	61.7	61.7		30	30	137	21.9	21.9	
31	Scallop Dredge	OPEN	GEN	MA	all	25	26	8,679	0.3	0.3		31	31	6,177	0.5	0.5		42	42	3,059	1.4	1.4	
32	Scallop Dredge	OPEN	GEN	NE	all	10	10	3,555	0.3	0.3		13	13	1,957	0.7	0.7		15	15	2,328	0.6	0.6	
33	Scallop Dredge	OPEN	LIM	MA	all	49	49	1,343	3.6	3.6		65	65	1,054	6.2	6.2		49	53	1,115	4.4	4.8	
34	Scallop Dredge	OPEN	LIM	NE	all	77	77	1,637	4.7	4.7		69	69	1,082	6.4	6.4		63	63	1,037	6.1	6.1	
35	Mid-water Paired & Single Trawl	OPEN	all	MA	all	1	3	44	2.3	6.8	P	2	2	70	2.9	2.9	P	3	4	25	12.0	16.0	P
36	Mid-water Paired & Single Trawl	OPEN	all	NE	all	46	49	302	15.2	16.2		64	78	313	20.4	24.9		99	125	310	31.9	40.3	
37	Pots and Traps, Fish	OPEN	all	MA	all	2	2	1,283	0.2	0.2	P			1,183			P			1,050			P
38	Pots and Traps, Fish	OPEN	all	NE	all	1	1	848	0.1	0.1	P	3	3	508	0.6	0.6	P	5	5	479	1.0	1.0	P
39	Pots and Traps, Conch	OPEN	all	MA	all		1	641		0.2	P			586			P			751			P
40	Pots and Traps, Conch	OPEN	all	NE	all			679			P			652			P			764			P

Source: NEFSC SBRM Three-Year Review Report (2011).

Table 131 **continued. Number of NEFOP and VTR Trips and Percentage Observer Coverage for SBRM 2009, 2012, and 2011 Years**

						SBRM 2009						SBRM 2010						SBRM 2011					
		Access	Trip		Mesh	NEFOP			% Coverage			NEFOP			% Coverage			NEFOP			% Coverage		
Row	Gear Type	Area	Category	Region	Group	FISH	PSPP	VTR	FISH	PSPP	Pilot	FISH	PSPP	VTR	FISH	PSPP	Pilot	FISH	PSPP	VTR	FISH	PSPP	Pilot
41	Pots and Traps, Hagfish	OPEN	all	MA	all	3	3	23	13.0	13.0	P			18			P			1			P
42	Pots and Traps, Hagfish	OPEN	all	NE	all	7	7	157	4.5	4.5		12	12	129	9.3	9.3		10	10	89	11.2	11.2	
43	Pots and Traps, Shrimp	OPEN	all	NE	all									122			P			232			P
44	Pots and Traps, Lobster	OPEN	all	MA	all			2,809			P			2,697			P			2,523			P
45	Pots and Traps, Lobster	OPEN	all	NE	all			29,214			P	1	1	27,232	<0.1	<0.1	P			27,994			P
46	Pots and Traps, Crab	OPEN	all	MA	all	1	1	126	0.8	0.8	P	1	1	46	2.2	2.2	P			112			P
47	Pots and Traps, Crab	OPEN	all	NE	all			106			P	1	1	122	0.8	0.8	P			203			P
48	Beam Trawl	OPEN	all	MA	all									230			P			160			P
49	Beam Trawl	OPEN	all	NE	all									118			P			134			P
50	Dredge, Other	OPEN	all	MA	all									261			P			457			P
51	Ocean Quahog/Surf Clam Dredge	OPEN	all	MA	all			3,725			P			2,012			P			1,712			P
52	Ocean Quahog/Surf Clam Dredge	OPEN	all	NE	all			2,744			P			917			P			1,150			P
					Total for Rows 1 to 52	**2,278**	**2,994**	**114,662**	**2.0**	**2.6**		**2,440**	**3,020**	**100,536**	**2.4**	**3.0**		**2,923**	**3,446**	**99,343**	**2.9**	**3.5**	
53	Hand Line	AA	all	MA	all							1	1		*	*							
54	Scallop Trawl	AA	LIM	NE	all	1	1	3	33.3	33.3		1	1	5	20.0	20.0		1	1	3	33.3	33.3	
55	Scallop Trawl	OPEN	LIM	NE	all			7				1	1	6	16.7	16.7				5			
56	Twin Trawl	OPEN	all	MA	all							2	2		*	*		1	1		*	*	
57	Twin Trawl	OPEN	all	NE	all													1	1		*	*	
58	Troll Line, Other	OPEN	all	MA	all	1	1		*	*													
59	Beach Seine	OPEN	all	MA	all	53	55	1	*	*		6	7		*	*		8	8		*	*	
60	Purse Seine, Menhaden	OPEN	all	MA	all	1	5		*	*		6	7		*	*		3	3		*	*	
61	Purse Seine, Menhaden	OPEN	all	NE	all														1			*	
					Total for Rows 1 to 61	**2,334**	**3,056**	**114,673**	**2.0**	**2.7**		**2,457**	**3,039**	**100,547**	**2.4**	**3.0**		**2,937**	**3,461**	**99,351**	**3.0**	**3.5**	

Source: NEFSC SBRM Three-Year Review Report (2011).

Alternative 3 simply requires SBRM levels as minimum levels of coverage for the affected fleets; additional coverage may occur, the extent to which is unknown. The impacts of this alternative on the herring resource are therefore *unknown*, but *potentially low positive* (relative to taking no action) if sampling is increased to a level that increases the precision of catch/bycatch estimates. For reasons discussed under Alternative 2 (above), funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers would not affect this determination. It is not clear that additional funding or service providers would be necessary under this alternative.

5.2.2.4 Impacts of Alternative 4 (Council-Specified Targets) on Atlantic Herring

Alternative 4 proposes to allocate observer coverage on limited access herring vessels based on the following targets/priorities identified by the New England Fishery Management Council: a 30% CV on catch estimates for Atlantic herring and haddock, and a 20% CV on catch estimates for river herring. The alternative would utilize a process that includes a supplemental analysis developed by either the NEFSC or the Herring PDT. The options related to the technical group responsible for providing a supplemental analysis under this alternative are neutral with respect to the impacts on the Atlantic herring resource.

Positive impacts on the Atlantic herring resource related to increased observer coverage are discussed in the previous subsection under Alternative 2 and relate to Alternative 4 to the extent that Alternative 4 would increase observer coverage *above* current/recent levels. To explore the potential impacts of Alternative 4, the Herring PDT developed a preliminary analysis and example approach to determining levels of observer coverage necessary to meet a specific goal. VTR and observer data from the 2010 fishing year were analyzed with formulae similar to those specified by the SBRM amendment to calculate variance and to estimate the number of trips necessary to achieve certain levels of precision for river herring, haddock, and Atlantic herring over a range of desired CVs. This example helps to better illustrate the trade-offs associated with the choices that would need to be made, based on goals and priorities for observer coverage as well as available resources. This exercise also shows how the SBRM can be used to develop a statistical approach to sampling the herring fishery to meet a specific goal under this option for observer coverage levels. The complete Herring PDT analysis is provided in Appendix III of this document in Volume II (*Impacts of Alternatives Under Consideration in Amendment 5 to Allocate Observer Coverage on Limited Access Herring Vessels*). Results with respect to the herring resource are summarized/discussed below.

2010 observer coverage rates calculated in the Herring PDT analysis (based on the strata identified in Appendix III, Volume II) for Atlantic herring are provided in Table 132. It should be noted that number of observed and total number of trips will vary as the geographic stratification are different by species group. Overall, observer coverage in both number of trips and percentage were higher in 2010 than in reports for other years (Cieri, et al. 2008. Wigley et al, 2009).

Table 132 Total Trips by Fishery, Landings, Number of Observed Trips, and Percentage Coverage by At-Sea Observers by Strata for 2010 (Atlantic Herring)

Total Trips by fishery

Trips	Gear			
Area	BT	PS	MWT	Total
CC/GB	3	3	126	132
GOM	143	159	108	410
SNE	60		113	173
Total	203	160	258	621

Pounds Landed all species

	Gear			
Area	BT	PS	MWT	Total
CC/GB	34,138	200,000	43,452,304	43,686,442
GOM	763,766	16,567,910	40,534,010	57,865,686
SNE	7,586,649		42,811,557	50,398,206
Total	8,384,553	16,767,910	126,797,871	151,950,334

MT landed all species

	Gear			
Area	BT	PS	MWT	Total
CC/GB	15	91	19,706	19,812
GOM	346	7,514	18,383	26,243
SNE	3,441	0	19,416	22,856
Total	3,803	7,604	57,505	68,912

Number of Observed trips

	Gear			
Area	BT	PS	MWT	Total
CC/GB	2	0	88	90
GOM	6	21	31	58
SNE	3		24	27
Total	11	21	143	175

% Coverage

	Gear		
Area	BT	PS	MWT
CC/GB	67	0	70
GOM	4	13	29
SNE	5		21

	Improbable
	No coverage

The numbers of observed trips in Table 132 can then be compared to the coverage rates predicted by the Herring PDT's example approach in Appendix III to achieve all three of the target precision estimates (Atlantic herring, haddock, and river herring) specified in Alternative 4 (Table 133 below). This provides some perspective on the difference between recent (2010) observer coverage in the limited access herring fishery and the coverage that may be needed to achieve all three of the CV targets specified under Alternative 4.

For each stratum identified by the Herring PDT, the highest number of trips required to achieve the three management goals was used to generate the estimates in Table 133. However, in the case of river herring, the geographic stratification differences in management Area 1B and 3 need to be accounted for (see further discussion in Appendix III). To accomplish this, a proration in number of trips needed in the Cape Cod (for river herring) and the Cape Cod/Georges bank (for haddock) strata was used. This proration was based on the percentage of landings which occur in those areas (Table 133).

Table 133 Combined Trips, Average Length of Trips, and Total Observer Days Needed to Meet CV Targets by Strata (Based on 2010)

Trips needed

Area	BT	PS	MWT	Total
CC	3	3	15	21
GB	7		71	78
CC/GB	10	3	86	99
GOM	7	105	68	180
SNE	17		75	92
total	34	108	228	371

Average days per trip

Area	BT	PS	MWT	Total
CC	2	3	2	7
GB	3		3	6
GOM	2	2	2	6
SNE	2		4	6
total	4	2	6	12

Total days

Area	BT	PS	MWT	Total
CC	6	9	30	45
GB	21		212	234
CC/GB	27	9	243	279
GOM	11	211	135	357
SNE	34		298	332
total	72	220	676	968

Note: This only includes at-sea time, and not transport to dock, set-up time, etc. for observers. Also, CC and GB are listed singly and combined (see text) as CC/Georges Bank.

In general, the Herring PDT's analysis shows that the limited access herring fishery experienced higher levels of observer coverage in 2010 than in previous years (Cieri et al. 2008 and Wigley et al. 2009), and lower variability resulted from the catch/bycatch estimates generated from the observer data. In addition, the degree of variability associated with the catch estimates extrapolated from the 2010 coverage was less (see Appendix III in Volume II). It should be noted, however, that the year to year variability is not captured in this method. Cieri et al. 2008 and others have documented a high degree of variability within the same strata used by the PDT across fishing years. Undoubtedly, fishing patterns, management actions, and availability of the fish to the fishery affect the estimates of removals and the variability associated with catch estimates. As such should the levels of coverage suggested here be achieved, there is no guarantee that management targets on CV will be met. This analysis is only one example of the types of analyses that can be brought to bear on the issue of bycatch in the directed herring fishery. It should be viewed as a supplement, not a replacement, of the SBRM. However, using this sort of analysis can allow managers to tailor at-sea observer coverage to meet the species management goals and needs of the Atlantic herring fishery.

The funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers are not expected to impact the herring resource. Funding Option 1 includes only federal funds and represents the status quo. However, it is important to acknowledge that the coverage levels desired under this alternative (100%) may not be achieved under Funding Option 1. Funding Option 2 could have a negative impact if the quality of data collected by at-sea observers is compromised by using independent service providers. However, the intent with respect to these alternatives is to increase sea sampling for the limited access herring fishery based on the standards and protocols developed by the Northeast Fisheries Observer Program (NEFOP) so that any additional data collected by service providers would be comparable to NEFOP data. It is expected, and recommended by the NEFOP, that States adhere to the same standards and protocols if the option is selected to authorize states in Amendment 5 as service providers.

Development of an industry-funded observer program under Funding Option 2 will require clear and concisely documented goals, objectives and standards. An industry-funded observer program would require NMFS approval of an observer service provider based upon the published standards. The service provider requirements/standards proposed in this amendment are consistent with those utilized in other industry-funded programs in the Northeast Region. The proposed provisions for service providers and authorizing waivers would only be necessary under Funding Option 2. Under Funding Option 2, the industry-funded program would require further development of the specific objectives of data collection, and data quality standards to be incorporated and merged with current and existing data collection and monitoring programs. Observer data would be delivered to the NEFOP for data editing, auditing, archiving and quality assurance control. Training of observers and data processing standards would be developed by the NEFOP, in order to provide consistency across data collection. If the option is selected to authorize States as service providers under Funding Option 2, standards and protocols should be consistent as well. Therefore, the impact of the funding options and options related to utilizing service providers on the herring resource are expected to be neutral.

The numbers in the tables presented above suggest that observer coverage rates would likely increase above recent (2010) levels to achieve the desired CV targets under Alternative 4. To achieve all three targets, using the PDT's example, coverage would target about 99 trips in the Cape Cod/Georges Bank area, 180 trips in the Gulf of Maine, and 92 trips in southern New England (versus 90, 58, and 27 trips in these areas, respectively, in 2010 – see Table 132). If this is the case, at-sea sampling of the herring fishery will increase, and impacts on the herring resource are expected to be positive for reasons previously discussed (see discussion under Alternative 2). The level of coverage would be determined annually under this alternative and may vary, so the extent of the related impacts may vary as well from year to year. Overall, though, the alternative is expected to have a *low positive* impact on the herring resource when compared to the no action alternative. Positive impacts on herring are likely to be greater under Alternative 4 than Alternative 3 (the impacts of Alternative 3 are generally unknown but potentially low positive), and less than under Alternative 2. The selection of permit categories to which the observer allocation alternatives may apply (A/B versus A/B/C) is not likely to affect this determination because Category A and B vessels land 98-99% of all herring in a given fishing year (see information presented in Section 4.5.1 of this document (Fishery-Related Businesses).

5.2.3 Impacts on Non-Target Species and Other Fisheries

5.2.3.1 Impacts of Alternative 1 (No Action) on Non-Target Species and Other Fisheries

The no action alternative would allocate observer coverage on limited access herring vessels through the current optimization/allocation process, based on the Omnibus Standardized Bycatch Reporting Methodology (SBRM) amendment. The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment) and include river herring, mackerel, and multispecies (groundfish). The no action alternative proposes to continue the current process for allocating observers and would not be expected to result in any additional impacts on non-target species and other fisheries.

These alternatives are intended to improve sampling in the limited access herring fishery and increase precision associated with catch/bycatch estimates of non-target species. There may be indirect benefits that would result from improvements to catch sampling, increased sampling, a reduction in unobserved catch, and an increase in the accuracy of bycatch estimates that result from observer sampling. These benefits are discussed in the previous section of this analysis and relate to improving catch data for stock assessments and enhancing long-term management. The specific benefits on non-target species and other fisheries are difficult to quantify with respect to each of the alternatives under consideration but may not be realized under the no action alternative.

5.2.3.2 Impacts of Alternative 2 (100% Observer Coverage) on Non-Target Species and Other Fisheries

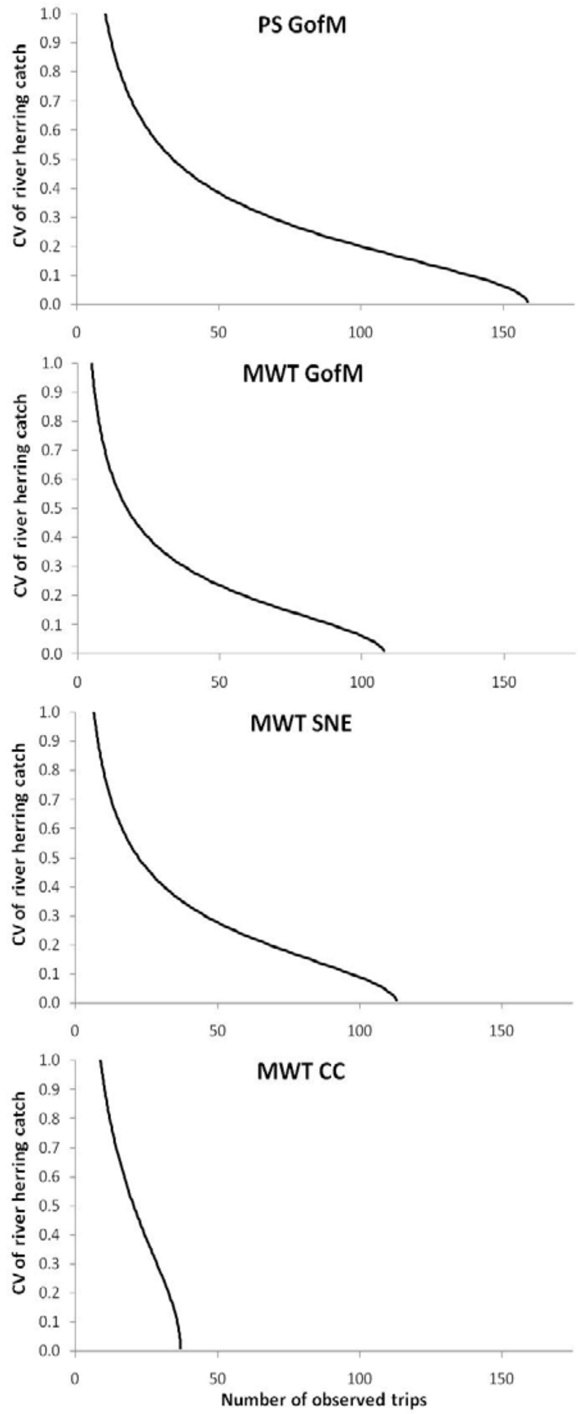
The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment) and include river herring, mackerel, and multispecies (groundfish). Requiring 100% observer coverage would represent a census of the limited access Atlantic herring fishery, which, in theory, should result in a CV of zero on estimates of bycatch. Because of the variability inherent in sampling of this fishery, it may be difficult, if not impossible, to generate bycatch estimates for non-target species like river herring with a CV of zero. There is not agreement across scientific literature about what sufficient levels of observer coverage may be, especially in high-volume fisheries where most bycatch is retained and landed. More observer coverage is clearly favored to increase precision and capture rare events. 100% observer coverage is usually regarded as ideal to accurately report bycatch and determine discard rates, but is financially challenging and may not be feasible for a variety of reasons. At minimum, “adequate” levels of observer coverage should be un-biased (taking into account non-random sampling and potential changes in fishermen’s behavior in the presence of observers).

"Diminishing Returns"

While the impacts on non-target species and other fisheries are expected to be positive under this alternative (and any other alternatives that increase observer coverage above recent/current levels), an important consideration regarding all observer allocation programs is that there are diminishing returns related to increasing observer coverage to very high levels (see Figure 78 for an illustration of this with respect to river herring CVs). Additional investment in observer coverage essentially "buys" more precise estimates; however, the gains are small at higher levels of coverage. The greatest "bang-for-the-buck" occurs when the curve in Figure 78 is steep; these points occur to the left side of the graphs in Figure 78. When observer coverage approaches 100% (as proposed in Alternative 2), the CV goes to zero since this estimate essentially becomes a census of bycatch in the fishery. Increased coverage, however, does not affect the quality of the data collected through the observer program, so this alternative is still likely to result in the most positive impact when compared to the other alternatives under consideration. However, it will be important to keep this relationship between observer coverage and precision in mind when evaluating the costs and benefits of requiring very high levels of observer coverage.

The Herring PDT notes that previous and ongoing analyses of coverage in the herring fishery suggests that a sizable increase in observer coverage does not always yield an expected increase in precision, due to the inter-annual variability in the abundance of Atlantic herring, bycatch species and how the fishery is prosecuted. The pre-trip notification system (PTNS) for the entire limited access herring fleet proposed in Amendment 5 should help to improve the predictability of fishing trips and the SBRM because the fleet's activity can be gauged on a more real-time basis.

Figure 78 Relationship Between Precision Surrounding Estimates of River Herring Bycatch and the Number of Observed Trips



Framework 46 – Haddock Catch Cap

The Final Rule for Framework 46 to the Multispecies (Groundfish) FMP became effective on September 14, 2011. This action modified the haddock catch cap provisions for herring midwater trawl vessels originally adopted in FW 43. Under Framework 46, catches of haddock by midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 that are documented by at-sea observers are extrapolated to an estimate of the total catch of haddock. Individual estimates are developed for each haddock stock (GOM and GB haddock). The catch cap is applied based on the multispecies fishing year (May 1 through April 30) and totals 1 percent of the Acceptable Biological Catch (ABC) of each haddock stock. Midwater trawl vessels fishing in Management Areas 1A, 1B, and 3 are required to report total kept catch by haddock stock area and gear used. This information is used by NMFS to extrapolate observer information to an estimate of total haddock catch.

The method used by NMFS to monitor haddock catch on herring midwater trawl vessels is the same as that used to monitor butterfish catch in the Longfin squid fishery. Requiring 100% observer coverage on limited access herring vessels (Alternative 2) would increase coverage levels related to the haddock catch cap and would likely increase precision associated with estimating haddock catch for the herring midwater trawl fleet. This may lead to more effective real-time management of haddock bycatch in the herring fishery and would therefore have a positive impact.

Funding Options and Options for Service Providers

The funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers are not expected to impact non-target species and other fisheries for reasons discussed in the following paragraphs.

There may be concern that if no action is taken with respect to funding observer days, Option 1 could shift sea sampling resources away from other fisheries, possibly compromising the precision of catch estimates for some non-target species/other fisheries. However, Option 1 states that:

> While observer coverage may be ***desired*** or ***targeted*** at a higher rate, realized annual coverage would be based on the allocation of Federal resources and would be subject to prioritization in the face of funding limitations. This option equates to the status quo with respect to funding observer coverage in the limited access herring fishery.

If Federal resources are limited under Option 1, the Council and NMFS would consider the trade-offs associated with shifting funds/days when specifying observer allocations for all fleets. Option 1 does not mandate that days be shifted from other fisheries; it is assumed that allocations would be made annually based on the availability of Federal funds for all fleets in the region; this occurs annually through the current SBRM optimization/allocation process.

Funding Option 2 could have a negative impact if the quality of data collected by at-sea observers is compromised by using independent service providers. However, the intent with respect to these alternatives is to increase sea sampling for the limited access herring fishery based on the standards and protocols developed by the Northeast Fisheries Observer Program (NEFOP) so that any additional data collected by service providers would be comparable to NEFOP data. It is expected, and recommended by the NEFOP, that States adhere to the same standards and protocols if the option is selected to authorize states in Amendment 5 as service providers.

Development of an industry-funded observer program will require clear and concisely documented goals, objectives and standards. An industry-funded observer program would require NMFS approval of an observer service provider based upon the published standards. The service provider requirements/standards proposed in this amendment are consistent with those utilized in other industry-funded programs in the Northeast Region. The proposed provisions for service providers and authorizing waivers would only be necessary under Funding Option 2. Under Funding Option 2, the industry-funded program would then require further development of the specific objectives of data collection, and data quality standards to be incorporated and merged with current and existing data collection and monitoring programs. Observer data would be delivered to the NEFOP for data editing, auditing, archiving and quality assurance control. Training of observers and data processing standards would be developed by the NEFOP, in order to provide consistency across data collection. If the option is selected to authorize States as service providers under Funding Option 2, standards and protocols should be consistent as well. Therefore, the impact of the funding options and options related to utilizing service providers on non-target species and other fisheries are expected to be neutral.

Conclusions

Relative to taking no action (Alternative 1), Alternative 2 would have a *positive* impact on non-target species and other fisheries from the significant increase in coverage and sampling that would result under 100% coverage of limited access herring vessels. The benefits to non-target species would likely be greatest under Alternative 2 relative to the other alternatives because it proposes the highest level of observer coverage and increases the likelihood of better documenting catch at-sea. The selection of permit categories to which the observer allocation alternatives may apply (A/B versus A/B/C) is not likely to affect this determination because Category A and B vessels land 98-99% of all herring in a given fishing year (see information presented in Section 4.5.1 of this document (Fishery-Related Businesses).

5.2.3.3 Impacts of Alternative 3 (Require SBRM Levels at a Minimum) on Non-Target Species and Other Fisheries

Alternative 3 proposes to require SBRM levels at a minimum for the fleets that most represent the limited access herring fishery: New England Midwater Trawl, Mid-Atlantic Midwater Trawl, and New England Purse Seine.

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment) and include river herring, mackerel, and multispecies (groundfish). In general, the impacts of this alternative on non-target species and other fisheries are unknown at this time with regards to Alternative 1 (no action). Requiring SBRM levels of observer coverage for the limited access Atlantic herring fishery may yield improved estimates of bycatch of some non-target species due to increased sample sizes. However, because Alternative 3 simply requires the SBRM levels to be minimum levels of coverage, this alternative resembles the status quo; it is unclear what additional coverage would result from adopting this approach, so additional impacts on non-target species and other fisheries cannot be predicted with any certainty.

The impacts of this alternative on non-target species and other fisheries are therefore *unknown*, but likely *neutral* (relative to taking no action). For reasons discussed under Alternative 2 (above), funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers would not affect this determination. It is not clear that additional funding or service providers would be necessary under this alternative.

5.2.3.4 Impacts of Alternative 4 (Council-Specified Targets) on Non-Target Species and Other Fisheries

Alternative 4 includes a mechanism for either the NEFSC (Option 1) or the Herring PDT (Option 2) to prepare a supplemental analysis to relate SBRM fleets/coverage levels to the limited access herring vessels and evaluate the potential allocation of additional days on these vessels to achieve a 20% CV on river herring catch estimates and a 30% CV on haddock catch estimates and a 30% CV on Atlantic herring discards. The timing of the supplemental analysis would mirror the annual SBRM prioritization process, and the supplemental analysis/report would be presented to the Council by the NEFSC in conjunction with the annual SBRM Sea Day Analysis and Prioritization. The intent of this option is to provide a supplemental process to evaluate the sampling goals and performance standards identified in this amendment without compromising or formally changing the SBRM methodologies or the annual optimization process.

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment) and include river herring, mackerel, and multispecies (groundfish). Alternative 4 would allocate additional observer coverage to specifically address the bycatch of river herring and haddock. This could lead to a greater understanding and reliability of bycatch estimates of these species in this fishery. Alternative 4 would not impact the SBRM allocation scheme, and would therefore not cause other fisheries to be under-sampled. Unlike the current SBRM process, however, this alternative incorporates river herring into the methodology for allocating observer coverage on the affected fleets by specifying a target level of precision for river herring catch estimates by these fleets. Overall, Alternative 4 is expected to yield a *positive* impact to non-target species and other fisheries in comparison to Alternative 1 (no action), but likely less of a positive impact than Alternative 2, as it would likely entail less coverage. It is difficult to compare Alternatives 3 and 4 because of the uncertainty in the impact of Alternative 3.

Positive impacts on non-target species and other fisheries related to increased observer coverage are discussed in the previous subsection under Alternative 2 and relate to Alternative 4 to the extent that Alternative 4 would increase observer coverage above current/recent levels. To explore the potential impacts of Alternative 4, the Herring PDT developed a preliminary analysis and example approach to determining levels of observer coverage necessary to meet a specific goal. VTR and observer data from the 2010 fishing year were analyzed with formulae similar to those specified by the SBRM amendment to calculate variance and to estimate the number of trips necessary to achieve certain levels of precision for river herring, haddock, and Atlantic herring over a range of desired CVs. This example helps to better illustrate the trade-offs associated with the choices that would need to be made, based on goals and priorities for observer coverage as well as available resources. This exercise also shows how the SBRM can be used to develop a statistical approach to sampling the herring fishery to meet a specific goal under this option for observer coverage levels. The complete Herring PDT analysis is provided in Appendix III of this document in Volume II (*Impacts of Alternatives Under Consideration in Amendment 5 to Allocate Observer Coverage on Limited Access Herring Vessels*). Results with respect to the river herring and haddock are summarized/discussed below.

2010 observer coverage rates for river herring and haddock, calculated based on the Herring PDT's stratification, are shown in Table 134 and Table 135 respectively. It should be noted that number of observed and total number of trips will vary as the geographic stratification are different by species group. Overall, observer coverage in both number of trips and percentage were higher in 2010 than in reports for other years (Cieri, et al. 2008. Wigley et al, 2009). Implementation of 100% observer coverage in the groundfish zero mortality areas has significantly improved coverage rates even in the adjacent areas. This is due in part to the presence of an at-sea observer on trips where the captain *may* be going into Closed

Area I. However, there were still a number of strata with low to almost no coverage; including bottom trawl gears in Southern New England and the Gulf of Maine.

Table 134 Total Trips by Fishery, Landings, Number of Observed Trips, and Percentage Coverage by At-Sea Observers by Strata for 2010 (River Herring)

Total Trips by fishery

Trips	Gear			
Area	BT	PS	MWT	Total
CC	0	1	37	38
GOM	143	159	108	410
SNE	60		113	173
Total	203	160	258	621

Pounds Landed all species

	Gear			
Area	BT	PS	MWT	Total
CC	0	20,000	12,298,341	12,318,341
GOM	763,766	16,567,910	40,094,010	57,425,686
SNE	6,029,289		42,222,557	48,251,846
Total	6,793,055	16,587,910	94,614,908	117,995,873

MT landed all species

	Gear			
Area	BT	PS	MWT	Total
CC	0	9	5,577	5,587
GOM	346	7,514	18,183	26,043
SNE	2,734		19,149	21,883
Total	3,081	7,523	42,909	53,513

Number of Observed trips

	Gear			
Area	BT	PS	MWT	Total
CC			22	22
GOM	5	21	31	57
SNE	3		24	27
Total	8	21	77	106

% Coverage

	Gear		
Area	BT	PS	MWT
CC			59
GOM	3	13	29
SNE	5		21

Improbable
No coverage

Table 135 Landings Total Trips by Fishery, Number of Observed Trips, and Percentage Coverage by At-Sea Observers by Strata for 2010 (Haddock)

Total Trips by fishery

Area	BT	PS	MWT	Total
GB	3	3	126	132
GOM	143	159	110	412
Total	203	160	258	621

Pounds Landed all species

Area	BT	PS	MWT	Total
GB	34,138	200,000	43,452,304	43,686,442
GOM	763,766	16,567,910	41,249,924	58,581,600
Total	797,904	16,767,910	84,702,228	102,268,042

MT landed all species

Area	BT	PS	MWT	Total
GB	15	91	19,706	19,812
GOM	346	7,514	18,707	26,568
Total	362	7,604	38,414	46,380

Number of Observed trips

Area	BT	PS	MWT	Total
GB	2	[redacted]	88	90
GOM	5	21	30	56
Total	7	21	118	146

% Coverage

Area	BT	PS	MWT
GB	67	[redacted]	70
GOM	3	13	27

Improbable

The numbers of observed trips in Table 134 and Table 135 can then be compared to the coverage rates predicted by the Herring PDT's example approach in Appendix III to achieve all three of the target precision estimates (Atlantic herring, haddock, and river herring) specified in Alternative 4 (Table 136 below). This provides some perspective on the difference between recent (2010) observer coverage in the limited access herring fishery and the coverage that may be needed to achieve all three of the CV targets specified under Alternative 4.

For each stratum, the highest number of trips required to achieve the three management goals was used to generate the estimates in Table 136. However in the case of river herring, the geographic stratification differences in management Areas 1B and 3 need to be accounted for (see more information in Appendix III). To accomplish this, a proration in number of trips needed in the Cape Cod (for River herring) and the Cape Cod/Georges bank (for haddock) strata was used. This proration was based on the percentage of landings that occur in those areas (Table 136).

Table 136 Combined Trips, Average Length of Trips, and Total Observer Days Needed to Meet CV Targets by Strata (Based on 2010)

Trips needed

Area	BT	PS	MWT	Total
CC	3	3	15	21
GB	7	[redacted]	71	78
CC/GB	10	3	86	99
GOM	7	105	68	180
SNE	17	[redacted]	75	92
total	34	108	228	371

Average days per trip

Area	BT	PS	MWT	Total
CC	2	3	2	7
GB	3	[redacted]	3	6
GOM	2	2	2	6
SNE	2	[redacted]	4	6
total	4	2	6	12

Total days

Area	BT	PS	MWT	Total
CC	6	9	30	45
GB	21	[redacted]	212	234
CC/GB	27	9	243	279
GOM	11	211	135	357
SNE	34	[redacted]	298	332
total	72	220	676	968

Note: This only includes at-sea time, and not transport to dock, set-up time, etc. for observers. Also, CC and GB are listed singly and combined (see text) as CC/Georges Bank.

In general, the Herring PDT's analysis shows that the limited access herring fishery experienced higher levels of observer coverage in 2010 than in previous years (Cieri et al. 2008 and Wigley et al. 2009), and lower variability resulted from the catch/bycatch estimates generated from the observer data (see bycatch estimates and CVs in Appendix III). In addition, the degree of variability associated with the catch estimates extrapolated from the 2010 coverage was less. It should be noted, however, that the year to year variability is not captured in this method. Cieri et al. 2008 and others have documented a high degree of variability within the same strata used by the PDT across fishing years. Undoubtedly, fishing patterns, management actions, and availability of the fish to the fishery affect the estimates of removals and the variability associated with catch estimates. As such, should the levels of coverage suggested here be achieved, there is no guarantee that management targets on CV will be met. This analysis is only one example of the types of analyses that can be brought to bear on the issue of bycatch in the directed herring fishery. It should be viewed as a supplement, not a replacement, of the SBRM. However, using this sort of analysis can allow managers to tailor at-sea observer coverage to meet the species management goals and needs of the herring fishery.

Framework 46 – Haddock Catch Cap

The Final Rule for Framework 46 to the Multispecies (Groundfish) FMP became effective on September 14, 2011. This action modified the haddock catch cap provisions for herring midwater trawl vessels originally adopted in FW 43. Under Framework 46, catches of haddock by midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 that are documented by at-sea observers are extrapolated to an estimate of the total catch of haddock. Individual estimates are developed for each haddock stock (GOM and GB haddock). The catch cap is applied based on the multispecies fishing year (May 1 through April 30) and totals 1 percent of the Acceptable Biological Catch (ABC) of each haddock stock. Midwater trawl vessels fishing in Management Areas 1A, 1B, and 3 are required to report total kept catch by haddock stock area and gear used. This information is used by NMFS to extrapolate observer information to an estimate of total haddock catch.

The method used by NMFS to monitor haddock catch on herring midwater trawl vessels is the same as that used to monitor butterfish catch in the Longfin squid fishery. The Herring PDT analysis (provided in Appendix III and summarized above) suggests that observer coverage rates would likely increase above recent (2010) levels to achieve the desired CV targets under Alternative 4. This would increase coverage levels related to the haddock catch cap and would likely increase precision associated with estimating haddock catch for the herring midwater trawl fleet. This may lead to more effective real-time management of haddock bycatch in the herring fishery and would therefore have a positive impact.

Funding Options and Options for Service Providers

The funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers are not expected to impact determinations regarding impacts on non-target species and other fisheries. Funding Option 2 could have a negative impact if the quality of data collected by at-sea observers is compromised by using independent service providers. However, the intent with respect to these alternatives is to increase sea sampling for the limited access herring fishery based on the standards and protocols developed by the Northeast Fisheries Observer Program (NEFOP) so that any additional data collected by service providers would be comparable to NEFOP data. It is expected, and recommended by the NEFOP, that States adhere to the same standards and protocols if the option is selected to authorize states in Amendment 5 as service providers.

Development of an industry-funded observer program will require clear and concisely documented goals, objectives and standards. An industry-funded observer program would require NMFS approval of an observer service provider based upon the published standards. The service provider requirements/standards proposed in this amendment are consistent with those utilized in other industry-funded programs in the Northeast Region. The proposed provisions for service providers and authorizing waivers would only be necessary under Funding Option 2. Under Funding Option 2, the industry-funded program would then require further development of the specific objectives of data collection, and data quality standards to be incorporated and merged with current and existing data collection and monitoring programs. Observer data would be delivered to the NEFOP for data editing, auditing, archiving and quality assurance control. Training of observers and data processing standards would be developed by the NEFOP, in order to provide consistency across data collection. If the option is selected to authorize States as service providers under Funding Option 2, standards and protocols should be consistent as well. Therefore, the impact of the funding options and options related to utilizing service providers on non-target species and other fisheries are expected to be neutral.

Conclusions

The numbers in the tables presented above suggest that observer coverage rates would likely increase above recent (2010) levels to achieve the desired CV targets under Alternative 4. To achieve all three targets, using the Herring PDT's example provided in the analysis, coverage would target about 99 trips in the Cape Cod/Georges Bank area, 180 trips in the Gulf of Maine, and 92 trips in southern New England (versus 90, 58, and 27 trips in these areas, respectively, in 2010 – see Table 132). Under Alternative 4, it is likely that sea sampling of the limited access herring fishery will increase, and impacts on non-target species and other fisheries are expected to be *positive* for reasons previously discussed. The level of coverage would be determined annually under this alternative and may vary, so the extent of the related impacts may vary as well from year to year. Overall, though, the alternative is expected to have a *positive* impact on non-target species and other fisheries when compared to the no action alternative. Positive impacts on non-target species are likely to be greater under Alternative 4 than Alternative 3 (the impacts of Alternative 3 are generally unknown), and less than under Alternative 2. The selection of permit categories to which the observer allocation alternatives may apply (A/B versus A/B/C) is not likely to affect this determination because Category A and B vessels land 98-99% of all herring in a given fishing year (see information presented in Section 4.5.1 of this document (Fishery-Related Businesses).

5.2.4 Impacts on Physical Environment and EFH

5.2.4.1 Impacts of Alternative 1 (No Action) on Physical Environment and EFH

Alternative 1 would maintain the current system of determining observer coverage levels. Since this alternative represents the status quo, no changes in the impacts on seabed habitats are expected because current management measures to protect them would remain in place. Specifically, adverse effects on EFH that result from the herring fishery are estimated to be minimal and temporary, and would likely continue to be minimal and temporary if this alternative is selected.

5.2.4.2 Impacts of Alternative 2 (100% Observer Coverage) on Physical Environment and EFH

Alternative 2 would increase observer coverage levels for limited access herring vessels to 100%, with two funding options: federal (Option 1) and federal/industry (Option 2), and an additional option to certify states as observer service providers (Option 1 would not authorize states; Option 2 would authorize states). This alternative could lead to a decrease in herring trips if industry funding is required and vessels are unwilling or unable to absorb the cost of observer coverage, given expected revenues and other costs. Adverse effects on EFH that result from the herring fishery are estimated to be minimal and temporary, and would likely continue to be minimal and temporary if this alternative is selected, with regards to Alternative 1 (no action). Alternatives 3 and 4 are expected to have the same impact as this alternative.

5.2.4.3 Impacts of Alternative 3 (Require SBRM Levels at a Minimum) on Physical Environment and EFH

Alternative 3 would increase observer coverage levels to those specified in the SBRM amendment, at a minimum, with two funding options: federal (Option 1) and federal/industry (Option 2), and an additional option to certify states as observer service providers (Option 1 would not authorize states; Option 2 would authorize states). This alternative could lead to a decrease in herring trips if industry funding is required and vessels are unwilling to absorb the cost of observer coverage given expected revenues, although there would be less of a decrease expected as compared to 100% coverage proposed in Alternative 2. Adverse effects on EFH that result from the herring fishery are estimated to be minimal and temporary, and would likely continue to be minimal and temporary if this alternative is selected, with regards to Alternative 1 (no action). Alternatives 2 and 4 are expected to have the same impact as this alternative.

5.2.4.4 Impacts of Alternative 4 (Council-Specified Targets) on Physical Environment and EFH

Alternative 4 would allocate observer coverage based on Council-specified targets and priorities, with two funding options: federal (Option 1) and federal/industry (Option 2), and an additional option to certify states as observer service providers (option 1 would not authorize states; Option 2 would authorize states). This alternative would allow for additional analyses and recommendations from either the NEFSC or the Herring PDT to supplement SBRM coverage recommendations. As above, this alternative could lead to a decrease in herring trips if industry funding is required and vessels are unwilling to absorb the cost of observer coverage given expected revenues, although there would be less of a decrease expected as compared to 100% coverage. Adverse effects on EFH that result from the herring fishery are estimated to be minimal and temporary, and would likely continue to be minimal and temporary if this alternative is selected, with regards to Alternative 1 (no action). Alternatives 2 and 3 are expected to have the same impact as this alternative.

5.2.5 Impacts on Protected Resources

5.2.5.1 Impacts of Alternative 1 (No Action) on Protected Resources

Under Alternative 1, no additional management measures would be implemented in Amendment 5 that would change observer coverage on limited access herring vessels. No additional impacts are expected on protected resources above the current status quo, as the management measures currently in place would be maintained. If Alternative 2 or Alternative 4 were to be implemented, there would be the potential for a low positive impact when compared to this no action alternative by increasing the amount of information gathered, although Alternative 2 would likely provide more observer coverage and therefore potentially capture more rare protected resources encounters. Uncertainty in the impact of Alternative 3 makes it difficult to compare to the other alternatives.

5.2.5.2 Impacts of Alternative 2 (100% Observer Coverage) on Protected Resources

This alternative has the potential to have a low positive impact on protected resources. There is likely to be no increase or decrease in effort, but as was stated in the impacts on non-target and other species, 100% observer coverage would represent a census of the Atlantic herring fishery. The measure has the potential to therefore provide as much information as possible on any and all protected resources that were encountered by the fishery, to the extent that a service provider could sample. A problem for protected resources, however, is similar to the problem with non-target and other species, where the variability inherent in sampling of this fishery makes it difficult, if not impossible, to generate bycatch estimates with a CV of zero. More observer coverage, however, would capture the rarer events of encounters of protected species with the herring fisheries, and therefore has the potential to improve general knowledge of them.

The funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers are not expected to impact protected resources for reasons discussed in the following paragraphs.

There may be concern that if no action is taken with respect to funding observer days, Option 1 could shift sea sampling resources away from other fisheries, possibly compromising information gathered on protected resources in the other fisheries. However, Option 1 states that:

> While observer coverage may be desired or targeted at a higher rate, realized annual coverage would be based on the allocation of Federal resources and would be subject to prioritization in the face of funding limitations. This option equates to the status quo with respect to funding observer coverage in the limited access herring fishery.

If Federal resources are limited under Option 1, the Council and NMFS would consider the trade-offs associated with shifting funds/days when specifying observer allocations for all fleets, including considerations of protected resources. Option 1 does not mandate that days be shifted from other fisheries; it is assumed that allocations would be made annually based on the availability of Federal funds for all fleets in the region; this occurs annually through the current SBRM optimization/allocation process. Therefore, there would be no expected impacts to protected resources from Option 1, as data collection on the species would be considered equally among the fisheries.

Funding Option 2 could have a negative impact if the quality of data collected by at-sea observers is compromised by using independent service providers. However, the intent with respect to these alternatives is to increase sea sampling for the limited access herring fishery based on the standards and protocols developed by the Northeast Fisheries Observer Program (NEFOP) so that any additional data collected by service providers would be comparable to NEFOP data on, including protected resource data. Development of an industry-funded observer program will require clear and concisely documented goals, objectives and standards. An industry-funded observer program would require NMFS approval of an observer service provider based upon the published standards. The service provider requirements/standards proposed in this amendment are consistent with those utilized in other industry-funded programs in the Northeast Region. The proposed provisions for service providers and authorizing waivers would only be necessary under Funding Option 2. Under Funding Option 2, the industry-funded program would then require further development of the specific objectives of data collection, and data quality standards to be incorporated and merged with current and existing data collection and monitoring programs. Observer data would be delivered to the NEFOP for data editing, auditing, archiving and quality assurance control. Training of observers and data processing standards would be developed by the NEFOP, in order to provide consistency across data collection. If the option is selected to authorize States as service providers under Funding Option 2, standards and protocols should be consistent as well. Therefore, the impact of the funding options and options related to utilizing service providers on protected resources are expected to be neutral.

Overall, in comparison to the no action alternative, Alternative 2 has the potential to have a *low positive* impact on protected species by increasing the likelihood of capturing rare events and therefore increasing the information that is gathered, which could lead to an increase in the amount of knowledge with respect to those species. This benefit is likely to be higher than the benefit of Alternative 4, which has the potential to provide less observer coverage than Alternative 2. The selection of permit categories to which the observer allocation alternatives may apply (A/B versus A/B/C) is not likely to affect this determination because Category A and B vessels land 98-99% of all herring in a given fishing year (see information presented in Section 4.5.1 of this document (Fishery-Related Businesses). The uncertainty of the impact of Alternative 3 (discussed below) makes it difficult to compare to the other alternatives.

5.2.5.3 Impacts of Alternative 3 (Require SBRM Levels at a Minimum) on Protected Resources

This alternative requires SBRM levels as minimum levels of coverage for the affected fleets; additional coverage may occur, the extent to which is unknown. This measure will likely not increase or decrease effort in the fishery. Although this alternative has the potential to have a low positive impact on protected resources through the collection of more information on protected resources encountered by the herring fishery (in comparison to Alternative 1, no action), it resembles the status quo by simply requiring the SBRM levels to be minimum levels of coverage. It is therefore unclear what additional coverage would result from adopting this approach, and therefore the impact of Alternative 3, in comparison to Alternative 1 (no action) is unknown at this time. For reasons discussed under Alternative 2 (above), funding options under consideration (Option 1 – No Action; Option 2 – Federal and Industry Funds) and the options related to the provisions for utilizing service providers and authorizing waivers would not affect this determination. It is not clear that additional funding or service providers would be necessary under this alternative. The unknown impact of this alternative also makes it difficult to compare to the other alternatives.

5.2.5.4 Impacts of Alternative 4 (Council-Specified Targets) on Protected Resources

Alternative 4 would allocate additional observer coverage to specifically address the bycatch of river herring and haddock; it would also not impact the SBRM allocation scheme (as discussed above), and would therefore not cause other fisheries to be under-sampled. Consequently, Alternative 4 has the potential to have a low positive impact on protected resources through observer's capture of rare encounter events, which would thereby increase the collection of more information on protected resources encountered by the herring fishery (in comparison to Alternative 1, the No Action alternative). The measure is also not likely to increase or decrease effort in the fishery, thereby not increasing or decreasing the chance of encounters of protected resources. The capture of rare events, however, may not increase in comparable magnitude to Alternative 2, and therefore the low positive impact of Alternative 4 is likely to be less than Alternative 2. Alternative 3 is difficult to compare to Alternative 4 due to the uncertainty of the impact of Alternative 3. The impact of Alternative 4, overall, is likely to be a low positive impact when compared to the no action alternative. The selection of permit categories to which the observer allocation alternatives may apply (A/B versus A/B/C) is not likely to affect this determination because Category A and B vessels land 98-99% of all herring in a given fishing year (see information presented in Section 4.5.1 of this document (Fishery-Related Businesses).

5.2.6 Impacts on Fishery-Related Businesses and Communities

The alternatives proposed to allocate observer coverage in the limited access herring fishery are intended, in part, to reduce the likelihood for errors in the calculation of catch statistics. This could lead to reductions in management uncertainty when setting ACLs (uncertainty about catch estimates is a component of management uncertainty), and long-term management of the Atlantic herring fishery may improve. Ultimately, this could lead to better catch data for stock assessments and may also reduce scientific uncertainty. To the extent that scientific and management uncertainty can be reduced, additional yield can be made available to the herring fishery through the specification-setting process (ACLs and sub-ACLs). The long-term impacts of reducing scientific and management uncertainty are positive for fishery-related businesses and communities, including both the directed herring fishery-related businesses and those relying on herring as forage. This generally applies to all alternatives that result in improved catch statistics.

In general, the potential impacts of Alternatives 1-4 depend on whether additional funding would be required and if so, which funding option is selected. The impacts of the funding options are discussed in the following subsection and apply to any alternatives under consideration that would require additional funding. Under Funding Option 1, Alternatives 2-4 are expected to have a neutral effect on fishery-related businesses and communities with respect to Alternative 1 (no action). Under Funding Option 2, Alternative 2 is likely to have the largest negative impacts on fishery-related businesses and communities. Alternative 4 is likely to have negative impacts, although the size of these impacts is depends on the Council-specified targets/priorities. Alternative 3 is likely to have unknown or potentially low negative impacts on fishery-related business and communities. Options for Observer Service Providers are likely to have neutral impacts on fishery-related businesses. Impacts on fishery-related businesses and communities are discussed relative to each alternative/option in the following subsections.

5.2.6.1 Impacts of Options for Funding and Utilizing Service Providers on Fishery-Related Businesses and Communities

Amendment 5 considers alternatives that would require additional observer coverage on herring limited access vessels and options that may require some/all of the additional coverage to be funded by the fishing industry. **Alternative 2** proposes 100% observer coverage on limited access herring vessels, which would require additional funds. **Alternative 3** and **Alternative 4** may also require additional funds to achieve the desired levels of coverage.

The extent of the impacts of Alternatives 1-4 on fishery-related businesses and communities depends on whether additional funding would be required and if so, which funding option is selected. The impacts of the funding options are discussed below and apply to any alternatives under consideration that would require additional funding. Relative to the no action alternative (Alternative 1), all of the other alternatives are likely to require additional funds if they are implemented as long-term strategies to allocate observer coverage on the approximately 100 limited access vessels in the herring fishery. Alternative 2 would likely require the most funding; followed by Alternative 4, and then Alternative 3. Alternative 3 would likely require coverage at levels that are closest to the status quo/no action alternative; it is not clear that additional funding or service providers would be necessary under Alternative 3.

Funding Options

Option 1: No Action

Option 2: Federal and Industry Funds

Option 1 (No Action) is not expected to result in any additional impacts on fishery-related businesses and communities because it represents the status quo and maintains the status quo with respect to funding observer days. Option 1 states that:

> While observer coverage may be ***desired*** or ***targeted*** at a higher rate, realized annual coverage would be based on the allocation of Federal resources and would be subject to prioritization in the face of funding limitations. This option equates to the status quo with respect to funding observer coverage in the limited access herring fishery.

If Federal resources are limited under Funding Option 1, the Council and NMFS would consider the trade-offs associated with shifting funds/days when specifying observer allocations for all fleets. Option 1 does not mandate that the days specified by the allocation approach be achieved; it is assumed that allocations would be made annually based on the availability of Federal funds for all fleets in the region; this occurs annually through the current SBRM optimization/allocation process.

Under Funding Option 2, development of an industry-funded observer program will require clear and concisely documented goals, objectives and standards. An industry-funded observer program would require NMFS approval of an observer service provider based upon the published standards. The program would then require further development of the specific objectives of data collection, and data quality standards to be incorporated and merged with current and existing data collection and monitoring programs. Observer data would be delivered to the NEFOP for data editing, auditing, archiving and quality assurance control. Training of observers and data processing standards would be further developed by the NEFOP, in order to provide consistency across data collection. A NEFOP observer is estimated to cost approximately $1,200 per sea day. This includes costs associated with observer trainings, salaries and benefits, facility costs, observer gear, equipment costs, insurance costs, travel and trip deployment costs, data processing (editing, auditing, loading) and data quality assurance program costs (NEFOP, 2012).

Funding Option 2: General Costs

In order to place the costs of industry-funded observers into context for decision-making in Amendment 5, Table 137 summarizes average revenues per trip, average revenues per day absent, operating costs per trip, and operating costs per day absent, classified by gear type for 2008-2010. Revenues were calculated using the VTR and Dealer data while operating costs were based on data collected through the observer program. Operating costs in this fishery are primarily fuel expenses; the price of fuel has fluctuated (along with the price of crude oil) over the past three years. There has been very little observer coverage for Category A/B/C vessels using bottom trawl gear to fish for Atlantic herring. The bottom trawl trips which have been observed have tended to be shorter in length than those not observed (and reported through VTRs).

Table 137 2008-2010 Average Revenues, Costs Per Day and Average Revenues, Costs Per Trip for Category A/B/C Herring Vessels

	Revenue/Day	Revenue/Trip	Operating Costs/Day	Operating Costs/Trip
Single Midwater Trawl	$12,853	$41,721	$4,271	$12,608
Pair Trawl	$15,683	$43,166	$3,295	$9,372
Purse Seine	$18,557	$25,499	$1,798	$2,746
Bottom Trawl	$5,325	$7,863	$785	$524

Revenue Data is from VTR and Dealer (n=5,329)
Operating Costs data is from Observer (n=352)

Relative to the daily operating costs for the fishery, the cost of an observer is fairly high. For example, a NEFOP observer would increase the per-day costs of single midwater trawl, pair trawl, purse seine and bottom trawl by 28%, 36%, 67%, and 153% respectively (Table 138). However, relative to daily revenues, the cost of an observer is lower; an observer would cost 9%, 9%, 6%, and 22% of average daily revenues for the midwater, pair trawl, purse seine, and bottom trawl vessels respectively. These figures are presented for illustration; it is possible that the type of data required in this fishery would result in higher or lower per-day costs than the $1,200 amount used.

Table 138 Cost of a NEFOP Observer as a Percentage of Daily Revenues and Daily Operating Costs

	Revenue	Costs
Single Midwater Trawl	9.3%	28.1%
Pair Trawl	7.7%	36.4%
Purse Seine	6.5%	66.7%
Bottom Trawl	22.5%	152.8%

Options for Utilizing Service Providers and Authorizing Waivers

The proposed Requirements for Service Providers currently only apply to a Federal sea sampling program, should service providers be utilized to sample the fishery beyond the scope of Federal resources. The Council is considering an option to authorize State agencies to be service providers for catch monitoring (sea sampling/observer coverage).

Option 1: No Action. Under the no action option, States would not be authorized in Amendment 5 as service providers for observer coverage. If a State Agency intends to provide sea sampling services for Atlantic herring vessels, it would apply to NMFS to become an authorized service provider, consistent with the provisions specified in 50 CFR 648.11(h) and (i)– *Observer service provider approval and responsibilities* and *Observer certification*.

Option 2: States Authorized as Service Providers. Under this option, Amendment 5 would authorize all States in the Northeast Region as service providers for sea sampling on limited access Atlantic herring vessels (i.e., States would be "grandfathered" in as service providers). States would not be required to apply to NMFS for an authorization and comply with the provisions specified in 50 CFR 648.11(h) and (i).

Currently, the States are not providing observer services (i.e. are not acting as observer service providers for the federally funded observer program). The State of Maine does have an employee that collects data at sea in the Atlantic herring fishery, but the other states do not cover the herring fleet, although to a limited degree cover other fisheries. If State Agencies are interested in becoming a certified observer service provider, under the no action option, the States would need to acquire NMFS approval and follow the same procedures as any other service providers. The approval process would be very similar to that of non-state observer service providers as it asks for general standards and operational details for hiring and deploying observers, which need to be clear regardless of who is applying.

Under Option 2, the States would be grandfathered in, and would not be required to apply for approval. This option would limit the amount of information that is obtained and pre-defined, and the State Agencies' operational details would be unknown. NEFOP personnel have expressed support for Option 1 (no action) to ensure that State Agencies adhere to the same requirements as other service providers, should service providers be utilized for sea sampling in the herring fishery. It remains unclear what qualifications, insurance, observer support would be offered under Option 2. It is possible that the type of data required in this fishery or the costs of coverage could be higher or lower per day than the $1200 based on the rates set by service providers and level of funding acquired once the proposed action is identified. These details are important in the development of an observer program and will affect successful data collection.

Options for Observer Service Providers are likely to have neutral impacts on fishery-related businesses because, as proposed, they simply define the standards for approval of additional service providers for industry-funded observer coverage. During the public comment period on the Amendment 5 Draft EIS, Council staff will work with NMFS NERO and NEFOP staff to review the current provisions and requirements for service providers (50 CFR 648.11(h) and (i)– *Observer service provider approval and responsibilities* and *Observer certification*), based primarily on the observer program for the sea scallop fishery. Prior to final decision-making, Council staff will brief the Council on any substantive changes to be made to the regulations in order to accommodate an industry-funded observer program that utilizes service providers in the herring fishery, should the Council select to establish one in this amendment.

5.2.6.2 Impacts of Alternative 1 (No Action) on Fishery-Related Businesses and Communities

The no action alternative would allocate observer coverage on limited access herring vessels through the current optimization/allocation process based on the Omnibus Standardized Bycatch Reporting Methodology (SBRM) amendment. The allocation of days would continue to be based on Federal funds. Analyses related to the SBRM are provided in Appendix III of this document (Volume II).

The alternatives under consideration to allocate observer coverage in the herring fishery are intended, in part, to reduce the likelihood for errors in the calculation of catch statistics when compared to the no action alternative. As discussed in previous sections of this analysis, improved catch data could lead to reductions in management uncertainty when setting ACLs for the fishery. Ultimately, this could lead to better catch data for stock assessments and may also reduce scientific uncertainty. To the extent that scientific and management uncertainty can be reduced, additional yield can be made available to the herring fishery through the specification-setting process (ACLs and sub-ACLs). The long-term impacts of reducing scientific and management uncertainty are positive for fishery-related businesses and communities. These benefits may not be realized under the no action alternative.

However, under some alternatives under consideration to allocate observer days on limited access herring vessels, the costs of increasing observer coverage may be funded by the fishing industry (Funding Option 2). This would represent negative, and possibly large negative, impacts on fishery-related businesses, depending on which alternative is selected (see below). These costs to fishery-related businesses and communities are foregone under the no action alternative. No additional negative impacts are therefore expected. Additionally, interviews with industry participants indicate that the current SBRM-based allocation of observer coverage is regarded as fair and adaptable to changes. Since this methodology also applies to other fisheries, herring fishery participants do not feel unduly targeted.

5.2.6.3 Impacts of Alternative 2 (100% Observer Coverage) on Fishery-Related Businesses and Communities

Alternative 2 requires 100% observer coverage on limited access herring vessels and would create negative impacts on herring-related businesses or communities if Federal funds were not used to pay for the additional observer coverage. Under Funding Option 1 (no action) were selected, the presumption is that Federal funds would be utilized. Under Funding Option 2, industry funds would be required to cover costs when Federal funds were unavailable; therefore, negative impacts on fishery participants are likely. These increased economic costs would result in less effort, lower landings, and affect the supply of herring bait in other fisheries. It would also negatively affect the businesses that supply (directed) herring-related businesses, and the communities whose economies are partially reliant on them (see the profiles for the Amendment 5 communities of interest, provided in Section 4.5.3.2 of this document).

In 2010, a NEFOP observer costs approximately $1,200 per day (see discussion in Section 5.2.6.1 for more information and discussion of impacts of the funding options and provisions for utilizing service providers on fishery-related businesses and communities). If industry members were required to pay for observers for every fishing day, this would increase operating costs by 28-153% (see Table 138).

Category A/B Versus Category C Vessels

Information about herring fishing vessels presented in the Affected Environment (Section 4.5.1) indicates that Category A herring vessels represent the vast majority of the fishery, landing more than 97% of the herring in 2010. The four limited access Category B vessels, all of which also hold Category C permits, landed close to 1% of all herring during the 2010 fishing year. There are another 55 Category C vessels that participate in various fisheries and catch herring incidentally, representing about 1% of the total herring landings in 2010. The costs of incorporating the additional 55 Category C vessels into an industry-funded observer program for the herring fishery should be considered relative to the goals of the monitoring program and the expected outcomes, especially given the level of participation by these vessels in the herring fishery.

To illustrate this and provide some perspective on costs associated with 100% observer coverage, data provided by Maine DMR was used to calculate the total number of days fished by each limited access herring vessel for 2007-2009. These were then aggregated by permit category. Results are presented in Table 139. **Based on information from the 2009 fishing year, 100% coverage of Category A/B vessels would cost approximately $2.36M per year (see below).** The herring fishing industry is likely to spend *fewer* days fishing in the future due to reductions in catch limits since 2009. Therefore, the cost of at-sea monitoring of the Category A/B vessels reported in this analysis should be regarded as an *upper bound* of the cost of monitoring. However, this also presumes that an observer could be placed on a Category A/B vessel before it began a herring fishing trip, through a Pre-Trip Notification.

Table 139 Aggregate Days Fished and Observer Costs for 2000-2009 by Herring Permit Category

	Category A/B		Category C	
	Days	**Cost**	**Days**	**Cost**
2007	1,700	$2,040,000	151	$181,200
2008	1,564	$1,876,800	22	$26,400
2009	1,969	$2,362,800	96	$115,200

Approximately 50 additional vessels possess limited access Category C permits (25 mt possession limit), but only about 20% (or less) of these vessels were active in the herring fishery from 2007-2009 (landed 2,000 pounds or more herring). Table 140 summarizes the **total number of trips and days fished** by Category C permit holders. The Herring Category C permit holders were extracted from the Permit Databases, then cross-referenced with the Vessel Trip Report data for calendar years 2007, 2008, and 2009. Trips lasting a fraction of a day were rounded up to the next integer value.

Category C vessels are *only* counted in Table 139 (above) if they landed herring on a given fishing trip. The cost of observer coverage for Category C vessels should be regarded as a *lower bound* on the actual cost of monitoring the Category C vessels.. Because of the way the database was queried, this analysis presumes that an observer would be placed to a Category C vessel *only* on trips that land more than 2,000 pounds of herring. If this is not logistically feasible, then it is likely that actual costs will be higher. The summary information presented in Table 140 below reflects all fishing activity by Category C permit holders and suggests that costs could increase significantly if monitoring requirements are extended to Category C permit holders on all trips, not just “directed” herring trips.

Table 140 Number of Trips and Days Fished By Category C Herring Permit Holders

Year	Trips	Days Fished
2007	2,832	5,252
2008	3,646	6,896
2009	3,407	6,605

Of the alternatives under consideration, Alternative 2 is likely to have *potentially high negative* impacts on fishery-related businesses and communities (*potentially* because the impacts depend on the funding option that is selected). The negative impacts are also expected to be the greatest under Alternative 2.

5.2.6.4 Impacts of Alternative 3 (Require SBRM Levels at a Minimum) on Fishery-Related Businesses and Communities

In general, the impacts of this alternative on fishery-related businesses and communities are unknown at this time. If this alternative increases coverage levels above current/recent SBRM levels, and if the industry is required to fund the additional observer coverage (Funding Option 2), negative impacts under this alternative would be experienced by fishery-related businesses and communities. The extent of the impacts would relate to the extent to which fleets affected by this alternative are inclusive of limited access herring vessels. Recent SBRM coverage levels are provided in Section 5.2.2.3 of this document (Impacts of Alternative 3 on Atlantic Herring). The effect that this alternative may have on coverage levels cannot be predicted at this time. The relationship between the SBRM fleets and the limited access herring vessels is discussed below.

Relationship Between SBRM Fleets and Limited Access Herring Vessels

The SBRM is stratified by:

- Quarter (based on date landed)
- Geographic Region (NE/MA based on port of departure)
- Gear Type (based on *negear*, single/pair midwater trawl are combined)
- Mesh Size (>5.5”< for otter trawl and three groups for gillnets)
- Access Area (AA and OPEN)
- Trip Category (General Category/limited access Scallop)

=52 Fleets

Table 141 illustrates the relationship between the SBRM fleets and the limited access herring vessels. This analysis is based on VTR data and uses three metrics to correlate the SBRM Fleets to the limited access herring vessels – number of trips, number of permits, and pounds of fish. This shows whether or not the SBRM fleets – Mid-Atlantic purse seine, New England purse seine, Mid-Atlantic midwater trawl, and New England midwater trawl – are active in the herring fishery and/or other fisheries. The first three rows in the table demonstrate that the Mid-Atlantic purse seine fleet does not correlate with the Atlantic herring fleet; only one Category A and one Category C vessel is represented by the data for this fleet. The Mid-Atlantic purse seine fleet is likely representative of the Atlantic menhaden fishery.

There is a strong relationship between the herring Category A vessels (most of the limited access directed fishery participants) and the New England midwater trawl fleet, the Mid-Atlantic midwater trawl fleet, and the New England purse seine fleet. Therefore, the Herring PDT has determined that the SBRM process and the allocation of days to the New England and Mid-Atlantic midwater trawl and New England purse seine fleets through the SBRM analysis sufficiently covers the majority of the Category A limited access directed herring vessels.

Table 141 Relationship of SBRM Fleets to Herring Limited Access Vessels

SBRM Year	SBRM Fleet	PLAN	CAT	No. Trips	No. Permits	Total Lbs.	Herring Lbs.	Mackerel Lbs.	Squid/Mack/ Butter Lbs.	% of trips	% of permits	% of Lbs.
2010	MA PS			121	5	18,370,430	0	0	0	57.3%	71.4%	55.5%
2010	MA PS	HRG	A	21	1	5,045,000	0	0	0	10.0%	14.3%	15.2%
2010	MA PS	HRG	C	69	1	9,680,000	0	0	0	32.7%	14.3%	29.2%
2010	NE PS			35	6	7,621,685	800,180	0	2,130	11.7%	31.6%	10.0%
2010	NE PS	HRG	A	244	12	67,948,643	57,462,242	0	0	81.3%	63.2%	89.4%
2010	NE PS	HRG	C	21	1	429,850	0	0	0	7.0%	5.3%	0.6%
2010	MA MWT			3	1	250,000	0	0	250,000	4.3%	10.0%	1.1%
2010	MA MWT	HRG	A	65	8	22,115,218	12,732,000	9,233,218	9,383,218	92.9%	80.0%	98.7%
2010	MA MWT	HRG	C	2	1	45,784	0	0	0	2.9%	10.0%	0.2%
2010	NE MWT			9	1	15,529	0	1	14,701	2.9%	6.3%	0.0%
2010	NE MWT	HRG	A	305	15	141,874,785	106,092,660	35,765,850	35,770,150	97.1%	93.8%	100.0%
2011	MA PS			137	4	15,208,302	0	0	0	64.0%	80.0%	61.8%
2011	MA PS	HRG	C	77	1	9,400,000	0	0	0	36.0%	20.0%	38.2%
2011	NE PS			27	9	4,238,560	113,500	0	40	12.5%	39.1%	9.8%
2011	NE PS	HRG	A	146	11	37,696,726	34,476,726	0	0	67.6%	47.8%	87.4%
2011	NE PS	HRG	C	43	3	1,201,078	769,158	1,470	1,470	19.9%	13.0%	2.8%
2011	MA MWT	HRG	A	25	7	8,269,700	3,664,000	4,305,700	4,305,700	100.0%	100.0%	100.0%
2011	NE MWT			6	2	1,269	170	0	254	1.9%	11.1%	0.0%
2011	NE MWT	HRG	A	304	16	155,950,158	143,150,232	12,720,319	12,720,639	98.1%	88.9%	100.0%

Because Alternative 3 simply requires the SBRM levels to be minimum levels of coverage, this alternative resembles the status quo; it is unclear what additional coverage would result from adopting this approach, so additional impacts on fishery-related businesses and communities cannot be predicted with any certainty. The impacts of this alternative on fishery-related businesses and communities are therefore *unknown*. The impacts are potentially low negative if fishery-related businesses and communities are required to fund additional observer coverage under this alternative (the impacts would be experienced primarily by Category A permit holders). It is not clear that additional funding or service providers would be necessary under this alternative.

5.2.6.5 Impacts of Alternative 4 (Council-Specified Targets) on Fishery-Related Businesses and Communities

Alternative 4 is fully analyzed in Appendix III, Volume II (*Detailed Analysis of Impacts of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels)*, and some of the results (trips and observer days that may be needed to achieve desired CV targets) are provided in Sections 5.2.2.4 and 5.2.3.4 of this document).

Alternative 4 would negatively impact herring-related businesses and communities if it is selected with Funding Option 2. The costs of additional observer coverage under this option would be borne by the herring industry. It is not possible to quantify the additional costs and negative impacts under this alternative because the allocation of observer days would be based on an annual analysis of data from the previous year. However, it is expected that the number of days (and therefore the potential costs) would be higher under this alternative than Alternative 1 (and Alternative 3 as well) because the CV targets are more conservative in Alternative 4, which likely would result in higher levels of coverage required for at least some strata. Relative to taking no action, the impact of Alternative 4 on fishery-related businesses and communities, therefore, is expected to be potentially negative. The potential costs to the industry are likely to be less than Alternative 2, however, because Alternative 2 requires 100% observer coverage across all strata considered in the analysis.

<u>Category A/B Versus Category C Vessels</u>

The example analysis provided in this document utilized an SBRM-like approach based on 2010 fishing data. Trip records were pulled for the limited access herring fishery, that is, the Category A/B and Category C vessels on trips when they were declared into the herring fishery. Category C vessels are primarily bottom trawl vessels that fish in a variety of fisheries and may only catch herring seasonally and/or incidentally, but they were incorporated into this analysis because they are part of the 100 vessels that represent the limited access herring fishery, the vessels to which the observer allocation alternatives are intended to apply. One of the benefits of the approach embedded in this alternative is that the Council has the flexibility to prioritize and allocate coverage based on the strata it deems most appropriate or most important at the time. If the Council selects this alternative and determines that Category C vessels should not be incorporated into the analysis or the allocation of observer coverage, then it can prioritize coverage for the A/B vessels and the PDT can conduct the supplemental analysis accordingly. At this point, however, the Category C trips that were declared into the herring fishery are incorporated because they represent the limited access trips for 2010; it is expected that the notification requirements proposed in this amendment will help to better target directed herring trips in the future so that the allocation of observers in the fishery can be optimized.

5.3 IMPACTS OF OTHER MEASURES TO ADDRESS CATCH MONITORING AT-SEA (SECTIONS 3.2.2, 3.2.3, AND 3.2.4)

This section addresses the potential impacts of the management measures under consideration in Amendment 5 to address catch monitoring at-sea. The Council is considering measures to improve/maximize sampling at-sea by NEFOP and/or NMFS-approved observers, as well as a range of options to address net slippage on limited access herring vessels. The Council is also considering an alternative that would provide a mechanism for NMFS to utilize the experimental fishery process to determine whether maximized retention (MR) is an appropriate way to improve catch monitoring in the Atlantic herring fishery. The potential impacts of these measures are discussed relative to the valued ecosystem components (VECs) identified in this amendment.

5.3.1 Impacts of Management Measures to Improve/Maximize Sampling At-Sea (Section 3.2.2)

The Council is considering two options to improve/maximize sampling at-sea by NMFS-approved observers: (Option 1) no action/status quo; and (Option 2) requirements for a safe sampling station, "reasonable assistance" for observers, notice to observers when pumping may be starting/ending, NMFS-approved observers to be deployed on all vessels on observed trips involving more than one fishing vessel, additional communication between pair trawl vessels, and visual access to the codend/purse seine net for NMFS-approved observers. The impacts of these options relative to the VECs identified in this amendment are discussed below.

5.3.1.1 General Impacts

The measures proposed to improve sea sampling relate directly to the first objective stated in Amendment 5 – to implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery. Relative to the status quo (Option 1), the measures proposed in Option 2 should enhance the observers' ability to perform his/her duties in a safe manner at sea and improve communication between observers, vessel captains, and other captains engaged in the fishing operation. The measures proposed in Option 2 also support the more specific goals/objectives of the catch monitoring program, particularly related to developing a program that will foster support by the herring industry and others concerned about accurate accounts of catch in the fishery.

The Enforcement Committee met on May 8, 2009 to discuss issues related to the development of this amendment and provide preliminary input. At that time, the Enforcement Committee approved by consensus the options to improve at-sea monitoring, as follows:

- Provide observer with safe sampling station – Yes, and enforceable
- Provide assistance in obtaining basket samples and sorted discards – Yes, and not enforceable
- Bring codend on board whenever possible and open it for the observer to inspect – No
- Provide accurate details about why a bag may be partially pumped/slipped – enforceable
- Provide Observer notice when pumping may be coming to an end – enforceable

5.3.1.2 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action option relative to the management measures to improve/maximize sampling would not be expected to affect the status of the herring resource. Because of the nature of the measures proposed in this section (see additional discussion below), there is no measureable difference expected between the no action option and the options proposed for maximizing sampling at-sea with respect to the Atlantic herring resource.

The management measures to improve/maximize at-sea sampling will likely have *neutral* impact on the Atlantic herring resource. The measures proposed in this section are not likely to affect removals from the herring fishery, so impacts on herring are expected to be neutral with regard to Option 1 (no action). Relative to the no action option, several of the measures proposed in Option 2 may provide some additional information on the contents of slipped nets (e.g., 2F – requirement to provide visual access to the codend), discards (e.g., 2B – requirement to provide reasonable assistance to observers; and 2D – requirements for observers on every vessel in a multi-vessel operation), and landed catch (e.g., 2E – requirement for additional communication between pair trawl vessels); however, much of the additional information collected as a result of the measures proposed in Option 2 is likely to be qualitative in nature. That is, none of the proposed measures will provide quantitative information or estimates that are not already being routinely collected. Consequently, this information is not likely to affect the Atlantic herring resource.

5.3.1.3 Impacts on Non-Target Species and Other Fisheries

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment). The no action option (Option 1) would maintain status quo, which would not be expected to result in any additional impacts on non-target species and other fisheries. Under the no action option, however, some of the (minor) benefits to non-target species and other fisheries that are expected from the options under consideration in Amendment 5 (see below) would not be realized.

In general, the management measures to improve/maximize at-sea sampling will likely have little impact on non-target species and other fisheries. Relative to the no action option, several of the measures proposed in Option 2 may provide some additional information on the contents of slipped nets (e.g., 2F – requirement to provide visual access to the codend), discards (e.g., 2B – requirement to provide reasonable assistance to observers; and 2D – requirements for observers on every vessel in a multi-vessel operation), and landed catch (e.g., 2E – requirement for additional communication between pair trawl vessels); however, much of the additional information collected as a result of the measures proposed in Option 2 is likely to be qualitative in nature. That is, none of the proposed measures will provide quantitative information or estimates that are not already being routinely collected. Similarly, the proposed measures focus on the limited access herring fishery (100 vessels), and none of the provisions under consideration are likely to produce data that would affect the outcome of future assessments of non-target species. Consequently, this information is not likely to affect non-target species and other fisheries, and the impacts are likely to be *neutral*.

5.3.1.4 Impacts on Physical Environment and EFH

Adoption of new measures to improve/maximize at-sea sampling (Option 2) is not likely to have any adverse effects on EFH, when compared to Option 1 (no action).

5.3.1.5 Impacts on Protected Resources

Option 2 has the opportunity to improve Observer conditions on vessels and may slightly improve the data collected in comparison to Option 1 (no action), however, from the standpoint of protection and monitoring of protected resources in the area, the changes are administrative in nature, and therefore are not likely to have an effect on protected resources. The no action option (Option 1) would maintain status quo with observation, and because the impacts of the measures (Option 2) are likely to be neutral, there is no expected difference between the no action option and the measures presented with respect to protected resources in the area.

5.3.1.6 Impacts on Fishery-Related Businesses and Communities

Option 1: There are no additional impacts on fishery-related businesses and communities expected from Option 1 (no action/status quo) as the current measures in place to administer observers at sea would remain in place.

Option 2: In general, the impacts of Option 2 on fishery-related businesses and communities are not expected to be significant and should be neutral when compared to Option 1 (no action). There may be some operational adjustments required by vessel operators and crew to comply with the new provisions; however, the proposed measures codify many of the practices that are already occurring at-sea when vessels take observers on-board. Interviews with captains and representatives/owners of herring businesses suggest that the proposed steps for improving or maximizing sampling at sea are currently a part of every herring vessels' normal operating practices, agreed upon by the fleet. To the extent that there are any vessels who do not comply, this option will make it easier to mandate these steps, thus making certain that observers on every boat have equal opportunity to fully sample the catch. The measures should improve the vessel owner/operator's understanding regarding expectations and the collection of information by observers during a fishing trip, and ensure safe working conditions for observers on all fishing vessels.

For the most part, there should be no differential impacts (by permit category) associated with these measures. Category C vessels may not pump fish, and some adjustments may need to be made for to accommodate the new provisions; such is the case with A/B permit holders who use purse seine gear or small mesh bottom trawls. Relative to the no action option, the provision that is likely to have the most impact on vessels participating in the fishery is the proposed requirement that vessels operators ensure that the observer has visual access to the codend (or purse seine net/bunt) and any of its contents after pumping has ended, before the pump is removed. This could be achieved in a number of ways depending on the size and nature of the fishing vessel, the gear type being utilized, the amount of fish left in the codend, weather, and other conditions. Recent changes to the Closed Area I provisions require vessels to bring all fish on board for sampling, including operational discards. At the time of this writing, only a small number of hauls on midwater trawl vessels have been observed in CA I, as the fleet is just moving into the area for the season. So far, at the end of the haul, vessel operators are cinching up the codend and dumping the operational discards into a tote for sampling by the observer. However, this practice has only been observed on a small number of hauls thus far, and because there is no purse seine activity in/around Closed Area I, it is unknown how this measure may affect purse seine operations what purse seine vessels may need to do to comply with this provision.

The direct pecuniary economic impacts of this option on the participants in limited access herring fishery are expected to be minimal. Any economic impacts to the herring fishery will be through increased administrative and regulatory burden. There may be an economic impact on participants in the fishery if vessels are required to pay for additional observers that may be required under Option 2D (requirements for trips with multiple vessels). However, it is not possible to predict whether or not the vessels would be required to pay for observers as a result of this particular provision; alternatives for allocating observer coverage to limited access herring vessels and options for funding additional observer days are evaluated in Section 5.2 of this document. Overall, therefore, the impacts of this option on fishery-related businesses and communities are expected to be neutral when compared to the no action option.

5.3.2 Impacts of Measures to Address Net Slippage (Section 3.2.3)

The Council is considering several options in this amendment, in addition to the no action option, to address net slippage on Atlantic herring vessels.

For the purposes of this amendment, slippage 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.

The Northeast Fisheries Observer Program (NEFOP) documents ***Released Catch/Catch Not Brought on Board*** as either *operational discards* (fish that cannot be pumped and/or remain in the gear after a successful pump – i.e., "left in net after pumping," "fell out of gear when pumps were switched"), *partial slippage* (some fish were kept – i.e., "vessel capacity filled," "too many dogfish," "poor quality haul," "did not like the mackerel:herring ratio," etc.), *full slippage* (no fish were kept – i.e., "herring too small," "too many dogfish," "undesired catch," "not enough fish worth pumping," etc.), or *gear damage*. Operational discards are observed and documented to the extent practicable by the observer (as Fish NK or Herring NK – see more information below). Partial and full slippage events are considered to be "unobserved," but observers still collect as much information about the released catch as they can for these events.

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 142 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 142 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 143 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 143 *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 143 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 144 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 144 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 145 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 79). 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 80 and Figure 81).

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 145 and Figure 79 – Figure 82, 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 145 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 79, Figure 80, and Figure 81 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 79 and Figure 80).

Figure 79 Analysis of Comments Regarding Released Catch 2008/2009

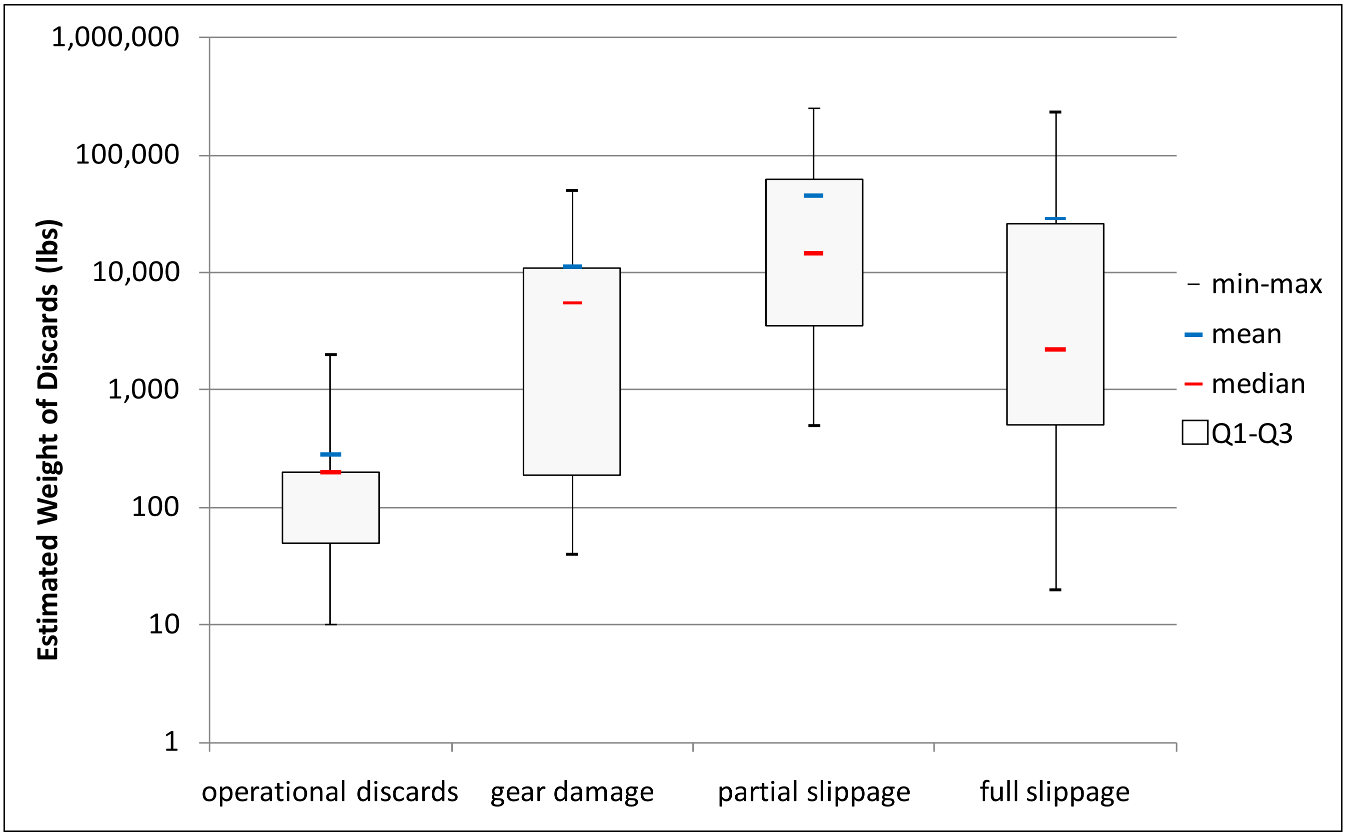


Figure 80 Analysis of Comments Regarding Released Catch 2008/2009 (continued)

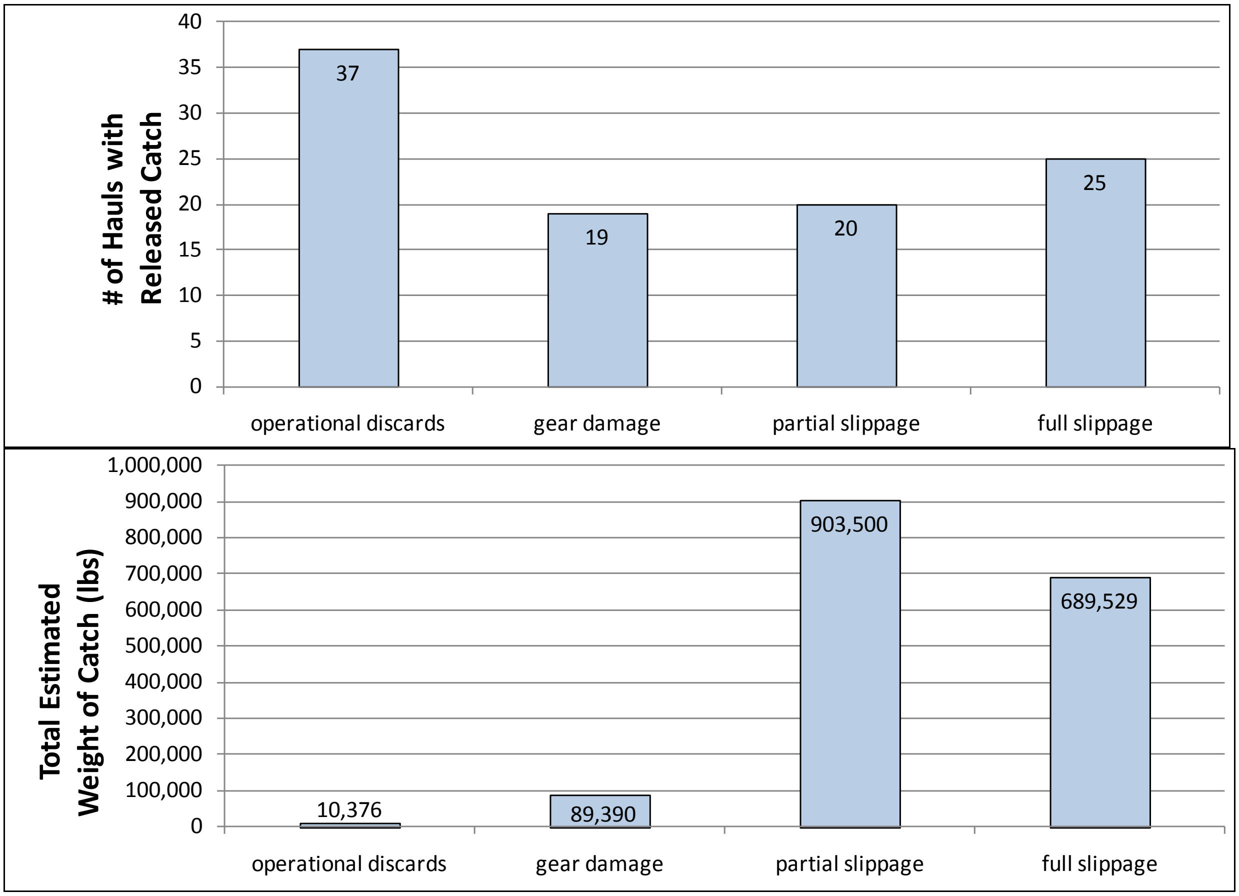
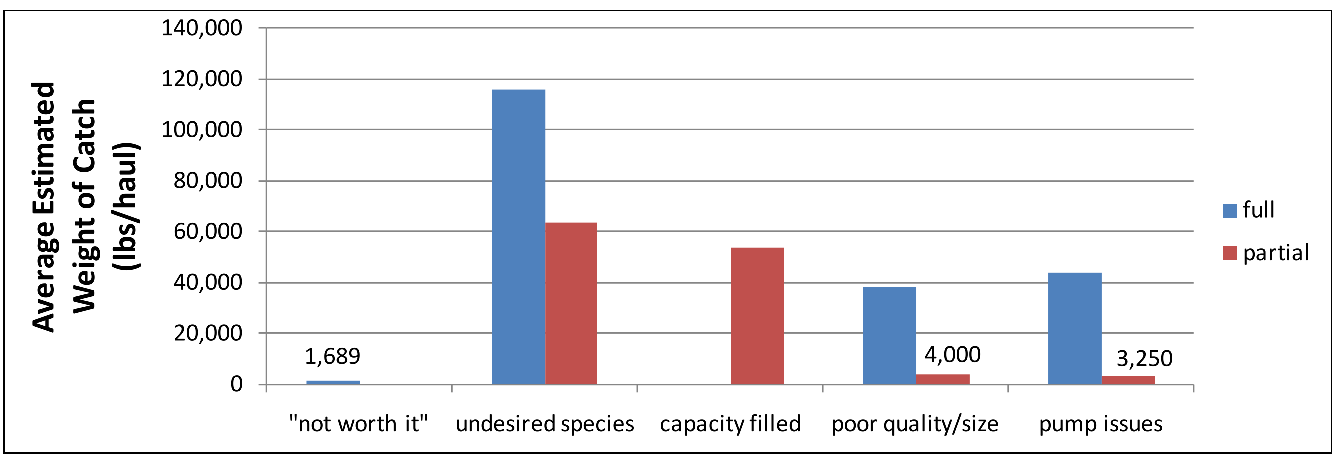


Figure 81 Information About Full and Partial Slippage Events 2008/2009



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 82). 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 82 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 82 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 146 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 146 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 83 Observed Events on Limited Access Herring Vessels (by Number of Hauls) with Fish Not Brought on Board in 2010

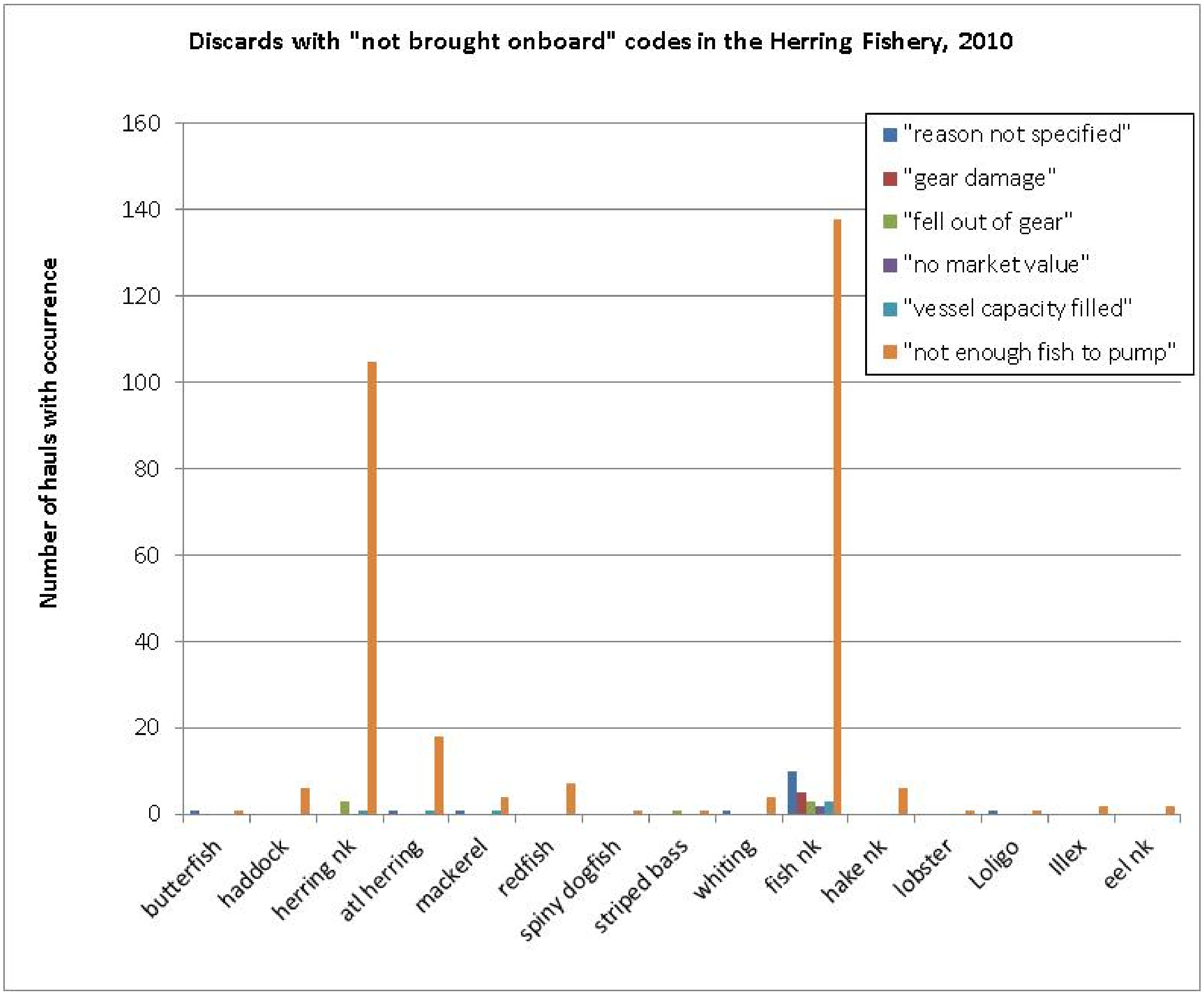
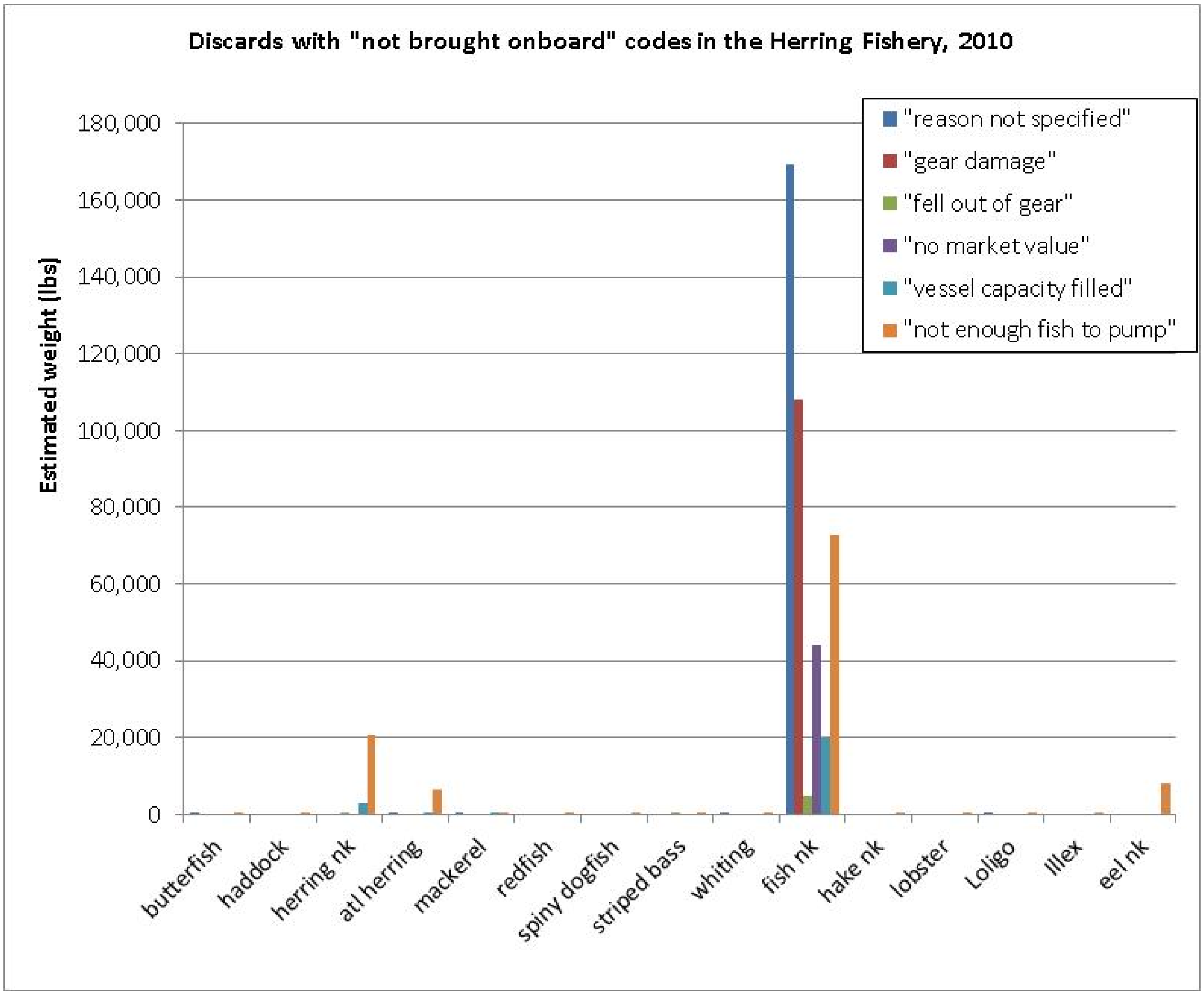


Figure 84 Observed Events on Limited Access Herring Vessels (by Estimated Weight of Fish in Pounds) with Fish Not Brought on Board in 2010



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 147), 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 147, Figure 85, Figure 86). 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.

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Table 147 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 85 Use of Fish NK and Herring NK Codes on Observed Limited Access Herring Trips (by Number of Hauls) in 2010

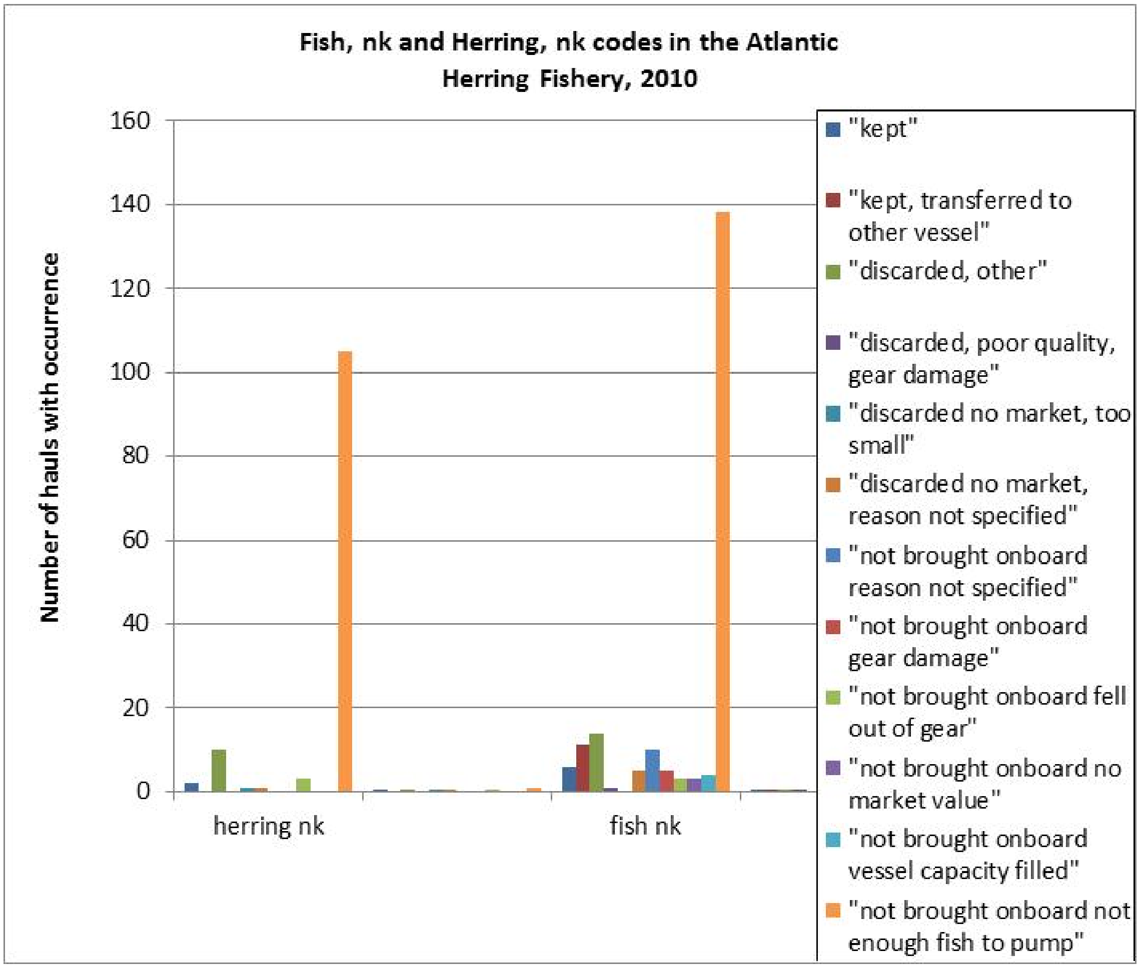
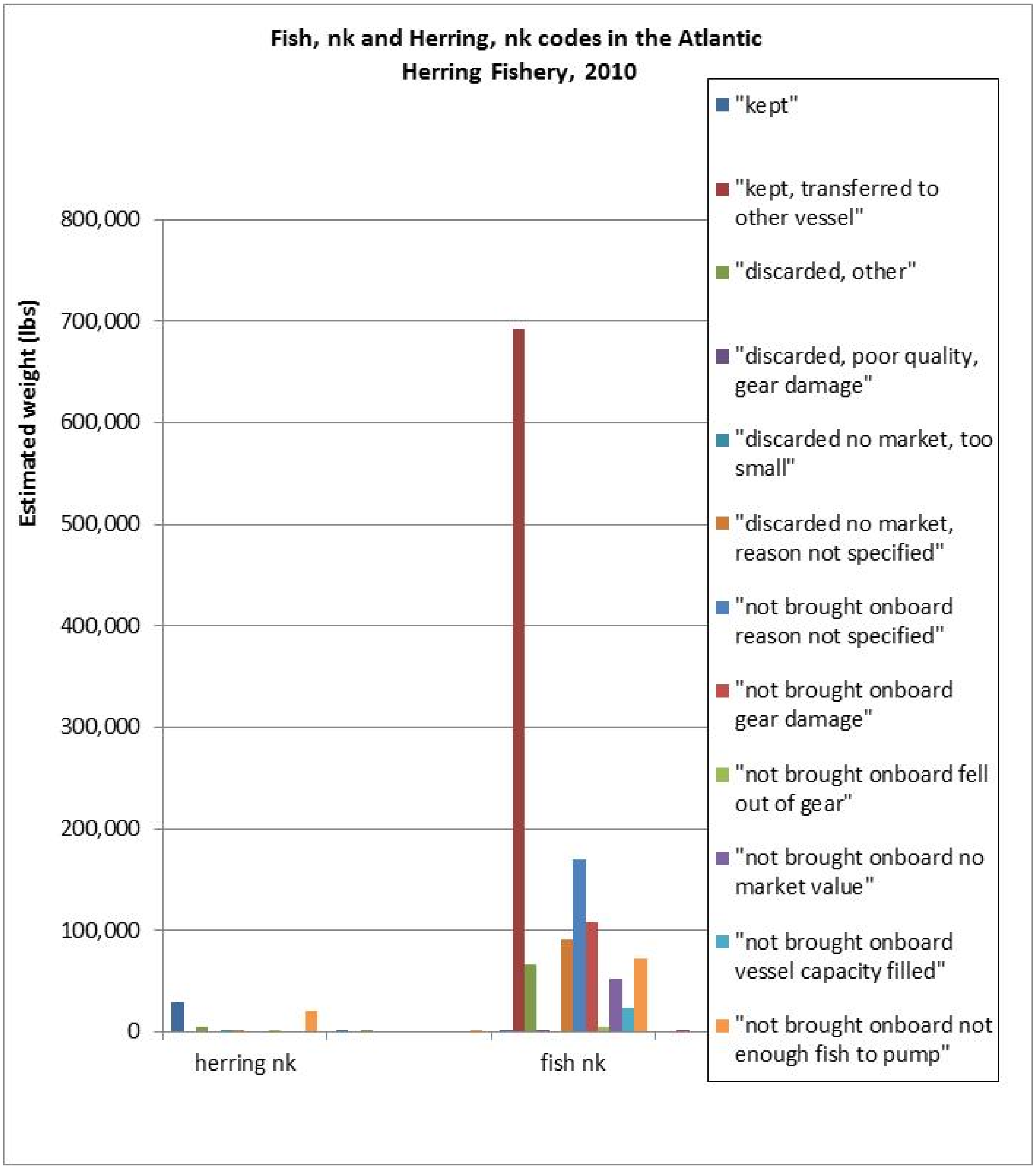
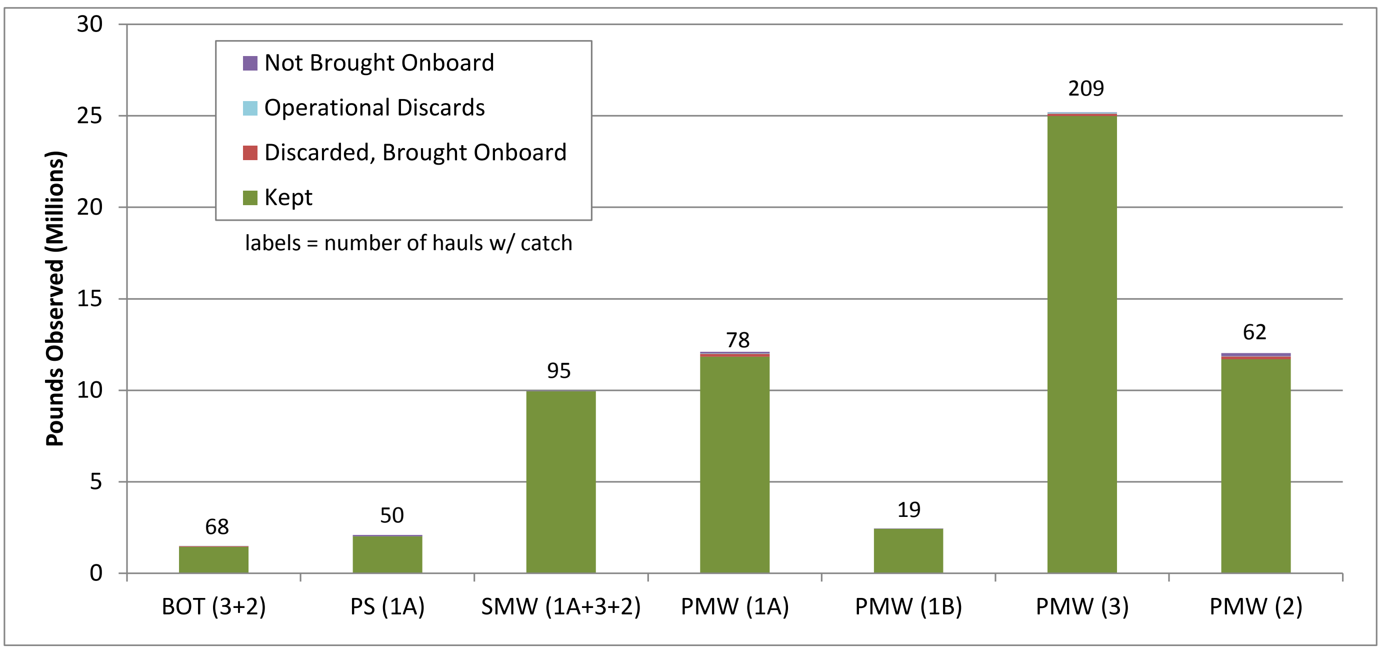


Figure 86 Use of Fish NK and Herring NK Codes on Observed Limited Access Herring Trips (by Estimated Weight) in 2010



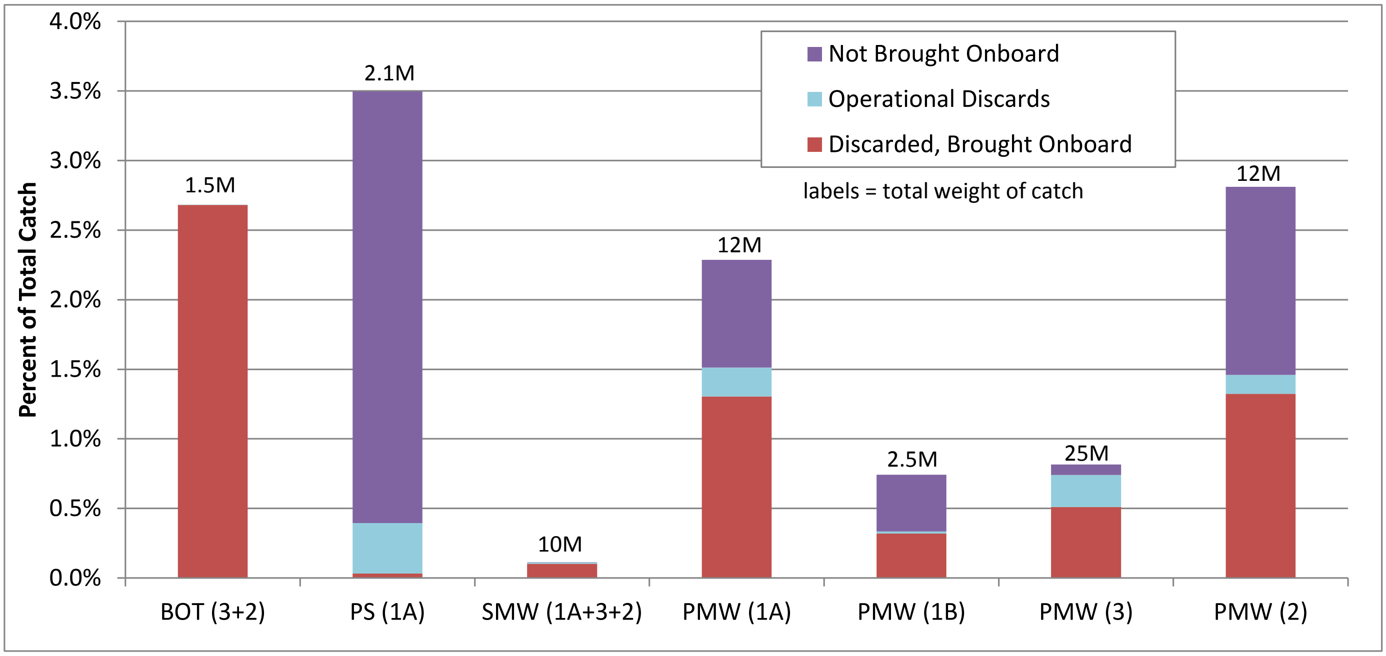
Available information suggests that the amount of fish estimated to be slipped in full/partial slippage events is less than 100,000 pounds. Information provided by vessel captains in 2008/2009, although incomplete, indicates that the estimated weight of partial slippage events (events for which captains 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 79 and Figure 80). 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 87 and Figure 88 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 87 and Figure 88 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 87 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 88 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

5.3.2.2 Impacts of Measures Under Consideration to Address Net Slippage

The Council is considering the following options to address net slippage on limited access herring vessels in Amendment 5 (see Section 3.2.3 for a more detailed description of the measures under consideration):

Option 1. No Action/Status Quo

Option 2. Released Catch Affidavit

Option 3. Closed Area I Sampling Provisions

Option 4. Catch Deduction and Possible Trip Termination for Slippage Events

The impacts of these options on each of the VECs identified in Amendment 5 are discussed below.

5.3.2.2.1 General Impacts

The measures proposed to address slippage directly relate to the first objective of Amendment 5: to implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery. Minimizing slippage events and better documenting slipped catch may improve estimates of bycatch in the fishery. To the extent that the amount and species composition of slipped catch can be sampled and/or estimated, catch monitoring will be enhanced. To the extent that slippage events can be reduced/eliminated, bycatch can be further minimized.

The measures under consideration in Amendment 5 to address net slippage also relate to the first two goals of the catch monitoring program (and some of the related objectives, identified below) that will ultimately be adopted in this amendment:

1. To create a cost effective and administratively feasible program for provision of accurate and timely records of catch of all species caught in the herring fishery;

2. Develop a program providing catch of herring and bycatch species that will foster support by the herring industry and others concerned about accurate accounts of catch and bycatch, i.e., a well-designed, credible program;

- Avoid prohibitive and unrealistic demands and requirements for those involved in the fishery, i.e., processors and fishermen using single and paired midwater trawls, bottom trawls, purse seines, weirs, stop seines, and any other gear capable of directing on herring;
- Improve communication and collaboration with sea herring vessels and processors to promote constructive dialogue, trust, better understanding of bycatch issues, and ways to reduce discards;
- Eliminate reliance on self-reported catch estimates;

Enforcement Committee Comments May 2009

The Enforcement Committee met on May 8, 2009 to discuss issues related to the development of this amendment and provide preliminary input. At the time, the following comments were made by the Enforcement Committee regarding the measures proposed in this section:

- It was noted that NEFOP observers already include digital photographs, usually one for every tow, and the photo documents are time/date stamped (Option 2 – Released Catch Affidavit).
- In general, a requirement for an affidavit serves as a reminder to fishermen that slipped catch must be documented. The measure would be more effective with a prohibition on slippage (see Option 3).

The Enforcement Committee reached the following consensus at the May 2009 meeting:

> *That if "all fish must be pumped aboard" is going to be included in the amendment, the Herring Committee should get some advice from NOAA General Counsel to word this in such a way that safety is considered.*

Additional Herring PDT Comments

- In general, a requirement for vessels to report slippage of catch (with reasons and estimates of discards) could be useful for improving catch monitoring and estimation of bycatch in the Atlantic herring fishery. Data on slippage events need to be collected in a more consistent manner, and this amendment provides an opportunity to implement the necessary provisions to do so.
- While developing Amendment 5, the Council determined that observer protocols already include documenting fish that remain in the net before they are released, and existing regulations require vessel operators to assist the observer in this process. Additional protocols have been implemented by the NEFOP to improve the collection of this information (see additional discussion below). It is important to acknowledge that the slippage definition used in this amendment does not include operational discards (see Section 3.2.3 for Amendment 5 slippage definition). **Options 2 and 4** (Released Catch Affidavit and Catch Deduction/Trip Termination), therefore, apply to slippage as defined in Amendment 5 and do not apply to operational discards. However**, Option 3** (CA I sampling provisions) is intended to be consistent with the recently-amended provisions for sampling and addressing net slippage in Closed Area I (changes implemented in the November 30, 2010 Rule for the Closed Area I provisions (CFR §648.80)). The recent changes to the rule extended the prohibition on releasing fish/discarding to operational discards. While the Council may still determine that the CA I provisions are most appropriate for sampling all catch in the fishery, the Herring PDT supports the NEFOP's approach to improve the collection of information about operational discards through its current sampling program.
- For the most part, relative to other measures under consideration, the measures to address slippage may be relatively cost-effective ways to improve sea sampling and the accuracy of catch information.
- **Option 2 (Released Catch Affidavit):** While the intent may be to provide a cross-check with the observer's log based on the captain's estimation of slipped catch, most captains are communicating with observers already and asking observers what they are recording for discards in the discard log. There is also already a place in the observer's log for the captain to provide additional information or his/her perspective on catch and discards in any cases where the captain may disagree with the observer's estimates (fishermen's comment log); this information becomes part of the NEFOP's formal database, and several have already been submitted. Moreover, observers already document operational discards and other events with photographs and are encouraged to take pictures in any instances where released catch can be observed and/or species identification is an issue. Vessel trip reports (VTRs) represent the captain's estimate of catch under a legal mandate, subject to penalty under law if falsified. Therefore, requiring the Released Catch Affidavit may be redundant.

- **Option 3 (Closed Area I Sampling Provisions):** While the original provisions appear to have been feasible from a sampling and logistical perspective, the new provisions to require operational discards to be brought on board have not been practiced yet because the fleet has just begun fishing in Closed Area I this year. There may be some new challenges associated with bringing operational discards on board for some vessels.

  Another important consideration is that Option 3 proposes to adopt these provisions throughout the fishery on any trip with an observer on board, but it is unclear how these provisions may affect purse seine operations (only trawl vessels fish in Closed Area I). The operation of the purse seine fishery is substantially different than that of the trawl fishery, and consideration must be given to the size of the vessels, nature of the fishery, and practical implications of bringing the net on board to ensure that all operational discards come across the deck.

- **Option 4 (Catch Deduction and Possible Trip Termination):** The Herring PDT does not believe that this measure enhances catch monitoring. If this measure is intended to provide a disincentive for slipping catch (versus improving the sampling of slipped catch and the accuracy of catch data), then it will be important to account for the 100,000 pound catch deductions in a way that separates this catch from fish that are landed/sold, to avoid further discrepancies in the datasets. A separate code should be developed for the IVR/VMS/VTR data to identify the slipped catch, so that it remains separate from the other data. It also will be important to ensure that this catch is not included in the catch-at-age matrix.

  The PDT expressed some concerns about potential inequities associated with this measure. For example, the consequences of exceeding the 10-event slippage threshold (trip termination, ACL/sub-ACL overages, and/or accountability measures) could be significant particularly for the directed herring fishery participants, yet the consequences could be the result of the actions of non-directed vessels (i.e., Category C and/or D vessels). Furthermore, the measure provides a very weak incentive for individual vessels to avoid slippage until there are ten slippage events in an area. Once ten events are reached, the trip termination is an extremely strong incentive to avoid recorded slippage events, which may have impacts on vessel safety (fishermen may ultimately bring fish on board in unsafe situations to avoid a catch deduction or trip termination).

  Regarding Option 4 as originally proposed, the Herring PDT noted the inconsistency associated with implementing a perceived punitive measure (catch deduction/trip termination) for slippage due to safety and gear malfunction, but not for slippage due to other factors (bycatch, market conditions, etc.). Moreover, safety issues for smaller vessels and purse seine vessels in the inshore Gulf of Maine may be different than those for larger vessels fishing offshore.

  **The additional sub-options under consideration for Option 4 were developed to address some of the Herring PDT's concerns with the original option.*

5.3.2.2.2 Impacts on Atlantic Herring

The Atlantic herring fishery is managed through sub-ACLs that are designed to prevent overfishing while addressing scientific and management uncertainty. The herring resource is currently not overfished, and overfishing is not occurring. At this time, available information about the frequency and/or contents of slipped nets is clearly improving in recent years and likely to continue to improve. Information from the NEFOP discard log should be available for inclusion in the Final EIS for Amendment 5.

Anticipating the effects that the measures to address net slippage may have on the Atlantic herring resource is challenging. For the most part, none of the options under consideration will have a direct biological impact on the herring resource. The herring resource is not overfished, and overfishing is not occurring. No matter which option is selected to address net slippage, the fishery would continue to be managed under sub-ACLs that are designed to prevent overfishing on the resource and/or any of its individual spawning components. Direct impacts of these options on the herring resource are therefore not expected.

However, there are indirect long-term benefits to the resource that would likely result from improvements to catch sampling, increased sampling, a reduction in unobserved catch (i.e., fish not brought on board), and an increase in the accuracy of bycatch estimates that result from observer sampling. These benefits are difficult to quantify with respect to each of the measures under consideration. The impacts relate to the potential for the measure to achieve those outcomes over the long-term, as long as sampling remains at levels sufficient to generate accurate and precise catch estimates that are representative of the fishery. As catch information improves, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. These impacts apply to all options under consideration that would maximize sampling and minimize slippage.

When evaluating each option separately, the following impacts to the herring resource can be identified:

Option 1 (No Action/Status Quo): Under the status quo, NEFOP efforts to better sample the fishery and characterize the nature, extent, and species composition of slipped catch would continue. The long-term benefits of improved catch monitoring on the herring resource are discussed above. However, under the no action option, provisions to enhance sampling and better monitor/document net slippage would not be mandated; the information collected by observers would continue to be provided by fishermen on a voluntary/cooperative basis. Therefore, relative to other options that may require documentation of slippage and/or implement provisions to enhance sampling, positive impacts on the herring resource resulting from the no action option may be less over the long-term.

Option 2 (Released Catch Affidavit): There were no Released Catch Affidavits filed in 2010 under the Closed Area I sampling provisions, so it is not clear what additional information, if any, the affidavit may provide that isn't already collected by observers. 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.

It is difficult to predict any impacts on the herring resource resulting from this measure. Option 2 may provide documentation of some previously-unrecorded Atlantic herring removals (discards) that would then count against the herring sub-ACL. Consequently, the sub-ACL could be achieved faster, and the fishery could close sooner. Overall, herring abundance could increase, with the extent of the increase depending on the frequency of slipped nets and the magnitude of herring catches in those nets. However, the Released Catch Affidavits would still represent an estimate of the released catch. If Atlantic herring slipped catch is over-estimated, the sub-ACLs could be reached faster, producing a lower fishing mortality rate. If Atlantic herring slipped catch is under-estimated, then actual removals of herring (and fishing mortality) would be higher. However, available data indicate that slippage represents a small component of total catch. Even when assuming that Atlantic herring represents 100% of all slipped catch (very highly unlikely and not supported by the data), it does not appear that this measure would produce an impact on the herring resource that is much different than the status quo. Nonetheless, the quantification of previously unaccounted mortality could improve the data used in assessments, thereby decreasing scientific uncertainty, albeit to an unknown degree. The impact of this Option in comparison to Option 1 (no action) is therefore unknown, and difficult to compare to the other two Options.

Option 3 (Closed Area I Provisions): Option 3 would likely reduce the occurrence of slippage events and allow fish to be sampled that would have previously been unobserved. Thus, Option 3 may result in the documentation of some previously unrecorded Atlantic herring removals, with the effect on the herring resource being similar to that hypothesized for Option 2. The likelihood of obtaining more accurate information about herring removals is higher under Option 3 than under Option 2 or Option 1. In this context, this measure is likely to have a positive impact on the herring resource. Documenting previously unrecorded herring removals would also improve the catch statistics used in stock assessment, thereby reducing scientific uncertainty to an unknown degree. Comparison to Option 4 is difficult as the Option considers deduction and termination, not monitoring.

Option 4 (Catch Deduction and Possible Trip Termination): If catch deductions occur, Option 4 could result in sub-ACLs being attained more quickly with subsequent directed fishery closures occurring sooner. This action would likely result in an increase in herring abundance, but again, the magnitude of this increase is difficult to assess. Options 4C and 4D do not include the catch deduction, so the overall impact of these options on the herring resource would be similar to those expected under Option 3 (Closed Area I provisions). Comparison to Option 4 to the other options is difficult as the Option considers deduction and termination, not monitoring. Compared to Option 1 (no action) however, the impacts are likely to be low positive.

5.3.2.2.3 Impacts on Non-Target Species and Other Fisheries

Option 1 (No Action/Status Quo): There are no additional impacts on non-target species and other fisheries expected under the status quo option, as the current measures in place to address the abundance and wellness of the fishery would be maintained.

Option 2 (Released Catch Affidavit): Option 2 may provide documentation of some previously-unrecorded removals (discards) of non-target species that may ultimately improve estimates of bycatch in the herring fishery. However, the Released Catch Affidavits would still represent an estimate of the released catch. Observers already document released catch with photographs and detailed information on the recently-implemented discard log, so it is unclear whether estimates of non-target species bycatch (discards) would be improved by the implementation of a released catch affidavit. Also, because available data indicate that slippage represents a small component of total catch in the limited access herring fishery, it is unlikely that this option would have significant impacts on non-target species and other fisheries. If this measure is effective, providing documentation of previously unrecorded bycatch of non-target species may improve catch statistics and subsequent assessment and management of those species over the long-term. Therefore the expected impact of this Option, in comparison to Option 1 (no action) is expected to be neutral; it is expected to have less of an impact that Option 3, as described below but is difficult to compare to Option 4 as it addresses monitoring and not deduction or termination.

Option 3 (Closed Area I Provisions): Relative to the other measures under consideration in this section, this measure may have the most positive impact on non-target species and other fisheries because it provides for more complete sampling of catch that is ultimately discarded at-sea,. This option requires the sampling of operational discards in addition to prohibiting slippage except in specific circumstances. Providing documentation of previously unrecorded bycatch of non-target species may improve catch statistics and subsequent assessment and management of those species over the long-term. Therefore the expected impact of this Option, in comparison to Option 1 (no action) is expected to be a low positive; it is difficult to compare to Option 4 as it addresses monitoring and not deduction or termination.

Option 4 (Catch Deduction and Possible Trip Termination): This option discourages slippage and discarding by applying a herring catch deduction and possibly requiring trip termination when slippage events occur. The catch deduction is not likely to have an impact on non-target species and other fisheries. However, trip termination could reduce the amount of effective fishing effort in an area throughout the course of the fishing season, thereby reducing bycatch and mortality of non-target species. It is difficult to predict the impacts of this option (and the sub-options) on non-target species and other fisheries because the impacts depend on how the fishery adapts/responds to the measure in terms of both avoiding slippage events and relocating/redistributing fishing effort if a management area closes earlier than expected because of the catch deductions. While the impacts on non-target species may be positive if vessels cannot fish in an area with high encounters of non-target species, the extent of the impacts will be determined by how fishing effort shifts and whether or not the fleet moves into an area(s) with a higher potential of encountering these species.

It is also important to note that Option 4 may affect mackerel fishery participants, as all limited access vessels (A/B/C) would be required to comply with the trip termination provisions. Mackerel fishery participants may face trip termination if they are fishing in an area with a high number of slippage events, regardless of whether or not they are targeting herring. Additionally, if a herring management area closes earlier because of the catch deduction, the mackerel fishery will be precluded in this area as well. While the impacts on mackerel could be construed as positive, the mackerel fishery is not fully utilized at this time and is managed under catch levels that are intended to prevent overfishing.

The expected impact of this Option, in comparison to Option 1 (no action) is expected to be neutral or a low positive, but is difficult to compare to Option 4 as it addresses deduction or termination, not catch monitoring.

5.3.2.2.4 Impacts on Physical Environment and EFH

Option 1 (No Action/Status Quo): Option 1 would maintain current sampling requirements with respect to net slippage and therefore no adverse effects on seabed habitats/EFH are expected. The same impacts are expected with Options 2 and 3. The effects of Option 4 are difficult to predict and therefore difficult to compare.

Option 2 (Released Catch Affidavit): Option 2 would maintain current sampling requirements with respect to net slippage and therefore no adverse effects on seabed habitats/EFH are expected. The same impacts are expected with Options 1 (no action) and 3. The effects of Option 4 are difficult to predict and therefore difficult to compare.

Option 3 (Closed Area I Provisions): Option 3 would maintain current sampling requirements with respect to net slippage and therefore no adverse effects on seabed habitats/EFH are expected. The same impacts are expected with Options 1 (no action) and 2. The effects of Option 4 are difficult to predict and therefore difficult to compare.

Option 4 (Catch Deduction and Possible Trip Termination): Option 4 is intended to discourage slippage to the extent practicable by specifying assumed slippage catches that would be deducted from the area sub-ACL and/or by terminating trips if a collective threshold number of slippage events (5 or 10, depending on the option) is reached. The catch deduction would not have any adverse effect on seabed habitats. However, trip termination could reduce the amount of effective fishing effort in an area throughout the course of the fishing season, and thereby reduce adverse effects to EFH, which again, are minimal/temporary in this fishery to begin with. It is difficult to predict the impacts of this option (and the sub-options) because they depend on how the fishery adapts/responds to the measure in terms of both avoiding slippage events and relocating/redistributing fishing effort if a management area closes early. The impacts of this action are therefore unknown with respect to the other Options.

5.3.2.2.5 Impacts on Protected Resources

Option 1 (No Action/Status Quo): There are no impacts expected on protected resources as a result of this measure as it would maintain the same measures that currently protect protected resources in the herring fishery.

Option 2 (Released Catch Affidavit): Requiring a Released Catch Affidavit, from the perspective of impacts to protected resources, is administrative in nature and therefore they are not likely to have any effect. The no action option (Option 1) would maintain status quo, and because the impacts Option 2 are likely to be negligible, there is no expected difference between the no action option and the action presented with respect to protected resources in the area.

Option 3 (Closed Area I Provisions): As was previously stated, this option requires the sampling of operational discards in addition to prohibiting slippage except in specific circumstances. Slippage has the potential to contain protected species, and so the measure to better document slippage events has the potential to increase the sampling of protected species that may be encountered by the herring fishery. This information could, in turn, help with the better understanding of protected resources. Overall, it would not be likely for fishery effort to increase or decrease in response to this action, so encounters of protected resources by the fishery are not likely to change either. Option 3 therefore has the potential to provide a low positive impact on protected resources in comparison to both Options 1 and 2.

Option 4 (Catch Deduction and Possible Trip Termination): Both actions of catch deduction and trip termination have the potential to reduce the amount of fishing effort in an area throughout the course of the fishing season, thereby reducing encounter rates and potential mortality of protected resources in those areas. It is difficult to predict the impacts of this option (and the sub-options), however, on protected species because the impacts will depend on how the fishery decides to adapt or respond to the measures. There is the potential for the fishery to decide to avoid slippage events by relocating and redistributing fishing effort if a management area closes earlier than expected because of the catch deductions. This, in turn, has the potential to increase interaction with some protected species, or potentially decrease it with others. The magnitude of fishing effort is likewise unknown, and so the frequency of encounters could go up or down. While the impacts on protected resources may be positive if vessels cannot fish in an area with high encounters of protected species, the extent of the impacts of

Option 4 is unknown in relation to Option 1 (No Action), until the extent of the fishery movement of effort is realized.

5.3.2.2.6 Impacts on Fishery-Related Businesses and Communities

Option 1 (No Action/Status Quo): Under the no action option, there is not likely to be any direct impact on herring fishery-related businesses and communities as the current measures in place to maintain the health of the businesses and communities related to the herring fishery would remain.

Other Options (2/3/4): The options under consideration to address net slippage may provide documentation of some previously-unrecorded Atlantic herring removals (discards) that would then count against the herring sub-ACLs. Consequently, the sub-ACLs could be achieved faster, and the fishery may close sooner. Under Option 2, the Released Catch Affidavits would still represent an estimate of the released catch. If Atlantic herring slipped catch is over-estimated, the sub-ACLs could be reached faster and the fishery could close prematurely. If the directed fishery in a management area closes prematurely, there is potential for lost fishing opportunity and revenues. If Atlantic herring slipped catch is under-estimated, then actual removals of herring (and fishing mortality) would be higher.

Option 2 (Released Catch Affidavit): The pecuniary economic impacts on the participants in herring fishery are expected to be neutral in comparison to Option 1 (no action). Any economic impacts to the herring fishery will be through increased administrative and regulatory burden. This is the lesser of the impacts when compared to Options 3 and 4.

Option 3 (Closed Area I Sampling Provisions): Option 3 relies less on estimates of discarded fish, as the observers may have more opportunity to fully sample all fish that are caught. While the original provisions appear to have been feasible from a sampling and logistical perspective, the new provisions to require operational discards to be brought on board have not been practiced yet because the fleet has not yet moved into the area around Closed Area I yet this year. There may be some new challenges associated with bringing operational discards on board for some vessels.

Option 3 proposes to adopt these provisions throughout the fishery on any trip with an observer on board; however, the effect of these provisions on purse seine operations is unclear because only trawl vessels fish in Closed Area I. The operation of the purse seine fishery is substantially different than that of the trawl fishery, and consideration must be given to the size of the vessels, nature of the fishery, and practical and safety implications of bringing the net on board to ensure that all operational discards come across the deck. Additionally, this provision has not been tested on Category C vessels, which primarily use bottom trawls. While many of these vessels may already bring the net and all fish across the deck, accommodations and adjustments to operations may be necessary for some vessels.

The restrictions already placed on midwater and pair trawl operations (e.g., the seasonal Area 1A closure) generally disadvantage this part of the fishery. Whereas requiring the extreme sampling in Closed Area I might be considered reasonable to document any interaction with groundfish in an area where groundfishing is not permitted, requiring these provisions wherever herring vessels go could be considered an inequitable burden. Further, if only the midwater and pair trawl vessels are required to comply, this could have the appearance of unfairness.

Any economic impacts to the herring fishery will be through increased time spent pumping fish aboard the vessel to be sampled and inspected by a NMFS-approved observer. The pecuniary impacts on the participants in herring fishery are therefore expected to be potentially a low negative when compared to Option 1 (no action). This is a slightly larger impact than Option 2 but less than Option 4.

Option 4 (Catch Deduction and Possible Trip Termination): In general, the option/sub-options proposing a catch deduction/trip termination are designed to create a disincentive for limited access herring vessels to slip catch. When choosing to slip a net or bring all fish onboard, vessel operators will compare the costs of bringing those fish aboard to the penalty associated with slippage. The costs of bringing fish aboard which would otherwise be slipped are the extra time spent in this activity and, possibly, decreases in vessel safety during poor operating conditions. To the extent that Option 4 (and Option 3, discussed above) compromise safety under some circumstances, both the herring fishery and communities would be negatively affected. The extent of impacts would depend on to what extent safety was affected (e.g., injury to loss of life for crewmembers and damage to loss of vessel for the boat) and the result. These costs are the same under all of the options/sub-options under consideration. The overall impact of this Option, in comparison to Option 1 (no action) is therefore expected to be a negative impact. It is the highest impact in comparison to the other Options.

The penalties associated with a slipped net vary slightly under the sub-options. A deduction of 100,000 pounds per slippage event in each management area (Options 4A/4B) will reduce the total sub-ACL available to fishing vessels and possibly close management areas to directed fishing earlier during the year. The sub-ACLs are typically reached or approached in two of the four management areas (1A and 1B). For each slippage event in Areas 1A and 1B, aggregate revenues in the herring fishery would decline by $12,000-$15,000 depending on the price of herring. Under Options 4A and 4B, the slippage by an individual vessel will result in a penalty being imposed on the entire fleet. This may not be perceived as fair.

Another fairness issue relates to applying these measures to Category C vessels; many Category C boats are smaller boats that do not even hold 100,000 pounds. A slippage event on a smaller trawl vessel, although less likely, would then result in a deduction larger than the vessel's entire trip. Such deductions could ultimately preclude the fishery.

The sub-ACLs are typically not reached in Areas 2 and 3 (see Section 4.5.1 – Affected Environment). In the near future, slippage events in Areas 2 and 3 are will not reduce aggregate revenues. However, if the harvest of herring approaches those sub-ACLs, aggregate revenues would decline by the same $12,000-$15,000 per slippage event in these areas as well.

Two sub-options (4B and 4C) include trip termination as a direct consequence for a slippage event. This is an additional penalty for net slippage. These penalties would result in higher costs for fishing vessels which do slip a net. These costs will be highest for vessels which are fishing in the offshore areas, essentially requiring vessels to make a round-trip steam from their fishing location to port (see Table 137 on p. 393 for more information about operating costs).

Beyond the safety compromises that may develop under Option 4, catch deduction and trip termination could have negative economic and social consequences for individual businesses and communities out of proportion to the original intent for the measure. Costs associated with herring fishing trips are high, particularly with the current cost of fuel. Trips terminated prematurely could result in an unprofitable or even "broker" trip leaving not only the owners with debt, but crewmembers without income. The consequences of income loss could reverberate through the community, diminishing other businesses that supply the vessel as well as those who provide goods and services for the families of fishing industry participants. Considering that fishing participants are interested in landing their catch to pay for their costs and obtain a profit rather than dumping it at sea, the measures for slippage, particularly when it has been driven by safety or gear-related considerations are perceived as punitive and may compound the negative (social) impact of incidents that arise naturally from any fishing operation.

In 2010, there were a total of 29 of 582 observed hauls were slippage events; the distribution of these events across areas and the resulting decrease in revenues is presented in Table 148. Two scenarios for revenue changes are presented. In Scenario A, it is assumed that fishing effort and the management area sub-ACLs are similar to the 2010 fishing year. While there would be large sub-ACL deductions in Areas 2 and 3, these would have no effect on revenues because aggregate catch in each management area has been much lower than the sub-ACL. Scenario B describes the impact on the fishery if aggregate catch in each of the management areas is close to the sub-ACLs. This might occur if effort increases, the sub-ACLs decrease, or a combination of the two occurs.

It is important to recognize that if the sub-ACL deduction regulations proposed in this option were in place, vessels may reduce slippage (as intended), especially in Areas 1A and 1B. Therefore the foregone revenues and catch are likely to be ***lower*** than Table 148 suggests. Table 148 also contains the impacts of the trip termination regulations; there were two trips which would have been terminated due to excessive slippage in a management area. It is important to recognize that if the sub-ACL deduction regulations proposed in this option were in place, vessels may reduce slippage. Therefore, the number of impacted trips is likely to be ***lower*** than suggested by Table 148.

Table 148 Potential Impacts of Catch Deduction/Trip Termination Options (Based on 2010 Observer Data)

AREA	Catch Deduction Options				Terminated Trips
	Observed Slippage Events	Sub ACL Deduction	Revenue Change Scenario A ($0.15/lb.)	Revenue Change Scenario B ($0.15/lb.)	
1A	8	800,000	$120,000	$120,000	0
1B	1	100,000	$15,000	$15,000	0
2	12	1,200,000	$0	$180,000	2
3	8	800,000	$0	$120,000	0

Amendment 5 to the Herring Fishery Management Plan contains Alternatives which would increase the level observer coverage about the 2010 level. If this occurs, it is possible that a higher number of slippage events would be observed even though the management options in this section provide incentives to reduce slippage.

5.3.3 Impacts of Maximized Retention Alternative

The Council is considering an alternative that would allow NMFS to conduct an experimental fishery for four years to evaluate the appropriateness and need for a maximized retention program on limited access herring vessels.

5.3.3.1 General Impacts

The Enforcement Committee met on May 8, 2009 to discuss issues related to the development of this amendment and provide preliminary input. At the time, the Committee discussed issues related to maximized retention but did not develop any consensus statements or provide any recommendations specific to the MR alternative currently under consideration in Amendment 5. Enforcement Committee comments related to maximizing sampling and requiring all fish to be brought on board have been summarized in previous sections of this document.

Additional Herring PDT Comments

- Under the assumption of full compliance (no slippage and/or at-sea discarding), maximized retention could provide an opportunity to sample at-sea catch that would have otherwise been discarded. The amount of various species would still be estimated, however, unless the entire catch was disaggregated into species and fully sampled. Complete sampling would have to occur dockside under a maximized retention program.
- In any well-designed experiment, there is a "study group/experimental group" and a "control group;" the control group is practically identical to the experimental group, although the experimental group is changed according to some key variable of interest, while the control group remains constant during the experiment. This provides for a basis of comparison and statistical evaluation with all other variables remaining constant between the two groups. In this alternative, all limited access herring vessels would be part of the experimental group, as MR would be required on all trips with observers on board. Because of changes to observer protocols and improved sampling of high-volume fisheries in recent years, comparisons to observer data from prior years (as the "control group") may not be appropriate. This should be addressed if an experimental fishery is to be developed in the future. It is unclear how vessels would be selected for either a control group or an experimental group since there are no incentives to participate in the experiment at this time.

Several challenges would need to be addressed by NMFS to the extent possible when designing provisions for a maximized retention (MR) experimental fishery:

- Separating the harvest from the unwanted catch may be difficult for some vessels and could reduce vessel capacity.
- Test tows should be considered. Fishermen may make a short tow to determine the composition and/or quality of fish they are catching before fully loading the bag. If the fish in the test tow are not desirable, the vessel can release the bag and move elsewhere. This is addressed in the Closed Area I provisions by requiring that the fish from the test tow remain in the net until the subsequent pumpout.
- Sampling of unwanted discarded catch should be a primary component of any MR program.
- The disposal of unwanted/unmarketable catch should be addressed.

- Safety concerns should be addressed. For example, slippage events have been noted due to full vessel capacity and gear problems. Exemptions (similar to Closed Area I) should be considered in a MR program.
- Because MR requires that all fish be landed (not just brought on board the vessel for sampling), concerns related to compromising the quality of the catch should be addressed.

5.3.3.2 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action alternative relative to the maximized retention alternative would not be expected to affect the status of the herring resource, and the no action alternative is expected to have a neutral impact on herring. Some of the indirect long-term benefits from the maximized retention alternative under consideration (if the experimental fishery is conducted) would not be realized under the no action alternative, but, as discussed below, the maximized retention alternative is expected to have very low positive impacts on the resource.

Maximized retention would likely have little effect on the herring resource because it would not affect the mortality rate exerted on the stock, but only force fish to be landed that would have otherwise been discarded or slipped. Over the long-term, maximized retention has the potential to improve the calculation of catch statistics and quantification of landed bycatch if it is applied in concert with a portside sampling program to determine the catch composition, once an experimental fishery is conducted to evaluate the need and effectiveness of MR and the objectives of a portside sampling program. Since no such portside program is currently under consideration, this benefit will likely not be realized under the alternative proposed in Amendment 5. If the alternative is selected and the experimental fishery is conducted, however, some previously undocumented herring mortality may be recorded by dealers and observers, which may modestly improve catch statistics and the assessment and management of the resource. Therefore, overall, this action may have a low positive impact on Atlantic herring, but the outcome is generally unknown in comparison to the no action alternative because so many of the elements of the experimental fishery remain unclear.

5.3.3.3 Impacts on Non-Target Species and Other Fisheries

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment). In general, a maximized retention program could increase the scientific knowledge available to fisheries managers about bycatch of non-target species. Maximized retention has the potential to improve the calculation of catch statistics and quantification of landed bycatch (non-target species) if it applied in concert with a portside sampling program to determine the catch composition of landings, once an experimental fishery is conducted to evaluate the need and effectiveness of MR and the objectives of a portside sampling program. Since no such portside program is currently under consideration, this benefit will likely not be realized under the alternative proposed in Amendment 5. If the alternative is selected and the experimental fishery is conducted, however, some previously undocumented catch/mortality of non-target species may be recorded by dealers and observers, however, but this is not likely to improve catch statistics and assessments for non-target species. Therefore, overall, this action may have a low positive impact on non-target species and other fisheries, but the outcome is generally unknown in comparison to the no action alternative because so many of the elements of the experimental fishery remain unclear. The impacts of a MR program on mackerel fishery participants with limited access herring permits would need to be evaluated by NMFS when developing the details of an experimental fishery under this alternative.

5.3.3.4 Impacts on Physical Environment and EFH

This alternative proposes implementing maximized retention on an experimental basis during some directed herring trips. Adoption of this option is not likely to have any adverse effect on EFH, and the impact can likely be considered neutral in comparison to the No Action Alternative.

5.3.3.5 Impacts on Protected Resources

Although the issuance of exempted fishing permits would allow for the collection of more information on bycatch species, the data collection is not likely to extend to the reach of protected species, as current regulation (the Endangered Species Act and the Marine Mammal Protection Act) would not allow them to be included in the exemption. Therefore the study of protected resources would likely not be benefitted by the action, and the impact can likely be considered neutral in comparison to the No Action Alternative.

5.3.3.6 Impacts on Fishery-Related Businesses and Communities

The no action alternative would maintain status quo conditions and would not establish a maximized retention experimental fishery after the implementation of Amendment 5. There are no additional impacts expected on fishery-related businesses and communities under the no action alternative. Because the impacts of the proposed maximized retention alternative are unknown (see discussion below), there is no measureable difference between impacts expected on fishery-related businesses and communities from selecting the no action alternative or the MR experimental fishery alternative.

The maximized retention alternative would create a maximized retention experimental fishery program in the directed Atlantic herring fishery for all trips which carry an observer. This program could impact the Atlantic herring fishery in two ways. First, retaining certain species, particularly a species like spiny dogfish, could degrade the quality of the catch by damaging in while in the fish hold. Second, retention of non-marketable fish in the hold of a vessel reduces the amount of marketable fish which can be landed. The magnitude of these effects are unknown at this time.

The impacts of maximized retention on herring businesses would depend on the details of how this option is implemented (see the questions noted above). The only potential benefit to herring-related businesses would be that they would be able to document their entire catch so that rumors of by-catch or quota-busting could be disproved. However, the negative impacts could be serious if, for example, the vessels are not able to separate desired from undesirable catch, the whole catch would be tainted. The industry as a whole has improved the quality of the catch by investing in refrigerated seawater systems and increased freezer capacity. Diminishing the quality would decrease marketing opportunities (e.g., food exports) and invariably lower prices. Furthermore, diminishing quality could affect other industries dependent on herring. The lobster fisheries, for example, currently uses high quality herring for bait. If unwanted catch is returned to the vessel after sampling for dumping at sea, the fuel costs could have serious negative impacts. Time and money implications could also arise from the implementation.

The communities identified in the Affected Environment rely on herring-related businesses as a significant portion in the mix of businesses that provide income for their residents either directly or indirectly. While none of the communities identified are solely dependent on the herring fishery, some, such as those in Downeast Maine, rely on the herring fishery for bait for their lobster fisheries. Others rely on the income dispersed through the community from the sale of herring. To the extent that any of these options diminish the ability of the herring-related businesses to survive economically, the community would be affected through the loss of jobs, both in the industry and among the servicers of the industry.

The overall impact of the MR alternative, in comparison to Alternative 1 (no action) is unknown at this time. If the MR alternative is selected, impacts on fishery-related businesses and communities would need to be evaluated more thoroughly based on the details and provisions included in the experimental fishery.

5.4 IMPACTS OF MANAGEMENT MEASURES TO ADDRESS RIVER HERRING BYCATCH (SECTION 3.3)

This section addresses the potential impacts of the management alternatives under consideration to address river herring bycatch.

A detailed analysis of the potential impacts of the management alternatives under consideration in Amendment 5 to address river herring bycatch is provided in Appendix VI of this document (Volume II).

In addition, information/analyses provided by the Herring PDT during the development of the measures to address river herring bycatch can be found in Volume II, Appendix IV.

The majority of the analysis to determine the impact of specific management measures on river herring populations is qualitative. The Herring PDT modeled river herring distribution at sea using NEFSC trawl survey data and detected spatial and temporal patterns of river herring bycatch in the directed Atlantic herring fishery from NEFOP data. However, many unknowns remain including but not limited to river herring stock status, overfishing/overfished status, population stock structure, coastwide biological reference points, mixing rates of pelagic species at sea, how to link river data with at sea data, the genetic structure of populations. Many of these research questions/needs are currently being addressed by many institutions, but the work/results have yet to be completed/published.

The following discussion provides a comprehensive summary of the impacts of the alternatives under consideration on the five VECs identified in Amendment 5.

5.4.1 Background Information

Alternatives Under Consideration

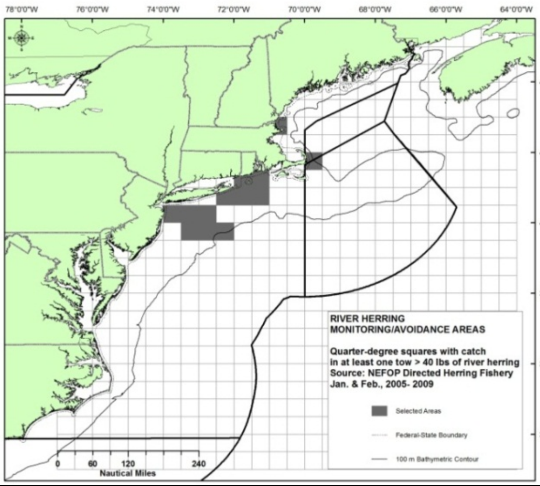
- **Alternative 1: No Action (Status Quo – Section 3.3.1)**
- **Alternative 2: River Herring Monitoring/Avoidance (Section 3.3.2)**
    - Establishment of River Herring Monitoring/Avoidance Areas (Section 3.3.2.1)
    - **Option 1:** 100% Observer Coverage in RH Monitoring/Avoidance Areas with sub-options for vessels to which the option applies (Section 3.3.2.2.1)
    - **Option 2:** Closed Area I Sampling Provisions in RH Monitoring/Avoidance Areas with sub-options for 100% observer coverage or less than 100% coverage, and sub-options for vessels to which the option applies (Section 3.3.2.2.2)
    - **Option 3:** Trigger-Based Monitoring with sub-options for RH catch triggers and related catch reporting requirements (either Option 1 or Option 2 would apply if/when trigger is reached – Section 3.3.2.2.3)
    - **Option 4:**Two-Phase Bycatch Avoidance Approach Based on SFC/SMAST/DMF Project (Phase I in Amendment 5 establishes areas, works with industry to obtain more information, and establishes a mechanism for implementing bycatch avoidance strategies, if appropriate, after the project is completed; Phase II requires a follow-up meeting and determination of appropriate action after the project is completed – See Section 3.3.2.2.4)

- **Alternative 3: River Herring Protection (Section 3.3.3)**
  - Establishment of River Herring Protection Areas (Section 3.3.3.1)
  - **Option 1:** Closed Areas for A/B/C/D permit holders fishing with mesh smaller than 5.5 inches with a sub-option for limited access herring vessels to declare out of the fishery for a period of time (Section 3.3.3.2.1)
  - **Option 2:** Trigger-Based Protection Areas with sub-options for RH catch triggers and related catch reporting requirements (Protection Areas would be implemented if/when trigger is reached – Section 3.3.3.2.2)
- **Mechanism for Adjusting/Updating River Herring Areas/Triggers (Section 3.3.4)**
- **River Herring Catch Caps (Section 3.3.5)**

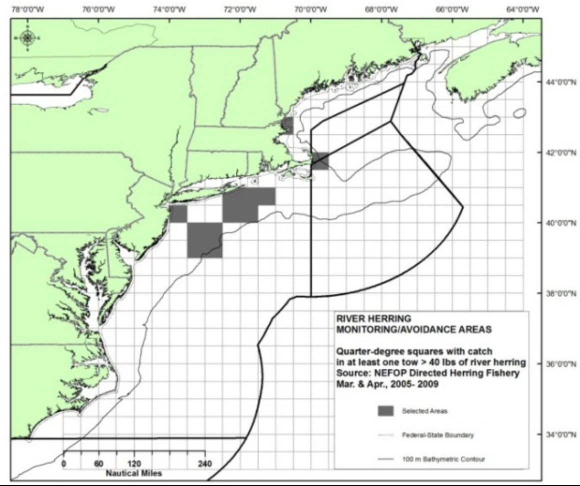
The Council is considering sub-options to apply the management measures to address river herring bycatch to either Category A/B (limited access directed fishery), Category A/B/C (all limited access vessels), or Categories A/B/C/D (all herring vessels, including open access vessels and vessels that receive new permits that may established in this amendment).

Figure 89 Proposed River Herring Monitoring/Avoidance Areas (Alternative 2)

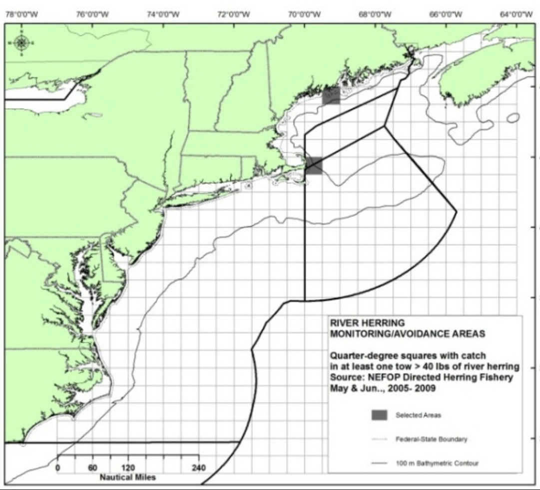
January – February



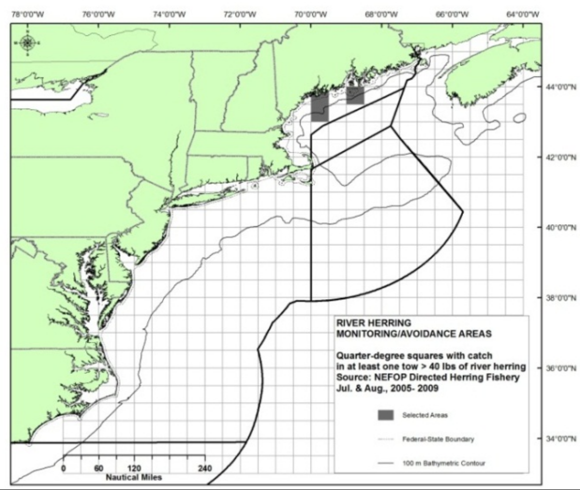
March – April



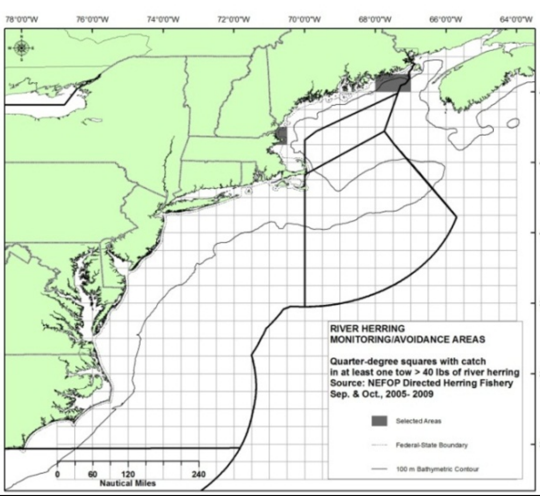
May – June



July – August



September – October



November – December

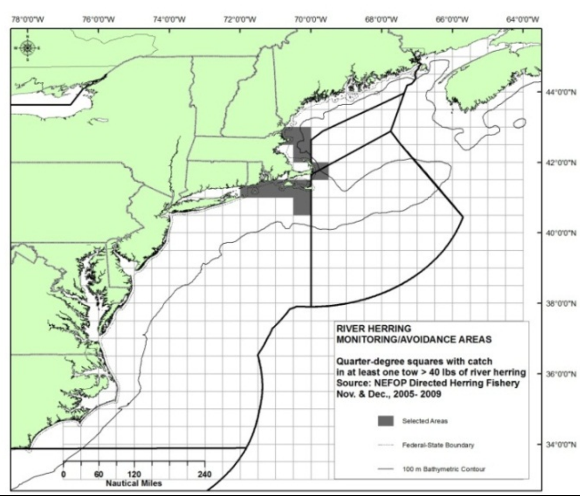
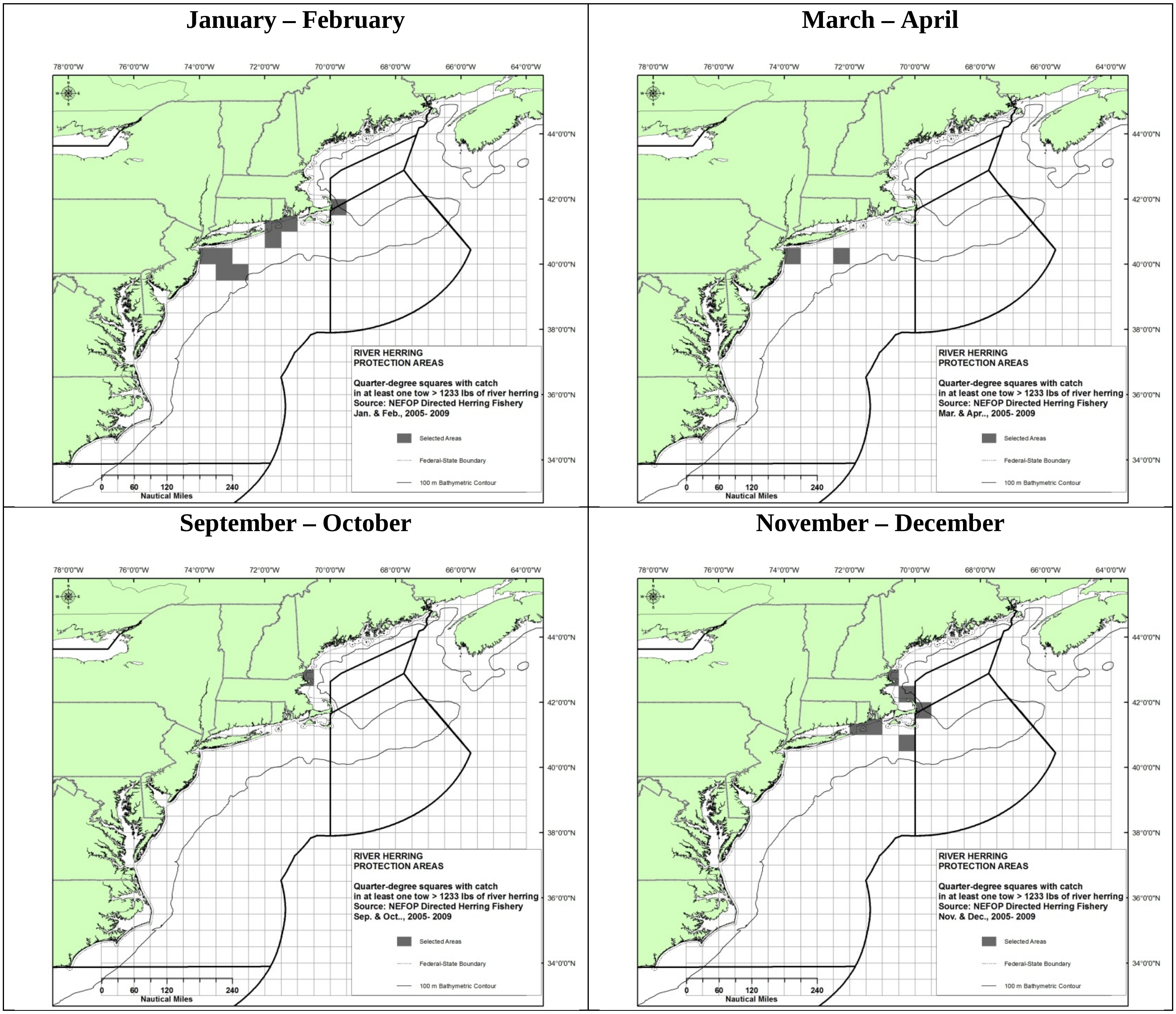
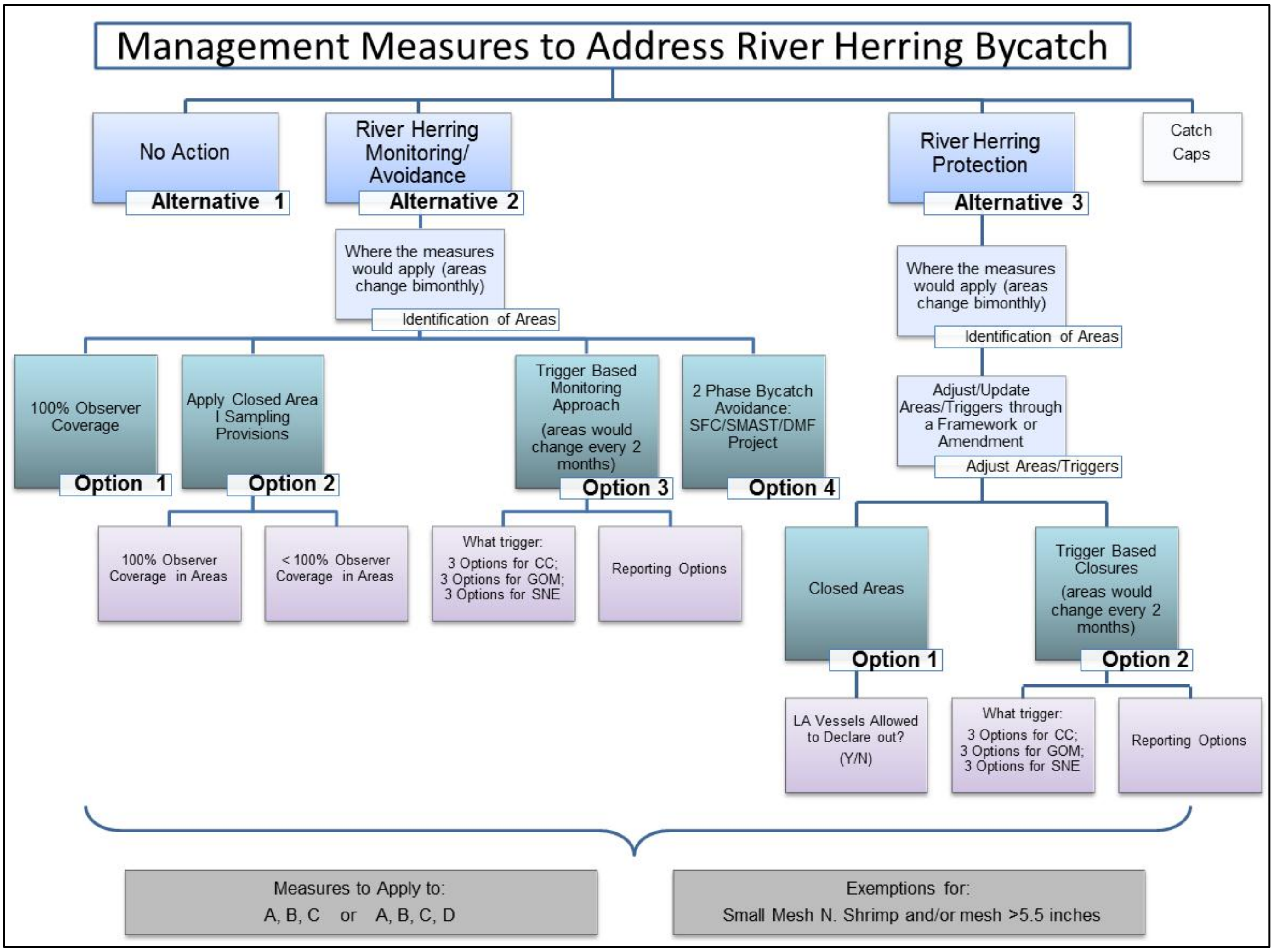


Figure 90 Proposed River Herring Protection Areas (Alternative 3)



Under Alternative 3, no River Herring Protection Areas would be established from May-August.

Figure 91 Summary of Amendment 5 Measures Under Consideration to Address River Herring Bycatch



The management measures under consideration in Amendment 5 to address river herring bycatch relate to the overall goal of Amendment 5: to develop an amendment to the Herring FMP to improve catch monitoring and ensure compliance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA). These measures also directly address the first three objectives of Amendment 5: (1) to implement measures to improve the long-term monitoring of catch (landings and bycatch) in the herring fishery; (2) to implement other management measures as necessary to ensure compliance with the MSA; and (3) to implement management measures to address bycatch in the Atlantic herring fishery.

Some of the measures under consideration to address river herring bycatch are likely to improve catch monitoring across the herring fishery and particularly in areas where river herring encounters may be expected and may therefore address the more specific goals and objectives of the Amendment 5 catch monitoring program. Moreover, the measures under consideration directly address MSA National Standard 9 (bycatch) – *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.*

River Herring Catch Comparison

To place the most recent (2010) Atlantic herring fishery river herring catch estimate into perspective, a catch estimate comparison was completed by the Herring PDT and is presented in Appendix VI (Volume II). This includes a summary of all available published and unpublished studies on at-sea river herring catch. Reported river herring catch estimates included data from 1989-2010, although estimates for the directed Atlantic herring fishery were not available for all years. Each study had a different purpose, stratification, and estimation method that should be considered when comparing across different studies. Notably, some studies used kept river herring catch, discarded river herring catch, or both kept and discarded river herring catch in their estimates.

Table 149 compares the most recent estimated river herring catch by the directed Atlantic herring fishery (165,915 lbs.) to that estimated for all at-sea fleets (531,314 lbs.) and the directed in-river fishery for alewife in Maine (1,342,293 lbs.). However, reviewing estimates from years prior to 2010, at-sea river herring catch estimates are highly variable year-to-year as well as associated CVs.

Table 149 River Herring Catch Comparison for 2010 Data

	2010 River Herring Catch		
Fishery	**Catch (lbs.)**		**Source**
Maine Directed Alewife Landings	1,342,293		Maine DMR
All Fleets (estimated)	531,314	*	NEFSC
Directed Herring Fleet (estimated)	165,915	**	Herring PDT

* High of 3.6 mil lbs. in 1997 (1989-2010)

** High of 1.9 mil lbs. in 2007 (2005-2010)

5.4.2 Impacts on Atlantic Herring

5.4.2.1 Impacts of Alternative 1 (No Action Alternative) on Atlantic Herring

Under Alternative 1, no additional management measures would be implemented in Amendment 5 to address river herring bycatch. The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS in 2000. The specification-setting process is the primary management tool used to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The Atlantic herring resource is not overfished, and overfishing is not occurring. Due to the ongoing management of the herring fishery through ACLs/sub-ACLs, selection of the no action alternative in this case is therefore not likely to affect removals of Atlantic herring from the fishery. There are no additional impacts on the herring resource expected from Alternative 1, and the impacts are expected to be *neutral*.

Some of the measures under consideration to address river herring bycatch may have positive impacts on the Atlantic herring resource through increased monitoring and data collection (see discussion of Alternative 2 below). These potential impacts on Atlantic herring are discussed in the following subsections. The benefits of these measures would not be realized under the no action alternative.

5.4.2.2 Impacts of Alternative 2 (River Herring Monitoring/Avoidance) on Atlantic Herring

Alternative 2 proposes to establish River Herring Monitoring/Avoidance Areas and includes options for implementing additional catch monitoring provisions in those areas. For the most part, none of the options under consideration in Alternative 2 will have a direct biological impact on the herring resource. The herring resource is not overfished, and overfishing is not occurring. The Atlantic herring fishery would continue to be managed under sub-ACLs that are designed to prevent overfishing on the resource and/or any of its individual spawning components. Alternative 2 and the monitoring options under consideration are not expected to affect total removals from the fishery.

However, there are indirect long-term benefits to the Atlantic herring resource that would likely result from improvements to catch sampling, increased sampling, and a reduction in unobserved catch (i.e., fish not brought on board), which the measures proposed under Alternative 2 are intended to do, primarily to address river herring concerns. As catch information in the fishery continues to improve, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. The benefits to the herring resource are difficult to quantify with respect to the individual options under consideration in Alternative 2 but are expected to be *low positive* in comparison to Alternative 1 (no action). The selection of vessels to which these measures apply (permit categories A/B/C and/or D) may marginally increase or decrease the impacts on Atlantic herring, but not likely to a measurable extent. Exemptions under consideration for the Northern shrimp fishery and large-mesh groundfish fishery should not affect this determination with respect to impacts on the Atlantic herring resource.

Options 1, 2, and 3

Options 1, 2, and 3 propose additional monitoring requirements in the River Herring Monitoring/Avoidance Areas. Option 1 would require 100% observer coverage in these areas; Option 2 would require the Closed Area I sampling provisions to apply to these areas; Option 3 would implement either Option 1 or Option 2 when a specified river herring catch trigger is reached in a particular area.

- Option 1 (100% Observer Coverage) is also being considered across the limited access herring fishery as one of the alternatives to allocate observer coverage in this amendment (Section 3.2.1.2). The impacts on the herring resource of implementing Option 1 in the River Herring Monitoring/Avoidance Areas are expected to be similar to those discussed in Section 5.2.2 (Impacts of Alternatives to Allocate Observer Coverage on Atlantic Herring), but to a lesser degree, because the requirements would only apply on a seasonal basis in the River Herring Monitoring/Avoidance Areas (versus throughout the fishery). The impacts are therefore expected to be *low positive*, relative to taking no action.
- Option 2 (Closed Area I Provisions) is also being considered as a measure to address net slippage across the entire fishery (Section 3.2.3). The impacts on the herring resource of implementing Option 2 in the River Herring Monitoring/Avoidance Areas are expected to be similar to those discussed in Section 5.3.2.2.2 (Impacts of Measures to Address Net Slippage on Atlantic Herring), but to a lesser degree, because the requirements would only apply on a seasonal basis in the River Herring Monitoring/Avoidance Areas (versus throughout the fishery). The impacts are therefore expected to be *low positive,* relative to taking no action.
- Option 3 (Trigger-Based Monitoring/Avoidance) would implement either Option 1 or Option 2 when a specified river herring catch trigger is reached in a particular area. Option 3 delays implementation of these measures until a catch trigger is reached and may have slightly less benefit because the measures would not apply in the areas throughout the entire fishing year, but the difference in terms of the impacts will depend on where/when the trigger is reached. Overall, the impacts are still expected to be *low positive*, relative to taking no action.

If any of the monitoring measures proposed in Options 1, 2, or 3 are adopted as part of the catch monitoring program in Amendment 5, these measures would apply across the entire herring fishery (at least on limited access vessels), not just in the River Herring Monitoring Areas, so the benefit would be greater. In this case, the impacts of these options as part of Alternative 2 (River Herring Monitoring/Avoidance) would be the same as Alternative 1 (No Action). If the no action option is selected for these measures under the Amendment 5 the catch monitoring program, then the impacts on the herring resource of selecting any of these options in the River Herring Monitoring Areas would be greater.

Option 1 requires 100% observer coverage in the River Herring Monitoring/Avoidance Areas and may increase sampling. Option 2 may reduce the occurrence of slippage events in and allow fish to be sampled that would have previously been unobserved. Thus, Option 2 may result in the documentation of some previously unrecorded Atlantic herring removals. Documenting previously unrecorded herring removals would also improve the catch statistics used in stock assessment, thereby reducing scientific uncertainty to an unknown degree. A detailed analysis of available information about slippage is presented in Section 5.3.2.1 of this document.

Option 4: Two-Phase Bycatch Avoidance Strategy

Similar to the other options, the impacts of a long-term river herring bycatch avoidance strategy on the Atlantic herring resource are likely to be positive to the extent that they enhance catch monitoring and data collection in the River Herring Monitoring/Avoidance Areas. There may be additional long-term benefits on the herring resource from Option 4, however, if the industry can work cooperatively to develop a long-term avoidance strategy. The communication network and cooperative relationships developed under Option 4 may lead to enhanced catch/bycatch management of all species in the fishery and could ultimately improve herring catch monitoring. However, because Option 4 proposes a two-phase avoidance strategy developed by the industry, impacts on the herring resource resulting from implementing the provisions proposed Option 4 as part of Amendment 5 are not expected. Under this option, the industry would share information to avoid bycatch in the Monitoring/Avoidance Areas, but additional catch monitoring would not be mandated, and no new catch reporting requirements or sampling protocols would be implemented; the impacts of this option on the herring resource are therefore expected to be *neutral*.

5.4.2.3 Impacts of Alternative 3 (River Herring Protection) on Atlantic Herring

Alternative 3 proposes to establish River Herring Protection Areas and seasonally (bimonthly) close these areas to herring fishing to some/all herring vessels. Protection areas might provide mortality protection for co-occurring Atlantic herring. This, however, is dependent on Atlantic herring life history and migratory patterns along with their susceptibility to fishing gears at different life stages. In particular, many of the bimonthly monitoring/avoidance areas overlap Atlantic herring EFH at various life stages (see Figure 68 – Figure 71).

The Atlantic herring resource is not overfished and overfishing is not occurring. The herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The selection of Alternative 3 is not likely to affect total removals of herring from the fishery, and the impacts of Alternative 3 on herring, therefore, are expected to be neutral.

Option 1 would implement seasonal closures in the bimonthly River Herring Protection Areas for the entire fishing year. Many of the blocks proposed for seasonal closure under Alternative 3 overlap substantially with the herring fishery, suggesting that directed herring fishing effort may be reduced, at least seasonally, in some of the areas. While these areas would be closed to some/all herring fishing on a seasonal basis, it is unclear if/how shifts of effort resulting from the closures would affect herring fishing in the open areas. Any short-term benefits to the resource that may result from decreasing seasonal concentrations of fishing effort, therefore, are likely small and difficult to quantify. In addition, other fishing activity is likely to continue in the Protection Areas even if herring fishing is prohibited.

Option 2 delays implementation of these measures until a catch trigger is reached and may have slightly less benefit because the closures would not apply to the proposed protection areas throughout the entire fishing year, but the difference in terms of the impacts will depend on where/when the trigger is reached. Because the potential benefit of short-term closures under Alternative 3 cannot be measured/quantified and are likely to be small since other fishing will continue in the areas, a greater long-term benefit for the Atlantic herring resource may come from enhanced herring fishery data (any of the options under Alternative 2). Overall, the impacts of Alternative 3 in comparison to Alternative 1 (no action) on the herring resource are therefore likely to be *neutral*. This determination applies to both Options 1 and 2 under Alternative 3. Exemptions under consideration for the Northern shrimp fishery and large-mesh groundfish fishery should not affect this determination with respect to impacts on the Atlantic herring resource.

5.4.3 Impacts on Non-Target Species and Other Fisheries

5.4.3.1 Coincidence of River Herring and Shad

A detailed analysis of the overlap of river herring and shad is provided in Appendix VI of this document (Volume II). Based on this analysis, the Herring PDT concluded that management measures implemented to address river herring bycatch in the Atlantic herring fishery would likely have similar impacts on shad. For the purposes of this assessment, American shad (*Alosa sapidissima*) and hickory shad (*Alosa mediocris*) were grouped together as "shad" and alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) were grouped together as "river herring."

To evaluate the coincidence of shad and river herring in bycatch from the Atlantic herring fishery, bycatch estimates from NEFOP observed trips that landed over 2000 pounds of Atlantic herring from 2005 to 2009 were examined by the Herring PDT. Of the 1,099 individual hauls that were observed, 287 (26%) encountered river herring and 102 (9%) encountered shad. Almost two-thirds of the hauls that caught shad also caught river herring, and over 80% of the shad catch came from hauls that also caught river herring. The level of coincidence between the two species groups is even greater when the spatial distribution of bycatch events is considered. Only 4% of the ten-minute squares with observed tows had shad bycatch and no river herring bycatch (see data and figures in Appendix VI, Volume II). Furthermore, the shad caught from those areas only account for 1% of the total shad bycatch. Therefore, it appears reasonable to conclude that management actions designed to protect river herring will likely also protect shad.

5.4.3.2 Summary of River Herring At-Sea Migratory Patterns

In general, river herring at-sea seasonal migratory patterns are reflected using the Herring PDT's hotspot analysis of survey data. Table 150 summarizes the results of the river herring hotspot analysis to identify survey-based areas. River herring travel from southern to northern latitudes from winter through fall, presumably due to temperature fluctuations and timing of in-river spawning, then returning to southern latitudes to overwinter. River herring were relatively more likely to be encountered in the winter in Southern New England waters and the Northern Mid-Atlantic Bight and in the spring in the Gulf of Maine, Southern New England waters, and the Northern Mid-Atlantic Bight. In addition, the winter survey did not operate in the more northern latitudes and the summer survey provided a limited number of observation years. Additional information/analyses provided by the Herring PDT can be found in Volume II, Appendix IV (Herring PDT Analysis: Development of Measures to Address River Herring Bycatch).

Table 150 Summary of Seasonal River Herring Hotspot Analysis Using NMFS Bottom Trawl Surveys

For each identified season and region combination, the relative likelihood of encountering river herring is summarized by shading in the table (see footnotes).

	Season			
Region	Winter	Spring	Summer	Fall
Scotian Shelf	*		*	
Bay of Fundy	*		*	
Gulf of Maine	*			
Georges Bank				
Southern New England				
Northern Mid-Atlantic Bight				

"*" indicates limited data

Relative likelihood of encountering river herring in hotspots scaled using ranked percent occurrence:

> or = 67% (dark gray), < 67% (light gray), and mixed results (medium gray)

5.4.3.3 Impacts of Alternative 1 (No Action Alternative) on Non-Target Species and Other Fisheries

The non-target species most pertinent to this amendment are described in detail in Section 4.2 of this document (Affected Environment). Under Alternative 1, no additional management measures would be implemented in Amendment 5 specifically to address river herring bycatch. Some of the measures under consideration to address river herring bycatch may have positive impacts on non-targets species and other fisheries, including river herring, through increased monitoring and data collection, or through reductions in fishing effort in some times/areas. These benefits would not be realized under Alternative 1.

The status of river herring is unknown, although a stock assessment by ASMFC will be finalized in 2012. The ASMFC managed directed river herring fishery is under a coastwide landings moratorium effective January 1, 2012. States with approved sustainable harvest plans have exemptions from the moratorium. These States include Maine, New Hampshire, New York, North Carolina, and South Carolina. NOAA considers both species, alewife and blueback herring, as species of concern and is reviewing whether they should be listed under the Endangered Species Act. The determination will be made later this year. The selection of the no action alternative in this case is not likely to be aligned with the coastwide moratorium and exemption process, however the measures in place under the ASMFC and States would continue for both shad and river herring if this no action alternative were selected. It is likely, however, that the increased monitoring and data collection benefits or reductions in fishing effort in some times/areas that may be realized under Alternatives 2 and 3 may not be realized for river herring under the no action alternative.

In the mackerel fishery, the status of the resource is currently "unknown" with respect to both fishing mortality rates and stock size. The mackerel fishery, however, is managed through an overall ABC for what is currently an open access fishery, although a new limited access program is currently being developed. The selection of the no action alternative in this case is therefore not likely to affect removals from the fishery, as the current management measures in place under the MAFMC FMP would remain in place. It is likely, however, that the increased monitoring and data collection benefits or reductions in fishing effort in some times/areas that may be realized under Alternatives 2 and 3 may not be realized for Atlantic mackerel under the no action alternative.

Of the 19 groundfish stocks that are managed under the Northeast Multispecies Fishery FMP, 13 of the stocks were overfished, and 11 of the stocks were overfished and experiencing overfishing. None of these groundfish stocks are likely to be effected by the no action alternative, however, because there are already measures under the Northeast Multispecies Fishery FMP to address these issues, and by taking no action, the measures currently in place would continue. Both Georges Bank and Gulf of Maine haddock were not overfished, and overfishing was not occurring, however. For the haddock stocks and others that were not considered overfished or in which overfishing was not occurring, it is also likely that the no action alternative would not have an effect on the species, because measures are in place to prevent these stocks from becoming overfished, or stocks in which overfishing is occurring under the Northeast Multispecies Fishery FMP. It is likely, however, that the increased monitoring and data collection benefits or reductions in fishing effort in some times/areas that may be realized under Alternatives 2 and 3 may not be realized for multispecies under the no action alternative.

It is likely, with all the non-target species and other fisheries mentioned above, that the impact of the no action alternative will be *neutral* because no additional impacts would be expected under status quo conditions. However, Alternative 2 would likely offer the benefits of increased monitoring and data collection for non-target species, and therefore likely offer an overall positive benefit to the resources in comparison to the no action alternative. Alternative 3 would offer the benefit of reductions in fishing effort in some times/areas, which may offer an overall positive benefit to the resources in comparison to the no action alternative. The no action alternative, however, will retain the measures in place to maintain the non-target species and other fisheries, and not realize the benefits of Alternative 2 and/or 3 for non-target species and other fisheries.

5.4.3.4 Impacts of Alternative 2 (River Herring Monitoring/Avoidance) on Non-Target Species and Other Fisheries

Detailed analyses related to the development of the management measures to address river herring bycatch can be found in Appendix IV of this document (Volume II) and should be referenced for additional technical and supporting information.

To develop and evaluate the proposed areas, the Herring PDT constructed a model of river herring distribution at sea using two indicators: percent occurrence and presence above a threshold level of river herring using NEFSC trawl surveys form the 1960s to 2009. These surveys provide snapshots of river herring distribution at sea. The analysis revealed that in general river herring are widely distributed across the US continental shelf during the spring, but their range is truncated in the fall to the Gulf of Maine. Analysis of the winter survey showed that river herring overwinter south of Cape Cod, however the winter survey did not survey in the Gulf of Maine. The Herring PDT compared this to NEFOP observed location of recent catch (2005-2009) of river herring by the Atlantic herring fishery and found similar patterns.

As part of the analysis, river herring monitoring/avoidance areas options were compared to other areas identified using research surveys. The survey-based areas provide information on the times and areas were river herring are likely to be encountered absent information from the fishery. Additional information/analyses provided by the Herring PDT can be found in Volume II, Appendix III (Herring PDT Analysis: Development of Measures to Address River Herring Bycatch) and Appendix VI (Detailed Analysis of Impacts of Management Measures Under Consideration in Amendment 5 to Address River Herring Bycatch).

In Appendix VI (Volume II), Table 12 – Table 17 and associated Figure 29 – Figure 35 provide a comparison of the bimonthly river herring monitoring/avoidance areas to associated survey-based areas. The number of NEFOP observations used to identify each monitoring/avoidance area (fishery-based areas) are provided in Table 12 – Table 17. Further, the number of NMFS bottom-trawl surveys used to identify survey-based areas are found within hatched areas in Figure 29 – Figure 35. Several questions were asked to qualitatively compare fishery-based and survey-based areas:

1) Are there any adjacent fishery-based areas?
2) Are there any adjacent survey-based areas?
3) Does the fishery-based area overlap a survey-based area?

Adjacency was defined as areas sharing a side and/or corner. The results of this analysis for each bimonthly period provide a qualitative evaluation of the proposed Monitoring/Avoidance Areas.

Spatial management options developed are similar to the areas identified by the survey-based analysis. However, there are many hotspot areas identified as important that are adjacent to the spatial management options. The risk is that future river herring migratory patterns and aggregations may change from recent patterns. For example if river herring distribution centers and/or aggregations shift (e.g. northward due to changing environmental conditions) in the future, these areas may not detect these changes (monitoring/avoidance area) or provide adequate protection (protection areas).

Under any/all of the monitoring options under consideration in Alternative 2, the impacts of Alternative 2 on non-target species/other fisheries relative to Alternative 1 (no action) are likely to be *potentially positive*. Positive impacts are likely to result from increased catch monitoring in the fishery and an improved understanding of river herring encounters in the herring fishery; additional positive impacts could result if the fleet chooses to avoid these areas and river herring bycatch decreases. The selection of permit holders to which the river herring measures apply (A/B/C/D) may influence the scope of the impacts; a greater positive impact would likely result from incorporating more vessels into the monitoring/avoidance program, thereby collecting more information.

There is, however, some degree of uncertainty about the nature and extent of impacts expected under these options because the impacts are linked to variability associated with river herring distribution as well as any shifts in fishing effort that may result from the measures implemented in the Monitoring/Avoidance Areas (and the costs associated with fishing in these areas). Focused monitoring in these areas may improve bycatch information and enhance the ability to assess the impacts of interactions between the herring fishery and non-target species, but only if the areas encompass future distribution of the species as well as areas of seasonal concentrations of herring fishing effort. Based on the information presented in Section 5.4.6.5 of this document (Impacts on Fishery-Related Businesses and Communities – Options for Shrimp/Large-Mesh Fishery Exemptions) and uncertainty about effort/distribution shifts, it is unclear how exemptions under consideration for the Northern shrimp fishery and large-mesh groundfish fishery may affect non-target species and other fisheries, but the impacts of these exemptions under Alternative 2 is not likely to be significant because of the small component of the fishery that would be affected.

Options 1, 2, and 3

Options 1, 2, and 3 propose additional monitoring requirements in the Monitoring/Avoidance Areas. Option 1 would require 100% observer coverage in these areas; Option 2 would require the Closed Area I sampling provisions to apply to these areas; Option 3 would implement either Option 1 or Option 2 when a specified river herring catch trigger is reached in a particular area. Option 3 delays implementation of these measures until a catch trigger is reached and may have slightly less benefit because the measures would not apply in the proposed Monitoring/Avoidance Areas throughout the entire fishing year, but the difference in terms of the impacts will depend on where/when the trigger is reached.

- Option 1 (100% Observer Coverage) is also being considered across the limited access herring fishery as one of the alternatives to allocate observer coverage in this amendment (Section 3.2.1.2). The impacts on non-target species and other fisheries of implementing Option 1 in the River Herring Monitoring/Avoidance Areas are expected to be similar to those discussed in Section 5.2.3 (Impacts of Alternatives to Allocate Observer Coverage on Non-Target Species and Other Fisheries), but to a lesser degree, because the requirements would only apply on a seasonal basis in the River Herring Monitoring/Avoidance Areas (versus throughout the fishery). The impacts on non-target species and other fisheries may therefore be *potentially positive*.
- Option 2 (Closed Area I Provisions) is also being considered as a measure to address net slippage across the entire fishery (Section 3.2.3). The impacts on non-target species and other fisheries of implementing Option 2 in the River Herring Monitoring/Avoidance Areas are expected to be similar to those discussed in Section 5.3.2.2.3 (Impacts of Measures to Address Net Slippage on Non-Target Species and Other Fisheries), but to a lesser degree, because the requirements would only apply on a seasonal basis in the River Herring Monitoring/Avoidance Areas (versus throughout the fishery). The impacts on non-target species and other fisheries may therefore be *potentially positive*.
- Option 3 (Trigger-Based Monitoring/Avoidance) would implement either Option 1 or Option 2 when a specified river herring catch trigger is reached in a particular area. Option 3 delays implementation of these measures until a catch trigger is reached and may have slightly less benefit because the measures would not apply in the areas throughout the entire fishing year, but the difference in terms of the impacts will depend on where/when the trigger is reached. Overall, the impacts on non-target species and other fisheries are still expected to be *potentially positive*, relative to taking no action.

River Herring

In general, establishing River Herring Monitoring/Avoidance Areas could improve understanding of river herring encounters in the Atlantic herring fishery through focused monitoring and could lead to possible reductions in river herring mortality if the fleet avoids these areas through the utilization of better information about bycatch. However, the monitoring options under Alternative 2 would likely result in no reduction on river herring mortality in the monitoring/avoidance areas, if the fleet chooses to fish in these areas. Additionally, specific areas monitored instead of across the full range of the species may miss important river herring encounters and influences river herring removals estimates. For example if river herring distribution centers and/or aggregations shift (e.g. northward due to changing environmental conditions) in the future, these areas may not detect these changes (monitoring/avoidance area). Likewise, shifts in fishing effort potentially impact the quality of information collected on river herring and the mortality of river herring. For example, if fishing effort shifts in the future out of the proposed areas, impacts on river herring by the fishery could increase into the outside areas. Effort shifts resulting from the measures proposed in Alternative 2 are difficult to predict, and the impact of any effort shift on river herring bycatch and/or the river herring resource cannot be measured at this time.

Other Small Pelagic Species (Mackerel, Squid, Butterfish, Whiting, and Menhaden)

Increased monitoring may provide additional information on bycatch/discards of the other pelagic species. This, however, is dependent on individual species life history and migratory patterns along with their susceptibility to fishing gears at different life stages. In addition when the mackerel fishery overlaps the Atlantic herring fishery in space and time and in these areas (e.g. Mid-Atlantic in winter), additional information on bycatch/discards will be gained from these vessels fishing for both target species.

Groundfish Species

Increased monitoring may provide additional information on bycatch/discards of the groundfish species, including haddock. This, however, is dependent on individual species life history and migratory patterns along with their susceptibility to fishing gears at different life stages. For example, increased monitoring in areas that overlap the haddock sub-stock catch cap monitoring areas (Framework 46, Groundfish FMP) could provide more information on haddock discards.

Option 4: Two-Phase Bycatch Avoidance Strategy

With this option, areas with relatively high river herring encounters would be avoided (by time or distance) when river herring are encountered at some threshold level. The details of this option are currently under development and await results from the SFC/SMAST/MADMF pilot project. If the pilot is successful at developing at-sea river herring avoidance protocols for the Atlantic herring fleet, there could be reductions in river herring mortality in the bimonthly Monitoring/Avoidance Areas. Additionally, there would need to be adequate incentives in place for the fleet to avoid the areas. The impacts of this option on non-target species and other fisheries, therefore, is potentially positive.

However, an avoidance strategy linked to specific bimonthly avoidance areas (i.e. not implemented throughout the spatial and temporal extent of the Atlantic herring fishery), could miss river herring encounters in adjacent areas, as demonstrated by the survey-based areas (additional areas of likely river herring encounter). Such an approach would not reduce river herring mortality outside of Monitoring/Avoidance Areas. Furthermore, areas outside avoidance areas could have increased rates of river herring encounters by the fishery, if areas selected do not reflect year-to-year river herring variability. Therefore, if the fleet is successful at developing at-sea protocols to avoid river herring inside the avoidance areas, modification of these protocols across the entire range of river herring should be considered during Phase II.

5.4.3.5 Impacts of Alternative 3 (River Herring Protection) on Non-Target Species and Other Fisheries

Alternative 3 proposes to establish River Herring Protection Areas, seasonally (bimonthly) areas closed to herring fishing to some/all herring vessels. Options 1 and 2 are similar; under Option 2, the closed areas would become effective after a river herring catch trigger is reached in a particular area and may have slightly less benefit depending on when/where the trigger is reached. The potential benefit of the bimonthly protection areas is that they provide river herring mortality protection during at-sea migrations by closing specific river herring fishery-based encounter hotspots. Such an approach could lead to reductions in at-sea river herring mortality. Relative to the no action alternative (Alternative 1), the impact of Alternative 3 (Options 1 and 2) on non-target species and other fisheries is *potentially positive*.

Based on the information presented in Section 5.4.6.5 of this document (Impacts on Fishery-Related Businesses and Communities – Options for Shrimp/Large-Mesh Fishery Exemptions) and uncertainty about effort/distribution shifts (discussed under Alternative 2 and below as well), it is unclear how exemptions under consideration for the Northern shrimp fishery and large-mesh groundfish fishery may affect non-target species and other fisheries, but the impacts of these exemptions under Alternative 3 is not likely to be significant because of the small component of the fishery that would be affected.

In Appendix VI (Volume II), Table 31 – Table 34 and associated Figure 55 – Figure 58 provide a comparison of the bimonthly river herring protection areas to associated survey-based areas. The number of NEFOP observations used to identify each monitoring/avoidance area (fishery-based areas) are provided in Table 31 – Table 34. Further, the number of NMFS bottom-trawl surveys used to identify survey-based areas are found within hatched areas in Figure 55 – Figure 58. Several questions were asked to qualitatively compare fishery-based and survey-based areas:

1) Are there any adjacent fishery-based areas?
2) Are there any adjacent survey-based areas?
3) Does the fishery-based area overlap a survey-based area?

Adjacency was defined as areas sharing a side and/or corner. The results of this analysis for each bimonthly period provide a qualitative evaluation of the proposed Protection Areas.

Spatial management options developed are similar to the areas identified by the survey-based analysis. However, there are many hotspot areas identified as important that are adjacent to the spatial management options. The risk is that future river herring migratory patterns and aggregations may change from recent patterns. For example if river herring distribution centers and/or aggregations shift (e.g. northward due to changing environmental conditions) in the future, these areas may not detect these changes (monitoring/avoidance area) or provide adequate protection (protection areas). With fixed bimonthly Protection Areas, information about catch/bycatch in the herring fishery would not be collected in the areas, nor would there be river herring mortality protection outside of proposed Protection Areas. Therefore, areas outside fixed areas could have increased rates of river herring encounters by the fishery, if areas selected do not reflect river herring year-to-year variability. If fishing effort shifts because of the seasonal closures, encounters of river herring in the fishery may change from previous observations; the impact of effort shifts cannot be predicted. If river herring distribution centers and/or aggregations shift (e.g. northward due to changing environmental conditions) in the future, these protection areas may not provide positive benefits for river herring unless the areas encapsulate these potential changes in patterns. Likewise, triggered protection areas might not be put in place quickly enough to be at the pace with river herring migratory patterns.

Other Small Pelagic Species (Mackerel, Squid, Butterfish, Whiting, and Menhaden)

Protection areas may provide mortality reductions for other pelagic species. This, however, is dependent on individual species life history and migratory patterns along with their susceptibility to fishing gears at different life stages. If fishing effort shifts because of the seasonal closures, encounters of these species in the herring fishery may change from previous observations; the impact of effort shifts cannot be predicted. In addition, many of the other small pelagic species (mackerel, squid, whiting) are managed similarly to Atlantic herring, through an annual catch limit (ACL, reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) designed to prevent overfishing, and accountability measures (AMs) designed to prevent ACLs from being exceeded. Due to the ongoing management of these fisheries through ACLs/AMs, bimonthly closures under Alternative 3 may have little impact on the managed species.

Groundfish Species

Protection areas may provide mortality reductions for groundfish species, including haddock. This, however, is dependent on individual species life history and migratory patterns along with their susceptibility to fishing gears at different life stages. For example, protection areas overlapping the haddock sub-stock catch cap areas (FW 46, Groundfish FMP) could reduce haddock mortality and alter monitoring of the haddock catch cap by displacing fishing effort into adjacent areas. If fishing effort shifts because of the seasonal closures, encounters of these species in the herring fishery may change from previous observations; the impact of effort shifts cannot be predicted.

In addition, groundfish stocks are managed through ACLs (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) designed to prevent overfishing, and AMs designed to prevent ACLs from being exceeded. Due to the ongoing management of the multispecies fishery through ACLs/AMs, bimonthly closures under Alternative 3 may have little impact on groundfish species.

5.4.3.6 Summary of Impacts on Non-Target Species and Other Fisheries

Table 151 and Table 152 generally summarize the impacts of the measures proposed to address river herring bycatch on Non-Target Species and Other Fisheries. The tables provide a qualitative comparison of the positive and negative impacts that may result from the alternatives under consideration with respect to non-target species and other fisheries. Relative to taking no action, Alternative 2 and Alternative 3 will potentially result in positive impacts on non-target species and other fisheries, particularly river herring, as these measures were developed specifically to address river herring bycatch. However, while impacts are potentially positive under both alternatives, the nature and extent of impacts relies heavily on shifts in both the distribution of the non-target species and the vessels that are affected/displaced by the measures proposed in either Alternative 2 or Alternative 3. These uncertainties are reflected in the trade-offs discussed in Table 151 and Table 152.

Table 151 Biological – River Herring-Focused Trade-offs of Spatial Management Approaches

	Biological- River Herring	
Possible Measure	**Positive Impacts**	**Negative Impacts**
Fixed Bimonthly Monitoring Areas (Alt.2, Opt.1-3) Obs. Coverage/CA I Sampling	Areas improve understanding of river herring encounters in the Atlantic herring fishery through focused monitoring. Possible reductions in river herring mortality if fleet avoids the areas.	No impact on river herring mortality, unless the fishery chooses to stay out of monitoring areas. Specific areas monitored instead of across the full range of the species misses important river herring encounters and influences river herring removals estimates.
Fixed Bimonthly Avoidance Areas (Alt.2, Opt.4) Two-Phase Avoidance Program	Areas with relatively high river herring encounters are avoided (by time or distance) when river herring are encountered at some threshold level. Likely reductions in river herring mortality.	No river herring mortality protection outside of avoidance areas. Areas outside avoidance areas could have increased rates of river herring encounters by the fishery, if areas selected do not reflect year-to-year variability.
Fixed Bimonthly Protection Areas (Alt. 3, Opt.1) Closed Areas	Areas provide river herring mortality protection during at-sea migrations by closing specific river herring encounter hotspots. Likely reductions in river herring mortality.	No river herring mortality protection outside of protection areas. Areas outside fixed areas could have increased rates of river herring encounters by the fishery, if areas selected do not reflect year-to-year variability.
Triggered Bimonthly Protection Areas (Alt.3, Opt.2) Trigger-Based Closures	Areas provide river herring mortality protection during at-sea migrations by closing specific river herring encounter hotspots upon reaching a trigger. Possible reductions in river herring mortality.	No river herring mortality protection outside of trigger areas. Trigger areas are not put in place quickly enough to be at the pace with river herring migratory patterns.

**This table provides a qualitative comparison of the positive and negative impacts that may result from the alternatives under consideration. The impacts of the no action alternative are discussed in detail in the previous subsections.*

Table 152 Biological – Other Small Pelagics-Focused Trade-offs of Spatial Management Approaches

	Other Small Pelagic- American and Hickory Shad, Mackerel, Herring, Squid, Butterfish, Whiting, Menhaden	
Possible Measure	**Positive Impacts**	**Negative Impacts**
Fixed Bimonthly Monitoring Areas (Alt.2, Opt.1-3) Obs. Coverage/CAI Sampling	Increased monitoring can provide additional information on bycatch/discards of other non-target species	Dependent on individual species life history and migratory patterns.
Fixed Bimonthly Avoidance Areas (Alt.2, Opt.4) Two-Phase Avoidance Program	Areas with co-occurring small pelagic species (shads, mackerel, herring, squid, butterfish, whiting) and potentially groundfish are avoided (by time or distance) when river herring are encountered at some threshold level. Possible reductions in American and hickory shad mortality, high rate of co-occurrence with river herring in NEFOP data for Atlantic herring fishery.	Dependent on individual species life history and migratory patterns.
Fixed Bimonthly Protection Areas (Alt. 3, Opt.1) Closed Areas	Areas might provide mortality protection for co-occurring small pelagic species (shads, mackerel, herring, squid, butterfish, whiting) and potentially groundfish are protected by closing specific river herring encounter hotspots. Likely reductions in American and hickory shad mortality, due to high rate of co-occurrence with river herring encounters in NEFOP data for Atlantic herring fishery.	Dependent on individual species life history and migratory patterns.
Triggered Bimonthly Protection Areas (Alt.3, Opt.2) Trigger-Based Closures	Areas might provide mortality protection for co-occurring small pelagic species (shads, mackerel, herring, squid, butterfish, whiting) and potentially groundfish are protected by closing specific river herring encounter hotspots upon reaching a trigger. Possible reductions in American and hickory shad mortality, due to high rate of co-occurrence with river herring encounters in NEFOP data for Atlantic herring fishery.	Dependent on individual species life history and migratory patterns.

**This table provides a qualitative comparison of the positive and negative impacts that may result from the alternatives under consideration. The impacts of the no action alternative are discussed in detail in the previous subsections.*

5.4.4 Impacts on Physical Environment and EFH

5.4.4.1 Impacts of Alternative 1 (No Action Alternative) on Physical Environment and EFH

Under Alternative 1, no additional management measures would be implemented in Amendment 5 to address river herring bycatch. Since this alternative represents the status quo, no changes in the impacts on seabed habitats are expected. Specifically, adverse effects on EFH that result from the herring fishery are estimated to be minimal and temporary, and would continue to be minimal and temporary if this alternative is selected.

5.4.4.2 Impacts of Alternative 2 (River Herring Monitoring/Avoidance) on Physical Environment and EFH

Alternative 2 would implement enhanced monitoring requirements (options 1-3) or avoidance requirements (option 4) for river herring in specified River Herring Monitoring/Avoidance Areas. The enhanced monitoring requirements are not expected to result in any additional impacts to seabed habitats/EFH, in comparison to the no action alternative. The avoidance requirements could result in spatial shifts in herring fishing effort, but changes are difficult to predict. Because seabed contact by midwater trawl gear is rare, it is assumed that herring fishery adverse effects on EFH will continue to be minimal and temporary if monitoring and avoidance areas are implemented.

5.4.4.3 Impacts of Alternative 3 (River Herring Protection) on Physical Environment and EFH

Alternative 3 would implement River Herring Protection Areas, which would be closed to the directed herring fishery on either a predetermined seasonal basis (specific, relatively small areas associated with specific months), or on a catch-trigger basis (with larger, more general areas subject to trigger controls on a year round basis). Predetermined seasonal closures could influence spatial patterns of fishing effort, but changes are difficult to predict. Because seabed contact by midwater trawl gear is rare, it is assumed that herring fishery adverse effects on EFH will continue to be minimal and temporary if monitoring and avoidance areas are implemented. If catch triggers were exceeded, the catch trigger options could also influence the spatial patterns of fishing effort. A shift in fishing that results in increased effort on Georges Bank during herring spawning (Sept-Nov) might lead to an increase in seabed gear contact, and thus an increase in adverse effects to EFH, because herring are near the seafloor during this time. However, is assumed that vessels will move to other inshore areas that would remain open, rather than fishing on Georges Bank during the herring spawning season. Triggers might not be exceeded in any given area and year, however, resulting in no change in patterns of fishing. The overall impacts of Alternative 3 are therefore unknown at this time.

5.4.5 Impacts on Protected Resources

5.4.5.1 Impacts of Alternative 1 (No Action Alternative) on Protected Resources

Under Alternative 1, no additional management measures would be implemented in Amendment 5 to address river herring bycatch. No additional impacts are expected on protected resources above the current status quo, as the management measures currently in place would be maintained. Alternative 2, Options 1, 2, and 3 all provide a the opportunity for more information collection when compared to this no action alternative, however Option 4 is likely to present no additional benefits. The impacts of Alternative 3, Option 1 are difficult to predict at this time so the comparison to this No Action alternative is difficult to make, however Option 2 would present a low positive.

5.4.5.2 Impacts of Alternative 2 (River Herring Monitoring/Avoidance) on Protected Resources

Options 1, 2, and 3

These options have the potential to have a low positive impact on protected resources through the collection of more information during encounters by the herring fishery (in comparison to Alternative 1, the No Action alternative). This information could, in turn, help with the better understanding of protected resources and improve their chance of survival. Option 1 would provide more information than Options 2 and 3, however overall magnitude of the improvement of monitoring is not likely to be great, as it will only apply in specific river herring hotspots, as determined by the Council.

Option 4: Two-Phase Bycatch Avoidance Strategy

The details of Option 4 are still being developed in the joint project between SFC/SMAST/MADMF, however the overall concept of the project is to allow the herring fishery to avoid areas with relatively high river herring encounters when river herring have been encountered at some threshold level. This project will ensure that vessels move out of the hotspots during certain times, however the variability in when and where the fleet movement will be makes the effects of this measure on protected resources difficult to determine. While it is likely that the effort will shift by the small increments of river herring hotspots, it is unlikely that this shift will increase or decrease the overall effort or change the vessels likelihood of encountering protected species by moving the vessels in the small increments. Therefore Option 4 is likely to have a neutral impact on protected resources in comparison to the No Action Alternative and the other three Options (1, 2, and 3) described within Alternative 2.

5.4.5.3 Impacts of Alternative 3 (River Herring Protection) on Protected Resources

Option 1: Closed Areas

This option has the potential to provide a low positive impact for protected resources by reducing the chance of encounters, and therefore potential mortality, with the herring fleet. The impact of these closed areas are difficult to determine at this time, however, as they are small in size and scattered up and down the east coast, making the behavior of the fleet in reaction to the closed areas difficult to determine at this time. It is possible that the overall magnitude of the effort will not decrease, but rather be displaced to the outside of the closed areas. The impacts of this option are therefore unknown at this time; similar to Option 4 under Alternative 2 (River Herring Monitoring/Avoidance), this option would provide areas of safety for protected species, but may not deter the overall effort and therefore the overall probability of a herring vessel encountering a protected species. Therefore, the overall impact of Option 1 is unknown.

Option 2: Trigger-Based Protection Areas

Under Alternative 3, all the benefits described in Option 1 (closed areas) would extend to Option 2 (trigger-based closed areas), however the magnitude of the benefits would be decreased under Option 2, because the areas would only be closed when triggered. Therefore, the overall impact of Option 2 is also unknown.

5.4.6 Impacts on Fishery-Related Businesses and Communities

5.4.6.1 Impacts of Alternative 1 (No Action Alternative) on Fishery-Related Businesses and Communities

Under Alternative 1, no additional management measures would be implemented in Amendment 5 specifically to address river herring bycatch. Herring businesses and dependent communities would likely not be affected, as the management measures in place that govern the herring fishery would remain intact. The potential (negative) impacts described below that affect herring fishery participants would not arise under Alternative 1 (no action alternative), but if no action is taken, any businesses that rely on the river herring, whether through a directed fishery, or indirectly as companies that rely on herring as forage, would not gain the potential benefits they anticipate with river herring protection.

5.4.6.2 Impacts of Alternative 2 (River Herring Monitoring/Avoidance) on Fishery-Related Businesses and Communities

Alternative 2 proposes to establish River Herring Monitoring/Avoidance Areas and includes options for implementing additional catch monitoring provisions in those areas. Options 1, 2, and 3 propose additional monitoring requirements in the Monitoring/Avoidance Areas. Option 1 would require 100% observer coverage in these areas; Option 2 would require the Closed Area I sampling provisions to apply to these areas; Option 3 would implement either Option 1 or Option 2 when a specified river herring catch trigger is reached in a particular area. Option 3 delays implementation of these measures until a catch trigger is reached and may have slightly less impact because the measures would not apply in the areas throughout the entire fishing year, but the difference in terms of the impacts will depend on where/when the trigger is reached.

- Option 1 (100% Observer Coverage) is also being considered across the limited access herring fishery as one of the alternatives to allocate observer coverage in this amendment (Section 3.2.1.2). The impacts on fishery-related businesses and communities of implementing Option 1 in the River Herring Monitoring/Avoidance Areas are expected to be similar to those discussed in Section 5.2.6 (Impacts of Alternatives to Allocate Observer Coverage on Fishery-Related Businesses and Communities), but to a lesser degree, because the requirements would only apply on a seasonal basis in the River Herring Monitoring/Avoidance Areas (versus throughout the limited access fishery).
- Option 2 (Closed Area I Provisions) is also being considered as a measure to address net slippage across the entire fishery (Section 3.2.3). The impacts on fishery-related businesses and communities of implementing Option 2 in the River Herring Monitoring/Avoidance Areas are expected to be similar to those discussed in Section 5.3.2.2.2 (Impacts of Measures to Address Net Slippage on Fishery-Related Businesses and Communities), but to a lesser degree, because the requirements would only apply on a seasonal basis in the River Herring Monitoring/Avoidance Areas (versus throughout the limited access fishery).

Relative to the no action alternative, Alternative 2 is expected to have a *negative* impact on fishery-related businesses and communities due to the costs associated with increased monitoring. The extent of the impacts will depend on the option selected for monitoring as well as the availability of Federal funding for observer coverage in the proposed River Herring Monitoring/Avoidance Areas.

- Option 1, requiring 100% observer coverage in the Monitoring/Avoidance Areas, would likely have the largest negative impact on fishery-related businesses and communities, especially if the industry is required to pay for some or all observer coverage. The Funding Options under consideration in this amendment relate to the alternatives to allocate observer coverage on limited access herring vessels. It is not clear if the industry would be required to pay for 100% observer coverage under this option. If an industry-funded program is utilized to pay for observer coverage in the River Herring Monitoring/Avoidance Areas under this option, the extent of impacts would depend on how many vessels are affected by this requirement (i.e., which permit categories are selected by the Council to be subject to the river herring management measures in Amendment 5).
- Option 2 could have a similar negative impact as Option 1 if the sub-option for 100% observer coverage is selected. The impact is lessened under the sub-option for less than 100% observer coverage because it is assumed that this sub-option would not result in a need for additional funding of observer days by the industry.
- Option 3 implements either Options 1 or 2 after a catch trigger is reached and would therefore have less impact on fishery-related businesses and communities because the additional monitoring requirements would not become effective until the catch trigger is reached; if the catch trigger is not reached in any area during the fishing year, then no additional monitoring requirements would be applied to the Monitoring/Avoidance Areas. The sub-options for specifying the river herring catch trigger may affect the timing of implementation of any additional measures (i.e., the higher the catch trigger, the less likely it is to be reached – see analyses provided in Appendix VI, Volume II).
- Option 4 represents an approach that builds from some industry-based initiatives and has potential to minimize adverse effects on fishery-related businesses and communities.

Details related to the specific impacts of each option under Alternative 2 on fishery-related businesses and communities are discussed in the following pages.

Option 1: 100% Observer Coverage

Alternative 2, Option 1 requires 100% observer coverage for some/all vessels on declared herring trips in the identified River Herring Monitoring/Avoidance Areas. The economic impacts on fishery-related businesses and communities depends on the funding options for observer coverage. If these businesses are not required to pay for observer coverage, then the impact of these options are neutral. If observer coverage is paid for by the fishing industry, then these options will have a *negative* impact on the fishing-related businesses by increasing costs.

If observer coverage is unaffordable for a subset of vessels, this option may lead to lower revenues for vessels whose owners choose to forego trips. Some negative impacts could be mitigated by exempting the shrimp and large-mesh bottom trawl fisheries (see Section 5.4.6.5 for more information about these fisheries), but the boats most likely to benefit from these exemptions are smaller boats with Category C vessels that fish primarily inshore. Finally, because vessels are prohibited from fishing in the River Herring Monitoring/Avoidance Areas without a NMFS-approved observer on board, Option 1A and 1B may negative impacts on operational flexibility if a NMFS-approved observer is un available.

Option 1A requires 100% observer coverage for A/B/C vessels when on a declared herring trip. The impact on fishing vessels is treated separately by gear and permit category to provide insight into the differential impacts of these options on various gear and permit categories. Table 157 – Table 164 summarize the fishing effort, herring revenues, herring landings, and total revenues which were located in the monitoring options. Approximately 6% of the purse seine (all permit categories) effort, catch, and revenues are derived from the monitoring areas. Therefore, the impacts on the purse seine fleet are expected to be neutral or slightly negative if the industry funds the observer coverage. A fairly large portion of the Category A/B/C trawl fishery would be impacted by the monitoring options; 40-45% of the effort, catch, and revenues for this segment of the fishery occurred in the monitoring areas. This option may also affect vessels targeting other species such as mackerel or squid while on declared herring trips. Therefore, the impact of this option is characterized as negative if the industry funds the observer coverage.

Table 155 describes the total number of trips and number of observer-days required to meet this coverage if this option had been active in 2010. In 2010, 343 trips (51.7% of total trips) entered the monitoring areas. 974 observer-days would have been required under Option 1A if this option had been in place during 2010.

In order to place the costs of industry-funded observers into context, Table 153 summarizes average revenues per trip, average revenues per day absent, operating costs per trip, and operating costs per day absent, classified by gear type for 2008-2010. Revenues were calculated using the VTR and Dealer data while operating costs were based on data collected through the observer program. Operating costs in this fishery are primarily fuel expenses; the price of fuel has fluctuated (along with the price of crude oil) over the past three years.

Table 153 2008-2010 Average Revenues, Costs Per Day and Average Revenues, Costs Per Trip for Category A/B/C Herring Vessels

	Revenue/Day	Revenue/Trip	Operating Costs/Day	Operating Costs/Trip
Single Midwater Trawl	$12,853	$41,721	$4,271	$12,608
Pair Trawl	$15,683	$43,166	$3,295	$9,372
Purse Seine	$18,557	$25,499	$1,798	$2,746
Bottom Trawl	$5,325	$7,863	$785	$524

Revenue Data is from VTR and Dealer (n=5,329)
Operating Costs data is from Observer (n=352)

Relative to the daily operating costs for the fishery, the cost of an observer is fairly high. For example, a NEFOP observer would increase the per-day costs of bottom trawl, single midwater trawl, pair trawl, and purse seine by 153%, 28%, 36%, and 67% respectively (Table 154). However, relative to daily revenues, the cost of an observer is lower; an observer would cost 22%, 9%, 9%, and 6% of average daily revenues for the bottom, midwater, pair trawl, and purse seine vessels. These numbers are presented for illustration; it is possible that the type of data required in this fishery would result in higher or lower per-day costs than described in Table 153.

Table 154 Cost of a NEFOP Observer as a Percentage of Daily Revenues and Daily Operating Costs

	Revenue	Costs
Single Midwater Trawl	9.3%	28.1%
Pair Trawl	7.7%	36.4%
Purse Seine	6.5%	66.7%
Bottom Trawl	22.5%	152.8%

Option 1B requires 100% observer coverage for A/B/C and Category D (open access) vessels when on a declared herring trip. Table 157 – Table 164 summarize the fishing effort, herring revenues, herring landings, and total revenues which were located in the monitoring options. The impacts of this measure are similar to Option 1A. Table 156 describes the total number of trips and number of observer-days required to meet this coverage if this option had been active in 2010. In 2010, 356 trips (50.3% of total trips) entered the proposed monitoring areas. 987 observer-days would have been required under Option 1B if this option had been effective during 2010.

Category C and Category D Vessels

The potential costs of monitoring the Category C herring vessels is discussed in Section 5.2.6.3 of this document (100% observer coverage for the limited access herring fishery). As the analysis indicates, incorporating Category C vessels may increase costs significantly, especially if observers are required on all trips for C vessels. Table 48 (p. 225) shows that over 2,000 vessels currently possess Category D (open access) permits. Requiring these vessels to carry an observer on board in the River Herring Monitoring/Avoidance Areas would again significantly increase costs because of the sheer number of vessels and trips that would be required to have an observer on board. It is possible, and likely for many. that Category D vessels would either relinquish their herring permit or fish in other areas during the restrictions in the bimonthly Monitoring/Avoidance Areas if they would be required to pay for an observer.

In general, the affected trips and required coverage for 100% observer coverage are the same as in Option 1 (see Table 155). Beyond additional coverage, vessels will incur additional regulatory costs related to filing out Released catch Affidavits. Note that the requirement to exit the area is creates a disincentive to safety-at-sea.

Option 2A

The impacts of this option are similar to the previous option and depend largely on who is responsible for covering the costs of additional observer coverage.

Option 2B

The impacts of Option 2B are similar to that of 2A, except vessel have the flexibility to fish in the monitoring areas if an observer is unavailable.

Option 2C

The impacts of Option 2C are similar to the impacts of 1A. However, vessels may choose not to declare that they are on a herring trip, and be able to use the monitoring areas without a monitor.

Option 2D

The impacts of Option 2D are similar to the impacts of 1B. However, vessels may choose not to declare that they are on a herring trip, and be able to fish for other species in the monitoring areas without a monitor.

Table 155 Total Number of Trips and Number of Observer-Days Required to Meet Sub-Option 1A, if This Option had been Effective in 2010

Gear (ABC permits only)	Trips in Monitoring Areas	Percentage of total Trips	Days of Coverage Required
Trawl	298	64.6%	874
Purse Seine	45	22.3%	100
Total	343	51.7%	974

Table 156 Total Number of Trips and Number of Observer-Days Required to Meet Sub-Option 1B, if This Option had been Effective in 2010

Gear (ABCD permits)	Trips in Monitoring Areas	Percentage of total Trips	Days of Coverage Required
Trawl	311	61.5%	887
Purse Seine	45	22.3%	100
Total	356	50.3%	987

Table 157 Fishing Time (Hours) Inside and Outside the Monitoring Areas

		Fishing Time		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		2,617	330	2,947
TR	ABC	6,699	5,406	12,105
	D	227	71	298
Grand Total		9,544	5,807	15,351

Table 158 Fishing Time (%) Inside and Outside the Monitoring Areas

		Fishing Time (%)		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		88.8%	11.2%	100.0%
TR	ABC	55.3%	44.7%	100.0%
	D	76.3%	23.7%	100.0%
Grand Total		62.2%	37.8%	100.0%

Table 159 Herring Catch (lbs.) Inside and Outside the Monitoring Areas

		Herring Catch		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		17,434,005	1,028,536	18,462,541
TR	ABC	67,237,466	56,866,383	124,103,849
	D	112,799	36,045	148,844
Grand Total		84,784,270	57,930,964	142,715,233

Table 160 Herring Catch (%) Inside and Outside the Monitoring Areas

		Herring Catch (%)		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		94.4%	5.6%	100.0%
TR	ABC	54.2%	45.8%	100.0%
	D	75.8%	24.2%	100.0%
Grand Total		59.4%	40.6%	100.0%

Table 161 Herring Revenue ($) Inside and Outside the Monitoring Areas

		Herring Revenue		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		$2,783,152	$174,925	$2,958,078
TR	ABC	$9,270,814	$6,349,882	$15,620,696
	D	$18,792	$5,645	$24,437
Grand Total		12,072,759	6,530,452	18,603,211

Table 162 Herring Revenue (%) Inside and Outside the Monitoring Areas

		Herring Revenue (%)		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		94.1%	5.9%	100.0%
TR	ABC	59.3%	40.7%	100.0%
	D	76.9%	23.1%	100.0%
Grand Total		64.9%	35.1%	100.0%

Table 163 Total Revenue ($) Inside and Outside the Monitoring Areas

		Total Revenue		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		$2,783,201	$174,928	$2,958,129
TR	ABC	$10,100,712	$7,992,356	$18,093,067
	D	$33,329	$9,683	$43,011
Grand Total		12917241.89	8176965.79	21094207.68

Table 164 Total Revenue (%) Inside and Outside the Monitoring Areas

		Total Revenue (%)		
Gear	Category	Not Monitored	Monitored	Grand Total
PUR		94.1%	5.9%	100.0%
TR	ABC	55.8%	44.2%	100.0%
	D	77.5%	22.5%	100.0%
Grand Total		61.2%	38.8%	100.0%

Category A/B Versus Category C and Category D Vessels

As discussed throughout this document, there are costs associated with incorporating a greater number of vessels into a comprehensive monitoring program, especially if there is an industry-funded element of the monitoring program. The goals and objectives of the monitoring program should be weighed against the costs of monitoring to the vessels and the degree of participation in the fishery.

To further investigate differential impacts by herring permit category, herring catch and revenues from these vessels inside and outside the proposed monitoring areas are summarized by permit category in Table 165. While 22-24% of the Category D effort, catch, and revenues are derived from the monitoring areas, the magnitude of effort, catch, and revenues attributable to Category D vessels is minimal. A fairly large portion of the Category A/B/C trawl fishery would be impacted by the monitoring options; 40-45% of the effort, catch, and revenues for this segment of the fishery occurred in the monitoring areas. Table 165 shows the potential impact of the monitoring areas on Category C vessels and the other fisheries on which they rely. While Category A vessels will be most affected because they catch the majority of herring, Category C vessels derive about 20% of their total revenues from all fisheries from the proposed monitoring areas. Should the monitoring measures become too costly for the Category C vessels to fish in these areas, they will likely lose revenues from other fisheries where herring may be caught incidentally.

Table 165 Herring Catch/Revenues and Total Revenues Inside and Outside the Proposed Monitoring Areas by Limited Access Herring Permit Category

Permit Cat.	No. Vessels	Inside/ Outside	Days Fished	Herring Catch (millions pounds)	Herring Revenue (millions dollars)	Total Revenue (millions dollars)
A	27	Outside	441	100.38	$13.77	$14.76
A	22	Inside	148	39.17	$4.36	$5.81
B	2	Outside	Cannot report	Cannot report	Cannot report	Cannot report
B	3	Inside	15	1.56	$0.17	$0.17
C	3	Outside	16	0.96	$0.23	$0.25
C	5	Inside	7	0.44	$0.04	$0.06
D	6	Outside	9	0.11	$0.02	$0.03
D	5	Inside	3	0.04	$0.01	$0.01

Option 2: Closed Area I Sampling Provisions

Option 2 proposes to implement Closed Area I sampling provisions in the River Herring Monitoring/Avoidance Areas on any trip with an observer on board (for some/all herring vessels depending on which permit categories are identified). While the original provisions appear to have been feasible from a sampling and logistical perspective, the new provisions to require operational discards to be brought on board have not been practiced yet because the fleet has not yet moved into the area around Closed Area I yet at the time of this writing. There may be some new challenges associated with bringing operational discards on board for some vessels. In addition, the effect of these provisions on purse seine operations is unclear because only trawl vessels fish in Closed Area I. The operation of the purse seine fishery is substantially different than that of the trawl fishery, and consideration must be given to the size of the vessels, nature of the fishery, and practical and safety implications of bringing the net on board to ensure that all operational discards come across the deck.

The restrictions already placed on midwater and pair trawl operations (e.g., the seasonal Area 1A closure) generally disadvantage this part of the fishery. Whereas requiring the extreme sampling in Closed Area I might be considered reasonable to document any interaction with groundfish in an area where groundfishing is not permitted, requiring these provisions wherever herring vessels go could be considered an inequitable burden. Further, if only the midwater and pair trawl vessels are required to comply, this could have the appearance of unfairness.

As previously discussed in this document (Section 5.3.2.2, Impacts of Measures to Address Net Slippage), any economic impacts to the herring fishery are expected to be neutral to slightly negative. These impacts will be through increased time spent pumping fish aboard the vessel to be sampled and inspected by a NMFS-approved observer. The pecuniary impacts on the participants in herring fishery are expected to be minimal. The same impacts (neutral to slightly negative) are expected for participants that hold Atlantic herring permits and are targeting other species (mackerel, squid). The negative impacts on fishery-related businesses and communities resulting from Option 2 are likely to be less than those under Option 1 (100% observer coverage), assuming the industry would be required to pay for observer coverage under Option 1.

Option 3: Trigger-Based Monitoring

This options establishes triggers, based on catch of river herring in three broad areas (CC, GOM, and SNE in Figure 19). There are three sets of options under consideration to establish river herring catch triggers, based on Maximum, Median, and Mean river herring removals estimated by the Herring PDT.

Trigger-based monitoring and trigger-based closed areas use a technique understood by fisheries participants. Atlantic herring participants would likely limit fishing in the protection area if feasible, but if river herring were not encountered, fishing for Atlantic herring could continue. The negative impact of this measure is that the uncertainty associated with trigger mechanisms makes planning difficult. Moreover, the complexity proposed with catch reporting to monitor a river herring trigger in addition to a haddock catch cap (Framework 46) and herring catch by management area will likely increase the reporting burden and prove to be challenging for fishery participants to provide accurate catch information in a real-time manner.

The first stage in assessing the impact of Trigger-Based Monitoring is to estimate when the triggers are likely to be reached. Use of VTR only is problematic, because river herring catch may not be accurately recorded in VTR. Therefore, a simulation based approach which combines VTR and observer bycatch rates is used. The detailed analysis is provided in Appendix VII of this document (Volume II); results and potential impacts are summarized below. The fishing years and river herring catch are simulated under two observer coverage scenarios (100% coverage and 50% coverage) to provide insight into the effect that changes in the levels of observer coverage might have on the triggers being reached.

The impacts of triggered closures are difficult to predict because it is difficult to know when these triggers would be achieved. The largest potential impacts are likely to be in the Southern New England areas because there is a large amount of overlap between the Protection areas and the fishery. Under these options, it is likely that all participants would undertake additional effort to avoid river herring in general. Therefore, it is reasonable to expect that this analysis somewhat over-estimates the probability that any trigger would be reached. However, it is not clear how effective the fishery is at avoiding river herring while continuing to harvest Atlantic herring.

Overall, the negative impact of Option 3 are expected to be less than Option 1 or Option 2 because Option 3 delays additional restrictions on the fishery until a specified catch trigger is reached. Of the three sub-options under consideration for river herring catch triggers, Option 3A is likely to have the smallest negative impacts on the entire fishery because the triggers in 3A are based on the maximum estimates from the selected time frame and are likely to be reached later in the fishing year (relative to the other options), if at all (see below). Option 3B is likely to have the largest impact on the fishery in the Cape Cod and Gulf of Maine areas and the 2nd smallest impact on the participants in the Southern New England area. Option 3C is likely to have the next smallest impact on the parts of the fishery which operate in the Cape Cod and Gulf of Maine areas and the largest impact on part of the fishery which use the Southern New England areas. Summary discussion of the potential for each of these triggers to be reached is provided below. The complete analysis, including graphic results of the projections, is provided in Appendix VI, Volume II (*Detailed Analysis of Impacts of Management Measures Under Consideration to Address River Herring Bycatch*).

Reporting Option 1:

Reporting Option 1 imposes some administrative and regulatory burden on fishing vessels.

Reporting Option 2:

Reporting Option 2 also imposes some administrative and regulatory burden on fishing vessels.

Trigger Option 3A (Max):

Under Option 3A, with 100% observer coverage, the Cape Cod (CC) and Gulf of Maine (GOM) triggers are unlikely to be reached; the triggers in those regions were reached in 5% and 4% of experiments. When reached, the triggers were reached late in the fishing year. However, the triggers were reached in 46% of the experiments in the Southern New England (SNE) region. The fishery is prosecuted in the winter; therefore, the triggers are likely to be reached either in the beginning of the year or at the end of the year. Under Option 3A with 50% observer coverage, the same qualitative pattern occurs: low probability of the trigger being reached in the Cape Cod or Gulf of Maine regions and a relatively high probability in the Southern New England area.

Trigger Option 3B (Median):

Under Option 3B, with 100% observer coverage, all triggers likely to be reached. The triggers in CC, GOM, and SNE were reached in 60%, 86%, and 77% of experiments respectively. The triggers in GOM and CC are likely to be reached at various times through the fishing year. The triggers in the Southern New England region again are likely to be reached either in the beginning of the year or at the end of the year. Under Option 3B, with 50% observer coverage, the same qualitative pattern occurs. The triggers in CC, GOM, and SNE were reached in 52%, 78%, and 62% of experiments respectively.

Trigger Option 3C (Mean):

Under Option 3C, with 100% observer coverage, all triggers likely to be reached. The triggers in CC, GOM, and SNE were reached in 27%, 67%, and 93% of experiments respectively. The triggers in GOM and CC are likely to be reached at various times through the fishing year. The triggers in the Southern New England region again are likely to be reached either in the beginning of the year or at the end of the year. Under Option 3C, with 50% observer coverage, the same qualitative pattern occurs. The triggers in CC, GOM, and SNE were reached in 25%, 60%, and 80% of experiments respectively.

Option 4: Two-Phase Bycatch Avoidance Strategy

The two-phase bycatch avoidance approach based on SFC/SMAST/MADMF project appears promising. Herring fishery participants have commented on the learning curve associated with river herring. Until recently, river herring was simply considered another form of bait. Now, however, most of the vessel captains have learned about the necessity of avoiding a catch of river herring and have educated their crews. This collaboration with trusted institutions will allow herring fishery participants to participate in observations and facilitate monitoring/sampling that will lead to appropriate adjustments of Monitoring/Avoidance Areas and to the development of avoidance strategies. Furthermore, social science research has documented improved effectiveness of regulations developed with a participatory/collaborative approach. In addition, selection of the initial areas (the New Jersey and Rhode Island grids) for the SFC/SMAST/MADMF pilot project were chosen by consulting the Herring PDT's spatial analysis of river herring catch in the Atlantic herring fishery.

Both fixed bimonthly monitoring areas and fixed bimonthly avoidance areas could enable Atlantic herring fishery participants to avoid river herring mortality if encounters in these areas are communicated quickly and consistently. These would also demonstrate the fishery's responsiveness to concerns about river herring.

Providing the industry with an opportunity to develop a communication network and bycatch avoidance strategy could ultimately reduce costs associated with bycatch avoidance because the industry would likely prioritize cost-effectiveness when developing strategies. For this reason, and because of the positive impacts associated with industry collaboration, the negative impacts on fishery-related businesses and communities associated with river herring bycatch avoidance may be less under Option 4 than the other options under consideration. Moreover, communication networks developed for river herring avoidance might be utilized for other reasons, for example, safety-related circumstances that arise suddenly, or other fisheries or fishing-related problems. Overall, it is expected that the impact of Option 4 may be a *low negative* in comparison to Alternative 1 (no action).

5.4.6.3 Impacts of Alternative 3 (River Herring Protection) on Fishery-Related Businesses and Communities

Alternative 3 proposes to establish River Herring Protection Areas and seasonally (bimonthly) close these areas to herring fishing to some/all herring vessels. Options 1 and 2 are similar; under Option 2, the closed areas would become effective after a river herring catch trigger is reached in a particular area and may have slightly less benefit depending on when/where the trigger is reached.

The detailed analysis of the impacts of Alternative 3 provided in Appendix VI (Volume II) describes the methods used to map the directed Atlantic herring fishery in relation to the proposed River Herring Protection Areas. The potential impacts described below that affect herring fishery participants would not arise under Alternative 1 (no action alternative), but if no action is taken, any businesses that rely on the river herring, whether through a directed fishery, or indirectly as companies that rely on herring as forage, would not gain the potential benefits they anticipate with river herring protection.

Fixed Bimonthly Protection Areas might unnecessarily constrain Atlantic herring operations, since hotspots are variable. This could lead to increased social costs triggered by economic losses. Some negative impacts could be mitigated by exempting the shrimp and large-mesh bottom trawl fisheries, but the boats most likely to benefit from these exemptions are smaller boats with Category C vessels that fish primarily inshore.

Trigger-based closed areas use a technique understood by fisheries participants. Atlantic herring participants would likely limit fishing in the protection area if feasible, but if river herring were not encountered, fishing for Atlantic herring could continue. The negative impact of this measure is that the uncertainty associated with trigger mechanisms makes planning difficult. Moreover, the complexity proposed with catch reporting to monitor a river herring trigger in addition to a haddock catch cap (Framework 46) and herring catch by management area will likely increase the reporting burden and prove to be challenging for fishery participants to provide accurate catch information in a real-time manner.

Overall, the impact of Alternative 3 in comparison to Alternative 1 (no action) is expected to be *negative*. While the impact of Alternative 2 is similar, it is of a different kind, as the impacts are related to monitoring and not closed areas.

Economic Impacts

Under this alternative, some/all vessels having a Category A, B, C, or D permit would be prohibited from fishing for, possessing, catching, transferring, or landing herring from the proposed River Herring Protection Areas on all fishing trips using small mesh. The economic impact of this alternative on fishing vessels is the change in profits of these vessels, after accounting for any behavioral changes. Under a spatial closure, the directed herring fleet may undertake different averting behavior to minimize the impact of those spatial closures. Vessels may fish in other areas, likely with lower profits. Vessels may fish in other fisheries, again, likely earning lower profits, or cease fishing operations, in which case they earn zero operating profits. The exact impacts cannot be quantified at this time. However, based on current patterns of use, the impacts are expected to be neutral for vessels that use purse seine gear. The impacts are expected to be negative for vessels that use trawl gear to harvest herring.

Maps of fishing effort in the Atlantic herring fishery are presented in Appendix VI, Volume II (*Detailed Analysis of Impacts of Management Measures Under Consideration in Amendment 5 to Address River Herring Bycatch*). The fishing time, herring catch, herring revenues, and total revenues which would occur in the River Herring Protection areas are presented below in Table 166 – Table 173. It is important to note that the revenue figures presented in Table 170 – Table 173 do not represent the economic impacts of the proposed River Herring Protection Areas. These tables should be interpreted as the effort, landings, and revenue which would be at-risk or exposed to change from the protection areas. By all four metrics, the impacts are expected to be neutral for vessels that use purse seine gear. The impacts are expected to be negative for vessels that use trawl gear to harvest herring.

There is minimal overlap between the purse seine fishery and the river herring protection areas during September-December. There is also minimal overlap between the Category D permit holders and the river herring protection areas. There is substantial overlap between the trawl fishery and the proposed river herring protection areas, particularly in January-February and November-December, with lesser overlap in other months. Over 50% of the Category A/B/C trips fished for some time within the proposed protection areas.

The effort, catch and revenue tables confirm that the River Herring Protection Areas would have minimal impact on the purse seine fleet and could have substantial impacts on the trawl fleet. In 2010, the trawl fishery spent approximately one-third of its fishing time within the proposed River Herring Protection Areas, catching one-third of the annual herring catch, 29% of its total herring revenues, and 33% of total revenues within those areas.

The impacts of the River Herring Protection Areas are likely to be largest for the trawl fishery during the winter (January-February and November-December). According to those figures, a large portion of total effort during those months occurs inside the proposed River Herring Protection Areas. Captains have built up large amounts of human capital (knowledge and experience) regarding where and how to catch fish. Closing the most productive areas to fishing will lead to higher costs (searching and steaming), lower catch-per-unit-effort, as vessels fish in unfamiliar areas and on lower densities of fish, and lower profits. For these months, captains are not likely to be familiar with alternative fishing locations. If they choose to fish for herring in alternative locations, captains will build their knowledge and experience; however, this process may take time.

This river herring protection option may have impacts on shoreside processors, bait dealers, and other consumptive users of herring. This option may reduce supply of herring, particularly in the winter months in the Southern New England areas. The substantial economic impacts noted above would carry-over to the businesses that rely on herring for their product, if supply is reduced or if the vessels limit their time at sea. Naturally, such economic impacts would also affect communities that support the herring trawl fishery.

Table 166 Fishing Time (Hours) Inside and Outside the River Herring Protection Areas

		Fishing Time		
Gear	Category	Not Protected	Protected	Grand Total
PUR		2,940	7	2,947
TR	ABC	8,029	4,077	12,105
	D	227	71	298
Grand Total		11,197	4,155	15,351

Table 167 Fishing Time (%) Inside and Outside the River Herring Protection Areas

		Fishing Time (%)		
Gear	Category	Not Protected	Protected	Grand Total
PUR		99.8%	0.2%	100.0%
TR	ABC	66.3%	33.7%	100.0%
	D	76.3%	23.7%	100.0%
Grand Total		72.9%	27.1%	100.0%

Table 168 Herring Catch (lbs.) Inside and Outside the River Herring Protection Areas

		Herring Catch		
Gear	Category	Not Protected	Protected	Grand Total
PUR		18,423,800	38,741	18,462,541
TR	ABC	82,973,751	41,130,098	124,103,849
	D	112,799	36,045	148,844
Grand Total		101,510,350	41,204,884	142,715,233

Table 169 Herring Catch (%) Inside and Outside the River Herring Protection Areas

		Herring Catch (%)		
Gear	Category	Not Protected	Protected	Grand Total
PUR		99.8%	0.2%	100.0%
TR	ABC	66.9%	33.1%	100.0%
	D	75.8%	24.2%	100.0%
Grand Total		71.1%	28.9%	100.0%

Table 170 Herring Revenue ($) Inside and Outside the River Herring Protection Areas

		Herring Revenue		
Gear	Category	Not Protected	Protected	Grand Total
PUR		$2,952,318	$5,760	$2,958,078
TR	ABC	$11,059,051	$4,561,645	$15,620,696
	D	$18,792	$5,645	$24,437
Grand Total		$14,030,161	$4,573,050	$18,603,211

Table 171 Herring Revenue (%) Inside and Outside the River Herring Protection Areas

		Herring Revenue (%)		
Gear	Category	Not Protected	Protected	Grand Total
PUR		99.8%	0.2%	100.0%
TR	ABC	70.8%	29.2%	100.0%
	D	76.9%	23.1%	100.0%
Grand Total		75.4%	24.6%	100.0%

Table 172 Total Revenue ($) Inside and Outside the River Herring Protection Areas

		Total Revenue		
Gear	Category	Not Protected	Protected	Grand Total
PUR		$2,952,369	$5,760	$2,958,129
TR	ABC	$12,065,312	$6,027,755	$18,093,067
	D	$33,329	$9,683	$43,011
Grand Total		$15,051,010	$6,043,198	$21,094,208

Table 173 Total Revenue (%) Inside and Outside the River Herring Protection Areas

		Total Revenue (%)		
Gear	Category	Not Protected	Protected	Grand Total
PUR		99.8%	0.2%	100.0%
TR	ABC	66.7%	33.3%	100.0%
	D	77.5%	22.5%	100.0%
Grand Total		71.4%	28.6%	100.0%

<u>Category A/B Versus Category C and Category D Vessels</u>

To further investigate differential impacts by herring permit category, herring catch and revenues from these vessels inside and outside the proposed protection areas are summarized by permit category in Table 174. While 22-24% of the Category D effort, catch, and revenues are derived from the monitoring areas, the magnitude of effort, catch, and revenues attributable to Category D vessels is minimal. A fairly large portion of the Category A/B/C trawl fishery would be impacted by the monitoring options; 40-45% of the effort, catch, and revenues for this segment of the fishery occurred in the monitoring areas. Category C vessels often participate in other fisheries and catch herring incidentally. Table 174 shows that Category C vessels derive almost 30% of their revenues from the areas proposed for closure under this alternative.

Table 174 Herring Catch/Revenues and Total Revenues Inside and Outside the Proposed Protection Areas by Limited Access Herring Permit Category

Permit Cat.	No. Vessels	Inside/ Outside	Days Fished	Herring Revenues (millions dollars)	Herring Catch (millions pounds)	Total Revenue (millions dollars)
A	27	Outside	375	$11.84	83.79	$12.66
A	26	Inside	214	$6.28	55.75	$7.91
B	1	Outside	Cannot report	Cannot report	Cannot report	Cannot report
B	3	Inside	15	$0.17	1.58	$0.17
C	3	Outside	13	$0.21	0.84	$0.22
C	6	Inside	10	$0.07	0.56	$0.09
D	6	Outside	9	$0.02	0.11	$0.03
D	5	Inside	3	$0.01	0.04	$0.01

5.4.6.4 Additional Discussion of Impacts of Sub-Options for Permit Holders to Which the River Herring Measures Apply

The Council is considering sub-options to apply the management measures to address river herring bycatch to either Category A/B (limited access directed fishery), Category A/B/C (all limited access vessels), or Categories A/B/C/D (all herring vessels, including open access vessels and vessels that receive new permits that may established in this amendment). Detailed information about herring vessels, by permit category, is provided in Section 4.5.1.2 of this document. Many of the potential impacts of the measures to address river herring bycatch have been discussed in the previous subsections; this section provides additional perspective on the potential impacts associated with incorporating a greater number of vessels (by permit category) into the river herring bycatch management strategy adopted in Amendment 5. The discussion in this section applies to any of the alternatives/options under consideration to address river herring bycatch.

Table 48 summarizes the number of federally permitted Atlantic herring vessels by Amendment 1 permit category and length. There were 101 vessels with limited access permits during the 2010 fishing year. The majority of participants in the directed Atlantic herring fishery are Category A and B vessels. There are 55 limited access incidental catch permit holders in the fishery, and over 2,000 open access (Category D) permit holders.

Thirty out of the 46 vessels (65%) that held a Category A or B herring permit were "active," meaning they landed herring during the 2010 fishing year. Twenty seven percent (27%) of Category C vessels (limited access incidental catch) landed herring in 2010, while only 4% of Category D permits landed herring in 2010. However, the number of D permits that landed herring increased significantly in 2010 to 94, up from 67/68 in 2009/2008 respectively.

Table 175 Number of Vessels by Atlantic Herring Permit Category, 2008-2010

		Year		
		2008	**2009**	**2010**
Herring Permit Category	**A**	45	45	42
	B	5	4	4
	C	58	55	55
	D	2,409	2,394	2,258

NMFS Permit databases, May 2011

In general, the more vessels to which the measures proposed to address river herring apply, the greater the impact will be, both positive and negative. Impacts of increased catch monitoring and data collection will likely be positive for river herring, Atlantic herring, other non-target species, other fisheries, and protected resources. Similarly, the costs associated with increased catch monitoring will be greater as more vessels are subject to the restrictions, so there are likely to be more negative impacts on fishing-related businesses and communities, as well as participants in other fisheries, under the sub-options that incorporate more vessels.

The tradeoffs associated with incorporating more vessels must be considered when selecting management measures to address river herring bycatch. The tradeoffs associated with incorporating more vessels must be considered when selecting management measures to address river herring bycatch. Depending on the catch monitoring program that is adopted in Amendment 5, the resources of the observer program will be stretched, perhaps leading to less coverage in other fisheries.

Additional information and analysis addressing the impacts of the measures under consideration by vessel permit category is provided in Appendix IV and VI of this document (Volume III).

5.4.6.5 Options for Shrimp/Large-Mesh Fishery Exemptions

At the September 2011 NEFMC Meeting, the Council agreed to consider exemptions to the options in River Herring Alternatives 2 and 3 that would require 100% observer coverage, Closed Area I provisions, or closed areas (Alternative 3). These exemptions are being considered for the Northern Shrimp Fishery, which operates seasonally in the inshore Gulf of Maine, and for the large mesh groundfish fishery (using mesh greater than 5.5 inches). Detailed information is included in Appendix V and VI to this document (Volume II) in order to provide perspective on river herring and other bycatch occurring in these two fisheries so that the Council can make a more informed decision when it selects the final measures for Amendment 5 and considers any exemptions.

To consider an exemption to the river herring measures proposed in Amendment 5, river herring bycatch in the small mesh Northern shrimp fishery in the Gulf of Maine was investigated. Observer data for 2005-2010 was queried from the database. Results are presented in Table 176 and Table 177 (below). The data summarized in these tables represents all observer data on trips using the Nordmore grate in the

Gulf of Maine between 2005-2010, regardless of target species (a Nordmore grate is required in the Northern shrimp fishery) and regardless of whether or not the vessels possess a herring permit.

In total, from 2005-2010, 97 shrimp trips were observed, representing less than 1% of the fishery when the State-only vessels are included (Table 176). Small amounts of river herring were observed in the catch (Table 177), but the low level of observer coverage precludes expansion of the bycatch numbers to develop an estimate of bycatch across the fishery; low sampling would lead to an extremely high CV and is not appropriate in this case.

State-permitted vessels represent the majority of the fishery. These vessels do not have herring permits. In 2010, VTR records indicate that 705 trips were taken by federally permitted vessels in the shrimp fishery (Table 178), while the total number of trips including the state vessels was 1,954.

Table 176 Number of Observed Trips and Percent Coverage in the Gulf of Maine Northern Shrimp Fishery, 2005-2010

Year	No. Trips Observed	Total No. Trips	Percent Coverage
2005	17	2,261	0.75
2006	20	2,838	0.70
2007	14	1,566	0.89
2008	19	2,635	0.72
2009	12	3,510	0.34
2010	15	1,954	0.77
Total	**97**	**14,764**	

Table 177 Total Catch Observed in the Northern Shrimp Fishery (Retained and Discarded) in Pounds by Species (2005-2010)

Species	Pounds caught
HAKE, SILVER (WHITING)	7,811
HERRING, ATLANTIC	2,488
FLOUNDER, AMERICAN PLAICE	1,846
LOBSTER, AMERICAN	796
REDFISH, NK (OCEAN PERCH)	738
SCULPIN, LONGHORN	697
FLOUNDER, WINTER (BLACKBACK)	621
HAKE, WHITE	557
HERRING, NK	447
ALEWIFE	443
HAKE, RED (LING)	412
HERRING, BLUEBACK	392
FLOUNDER, WITCH (GREY SOLE)	327
POLLOCK	185
FLOUNDER, SAND DAB (WINDOWPANE)	182
DOGFISH, SPINY	123
SKATE, LITTLE	95
FLOUNDER, YELLOWTAIL	88
COD, ATLANTIC	86
MONKFISH (GOOSEFISH)	84
MACKEREL, ATLANTIC	73
BUTTERFISH	72
HAKE, RED/WHITE MIX	56
MENHADEN, ATLANTIC	50
HADDOCK	46
FLOUNDER, FOURSPOT	39
SKATE, WINTER (BIG)	38
SKATE, NK	36
STARFISH, SEASTAR,NK	33
SEAWEED, NK	30
SCALLOP, SEA	24
FISH, NK	21
WRYMOUTH	21
CUSK	20
SMELT, RAINBOW	20
RAVEN, SEA	17
ROCKLING, FOURBEARD	15
HALIBUT, GREENLAND	14
SQUID, SHORT-FIN	10
HAKE, SPOTTED	10

Table 178 shows the number of shrimp trips during 2010 that were taken by federally permitted herring vessels and other federally permitted vessels that do not possess a herring permit. Of the herring-permitted vessels, Category C vessels are most active in the northern shrimp fishery; these vessels took 495 trips in 2010. Of all 705 trips that occurred by federally permitted vessels in 2010 (601 trips by herring vessels), only seven (7) were taken when declared into the herring fishery (and therefore subject to the herring FMP requirements). It appears that the vast majority of shrimp vessels declare out of the herring fishery to avoid the additional herring requirements (pre-landing notification), as there is no allowance for herring landings in the shrimp fishery anyway.

Table 178 Number of Shrimp Trips in 2010 by Herring and Non-Herring Permit Categories

Permit Category	Trip Count
Herring A	35
Herring B	71
Herring C	495
Non-herring	104
Total	**705**

**Does not include trips taken by State-only vessels.*

Observer data suggest that large-mesh bottom trawls are catching river herring, alewife, and shad in amounts that appear to be insignificant. Table 179 summarizes observer data for 113 trips taken on 21 bottom trawl vessels with a Category A or B permit using large mesh. Table 180 summarizes observer data for 194 trips on 41 bottom trawl vessels with a Category C permit using large mesh. And Table 181 summarizes observer data for 1,832 trips on 471 bottom trawl vessels with a Category D permit using large mesh. Observed bycatch of river herring/shad appears to be slightly higher during the second half of the fishing year, but still very low. The percent coverage levels for the groups of vessels represented in these tables was not determined.

Table 179 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category A and B, Large Mesh (>5.5 inch)

Species	January - June			July-December		
	Lbs Disc	Lbs Kept	Total Lbs	Lbs Disc	Lbs Kept	Total Lbs
ALEWIFE	158		**158**	39		**39**
FISH, NK	787		**787**	340		**340**
HERRING, ATLANTIC	284		**284**	182		**182**
HERRING, BLUEBACK	1		**1**	17		**17**
HERRING, NK	2		**2**	13		**13**
SHAD, AMERICAN	164	6	**170**	74		**74**

Table 180 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category C, Large Mesh (>5.5)

Species	January - June			July-December		
	Lbs Disc	Lbs Kept	Total Lbs	Lbs Disc	Lbs Kept	Total Lbs
ALEWIFE	27		**27**	7		**7**
FISH, NK	235		**235**	46		**46**
HERRING, ATLANTIC	139	4	**143**	715	200	**915**
HERRING, BLUEBACK	6		**6**	53		**53**
HERRING, NK						
SHAD, AMERICAN	13		**13**	42		**42**

Table 181 Catch and Discards of All Species on Observed Trips, 2009-2010, Bottom Otter Trawl, Permit Category D, Large Mesh (>5.5 inch)

Species	January - June			July-December		
	Lbs Disc	Lbs Kept	Total Lbs	Lbs Disc	Lbs Kept	Total Lbs
ALEWIFE	698		**698**	1,272	6	**1,278**
FISH, NK	12,812	310	**13,122**	2,845	6	**2,851**
HERRING, ATLANTIC	1,188	97	**1,285**	4,983	41	**5,024**
HERRING, BLUEBACK	351	3	**354**	542	70	**612**
HERRING, NK	212		**212**	79		**79**
SHAD, AMERICAN	1,249	18	**1,267**	538	2	**540**

The proposed exemptions would have positive impacts on some fishing operations by providing opportunities to participate in other fisheries that may overlap the river herring monitoring or protection areas. If the vessels in the shrimp fishery and large mesh groundfish fishery are exempted, they may continue their fishing operations in areas that would otherwise require 100% observer coverage, increased sampling, possible closure, among other measures. Vessels in these two fisheries that also have a herring permit would be able to declare out of the herring fishery and prosecute shrimp or groundfish in the areas that those fisheries operate. This increases opportunities and may mitigate some of the negative impacts of the proposed river herring measures.

Category A vessels took 35 shrimp trips in 2010, Category B vessels took 71 shrimp trips, and Category C vessels took 495 shrimp trips in 2010 (Table 178). Category C vessels are the most dependent of the herring vessels on the shrimp fishery; these vessels are likely smaller (less than 80 feet) and hail from ME, NH, and MA. The proposed exemption for the shrimp fishery would especially benefit these vessels because of their higher level of participation in the shrimp fishery and lower level of participation in the herring fishery; some of the measures proposed in this amendment are likely to produce a significant cost on the industry, and Category C vessels land less than 3% of herring during the fishing year.

5.4.6.6 Summary of Impacts on Fishery-Related Businesses and Communities

Table 182, Table 183, and Table 184 generally summarize the impacts of the measures proposed to address river herring bycatch on fishing-related businesses and communities, including economic impacts, social impacts, and monitoring-related impacts. The tables provide a qualitative comparison of the positive and negative impacts that may result from the alternatives under consideration with respect to fishery-related businesses and communities. Relative to taking no action, Alternative 2 and Alternative 3 are likely to result in negative impacts on fishery-related businesses and communities by increasing costs to affected vessels. However, while impacts are potentially negative under both alternatives, the nature and extent of impacts of Alternative 2 rely heavily on which vessels the measures apply to (herring permit categories) and whether or not industry funds would be utilized to cover additional sampling/monitoring in the proposed areas. The nature and extent of impacts of Alternative 3 rely on shifts in both the distribution of herring, river herring, and fishing effort by the vessels that are affected/displaced by the proposed bimonthly closures. The tradeoffs associated with these alternatives with respect to fishery-related businesses and communities are reflected in Table 182, Table 183, and Table 184.

Table 182 Economic – Atlantic Herring Fishery Participants Focused Trade-offs of Spatial Management Approaches

	Economic- Atlantic herring fishery participants	
Possible Measure	**Positive Impacts**	**Negative Impacts**
Fixed Bimonthly Monitoring Areas (Alt.2, Opt.1-3)	There are no economic benefits to the directed Atlantic herring fishery, relative to the status quo (no action alternative).	The SBRM-prioritized monitoring of fishing fleets can be considered the optimal pattern of observer coverage. To the extent that Fixed Bimonthly Monitoring Areas results in diversion of scarce observer days away from this optimal pattern of observer coverage, there is an economic loss. This is a loss of information which will result in less data available about bycatch in other fisheries and, presumably, stock assessments with larger errors. If the Fixed Bimonthly Monitoring Areas do not shift observer days away from the optimal pattern, then there is no information loss. If additional observer coverage is paid for by industry, this represents a negative economic impact. This can be calculated by estimating the additional observer coverage days and multiplying by the cost of an observer day. The Closed Area I Sampling Provisions would entail slightly higher regulatory and compliance costs than the other options being considered.
Fixed Bimonthly Avoidance Areas (Alt.2, Opt.4)		
Fixed Bimonthly Protection Areas (Alt. 3, Opt.1)	There are no direct economic benefits to the directed Atlantic herring fishery, relative to the status quo (no action alternative).	Decreases in revenue in the directed Atlantic Herring Fishery and/or increases in costs of fishing for participants in the directed Atlantic Herring Fishery. The largest impacts are likely to be felt by trawl fishery participants during the winter season due to the high overlap between the Protection Areas and the current spatio-temporal distribution of fishing effort.
Triggered Bimonthly Protection Areas (Alt.3, Opt.2)	There are no direct economic benefits to the directed Atlantic herring fishery, relative to the status quo (no action alternative).	Decreases in revenue in the directed Atlantic Herring Fishery and/or increases in costs of fishing for participants in the directed Atlantic Herring Fishery. The largest impacts are likely to be felt by trawl fishery participants during the winter season due to the high overlap between the Protection Areas and the current spatio-temporal distribution of fishing effort. These costs are likely to be lower than Alt 3, Opt 1; however, there is substantial uncertainty associated with projecting when the Triggers might be reached.

**This table provides a qualitative comparison of the positive and negative impacts that may result from the alternatives under consideration. The impacts of the no action alternative are discussed in detail in the previous subsections.*

Table 183 Social – Focused Trade-offs of Spatial Management Approaches

	Social/Other- management, directed-river herring fishery, etc.	
Possible Measure	**Positive Impacts**	**Negative Impacts**
Fixed Bimonthly Monitoring Areas (Alt.2, Opt.1-3)	Participants in the directed river herring fishery should see increased availability of river herring catch, if the fixed monitoring areas results in higher stock levels of river herring. Indirect users of the river herring resource, including consumers that use species that prey on river herring, will benefit if the monitoring areas result in higher stock levels of river herring. Would enable Atlantic herring fishery participants to avoid river herring mortality if encounters are communicated quickly and consistently.	Increased economic costs associated with industry payment for observers could trigger additional losses of vessels and processing plants, thereby also affecting bait supplies for other fisheries.
Fixed Bimonthly Avoidance Areas (Alt.2, Opt.4)	Would enable Atlantic herring fishery participants to avoid river herring mortality if encounters are communicated quickly and consistently. This would also demonstrate the fishery's responsiveness to concerns about river herring.	Increased economic costs with industry payment for observers could trigger additional losses of vessels and processing plants, thereby also affecting bait supplies for other fisheries. Keeping the threshold values meaningful could be problematic as the size of the river herring stock changes.
Fixed Bimonthly Protection Areas (Alt. 3, Opt.1)	Most straight-forward option to enforce	Since the hotspots are variable, this might unnecessarily constrain Atlantic herring operations, leading to increased social costs triggered by economic losses.
Triggered Bimonthly Protection Areas (Alt.3, Opt.2)	Triggers are understood so Atlantic herring fishery participants would be likely to limit fishing in the protection area if feasible, but if river herring is not encountered, fishing could continue if the Atlantic herring are present.	Uncertainty associated with trigger mechanisms makes planning more difficult. Keeping the trigger values meaningful could be problematic as the size of the river herring stock changes.

**This table provides a qualitative comparison of the positive and negative impacts that may result from the alternatives under consideration. The impacts of the no action alternative are discussed in detail in the previous subsections.*

Table 184 Monitoring – Focused Trade-offs of Spatial Management Approaches

	Monitoring- NEFOP	
Possible Measure	**Positive Impacts**	**Negative Impacts**
No Action (A1)	Benefits associated under the no action alternative possible if catch monitoring provisions that would apply across the fishery, (i.e. the 100% observer coverage option) which would allow for observers to document interactions with river herring across the fleet, at different times and in different areas that perhaps have not been sampled before. More coverage allows for more biological sampling, more scale sampling and length frequency collection which will aid in the stock assessment process and will add to further understanding of the species and stock. Catch Monitoring Alternatives 3 and 4 would also increase coverage rates, if selected, and therefore provide the same type of biological benefits associated with increased sampling, and generally increasing the possibility of encountering the species. Increased monitoring will lead to greater understanding of interactions with river herring and the overall fleet during peak fishing times and off peak fishing times of the year.	Increased monitoring beyond federal funds would cost the industry and would have a negative impact with the potential for backlash to observers if/when industry has to pay for them. Or it could be the opposite – perhaps industry will buy into the increase in scientific information to improve stock assessments for the future of their fishery, and therefore work more closely with observers. Cost could be different if an industry funded at-sea monitoring program were developed vs. a full observer program currently in place.
Fixed Bimonthly Monitoring Areas (Alt.2, Opt.1-3)	Increased sampling would be achieved, therefore further quantifying the catch composition. Biological sampling would be increased, potentially if increased interactions occur. Further understanding of the interactions and where and when they take place. Ground-truthing the monitoring areas if catches show river herring composition. May in fact avoid fishing in areas with the coverage requirements, if they are paying for the coverage, which would decrease potential negative impacts on the species.	Possibly difficult determining ahead of time what areas the fleet will fish in, and therefore how they will notify for an area. Are they allowed to fish in multiple monitoring areas on a single trip, if not it would impact their flexibility and therefore possible catch, if there are low catch rates in an area. Can they fish inside and outside of a monitoring area, and if so do they need to have the coverage for that particular situation? How to enforce the notifications (i.e. what if they notify for one area and fish in another?) This could affect the coverage rates if coverage is less than 100%. Increased monitoring beyond federal funds would cost the industry and would have a negative impact. Again, an ASM program may be a cost-effective option. Monitoring areas are set in place until a framework action is taken, which could take some time, if river herring are not present in the areas, as would be documented by the observer data, and the industry is paying for it likely they will want to update the area determination quickly.

Table 184 Continued.

	Monitoring-NEFOP	
Possible Measure	**Positive Impacts**	**Negative Impacts**
Fixed Bimonthly Avoidance Areas (Alt.2, Opt.4)	Same as above	Same as above
Fixed Bimonthly Protection Areas (Alt. 3, Opt.1)		
Triggered Bimonthly Protection Areas (Alt.3, Opt.2)	Similar to Monitoring/Avoidance	Similar to Monitoring/Avoidance Except similar to the haddock cap, if the industry is paying attention to the trigger number, and they are close to hitting the trigger, which could prove difficult for observers. Pressure is higher on such trips. Potential of releasing catch (slippage) may be higher. Or if the industry knows if they hit the trigger then they have to pay for 100% coverage to fish in an area, again may lead to potential slippage events.

**This table provides a qualitative comparison of the positive and negative impacts that may result from the alternatives under consideration. The impacts of the no action alternative are discussed in detail in the previous subsections.*

5.4.7 Impacts of Option to Establish River Herring Catch Caps

Currently, this amendment proposes to add river herring catch caps as one measure that could be implemented in the future through a framework adjustment to the Herring FMP. The ability to do this will depend on whether or not the mechanism to establish river herring catch caps (Section 3.3.5) is adopted by the Council in this amendment. The proposed mechanism would allow for a river herring catch cap to be established through either a framework adjustment or the herring fishery specifications process, once ASMFC completes a stock assessment for the river herring resource.

Since there is no specific catch cap proposed in the amendment, there are no ***direct*** impacts on any of the Amendment 5 VECs expected from the option under consideration. The impacts of any caps established in the future will be evaluated through the action that establishes them (framework adjustment, or through the herring specifications process, as indicated in Section 3.3.5).

During the Councils deliberations on the Amendment 5 alternatives, however, the Herring PDT provided a detailed discussion paper addressing the development of river herring catch caps, including a discussion of the potential challenges associated with implementing and monitoring, as well as the potential impacts of catch caps. The Herring PDT's discussion paper can be found in Volume II of this amendment (Appendix VII, Discussion Paper: *Developing River Herring Catch Cap Options in the Directed Atlantic Herring Fishery* (December 2010)) and forms the technical/analytical basis for future development of river herring catch caps through a framework or specifications process. Some of the relevant analysis is summarized below, but Appendix VII should be referenced for more detailed technical information.

In the fall of 2010, the Herring PDT was tasked by the Council with developing river herring catch cap options for consideration in Amendment 5. The initial task was summarize and review past studies on river herring removals at sea. Then, the PDT agreed to calculate the best possible estimate of river herring removals by the Atlantic herring fishery. The analysis included selecting 2005- 2009 observer and VTR data from those trips landing greater than 2,000 lbs of Atlantic herring. Data was pooled across gear types. Two methods were used to examine and estimate river herring removals from the directed Atlantic herring fishery. Both methods are based on the Standard Bycatch Reporting Methodology (SBRM) amendment (2007). In general, Method 1 uses the ratio of river herring to Atlantic herring for the expansion, while Method 2 extrapolates to the trip level by using the mean discard level per trip. Calculation for river herring removals by the fishery were made for three sub-areas: Cape Cod (CC), Gulf of Maine (GOM), and Southern New England (SNE). As can be seen by the tables and figures provided in the detailed analysis (Appendix VII, Volume II0, in general the CC area and the GOM area had lower removals of river herring when compared to SNE area. Also both CC and GOM had similar removal levels of river herring by the directed herring fleet.

The Herring PDT recognized that their estimates of river herring removals have high uncertainty. Sampling by year, gear and area is not complete and missing strata exist in the dataset across years. The distribution of river herring catch has high variability and strata sample sizes are generally low. Finally, their estimates of uncertainty are likely to be underestimated because within trip variation of river herring catch is not propagated into the variation of the total catch estimate. Separating the strata into seasonal-area groups exacerbates the missing strata problems.

The non-sampling component of inter-annual variation for river herring catch can also include population dynamics such as year-class strength and population size, oceanographic conditions, and distribution of Atlantic herring fishing effort. The time series is currently too short to investigate whether these factors impact river herring catch in the Atlantic herring fishery. River herring do not currently have a stock assessment, thus the removal cap cannot be related to the river herring population. The cap only functions to prevent future river herring catch from exceeding recent catches. If river herring populations decline, then the cap may be too high for the river herring population. If a strong year-class is produced, then the cap may be set too low relative to the river herring population size, prematurely closing the Atlantic herring fishery.

The PDT did not agree on an approach to setting a catch cap in Amendment 5, but did discuss possible alternatives. Some of the options rely on the use of the catch history estimates described above, while others do not. The options include using the historical catch history (ceiling, percentage), waiting for a stock assessment (reference points), and liming fishing activity (limit hauls/sets or trips based on a threshold level of river herring removals).

The example catch caps analyzed by the Herring PDT in Appendix VII are proposed in this amendment as catch triggers under Alternatives 2 and 3 to address river herring bycatch (Section 3.3.2.2.3 and 3.3.3.2.2). A range of options for catch triggers, based on the PDT's work, is being considered along with two reporting options to monitor the triggers. These trigger options provide the opportunity to assess the potential impacts of catch caps on the VECs in Amendment 5, so much of the technical work and analysis is provided up-front in this EIS, thereby allowing the Council to use the framework adjustment process in the future to implement river herring catch caps. The analysis of the river herring catch triggers is discussed in Sections 5.4 of this document. The analysis presented in Appendix VI (*Detailed Analysis of Impacts of Management Measures Under Consideration in Amendment 5 to Address River Herring Bycatch*) includes the technical information and methodologies utilized to develop the trigger options, as well as a thorough analysis of fishery data to project when the triggers may be reached during the fishing year in each of the trigger areas. This analysis lays the groundwork for implementing catch caps through a framework adjustment in the future.

5.5 IMPACTS OF MANAGEMENT MEASURES TO ADDRESS MIDWATERAWL ACCESS TO GROUNDFISH CLOSED AREAS

5.5.1 Background Information

The Council is considering several alternatives to establish criteria for midwater trawl vessels to access the year-round groundfish closed areas:

Alternatives 1 and 2: Alternative 1 represents the current "status quo," and Alternative 2 eliminates the Closed Area I sampling provisions (unrestricted access to closed areas); the Framework 46 provisions and haddock catch cap would continue to apply under both alternatives

Alternative 3: 100% observer coverage on midwater trawl vessels in the groundfish year-round closed areas (in addition to Closed Area I sampling provisions and haddock catch cap/Framework 46 provisions)

Alternative 4: Closed Area I sampling provisions apply in all groundfish year-round closed areas (sub-options 4A to require 100% observer coverage and 4B for less than 100% observer coverage)

Alternative 5: Closed Areas (no midwater trawl fishing allowed in the year-round groundfish closed areas)

Establishing criteria and provisions for midwater trawl access to groundfish year-round closed areas is largely a policy decision to be made by the Council. Analysis of data collected by the NEFOP does not indicate that groundfish bycatch by midwater trawl vessels has a significant effect on fishing mortality/rebuilding for groundfish stocks (see following information/analysis). Haddock comprises the largest component of groundfish bycatch by midwater trawl vessels, and the catch of haddock by these vessels is managed by the Council through a catch cap (Framework 46) and increased sampling (Closed Area I provisions). The alternatives that propose to establish criteria for midwater trawl vessel access to the year-round groundfish year-round closed areas include many of the measures under consideration in Amendment 5 to improve at-sea sampling and address river herring bycatch (see Sections 3.2.2 and 3.3 of this document). Depending on what management measures are ultimately selected by the Council for implementation in Amendment 5, some of the alternatives to establish criteria for groundfish closed area access may be redundant and moot. In addition, there has been considerable discussion by the Council of considering an action to eliminate the year-round groundfish closed areas; no action is currently under development, and the timing for considering this action is not clear, but the Council may address this issue in the upcoming year.

The impacts of these alternatives relative to the VECs identified in this amendment are discussed below. Some of the criteria under consideration include increased monitoring and sampling. Depending on which alternative is ultimately selected, the measures to establish criteria for midwater trawl vessel access to groundfish closed areas may support the overall goal of Amendment 5 to improve catch monitoring and ensure compliance with the Magnuson-Stevens Fishery Conservation and Management Act (M- S Act).

5.5.2 Impacts on Atlantic Herring

The Atlantic herring fishery is administered in accordance with the Atlantic Herring FMP. The Herring FMP was developed by the Council and implemented by NMFS, in 2000. The specification-setting process is the primary management tool to administer the herring fishery and was modified in Amendment 4 for consistency with the ACL/AM provisions in the reauthorized M-S Act. The current specifications (75 FR 48874, August 12, 2010) established 2010-2012 herring harvest levels for each of four management areas, and Amendment 4 (76 FR 11373, March 2, 2011) established the provision that any overages would be deducted from future harvest levels (Accountability Measures).

In general, the Atlantic herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The measures proposed to address midwater trawl access to the year-round groundfish closed areas are not likely to affect removals of herring from the fishery. All of the alternatives considered in this section are unlikely to affect the amount of herring available for harvest or total removals from the fishery. Therefore, there would likely be no direct impacts to the Atlantic herring resource associated with implementing any of the alternatives to establish criteria for midwater trawl vessel access to the groundfish closed areas.

The alternatives that propose to establish criteria for midwater trawl vessel access to the year-round groundfish year-round closed areas include many of the measures under consideration in Amendment 5 to improve at-sea sampling and address river herring bycatch; consequently, the expected impacts on the Atlantic herring resource are similar. More specifically, the groundfish closed area alternatives, which consider high observer coverage rates, Closed Area I sampling provisions, and closed areas, will likely have little direct impact on the Atlantic herring resource but may increase sampling and improve catch statistics; therefore, there may be long-term positive impacts associated with these measures. The specific benefits to the herring resource that may result are difficult to quantify with respect to each of the individual alternatives under consideration.

As catch information improves, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. The quantification of previously unaccounted mortality could improve the data used in assessments, thereby decreasing scientific uncertainty, albeit to an unknown degree. In addition, reducing the likelihood for errors in the calculation of catch statistics through increased sampling could reduce management uncertainty (uncertainty about catch estimates is a component of management uncertainty) and long-term management of the herring fishery may improve.

Alternative 1 represents the "status quo" alternative; **Alternative 2** is less restrictive than the status quo because it eliminates the Closed Area I sampling provisions. Alternative 1 represents the true no action alternative, and the impacts with respect to the herring resource are expected to be neutral. Under Alternative 2, the additional sampling requirements in Closed Area I would be eliminated, so any positive impact, however small, that may be resulting from increased sampling in Closed Area I would be eliminated. Alternative 2 may therefore have a slightly low negative impact on the herring resource when compared to the no action alternative.

Alternative 3 would require 100% observer coverage on midwater trawl vessels fishing in the year-round groundfish closed areas. While there is not likely to be any direct impact on the herring resource from increasing observer coverage on midwater trawl vessels in the groundfish closed areas, the indirect benefits to the resource of increased monitoring/sampling have been addressed several times in this document and apply to this alternative in the groundfish closed areas. As catch information in the fishery continues to improve, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. The benefits to the herring resource are difficult to quantify with respect to the individual alternatives under consideration but are expected to be *low positive* under Alternative 3 in comparison to the no action alternative.

Alternative 4 would implement the Closed Area I sampling provisions on midwater trawl vessels fishing in all of the year-round groundfish closed areas. While there is not likely to be any direct impact on the herring resource from increasing observer coverage on midwater trawl vessels in the groundfish closed areas, the indirect benefits to the resource of increased monitoring/sampling have been addressed several times in this document and apply to this alternative in the groundfish closed areas. As catch information in the fishery continues to improve, discard estimates can be incorporated into future stock assessments for Atlantic herring, thereby potentially reducing some uncertainties associated with the assessment data/models, improving biomass and fishing mortality estimates, and enhancing the Council's ability to successfully manage the herring resource at long-term sustainable levels. The benefits to the herring resource are difficult to quantify with respect to the individual alternatives under consideration but are expected to be *low positive* under Alternative 4 in comparison to the no action alternative.

Alternative 5 would close all of the year-round groundfish closed areas to midwater trawl fishing. The Atlantic herring resource is not overfished and overfishing is not occurring. The herring fishery is managed through an overall ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs that are designed to prevent overfishing on individual stock components. The selection of Alternative 5 in this case is not likely to affect total removals of herring from the fishery; it is unclear how closing these areas may affect herring fishing and/or shift effort in the open areas, but it is assumed that the sub-ACLs would continue to be utilized in a manner similar to recent fishing history. Therefore, the overall impact on the herring resource is likely to be *neutral*. However, because the groundfish year-round closed areas are rather large and would be closed to all midwater trawl fishing, there may be some localized benefits to the herring resource in those areas as concentrations of fishing effort are reduced/eliminated. It is possible that some additional protection would be afforded to biodiversity in the closed areas, but the extent to which this may occur cannot be predicted.

5.5.3 Impacts on Non-Target Species and Other Fisheries

Midwater Trawl Vessel Catch in Groundfish Closed Areas

On November 3, 2009, NMFS announced new regulations for any vessel issued a Category A or B herring permit fishing in Northeast Multispecies Closed Area I (CAI). These requirements included 100 percent observer coverage on trips in the closed areas and a prohibition on releasing catch before it is sampled by an observer, except in certain circumstances. The results of this coverage offer a unique look into the overlap between the herring fishery and the northeast multispecies.

As a result of the requirement, there was a high percentage of observer coverage on midwater trawl trips to Herring Management Area 3 in 2010. There were 114 observed trips on GB in CY 2010; 105 in FY 2010. Through March, 2011, during FY 2010 there were 135 MWT trips on GB according to VTR records. As a result, about 84 percent of reported VTR trips carried an observer during the fishing year. Total herring landings from GB in CY 2010 were about 15,430 mt according to IVRs. Estimated landings on observed trips were about 14,700 mt, so about 95 percent of the landed herring came from observed trips. This provides a near census of midwater trawl (MWT) fishing activity on GB in CY and/or FY 2010. The analyses were performed when data were available through October 2010, so these data reflect an additional two months of data that were not used in the previous sections.

The following information is based on the ending tow locations to be consistent with how NMFS determines catch areas, and the data below are reported for all tows on trips with an observer unless otherwise specified, and not just those tows that are flagged as observed (which means discards were estimated). While this gives a higher count of tows and accounts for more MWT catch, it could be argued that by including tows where discards may not have been estimated it makes discards appear lower than actually occurred. Observer practices for pair trawl trips differ slightly from those used with other gear. A tow is only coded as observed if all the catch is observed and discards are estimated. In pair trawl operations, if the catch is split between the two vessels, the tow is coded as not observed because the observer does not see the catch that is take onto the other vessel. As shown in the table below, differences between the two approaches are minor. These analyses consider not just haddock, but all groundfish to reflect that there are regulatory requirements that set a standard for the amount of groundfish caught in closed areas as a proportion of the amount of herring and mackerel kept (50 CFR 648.81(a)(2)(iii)). Almost all the groundfish catch is haddock, and almost all the kept catch is Atlantic herring.

In 2010, NMFS observer coverage on herring vessels in Area 3 (Georges Bank) was about 85%. Table 185 shows that the observed ratio of groundfish to kept species (almost all of which is Atlantic herring) in 2010 was higher in the closed areas than in the open areas of Georges Bank. The difference between CAI and open areas was relatively small, but the ratio for CAII was noticeably higher, although the number of observed tows in CAII was small.

Table 185 – Summary of Catch (Pounds) on Observed MWT Trips to GB in CY 2010

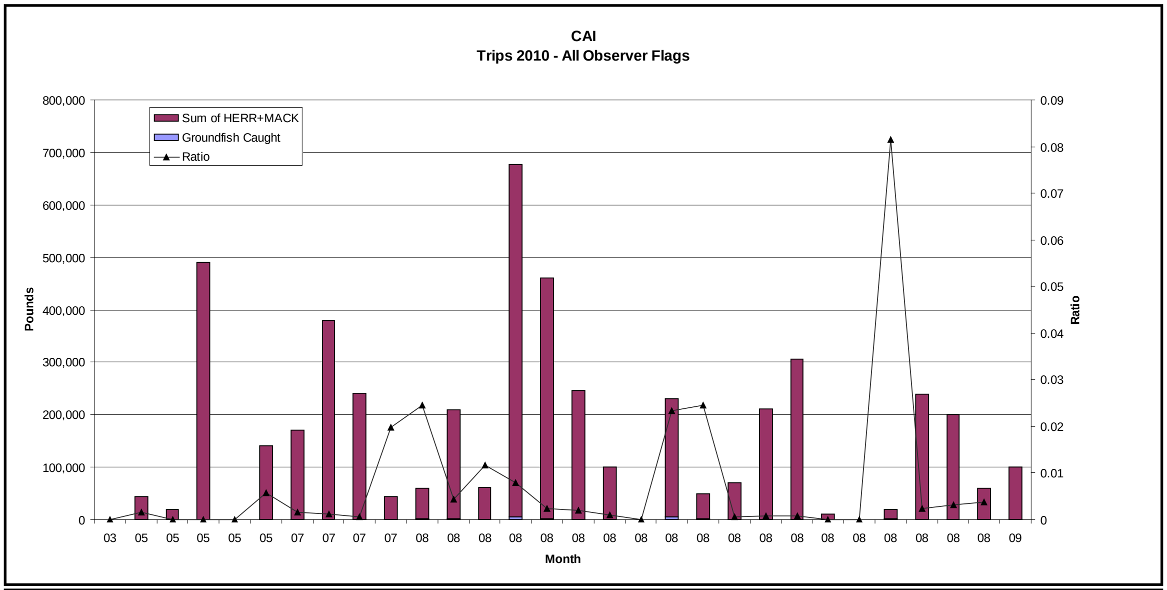
	Groundfish Caught	Alt Herring Kept	Mackerel Kept	Herring NK Kept	Ratio Groundfish/ (Herring + Mackerel)
	All tows on trips with an observer				
CAI	22,525	4,790,088	27,810	0	0.0047
CAII	44,248	1,423,605	0	0	0.0311
Open	87,623	26,165,111	121,174	4	0.0033
Total	154,396	32,378,804	148,984	4	0.0047
Combined CAs	66,773	6,213,693	27,810	0	0.0107
	Tows coded as observed only				
CAI	21,828	4,245,530	2,370	0	0.0051
CAII	43,772	1,254,462	0	0	0.0349
Open	86,603	24,201,905	121,169	4	0.0036
Total	152,203	29,701,897	123,539	4	0.0051
Combined CAs	65,600	5,499,992	2,370	0	0.0119

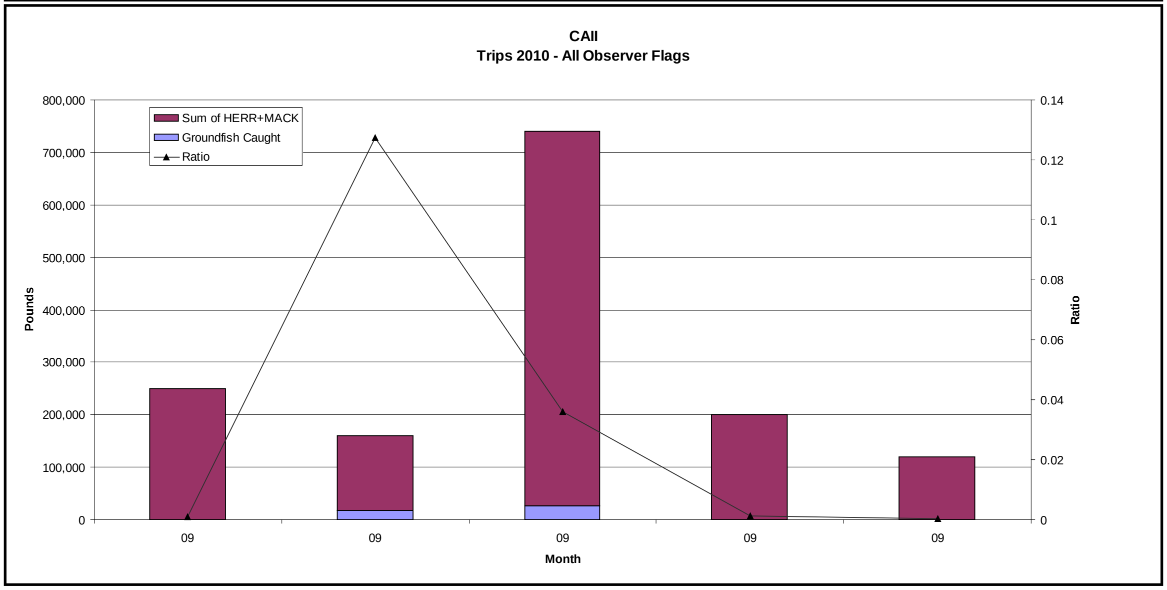
Source: Groundfish Amendment
For this analysis GB defined as SAs 521/522/525/525/561/562 only

The ratio of haddock (as opposed to all groundfish) to herring was examined in CAI and CAII in two ways. Individual tows were plotted and assigned to the closed area based on where the haul ended. The tows were first summarized by trip and then individual tows were examined. In CAI the ratio of groundfish caught to herring and mackerel kept varied. Generally the ratio is highest on those trips with the smallest kept catches. The same relationship is not as evident for the trips in CAII, but with only five trips it is difficult to draw conclusions.

With respect to individual tows (Figure 93), again in CAI it appears that generally the higher ratios of groundfish to kept herring and mackerel occur with small kept catches, though this is not always the case. There are a limited number of tows in CAII that preclude drawing firm conclusions but it does appear that even on an individual tow basis more groundfish is caught in CAII.

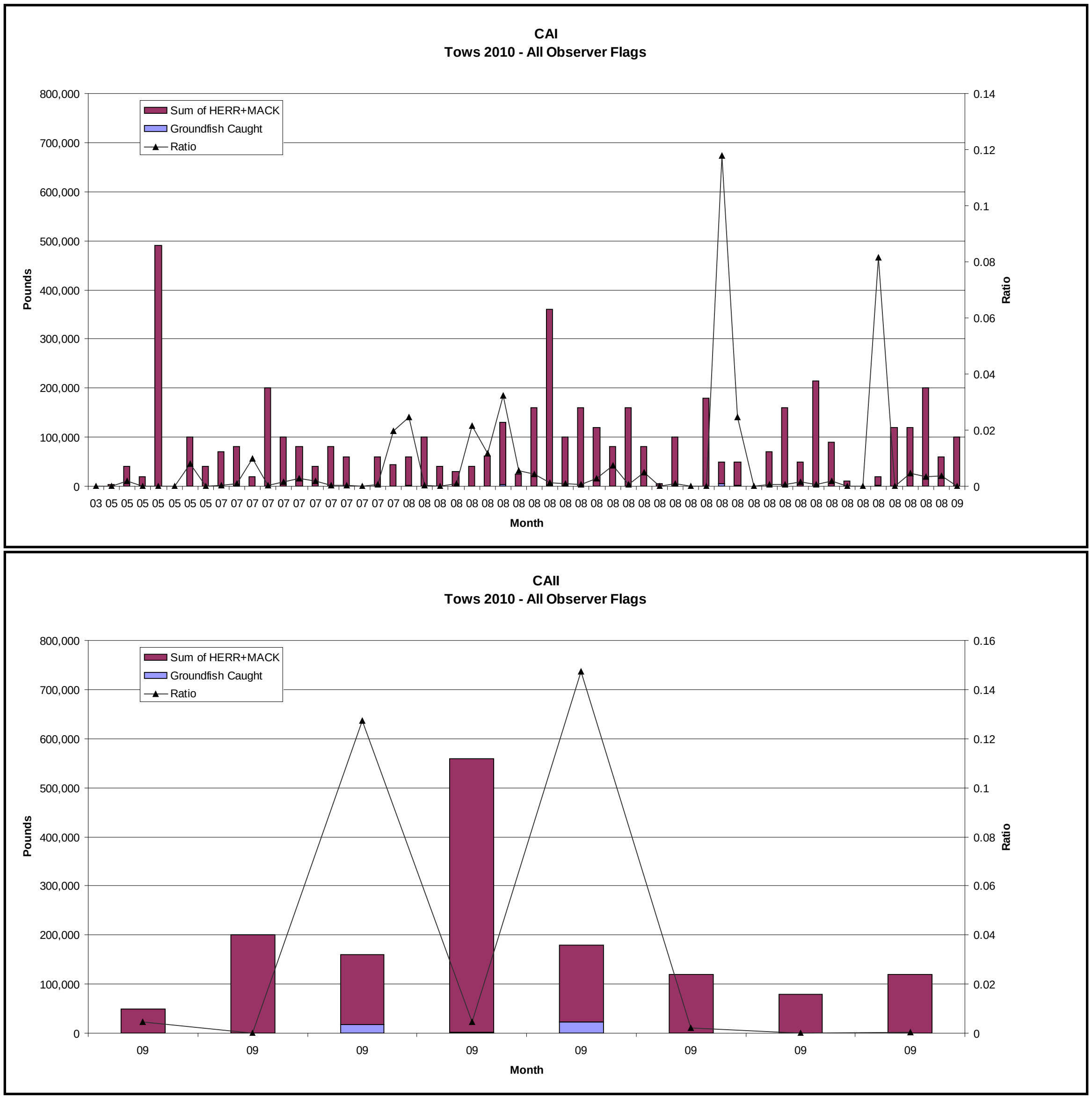
Figure 92 2010 Midwater Trawl Trips in CAI and CAII





Source: NEFOP

Figure 93 2010 Midwater Trawl Trips in CAI and CAII



Source: NEFOP

The Herring PDT's analysis of Alternative 4 to allocate observer coverage on limited access herring vessels indicates that removals of haddock by Category A/B/C vessels were approximately 222,524 pounds (about 101 mt) during 2010, with a CV of 28% (See technical analysis presented in Appendix III, Volume II: *Detailed Analysis of Impacts of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels*). Table 186 provides NMFS' estimates of commercial removals (landings and discards) of haddock for the 2010 fishing year. Removals from other sources (state waters, recreational fisheries) are not included in the table but are not significant (with the exception of recreational removals of Gulf of Maine haddock). These numbers provide some context to evaluate the potential impact of haddock removals by herring midwater trawl vessels. The commercial haddock fishery remains under-utilized, and removals by herring midwater trawl vessels are relatively small given the available yield.

Table 186 FY 2010 (May 1 – April 30) Commercial Haddock Catch (mt)

Stock	Sub-ACL (mt)	Cumulative Catch (mt)	Percent Caught
GB Haddock	40,440	8,340.2	20.6
GOM Haddock	825	377.7	45.8

Alternative 1 (No Action/Status Quo)

This alternative would continue to allow midwater trawl fishing in the year-round groundfish closed areas, and would maintain the enhanced monitoring requirements when fishing in CAI. The haddock catch cap and 100-lb multispecies possession limit would continue to apply, and there would still be prohibitions against discarding haddock at sea. This alternative maintains status quo conditions, so the impacts with respect to non-target species and other fisheries is expected to be neutral.

Alternative 2 (Pre-Closed Area I Provisions)

This alternative would also continue to allow midwater trawl fishing in the groundfish closed areas, but would eliminate the additional monitoring/sampling provisions in CAI. It is therefore less restrictive than the no action alternative. However, as discussed throughout this document, providing data about previously unrecorded bycatch of non-target species may improve catch statistics and subsequent assessment and management of those species over the long-term. Therefore, while eliminating the CAI provisions are not likely to have a direct impact on non-target species and other fisheries, there may be an indirect low negative impact resulting from the reduction in catch sampling on midwater trawl vessels in CAI relative to the no action alternative.

Alternative 3 (100% Observer Coverage)

This alternative would require 100% observer coverage on midwater trawl trips occurring in all the year-round groundfish closed areas. This alternative could lead to a decrease in midwater trawl trips in the groundfish closed areas if industry funding is required and vessels are unwilling to absorb the cost of observer coverage given expected revenues. It is expected that this fishing effort would be redistributed to other herring fishing grounds outside the groundfish closed areas. The impacts on non-target species and other fisheries, therefore, are difficult to predict. However, requiring 100% observer coverage on the midwater trawl trips in the groundfish closed areas would result in increased sampling of the trips these vessels take in the closed areas and could lead to the collection of additional information about catch and bycatch in the herring fishery. As a result, this alternative could have low positive impacts on non-target species and other fisheries to the extent that the additional observer coverage enhances catch information and improves the counting and/or precision of bycatch estimates. The potential for positive impacts is greatest for the groundfish species, as these areas were selected by the Council to reduce groundfish mortality and rebuild groundfish stocks. Catch information presented in this section indicates that the majority of groundfish bycatch by midwater trawl vessels is haddock, the catch of which on midwater trawl vessels is already managed through a catch cap.

Alternative 4 (Apply Closed Area I Provisions)

This alternative would apply the current CAI provisions to all trips in all groundfish closed areas. These provisions relate to pumping all fish, the ability to make test tows, not pumping/authorized release of the net due to safety or other specified concerns, slipped catch affidavit requirement, and requirement to leave the closed area if the net is released for exempted reasons. Alternative 4A would apply these requirements and also require 100% observer coverage, whereas alternative 4B would only apply the listed provisions. The impacts of this alternative on non-target species and other fisheries is expected to be low positive, resulting from enhanced sampling and the potential documentation of previously unrecorded catch. Providing documentation of previously unrecorded bycatch of non-target species may improve catch statistics and subsequent assessment and management of those species over the long-term.

Alternative 5 (Closed Areas)

This alternative would close all of the groundfish closed areas to midwater trawl vessels, but would endorse experimental fisheries. If this alternative is selected, the fishing effort that currently occurs in the groundfish closed areas (representing 12% of revenues in 2010) would likely be redistributed to other herring fishing grounds. The impacts of this alternative on non-target species and other fisheries are therefore difficult to predict. Relative to the no action alternative, however, the impacts of this alternative on non-target species and other fisheries is likely to be positive for the reasons addressed in other sections of this document and summarized below.

However, the groundfish year-round closed areas were selected and closed to groundfish fishing to reduce fishing mortality and offer protection to groundfish stocks and spawning grounds. Eliminating midwater trawl fishing from these areas would provide a positive impact in that it would further reduce fishing activity in the areas and help to ensure that catch of non-target species and other fisheries in the area is minimized. The closed areas may provide mortality reductions for some non-target species, especially groundfish. This benefit, however, is dependent on individual species life history and migratory patterns along with their susceptibility to fishing gears at different life stages. It is important to note that catch information presented in this section indicates that midwater trawl vessels are not catching significant amounts of groundfish either inside or outside the closed areas; the majority of groundfish bycatch by midwater trawl vessels is haddock, the catch of which on midwater trawl vessels is already managed through a catch cap.

5.5.4 Impacts on Physical Environment and EFH

Alternative 1 (No Action/Status Quo)

This alternative would continue to allow fishing in the groundfish closed areas, and would maintain the enhanced monitoring requirements when fishing in CAI. The haddock catch cap and 100-lb multispecies possession limit would continue to apply, and there would still be prohibitions against discarding haddock at sea. Alternative 1 would maintain current measures to protect EFH and therefore no adverse effects on EFH are expected.

Alternative 2 (Pre-Closed Area I Provisions)

This alternative would also continue to allow fishing in the groundfish closed areas, but would revert to previously implemented monitoring provisions in CAI. The haddock catch cap and 100-lb multispecies possession limit would continue to apply, and there would still be prohibitions against discarding haddock at sea. Alternative 2 is not expected to produce any adverse effects to EFH as bottom contact by MWT is occasional and the impacts are minimal and/or temporary, compared to Alternative 1.

Alternative 3 (100% Observer Coverage)

This alternative would require 100% observer coverage on trips occurring in all the groundfish closed areas (100% observer coverage is currently mandatory for permit category A and B trips into CAI). This alternative could lead to a decrease in herring trips in the groundfish closed areas if industry funding is required and vessels are unwilling to absorb the cost of observer coverage given expected revenues. It is expected that this fishing effort would be redistributed to other herring fishing grounds outside the groundfish closed areas. However, since mid-water trawl gear has been determined to only occasionally contact the bottom and its impact on benthic habitats has been determined to be minimal and temporary, this alternative would not cause any additional impacts to EFH.

Alternative 4 (Apply Closed Area I Provisions)

This alternative would apply the current CAI provisions to all trips in all groundfish closed areas. These provisions relate to pumping all fish, the ability to make test tows, not pumping/authorized release of the net due to safety or other specified concerns, slipped catch affidavit requirement, and requirement to leave the closed area if the net is released for exempted reasons. Alternative 4A would apply these requirements and also require 100% observer coverage, whereas alternative 4B would only apply the listed provisions.

Alternatives 4A and 4B could lead to a decrease in herring trips in the groundfish closed areas if industry funding is required and vessel owners are unwilling to absorb the cost of observer coverage given expected revenues, or if vessel operators elect not to comply with the listed provisions . As above, it is expected that this fishing effort would be redistributed to other herring fishing grounds outside the groundfish closed areas. However, since mid-water trawl gear has been determined to only occasionally contact the bottom and its impact on benthic habitats has been determined to be minimal and temporary, this alternative would not cause any additional EFH impacts.

Alternative 5 (Closed Areas)

This alternative would close all of the groundfish closed areas to midwater trawl vessels, but would endorse experimental fisheries. If this alternative is selected, the fishing effort that currently occurs in the groundfish closed areas (representing 12% of revenues in 2010) would be redistributed to other herring fishing grounds. Catching the herring sub-ACLs outside the closed areas would probably result in some additional amount of fishing effort because both catch and revenue per hour are higher when fishing in the closed areas. This could result in increased bottom contact, especially if there is increased mid-water trawling in the open areas on Georges Bank during the spawning season (September-November) when pre-spawning adult herring aggregate near the bottom and the gear is more likely to contact the bottom. Potential changes in the magnitude and location of fishing effort, and thus potential changes in seabed contact rates, are difficult to predict. Any additional disturbance of benthic habitats on the spawning grounds would in all likelihood be minimal and temporary since the bank is predominantly sandy and exposed to strong bottom currents. EFH for herring eggs in particular consists of relatively shallow water with gravels and strong currents, and this type of habitat is only minimally affected by seabed gear contact.

5.5.5 Impacts on Protected Resources

Alternative 1 (No Action/Status Quo)

There are no impacts expected on protected resources as a result of this measure as it would maintain the current measures that protect protected resources

Alternative 2 (Pre-Closed Area I Provisions)

There are no impacts expected on protected resources as a result of this measure as it would maintain the current measures that protect protected resources

Alternative 3 (100% Observer Coverage)

This option has the potential to have a low positive impact on protected resources. 100% observer coverage would represent a census of midwater trawl boats in the Atlantic herring fishery in the Groundfish year round closed areas, and therefore could provide as much information as possible on any and all protected resources that were encountered by the fishery in those areas that may be encountered by midwater trawl vessels, to the extent that a service provider could possibly sample. More observer coverage will also capture some of the rarer encounters of protected species with the herring fisheries. In comparison to the No Action Alternative, Alternative 2 has the potential to have a low positive impact on protected species by increasing the amount of information that is gathered, and therefore increasing the amount of knowledge with respect to those species.

Alternative 4 (Apply Closed Area I Provisions)

The impacts are expected to be very similar to Alternative 3, however the benefit would be wider spread as more information could be gathered as the observer coverage would greater and the information gathered would be a larger body to draw from and benefit protected resources.

Alternative 5 (Closed Areas)

This action has the potential to provide a low positive impact for protected resources by reducing the chance of encounters, and therefore potential mortality, with the herring fleet. The impact of these closed areas are difficult to determine at this time, however, due to the difficultly in determining fleet behavior as a result of the closures. It is possible that the overall magnitude of the effort will not decrease, but rather be displaced to the outside of the closed areas. This would provide areas of safety for protected species, but may not deter the overall effort and therefore the overall probability of a herring vessel encountering a protected species. Therefore in comparison to Alternative 1, the No Action Alternative, it is difficult to determine the impact of this action which will remove herring fleet effort in certain areas at certain times. In comparison to Alternatives 2 through 4, the action may provide protection rather than information gathering benefits for protected resources, and the benefit varies from species to species, depending on the information needed. Overall, however, the extent of the impact will depend on the behavior of the fleet outside of the closed areas.

5.5.6 Impacts on Fishery-Related Businesses and Communities

Alternatives 1 and 2:

Alternative 1 would maintain the measures in place that currently govern the Atlantic herring fishery and the associated fishery-related businesses and communities. There are no additional impacts on fishery-related businesses and communities expected under Alternative 1, so the impacts of Alternative 1 are *neutral*.

Alternative 2 would eliminate the Closed Area I sampling provisions and the requirement that vessels take an observer on any trip that may enter Closed Area I. This alternative represents a less restrictive alternative than Alternative 1 (no action). This alternative would potentially have positive impacts on fishery-related businesses and communities because it increases flexibility and fishing opportunities while decreasing the regulatory burden associated with fishing in Closed Area I. This alternative eliminates the pre-trip notification to request an observer to fish in Closed Area I, eliminates the requirement to carry an observer in CAI, and eliminates the sampling requirements in CAI (all fish must be pumped aboard the vessel for sampling). The impact of this alternative on fishery-related businesses and communities, overall, is *potentially positive*.

Alternative 3 (100% Observer Coverage):

Relative to the no action alternative, midwater trawl vessels fishing in Closed Area I would not be impacted by implementation of Alternative 3 because 100% observer coverage is already required in Closed Area I. However, fishing vessels operating in Closed Area II, Cashes Ledge, Nantucket Lightship or the Western Gulf of Maine Closed areas would likely be impacted, depending on the source of funding of observer coverage. Under the no action alternative, vessels fishing in these areas would not be required to carry an observer unless one is deployed by NMFS; based on recent coverage rates, it is likely that 30% (or more) of trips in these areas would be allocated an observer.

Table 187 characterizes the spatial distribution of the midwater trawl directed Atlantic herring fishery relative to the five year-round groundfish closed areas in 2010. The data in Table 187 were pulled from 2005-2010 based on midwater trawl trips landing 2,000 pounds or more Atlantic herring. Currently, approximately 9-12% of herring fishing (as measured by revenues, catch, and fishing effort) occur in the five multispecies year-round closed areas. Five to seven percent (5-7%) of fishing occurs in the four multispecies closed areas in which there are currently no additional regulations on herring fishing.

Table 187 Herring Fishing Effort and Revenues in the Groundfish Closed Areas in 2010

	Cashes Ledge	Closed Area I	Closed Area II	NLSCA	Western GOM	Subtotal CA's	Open Areas	Total
Fishing Time (hours)	182	462	140	62	269	1,115	10,991	12,105
Herring Catch (000's lbs)	2,080.4	4,739	1,738.9	2,178.7	3,518.7	14,255.6	109,848.2	124,103.8
Herring Revenue (000's of $)	$320.3	$718.3	$282.8	$128.2	$483.2	1,932.9	$13,687.8	$15,620.7
	Cashes Ledge	**Closed Area I**	**Closed Area II**	**NLSCA**	**Western GOM**	**Subtotal CA's**	**Open Areas**	**Grand Total**
Fishing Time (hours)	1.5%	3.8%	1.2%	0.5%	2.2%	9.2%	90.8%	100%
Herring Catch	1.7%	3.8%	1.4%	1.8%	2.8%	11.5%	88.5%	100%
Herring Revenue	2.1%	4.6%	1.8%	0.8%	3.1%	12.4%	87.6%	100%

During the 2010 fishing year, 102 midwater trawl trips went into the Multispecies Closed Areas; however, 64 of these trips did not fish in Closed Area I. A total of 212 observer days are estimated to be required for 100% coverage of the non-Closed Area I trips (see Table 188 – days estimates based on VTR records for the identified trips).

Using $1,200 per NEFOP-day as the cost of a day of monitoring, the total costs of this observer coverage is estimated at $254,400. However, based on observer days allocated through the current SBRM process, the midwater trawl fleet is likely to receive about 30% coverage. Therefore, the additional impacts to the fishing industry are likely to be approximately $169,000 if industry-funded observers are utilized to cover the additional cost in the groundfish closed areas (see 5.2 for more information). If observer coverage is industry-funded, it is possible that herring vessels will avoid fishing in these areas more often (depending on markets, fish availability, fuel prices, and other factors) because fishing in the groundfish closed areas would be more expensive. Overall, the impact of this alternative on fishery-related businesses and communities is potentially *low negative*.

Table 188 Number of Trips and Observer Days Projected for 100% Coverage in Year-Round Groundfish Closed Areas

Area	Number of Trips	Number of Observer Days
Closed Area I	37	148
Closed Area II	18	59
Cashes Ledge	14	45
Nantucket Lightship	8	22
Western Gulf of Maine	25	89
Total (not including CAI)	**64**	**212**

Alternative 4 (Closed Area I Sampling Provisions):

The expected impacts of Alternative 4A are similar to the expected impacts of Alternative 3 because this option requires 100% observer coverage in all of the groundfish closed areas. Restrictions on fishing practices as a result of the additional requirements are likely to increase costs of fishing slightly. The other potential impact is diminishing flexibility since the vessel operator would be required to provide notice if fishing in any of the year-round closed areas was contemplated. The requirement that a vessel must leave a Closed Area acts as a disincentive to slip a nets; however, this requirement may not promote safety-at-sea. Restrictions on fishing practices are likely to increase costs of fishing slightly relative to the status quo. Under alternative 4B, no additional observer coverage in the closed areas are mandated. The overall impact of this alternative on fishery-related businesses and communities, therefore, is *potentially low negative*.

Alternative 5 (Closed Areas):

This alternative closes the year-round groundfish closed areas to midwater trawl vessels participating in the herring fishery. Under this alternative, access to groundfish closed areas by midwater trawl vessels (single and paired) that are not declared out of the fishery (DOF) would be prohibited except with an experimental fishing permit (EFP).

This alternative would reduce revenues for the midwater trawl fishery. Under Alternative 5, the number of midwater trawl trips would likely also decrease. While 12% of revenues for the midwater trawl fishery were located in the five closed areas (see Table 187), this effort and revenue is not likely to completely disappear. Instead, the midwater fleet is likely to fish in other, less productive areas. This will increase costs for the fleet. The purse seine fleet is likely to benefit from additional catch due to the exclusion of trawl gear from the Western Gulf of Maine Closed Area portion of Area 1A. Overall, the impacts of Alternative 5 on fishery-related businesses and communities is expected to be negative.

The impacts of closing the year-round groundfish closed areas to midwater trawl vessels participating in the herring fishery unless they have an experimental fishing permit (EFP) would depend largely on what provisions were included in the EFP. The proposed provisions include full observer coverage and/or electronic monitoring, both of which have high associated costs that might make fishing in the closed areas prohibitively expensive. In addition, if pair trawling is prohibited and midwater trawl trips are limited, compensation may not be sufficient to pay for the added costs.

5.6 CUMULATIVE EFFECTS ANALYSIS

5.6.1 Introduction

A cumulative effects assessment (CEA) is a required part of an EIS or EA according to the Council on Environmental Quality (CEQ) (40 CFR part 1508.7) and NOAA's agency policy and procedures for NEPA, found in NOAA Administrative Order 216-6. 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 Framework 46 together with past, present, and reasonably foreseeable future actions that affect the herring environment. It should also be noted that the predictions of potential synergistic effects from multiple actions, past, present and/or future will generally be qualitative in nature.

5.6.2 Valued Ecosystem Components (VECs)

Consistent with the guidelines for CEA, cumulative effects can be more easily identified by analyzing the impacts of the Proposed Action on valued ecosystem components (VECs). The affected environment is described in this document based on VECs that were identified for consideration relative to the proposed specifications. The VECs described in this document and considered in this CEA are listed below.

VECs represent the resources, areas, and human communities that may be affected by a Proposed Action or alternatives and by other actions that have occurred or will occur outside the Proposed Action. VECs are generally the "place" where the impacts of management actions are exhibited. An analysis of impacts is performed on each VEC to assess whether the direct/indirect effects of an alternative adds to or subtracts from the effects that are already affecting the VEC from past, present and future actions outside of the Proposed Action (i.e., cumulative effects).

The Affected Environment is described in this document based on VECs that were identified specifically for Amendment 5. The VECs for consideration in Amendment 5 include:

1. Atlantic Herring;
2. Non-Target Species and Other Fisheries;
3. Physical Environment and Essential Fish Habitat (EFH);
4. Protected Resources; and
5. Fishery-Related Businesses and Communities.

Changes to the Herring FMP have potential to directly affect the Atlantic herring resource. Similarly, management actions that would alter the distribution and magnitude of fishing effort for herring could directly or indirectly affect non-target species and other fisheries, which, for this amendment, have been identified as groundfish, mackerel, and river herring. The physical environment and EFH VEC focuses on habitat types vulnerable to activities related to directed fishing for herring. The protected resources VEC focuses on those protected species with a history of encounters with the herring fishery. The fishery-related businesses and communities VEC could be affected directly or indirectly through a variety of complex economic and social relationships associated with either the managed species (herring) or any of the other VECs.

The descriptive and analytic components of this document are constructed in a consistent manner. The Affected Environment for Amendment 5 (Section 4.0 of this document) traces the history of each VEC since the implementation of Amendment 1 to the Herring FMP (in 2006) and consequently addresses the impacts of past actions. The Affected Environment section is designed to enhance the readers' understanding of the historical, current, and near-future conditions (baselines and trends) in order to fully understand the anticipated environmental impacts of the management alternatives and independent measures under consideration in this amendment. The direct/indirect and cumulative impacts of these alternatives and measures are then assessed in Section 5.0 of this document using a similar structure to that found in the Affected Environment. This EIS, therefore, is intended to follow each VEC through each management alternative.

The following assessment will identify and characterize the impact on the VECs by the alternatives proposed in this document when analyzed in the context of other past, present, and reasonably foreseeable future actions. To enhance clarity and maintain consistency, the following terms are used to summarize impacts:

Table 189 Terms Used in Tables to Summarize Cumulative Impacts

Impacts Are Known	Impacts Are Uncertain	Impacts Are Unknown
High Negative/Positive	Potentially High Negative/Positive	Unknown
Negative/Positive	Potentially Negative/Positive	
Low Negative/Positive	Potentially Low Negative/Positive	
Neutral	Potentially Neutral	
No Impact		

**In some cases, terms like "more" and "most" are used for the purposes of comparing management alternatives to each other.*

5.6.3 Spatial and Temporal Boundaries

The geographic area that encompasses the physical, biological and human communities impacts to be considered in the cumulative effects analysis are described in detail in Section 4.0 of this Amendment 5 (Affected Environment). The geographic range for impacts to fish species is the range of each fish species in the western Atlantic Ocean. The physical environment, including habitat and EFH, is bounded by the range of the Atlantic herring fishery, from the GOM through the mid-Atlantic Bight, and includes adjacent upland areas (from which non-fishing impacts may originate). For Protected Species, the geographic range is the total range of Atlantic herring. The geographic range for fishery-related businesses and communities is defined in the Affected Environment as well.

Overall, while the effects of the historical herring fishery are important and are considered in the analysis, the temporal scope of past and present actions for Atlantic herring, non-target species and other fisheries, the physical environment and EFH, protected species, fishery-related businesses and communities is focused principally on actions that have occurred since 1996, when the MSA was amended and implemented new fisheries management and EFH requirements. The temporal scope for marine mammals begins in the mid-1990s, when NMFS was required to generate stock assessments for marine mammals that inhabit waters of the U.S. EEZ that create the baseline against which current stock assessments are evaluated. For turtle species, the temporal scope begins in the 1970s, when populations were noticed to be in decline. The temporal scope for Atlantic herring is focused more on the time since the Council's original Herring FMP was implemented at the beginning of the 2001 fishing year. This FMP serves as the primary management action for the Atlantic herring fishery and has helped to shape the current condition of the resource.

The temporal scope of future actions for all VECs, which includes the Amendment 5, extends five years into the future. This period was chosen because of the dynamic nature of resource management and lack of specific information on projects that may occur in the future, which make it difficult to predict impacts beyond this time frame with any certainty. This is also the rebuilding time frame for the Atlantic herring resource, as defined in the Herring FMP, should the resource become overfished and subject to a rebuilding program in the future.

5.6.4 Analysis of Total Cumulative Effects

A cumulative effects assessment ideally makes effect determinations based on the culmination of the following: (1) impacts from past, present and reasonably foreseeable future actions; PLUS (2) the baseline condition for resources and human communities (note – the baseline condition consists of the present condition of the VECs plus the combined effects of past, present and reasonably foreseeable future actions); plus (3) impacts from the Proposed Action and alternatives.

A description of past, present and reasonably foreseeable future actions is presented immediately below in Table 191. The baseline conditions of the resources and human community are subsequently summarized although it is important to note that beyond the stock managed under this FMP and protected species, quantitative metrics for the baseline conditions are not available. Finally, a brief summary of the impacts from the alternatives contained in this amendment is included. The culmination of all these factors is considered when making the cumulative effects assessment.

5.6.5 Past, Present, and Reasonably Foreseeable Future Actions

Table 191 summarizes the combined effects of other past, present and reasonably foreseeable future actions that affect the VECs, i.e., actions other than those alternatives under development in this document.

Note that most of the actions affecting the VECs related to this amendment and considered in Table 191 come from fishery-related activities (e.g., Federal fishery management actions). As expected, these activities have fairly straightforward 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 reauthorized Magnuson-Stevens Act (MSA). That legislation was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. More specifically, the MSA 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 fishing effort frequently results in negative short-term socio-economic impacts for fishery participants. However, these impacts are usually necessary to bring about the long-term sustainability of a given resource 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 were also considered when determining the combined effects from past, present and reasonably foreseeable future actions. 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 near shore 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 constrain the sustainability of the managed resources, 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.

5.6.5.1 Atlantic Herring

Past and Present Actions: Atlantic herring management measures were implemented in two related, but separate FMPs in 1999 – one by the federal government (NEFMC 1999, amended in 2006) and one by the states (ASMFC 1999, amended in 2006). The status of the herring resource is updated in Section 4.1 of this document, and the herring fishery is summarized in Section 4.5 of this document. The offshore stock has recovered from its collapse in the early 1970s and, overall, the coastal Atlantic herring resource is not overfished, and overfishing is not occurring. There is more concern for the inshore stock since it receives more fishing pressure, and recent survey trends in the inshore Gulf of Maine are declining. Additional past and present actions that affect the herring resource are discussed in the other VEC sections.

The ASMFC adopted Amendment 2 in March of 2006 to herring management in state waters which revised management area boundaries, biological reference points, the specification process, research set-asides, internal waters processing operations, and measures to address fixed gear fisheries and required fixed gear fishermen to report herring catches through the IVR program. Further discussion can be found in the 2007-2009 Atlantic Herring specifications package.

The ASMFC also adopted an Addendum in 2010 which modified Amendment 1 (Amendment 1) and Amendment 2 (Amendment 2) to the Interstate Fisheries Management Plan for Atlantic Sea Herring by changing the specification setting process and associated definitions. Based on the difficulty of having two sets of acronyms, one for the NEFMC plan and one for the ASMFC plan, for one cooperatively managed species the addendum was developed to establish an identical set of definitions and acronyms as those that the NEFMC is required to use under MSRA. The addendum also established a new specification setting process that is more in line with the ASMFC Sea Herring Section's usual process for setting specifications while taking into account the new process that was enacted by the NEFMC in Amendment 4 to the Atlantic Herring FMP.

Amendment 4 to the Atlantic Herring FMP, as enacted by the NEFMC in 2010, primarily responded to the requirements of the MSA and NEPA. The Amendment established ACLs by first defining terms to bring the FMP into compliance with the MSA, setting an interim ABC control rule, eliminating JVP, IWP, TALFF and reserve specifications, establishing sub-ACLs, and establishing the Specifications Process to utilize these elements. Three Accountability Measures (AMs) were also established: one which closed the fishery when there is a projection that 95% of the sub-ACL will be reached, one which subtracts the amount of an ACL overage from subsequent ACLs, and another which established a haddock catch cap.

In 2006 Framework 43 to the Northeast Multispecies FMP was enacted, which modified the restrictions for herring vessels so that herring fishing could continue on Georges Bank, but prohibited certain herring vessels from discarding haddock and limited possession of other groundfish to small amounts. It also adopted a cap on the amount of haddock that could be caught by certain herring vessels. In 2011, Framework 46 changed these catch cap provisions so that they would apply only to midwater trawl vessels with a herring permit, because these vessels caught nearly all of the haddock caught by the herring fishery. Catches of haddock by midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 that are documented by at-sea observers are now extrapolated to an estimate of the total catch of haddock. Individual estimates are then developed for each haddock stock (GOM and GB haddock). The cap is then applied based on the multispecies fishing year (May 1 through April 30), and is 1 percent of the Acceptable Biological Catch (ABC) of each stock. If the haddock catch estimate extrapolated from observer reports exceeds a stock-specific cap, midwater trawl vessels are limited to catching 2,000 pounds of Atlantic herring in a relevant area. If there is an overage of the cap, the cap for the following year is reduced by the amount of the overage. In order to monitor the cap, midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 are also required to report total kept catch by haddock stock area and gear used.

Reasonably Foreseeable Future Actions: The 2012-2013 Specifications Process will set the specifications for the Atlantic Herring fishery for those years, which will rely primarily on information from a Benchmark Assessment, which is set to take place in 2013, to inform it, as well as information from the PDT. The action will likely be beneficial to the Atlantic Herring resource as in accordance with the reauthorized Magnuson-Stevens Act, which was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. The cumulative impacts of the future Specifications Process on the VECs should therefore be expected to result in positive long-term outcomes.

Omnibus EFH Amendment is likely to be implemented in 2013. This amendment could positively affect Atlantic herring via increased protection of benthic habitats used by the species from the adverse effects of various regional fisheries. Further, NMFS is currently in a rule-making process to propose changes to the Harbor Porpoise Take Reduction Plan which are intended to reduce harbor porpoise mortalities (74 FR 36058, July 21, 2009). This action would likely result in vessels facing additional restrictions, possibly resulting in positive impacts to herring and other species taken incidentally.

The sea turtle Strategy is a gear-based approach to addressing sea turtle bycatch. NMFS is currently considering proposing changes to the regulatory requirements for trawl fisheries to protect sea turtles. As described in a NOI to prepare an EIS (74 FR 88 May 8, 2009), NMFS is considering expanding the use of TEDs to other trawl fisheries and modifying the geographic scope of the TED requirements. This measure is likely to be neutral for the herring resource as it will not affect herring directly.

5.6.5.2 Non-Target Species and Other Fisheries

Past and Present Actions: This section serves to summarize the past and present management measures that may have impacted non-target species and other fisheries; a more lengthy summary of river herring measures can be found in Section 4.2.2.1, for mackerel in Section 4.2.2.2, and for groundfish in Section 4.2.2.3.

Figure 57 and Figure 58 present an overview of actions that have applied to river herring in recent years. The ASMFC Fishery Management Plan for Shad & River Herring, approved in 1985, was one of the very first FMPs developed by the ASMFC. Amendment 1 was adopted in 1998 and focuses on American shad regulations as well as and monitoring programs to improve data collection and stock assessment capabilities. Amendment 2 to the ASMFC Interstate Fisheries Management Plan for Shad and River Herring was approved in 2009 and implemented a precautionary approach to river herring management. Amendment 2 requires states or jurisdictions to close all state fisheries by January 1, 2012, with exceptions for systems with a sustainable fishery. A sustainable fishery is defined as one that demonstrates that the river herring stock can support a commercial and/or recreational fishery without diminishing future stock reproduction and recruitment. Under Amendment 2, river herring from any state waters fishery may not be landed without an approved plan requesting State fishery proposals must contain 'sustainability targets' that are subject to Shad and River Herring Technical Committee (TC) review and Shad & River Herring Management Board (Board) approval. States with approved plans are required to submit annual updates of the achievement and maintenance of sustainability targets. The TC has reviewed proposals from Maine, New Hampshire, North Carolina and South Carolina and the Board approved all plans. The 2012 sustainability plan deadline was implemented in order to allow states with a lengthy legislative process adequate time to develop and implement proposals.

In 2010, the Board approved Amendment 3, which revises American shad regulatory and monitoring programs in place under Amendment 1. The Amendment was developed in response to the 2007 American shad stock assessment, which found that most American shad stocks were at all-time lows and did not appear to be recovering. Amendment 3 is similar to the management program required for river herring. The Amendment prohibits state waters commercial and recreational fisheries beginning January 1, 2013, unless a state or jurisdiction has a sustainable management reviewed by the TC and approved by the Board. The Amendment 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 American shad fisheries meet this new definition of sustainability through the development of sustainability targets which must be achieved and maintained. The Amendment allows any river systems to maintain a catch and release recreational fishery. States and jurisdictions are also required to identify local significant threats to American shad critical habitat and develop a plan for mitigation and restoration.

The MAFMC's Draft Amendment 14 to the Mackerel, Squid, and Butterfish FMP contains Table 53, which provides a summary of all relevant actions to that FMP, starting with the designation of the EEZ. Three original FMPs were implemented between 1978 and 1979, and the plans were merged in 1983. Amendments relevant to the mackerel fishery are currently being considered and are listed under the reasonably foreseeable future actions.

The Northeast Multispecies FMP has a multitude of management measures , a full summary of which has been provided in the most recent Framework to the FMP, Framework 46 (which can be found in Appendix III). Groundfish was considered as its own VEC in that Framework, however groundfish is a portion of the non-target species and other fisheries VEC being considered herein, and as such, the summary of the effects of past, present, and reasonably foreseeable future actions that was used in that Framework will be considered here. In summary, past actions to the regulated groundfish stocks have created mixed effects, as the combined effects of past actions have decreased effort, improved habitat protection, and implemented rebuilding plans when necessary, but some stocks remain overfished. Present actions created a positive effect, as sustainable stocks were the purpose of the regulations, as was the case for foreseeable future actions as well. Overall, the combined effects had a short-term negative, but long-term positive effect.

In 2006, Framework 43 to the Northeast Multispecies FMP was enacted, which modified the restrictions for herring vessels so that herring fishing could continue on Georges Bank, but prohibited certain herring vessels from discarding haddock and limited possession of other groundfish to small amounts. It also adopted a cap on the amount of haddock that could be caught by certain herring vessels. In 2011, Framework 46 changed these catch cap provisions so that they would apply only to midwater trawl vessels with a herring permit, because these vessels caught nearly all of the haddock caught by the herring fishery. Catches of haddock by midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 that are documented by at-sea observers are now extrapolated to an estimate of the total catch of haddock. Individual estimates are then developed for each haddock stock (GOM and GB haddock). The cap is then applied based on the multispecies fishing year (May 1 through April 30), and is 1 percent of the Acceptable Biological Catch (ABC) of each stock. If the haddock catch estimate extrapolated from observer reports exceeds a stock-specific cap, midwater trawl vessels are limited to catching 2,000 pounds of Atlantic herring in a relevant area. If there is an overage of the cap, the cap for the following year is reduced by the amount of the overage. In order to monitor the cap, midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 are also required to report total kept catch by haddock stock area and gear used.

Amendment 4 to the Atlantic Herring FMP, as enacted by the NEFMC in 2010, primarily responded to the requirements of the MSA and NEPA. The Amendment established ACLs by first defining terms to bring the FMP into compliance with the MSA, setting an interim ABC control rule, eliminating JVP, IWP, TALFF and reserve specifications, establishing sub-ACLs, and establishing the Specifications Process to utilize these elements. Three Accountability Measures (AMs) were also established: one which closed the fishery when there is a projection that 95% of the sub-ACL will be reached, one which subtracts the amount of an ACL overage from subsequent ACLs, and another which established a haddock catch cap.

Reasonably Foreseeable Future Actions: Amendment 14 to the Mackerel Squid Butterfish (MSB) FMP has been developed concurrently to Amendment 5 by the Mid-Atlantic Fishery Management Council. Many of the actions contained with both Amendments have been developed to compliment and/or replicate each other so as to avoid conflicting overlaps of restrictions on vessels that participate in both fisheries. In some cases, however, the actions contained in both Amendments present some conflict with each other. Actions currently being considered in Amendment 14 include: vessel reporting measures, dealer reporting measures, at-sea observation optimization measures, other sampling and monitoring measures such as port-side monitoring, at-sea observer coverage requirements, mortality caps on river herring, restrictions in areas of high river herring catch, mesh requirements, and the potential addition of river herring as a stock in the fishery. The ways in which these actions overlap can be seen in Table 190. Similarly, the timelines for both this Amendment and Amendment 14 have been designed to complement each other and allow public comment sessions to occur simultaneously.

Table 190 Overlap Between Amendment 14 to the Squid/Mackerel/Butterfish FMP (MAFMC) and Amendment 5 to the Herring FMP (NEFMC)

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	

Table 190 continued. Overlap Between Amendment 14 to the Squid/Mackerel/Butterfish FMP (MAFMC) and Amendment 5 to the Herring FMP (NEFMC)

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 <u>annually on dealer application</u> 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 <u>at each transaction</u> 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	

Table 190 continued. Overlap Between Amendment 14 to the Squid/Mackerel/Butterfish FMP (MAFMC) and Amendment 5 to the Herring FMP (NEFMC)

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	

Table 190 continued. Overlap Between Amendment 14 to the Squid/Mackerel/Butterfish FMP (MAFMC) and Amendment 5 to the Herring FMP (NEFMC)

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	

Table 190 continued. Overlap Between Amendment 14 to the Squid/Mackerel/Butterfish FMP (MAFMC) and Amendment 5 to the Herring FMP (NEFMC)

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

Table 190 continued. 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	

Amendment 11 to the MSB FMP proposes a limited access system consisting of tiered limited access and an open access component. The qualifying criteria for the limited access component are a valid Federal Fisheries Permit for mackerel as of March 21, 2007 and a certain level of mackerel landings during a specified time period: Tier 1 would require at least 400,000 pounds landed in any one year between 1997-2005; Tier 2 would require at least 100,000 pounds landed in any one year 3/1/1994-2005; Tier 3 would require at least 1,000 pounds in any one year 3/1/1994-2005 (would be capped for a maximum catch up to 7% of the commercial quota, set annually during the specifications process (no other allocations)). The Open Access category would apply to all other vessels. Overall, 47 herring vessels are likely to be assigned to one of the three tiers. A more detailed description of this action and its potential effect on the herring vessels can be found in Section 4.2.2.2.

At the time, it is not known how the 2012-2015 Specifications Process will impact non-target species and other fisheries. The Specifications Process will set the specifications for the Atlantic Herring fishery for 2012-2015, which will rely primarily on information from a Benchmark Assessment which is set to take place in 2013 to inform decision making, in addition to information from the PDT. The action will likely be beneficial to the Atlantic Herring resource, as in accordance with the reauthorized Magnuson-Stevens Act, which was enacted to promote long-term positive impacts on the environment in the context of fisheries activities; as an extension, it may therefore also be beneficial to non-target and other fisheries by reducing effort on those stocks. Conversely, effort on other species and fisheries my increase if the specifications are set low enough that other species are targeted to maintain revenue as a result. The cumulative impacts of the future Specifications Process on non-target and other species is therefore also difficult to predict at this time.

Implementation of the Omnibus EFH Amendment may also result in additional habitat protections for which there is an indirect positive effect to bycatch species, as they would also receive protection. As with Allocated Target Species, if revisions are made to the Harbor Porpoise Take Reduction Plan, vessels could face additional restrictions, possibly resulting in positive impacts to bycatch through effort reductions.

The sea turtle Strategy is a gear-based approach to addressing sea turtle bycatch. NMFS is currently considering proposing changes to the regulatory requirements for trawl fisheries to protect sea turtles. As described in a NOI to prepare an EIS (74 FR 88 May 8, 2009), NMFS is considering expanding the use of TEDs to other trawl fisheries and modifying the geographic scope of the TED requirements. TED requirements would likely have a positive effect on bycatch and discards as they would likely exclude some of these species from capture in the cod-end.

5.6.5.3 Physical Environment and Essential Fish Habitat (EFH)

Past and Present Actions: The Herring EFH designation, which was developed as part of an Omnibus EFH Amendment prepared by NEFMC for all its managed species, is reproduced in Section 4.3 of this document. The Omnibus EFH Amendment was approved for Atlantic herring by the Secretary of Commerce on October 27, 1999. The final rule implementing the Atlantic herring FMP to allow for the development of a sustainable Atlantic herring fishery was published on December 11, 2000 (65 FR 77450).

Because the gears used in the herring fishery have only occasional bottom contact with the primary substrates used by herring for egg deposition, and because the noises produced by herring fishing operations only temporarily disperse schools of juvenile and adult herring, EFH impacts assessments for the fishery have concluded that it does not have an adverse effect on herring EFH. In addition, these assessments have concluded that the herring fishery does not have an adverse impact on EFH designated for non-herring species.

Various measures have been implemented in the Northeast Region to protect the EFH of NEFMC-managed species. In particular, all bottom-tending mobile gear is prohibited from the level 3 Habitat Closed Areas (HCAs) established in 2004 under Amendment 13 to the Northeast Multispecies FMP and Amendment 10 to the Atlantic Sea Scallop FMP. In large part, these HCAs overlap with areas established in 1994 and 1998 to protect overfished stocks of cod, haddock and other groundfish species. As mobile bottom-tending gear is largely prohibited from the groundfish closures, they have incidental EFH protection benefits. Other measures to protect EFH include spatially-specific roller gear restrictions in the Multispecies and Monkfish fisheries.

Reasonably Foreseeable Future Actions: Reasonably foreseeable future actions that will likely affect habitat include the Omnibus EFH Amendment, currently under development. This action reviews and updates EFH designations, identifies Habitat Areas of Particular Concerns (HAPCs), reviews prey information for all managed species, reviews non-fishery impacts to EFH, and reviews the current science on fishing impacts to habitat. It will also include coordinated and integrated measures intended to minimize the adverse impact of NEFMC-managed fishing on EFH. The net effect of new EFH and HAPC designations and more targeted habitat management measures should be positive for EFH.

At the time, it is not known how the 2012-2015 Specifications Process will impact EFH. The Specifications Process will set the specifications for the Atlantic Herring fishery for 2012-2015, which will rely primarily on information from a Benchmark Assessment which is set to take place in 2013 to inform decision making, in addition to information from the PDT. The action will likely be beneficial to the Atlantic Herring resource, as in accordance with the reauthorized Magnuson-Stevens Act , which was enacted to promote long-term positive impacts on the environment in the context of fisheries activities; as an extension, it may therefore also be beneficial to EFH by reducing effort in those areas, but the cumulative impacts of the future Specifications Process on EFH is difficult to predict at this time, as the changes to the fishery are unknown.

The Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico ("Strategy") is a gear-based approach to addressing sea turtle bycatch. NMFS is currently considering proposing changes to the regulatory requirements for trawl fisheries to protect sea turtles. As described in a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for Sea Turtle Conservation and Recovery in Relation to the Atlantic Ocean and Gulf of Mexico Trawl Fisheries (74 FR 88 May 8, 2009), NMFS is considering expanding the use of TEDs in trawl fisheries and modifying the geographic scope of the TED requirements. Since TED requirements may decrease the catch retention of some target species, vessels may tow longer to offset this loss of catch, likely resulting in negative impacts to habitat and EFH.

5.6.5.4 Protected Resources

A general description of protected species that may be affected by the Proposed Action is provided in Section 4.4 of this document and in more detail in Amendment 1 and Amendment 4 to the FMP.

Large whales may be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries. Ship strikes and fishing gear entanglement continue to be the most likely sources of human-related injury or mortality for right, humpback, fin and minke whales. Sei, blue and sperm whales are also vulnerable, but fewer ship strikes or entanglements have been recorded. Mobile bottom trawls, as well as midwater trawl gear, appear to be less of a concern for the large whale species. Other marine mammals, however, such as harbor porpoise, dolphins and to a greater degree seals, are vulnerable to entanglement in net gear, including midwater trawl gear and purse seines.

In addition to these actions, NMFS has implemented specific regulatory actions to reduce injuries and mortalities from gear interactions. The ALWTRP, implemented in 1999 with subsequent rule modifications, restrictions, and extensions, includes time and area closures for trap/pot fisheries (e.g., lobster and black sea bass) and gillnet fisheries (e.g., anchored gillnet and shark gillnet fisheries); gear requirements, including a general prohibition on having line floating at the surface in these fisheries; a prohibition on storing inactive gear at sea; and restrictions on setting shark gillnets off the coasts of Georgia and Florida and drift gillnets in the Mid-Atlantic. This plan also contains non-regulatory aspects, including gear research, public outreach, scientific research, a network to inform mariners when right whales are in an area, and increasing efforts to disentangle whales caught in fishing gear. The intent of the ALWTRP is to positively affect large whales by reducing injuries and deaths of large whales (North-Atlantic right, humpback, and fin) in waters off the United States East Coast due to incidental entanglement in fishing gear.

Turtles in general have documented entanglements in shrimp trawls, pound nets, bottom trawls and sink gillnets. Shrimp trawls are required to use turtle excluder devices. The diversity of the sea turtle life history also leaves them susceptible to many other human impacts, including impacts on land, in the benthic environment, and in the pelagic environment. Anthropogenic factors that impact the success of nesting and hatching include: beach erosion, beach armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, and an increased presence of native species (e.g., raccoons, armadillos, and opossums) which raid and feed on turtle eggs. Entanglement in debris or ingestion of marine debris are also seen as possible threats.

Reasonably Foreseeable Future Actions: At the time, it is not known how the 2012-2015 Specifications Process will impact protected resources. The Specifications Process will set the specifications for the Atlantic Herring fishery for 2012-2015, which will rely primarily on information from a Benchmark Assessment which is set to take place in 2013 to inform decision making, in addition to information from the PDT. The action will likely be beneficial to the Atlantic Herring resource, as in accordance with the reauthorized Magnuson-Stevens Act, which was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. One way in which the Specifications Process my benefit the Atlantic Herring resource is by reducing effort. As an extension, it may therefore also be beneficial to protected resources by reducing effort in those areas which they are located; the cumulative impacts of the future Specifications Process on protected resources is difficult to predict at this time, however, as the changes to the fishery are as yet unknown.

The likely impacts of the Omnibus EFH Amendment on protected resources cannot be determined at this time. The Harbor Porpoise Take Reduction Plan for the GOM and Mid-Atlantic Coasts was originally implemented in 1998, and NMFS published a proposed rule in July 2009 indicating additional management restrictions for gillnetters. Future measures of this plan may be implemented if take reduction goals are not met, which could further reduce fishing effort and may have a positive effect on the population of this species.

The sea turtle Strategy is a gear-based approach to addressing sea turtle bycatch. Under the Strategy, NMFS has identified trawl gear as a priority for reducing sea turtle bycatch and is considering proposing changes to the TED requirements in the trawl fisheries. TED requirements are designed to have a positive effect on protected resources, specifically turtles by allowing for most turtles caught in trawl nets to escape. NMFS is working to develop and implement bycatch reduction measures in all trawl fisheries in the Atlantic and Gulf of Mexico when and where sea turtle takes have occurred or where gear, time, location, fishing method, and other similarities exist between a particular trawl fishery and sea turtle takes have occurred by trawls (72 FR 7382, February 15, 2007). On February 15, 2007, NMFS issued an advance notice of proposed rulemaking to announce that it is considering amendments to the regulatory requirements for TEDs (72 FR 7382). On May 8, 2009, NMFS issued a NOI to prepare an EIS (74 FR 88 May 8, 2009), and held public scoping meetings throughout the East coast.

5.6.5.5 Fishery-Related Businesses and Communities

Past and Present Actions: In 2010 the ASMFC adopted an Addendum which modified Amendment 1 (Amendment 1) and Amendment 2 (Amendment 2) to the Interstate Fisheries Management Plan for Atlantic Sea Herring by changing the specification setting process and associated definitions. Based on the difficulty of having two sets of acronyms, one for the NEFMC plan and one for the ASMFC plan, for one cooperatively managed species the addendum was developed to establish an identical set of definitions and acronyms as those that the NEFMC is required to use under MSRA. The addendum also established a new specification setting process that is more in line with the ASMFC Sea Herring Section's usual process for setting specifications while taking into account the new process that was enacted by the NEFMC in Amendment 4 to the Atlantic Herring FMP

Amendment 4 to the Atlantic Herring FMP, as enacted by the NEFMC in 2010, primarily responded to the requirements of the MSA and NEPA. The Amendment established ACLs by first defining terms to bring the FMP into compliance with the MSA, setting an interim ABC control rule, eliminating JVP, IWP, TALFF and reserve specifications, establishing sub-ACLs, and establishing the Specifications Process to utilize these elements. Three Accountability Measures (AMs) were also established: one which closed the fishery when there is a projection that 95% of the sub-ACL will be reached, one which subtracts the amount of an ACL overage from subsequent ACLs, and another which established a haddock catch cap.

In 2006 Framework 43 to the Northeast Multispecies FMP was enacted, which modified the restrictions for herring vessels so that herring fishing could continue on Georges Bank, but prohibited certain herring vessels from discarding haddock and limited possession of other groundfish to small amounts. It also adopted a cap on the amount of haddock that could be caught by certain herring vessels. In 2011, Framework 46 changed these catch cap provisions so that they would apply only to midwater trawl vessels with a herring permit, because these vessels caught nearly all of the haddock caught by the herring fishery. Catches of haddock by midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 that are documented by at-sea observers are now extrapolated to an estimate of the total catch of haddock. Individual estimates are then developed for each haddock stock (GOM and GB haddock). The cap is then applied based on the multispecies fishing year (May 1 through April 30), and is 1 percent of the Acceptable Biological Catch (ABC) of each stock. If the haddock catch estimate extrapolated from observer reports exceeds a stock-specific cap, midwater trawl vessels are limited to catching 2,000 pounds of Atlantic herring in a relevant area. If there is an overage of the cap, the cap for the following year is reduced by the amount of the overage. In order to monitor the cap, midwater trawl vessels fishing in Herring Management Areas 1A, 1B, and 3 are also required to report total kept catch by haddock stock area and gear used.

Reasonably Foreseeable Future Actions: Amendment 14 to the Mackerel Squid Butterfish (MSB) FMP has been developed concurrently to Amendment 5 by the Mid-Atlantic Fishery Management Council. Many of the actions contained with both Amendments have been developed to compliment and/or replicate each other so as to avoid conflicting overlaps of restrictions on vessels that participate in both fisheries. In some cases, however, the actions contained in both Amendments present some conflict with each other. Actions currently being considered in Amendment 14 include: vessel reporting measures, dealer reporting measures, at-sea observation optimization measures, other sampling and monitoring measures such as port-side monitoring, at-sea observer coverage requirements, mortality caps on river herring, restrictions in areas of high river herring catch, mesh requirements, and the potential addition of river herring as a stock in the fishery. The ways in which these actions overlap can be seen in Table 190. Similarly, the timelines for both this Amendment and Amendment 14 have been designed to complement each other and allow public comment sessions to occur simultaneously.

The 2012-2013 Specifications Process will set the specifications for the Atlantic Herring fishery for those years, which will rely primarily on information from a Benchmark Assessment, which is set to take place in 2013, to inform it, as well as information from the PDT. The action will likely be beneficial to the Atlantic Herring resource as in accordance with the reauthorized Magnuson-Stevens Act, which was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. More specifically, it will likely comply with a set of National Standards that collectively serve to optimize the conditions of the human environment, which will benefit both fishery-related business and communities. The cumulative impacts of the future Federal fishery management actions on them should therefore be expected to result in positive long-term outcomes. Nevertheless, Specifications Process may be associated with offsetting impacts, such as constraining fishing effort, which frequently results in negative short-term socio-economic impacts for fishery participants. However, these impacts are necessary to bring about the long-term sustainability of a given resource and as such should, in the long-term, promote positive effects on both fishery-related businesses and communities, especially those that are economically dependent upon the managed resource.

Implementation of the Omnibus EFH Amendment may result in additional habitat protections, which may or may not effect fishery-related businesses and communities depending on what the protection does to vessel effort. Similarly, if revisions are made to the Harbor Porpoise Take Reduction Plan, vessels could face additional restrictions, possibly resulting in positive impacts to bycatch through effort reductions.

NMFS is currently considering proposing changes to the regulatory requirements for trawl fisheries to protect sea turtles. As described in a NOI to prepare an EIS (74 FR 88 May 8, 2009), NMFS is considering expanding the use of TEDs to other trawl fisheries and modifying the geographic scope of the TED requirements. TED requirements may have a negative effect on fishery-related businesses and communities, as they may increase the cost of fishing, however the extent of the measures is unknown at this time.

Table 191 Summary Effects of Past, Present, and Reasonably Foreseeable Future Actions on the VECs Identified for Amendment 5

VEC	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Atlantic Herring	**Positive** Combined effects of past actions have decreased effort, improved habitat protection	**Positive** Current regulations continue to manage for a sustainable stock	**Positive** Future actions are anticipated to strive to maintain a sustainable stock	**Positive** Stock are being managed for sustainability
Non-Target Species and Other Fisheries	**Mixed** Combined effects of past actions have decreased effort and reduced bycatch; river herring bycatch issues remain largely unaddressed	**Mixed** Current regulations continue to decrease effort and reduced bycatch; river herring bycatch remains largely unaddressed	**Positive** Future regulations are being developed to improve monitoring and address river herring bycatch issues	**Low Positive** Decreased effort and reduced bycatch continue; river herring bycatch will be addressed
Physical Environment and Essential Fish Habitat (EFH)	**Positive** Combined effects of past actions have decreased effort and improved habitat protection	**Positive** Current regulations continue to manage for a sustainable stock, thus controlling effort on direct and discard/bycatch species	**Positive** Future actions are anticipated to continue rebuilding and target healthy stocks, thus limiting the take of discards/bycatch	**Positive** Continued management of directed stocks will also control incidental catch/bycatch
Protected Resources	**Positive** Combined effects of past fishery actions have reduced effort and thus interactions with protected resources	**Positive** Current regulations continue to control effort, thus reducing opportunities for interactions	**Mixed** Future regulations will likely control effort and thus protected species interactions, but as stocks improve, effort will likely increase, possibly increasing interactions	**Positive** Continued effort controls along with past regulations will likely help stabilize protected species interactions
Fishery-Related Businesses and Communities	**Mixed** Combined effects of effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities	**Mixed** Continued fisheries management will likely control effort and thus fishery related habitat impacts but fishery and non-fishery related activities will continue to reduce habitat quality

5.6.6 Baseline Conditions

For the purposes of a cumulative effects assessment, the baseline conditions for resources and human communities are considered the present condition of the VECs plus the combined effects of the past, present, and reasonably foreseeable future actions. The following table (Table 192) summarizes the added effects of the condition of the VECs (i.e., status/trends from Section 0) and the sum effect of the past, present and reasonably foreseeable future actions (from Section 5.6.5 above). The resulting CEA baseline for each VEC is exhibited in Table 191. The resulting CEA baseline for each VEC is exhibited in the last column (shaded). In general, straightforward quantitative metrics of the baseline conditions are only available for the managed resources, non-target species, and protected resources. The conditions of the habitat and human communities VECS are complex and varied. As such, the reader should refer to the characterizations given in Section 0.

Table 192 Cumulative Effects Assessment Baseline Conditions of the VECs

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 191)	Combined CEA Baseline Conditions
Atlantic Herring Resource		Not overfished and overfishing is not occurring.	**Positive -** Stocks are being managed to meet sustainable fishing levels	**Positive -** Stocks are being managed to meet sustainable fishing levels
Non-Target Species and Other Fisheries	**River Herring**	Unknown; ASMFC stock assessment to be completed 2012	**Low Positive** – Decreased effort and reduced bycatch continue; river herring bycatch will be addressed in this Amendment and Amendment 14 to the MSB FMP	**Low Positive** – Effort and bycatch will continue to decrease
	Mackerel	Not overfished and overfishing is not occurring		
	Groundfish (GB and GOM Haddock)	Not overfished and overfishing is not occurring		

Table 192 Cumulative Effects Assessment Baseline Conditions of the VECs, continued

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 191)	Combined CEA Baseline Conditions
Habitat and EFH		Fishing impacts are complex and variable and typically adverse (see Section 4.5); Non-fishing activities had historically negative but site-specific effects on habitat quality.	**Mixed** – Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities.	**Mixed** - reduced habitat disturbance by fishing gear but impacts from non-fishing actions, such as global warming, could increase and have a negative impact.
Protected Resources	**Sea Turtles**	Leatherback, Kemp's ridley and green sea turtles are classified as endangered under the ESA and loggerhead sea turtles are classified as threatened, with a proposed listing.	**Positive** – reduced gear encounters through effort reductions and management actions taken under the ESA and MMPA have had a positive impact	**Positive** – reduced gear encounters through effort reductions and additional management actions taken under the ESA and MMPA.
	Large Cetaceans	Of the baleen whales (right, humpback, fin, blue, sei and minke whales) and sperm whales, all are protected under the MSA and with the exception of minke whales, all are listed as endangered under the ESA.		
	Small Cetaceans	Pilot whales, dolphins and harbor porpoise are all protected under the MSA. The most recent stock assessment for harbor porpoise shows that takes are increasing and nearing PBR.		
	Pinnipeds	Harbor, Grey, Harp and Hooded seals are all protected under the MSA and the MMPA.		
Human Communities		Complex and variable. In general, herring catch for New England states since 1996 has declined, but catch year to year has been variable. Revenues have also generally been variable.	**Negative** – Although future sustainable resources should support viable communities and economies, continued effort reductions over the past few years have had negative impacts on communities	**Negative –** short term: lower revenues would continue until stocks are sustainable **Positive** – long term: sustainable resources should support viable communities and economies

5.6.7 Summary of Impacts from Amendment 5 Alternatives

The following tables summarize the impacts of the management measures under consideration in Amendment 5 on each of the VECs identified in this amendment and described in the Affected Environment. Some additional discussion regarding the cumulative impacts of the proposed alternatives/options on fishery-related businesses and communities is also provided following the tables, with more specific focus on social impacts.

Measure Description	Potential Impacts of the Proposed Adjustments to the Fishery Management Plan (Section 3.1) VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
Section 3.1.1, Regulatory Definitions: Proposed regulatory definitions for *offload* and *transfer at sea*	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled	Neutral Measures are administrative and not likely to affect non-target species encountered in the herring fishery	Neutral Measures are administrative and not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled
Section 3.1.2, Administrative/General Provisions: **-**Expand possession limits to vessels working cooperatively -Eliminate the VMS power down provision - At-sea Dealer Permit	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled	Neutral Measures are administrative and not likely to affect non-target species encountered in the herring fishery	Neutral Measures are administrative and not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Positive Measures are administrative and not likely to affect the amount of herring for harvest or fishing effort, but may improve catch reporting by clarifying how catch is handled
Section 3.1.3, Carrier Vessels: Option 2 - allow carriers to declare in/out through VMS to eliminate the 7-day minimum enrollment Option 3 - dual option allows SQ for carriers with no VMS	Neutral Measures not likely to affect the amount of herring for harvest or fishing effort	Neutral Measures not likely to affect non-target species encountered in the herring fishery	Neutral Measures not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Negative/Low Positive Option 2 would increase flexibility for limited access vessel but may negatively impact open access vessels that would need to purchase ($1,750-$3,300) and operate ($40-$100/month) a VMS; Option 3 increases flexibility for all vessels without the additional cost of purchasing/ operating a VMS
Section 3.1.3.3, Transfers at Sea: Option 2 - Category A and B vessels only Option 3 - prohibit transfers to non-permitted vessels	Low Positive Measures not likely to affect the amount of herring for harvest or fishing effort; transfers at sea represent small component of fishery, but options under consideration may improve catch monitoring	Neutral Measures not likely to affect non-target species encountered in the herring fishery	Neutral Measures not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Negative Option 2 decreases flexibility of Category C and D vessels; Option 3 decreases flexibility for all herring vessels by prohibiting vessels from selling herring at sea as lobster bait; Options 2 and 3 increase reporting burden but should have minimal negative economic impacts as less than 0.5% of catch is transferred at sea

Measure Description	Potential Impacts of the Proposed Adjustments to the Fishery Management Plan (Section 3.1) Continued VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Business and Communities
Section 3.1.4: Trip Notification Requirements Option 2 - modify/extend pre-trip notification requirements and add VMS gear declaration Option 3 - extend pre-landing notification requirement	Low Positive Herring harvest or fishing effort is not expected to change, but catch accounting and/or the tracking of catch may improve; either may improve allocation of observers and help ensure the timely sampling of the Atlantic herring fishery	Neutral Measures are administrative and not likely to affect non-target species encountered in the herring fishery	Neutral Measures are administrative and not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Low Positive Options 2 and 3 will increase reporting burden, but measures should provide consistency regarding which vessels are subject to the pre-trip and pre-landing notifications and extending notification requirements will likely improve allocation of observer coverage and management uncertainty can therefore be reduced.
Section 3.1.5: Reporting Requirements for Federally Permitted Dealers Option 2 - require dealers to weigh all fish Sub-Option 2A and 2B– requirement for annual/weekly reporting of catch composition estimation method Sub-Option 2C – vessel owner/operator confirmation of SAFIS	Neutral/Low Positive Option 2 does not require dealers to use any particular method to accurately weigh all fish; dealers are therefore unlikely to change their behavior under Option 2, in comparison to the no action alternative; sub-options may provide more information	Neutral/Low Positive Option 2 does not require dealers to use any particular method to accurately weigh all fish; dealers are therefore unlikely to change their behavior under Option 2, in comparison to the no action alternative; sub-options may provide more information	Neutral Measures are not likely to affect EFH or Protected Resources; Sub-Options is not likely to improve separation of protected resources	Neutral Sub-Option 2A/2B Low Negative Sub-Option 2C Low Positive Option 2 does not require dealers to use any particular method to accurately weigh all fish; dealers are therefore unlikely to change their behavior under Option 2, in comparison to the no action alternative; Sub-Options 2A/2B would require extra time and effort for owner/operators; 2C may improve quality of data, resulting in better monitoring against sub-ACLs (potential economic benefit)
Section 3.1.6: Changes to Open Access Provisions for Limited Access Mackerel Vessels in Areas 2/3 Option 2 - 20K pound possession limit of LA mackerel vessels with OA herring permit Option 3 - 10K pound possession limit option for LA mackerel vessels with OA herring permit	Neutral Increases the potential for targeted fishing for herring in SNE and MA areas; should not be a concern for herring because of quota management (controls F) but impact on inshore stock depends on timing of catch and stock component mixing	Unknown Impacts will depend largely on how many vessels/which tiers the Council agrees to apply these options to; will also depend on if additional measures are implemented to monitor or manage the catch of non-target species in the times and areas where vessels with the new mackerel permit may fish	Low Negative Increase in effort may lead to more encounters with EFH and/or Protected Resources, however the effort increase is expected to be minimal based on the magnitude of the overall fishery	Positive Could decrease the occurrence of regulatory discards and increase revenues for vessels that qualify for this permit category; vast majority of mackerel are landed by vessels which are not subject to the 3 mt possession limit; equity issue between LA herring and mackerel permit holders may be resolved by permitting similar levels of non-directed catch in both fisheries

Measure Description	Potential Impacts of the Catch Monitoring at Sea Alternatives (Section 3.2)			
	VEC 1: Atlantic Herring	**VEC 2: Non-Target Species /Other Fisheries**	**VECs 3 and 4: Essential Fish Habitat and Protected Resources**	**VEC 5: Fishery Related Business and Communities**
Section 3.2.1.2, Alternative 2 - 100% Observer Coverage: Funding Option 2 - federal and industry funds States as Service Providers Option 2 - states authorized	Positive Benefits to resource would be highest under this alternative because it increases the likelihood of better documenting herring catch the most; may improve the precision of estimates of discards and/or landed bycatch; long-term effects may have low positive effects; relationship between observer coverage and precision important to consider at high levels of coverage	Positive Benefits from significant increase in sampling and coverage, which should lower CVs and increase precision of bycatch estimates in the herring fishery; relationship between observer coverage and precision important to consider at high levels of coverage	Neutral/Low Positive Measures are not likely to affect EFH; the effects to Protected Resources result from significant increase in sampling and observer coverage	Potentially High Negative Impacts depend on funding options for observer coverage; would only create negative impacts on herring-related businesses or communities if Federal funds were not used to pay for the additional observer coverage; full cost of 100% coverage of the A/B/C herring fishery is likely to be approximately $2.5M per year
Section 3.2.1.3, Alternative 3 - Require SBRM Coverage Levels as Minimum: Funding Option 2 - federal and industry funds	Unknown/Potentially Low Positive Unclear how observer allocations may differ from the status quo; if sampling increases, may improve the precision of estimates of discards and/or landed bycatch; have low positive long-term effects	Unknown/Neutral Unclear how observer allocations may differ from the status quo; if sampling increases, will only affect a minor component of Northeast Region fisheries	Neutral/Unknown Measures are not likely to affect EFH or Protected Resources that may be encountered by the herring fishery	Unknown/Potentially Low Negative Similar to status quo; unclear what additional coverage would result from adopting this approach; would negatively affect fishery-related businesses if industry has to pay for additional coverage
Section 3.2.1.4, Alternative 4 - Council Specified Targets: Funding Option 2 - federal and industry funds	Low Positive May improve the precision of estimates of discards and/or landed bycatch; long-term effects may have low positive effects	Positive Allocation of additional observer coverage of river herring and haddock may lead to a great understanding and reliability of their bycatch estimates; would not impact the SBRM allocation scheme, and would therefore not cause other fisheries to be under-sampled	Neutral/Low Positive Measures are not likely to affect EFH; Protected Resources may benefit from additional monitoring	Potentially Negative Impacts depend on funding options for observer coverage; would negatively impact herring-related businesses if the industry has to pay for coverage; depends on the Council-specified targets/priorities

Measure Description	VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
	Potential Impacts of the Catch Monitoring at Sea Alternatives (Section 3.2) Continued			
Section 3.2.2.2, Additional Measures Improve Sampling: Option 2A - requirements for a safe sampling station Option 2B - requirements for reasonable assistance Option 2C - requirements to provide notice Option 2D - requirements for trips with multiple vessels Option 2E - pair trawl communication Option 2F - visual access to net/codend	Neutral May have little impact on the Atlantic herring resource; several of the measures may provide some additional information on the contents of slipped nets, discards, and landed catch, but likely to be qualitative	Neutral Several of the measures may provide some additional information on the contents of slipped nets, discards, and landed catch, but likely to be qualitative and not likely to affect the outcome of future assessments of non-target species	Neutral Measures are not likely to affect EFH or Protected Resources	Neutral Minimal direct economic impacts on the herring fishery; the proposed steps for improving or maximizing sampling at sea are currently a part of every herring vessels' normal operating practices, according to interviewed captains; it is unknown how this measure may affect purse seine operations; any economic impacts to the herring fishery will be through increased administrative and regulatory burden, but expected to be slight
Section 3.2.3.2, Measures to Address Net Slippage: Option 2 - require released catch affidavit for slippage events	Unknown May improve accounting of Atlantic herring catch but still represents an estimate; may therefore be redundant and unlikely to affect herring resource	Neutral May improve accounting of non-target species/other fisheries catch, but still represents an estimate	Neutral Released catch affidavits are not likely to affect EFH or Protected Resources	Neutral Minimal impacts on the directed herring fishery
Section 3.2.3.3, Measures to Address Net Slippage: Option 3 - CAI Sampling Provisions	Positive Likely to improve accounting of Atlantic herring catch; may improve statistics used in stock assessment and reduce uncertainty to an unknown degree	Low Positive Likely to improve accounting of non-target species/other fisheries	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Potentially Low Negative Minimal direct economic impacts on the herring fishery; however there may be new challenges associated with bringing operational discards on board for some vessels; increased times spent pumping fish to be sampled and observed; it is unknown how this measure may affect purse seine operations

Measure Description	Potential Impacts of the Catch Monitoring at Sea Alternatives (Section 3.2) Continued VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
Section 3.2.3.4, Measures to Address Net Slippage: Option 4 - catch deduction (and possible trip termination) for slippage events Option 4A -catch deduction, possible trip termination Option 4B - with CAI provisions Option 4C - with CAI provisions (10 events) Option 4D - with CAI provisions (5 events)	Low Positive Would likely result in sub-ACLs being attained more quickly with subsequent directed fishery closures occurring sooner; possible increase in herring abundance	Neutral/Potentially Low Positive Effects difficult to predict; trip termination could reduce the amount of effective fishing effort in an area throughout the course of the fishing season, thereby reducing bycatch and mortality of non-target species; the extent of the impacts will be determined by how fishing effort shifts and whether or not the fleet moves into an area(s) with a higher potential of encountering these species.	Unknown Not likely to affect EFH; impacts to Protected Resources will vary based on reaction of the fleet to the new measures	Negative Trip termination increases costs to participants; sub-ACL deductions could reduce catch and revenue, although this is likely to have an effect only in Areas 1A and 1B unless sub-ACLs are fully utilized in other areas; aggregate revenues expected to decline by $12,000-$15,000 per slippage event in areas where ACLs are fully utilized; potential safety concerns with trip termination and measures that are perceived as punitive
Section 3.2.4.2, Alternative 2: Evaluation of maximized retention through the annual issuance of exempted fishing permits	Unknown/Low Positive Would likely have little effect on the herring resource because it would not affect the mortality rate exerted on the stock; dealers may record previously undocumented catch	Unknown/Low Positive Could increase the scientific knowledge available to fisheries managers about bycatch of non-target species; impacts to mackerel fishery would need to be evaluated by NMFS when the alternative is developed	Neutral Exempted fishing permits are not likely to affect EFH or Protected Resources	Unknown Could degrade the quality of the catch by damaging in while in the fish hold; retention of non-marketable fish in the hold of a vessel reduces the amount of marketable fish which can be landed; magnitude of these effects are unknown at this time.

Measure Description	VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
	Potential Impacts of the Management Measures to Address River Herring Bycatch (Section 3.3)			
Section 3.3.2.2.1, 3.3.2.2.2, and 3.3.2.2.3; Alternative 2 - Monitoring/Avoidance Management Options: Option 1 - 100% Observer Coverage Option 2 - CAI sampling provisions Option 3 - trigger based monitoring	Low Positive No direct biological impact on the herring resource; indirect long-term benefits likely to result from improvements to catch sampling, increased sampling, and a reduction in unobserved catch	Potentially Positive May improve understanding of river herring encounters in the Atlantic herring fishery through focused monitoring and could lead to possible reductions in river herring mortality if the fleet avoids those areas; more monitoring may mean more bycatch/discards information in specific areas where river herring may be missed; monitoring specific areas instead of across the full range of the species may miss important river herring encounters by the fleet	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Negative Potential for increased costs associated with industry payment for observers; could trigger additional losses, thereby affecting bait supplies; slightly higher regulatory/compliance costs; indirect users of the river herring resource may benefit if higher stock levels of river herring are achieved; uncertainty of trigger mechanisms makes business planning difficult; complexity of trigger reporting options likely to be very challenging for fishery participants to provide accurate catch information in a real-time manner; impact may be mitigated for shrimp fishery and large-mesh bottom trawl vessels if exemption is approved
Section 3.3.2.2.4, Alternative 2 - Monitoring/Avoidance Management Options: Option 4 - two phase bycatch avoidance approach based on SFC project	Neutral No direct biological impact on the herring resource; indirect long-term benefits if the industry can work cooperatively to develop a long-term avoidance strategy	Potentially Positive Could be reductions in river herring mortality in the bimonthly avoidance areas; would need to be adequate incentives in place for the fleet to avoid the areas	Neutral The shift in effort is not likely to affect EFH or Protected Resources	Low Negative Collaboration with trusted institutions may allow herring fishery participants to participate in observations and facilitate monitoring/sampling that will lead to appropriate adjustments of Monitoring/Avoidance Areas and to the development of avoidance strategies; could ultimately reduce costs associated with bycatch avoidance because the industry would likely prioritize cost-effectiveness when developing strategies

Measure Description	Potential Impacts of the Management Measures to Address River Herring Bycatch (Section 3.3)			
	VEC 1: Atlantic Herring	VEC 2: Non-Target Species /Other Fisheries	VECs 3 and 4: Essential Fish Habitat and Protected Resources	VEC 5: Fishery Related Businesses and Communities
Section 3.3.3.2.1, Alternative 3 - River Herring Protection: Option 1 - closed areas	Neutral Not likely to affect total removals of herring from the fishery; many of the blocks proposed for seasonal closure under Alternative 3 overlap substantially with the herring fishery, suggesting that directed herring fishing effort may be reduced, at least seasonally, in some of the areas, but the areas are small and closed for short durations; other fishing activity is likely to occur as well; no benefits to the resource are expected	Potentially Positive May provide river herring protection during at-sea migrations, leading to reductions in mortality; fixed protection areas would not provide river herring mortality protection outside of protection areas; open areas could therefore have increased river herring encounter rates, depending on year-to-year variability associated with river herring distribution	Unknown Closed areas levels are not likely to affect EFH; Protected Resources impacts are unknown due to uncertainty in shift of effort	Negative Decreases in revenue in the directed fishery and/or increases in costs of fishing may occur with the closures; trawl fishery participants during the winter season may experience hardship due to the overlap with Protection Areas; may be straight-forward option to enforce; economic and social costs may be incurred though the variability of the hotspots; impact may be mitigated for shrimp fishery and large-mesh bottom trawl vessels if exemption is approved
Section 3.3.3.2.2, Alternative 3 - River Herring Protection: Option 2 - trigger based closed areas	Neutral Not likely to affect total removals of herring from the fishery; many of the blocks proposed for seasonal closure under Alternative 3 overlap substantially with the herring fishery, suggesting that directed herring fishing effort may be reduced, at least seasonally, in some of the areas, but the areas are small and closed for short durations; other fishing activity is likely to occur as well; no benefits to the resource are expected	Potentially Positive May provide river herring protection during at-sea migrations, reducing mortality; fixed protection areas would not provide river herring protection outside of the areas; open areas could therefore have increased river herring encounter rates, depending on year-to-year variability associated with river herring distribution; triggered closures may not be implemented quickly enough to protect river herring during migration	Unknown Closed areas levels are not likely to affect EFH; Protected Resources impacts are unknown due to uncertainty in shift of effort	Negative Decreases in revenue in the directed fishery and/or increases in costs of fishing may occur with the closures; trawl fishery participants during the winter season may experience hardship due to the overlap with Protection Areas; economic and social costs may be incurred though the variability of the hotspots, complexity of reporting catch under triggers, and uncertainty associated with reaching the triggers during the fishing year

Measure Description	Potential Impacts of the Management Measures to Address Midwater Trawl Access to Groundfish Closed Areas (Section 3.4)			
	VEC 1: Atlantic Herring	**VEC 2: Non-Target Species /Other Fisheries**	**VECs 3 and 4: Essential Fish Habitat and Protected Resources**	**VEC 5: Fishery Related Businesses and Communities**
Section 3.4.1, Alternatives 1, 2: No Action/ Pre-CAI Provisions	Neutral/Low Negative Maintain current provisions or adopt pre-CAI provisions; Alt 2 less restrictive by eliminating CAI sampling provisions	Neutral/Low Negative Maintain current provisions or adopt pre-CAI provisions; Alt 2 less restrictive by eliminating CAI sampling provisions	Neutral Maintain current provisions or adopt pre-CAI provisions; Alt 2 less restrictive by eliminating CAI sampling provisions	Neutral/Potentially Positive No impact (status quo); Alt 2 increases flexibility and fishing opportunities while decreasing the regulatory burden associated with fishing in CAI
Section 3.4.2, Alternative 3: 100% observer coverage in closed areas	Low Positive No direct biological impact on the herring resource; indirect long-term benefits likely to result from improvements to catch sampling, increased sampling, and a reduction in unobserved catch	Low Positive May improve accounting and precision of estimates of discards and/or landed bycatch for non-target species, especially groundfish (i.e. haddock, cod); almost all groundfish catch by herring vessels is haddock, which is already managed under a catch cap	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Potentially Low Negative Impacts depend on funding options for observer coverage; would only create negative impacts on herring-related businesses or communities if Federal funds were not used to pay for the additional observer coverage
Section 3.4.3, Alternative 4: Apply CAI provisions Option 4A - 100% observer coverage Option 4B - Less than 100% observer coverage	Low Positive No direct biological impact on the herring resource; indirect long-term benefits likely to result from improvements to catch sampling, increased sampling, and a reduction in unobserved catch	Low Positive Likely to improve accounting of non-target species/other fisheries; may improve estimation of principle bycatch species (herring, haddock, river herring, etc.)	Neutral/Low Positive Observer coverage levels are not likely to affect EFH; information gathering for Protected Resources may benefit from increased coverage	Potentially Low Negative Minimal direct economic impacts on the herring fishery; however there may be new challenges associated with bringing operational discards on board for some vessels; unknown how measure may affect purse seine operations; diminishing flexibility may result since the vessel operator would be required to provide notice if fishing in any of the closed areas
Section 3.4.4, Alternative 5: Closed Areas - prohibit midwater trawl fishing in year-round closed areas	Neutral/Low Positive Not likely to affect total removals because of shifts in fishing effort; may be beneficial for herring in Georges Bank closures (CAI and CAII) and in the more inshore closures in the Nantucket Lightship Closure, GOM Closure, and Cashes Ledge Closures; may offer protection for biodiversity rich areas	Positive May offer protection against groundfish mortality extended beyond existing gear exclusions; may be beneficial for haddock in GB closures (CAI and CAII) and a diverse suite of species (such as river herring, shad, and mackerel) in the more inshore closures in the Nantucket Lightship Closure, GOM Closure, and Cashes Ledge Closures; may offer protection for biodiversity rich areas	Neutral/Unknown Closed areas levels are not likely to affect EFH; Protected Resources impacts are unknown due to uncertainty in shift of effort	Negative Would likely reduce revenues for the midwater trawl fishery; number of midwater trawl trips would likely also decrease; midwater fleet is likely to fish in other, less productive areas while purse seine fleet benefits from their exclusion

5.6.8 Cumulative Effects Summary

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. Given this regulatory environment, and because fishery management actions must strive to create and maintain sustainable resources, impacts on all VECs (except short-term impacts to human communities) from past, present and reasonably foreseeable future actions, when combined with baseline conditions, have generally been positive and are expected to continue in that manner for the foreseeable future. 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 tables above are provided as a summary of likely cumulative effects found in the management alternatives contained in Amendment 5. Impacts are listed as no impact/neutral, positive, negative, or mixed. Impacts listed as no impact/neutral include those alternatives that have no impact or have a neutral impact (neither positive nor negative). Impacts listed as mixed contain both positive and negative impacts. The resultant cumulative effect is the CEA baseline that, as described above in Table 192, represents the sum of the past, present, and reasonably foreseeable future (identified hereafter as "other") actions and conditions of each VEC. When an alternative has a positive effect on a VEC, for example, reduced fishing mortality on a managed species, it has a positive cumulative effect on the stock size of the species when combined with the "other" actions that were also designed to increase stock size. In contrast, when an alternative has a negative effect on a VEC, such as increased mortality, the cumulative effect on the VEC would be negative and tend to reduce the positive effects of the "other" actions. The resultant positive and negative cumulative effects are described below for each VEC.

Atlantic Herring Resource

As noted in Table 192, the combined impacts of past federal fishery management actions has helped the stock retain a not overfished status with overfishing not occurring. Future management efforts are also expected to yield a sustainable herring stock in the future. The actions proposed in this Amendment are expected to continue the trend, by increasing monitoring and improving reporting requirements for the fishery, thereby increasing the quality and quantity of information collected on the stock. The past and present impacts, combined with the Proposed Action and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield low positive impact to the Atlantic Herring resource in the long term.

Non-Target Species and Other Fisheries

As noted in Table 192, the combined impacts of past federal fishery management actions have decreased fishing effort and improved habitat protection for non-target species, with the exception of river herring bycatch. Current management measures are expected to continue to control effort, and decrease bycatch and discards. The actions proposed by Amendment 5 are expected to continue this trend by increasing bycatch reporting and monitoring and it is also expected to increase either the protection or monitoring of river herring that is a bycatch of the herring fishery. The past and present impacts, combined with the Proposed Action and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield positive impacts to non-target species.

Physical Environment and EFH

As noted in Table 192, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore have been positive for habitat protection. In addition, better control of non-fishing activities has also been positive for habitat protection. However, both fishing and non-fishing activities continue to decrease habitat quality. No aspects of the Proposed Action are expected to have substantial impacts to habitat or EFH. Overall, the combination of past, present, and future actions is expected to reduce fishing effort and hence reduce damage to habitat; however, it is likely that fishing and non-fishing activities will continue to degrade habitat quality.

Protected Resources

As noted in Table 192, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore reduced interactions with protected resources. Current management measures are expected to continue to control effort and catch, and therefore continue to lessen interactions with protected resources. The actions proposed by Framework 46 are expected to continue this trend; however, as stocks rebuild to sustainable levels, future actions may lead to increased effort, which may increase potential interactions with protected species. Overall, the combination of past, present, and future actions is expected to stabilize protected species interactions and lead to positive impacts to protected species.

Fishery-Related Businesses and Communities

As noted in Table 192, the combined impacts of past federal fishery management actions have reduced effort, and therefore have curtailed fishing opportunities. Past and current management measures, including Amendment 4, will maintain effort and catch limit controls, which together with non-fishing impacts such as rising fuel costs have had significant negative short term economic impacts on human communities. The adjustments to the FMP may provide some benefit to fishing communities by improving catch reporting and notification requirements, but it may also simultaneously decrease vessels ability to sell herring as bait. Depending on the mechanism for funding that is decided upon, the catch monitoring at sea alternatives have the potential to create an immediate high negative effect on communities and businesses by requiring them to pay for the monitoring costs; operational costs may also increase with a few of the measures, and trip termination could also have a high negative impact. Similarly, the river herring bycatch measures would have an immediately negative impact if vessels were required to pay for the monitoring costs; the impacts of having to leave or be denied access to closed areas would also immediately impact vessels and the communities which depend on them. The impacts of the management measures to address midwater trawl access to groundfish closed areas range from potentially positive to negative, depending on the measure chosen; pre-Closed Area I provisions would reduce the regulatory burden on vessels, but prohibiting the midwater trawl fishery from groundfish closed areas could immediately effect vessels negatively. In the short term, this action has the potential to decrease revenue that will compound the significant economic impact on the fishing industry from past actions. Overall, the combination of past, present, and future actions is expected to enable a sustainable harvest of herring, however, which should lead to a long term positive impact on fishery-related businesses and communities.

6.0 CONSISTENCY WITH THE MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT (MSFCMA)

6.1 NATIONAL STANDARDS

Section 301 of the Magnuson-Stevens Fishery Conservation and Management Act requires that fishery management plans (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.

[TO BE COMPLETED FOR FINAL AMENDMENT 5 DOCUMENT]

(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.

6.2 OTHER REQUIRED PROVISIONS OF MSFCMA

Section 303 of the Magnuson-Stevens Fishery Conservation and Management Act contains 14 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:

[TO BE COMPLETED FOR FINAL AMENDMENT 5 DOCUMENT]

(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;*

(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 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; 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 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.*

7.0 RELATIONSHIP TO OTHER APPLICABLE LAW

7.1 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

7.1.1 Introduction/DEIS Table of Contents

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 DEIS in the *Federal Register* May 8, 2008. A second, Supplementary NOI was published on December 28, 2009 to announce the intent to prepare an EA for Amendment 4 and EIS for Amendment 5, after the two amendments were split. The purpose of both of the NOIs was to alert the interested public to the commencement of the scoping process and to provide for public participation in the development of this amendment, consistent with the requirements of NEPA. The Council prepared a scoping document that outlined some of the major issues and types of management measures that the Council might consider during the development of Amendment 5. The Council invited discussion on the scoping document and any other issues of concern at the scoping meetings as well as suggestions for appropriate management measures to consider during the development of this amendment. A summary of the scoping process and the comments received can be found in Section 1.3 of this document.

To prepare this Draft Amendment/DEIS, the Council also held many meetings of its Herring Oversight Committee, and Herring Advisory Panel. All of these meetings, as well as numerous Herring Plan Development Team meetings, were open to the public. A list of public meetings held during the development of Amendment 5 is provided in Section 9.0 of this document (p. 543). The proposed management measures in this integrated amendment/DEIS document will be the subject of public hearings during 2012. The Council will take public comment into consideration when selecting the final management measures for Amendment 5 later during 2012.

The following Table of Contents for the DEIS is provided to aid reviewers in referencing the appropriate corresponding sections of this integrated amendment/DEIS document.

7.1.2 Summary of Amendment 5 Scoping Process

A summary of the Amendment 5 scoping process is presented in Section 1.3 of this document.

7.1.3 Areas of Controversy and Issues to be Resolved

[TO BE COMPLETED FOR FINAL AMENDMENT 5 DOCUMENT]

7.1.4 Determination of Significance

[TO BE COMPLETED FOR FINAL AMENDMENT 5 DOCUMENT]

7.1.5 DEIS Circulation List

The draft document is available on the NEFMC web page, www.nefmc.org. Copies were provided to all Council members. Announcements of the documents availability will be made in the Federal Register and to the interested parties mailing list. In addition, copies were distributed to the following:

US Environmental Protection Agency
EIS Filing Section
Office of Federal Activities
Ariel Rios Building (South Oval Lobby)
Mail Code 2252-A
1200 Pennsylvania Avenue N.W.
Washington, DC 20460

United States Environmental Protection Agency (USEPA), Region 1
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Boston, MA 02203
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William Gibbons-Fly, Director
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Timothy J. Ragan, Ph.D.
Acting Executive Director
Marine Mammal Commission
4340 East-West Highway
Bethesda, MD 20814

Willie R. Taylor
Office of Environmental Affairs
Department of Interior
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Washington, DC 20520
202.208.3100

7.2 MARINE MAMMAL PROTECTION ACT (MMPA)

A description of marine mammals potentially affected by the measures proposed in Amendment 5 is provide in Section 4.4 of this document. For further information on the potential impacts of the fishery and the management measures under consideration on marine mammals, see Section 5.0 of this document. The NEFMC has reviewed the impacts of the alternatives under consideration on marine mammals and has concluded that the management actions proposed are consistent with the provisions of the MMPA. Although they are likely to affect species inhabiting the multispecies management unit, the measures will not alter the effectiveness of existing MMPA measures, such as take reduction plans, to protect those species based on overall reductions in fishing effort that have been implemented through the FMP.

7.3 ENDANGERED SPECIES ACT (ESA)

Section 7 of the Endangered Species Act 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. A description of the protected resources potentially affected by the action proposed in Amendment 5 is provided in Section 4.4 of this document. For further information on the potential impacts of the fishery and the proposed management action on listed species, see section 5.0 of this document. This section will be completed when the proposed action is submitted in the final amendment and EIS.

7.4 PAPERWORK REDUCTION ACT (PRA)

The purpose of the PRA is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. The authority to manage information and recordkeeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

With significant changes to the catch monitoring program proposed for the Atlantic herring fishery, Amendment 5 may contain new collection of information requirements subject to the PRA, including changes to permits, reporting requirements, notification requirements, and affidavit requirements, among other things. 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 5 is submitted.

7.5 INFORMATION QUALITY ACT (IQA)

[TO BE COMPLETED FOR FINAL AMENDMENT 5 DOCUMENT]

7.6 IMPACTS ON FEDERALISM/E.O. 13132

This E.O. established nine fundamental federalism principles for Federal agencies to follow when developing and implementing actions with federalism implications. The E.O. also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. This section will be completed when the proposed action is submitted in the final amendment and EIS.

7.7 ADMINISTRATIVE PROCEDURES ACT (APA)

This action was developed in compliance with the requirements of the Administrative Procedures Act, and these requirements will continue to be followed when the proposed regulation is published. 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.

7.8 COASTAL ZONE MANAGEMENT ACT (CZMA)

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.

This section will be completed when the proposed action is submitted in the final amendment and EIS.

7.9 REGULATORY FLEXIBILITY ACT (RFA)/E.O. 12866 (REGULATORY PLANNING AND REVIEW)

A summary of economic impacts and a preliminary regulatory economic evaluation is presented in Section 5.0 of this document.

The purpose of E.O 12866 is to enhance planning and coordination with respect to new and existing regulations. This E.O. requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be “significant.” E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant action is any regulatory action that may:

- Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President’s priorities, of the principles set forth in the Executive Order.

Additional requirements to comply with the Regulatory Flexibility Act will be completed for the Final Amendment 5 document.

7.10 E.O. 13158 (MARINE PROTECTED AREAS)

The Executive Order on Marine Protected Areas requires each federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the extent practicable, avoid harm to the natural and cultural resources that are protected by an MPA. The E.O. defines a Marine Protected Area as “any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.”

[TO BE COMPLETED FOR FINAL AMENDMENT 5 DOCUMENT]

8.0 DATA AND RESEARCH NEEDS

8.1 AMENDMENT 5 RESEARCH PRIORITIES

During the development of Amendment 5, the Council considered several management approaches and different “tools” to utilize when developing a comprehensive catch monitoring program for the herring fishery. While some of those tools may not yet be fully tested and ready to implement across the herring fishery, there appears to be potential in the near future to utilize them to improve catch monitoring. The Council identified two research priorities for further enhancing catch monitoring in the future: (1) electronic monitoring (EM) applications for net sensors; and (2) EM through the use of video cameras on the vessels. The Council supports and encourages testing and development of these technologies in cooperation with the herring industry.

Explore Net Sensor Technology Through “Study Fleet

The Council encourages research projects to investigate the feasibility of using the study fleet technology in the Atlantic herring fishery and test applications of passive monitoring systems for midwater, bottom trawl, and purse seine vessels. New technologies could be incorporated into the fishery management program as quickly as possible once their applicability and usefulness is tested.

The technology developed by Northeast Fisheries Science Center for the study fleet has significant potential for providing greatly improved monitoring of the herring fishery, including the goal of near real-time TAC-monitoring. As the Council is likely aware from prior briefings by the Science Center, the Study Fleet technology includes a computer, sensors, and software that can be integrated into a ship's systems and VMS, creating a combination of computerized reporting and passive collection of a wide variety of data. This technology can help identify conditions leading to higher rates of bycatch, improve the quality and timeliness of reporting, and, potentially even help measure the extent of slippage.

The industry has suggested that through testing, the technology may be developed to measure incidences of slipped hauls on unobserved trips and provide fine-scale effort data. It may be feasible to tie the computer system (which currently is designed and tested to collect, among other variables, GPS data, vessel speed, and depth/temperature data) into the winch and pump systems. If feasible, this could provide a means by which incidents of slippage – i.e., hauls that are not pumped. This could also help detect whether there is an "observer effect" – i.e., a difference in the incidence of slippage between observed and unobserved trips. The industry has encouraged the Council to identify the testing of this technology as a research priority for funding under the research set-aside program. If it can be successfully adapted to the herring fishery, this monitoring system can provide high quality information in a very cost effective manner.

Explore Video Monitoring Through a Pilot Program

A top priority for cooperative research (including use of future RSA funds, if available) should be to investigate the feasibility of video monitoring in the Atlantic herring fishery through a video monitoring pilot program. Currently, a similar pilot program is underway in the northeast multispecies (groundfish) fishery, which could form the basis of a similar study in the herring fishery.

8.2 OTHER HERRING-RELATED RESEARCH PRIORITIES

In addition, over the last few years, the Council, in consultation with the Herring PDT, has identified several ongoing needs for data and cooperative research in the Atlantic herring fishery. These are listed below and identified as either high, medium, or low priority.

High Priority

- Continue to utilize the inshore and offshore hydroacoustic and trawl surveys to provide an independent means of estimating stock sizes. Collaborative work between NMFS, DFO, state agencies, and the herring industry on acoustic surveys for herring should continue to be encouraged.
- Develop tagging and morphometric studies to explore uncertainties in stock structure and the impacts of harvest mortality on different components of the stock. Although tagging studies may be problematic for assessing survivorship for a species like herring, they may be helpful in identifying the stock components and the proportion of these components taken in the fishery on a seasonal basis.
- Continue commercial catch sampling of Atlantic herring fishery according to ACCSP/ME DMR protocols.
- Organize annual US-Canada workshops to coordinate stock assessment activities and optimize cooperation in management approaches between the two countries.
- Develop a strategy for assessing individual spawning components to better heavily exploited portion(s) of the stock complex.
- Examine the root causes of the discrepancy between Forward Projection and ADAPT assessments.
- Investigate bycatch and discards in the directed herring fishery.
- Synthesize predator/prey information and conduct investigations to address information gaps

Medium Priority

- Develop a stock assessment for the Gulf of Maine component of the stock complex.
- Conduct an otolith methods workshop to address aging differences between DFO, NMFS and ME DMR readers after age 5.
- Investigate possible density-dependence reduced growth rates affecting both the entire complex and inshore subcomponent.

Low Priority

- Develop socio-economic analyses appropriate to the determination of optimum yield.
- Consider potential discards if fishing mortality increases in the future.
- Develop economic analyses necessary to evaluate the costs and benefits associated with different segments of the industry.

8.3 OUTREACH PROGRAMS

The Council recommends that NMFS conduct outreach programs with the implementation of Amendment 5 (and Amendment 14 to the MAFMC's Squid, Mackerel, Butterfish FMP). The reporting requirements for the herring fishery are complex, and compliance will likely improve with a greater understanding of the requirements in both the herring and mackerel regulations.

Outreach Program to Ensure Consistency in Reporting and Improve Compliance

The Council will work with NMFS to structure an outreach program for improving reporting compliance by vessels and dealers once Amendment 5 is implemented. The Atlantic herring fishery is discrete enough that NMFS could work with the majority of participants in the fishery to standardize and clarify reporting requirements and better ensure that landings/catch data are provided to NMFS in a consistent and complete format.

Outreach Program to Foster Cooperation with Catch Monitoring Program

The Council will work with NMFS to structure an outreach program for enhancing communication and fostering cooperation between vessel operators, dealers, processors, and managers upon the implementation of the catch monitoring program proposed in this amendment.

9.0 LIST OF PUBLIC MEETINGS

Table 193 provides a list of all Council-related public meetings during which discussion focused on the development of management measures for consideration in Amendment 5.

Table 193 List of Public Meetings Related to the Development of Amendment 5

DATE	MEETING	LOCATION
November 6-7, 2007	Council Meeting	Newport, RI
March 26, 2008	Herring Oversight Committee	Portland, ME
April 9, 2008	Herring PDT	Mansfield, MA
April 15-17, 2008	Council Meeting	Providence, RI
April 30, 2008	Herring Advisory Panel	Peabody, MA
April 30, 2008	Amendment 4 Scoping Hearing	Peabody, MA
May 22, 2008	Amendment 4 Scoping Hearing	Portland, ME
May 22, 2008	Herring Oversight Committee	Portland, ME
June 2, 2008	Amendment 4 Scoping Hearing	Portland, MA
June 10, 2008	Amendment 4 Scoping Hearing	Atlantic City, NJ
July 30, 2008	Joint Herring Oversight & Advisory Panel	Portland, ME
August 14, 2008	Herring PDT	Danvers, MA
Sept. 30. – Oct. 1, 2008	Herring Oversight Committee	Portland, ME
October 7-9, 2008	Council Meeting	Mystic, CT
November 12, 2008	Herring PDT	Mansfield, MA
December 16, 2008	Herring Oversight Committee	Danvers, MA
February 9-11, 2009	Council Meeting	Portsmouth, NH
January 14, 2009	Herring PDT	Mansfield, MA
January 28, 2009	Herring Oversight Committee	Warwick, RI
March 24, 2009	Herring Oversight Committee	Portland, ME
April 7-9, 2009	Council Meeting	Mystic, CT
May 8, 2009	Enforcement Committee	Danvers, MA
May 14, 2009	Herring Advisory Panel	Portsmouth, NH
May 26, 2009	Herring PDT	Mansfield, MA
June 4-5, 2009	Herring Oversight Committee	Portland, ME
June 22-25, 2009	Council Meeting	Portland, ME
November 17-19, 2009	Council Meeting	Newport, RI
January 6 7 11, 2010	Public Hearing	Gloucester, MA
January 7, 2010	Public Hearing	Fairhaven, MA
January 11, 2010	Public Hearing	Portland, ME
March 30-31, 2010	Herring Oversight Committee	Portland, ME
April 8, 2010	Herring PDT	Mansfield, MA
May 17, 2010	Herring Oversight Committee	Portsmouth, NH
June 15, 2010	Herring PDT	Mansfield, MA
July 15, 2010	Herring PDT	Mansfield, MA
July 27-28, 2010	Herring Oversight Committee	Portland, ME
August 19, 2010	Herring PDT	Mansfield, MA
August 25, 2010	Herring Advisory Panel	Portland, ME
September 1-2, 2010	Herring Oversight Committee	Portsmouth, NH

October 4, 2010	Herring PDT Conference Call	N/A
November 30, 2010	Herring Oversight Committee	Portsmouth, NH
December 2, 2010	Herring PDT	Mansfield, MA
December 20, 2010	Herring Oversight Committee	Portsmouth, NH
January 25-27, 2011	Council Meeting	Portsmouth, NH
February 24, 2011	Herring PDT	Newburyport, MA
April 26-28, 2011	Council Meeting	Mystic, CT
May 11, 2011	Herring PDT	Mansfield, MA
June 21-23, 3011	Council Meeting	Portland, ME
June 29, 2011	Herring PDT	Gloucester, MA
August 10, 2011	Herring PDT	Mansfield, MA
August 31, 2011	Herring PDT Conference Call	N/A
September 7, 2011	Herring PDT Conference Call	N/A
Sept. 22, 2011	Herring Advisory Panel	Danvers, MA
November 3, 2011	Herring PDT Conference Call	N/A
November 14-16, 2011	Council Meeting	Newport, RI

10.0 LIST OF PREPARERS AND AGENCIES CONSULTED

This document was prepared by the New England Fishery Management Council and the National Marine Fisheries Service, in consultation with the Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fishery Management Council. Members of the New England Fishery Management Council's Herring Plan Development Team include:

- Lori Steele, NEFMC Staff, Herring PDT Chair
- Talia Bigelow, NEFMC Staff
- Michelle Bachman, NEFMC Staff
- Matt Cieri, ME DMR Biologist, ASMFC Herring TC Chair
- Amy van Atten, Sara Weeks, Debra Duarte, NEFOP
- Jon Deroba, NEFSC Population Dynamics
- Min Yang Lee, NEFSC Social Sciences
- Steve Correia, MA DMF Biologist
- Micah Dean, MA DMF Biologist
- Madeleine Hall-Arber, MIT Sea Grant
- Jamie Cournane, UNH
- Carrie Nordeen, NMFS NERO
- Lindsey Feldman and Aja Szumylo, NMFS NERO
- Robert Vincent, NMFS NERO
- Chris Vonderweidt, and Bob Beal, ASMFC Staff

The following agencies were consulted during the development of Amendment 5, either through direct communication/correspondence and/or participation on the Herring Committee or Herring PDT:

- NOAA Fisheries, National Marine Fisheries Service, Northeast Regional Office, Gloucester MA
- Northeast Fisheries Science Center, Woods Hole MA
- Atlantic States Marine Fisheries Commission and Atlantic Herring Section
- Mid-Atlantic Fishery Management Council

11.0 GLOSSARY

ABC: Acceptable Biological Catch. The maximum catch that is recommended for harvest, consistent with meeting the biological objectives of the management plan. ABC can equal but never exceed the OFL. ABC should be based on F_{MSY} or its proxy for the stock if overfishing is not occurring and/or the stock is not in a rebuilding program, and should be based on the rebuilding fishing mortality (F_{reb}) rate for the stock if it is in a rebuilding program. The specification of ABC will consider scientific uncertainty and will be recommended to the Council by its Scientific and Statistical Committee.

ABC Control Rule. The specified approach to setting the ABC for a stock or stock complex as a function of scientific uncertainty in the estimate of OFL and any other scientific uncertainty. The ABC control rule will consider uncertainty in factors such as stock assessment issues, retrospective patterns, predator-prey issues, and projection results.

ACL: Annual Catch Limit. The catch level selected such that the risk of exceeding the ABC is consistent with the management program. ACL can be equal to but can never exceed the ABC. ACL should be set lower than the ABC as necessary due to uncertainty over the effectiveness of management measures. The ACL serves as the level of catch that determines whether accountability measures (AMs) become effective.

Adult stage – one of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect – any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation – a group of animals or plants occurring together in a particular location or region.

AM: Accountability Measure(s). Management measures established to ensure that (1) the ACL is not exceeded during the fishing year; and (2) any ACL overages, if they occur, are mitigated and corrected.

Anadromous species – fish that spawn in fresh or estuarine waters and migrate to ocean waters

Amendment – a formal change to a fishery management plan (FMP). The Council prepares amendments and submits them to the Secretary of Commerce for review and approval. The Council may also change FMPs through a "framework adjustment procedure" (see below). The Commission prepares amendments and submits them to the Commission's Atlantic Herring Section for approval. Implementing regulations are adopted by the states.

Atlantic herring – *Clupea h. harengus*. The species that will be managed by the management plans developed by the Council and the Commission and described in this document. Sometimes referred to as sea herring.

Benthic community – *Benthic* means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. *Benthic community* refers to those organisms that live in and on the bottom.

B_{MSY} – stock biomass that would produce MSY when fished at a fishing mortality rate equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity. The overfishing definition control rules call for action when biomass is below ¼ or ½ B_{MSY}, depending on the species.

$B_{threshold}$ – 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below $B_{threshold}$.

B_{target} –desirable biomass to maintain fishery stocks. This is usually synonymous with B_{MSY} or its proxy.

Bycatch – fish that are harvested in a fishery, but which are not sold or kept for personal use. This includes economic discards and regulatory discards. The fish that are being targeted may be bycatch if they are not retained.

Capacity – the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: Catch is defined in the NS1 Guidelines as the total quantity of fish, measured in weight or numbers of fish, taken in commercial, recreational, subsistence, tribal, and other fisheries. Catch includes fish that are retained for any purpose, as well as mortality of fish that are discarded. The ACLs established for the herring fishery should relate to total catch in the fishery, including landings and discards.

Continental shelf waters – waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Crustaceans – invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Days absent – an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Demersal species – most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Ecosystem-based management – a management approach that takes major ecosystem components and services—both structural and functional—into account, often with a multispecies or habitat perspective.

Egg stage – one of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the *larval* or *juvenile stage*.

Elasmobranch – any of numerous fishes of the class Chondrichthyes characterized by a cartilaginous skeleton and placoid scales: sharks; rays; skates.

Embayment – a bay or an indentation in a coastline resembling a bay.

Environmental Impact Statement (EIS) – an analysis of the expected impacts of a fishery management plan (or some other Proposed Action) on the environment and on people, initially prepared as a "Draft" (DEIS) for public comment. After an initial EIS is prepared for a plan, subsequent analyses are called "Supplemental" (i.e., DSEIS, FSEIS).

Essential Fish Habitat (EFH) – those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Exclusive Economic Zone (EEZ) – for the purposes of the Magnuson-Stevens Fishery Conservation and Management Act, the area from the seaward boundary of each of the coastal states to 200 nautical miles from the baseline.

Exploitation rate – the percentage of catchable fish killed by fishing every year. If a fish stock has 1,000,000 fish large enough to be caught by fishing gear and 550,000 are killed by fishing during the year, the annual exploitation rate is 55%.

Fathom – a measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Fishing effort – the amount of time and fishing power used to harvest fish. Fishing power includes gear size, boat size and horsepower.

Fishing mortality (F) – (see Mortality)

FMP (Fishery Management Plan) – also referred to as a "plan," this is a document that describes a fishery and establishes measures to manage it. The New England Fishery Management Council prepares FMPs and submits them to the Secretary of Commerce for approval and implementation. The Atlantic States Marine Fisheries Commission prepares FMPs and implementing regulations are adopted by the States.

Framework Adjustments – adjustments within a range of measures previously specified in a fishery management plan (FMP). A change can usually be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

Gonadosomatic Index (GSI) – a measure of the stage of spawning condition.

GRT –gross registered tons. Measure of vessel size based on volume.

Internal Waters Processing (IWP) – an operation by a foreign vessel processing fish caught by U. S. vessels. The foreign vessel is located in the internal waters of a state. "IWP" is usually a reference to the fish allocated for these operations.

Joint Venture (JV) – any operation by a foreign vessel assisting fishing by U.S. fishing vessels, including catching, scouting, processing and/or support. (A joint venture generally entails a foreign vessel processing fish received from U.S. fishing vessels and conducting associated support activities.) "JVP" is usually a reference to the fish allocated for joint venture operations.

Juvenile stage – one of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the *egg* or *larval stage* and the *adult stage*; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

Landings – the portion of the catch that is harvested for personal use or sold.

Larvae (or Larval) stage – one of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the *egg* for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Limited entry (or access) – a management system that limits the number of participants in a fishery. Usually, qualification for this system is based on historic participation and the participants remain constant over time (with the exception of attrition).

Meter – a measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton – a unit of weight equal to a thousand kilograms (1 kg = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Mortality
Fishing mortality (F) – (see also exploitation rate) a measurement of the rate of removal of fish from a population by fishing. Fishing mortality (F) is that rate at which fish are harvested at any given point in time. ("Exploitation rate" is an annual rate of removal, "F" is an instantaneous rate.)

> **F_{target}** – the fishing mortality that management measures are designed to achieve.

Natural mortality (M) – a measurement of the rate of fish deaths from all other causes other than fishing such as predation, disease, starvation and pollution. The rate of natural mortality may vary from species to species.

Total mortality – the rate of mortality from all sources (fishing, natural, pollution). Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year).

Minimum biomass level – the minimum stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long term. If a stock is at this level, fishing mortality must be reduced to as near zero as possible until the stock rebuilds.

Observer – any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this action.

OFL: Overfishing Level. The catch that results from applying the maximum fishing mortality threshold to a current or projected estimate of stock size. When the stock is not overfished and overfishing is not occurring, this is usually F_{MSY} or its proxy. Catches that exceed this amount would be expected to result in overfishing. The annual OFL can fluctuate above and below MSY depending on the current size of the stock. This specification will replace the current specification of *allowable biological catch* in the herring fishery.

Open access – describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Optimum Yield (OY) – the amount of fish which –
(a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
(b) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
(c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overfished – a conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing – a level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Pelagic gear – mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are midwater trawls and pelagic longlines.

Plan Development Team (PDT) – a group of technical experts responsible for developing and analyzing management measures under the direction of the Council or the ASMFC. The ASMFC uses the term **Technical Committee** during the development of a plan and **Plan Review Team** after a plan is adopted.

Prey availability – the availability or accessibility of prey (food, **forage**) to a predator. Important for growth and survival.

Primary production – the synthesis of organic materials from inorganic substances by photosynthesis.

Proposed rule – a federal regulation is usually published in the *Federal Register* as a proposed rule with a time period for public comment. After the comment period closes, the proposed regulation may be changed or withdrawn before it is published as a final rule, along with its date of implementation and response to comments.

Rebuilding schedule – a plan to increase the biomass of a fishery stock, based on a target fishing mortality applied over a period of time.

Recovery time – the period of time required for something (e.g. a habitat) to achieve its former state after being disturbed.

Recruitment – the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be recruitment to the fishery.

Recruitment overfishing – fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Regional Administrator – Regional Administrator, NOAA/NMFS Northeast Region, Gloucester, MA.

Regulated groundfish species – cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Relative exploitation – an index of exploitation derived by dividing landings by trawl survey biomass. This measure does not provide an absolute magnitude of exploitation but allows for general statements about trends in exploitation.

Secretarial review process – a process which normally takes 140 days from the time the Council submits a plan or amendment to the Secretary of Commerce until its implementation. The Secretary of Commerce reviews and possibly approves the plan or amendment which must meet the National Standards established by the Magnuson Stevens Fishery Conservation and Management Act as well as other federal requirements (the National Environmental Policy Act, the Marine Mammal Protection Act, the Endangered Species Act and other applicable law.)

Spawning component – reference to a group of herring that spawn in a general location. There is evidence herring return to the same areas to spawn. These fish may, in fact, comprise different "stocks" but the evidence is ambiguous; they are identified as components to allow the development of measures for their protection. A healthy herring resource depends on maintaining spawning in as many areas as possible.

Spawning stock biomass (SSB) – the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage – several species occurring together in a particular location or region

Species composition – a term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity – the number of different species in an area and their relative abundance.

Species richness – see *Species diversity*. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Status Determination – a determination of stock status relative to $B_{threshold}$ (defines overfished) and $F_{threshold}$ (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock – a grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species.

Stock assessment – a process for determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock.

Technical Committee – a group of biologists assembled by the Commission to assess the (herring) resource.

Tolerance – a reference to a management measure used in the original Commission herring management plan. This measure allows fishing in a spawning closure as long as only a certain percentage of the fish caught contain spawn (roe or milt).

VMS – an electronic vessel monitoring system, which may also be used for communications. Previously referred to as a vessel tracking system, or VTS.

Year class – also called cohort. Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc.

12.0 INDEX

13.0 REFERENCES

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