Industry-Funded Monitoring

An Omnibus Amendment to the
Fishery Management Plans
of the Mid-Atlantic and New England
Fishery Management Councils

September 2016

MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

NEW ENGLAND FISHERY MANAGEMENT COUNCIL

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Amendment X to the Atlantic Bluefish Fishery Management Plan (FMP);
Amendment 7 to the Atlantic Herring FMP;
Amendment X to the Atlantic Salmon FMP;
Amendment 17 to the Atlantic Sea Scallop FMP;
Amendment 5 to the Deep-Sea Red Crab FMP;
Amendment XX to the Mackerel, Squid, and Butterfish FMP;
Amendment 8 to the Monkfish FMP;
Amendment 22 to the Northeast Multispecies FMP;
Amendment 5 to the Northeast Skate Complex FMP;
Amendment X to the Spiny Dogfish FMP;
Amendment XX to the Summer Flounder, Scup, and Black Sea Bass FMP;
Amendment XX to the Surfclam and Ocean Quahog FMP; and
Amendment X to the Tilefish FMP

Including a
Draft Environmental Assessment

September 2016

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Executive Summary

The New England Fishery Management Council (NEFMC) and the Mid-Atlantic Fishery Management Council (MAFMC) are interested in increasing monitoring and/or other types of data collection in some fishery management plans (FMPs) to assess the amount and type of catch, to more precisely monitor annual catch limits, and/or provide other information for management. This increased monitoring would be above coverage required through the Standardized Bycatch Reporting Methodology (SBRM), the Endangered Species Act (ESA) or Marine Mammal Protection Act (MMPA). The amount of available Federal funding to support additional monitoring and legal constraints associated with industry-funded monitoring cost responsibilities have prevented the National Marine Fisheries Service (NMFS) from approving recent industry-funded monitoring proposals, specifically Atlantic Herring Amendment 5, Atlantic Mackerel, Squid, and Butterfish Amendment 14, and Northeast (NE) Multispecies Framework Adjustment 48.

The Industry-Funded Monitoring Omnibus Amendment would provide the measures necessary for industry funding and available Federal funding to pay for additional monitoring to meet specific monitoring coverage targets for each FMP. This action is needed for the Councils to prioritize industry-funded monitoring programs across fishery management plans when available Federal funding falls short of the total needed to fully fund all monitoring programs. This omnibus amendment would also ensure consistency for industry-funded monitoring programs across New England and Mid-Atlantic FMPs.

This amendment includes a set of Omnibus Alternatives that would modify all the FMPs managed by the New England and MAFMCs to allow standardized, streamlined development of future FMP-specific industry-funded monitoring programs. Additionally, this amendment includes alternatives for specific industry-funded monitoring programs for the Atlantic Herring FMP and the Atlantic Mackerel, Squid, and Butterfish FMP, which would be implemented as part of this action. All of the alternatives are summarized below.

Overview of Omnibus Alternatives

The Omnibus Alternatives consider (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) a process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, (3) standard administrative requirements for industry-funded monitoring service providers, (4) a process to prioritize industry-funded monitoring programs in order to allocate available Federal resources across all FMPs, and (5) a process for monitoring set-aside programs to be implemented via a future framework adjustment action. The NEFMC and MAFMC selected Omnibus Alternative 2 as the preferred alternative.

Omnibus Alternative 1 (No Action) – No standardized structure for industry-funded monitoring programs

- No standard definition of cost responsibilities of industry and NMFS;

- No standardized framework adjustment process to implement future industry-funded monitoring programs in other FMPs;
- No standardized observer service provider requirements;
- No process for prioritizing industry-funded monitoring programs in order to allocate available Federal resources across all FMPs; and
- No standardized framework adjustment process to implement future monitoring set-aside programs.

Omnibus Alternative 2 (Preferred Alternative) – Standardized structure for industry-funded monitoring programs and option for monitoring set-aside provision.

- Standard definition for cost responsibilities of industry and NMFS;
- Standard framework adjustment process to implement future industry-funded monitoring programs in other FMPs;
- Standard observer service provider requirements;
- Process for prioritizing industry-funded monitoring programs in order to allocate available Federal resources across all FMPs; and
- Option for standard framework adjustment process to implement future monitoring set-aside programs.

Omnibus Alternatives 2.1-2.5 are variations on the prioritization process in Omnibus Alternative 2, and consider specific options for what to do when Federal funding is not sufficient to cover NMFS costs to support the Council's desired monitoring coverage level for a given FMP. The NEFMC and MAFMC selected Omnibus Alternative 2.2 as the preferred alternative.

1. Omnibus Alternative 2.1 – NMFS-led prioritization process. NMFS prepares analysis and prioritization in consultation with the Councils.
2. Omnibus Alternative 2.2 (Preferred Alternative) – Council-led prioritization process. Council prepares analysis and recommended priorities to NMFS.
3. Omnibus Alternative 2.3 – Proportional prioritization process. Available Federal funding would be allocated proportionally among all industry-funded monitoring programs.
4. Omnibus Alternative 2.4 – Coverage ratio-based prioritization process. The amount of available Federal funding would be allocated to each FMP relative to the extra coverage needed and total fleet activity. Alternative 2.4 would favor coverage for the FMPs that do not need much additional monitoring to meet coverage targets and have the most active fleets.
5. Omnibus Alternative 2.5 – Coverage ratio-based prioritization process. The amount of available Federal funding would be allocated to each FMP relative to the extra coverage needed and total fleet activity. Alternative 2.5 would favor coverage for the FMPs that need more additional monitoring to meet coverage targets and have the least active fleets.

Omnibus Alternative 2.6 – Monitoring Set-Aside

This alternative would provide a structure to develop future monitoring set-aside programs which could generally consist of reserving a portion of the annual catch limit for a fishery to assist in funding vessel/non-governmental costs for additional monitoring coverage beyond the SBRM requirements. No monitoring set-aside program would be directly established by this action.

Overview of Atlantic Herring Coverage Target Alternatives

The NEFMC is interested in increasing catch monitoring in the Atlantic herring fishery to address the following goals and objectives: (1) Accurate estimates of catch (retained and discarded), (2) accurate catch estimates for incidental species for which catch caps apply, and (3) affordable monitoring for the herring fishery. The Herring Alternatives provide a range of data collection and monitoring costs through various monitoring types including Northeast Fisheries Observer Program (NEFOP)-level observing, at-sea monitoring (ASM), electronic monitoring (EM), and portside sampling. Existing industry reporting requirements and observer coverage to meet SBRM, ESA, and MMPA requirements under the No Action alternative would continue. Any information collected under the herring coverage target action alternatives would be in addition to existing reporting and monitoring.

Table 1. Range of Industry-Funded Monitoring Herring Coverage Target Alternatives

Gear Type	Midwater Trawl	Purse Seine	Small Mesh Bottom Trawl
Herring Alternative 1: No Coverage Target for IFM Program (No Action)	SBRM		
Herring Alternative 2: Coverage Targets for IFM Program	Includes Sub-Options: 1) Wavier Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold		
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	100% NEFOP-Level Observer		
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	25%, 50%, 75% or 100% ASM		
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	50% or 100% EM/Portside	25%, 50%, 75% or 100% ASM	
Herring Alternative 2.4: EM and Portside Coverage on Midwater Trawl Fleet	50% or 100% EM/Portside	SBRM (No Action)	
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet in Groundfish Closed Areas*	100% NEFOP-Level Coverage	SBRM (No Action)	
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet in Groundfish Closed Areas	Coverage would match selected alternative 2.1-2.4	SBRM (No Action)	

Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	25%, 50%, 75% or 100% ASM or EM/Portside	25%, 50%, 75% or 100% ASM or EM/Portside	25%, 50%, 75% or 100% ASM or EM/Portside
* Sub-Options do not apply to Herring Alternative 2.5.			

As noted in the table above, Herring Alternative 2 would allow several sub-options to apply to the herring coverage target alternatives. Sub-options could apply to any of the alternatives <u>except</u> Herring Alternative 2.5.

- Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the NEFMC's intent for additional monitoring in the herring fishery, but would not prevent vessels from participating in the herring fishery if monitoring coverage was not available. **Should the NEFMC not select Sub-Option 1, then fishing effort would be reduced to match the available level of monitoring (i.e., the fleet would not fish if NMFS does not have funding to support the administration of the program).** Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards.
- Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish.
- Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation.
- Sub-Option 4 would require the NEFMC to examine the results of any increased coverage in the herring fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via a framework adjustment or an amendment to the Herring FMP, as appropriate.
- Sub-Option 5 would exempt trips that land less than 25 mt of herring from industry-funded monitoring requirements.

Under Herring Alternative 1 (No Action), there would be no coverage target specified for an industry-funded monitoring program in the Herring FMP. Observer coverage for herring vessels would be allocated according to SBRM, and there would be no additional cost to the herring industry for monitoring coverage. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the herring fishery would be evaluated on a case-by-case basis.

Under Herring Alternative 2, the NEFMC would specify the details of an industry-funded monitoring program for the Herring FMP. These details may include, but are not limited to:

(1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional National Environmental Policy Act (NEPA) analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Herring Alternatives 2.1-2.7 specify specific monitoring options for the herring fishery. Alternatives differ by monitoring type, coverage target, and how coverage is allocated. The NEFMC has not yet selected a preferred herring coverage target alternative.

1. Herring Alternative 2.1 – Vessels with All Areas (Category A) and Areas 2/3 (Category B) Limited Access Herring Permits would be required to carry a NEFOP-level observer on every declared herring trip.
2. Herring Alternative 2.2 – Vessels with Category A and B herring permits would be required to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) specified in this action.
3. Herring Alternative 2.3 – Vessels with Category A and B herring permits using purse seine and small mesh bottom trawl gear would be required to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) specified in this action. Additionally, midwater trawl vessels would be required to carry an operating EM system on every trip declared into the herring fishery and allow portside sampling of catch on declared herring trips selected for coverage by NMFS. The intention of the NEFMC would be that all declared herring trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%).
4. Herring Alternative 2.4 – Midwater trawl vessels would be required to carry an operating EM system on every trip declared into the herring fishery and allow portside sampling of their catch on declared herring trip selected for coverage by NMFS. The intention of the NEFMC would be that all declared herring trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%).
5. Herring Alternative 2.5 – Vessels fishing with midwater trawl gear would be required to carry a NEFOP-level observer on every trip into the Groundfish Closed Areas.
6. Herring Alternative 2.6 – Vessels fishing with midwater trawl gear would be required to comply with any ASM or EM and portside monitoring requirements selected in this action for the herring fishery (i.e., Herring Alternatives 2.2-2.4 or 2.7) on every trip into the Groundfish Closed Areas.

7. Herring Alternative 2.7– Initially, vessels with Category A and B herring permits would be required to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the ASM coverage target (25%, 50%, 75%, or 100%) specified in this action. If the NEFMC determines that EM and portside sampling is an adequate substitute for ASM coverage aboard midwater trawl vessels, then Category A and B vessels using midwater trawl gear would be able to choose whether to use ASM or EM and portside sampling coverage. The NEFMC may select a different coverage target for each monitoring type (ASM or EM and portside sampling) and each gear type (midwater trawl, purse seine, bottom trawl).

Overview of Atlantic Mackerel Coverage Target Alternatives

The MAFMC is interested in increasing catch monitoring in the Atlantic mackerel fishery to address the following goals and objectives: (1) Accurate estimates of catch (retained and discarded), (2) accurate catch estimates for incidental species for which catch caps apply, and (3) effective and affordable monitoring for the mackerel fishery. The Mackerel Alternatives provide a range of data collection and monitoring costs through various monitoring types including NEFOP-level observing, ASM, EM, and portside sampling. Existing industry reporting requirements and observer coverage to meet SBRM, ESA, and MMPA requirements under the No Action alternative would continue. Any information collected under the mackerel coverage target action alternatives would be in addition to existing reporting and monitoring.

Table 2. Range of Industry-Funded Monitoring Mackerel Coverage Target Alternatives

Gear Type	**MWT**	**SMBT**	**SMBT**	**SMBT**
Permit Categories	All Tiers	Tier 1	Tier 2	Tier 3
Mackerel Alternative 1: No Coverage Target for IFM Program (No Action)	SBRM			
Mackerel Alternative 2: Coverage Target for IFM Program	Includes Sub-Options: 1) Waiver Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold			
Mackerel Alternative 2.1: NEFOP-Level Coverage	100% NEFOP-Level Observer		50% NEFOP-Level Observer	25% NEFOP-Level Observer
Mackerel Alternative 2.2: ASM Coverage	25%, 50%. 75%, or 100% ASM		SBRM (No Action)	
Mackerel Alternative 2.3: Combination Coverage	50% or 100% EM/Portside	25%, 50%, 75%, or 100% ASM	SBRM (No Action)	
Mackerel Alternative	50% or 100%	SBRM (No Action)		

2.4: EM and Portside Coverage	EM/Portside	
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	25%, 50%, 75% or 100% ASM or EM/Portside	SBRM (No Action)
MWT indicates midwater trawl and SMBT indicates small mesh bottom trawl vessels.		
Mackerel Alternatives would only apply to trips that land greater than 20,000 lb of mackerel. Sub-Options could apply to any of the alternatives.		

As noted in the table above, Mackerel Alternative 2 would allow several sub-options to apply to the mackerel coverage target alternatives. Sub-options could apply to any of the Mackerel Alternatives (2.1-2.4).

- Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the MAFMC's intent for additional monitoring in the mackerel fishery, but would not prevent vessels from participating in the mackerel fishery if monitoring coverage was not available. **Should the MAFMC not select Sub-Option 1, then fishing effort would be reduced to match the available level of monitoring (i.e., the fleet would not fish if NMFS does not have funding to support the administration of the program).** Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards.
- Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish.
- Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation.
- Sub-Option 4 would require the MAFMC to examine the results of any increased coverage in the mackerel fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via a framework adjustment or an amendment to the MSB FMP, as appropriate.
- Sub-Option 5 would exempt trips that land less than 25 mt of mackerel from industry-funded monitoring requirements.

Under Mackerel Alternative 1 (No Action), there would be no coverage target specified for an industry-funded monitoring program in the mackerel fishery. Observer coverage for mackerel vessels would be allocated according to SBRM, and there would be no additional cost to the mackerel industry for observer coverage. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis.

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the mackerel fishery. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Mackerel Alternatives 2.1-2.5 specify specific industry-funded monitoring options for the mackerel fishery. Alternatives differ by monitoring type, coverage target, and how coverage is allocated. These monitoring requirements would apply to trips landing more than 20,000 lb of mackerel. The MAFMC has not yet selected a preferred mackerel coverage target alternative.

1. Mackerel Alternative 2.1 – Vessels would be required comply with the following levels of NEFOP-level observer coverage on declared mackerel trips:
    - 100% coverage on all limited access vessels using midwater trawl gear,
    - 100% coverage on vessels with Tier 1 mackerel permits using small mesh bottom trawl gear,
    - 50% coverage on vessels with Tier 2 mackerel permits using small mesh bottom trawl gear, and
    - 25% coverage on vessels with Tier 3 mackerel permits using small mesh bottom trawl gear.
2. Mackerel Alternative 2.2 – Vessels with limited access mackerel permits using midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear would be required to carry an at-sea monitor on every declared mackerel trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) specified in this action.
3. Mackerel Alternative 2.3 – Vessels with Tier 1 mackerel permits and using small mesh bottom trawl gear would be required to carry an at-sea monitor on every declared mackerel trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) specified in this action. Additionally, vessels with limited access mackerel permits using midwater trawl gear would be required to carry an operating EM system on every trip declared into the mackerel fishery and allow portside sampling of their catch on every declared mackerel trip selected for coverage by NMFS. The intention of the MAFMC would be that all declared mackerel

trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%)

4. Mackerel Alternative 2.4 – Vessels with limited access mackerel permits using midwater trawl gear would be required to carry an operating EM system on every trip declared into the mackerel fishery and allow portside sampling of their catch on every declared mackerel trip selected for coverage by NMFS. The intention of the MAFMC would be that all declared mackerel trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%).
5. Mackerel Alternative 2.5 – Initially, vessels with limited access vessels using midwater trawl gear would be required to carry an at-sea monitor on every declared mackerel trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the ASM coverage target (25%, 50%, 75%, or 100%) specified in this action. If the MAFMC determines that EM and portside sampling is an adequate substitute for ASM coverage aboard midwater trawl vessels, then limited access vessels using midwater trawl gear would be able to choose whether to use ASM or EM and portside sampling coverage. The MAFMC may select a different coverage targets for each monitoring type (ASM and EM and portside).

Overview of Impacts Associated with Omnibus Alternatives

The omnibus alternatives (Omnibus Alternatives 1, 2, and 2.1-2.6) in this amendment are procedural in nature—focused on standardizing and streamlining the establishment of future industry-funded monitoring programs. Therefore, there are no expected direct physical or biological impacts associated with the alternatives under consideration for the omnibus portions of the action. The indirect impacts of the omnibus alternatives on the biological resources (target species, non-target species, and protected species) and fishery-related businesses and communities are summarized in Table 3.

Overall, there will be negative direct economic impacts to fishing vessels as a result of selecting Omnibus Alternative 2 if both of the following occur: 1) There is an established industry-funded monitoring program for the FMP; and 2) there is Federal funding available to cover all, or a portion, of the costs of industry-funded monitoring programs after SBRM coverage requirements are met. The indirect impacts of the various aspects of the Omnibus Alternatives on human communities are summarized in Table 3, but should be interpreted within the context of the economic impacts being overall negative.

Table 3. Summary of the Indirect Impacts of Omnibus Alternatives Compared to Each Other

Alternatives	Impacts on Biological Resource	Impacts on Fishery-Related Businesses and Communities
Alternative 1: No Industry-Funded	Potential low negative impact related to allocating funding to industry-funded monitoring programs on a case-by-case	Potential low negative impact related to continued uncertainty about true discard

Monitoring Programs (No Action)	basis (rather than aligning to Council priorities)	rates (could lead to overly cautious management)
Alternative 2: Industry-Funded Monitoring Programs (Action Alternative)	Negligible impact related to standardized cost responsibilities and process for future industry-funded programs implemented via framework Potential low positive impact related to standardized service provider requirements and process to prioritize additional monitoring	Potential low positive impact related to standardized cost responsibilities and process for future industry-funded programs implemented via framework Potential low positive impact related to establishing service provider requirements, and process to prioritize additional monitoring
Alternative 2.1: NMFS-Led Prioritization Process	Potential low positive impact because all industry-funded programs are considered; compared to other prioritization processes allows an evaluation of program need/design when assigning priority	Potential low positive impact because all industry-funded programs are considered; compared to other prioritization processes allows an evaluation of program need/design when assigning priority
Alternative 2.2: Council-Led Prioritization Process		
Alternative 2.3: Proportional Prioritization Process	Potential low positive impact related to information collection because process considers all industry-funded programs Does not allow for prioritization based on program need/design	Potential low positive impact related to information collection because process considers all industry-funded programs Does not allow for prioritization based on program need/design
Alternative 2.4 and 2.5: Coverage Ratio-Based Prioritization Processes		
Alternative 2.6 Monitoring Set-Aside	Negligible impact related to standardized process for monitoring set-asides implemented via framework	Negligible impact related to standardized process for monitoring set-asides implemented via framework
Impacts to physical environment were not discussed in this table because they are negligible. These alternatives will not alter fishing behavior, or directly impact fishing regulations (gears used or areas fished).		

Overview of Impacts Associated with Herring Alternatives

The impacts of the Herring Alternatives (1, 2, and 2.1-2.7) on the biological resources (herring resource, non-target species, and protected species) are summarized below in Table 4. The benefits of these herring alternatives to biological resources are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to the biological resources are possible if increased monitoring can reduce uncertainty of catch tracked against catch limits and generate more information for stock assessments. However, these alternatives may lead to direct positive impacts on biological resources if fishing effort is limited, either through monitoring availability or catch tracked against catch limits, leading to increased reproductive potential of biological resources. The impacts of these herring alternatives on biological resources are not significant because they would not cause any biological resource to become overfished, would not result in overfishing, and/or would not cause a change in population status.

Table 4. Impacts Summary of Herring Coverage Target Alternatives on Biological Resources

Alternatives	Impacts on Biological Resources
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Herring Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be primarily dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Positive impact associated with Sub-Option 1 not being selected if fishing effort is limited and reproductive potential is increased • Negative impact associated with Sub-Option 5 if it biases data used to track catch against catch caps
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and reproductive potential is increased
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	• Low positive impact associated with additional information reduce around uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and reproductive potential is increased
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and reproductive potential is increased
Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet • Positive impact if fishing effort is limited and reproductive potential is increased
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet • Negligible impact associated with changes in fishing effort
Herring Alternative 2.6: Combination Coverage on Midwater Trawl	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet

Fleet Fishing in Groundfish Closed Areas	• Negligible impact associated with changes in fishing effort
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and reproductive potential is increased

The impacts of the Herring Alternatives (1, 2, and 2.1-2.7) on the physical environment are summarized below in Table 5. The impact of the herring fishery on the physical environment is thought to be minimal and temporary. Therefore, the expected impact on the physical environment of increased monitoring in the herring fishery is expected to be negligible under both Herring Alternatives 1 and 2.

Table 5. Summary of Physical Environment Impacts of Herring Coverage Target Alternatives

Alternatives	Impacts on Physical Environment
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Negligible impact associated with minimal and temporary effects on the environment from herring fishery
Herring Alternative 2: Coverage Target Specified For IFM Programs	• Negligible impact associated with minimal and temporary effects on the environment from herring fishery • Low positive impact if fishing effort is limited by monitoring availability • Negligible impact associated with switching gear modes

The impacts of the Herring Alternatives (1, 2, and 2.1-2.7) on fishery-related businesses are summarized below in Table 6. The direct economic impacts on herring vessels associated with Herring Alternatives 2.1-2.7 are negative. Impacts result from reductions in return to owner (RTO). RTO is calculated by subtracting fixed and operational costs from gross revenue and was used rather than net revenues to more accurately reflect income from fishing trips. Reductions in RTO are related to paying for monitoring coverage and possible reductions in fishing effort to match monitoring availability and would vary in magnitude by alternative. Indirect economic impacts on herring vessels result from increased monitoring and relate to whether or not vessels would be able to fully harvest herring annual catch limit (ACL). An indirect positive impact would result if increased monitoring decreases the uncertainty around catch estimates tracked against catch caps such that vessels would be more likely to be able to fully harvest the herring ACL without being constrained by catch caps. An indirect negative impact would result if increased monitoring shows higher than expected catch of haddock, river herring, and shad such that vessels would be less likely to be able to fully harvest the herring ACL because they were constrained by catch caps.

TABLE 6. SUMMARY OF ECONOMIC IMPACTS OF HERRING COVERAGE TARGET ALTERNATIVES

Alternatives	Impacts on Fishery-Related Businesses and Communities
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Herring Alternative 2: Coverage Target Specified For IFM Programs	• Negative impact associated with potential reduction in RTO • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional monitoring to reduce uncertainty around catch estimates in the herring fishery • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Magnitude of impacts associated with selection of Sub-Options
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	• Negative impact associated with potential 44.7%-11.5% reduction in RTO • Negative impact associated with potential 42.2%-5.8% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	• Negative impact associated with potential 38.9%-3.0% reduction in RTO • Negative impact associated with potential 36.7%-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	• Negative impact associated with potential 38.5%-3.0% reduction in RTO • Negative impact associated with potential 36.7%-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery

Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	• Negative impact associated with potential 29.1%*-6.9% reduction in RTO • Negative impact associated with potential 27.5%*-2.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the herring fishery
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Negative impact associated with potential 5.4%-1.0% reduction in RTO • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the Groundfish Closed Areas • Negligible impact associated with changes in fishing effort
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Negative impact associated with potential reduction in RTO • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the Groundfish Closed Areas • Negligible impact associated with changes in fishing effort
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Negative impact associated with potential 34.6%*-1.0%* reduction in RTO • Negative impact associated with potential 29.7%-*0.9%* reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery
* Reflects RTO from Year 2	

Table 7. Summary of Overall Impacts Associated with Herring Coverage Target Alternatives

Alternatives	Herring Resource	Non-Target Species	Protected Species	Physical Environment	Fishery-Related Businesses
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	Low Positive	Low Positive	Low Positive	Negligible	Low Positive
Herring Alternative 2: Coverage Target Specified For IFM Programs	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	Low Positive	Low Positive	Low Positive	Negligible	Negative

Overview of Impacts Associated with Mackerel Alternatives

The impacts of the Mackerel Alternatives (1, 2, and 2.1-2.5) on the biological resources (mackerel resource, non-target species, and protected species) are summarized below in Table 7. The benefits of these mackerel alternatives to biological resources are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to the biological resources are possible if increased monitoring can reduce uncertainty of catch tracked against catch limits and generate more information for stock assessments. However, these alternatives may lead to direct positive impacts on biological resources if fishing effort is limited, either through monitoring availability or catch tracked against catch limits, leading to increased reproductive potential of biological resources. The impacts of these mackerel alternatives on biological resources are not significant because they would not cause any biological resource to become overfished, would not result in overfishing, and/or would not cause a change in population status.

Table 8. Summary of Mackerel Coverage Target Alternatives on Biological resources

Alternatives	Impacts on Biological Resources
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be primarily dependent on the type of information collected, amount of coverage, and amount of available Federal funding • Positive impact associated with Sub-Option 1 not being selected if fishing effort is limited and mackerel reproductive potential is increased • Negative impact associated with Sub-Option 5 if it biases data used to track catch against catch caps
Mackerel Alternative 2.1: NEFOP-Level Coverage on Limited Access Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates for Tier 1-3 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and reproductive potential is increased

Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates for Tier 1-3 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and reproductive potential is increased
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and reproductive potential is increased
Mackerel Alternative 2.4: EM and Portside Sampling Midwater Trawl Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Positive impact if fishing effort is limited and reproductive potential is increased
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Positive impact if fishing effort is limited and reproductive potential is increased

The impacts of the Mackerel Alternatives (1, 2, and 2.1-2.5) on the physical environment are summarized below in Table 8. The impact of the mackerel fishery on the physical environment is thought to be minimal and temporary. Therefore, the expected impact on the physical environment of increased monitoring in the mackerel fishery is expected to be negligible under both Mackerel Alternatives 1 and 2.

Table 9. Impacts of mackerel Coverage Target Alternatives on Physical Environment

Alternatives	Impacts on Physical Environment
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Negligible impact associated with minimal and temporary effects on the environment from mackerel fishery
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Negligible impact associated with minimal and temporary effects on the environment from mackerel fishery • Low positive impact if fishing effort is limited by monitoring availability • Negligible impact associated with switching gear modes

The impacts of the Mackerel Alternatives (1, 2, and 2.1-2.5) on fishery-related businesses are summarized below in Table 9. The direct economic impacts on mackerel vessels associated with Mackerel Alternatives 2.1-2.5 are negative. The negative impacts result from reductions in RTO related to paying for monitoring coverage and possible reductions in fishing effort to match monitoring availability, and vary in magnitude by alternative. An indirect positive impact would result if increased monitoring deceased the uncertainty around river herring and shad catch such that it was less likely that mackerel harvest was constrained by catch caps. An indirect negative impact would result if increased monitoring showed higher than expected catch of river herring and shad such that it was more likely that mackerel harvest would be inappropriately constrained by catch caps.

Table 10. Summary of Economic Impacts of Mackerel Coverage target Alternatives

Alternatives	Impacts on Fishery-Related Businesses and Communities
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Negative impact associated with potential reduction in return to owner (RTO) • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional monitoring to reduce uncertainty around catch estimates in the mackerel fishery • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Magnitude of impacts associated with selection of Sub-Options
Mackerel Alternative 2.1: NEFOP-Level Coverage	• Negative impact associated with potential 11.9%-5.1% reduction in RTO • Negative impact associated with potential 6.9%-4.3% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery
Mackerel Alternative 2.2: ASM Coverage	• Negative impact associated with potential 10.3%-1.4% reduction in RTO • Negative impact associated with potential 6.0%-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery

Mackerel Alternative 2.3: Combination Coverage	• Negative impact associated with potential 10.3%-1.4% reduction in RTO • Negative impact associated with potential 16.4%*-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery
Mackerel Alternative 2.4: EM and Portside Sampling on Midwater Trawl Vessels	• Negative impact associated with potential 8.3%*-1.8% reduction in RTO • Negative impact associated with potential 7.0%*-1.6% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the mackerel fishery
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Negative impact associated with potential 3.7%*-0.5%* reduction in RTO • Negative impact associated with potential 3.4%*-0.5%* reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery

Table 11. Summary of Overall Impacts Associated with Mackerel Coverage Target Alternatives

Alternatives	Mackerel Resource	Non-Target Species	Protected Species	Physical Environment	Fishery-Related Businesses
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	Low Positive	Low Positive	Low Positive	Negligible	Low Positive
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.1: NEFOP-Level Coverage on Midwater Trawl Vessels and Tier 1-3 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative

Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.4: EM and Portside Sampling Midwater Trawl Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	Low Positive	Low Positive	Low Positive	Negligible	Negative

List of Acronyms and Abbreviations

ABC	Acceptable Biological Catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
ACFCMA	Atlantic Coastal Fishery Cooperative Management Act
ACL	Annual Catch Limit
AM	Accountability Measure
APA	Administrative Procedure Act
APAIS	Access Point Angler Intercept Survey
ASMFC	Atlantic States Marine Fisheries Commission
CEQ	Council of Environmental Quality
CFDBS	Commercial Fisheries Database System
CV	Coefficient of Variation
CZMA	Coastal Zone Management Act
DAS	Days-at-sea
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EO	Executive Order
ESA	Endangered Species Act
eVTR	Electronic Fishing Vessel Trip Report
FMP	Fishery Management Plan
FOIA	Freedom of Information Act
FONSI	Finding Of No Significant Impact
FVTR	Fishing Vessel Trip Report
GAM	Generalized Additive Model
GARFO	Greater Atlantic Regional Fisheries Office (formerly NERO)
GPS	Global Positioning System
IBS	Industry-Based Survey
ICNAF	International Commission for the Northwest Atlantic Fisheries
IFQ	Individual Fishing Quota
IQA	Information Quality Act (also known as the Data Quality Act or DQA)
IRFA	Initial Regulatory Flexibility Analysis

ITQ	Individual Transferable Quota
km	Kilometer
lb	Pounds
MA	Mid-Atlantic
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MRIP	Marine Recreational Information Program
MRFSS	Marine Recreational Fisheries Statistics Survey
MSR	Master Site Register
NAFO	Northwest Atlantic Fisheries Organization
NASCO	North Atlantic Salmon Conservation Organization
NE	New England
NEAMAP	Northeast Area Monitoring and Assessment Program
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 (renamed GARFO in 2014)
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council of the National Academies of Science
NWGB	National Working Group on Bycatch
OLE	NOAA Office of Law Enforcement
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
PSP	Paralytic Shellfish Poisoning
QA/QC	Quality Assurance/Quality Control
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation
SAFIS	Standard Atlantic Fisheries Information System
SAP	Special Access Program
SAW/SARC	Stock Assessment Workshop/Stock Assessment Review Committee

SBRM	Standardized Bycatch Reporting Methodology
SFCPO	State-Federal Constituent Programs Office
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
TAL	Total Allowable Landings
U.S.	United States
USFWS	United States Fish and Wildlife Service
VMS	Vessel Monitoring System

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1.0 INTRODUCTION AND BACKGROUND

The New England Fishery Management Council (NEFMC) and the Mid-Atlantic Fishery Management Council (MAFMC) are interested in increasing monitoring and/or other types of data collection to assess the amount and type of catch, to more precisely monitor annual catch limits, and/or provide other information for management. This increased monitoring would be above coverage required through the Standardized Bycatch Reporting Methodology (SBRM), the Endangered Species Act (ESA) or Marine Mammal Protection Act (MMPA). Both Councils have previously proposed industry-funded monitoring requirements in some fisheries to meet Council monitoring goals beyond SBRM. However, the National Marine Fisheries Service (NMFS) disapproved these proposals because they were inconsistent with Federal law (see Appendix 1).

The Industry-Funded Monitoring Omnibus Amendment would provide options and set priorities for industry-funded monitoring programs. These programs would be used in conjunction with existing monitoring programs to provide for additional monitoring to meet fishery-specific coverage targets in a way that would not conflict with other Federal laws.

Industry-funded monitoring is a complex and highly sensitive issue. In addition to accounting for socioeconomic conditions of the fleets that must bear the cost of industry-funded monitoring requirements, it involves the Federal budgeting and appropriations process and a diverse suite of Federal mandates. In an effort to simplify these issues for fisheries stakeholders, we use a question and answer format for the introduction and background section of this document. We hope this approach helps clarify the considerations that drove the development of the alternatives considered in this action, as well as the expected function and impacts of the alternatives.

The introduction and background section includes four categories of questions and answers, including: 1) General questions about the Industry-Funded Monitoring Omnibus Amendment; 2) Cost responsibilities; 3) NMFS administrative costs; and 4) Industry Costs. The list of questions under each of these categories is summarized below. If you are viewing this document electronically, click on any question of interest, and the hyperlink will take you to the page with the answer. Page numbers are provided for those viewing paper copies of the document.

<u>General Questions and Answers about the Industry-Funded Monitoring Omnibus Amendment</u>

- Can there be a fully industry-funded program where industry pays for both administrative and monitoring costs, and hands packaged data over to NMFS? (p. 57)
- If NMFS has extra funding available, can the money be passed along to industry to help defray its cost responsibilities for monitoring? (p. 58)

1.1.1 General Question and Answers about the Industry-Funded Monitoring Omnibus Amendment

How is this document organized?

This Amendment has three sets of alternatives.

The first set of alternatives is referred to as the "Omnibus Alternatives." These alternatives include: (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) a process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, (3) standard administrative requirements for industry-funded monitoring service providers, (4) a process to prioritize industry-funded monitoring programs in order to allocate Federal resources across all FMPs, and (5) a process to develop monitoring set-aside programs via a future framework action. If selected, these alternatives will apply to all NEFMC and MAFMC FMPs. The Omnibus Alternatives are described in section 2.1 of this document. The impacts of the Omnibus Alternatives are analyzed in section 4.1.

The second set of alternatives includes monitoring coverage target alternatives specific to the Atlantic Herring FMP. These alternatives are referred to as the "Herring Alternatives." The Herring Alternatives are described in section 2.2 of this document. The impacts of the Herring Alternatives are analyzed in section 4.2.

The third set of alternatives includes monitoring coverage target alternatives specific to the Atlantic mackerel fishery, which is managed as part of the Atlantic Mackerel, Squid, and Butterfish FMP. These alternatives are referred to as the "Mackerel Alternatives." The Mackerel Alternatives are described in section 2.3 of this document. The impacts of the Mackerel Alternatives are analyzed in section 4.3.

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Why are the Councils establishing industry-funded monitoring programs?

The NEFMC and MAFMC are interested in increasing monitoring and/or other types of data collection in some FMPs to assess the amount and type of catch, to more accurately monitor annual catch limits, and/or provide other information for management. NMFS has limited funding for monitoring, so both Councils have considered requiring industry to contribute to the cost of monitoring. Therefore, this amendment considers measures that would provide options to allow the Councils to implement industry-funded monitoring coverage in New England and Mid-Atlantic fishery management plans. Industry funding would be used in conjunction with available Federal funding to pay for additional monitoring to meet FMP-specific coverage targets. This amendment would also set priorities for meeting coverage targets when Federal funding is limited.

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How is the Federal budget for monitoring decided each year?

Each year, the White House Office of Management and Budget submits a budget request for the entire Federal government for the following fiscal year, which starts in October. The budget request contains numerous funding lines and Congress makes the final determination on that request. Each of these funding lines is accompanied by a brief description which explains to Congress and the public how the funding in that line will be used. Funds cannot be used for programs, projects, or activities that are not included in the description of the budget line, or as directed by Congress in appropriations bills.

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Why did NMFS disapprove past Council proposals for industry-funded monitoring programs?

Recent Council proposals for industry-funded monitoring either attempted to require NMFS to spend money that was not in the budget, or attempted to split monitoring costs between industry and NMFS in ways that are not consistent with Federal law. These actions raised concerns relating to the Miscellaneous Receipts Statute,[1] the Anti-Deficiency Act,[2] and other statutes and regulations that govern Federal budgets. More detailed explanations of recent NMFS disapprovals of industry-funded monitoring provisions in Atlantic Herring Amendment 5; Atlantic Mackerel, Squid, and Butterfish Amendment 14; and Northeast (NE) Multispecies Framework Adjustment 48 are included in Appendix 1. The concepts behind the disapprovals are also summarized here.

Congress must decide how to finance any program, project, or activity (program) it establishes. Typically, programs funded by appropriating funds from the U.S. Treasury. In

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[1] The Miscellaneous Receipts Statute provides that "an official or agent of the United States Government having custody or possession of public money shall keep the money safe" and may not lend, use, deposit in a bank or exchange the money for other amounts. 31 U.S.C. § 3302(a). It obliges government officials "receiving money for the Government from any source [to] deposit the money in the Treasury as soon as practicable without deduction for any charge or claim." *Id.*

[2] The Anti-Deficiency Act prevents federal officers from "mak[ing] or authoriz[ing] an expenditure or obligation exceeding an amount available in an appropriation" from Congress or "involv[ing] either government in a contract or obligation for the payment of money before an appropriation is made [by Congress] unless authorized by law." 31 U.S.C. § 1341(a)(1).

addition to designating the funds necessary for a program, a congressional appropriation sets a maximum authorized program level. The maximum authorized program level functions as a cap on funding for a program. A Federal agency cannot spend money on a program beyond the maximum authorized program level without authorization from Congress. A Federal agency also cannot get around the maximum authorized program level by adding to its appropriations from sources outside the government without permission from Congress.

The disapproved monitoring provisions in Herring Amendment 5 and Mackerel Amendment 14 would have required NMFS to fund very high levels of observer coverage in the herring and mackerel fisheries. Because NMFS's spending is limited by its Congressional appropriations, NMFS cannot approve a monitoring program that it doesn't have enough money to fund. NMFS also cannot take money from budget lines intended for other activities in order to fund monitoring programs.

Second, the Herring Amendment 5 and Mackerel Amendment 14 attempted to specify a set industry contribution for industry-funded monitoring (i.e., industry would only pay $325 per sea day). Similarly, the NE Multispecies Framework 48 attempted to limit the types costs that industry would be responsible for in an industry-funded program (i.e., industry would only have to pay for observer salary). These proposals were disapproved because the government cannot commit to pay for costs that are not inherently the responsibility of the government. In the case of industry-funded monitoring, NMFS interpreted this to mean that it is only obligated to pay for its administrative costs to support industry-funded programs and is not obligated to pay for any costs generated from sampling activities for these programs. This standard was applied to the monitoring cost provisions recently proposed in the Herring, Mackerel, and NE Multispecies FMPs and resulted in the disapproval of those measures.

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How does this amendment fix the issues that resulted in the recent disapprovals?

The amendment addresses the disapprovals by: 1) Establishing a process through which NMFS can approve new monitoring programs without committing funding that is not in the budget, and 2) establishing a legal approach to allow industry funding to be used in conjunction with Federal funding to pay for additional monitoring to meet fishery-specific coverage targets.

First, the concept of a monitoring *coverage target*, as opposed to a mandatory monitoring coverage level, allows NMFS to approve new monitoring programs without committing to support coverage levels above appropriated funding or before funding is determined to be available. The realized coverage in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities in a given year. Fishery management plans interested in coverage above SBRM would set coverage targets in an individual fishery management plan action (i.e., a framework adjustment or amendment). Realized coverage for a fishery in a given year would be anywhere from no additional coverage above SBRM up to the specified coverage target.

Second, this amendment establishes a description of the division of cost responsibilities for industry-funded monitoring programs between industry and NMFS that is consistent with legal requirements. This division of costs is described under the heading "Standardized Cost Responsibilities" in Omnibus Alternative 2. Department of Commerce General Counsel has advised NMFS that monitoring cost responsibilities may be allocated between industry and the government as long as government cost responsibilities are paid by the government, and the government's costs are differentiated from the industries responsibilities. Currently, the delineation has been made between administrative and sampling costs. This amendment will set a standard delimitation to avoid confusion and ensure compliance with appropriations requirements. Establishing a common definition means that all future Council proposals for industry-funded monitoring programs would consider NMFS and industry cost responsibilities in the same way.

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Under this amendment, would setting an industry-funded monitoring coverage target for a given FMP mean that the fishery is guaranteed that level of coverage for a given year? For example, if the Herring FMP sets a coverage target of 100% for 2017, does this amendment ensure that level of coverage be achieved?

No. This amendment establishes tools that NMFS and the Councils could use to provide for and prioritize additional monitoring in Greater Atlantic fisheries when Federal funding is available, but it cannot resolve the underlying issue of limited Federal funding. This means that this Industry-Funded Omnibus Amendment WOULD NOT automatically allow for higher coverage levels in Greater Atlantic fisheries. During years when there is no additional funding to cover NMFS cost responsibilities above funding for SBRM, there would be no additional monitoring coverage, even if industry is able to fully fund their cost responsibilities.

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How are existing industry-funded monitoring programs administered in the Greater Atlantic Region?

The Greater Atlantic Region currently administers an industry-funded monitoring program for the Atlantic sea scallop fishery and for groundfish sectors in the NE Multispecies FMP. Additional detail about the industry-funded monitoring programs for these fisheries is provided below.

The IFM Omnibus Amendment does not currently modify the coverage levels or allocation of funding for NMFS administrative costs for the scallop or groundfish sector industry-funded monitoring programs. The standardized structure and prioritization process considered in the IFM Omnibus Amendment could apply to groundfish sectors and/or the scallop fishery if, in a future action, the Council desires to include those programs in this prioritization process, or develops new IFM programs within those FMPs.

Scallop Industry-Funded Observer Program. NMFS incorporated the industry-funded observer program into the Atlantic Sea Scallop FMP in 1999 in Framework Adjustment 11 (64 FR 31144, June 10, 1999). The scallop industry-funded observer program first applied to the Closed Area II scallop fishery exemption program. Six subsequent management actions addressed major aspects of the industry-funded observer program:

- Framework 13 to the Scallop FMP (65 FR 37903, June 19, 2000) kept the program in place for the Closed Area I, Closed Area II, and Nantucket Lightship exemption program;
- Framework 14 to the Scallop FMP (66 FR 24052, May 11, 2001) kept the program in place for the Hudson Canyon and Virginia Beach Area Access program;
- Amendment 10 to the Scallop FMP (69 FR 35194, June 23, 2004) formally included the program for all limited access scallop fishing under the area access and open area days-at-sea programs;
- Framework 16 to the Scallop FMP (69 FR 63460, November 2, 2004) established observer coverage levels to meet a 30-percent coefficient of variation (CV) (a measurement of the precision of the estimate) for Closed Area I, Closed Area II, and the Nantucket Lightship area access fisheries;
- Secretarial Emergency Rule (71 FR 34832, June 16, 2006; extension 71 FR 69073, November 29, 2006) established a mechanism for vessels to contract directly with observer service providers to resolve legal constraints of industry paying for observer coverage; and
- Amendment 13 to the Scallop FMP (72 FR 32549, June 13, 2007) formally incorporated the emergency action industry-funded observer measures into the Scallop FMP.
- As monitoring needs expanded and administration of the program became more efficient, the Council and NMFS ultimately expanded the scallop industry-funded monitoring program to all access areas, open areas, and to the limited access general category individual fishing quota fleet. The Council and NMFS have made minor operational modifications to the program over the years. The Scallop FMP's program is a good example of an effective industry-funded program that phased in changes as program and administration needs evolved.

The need for the scallop industry-funded program consistently has been to collect catch information (kept fish and bycatch) through levels of at-sea observer coverage that could not otherwise be consistently achieved through NMFS observer program funding alone. NMFS has, and continues to be able to pay for its costs of administering the scallop industry-funded observer program because the coverage level is primarily set through SBRM. Prior to the implementation of the 2007 SBRM amendment, the Council concluded that industry-funded coverage levels set to achieve a 30-percent CV performance standard would appropriately reduce variability in bycatch estimates for yellowtail flounder, other finfish, and sea turtles. When the SBRM was first implemented, this goal for monitoring the scallop fishery was included in the SBRM coverage goals. The scallop industry-funded observer program provides funding through a quota set-aside (described below) that enables the scallop fishery to pay for coverage levels that meet or exceed the SBRM coverage targets.

The observer set-aside model works well in the scallop fishery because the high value of scallops allocated to vessels that carry an observer helps compensate the vessel for the cost of the observer. The vessel receives extra pounds or days-at-sea on each observed trip that provides additional funds to pay for the observer. However, vessel owners are required to pay for the observer even if the vessel does not catch any scallops or the additional set-aside of scallops, or if there is insufficient set-aside allocated to compensate the vessel. NMFS's goal is to set a compensation rate (the amount of extra pounds of scallops allocated to trips that carry observers) that covers the cost of an observer, without providing financial incentive for a vessel to desire observer coverage, which could bias sampling.

Groundfish Industry-Funded At-Sea Monitoring. The groundfish sector ASM program was first developed by the Council in Amendment 16 to the Northeast Multispecies FMP (75 FR 18262, April 9, 2010). Amendment 16 stated that the primary purpose of the groundfish ASM program was to verify area fished, catch, and discards by species on sector trips, and that coverage levels must be sufficient to at least meet the CV performance standard in SBRM (i.e., a 30% CV). This CV standard is achieved through a combination of SBRM (fully-NMFS funded) and ASM (industry-funded) coverage. Framework 48 to the Northeast Multispecies FMP (78 FR 26118, May 3, 2013) further defined specific goals and objectives for the ASM program, and also clarified that the 30% CV standard for ASM should apply at the stock level (i.e., each stock of fish for the fishery as a whole). In contrast, the SBRM CV standard for groundfish applies at the stock complex level (e.g., for all groundfish stocks in aggregate).

The groundfish ASM program was designed to transition to an industry-funded program in 2012, but from groundfish fishing years 2010 through 2014, NMFS was able to fully fund both the NMFS and industry cost responsibilities for groundfish ASM. Though NMFS has paid both sampling and administrative costs for ASM for groundfish sectors since 2010, groundfish sectors are responsible for covering the sampling costs for the ASM program if NMFS is unable. Fishermen have recently begun to fund their ASM program costs.

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Why does this action propose to consider industry-funded monitoring programs in a different way than it is considered for the NE Multispecies and Scallop FMPs?

The Atlantic sea scallop and NE Multispecies monitoring programs have already been established by the Councils, and the operation of their fisheries depends on these programs. For example, the sector fishery requires at-sea monitoring to reliably estimate catch to ensure that the groundfish catch limits are not exceeded and that overfishing does not occur. Sectors could not operate without sufficient at-sea monitoring programs. In addition to the programs they already established, the Councils have been increasingly interested in requiring monitoring coverage for purposes different than those for which NMFS is legally required to provide monitoring coverage (e.g., Magnuson-Stevens Fishery

Conservation and Management Act (Magnuson-Stevens Act), MMPA, ESA). NMFS's limited budget requires NMFS to prioritize resources across competing monitoring interests. The standardized process for industry-funded programs described in this amendment, including the prioritization process detailed under Omnibus Alternative 2, provides a method to address the Councils' identified monitoring needs and priorities in consideration of NMFS's budget limitations. This process would allow available funding for coverage to be applied where it is most needed to achieve the highest priority objectives, and allows both the Council and the public to be informed about funding limitations and to contribute to the decision-making process.

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Why does NMFS caution the Councils about additional costs for monitoring but not for other FMP requirements, such as vessel trip reports?

NMFS evaluates its ability to financially administer all of the Councils' recommendations prior to approval. Certain requirements, for example, an increase to weekly vessel trip reports (VTRs) for a fishery, can be administered within existing resources because they are either cost neutral under the existing administrative infrastructure, or they only add marginally to NMFS costs. In the example of VTRs, NMFS already has staff processing weekly VTRs for a number of fisheries, and most Greater Atlantic Region permit holders already submit VTRs weekly related to permit requirements for the NE Multispecies and Atlantic herring fisheries.

In contrast, the costs associated with implementing new at-sea monitoring, portside sampling, or electronic monitoring programs are often substantial and cannot be easily completed by existing staff using the existing budget. In addition, the amount of money Congress appropriates to fund monitoring costs fluctuates from year to year, so NMFS cannot commit to pay for new, expensive monitoring programs indefinitely. For these reasons, NMFS has made efforts to communicate to the Councils that funding for new monitoring programs must be a significant consideration during program development.

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What types of monitoring are considered in this amendment?

This amendment discusses industry-funded programs to implement four types of monitoring: 1) NEFOP-level observer monitoring; 2) at-sea monitoring; 3) portside monitoring; and 4) electronic monitoring. These four types of monitoring are briefly described below, and described in more detail in Section 2.1.2 of this document.

1. NEFOP-level observer monitoring focuses on data collection at sea, recording an advanced and diverse set of information on the type and quantity of retained and discarded catch on fishing trips.
2. At-sea monitoring focuses on data collection at sea, recording the type and quantity of retained and/or discarded catch, but a more limited set of information on fishing

trips than NEFOP-level observers. There are fishery-specific at-sea monitoring programs that support FMP-specific goals (i.e., groundfish ASM program).

3. Portside monitoring focuses on data collection at the dock, accounting for landings of target species and incidental catch. If all fish caught are retained and landed, portside monitoring can also record type and quantity of total catch.
4. Electronic monitoring (EM) uses video cameras and other sensors to monitor discards at sea or to monitor compliance with retention requirements.

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1.1.2 Questions and Answers about Cost Responsibilities

What are the cost components for monitoring programs?

There are two types of costs associated with monitoring programs: (1) Sampling costs, such as observer salary and travel costs, and (2) NMFS administrative costs, such as observer training and data processing. This amendment would codify the separation of monitoring cost responsibilities such that industry is responsible for sampling costs and NMFS is responsible for administrative costs. This division of costs is described under the heading "Standardized Cost Responsibilities" in Omnibus Alternative 2.

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What is cost sharing? Can industry split the cost of monitoring with the government by some percent (e.g., industry pays for 30%, NMFS pays for 70%) or some dollar amount (e.g., industry pays for $325, NMFS pays for the rest)?

The concept of "cost sharing" has come up throughout the discussions of industry-funded monitoring. Conceptually, cost sharing implies that industry and the government both contribute to the cost of the monitoring program. However, legal constraints prevent NMFS from receiving industry funds to pay for government costs in an industry-funded monitoring program. Therefore, it is necessary to specify appropriate cost responsibilities for NMFS and industry to avoid NMFS and industry sharing costs.

Department of Commerce General Counsel has advised NMFS that monitoring cost responsibilities can be allocated between industry and the government by delineating the sampling and administrative portions of the costs of monitoring. Industry would be responsible for costs directly attributable to the sampling portion of a monitoring program, and NMFS would be responsible for costs directly attributable to the administrative portion of the monitoring program (See Omnibus Alternative 2 under "Standardized Cost Responsibilities"). This division of cost responsibilities should remain the same and should differentiate between inherently governmental responsibilities and industry costs.

It is illegal for industry to pay inherently government costs (e.g., administrative costs), but either group can pay for sampling costs. Actual payment of different cost responsibilities for monitoring programs can work in two ways: 1) NMFS can pay for its cost responsibilities, such as support and administrative costs, and also pay for the industry's cost responsibilities, such as sampling costs (e.g., the Northeast Fisheries Observer Program); or 2) NMFS can pay for its cost responsibilities, such as support and administrative costs, and industry can pay for its cost responsibilities, such as sampling costs (e.g., industry-funded Atlantic scallop observer program). Additionally, NMFS can help to offset industry's monitoring cost responsibilities by reimbursing vessel owners through cooperative agreements with third parties when funding is available.

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Why can't NMFS directly collect fees for monitoring programs?

The Miscellaneous Receipts Act requires Federal employees to deposit any money received on behalf of the government into the general Treasury, unless otherwise directed by law. This means that if NMFS accepted funds from the industry, NMFS would be required to direct those funds to the Treasury and would not be able to reserve them to pay for monitoring in the Greater Atlantic Region without a change in law to allow that to happen. For example, the Alaska Region has special authorization in the Magnuson-Stevens Act to collect fees from the industry and to put those fees into a fund to be used to defray the costs of monitoring in that region (Magnuson-Stevens Act § 313). The Greater Atlantic Region does not have such authority, except for cost recovery for Limited Access Privilege Programs (LAPPs). Currently, cost recovery is applicable only to the Atlantic sea scallop limited access general category individual fishing quota (IFQ) and the golden tilefish IFQ programs (both are forms of LAPPs). These fisheries, along with the surfclam and ocean quahog fisheries, are the only programs in the Greater Atlantic Region that are subject to the cost recovery requirement.

Under the LAPP cost recovery authority (Magnuson-Stevens Act § 303A(e)) and the authority to establish fees (Magnuson-Stevens Act § 304(d)), the Magnuson-Stevens Act requires NMFS to collect a fee to recover the actual costs directly related to the management, data collection, and enforcement of any LAPP and community development quota program that allocates a percentage of the total allowable catch of a fishery to such program. NMFS must collect a fee not to exceed three percent of the ex-vessel value of fish harvested under these programs. The fees are deposited into a unique fund that NMFS uses to directly pay for the management, data collection, and enforcement of the program. The relevant costs to recover are the incremental costs, meaning those costs that would not have been incurred but for the LAPP. If the Councils decide at some future point to develop LAPPs in other fisheries, cost recovery programs could be implemented in those fisheries. Development of LAPPs and cost recovery programs are complex and often take several years.

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Why has it been difficult for NMFS to give cost estimates for various types of monitoring programs?

Monitoring program costs include a variety of administrative and sampling costs that vary substantially within and between years. This variability affects the estimates of both NMFS and industry costs for monitoring programs, which means that the estimate of the total or per sea day cost for the same monitoring program can vary depending on the time period of interest. A discussion of the difficulties with generating a cost estimates for monitoring is included in the 2015 Program Review of the Northeast Fisheries Science Center Fisheries Sampling Branch, available at http://www.nefsc.noaa.gov/fsb/index.html#fsb-review.

Some of the reasons why estimates of NMFS administrative costs can vary include:

- The costs associated with training vary substantially within and between years because of the high monitor turnover rate.
- The costs associated with data editing varies greatly depending on the experience of the cohort of monitors for a given time period. Data editing costs may be lower for a given period if the cohort of monitors is highly experienced. Conversely, data editing costs may be higher for a period with a large cohort with less experienced monitors.

In addition, the breakdown of industry costs for sampling for a single sea day can vary depending on:

- How close the monitor's home port is to the port of deployment (an observer will be reimbursed travel costs which include mileage and an hourly wage for time traveling if traveling greater than 50 miles from their assigned home port);
- How long monitors are retained by the service provider (training costs are amortized over the career span of the monitors);
- Trip length;
- How accurately a vessel schedules its departure time; and
- A given service providers' business models (provider observer support, strategies for retention, observer bonus structure, benefits).

Finally, with the exception of the industry-funded scallop observer program, industry-funded monitoring is a relatively new arrangement for funding monitoring programs in the Greater Atlantic Region. Most of the monitoring program cost estimates in this document are based on costs negotiated and structured as part of Federal contracts between NMFS and various monitoring service providers. When individual vessels or groups of vessels form contracts with service providers for monitoring coverage in future industry-funded monitoring programs, the terms and structure of the contracts may differ from those in recent and existing Federal contracts. This means that the actual costs that industry may pay to service providers for monitoring may differ from the available estimates.

For these reasons, this document presents several of the available Greater Atlantic Region and national cost estimates for at-sea, dockside, and electronic monitoring programs. With each estimate, we state the source and assumptions that generated the estimate. Although this may be confusing, we hope that providing the managers and the public a full understanding of the potential costs will allow for informed decision making when establishing industry-funded monitoring programs.

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1.1.3 Questions and Answers about NMFS Administrative Costs

How was the use of certain funding lines changed in relation to SBRM?

The Court order in *Oceana* v. *Locke*, which vacated the 2007 SBRM Omnibus Amendment, found legal fault with two aspects of the process used to prioritize funding for observer coverage. First, the Court found that NMFS had too much discretion in determining whether there were sufficient resources available to fully implement the estimated number of sea days needed to achieve the CV-based SBRM performance standard. Second, the Court found that NMFS had too much discretion in how observer sea days were redistributed under the prioritization process. To address these two aspects of the court order, the revised SBRM established a process for distributing the available observer sea days if resources are limited.

Under the revised SBRM prioritization process, the amount of money available for the SBRM will be the funding allocated to the Region under four specific historically-appropriated observer funding lines. The Northeast Fisheries Observers funding line is now fully committed to funding SBRM. The three other observer funding lines now dedicated to SBRM are allocated among different NMFS regions, including the Greater Atlantic Region, to meet national observer program needs. The total amount of the funds allocated to the Greater Atlantic Region from these three funding lines will constitute the remainder of the available SBRM funds.

Historically, the available SBRM funding has been insufficient to fully meet the CV-based performance standard for all of the fishing modes (gear type, access area, trip category, region, and mesh group combinations analyzed under SBRM). If the available funding continues to be insufficient to meet the CV-based performance standard, the SBRM amendment establishes a non-discretionary formulaic processes for prioritizing how the available observer sea-days would be allocated to the various fishing modes to maximize the effectiveness of bycatch reporting and bycatch determinations.

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What funding lines are available to fund administrative costs for industry-funded monitoring programs?

A number of different funding lines contribute to monitoring programs in the Greater Atlantic Region.

NMFS Greater Atlantic Regional Fisheries Office (GARFO) and Northeast Fisheries Science Center (NEFSC) receive funding amounts through specific budget line items to cover its costs for monitoring programs. Some of the funding lines must be used for specific monitoring programs. With implementation of the Greater Atlantic Region SBRM amendment, NMFS no longer has the flexibility to use certain funding lines as we have in the past, as described above. In addition, there are certain funding lines specifically designated for other monitoring priorities (e.g., protected species monitoring). Thus, there are certain funding lines that will not be available to support industry-funded programs, unless there is excess available funding in these lines above the amount needed to meet the designated monitoring obligations for that year.

Other funding lines that include monitoring or administrative aspects of monitoring programs in their described purpose could be used to cover NMFS costs for industry-funded monitoring programs. Once the Council establishes industry-funded monitoring programs, NMFS will be able to determine the funding lines that could contribute to NMFS costs for industry-funded monitoring programs. If there is not enough money to cover NMFS costs related to industry-funded monitoring programs for a given year, depending on the alternatives chosen the Amendment, either NMFS or the Councils would need to prioritize which programs are funded first.

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Can NMFS accept funding from external groups to fund administrative costs for monitoring programs?

Consistent with current law, there are two mechanisms by which the Greater Atlantic Region may accept outside resources for monitoring. First, Section 208 of the Magnuson-Stevens Act established a Fisheries Conservation and Management Fund, which may be funded through quota set-asides, appropriations, states or other public sources, and private or nonprofit organizations. This fund may be used to expand the use of electronic monitoring, and each region must be apportioned at least 5 percent of any money contributed to this fund. There have been inquiries about the fund over the years, but to date no contributions have been made.

Second, Section 403(b) of the Magnuson-Stevens Act allows for NMFS to accept resources and facilities for observer training from state, university, and any appropriate private nonprofit organizations on a limited basis. This provision has not been previously implemented and may have limitations that might undermine its utility for this region's fisheries.

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How does NMFS cover its administrative costs for the groundfish ASM program?

In part, NMFS has used funding in budget line items related to Catch Shares to fund administrative and sampling costs for the groundfish ASM program. The groundfish ASM program was designed to be an industry-funded program, but from groundfish fishing years 2010 through 2014, NMFS was able to fully fund both the NMFS and industry cost responsibilities for groundfish ASM. Groundfish sectors are required to pay for their sampling costs responsibilities for the ASM program if NMFS is unable. Fishermen have recently begun to pay for their ASM program costs.

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When could SBRM funds be used to cover the administrative costs for monitoring?

SBRM funding is used to cover the administrative costs for the industry-funded Atlantic sea scallop observer program. NMFS could explore using SBRM funding to cover the administrative costs for NEFOP-level observer coverage for other FMPs, but there three important considerations for this approach.

First, the sampling criteria (i.e., the gears and areas combinations) that the observer coverage applies to would need to match SBRM modes (gear type, access area, trip category, region, and mesh group combinations analyzed under SBRM). This means that this approach could not be used if the Councils desired to use an industry-funded program to cover specific permit categories unless those permit categories directly aligned with SBRM modes. In the case of the scallop industry-funded observer program, the observer coverage requirements apply to gear and area combinations that match SBRM modes.

Second, industry would be fully responsible for paying the sampling costs for NEFOP-level observer coverage, currently estimated at $818 per sea day. In addition, this approach could not be used for other types of monitoring coverage, including fishery specific at-sea monitors, portside sampling, or electronic monitoring. The scallop industry-funded observer program uses a set-aside to help defray industry costs for monitoring. However, vessel owners are required to pay for the observer even if the vessel does not catch any scallops or the additional set-aside of scallops, or if there is insufficient set-aside allocated to compensate the vessel. These same requirements would apply to other FMPs desiring to use SBRM funding to cover the administrative costs for monitoring.

Third, this approach could only be used to reach SBRM monitoring coverage levels for a given FMP. SBRM seeks to allocate observer coverage to reach a 30% CV on the discard estimate for managed species. This means that if only 10% observer coverage on a given SBRM mode is needed to reach the 30% CV, then this approach would only allow for 10% coverage for that gear and area combination in a given year. The Councils have been interested in higher levels of monitoring coverage for a number of FMPs, so this approach may not provide the level of coverage necessary to meet FMP goals.

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If SBRM isn't fully funded every year, how could there be discretionary funding available to cover administrative costs from industry-funded programs?

Under the revised SBRM prioritization process, the amount of money available for the SBRM will be the funding allocated to the Region under four specific historically-appropriated observer funding lines. Unless there is excess funding in these lines above the amount needed to meet the designated monitoring obligations for that year, SBRM funding will not be available to fund industry-funded monitoring programs. Historically, the available SBRM funding has been insufficient to fully meet the CV-based performance standard for all of the fishing modes (gear type, access area, trip category, region, and mesh group combinations analyzed under SBRM). Thus, there is stakeholder concern that there will never be funding available to cover NMFS administrative costs for industry-funded monitoring programs. However, past funding availability is not a predictor of future funding availability.

We reiterate that other funding lines that include monitoring or administrative aspects of monitoring programs in their described purpose, other than the four funding lines designated for SBRM, could be used to cover NMFS costs for industry-funded monitoring programs. Until the Council establishes industry-funded monitoring programs, it will not be clear what NMFS costs might be related to these new programs, and what amount and type of administrative support will be necessary. Thus it is not possible to list the funding lines that could contribute to NMFS costs for industry-funded monitoring programs at this time. If there is not enough money to cover NMFS costs related to industry-funded monitoring programs for a given year, either NMFS or the Councils would need to prioritize which programs are funded first.

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1.1.4 Question and Answers about Industry Costs

The expected industry contribution for monitoring in the Northeast seems a lot higher than other regions. Don't Alaska fishermen only pay $325 per sea day for observer coverage?

There are a number of factors that influence industry costs for monitoring programs. A 2012 MRAG Americas report titled "Comparison of At-Sea Catch Monitoring Programs with Full Observer Coverage to the Directed Atlantic Herring Fishery – New England" compared the industry costs for NEFOP monitoring in the Atlantic herring fisheries to the industry contribution for several other fisheries that require 100% industry-funded monitoring coverage, including the Hawaii longline swordfish fishery, the Alaska pollock midwater trawl fishery, the west coast at-sea whiting (hake) midwater trawl fishery, and the west coast non-whiting trawl Individual Fishing Quota fishery. The report estimated industry contributions for these programs in the range of $360-420 per sea day. However, the report noted that the short trip duration (1-5 days) and complicated deployment logistics for the herring fleet result in higher per sea day costs for monitoring. In contrast, some of the other fisheries reviewed in the report have much longer trip duration (21-90 days) and have vessels that operate out of a limited number of ports, which simplifies deployment logistics.

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The scallop fishery has an observer set-aside to help defray industry costs for monitoring. Can other FMPs use this approach? What are some of the challenges of using a monitoring set-aside to pay for industry costs?

There are aspects of the scallop fishery, including the health and value of the stock, the management regime, and the predictability of landings, which allow the observer set-aside model to work well.

First, the health of the scallop resource means that a certain amount of the quota can be set aside to compensate the vessel for the cost of the observer. If a fishery resource is in poor shape, it may not be possible to allocate enough of the quota to a set-aside to effectively offset industry costs for monitoring. In addition, the high value of scallops allocated to vessels that carry observers helps compensate the vessel for the cost of the observer. Other fisheries with a lower price per pound (e.g., herring and mackerel fisheries) may need to set aside a much larger portion of the resource to compensate industry for monitoring cost.

Second, the management regime of the scallop fishery supports the set-aside model. The scallop fishery uses trip or days-at-sea limits for many of its permits, and vessels receive extra pounds or days-at-sea on each observed trip that provides additional funds to pay for the observer. The set-aside approach may not be appropriate for fisheries that have permits without possession limits (e.g., Herring Category A or Mackerel Tier 1), or would require those fisheries to adjust their management regimes to allow the set-aside program to function.

Finally, scallop trips are more predictable than trips targeting other species, specifically migratory species like herring and mackerel. While it is fairly likely that a given scallop trip could land the set-aside amount necessary to offset the cost of observers, the availability of herring and mackerel is much less predictable, and is influenced by a number of environmental factors. On a given herring or mackerel trip, it is much less likely that a vessel may be able to land a set-aside amount necessary to offset the cost of an observer.

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Can there be a fully industry-funded program where industry pays for both administrative and monitoring costs, and hands packaged data over to NMFS?

All governmental agencies perform some work that is so intimately related to the public interest that it requires performance by a Federal employee, rather than a contractor or third party. This type of work is classified as an "inherently government function." Guidance about the types of work that is classified as an inherently government function can be found in the Office of Federal Procurement Policy Letter 11-01, Performance of Inherently Governmental and Critical Functions (76 FR 56227, September 12, 2011).

For NMFS, our responsibilities for maintaining the public interest are governed by a number of Federal mandates, including the Magnuson-Stevens Act, the MMPA and the ESA. Because our monitoring programs are used to support our mission to conserve and manage fisheries and other marine resources, we are obligated to assure the quality of data collected through these programs. Ultimately, this means that there are certain aspects of monitoring programs that NMFS must manage and fund, even if industry contributes for sampling costs.

Department of Commerce General Counsel has advised NMFS that monitoring cost responsibilities may be allocated between industry and the government by delineating the sampling and administrative portions of the costs of monitoring. Industry can be responsible for costs directly attributable to the sampling portion of a monitoring program, but NMFS must be responsible for costs directly attributable to the administrative portion of the monitoring program (See Omnibus Alternative 2 under "Standardized Cost Responsibilities") in cases where the monitoring programs support our management objectives. If industry were to pay for inherently governmental costs such as the administrative costs for monitoring programs that directly support our Federal mandates, it would mean that industry was supplementing Federal appropriations, which would violate appropriations laws.

While it is not possible for industry to fully fund a monitoring program that supports our obligations under the Magnuson-Stevens Act, the MMPA and the ESA, it is possible for industry to fully fund a monitoring program to gather information in support of future management actions. For example, industry could fully fund a monitoring program to gather data on a gear modification to reduce incidental catch of river herring and shad in midwater trawl gear. Industry could then provide the results of the study to the Councils and NMFS, who could in turn make the gear modification a regulatory requirement.

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If NMFS has extra funding available, can the money be passed along to industry to help defray its cost responsibilities for monitoring?

Yes, NMFS could reimburse industry for sampling costs through cooperative agreements with third parties if additional funding is available. This model was used to reimburse sectors for dockside monitoring costs.

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1.2 PURPOSE AND NEED FOR ACTION

Under the Omnibus portion of this document, the main purposes are: 1) to establish separate cost responsibilities for NMFS and the industry during collection of monitoring data not required by the Standardized Bycatch Reporting Methodology (SBRM); 2) to establish administrative requirements for any service providers of monitoring data; and 3) to make establishment of industry-funded monitoring programs frameworkable under the Magnuson-Stevens Act. This action is needed to enable the Councils to develop industry funded monitoring (IFM) programs designed to collect more information than is provided by the SBRM. IFM programs under consideration include monitoring by fishery observers or at-sea monitors, portside samplers, or electronic monitoring that collects data.

The second purpose under the Omnibus portion of this document is to establish a procedure for prioritizing between multiple IFM programs. This action is needed to identify which IFM programs will be funded if funding shortfalls occur.

Under the Herring FMP, this document also serves the purpose of considering an IFM program within the herring fishery. This action is needed to improve the accuracy of catch monitoring, specifically the accuracy of the catch caps that control bycatch of river herring and shad, as well as haddock.

Under the Atlantic Mackerel, Squid, and Butterfish FMP, this document also serves the purpose of considering an IFM program within the mackerel fishery. This action is needed to improve the accuracy of catch monitoring, specifically the accuracy of the catch cap that controls bycatch of river herring and shad.

Purpose	Need
Omnibus Alternatives	
➢ Establish separate cost responsibilities for NMFS and the industry during collection of monitoring data ➢ Establish administrative requirements for service providers of industry funded monitoring ➢ Make industry funded monitoring programs frameworkable under the MSA	➢ To enable the Councils to develop industry funded monitoring programs for the collection of information in addition to that collected by SBRM
➢ Establish a procedure for prioritizing between new industry funded monitoring programs	➢ If funding shortfalls occur, identify priorities for which monitoring programs should be funded
FMP Alternatives	
➢ Establish an industry funded monitoring program for the Atlantic herring fishery	➢ Improve the accuracy of catch estimation and catch caps for river herring and shad and haddock
➢ Establish an industry funded monitoring program for the Atlantic mackerel fishery	➢ Improve the accuracy of catch estimation and the catch cap for river herring and shad

2.0 MANAGEMENT ALTERNATIVES

The Councils, in collaboration with their advisory panels and the PDT/FMAT for this action, have developed a range of management alternatives. These alternatives include the following:

- Standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry;
- A process by which industry-funded monitoring programs (e.g., at-sea monitoring, portside monitoring, electronic monitoring) can be implemented via a framework adjustment in each FMP;
- Standards for industry-funded monitoring service providers (e.g., for portside monitoring, at-sea monitoring and electronic monitoring);
- A process by which NMFS and/or the Councils would prioritize industry-funded monitoring programs in order to allocate available Federal resources across all FMPs in the event the resources are not sufficient to meet all coverage targets;
- A process by which monitoring set-aside programs can be implemented via framework adjustment in each FMP for those FMPs with industry-funded monitoring programs; and
- Monitoring coverage targets or requirements for certain permit categories and/or gear types for the herring and mackerel fisheries.

2.1 OMNIBUS ALTERNATIVES

The following omnibus alternatives consider provisions that would apply to all New England and Mid-Atlantic FMPs, including (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) a process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, (3) standard administrative requirements for industry-funded monitoring service providers, (4) a process to prioritize industry-funded monitoring programs in order to allocate available Federal resources across all FMPs, and (5) a process to develop monitoring set-aside programs via a future framework adjustment action.

The NEFMC and MAFMC have adopted the following principles to guide the selection and implementation of future industry-funded monitoring programs. Data collection program for the estimation of fishery catch should:

- Be fit for purpose – the reason, or clear need, for data collection should be identified to ensure objective design criteria.
- Be affordable – the cost of data collection programs should not diminish net benefits to the nation, nor threaten the continued existence of our fisheries. However, essential data collection is needed to assure conservation and sustainability, and is reason to seek less data intensive ways to assess and manage fisheries on the economic margins.
- Should apply modern technology – data collection should prioritize the utilization of modern technology to the extent possible to meet our data collection needs, while recognizing an affordable robust program is likely to need a mix of data collection by people and technology.
- Incentivize reliable self-reporting.

2.1.1 Omnibus Alternative 1: No Industry-Funded Monitoring Programs

Under Omnibus Alternative 1 (No Action), there would be no standardized structure developed for Greater Atlantic Region industry-funded monitoring programs. There would be no standard definition of costs and cost responsibility for industry-funded monitoring in the New England and Mid-Atlantic fisheries. Cost definitions and the determination of who pays for them would be considered individually by each FMP as industry-funded monitoring programs are developed. Under Omnibus Alternative 1, there would be no process to prioritize industry-funded monitoring programs to allocate available Federal resources to meet Council desired monitoring coverage target above SBRM coverage and no standard administrative requirements for industry-funded monitoring service providers. The allocation of available Federal funding to increase monitoring to meet Council desired coverage levels and observer service provider requirements for industry-funded monitoring would be evaluated on an case-by-case, FMP-by-FMP basis. Additionally, under Omnibus Alternative 1, there would be no framework adjustment process to implement FMP-specific industry-funded monitoring and therefore, no framework adjustment process to implement FMP-specific monitoring set-aside programs. Rather, industry-funded monitoring programs and monitoring set-aside programs would be developed and established in FMP-specific amendments.

Timing for the Omnibus Alternative 1 (No Action)

The following table outlines the existing timeline for sea day allocation related to SBRM, Sector At-Sea monitoring, and the scallop fishery (compensation rate determination). The SBRM year runs from April to March, the NE Multispecies fishing year runs from May to April, and the scallop fishing year runs from March to February. The schedule below would remain unchanged under the status quo alternative.

TABLE 12. STATUS QUO TIMING OF GREATER ATLANTIC REGION SBRM, SECTOR AND SCALLOP MONITORING ALLOCATION AND ANALYSIS

Year	Month	SBRM schedule	Sector ASM Schedule	Scallop Compensation Rate Determination Schedule
Year 1	January to April			
	April/May			
	May to October			
	October	• Observer data July Year 0 – June Year 1 available	Work on analysis for sector ASM using most recent complete fishing	

		• Begin analysis for SBRM	year (May Year 0 – April Year 1)	
	November	Work on discard estimation analysis for SBRM from November through early February		
	December			
Year 2	January	Receive Year 2 budget	Sector ASM coverage rates published in proposed rule	Determine compensation rate
	February		Collect public comment	
	March	If funding shortfall, run SBRM prioritization process	Sector ASM coverage rates published in final rule	Begin Year 2
	April	Determine and begin Year 2 seaday schedule	Determine seaday schedule	Determine and begin seaday schedule
	May		Begin Sector ASM Year 2	

2.1.2 Omnibus Alternative 2: Industry-Funded Monitoring Programs

Under Omnibus Alternative 2, there would be an established, standardized structure for new industry-funded monitoring programs that would apply to all New England and Mid-Atlantic FMPs that choose to use industry funding to increase monitoring via new programs (the existing scallop and groundfish programs would not be affected by this action). This industry-funded monitoring program structure would include the following components: (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) a process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, (3) standard administrative requirements for industry-funded monitoring service providers, and (4) a process for FMP-specific monitoring set-aside programs to be implemented via a future framework adjustment action. Additionally, Omnibus Alternative 2 would include a range of options for the process to prioritize industry-funded monitoring programs in order to allocate available Federal resources for industry-funded monitoring across all FMPs. No individual FMP would be subject to an industry-funded monitoring program as a result of implementation of the Omnibus alternatives proposed in this action. Rather, any FMP that wishes to develop an industry-funded monitoring program, and optionally, a monitoring set-aside program would need to develop the program that meets the specifications of this action in a separate framework. Other parts of this action do consider specific programs for the Atlantic herring and Atlantic mackerel fisheries.

Current Monitoring Types in the Greater Atlantic Region

The existing types of monitoring programs include:

1. NEFOP-level observer monitoring focuses data collection at sea, recording the type and quantity of retained and discarded catch on fishing trips. In addition, NEFOP-level observers collect biological data and samples on marine mammal, sea birds, and sea turtles.
2. At-sea monitoring, which focuses on data collection at sea, recording the type and quantity of retained and discarded catch.
3. Portside monitoring, which focuses on data collection in port, accounting for landings of target species and incidental catch. If all fish caught are retained and landed, portside monitoring can also record type and quantity of total catch.
4. Electronic monitoring (EM), which uses video cameras and other sensors to monitor discarding events at sea and/or to monitor compliance with full retention requirements or other at-sea requirements.

The following section provides further detail on these monitoring types, and their current uses in the Greater Atlantic Region.

Basic description of monitoring at sea. Monitoring at sea is used to refer to the collection of data at sea aboard fishing vessels by human observers. The NEFSC Fisheries Sampling Branch currently manages the collection and processing of data and biological samples obtained during commercial fishing trips through the NEFOP and groundfish ASM programs.

The Fisheries Sampling Branch oversees observer training, translates data requirements from the NEFSC research programs into a detailed schedule of fisheries to be sampled, manages data collected by observers, and provides qualified researchers with audited data files and summaries. Observers collect operational fishing data, biological data, and economic data while on board fishing vessels. Additionally, in support of the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA), observers monitor interactions with protected and endangered species. Summaries of fishery observer data are provided to scientists and analysts of the GARFO, NEFSC, and the Regional Fishery Management Councils to support quantitative and qualitative evaluations of various management actions.

NEFOP-level observers collect a wide array of information on a subset of the trips in all Greater Atlantic Region fisheries. The information they collect includes:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All kept and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Kept catch on unobserved hauls (species, weight, and disposition);

- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling methodologies;
- Whole specimens, photos, and biological samples (i.e., scales, ear bones, and/or vertebrae from fish, invertebrates, and incidental takes);
- Information on interactions with protected species, such as sea turtles, porpoise, dolphins, whales, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

In recent years, NEFOP-level observer coverage has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-specific basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

For example, New England vessels using extra-large mesh gillnets catch monkfish, skates, and Northeast multispecies, often on the same fishing trip, and, therefore, most participants in this fishery must operate according to the regulations implemented under three different FMPs. To distinguish between the management units identified in individual FMPs and the fisheries that operate under one or more FMPs, the SBRM is designed around "fishing modes" defined by the type of fishing gear used and the area from which the vessels depart.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through an FMP developed by either the Mid-Atlantic or NEFMC.

The Atlantic Sea Scallop observer program, described in further detail in the introduction section of this document, is the only existing industry-funded monitoring program in the region that uses NEFOP-level observer coverage.

While NEFOP-level observers are used to cover all fisheries, including sector trips, groundfish at-sea monitors are deployed on vessels participating in the groundfish sector program. Groundfish at-sea monitors follow a rigorous sampling protocol to collect weights of fish catch (kept and discarded), to measure the lengths of groundfish species, and document interactions with protected species. Groundfish at-sea monitors also collect information on trip costs, gear type, and tow locations. In contrast to NEFOP-level observers, groundfish at-sea monitors collect a reduced set of data (i.e., no biological samples and reduced information on gear configurations), thereby reducing training time, gear requirements, and internal support resources necessary to administer this program.

Basic description of portside (or dockside) monitoring. Portside monitoring programs deploy trained monitors to vessel landing locations to monitor the weights and species composition of landed catch. Landings sampling protocols for portside monitoring differ between programs depending on the program goals. Monitors typically monitor offloads directly to dealers, but roving monitoring programs can be established in cases where landings are offloaded to a truck for later delivery to a dealer.

There are not any Federal portside monitoring programs currently administered in the Greater Atlantic Region. However, there was previously an industry-funded dockside monitoring requirement for groundfish sectors. Sectors were required to implement a dockside monitoring program to validate dealer-reported landings, with 50-percent coverage of sector trips in the 2010 groundfish fishing year, and 20-percent coverage each year thereafter. In 2010, NMFS reimbursed sectors for the costs of dockside monitoring. Shortly after the implementation of Amendment 16 to the NE Multispecies FMP, the Council became concerned that the industry would not be able to support full responsibility for the costs of monitoring programs, beginning with dockside monitoring in 2011 and at-sea monitoring in 2012. Through Framework 45 to the Northeast Multispecies FMP, the Council suspended the dockside monitoring requirements until FY 2013 and required dockside monitoring only to the extent that NMFS could fund it. In 2011, NMFS made the determination that dockside intercepts by enforcement personnel were sufficient to monitor sector landings and reprioritized financial support for dockside monitoring to alleviate general sector operating costs. The dockside monitoring program was ultimately eliminated in Framework 48 to the Northeast Multispecies FMP in advance of the 2013 groundfish fishing year.

A number of states in this region administer portside monitoring programs related to state-managed species; a number of Federal permit holders are sampled through the state portside monitoring programs. The Massachusetts Department of Marine Fisheries and Maine Department of Marine Resources portside monitoring programs for Atlantic herring are described under the herring coverage target alternatives.

Basic description of electronic monitoring. The use of electronic monitoring (EM) systems on fishing vessels, namely electronic systems that incorporate video cameras, sensors, and electronic reporting systems into a vessel's fishing operations, has been a relatively recent development in fisheries around the world. EM can be used to augment or replace onboard human observers in some data collection tasks.

The technology supporting electronic monitoring has advanced significantly in a short time span and issues of image quality that were once prevalent are virtually nonexistent when the cameras are properly placed. There have been regional and national workshops to explore the technology and capabilities of EM, examine how EM can meet scientific and management needs, and understand the legal requirements, data integration, and costs of implementing EM.

The majority of applications using EM have been developed to monitor gear interactions with protected species and birds, to detect presence or absence of specific fish species occurring as bycatch, or to validate vessel landing and logbook information. There are two primary approaches for EM: 1) the audit approach, and 2) the optimized or full retention approach.

- Under the audit approach, EM technology is used to account for catch, and catch estimation is substantiated through a data validation source, such as vessel trip reports. This model is associated with increased captain responsibility and places a greater emphasis on industry-reported data. EM applications have been deployed successfully in fixed gear fisheries (i.e., longline, pot/trap, mechanical jig) and in trawl fisheries with relatively homogeneous catch composition.
- Under optimized or full retention approach, EM is used to monitor for discards. In this case, EM should be paired with portside monitoring to gather information about landed species composition.

In the Greater Atlantic Region, the NEFOP observer programs are very complex in their sampling schemes and in regards to the data collected. EM technology is currently not capable of performing most of the detailed data collection tasks performed by human observers. However, depending on the monitoring needs for a given fishery, EM could provide a cost-effective alternative to human observers. EM is being developed for the groundfish fishery, as described below. In addition, this amendment contains alternatives for EM for the Greater Atlantic Region midwater trawl fleet, which includes vessels permitted in the herring and mackerel fisheries.

The need to balance the financial viability of sectors with the expectation to have the fishing industry fund groundfish ASM precipitated several efforts to explore electronic monitoring as an alternative to ASM. EM may be a suitable replacement to ASM, provided EM has the ability to identify species, and verify weights and counts of discards in the groundfish fishery. Balancing management data needs with the costs of a comprehensive EM system that satisfies monitoring requirements remains an ongoing endeavor.

From 2004-2006, the Cape Cod Commercial Fishermen's Alliance (CCCFA) and Archipelago Marine Research Ltd. (AMR) tested EM systems on longline and gillnet vessels targeting groundfish and compared EM and observer data. Beginning in 2010, NMFS and Archipelago conducted a more comprehensive study in three phases. Phase one identified baseline metrics for detecting fishing events, counting fish, and identifying species. Phase two addressed issues such as weight estimation and expanded species identification methods through catch handling. The third phase tested catch handling methods to simulate an operational EM program. Currently, the Gulf of Maine Research Institute (GMRI), the Maine Coast Community Sector (MCCS), The Nature Conservancy (TNC), and Ecotrust Canada (EC), have collaborated to operationalize an EM program using open-source software. Funding for this pilot project has come from grants through foundations.

Their model uses EM to validate captain-reported data on vessel trip reports and has introduced a new EM provider to the fishery. The first year (2013) was designed to be a training period for captains. For 2014 and 2015, the project's goal was to complete the necessary data collection and analysis to demonstrate the ability that EM can replace ASM for sectors in the New England groundfish fishery.

Since these pilot projects, EM proponents have supported implementation of EM in the groundfish fishery. However, given legal, analytical, and logistical obstacles that remain, EM has not yet been approved for implementation as an alternative to ASM.

In January 2015, NMFS' GARFO and NEFSC released a Regional Electronic Technologies Implementation Plan that articulated the remaining aspects of a comprehensive EM program that need to be addressed. Some outstanding questions include:

- What are the detailed roles and responsibilities of the various parties involved?
- Who will have responsibility to store the data and for how long?
- Who will have access to the data and for what purpose?
- How much will it cost the government and the industry?

In concert with the release of the Plan, GARFO and NEFSC partnered with GMRI, MCCS, TNC, and EC as they continue their project to address these final issues and fully develop an EM model for groundfish sectors. This pre-implementation group has worked from an agreed set of questions and tasks, which has facilitated a transparent and coordinated process. The group holds monthly face-to-face meetings to discuss data collection, retrieval, review, and storage, the roles and responsibilities in a functional program, and the process for approving and implementing EM for 2016. These partnerships have provided GARFO and NEFSC with an understanding of how reasonable certain program requirements may be for a fisherman or an EM provider, and have also provided insight to non-NMFS partners on the existing gaps between the pilot projects and fully implementing EM. The intention is that this group will continue to meet moving forward, adding additional partners such as CCCFA and AMR, to develop the final data and provider standards, EM monitoring plans, and regulatory framework for implementing EM for a portion of the groundfish fishery.

Currently, GARFO and NEFSC are building the database infrastructure and processing tools for data collected from EM video footage, conducting comparative analysis to the existing catch monitoring systems in the groundfish fishery, and addressing the final legal and logistical hurdles. The EM project partners have pursued having EM operational on all trips, with a portion of the video used to validate electronic vessel trip reports (the eVTR audit model). Given some of the challenges with using EM footage for species identification, the partners have shifted their experimental program design to having groundfish EM operate on only trips that would otherwise be covered by an at-sea monitor.

GARFO is developing an exempted fishing permit (EFP) with TNC for fishing year 2016, rather than making modifications to each sector's operations plan. Under the EFP and the new program design, the entire EM video will be reviewed and will serve as the basis for identifying and counting discards on trips that would otherwise have an at-sea monitor. The approach to using an EFP is similar to ongoing EM efforts on the West Coast and would provide us with an opportunity to address the remaining questions to implement the EM/eVTR audit model in a future fishing year.

GARFO expects the ongoing pre-implementation work to continue and may propose approval of EM standards and monitoring plans prior to next groundfish fishing year, set to begin May 1, 2017. GARFO expects that grant funding, through the partner organizations noted above, will be used to fund industry costs for the groundfish sector participants that use EM in 2016.

In 2016 and 2017, GARFO and NEFSC, in cooperation with Saltwater Inc., are evaluating the utility of EM aboard midwater trawl vessel participating in the Atlantic herring and mackerel fisheries. The purpose of the program is to:

- Analyze the utility of EM in monitoring fisheries as a means of informing future EM programs.
- Deploy and test an EM program in an operational setting, allowing analysis and adjustment of EM program requirements.
- Evaluate the range of information that can be gathered with EM systems, such as: Verify slippage events; categorize the types of slippage events; verify other discard sources; and determine if EM can help estimate the amount of catch retained (if not all catch is retained).
- Refine EM cost estimates for NMFS and the fishing industry.

If EM is adopted by the Councils, NMFS intends to have a pre-implementation plan to help the industry understand any new EM and portside monitoring requirements for the herring and mackerel midwater trawl fleet.

Standard Cost Responsibilities

Omnibus Alternative 2 would include standard cost responsibilities between NMFS and the industry for supporting monitoring programs targeting coverage above SBRM. As described in the Introduction, legal requirements dictate that certain cost responsibilities must be borne by NMFS. Cost responsibilities that are dictated by legal requirements cannot be modified through this action. This action seeks to codify cost responsibilities into regulation for industry-funded monitoring in New England and Mid-Atlantic FMPs to ensure consistency and compliance with legal requirements. If Omnibus Alternative 2 was not selected by the Councils, cost responsibilities for industry-funded monitoring would be codified on an FMP-by-FMP basis.

The cost responsibilities described below would be considered by the Councils when developing any industry-funded monitoring program for New England and Mid-Atlantic FMPs in future actions. The cost responsibilities described below are already in operation in the Atlantic Sea Scallop and NE Multispecies FMPs, although the cost responsibilities are not explicitly defined in those FMPs. Selection of the Omnibus Alternative 2 would codify

NMFS cost responsibilities for industry-funded monitoring into regulation for all New England and Mid-Atlantic FMPs, but it would not change NMFS cost responsibilities for the industry-funded monitoring programs currently established in the scallop or multispecies fisheries.

NMFS Cost Responsibilities

NMFS would be responsible for funding the costs to set standards for, monitor performance of, and administer industry-funded monitoring programs. These program elements would include:

- The labor and facilities costs associated training and debriefing of monitors
- NMFS-issued gear (e.g., electronic reporting aids used by human monitors to record trip information)
- Certification of monitoring providers and individual monitors; performance monitoring to maintain certificates
- Developing and executing vessel selection
- Data processing (including electronic monitoring video audit, but excluding electronic video review)
- Costs associated with liaison activities between service providers, and NMFS, Coast Guard, Councils, sector managers and other partners

NMFS cost responsibilities for all types of existing monitoring, including NEFOP-level observer coverage, fishery-specific at-sea monitoring programs, dockside monitoring, and electronic monitoring, including details on how NMFS cost responsibilities were derived, are included in the text below.

Industry Cost Responsibilities

The industry would be responsible for funding all other costs of the monitoring program. These program elements and activities would include, but are not limited to:

- Costs to the provider for deployments and sampling (e.g., travel and salary for observer deployments and debriefing)
- Equipment, as specified by NMFS, to the extent not provided by NMFS (e.g., electronic monitoring system)
- Costs to the provider for observer time and travel to a scheduled deployment that doesn't sail and was not canceled by the vessel prior to the sail time
- Costs to the provider for installation and maintenance of electronic monitoring systems
- Provider overhead and project management costs (e.g., provider office space, administrative and management staff, recruitment costs, salary and per diem for trainees)
- Other costs of the provider to meet performance standards laid out by a fishery management plan

NMFS costs to administer industry-funded monitoring would be fully funded with Federal funds. More information on cost sharing, including external funding, can be found in the Introduction section. The industry would be responsible for its costs; unless it was determined that appropriately-designated Federal funds were also available to offset industry cost responsibilities. If NMFS has funds to cover its administrative cost responsibilities with additional funds remaining, then NMFS may be able to help cover some of the industry's cost responsibilities. The administrative mechanism by which industry cost responsibilities could be offset using available Federal funding is being developed by NMFS separately and can be used in conjunction with Omnibus Alternative 2.

Factors that Affect Industry Costs for Monitoring

The following section discusses the factors that affect industry costs for at-sea, dockside, and electronic monitoring programs. There are several factors that can significantly affect industry cost responsibilities in any industry-funded monitoring program, and the per day at-sea component of these costs (sea day costs) can vary. Industry costs would be largely determined by the contracts with the service providers. For example, the $640/day paid to providers may cover such things as: Labor and overtime, data editing, project management and administration, benefits (vacation and sick leave), health insurance, and workers compensation. Additionally, service providers may have individual requirements for training and debriefing, such as annual observer training or semi-annual safety training.

Cost for industry-funded monitoring programs is a very important consideration. The requirement to pay for an observer increases operating costs for fishing vessels, which in turn reduces net revenues and overall profitability (as described later in Section 4). While the total cost for each sea day can vary between service providers, the individual components (i.e., costs for deployment and sampling, costs for equipment) are necessary to successfully execute a monitoring program. Because each of these components is essential, in most cases, it is not appropriate to reduce industry's cost responsibilities by removing or adjusting components of the sea day cost. Since vessels would be contracting directly with service providers they may be able to negotiate prices. However, due to the requirements for monitoring coverage and a variety of other factors (including number of vessels participating and coverage rates), the ability to negotiate lower prices may be limited. Since vessels are contracting with the providers for much smaller amounts of monitoring coverage than NMFS does, project management costs for service providers may increase, which could increase some costs that providers charge vessels. However, unlike NMFS, vessels are not constrained by certain laws when establishing contracts, which could lower some costs that providers charge for contracts directly with vessels.

There are two ways to limit the costs of an industry-funded monitoring program for industry. Both of these approaches limit the total cost of the observer program rather than adjusting the industry cost responsibilities. The first way to limit costs to industry is to set coverage levels at the lowest level necessary to gather information to meet fishery management plan goals. For example, it may be possible to sufficiently increase precision around catch and discard estimates for a certain species by setting a coverage target of 50 percent, rather than a coverage target of 100 percent. The second way to limit costs to industry is to select the appropriate type of coverage for the fishery management plan goals.

Factors that affect industry costs for at-sea and portside monitoring. Representatives from the NEFOP, service provider companies in the northeast U.S., and representatives from U.S. west coast service provider companies identified the following factors that most commonly increase sea day costs. The cost drivers for at-sea and portside monitoring programs are similar, so are discussed together here.

- **Requirements for New Data Collection/New Equipment.** New or different sampling protocols require modifications to observer training, which could increase training costs for both the government and service providers. If new or different sampling equipment is required to meet the monitoring program needs, the expense of the additional equipment will be incurred by the service provider. In addition, re-designing existing observer databases to incorporate new data introduces a significant administrative expense.
- **SCA and FLSA Requirements.** Requirements associated with the Service Contract Act (SCA) and Fair Labor Standards Act (FLSA) apply to any contracts in which the Federal government is involved. There may be some reduction in sea day cost associated with eliminating any legal requirements that apply specifically to contracts involving the Federal government. However, service provider companies would still be subject to FLSA requirements and other applicable labor laws.
- **Ability to Predict the Fishery.** Sea day costs will likely be higher if service providers cannot predict how the fishery will operate (numbers of vessels/trips, length of trips, seasonality and spatial distribution of trips) in order to accurately estimate costs (administrative, overhead, communications, logistics) associated with deploying observers to meet the needs of the monitoring program. Predictability increases efficiency and therefore reduces costs. With limited information to predict the fishery, service providers are more likely to over-estimate costs associated with travel and observer deployment to ensure that they cover their costs.
- **Complicated Logistics (Vessel Selection and Observer Deployment).** The more infrastructure necessary to efficiently deploy observers to meet the needs of the monitoring program (field offices, coordinators, communications networks), then the higher the sea day costs will be. If pre-trip notification systems need to be expanded to determine observer/monitor deployment, this would likely increase costs.

Framework Adjustment Process

Omnibus Alternative 2 would include the ability for Councils to implement industry-funded monitoring programs, including at-sea monitoring, dockside monitoring, or electronic monitoring, through framework adjustments to the relevant FMP. Omnibus Alternative 2 would provide the option to implement new industry-funded monitoring programs via a framework adjustment, but it would not require any particular new industry-funded monitoring programs. Under Omnibus Alternative 2, Councils would retain the ability to implement new industry-funded monitoring program via the amendment process. If Omnibus Alternative 2 was not selected by the Councils, Councils would not have the option to use a framework adjustment when suitable, and a full FMP amendment would be required to implement industry-funded monitoring programs for any New England and Mid-Atlantic fisheries, excluding existing industry funded monitoring programs in the Scallop and Multispecies FMP, and any program developed in this action for the Herring or Mackerel, Squid, and Butterfish FMPs.

Under Omnibus Alternative 2, the details of any industry-funded monitoring program, including at-sea, dockside, or electronic monitoring, would be specified and/or modified in a subsequent framework adjustment to the relevant FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) fee collection and administration, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional National Environmental Policy Act (NEPA) analysis would be required for any action implementing and/or modifying industry-funded monitoring programs regardless if a framework adjustment or full amendment was used to consider modifications of new programs.

Omnibus Alternative 2 contains a framework adjustment component for the known types of monitoring that are available for Greater Atlantic Region fisheries. The existing types of monitoring include at-sea monitoring (data collection at sea); dockside monitoring (data collection at the dock); and electronic monitoring (using video cameras and other sensors to monitor fishing activity at sea). Depending on the information needs for a given fishery, a dockside and/or electronic monitoring program could be used in place of or in addition to monitoring at sea to provide more complete catch monitoring, or to reduce the overall monitoring costs for a given fishery (if dockside or electronic monitoring can be administered at a lower cost). If an additional industry-funded monitoring program is established through a future framework adjustment, it would become subject to prioritization for funding under one of the alternatives for the prioritization process described later in this document.

Cost for industry-funded monitoring programs is a very important consideration. The requirement to pay for an observer substantially increases operating costs for fishing vessels, which in turn reduces revenues. The best ways to limit the financial burden of an industry-funded monitoring program is to carefully design the program to minimize total program costs necessary to meet the FMP-specific goals for monitoring. As described in the cost responsibility discussion above, this can be accomplished by selecting the appropriate type of coverage or setting coverage levels at the lowest level necessary to meet fishery management plan goals.

Monitoring Service Providers

Omnibus Alternative 2 would include standard administrative requirements for industry-funded monitoring service providers, including at-sea monitoring, dockside monitoring and electronic monitoring. These service provider requirements would serve as the default service provider requirements for any future industry-funded monitoring programs developed through future framework actions. If Omnibus Alternative 2 is not selected by the Councils, service provider requirements for industry-funded monitoring programs would be developed and implemented in individual FMPs.

Monitoring service provider regulations for industry-funded at-sea and dockside monitoring programs. The SBRM Omnibus Amendment modified the scallop industry-funded observer service provider requirements (at 50 CFR 648.11(h) and (i)) to apply to all New England and Mid-Atlantic FMPs. Specifically, the SBRM Amendment authorized observer service provider approval and certification for all applicable fisheries, should a Council develop and implement a requirement or option for an industry-funded observer program to support SBRM in other fisheries beside scallops. However, the SBRM Amendment did not address service provider requirements for other types of industry-funded monitoring programs.

Omnibus Alternative 2 would modify the SBRM observer service provider approval and certification process to be a monitoring service provider approval and certification process that would apply to observer and dockside service providers for all New England and Mid-Atlantic FMPs. The selection of Omnibus Alternative 2 would not implement any new at-sea observer or dockside monitoring programs, but would only implement a process and standards to approve and certify monitoring service providers. In the future, if the Councils implement any industry-funded at-sea or dockside monitoring programs through a future action, the process to develop those monitoring programs would be streamlined.

Omnibus Alternative 2 would include standard monitoring and service provider requirements based on current regulations. Appendix 2 contains existing service provider regulations for NEFOP-level observers, at-sea monitors, electronic monitoring, and portside samplers. If Omnibus Alternative 2 is not selected by the Councils, server provider requirements for industry-funded monitoring program would be developed and implemented in individual FMPs.

Monitoring service provider regulations for electronic monitoring programs. Monitoring service provider regulations for electronic monitoring programs will be based on regulations for existing regional and national electronic monitoring programs. Electronic monitoring service provider regulations are currently in place for the NE multispecies fishery. These requirements are included in the Appendix 2. In addition, the NMFS West Coast Region is currently working to develop regulations for the industry-funded electronic monitoring program for the At-Sea and Shoreside Hake West Coast Whiting fishery. The Greater Atlantic and West Coast Regions will be working together to develop consistent electronic monitoring service provider regulations.

<u>Special considerations for service provider requirements</u>

During development of this section of the Amendment, the Councils explored options to reduce the cost of industry-funded monitoring programs by adjusting the service provider requirements or modifying the monitor certification requirements. After analyzing the possible adjustments to the service provider regulations, the PDT/FMAT concluded that the best ways to limit the financial burden of an industry-funded monitoring program is to carefully design the program to minimize total program costs. This can be accomplished by selecting the appropriate type of coverage or setting coverage levels at the lowest level necessary to meet fishery management plan goals.

Given this, the overarching service provider requirements for all industry-funded programs, including at-sea, dockside, and electronic monitoring programs, are proposed to be the same for all FMPs. This means that the overarching industry-funded monitoring service provider regulations will be standardized for all FMPs, whether industry funding is necessary to support statutory monitoring requirements (Magnuson-Stevens Act, MMPA, ESA), or monitoring coverage above statutory requirements. However, the Amendment would allow individual FMPs to deviate from the overarching monitoring service provider requirements on an FMP-specific basis. For example, the groundfish at-sea monitor service provider requirements only require a monitor to have a high school diploma, while the overarching industry-funded monitoring service provider regulations require a college degree. The herring and mackerel at-sea monitoring programs also have deviations from the overarching monitoring service provider regulations, described in the herring and mackerel alternative descriptions in Sections 2.2 and 2.3.

The following is a description of some of the provisions in the overarching industry-funded monitoring service provider regulations that the Councils discussed adjusting during the development of this amendment.

Observer education requirements. The National Minimum Eligibility Standards for Marine Fisheries Observers were published in 2007 (04-109-01). The development of the national standards grew out of concern from the Office of Inspector General, NOAA Science Board, National Observer Program Advisory Team, observer provider companies, professional observer associations, and the fishing industry that observers were not appropriately trained to observe fishing trips, that high levels of attrition were resource inefficient, and that the lack of standards was confusing and deterring interested and qualified observer candidates nationally. All observer programs in the United States (Greater Atlantic Region, Southeast, Alaska, Northwest, Southwest, and Pacific Islands) currently follow the National Minimum Eligibility Standards. The standards are also adopted and supported as best practices by the International Fisheries Observer and Monitoring Conference.

The most controversial standard is the requirement that observer candidates must have a bachelor’s degree with a major in the natural sciences. However, Regional Administrators and Science Directors may waive the education and experience requirements if a candidate has acquired the required skills to be considered eligible for observer training through a NMFS-approved alternative training program that includes activities such as:

a) Participating in or/and observing ocean fishing activities consistent with those that would be required during observer work performance;
b) Participating in fisheries research cruises;
c) Recording data on marine mammal sightings and fishing activities;
d) Tallying incidental take of marine mammals, sea turtles, and sea birds from fishing platforms;

e) Collecting biological samples and specimens from postmortem animals;
f) Entering data into a database using computers; and
g) Completion of a biological training program, equivalent to that received as part of a bachelor's degree, conducted by or approved by NMFS with the specific objective of preparing potential candidates for observer training.

The Council expressed interest in removing the bachelor's degree requirement from the overarching industry-funded monitoring service provider regulations for observers in order to save costs, with the rationale that monitors with bachelor's degrees may command a higher hourly wage than those without bachelor's degrees. While it is consistent with regional policy to require a lower education requirement for fishery specific at-sea monitoring programs, for the overarching industry-funded monitoring service provider requirement for observers a bachelor's degree is obligatory to comply with national standards and for the reasons detailed below. Through future development of FMP-specific industry-funded monitoring programs, the minimum education requirement for an observer can be reconsidered.

Contrary to the intent of negating the national education standard for becoming a fisheries observer, requiring only a high school diploma will likely not lower the cost of observer coverage. Nationally, there was no increase in sea day costs with the adoption of the educational standard national policy in 2007. Instead, national observer programs found that the education standard resulted in recruitment of higher quality observer candidates and better observer retention. There is not currently a shortage of interested and qualified applicants with bachelor's degrees, and many candidates have fishing and sea-going experience in addition to their bachelor's degrees. Observers often hold multiple certifications in a variety of observing programs, which helps with observer availability to meet coverage targets and improves retention of certified observers.

The information observers collect is necessary for assessing the nation's managed biological resources, and for evaluating the social and economic impacts of catch allocations, entitlements and fishing regulations on fishermen and their communities. Thus reducing education standards has a direct impact on the information used to support critical NMFS goals. Studies comparing observer candidates without a college degree to those with college degrees show that candidates without degrees had:

- Higher drop-out and failure occurrences during observer training, despite additional resources invested to support the candidates;
- Lower compliance in following detailed program requirements and meeting data loading deadlines;
- Lower accuracy with species identification and catch estimation;
- Lower data quality scores and overall performance; and
- Lower retention rates (Chilton et al. 2011).

In addition, there was concern that codifying the requirement in the overarching service provider regulations would prevent fisherman from participating as observers. However, we reiterate that the current education standard policy includes a waiver if the observer candidate has fishing experience. There are a number of current observers who were fishermen, though the policy does outline potential conflicts of interest that may prohibit some fishermen who are still financially vested in the industry from participating as observers. In order to encourage and support employment of former fishermen, NEFOP developed an optional alternative training program for fishermen with interest in becoming observers.

The Fair Labor Standards Act and Service Contract Act requirements. The Services Contract Act (SCA) applies to every contract entered into by the United States (government) or the District of Columbia. Contractors and subcontractors performing on these Federal contracts must observe minimum wage standards (based on the prevailing wage for a locality, as determined by the Department of Labor) as well as safety and health standards, and they must maintain certain records. The SCA requires that every employee working under the contract must be paid not less than the monetary wages, and must be furnished fringe benefits, which are determined based on locality. Fringe benefits include paid holiday leave, vacation time, and minimum requirements for health and welfare (80/20 compensation for health insurance). Because contracts for industry-funded monitoring program will be between service providers and participants in the fishing industry, it will not be necessary for these contracts to meet the requirements of the SCA.

However, even without the SCA requirements, service provider companies will still be required to pay employees not less than the federal minimum wage provided in the Fair Labor Standards Act (FLSA). The FLSA establishes minimum wage, overtime pay, recordkeeping, and youth employment standards affecting employees *in the private sector as well as in Federal, State, and local governments.* Covered non-exempt workers are entitled to a minimum wage of not less than $7.25 per hour effective July 24, 2009. Overtime pay at a rate not less than one and one-half times the regular rate of pay is required after 40 hours of work in a workweek.

According to a report published by MRAG Americas (June 2012), Northern Economics (2011) estimated that the SCA and FLSA requirements are likely to add $50-$100 to the sea day cost for an industry-funded monitoring program. However, eliminating SCA requirements by privatizing contracts in this region is not likely to decrease sea day costs by as much as $100 for two reasons: (1) FLSA requirements for minimum wage and overtime would still apply to vessel/provider contracts; and (2) employees working for companies currently providing observer coverage and at-sea monitoring services in this region have been working (some for many years) under government contracts, which are consistent with SCA requirements for wages and fringe benefits. It may be very difficult for service providers in this region to change the wage and benefit structure they offer to their employees, many of whom have been working in observer and ASM programs in this region for several years. Therefore, the reduction in sea day cost that can be expected from the privatization of contracts cannot be estimated with certainty but is likely to be on the lower end of the range predicted in the MRAG Report.

Streamlining the application process for observer service providers. The Councils discussed a number of options to simplify the application process for service providers, including "grandfathering in" states as service providers, allowing the service provider approval from one NMFS region to extend to other regions, or developing a standardized national application for service providers. The rationale for these provisions is that limiting the application process for service providers could translate into reductions in program administration costs, which could ultimately reduce sea day costs for industry. While there are potential cost savings with these approaches, many have national implications and will need to be investigated outside of this amendment. Ultimately, because the information collected through our monitoring programs support our mission to conserve and manage fisheries and other marine resources, we are obligated to assure the quality of data collected through these programs. This means that any process used to evaluate service providers ensures that the providers are able to comply with regional requirements. NMFS is investigating these ideas at a national level, and any results from this effort will not be available for informing this amendment.

Prioritization Process

Omnibus Alternative 2 includes a prioritization process for coverage targets above SBRM and independent from ESA and MMPA requirements in order to allocate available Federal funding across FMPs. Again, due to legal and budgetary constraints described in the Introduction, NMFS cannot approve and implement monitoring requirements for which it does not have available Federal funding to cover NMFS cost responsibilities. NMFS can, however, approve coverage targets associated with industry-funded monitoring programs for FMPs with the understanding that annual funding available to cover NMFS cost responsibilities will dictate realized coverage levels.

When industry-funded monitoring programs and coverage levels exist for multiple FMPs (e.g., the herring and mackerel FMPs), and when Federal funding is not sufficient to cover all associated NMFS cost responsibilities, the Councils and/or NMFS must decide how to prioritize industry-funded monitoring programs in order to allocate available Federal funding across the relevant FMPs. Available Federal funding refers to any funds in excess of those allocated to meet SBRM or other existing monitoring requirements that may be used to fund IFM programs. The prioritization processes outlined in Omnibus Alternative 2 would guide which industry-funded monitoring programs would operate for a given year and which would not depending on available Federal funding. The prioritization process would not apply to the existing scallop and groundfish industry-funded monitoring programs. The prioritization process alternatives in the IFM Omnibus Amendment could apply to groundfish sectors and/or the scallop fishery if, in a future action, the Council desires to include these programs in the prioritization process, or develops new IFM programs within those FMPs.

When there is no Federal funding available to cover NMFS cost responsibilities above SBRM coverage, then no industry-funded monitoring program could operate. In the event that no Federal funding is available, and the IFM program does not allow for vessels to be issued waivers to exempt them from industry-funded monitoring requirements, the fishing effort will be reduced to match available monitoring. In the event that no Federal funding is available, and the IFM program does allow for vessels to be issued waivers to exempt them from industry-funded monitoring requirements, then there would be no additional monitoring.

Alternatives 2.1 and 2.2 provide the Councils and NMFS with more discretion to make trade-offs between FMPs, but also require more recurring analysis and resources. The primary difference between these two alternatives is who (NMFS or Councils) would lead the prioritization process and analysis. Alternatives 2.3, 2.4, and 2.5 use formulaic approaches, eliminating much of the discretion and analytical burden of Alternatives 2.1 and 2.2. However, the formulaic approaches in Alternatives 2.3, 2.4 and 2.5 may reduce the effectiveness of the resulting outcome relative to Council priorities. Under all of the options described below, the industry would be responsible for covering its cost responsibilities, unless it was determined that Federal funds were otherwise available to be used to offset industry cost responsibilities. If Omnibus Alternative 2 was not selected by the Councils, available Federal funding would be allocated toward industry-funded monitoring on an FMP-by-FMP basis.

The following tables summarize the discretionary and formulaic prioritization alternative to facilitate comparisons.

Table 13. Summary of Prioritization Alternatives

	Alternative	Summary
Discretionary	2.1 NMFS-led	NMFS staff would use a weighting approach (described below pages 26-33), in consultation with the Councils, to determine priorities among IFM programs.
Discretionary	2.2 Council-led	Both Councils would work together using a weighting approach to determine priorities among IFM programs.
Formulaic	2.3 Proportional	Each IFM program would be reduced by the same percentage as the funding shortfall (i.e. if NMFS funding is short by 20%, each IFM program would receive only 80% of the Federal funded need for that program).
Formulaic	2.4 Lowest Coverage Ratio-based	IFM programs would be prioritized by fisheries that have the lowest coverage needs relative to fleet activity. This alternative would favor coverage for the FMPs that do not need much additional monitoring to meet coverage targets and have the most active fleets.
Formulaic	2.5 Highest Coverage Ratio-based	IFM programs would be prioritized by fisheries that have the highest coverage needs relative to fleet activity. This alternative would favor coverage for the FMPs that need more additional monitoring to meet coverage targets and have the least active fleets.

Table 14. Pros and Cons of Discretionary Versus Formulaic Prioritization Alternatives.

	Pros	Cons
Discretionary Alternatives: Alternative 2.1 and 2.2	More discretion over funding priorities	Complex, and requires additional workload to prioritize
	Takes objectives, performance and fishery context into account	Timeline > 1 year
	Could result in funding of most important programs first	May require rulemaking
Formulaic Alternatives: Alternatives 2.3, 2.4, and 2.5	Shorter timeline	No discretion
	Adaptive to budget changes and timing	No flexibility to consider management objectives when prioritizing with a formulaic approach

Only one of the prioritization process alternatives will be selected. It is important to consider the advantages and disadvantages that each alternative will provide to the management of future IFM programs. For example, the discretionary alternatives 2.1 and 2.2 would allow NMFS and/or the Councils the opportunity to determine priority among FMPs/IFM programs, but would be more complex, take longer, and involve more staff resources. Comparing the discretionary alternatives to each other, the only difference is which entity, either NMFS or the Councils, will be conducting the prioritization. The formulaic alternatives 2.3, 2.4, and 2.5 have the advantage of taking less time and staff resources to develop, but do not allow discretion of priority among FMPs/IFM programs and may result in priorities that do not match current Council monitoring interests. When comparing the formulaic alternatives, the proportional alternative 2.3 would equally consider FMPs/IFM programs needs such that Federal budgetary shortfalls in any particular year would equally impact IFM programs. While the coverage ratio-based alternatives 2.4 and 2.5 would be formulaically-biased between FMPs/IFM programs based on the needed coverage to meet targets and the total activity in the relevant fleets.

2.1.2.1 Omnibus Alternative 2.1: NMFS-led Prioritization Process for Industry-Funded Monitoring Programs

Under Omnibus Alternative 2.1, the Regional Administrator and Science and Research Director would use the weighting approach below to determine, in consultation with the Councils, how to prioritize industry-funded monitoring programs in order to allocate NMFS available resources to support NMFS cost responsibilities required to achieve coverage targets for industry-funded monitoring coverage. After those costs are funded, NMFS would also determine, in consultation with the Councils, the allocation of any remaining funding available to offset industry costs established in this amendment for the Herring and MSB FMPs and other FMP actions. The costs would be defined as described by Omnibus Alternative 2. Funding for SBRM, ESA, and MMPA observer coverage would not be changed by this measure. Any funding for industry-funded monitoring programs would be allocated separately from any funding for SBRM or other statutory requirements and any coverage would be above coverage for SBRM or other statutory requirements.

The prioritization process would have the following steps:

1. NMFS would apply the weighting approach (described below) to develop proposed priorities for industry-funded monitoring coverage in order to allocate Federal resources across FMPs with industry-funded monitoring programs. If available funding in a given year is sufficient, this distribution would be based on the allocation necessary to fully implement the industry-funded monitoring coverage targets specified in each FMP. If available funding is not sufficient to fully fund all industry-funded monitoring programs, then NMFS would recommend a prioritization of industry-funded monitoring coverage in order to allocate resources across FMPs that would include:
    - The total amount of funding and sea days necessary to meet the coverage targets specified by each FMP if each FMP were fully funded, including each FMP's share of the total;
    - The coverage level for each FMP if each FMP maintains its percentage share of the total funding (e.g., a fishery with a bigger proportion of the total funding would absorb a bigger proportion of the shortfall);
    - The coverage levels that incorporate the weighting approach; and
    - The rationale for the recommended prioritization.

2. At a joint New England/Mid-Atlantic committee meeting, NMFS and the Councils would review NMFS's proposed prioritization of industry-funded monitoring coverage and allocation of funding, and recommend any modifications to the prioritization.

3. NMFS would provide the Councils, at the earliest practicable opportunity: (1) The estimated industry-funded monitoring coverage levels that incorporate the recommended prioritization, based on available funding; and (2) the rationale for the recommended prioritization, including the reason for any deviation from the joint committee or joint Council's recommendations. The Councils may recommend revisions and additional considerations to be made by the Regional Administrator and Science and Research Director.

Step 3 allows the Councils and NMFS to discuss any final revisions to the distribution, which might be necessary if the final budget is not known at the time of initial prioritization and is less than expected.

Timing for this process is discussed below.

2.1.2.2 Omnibus Alternative 2.2 (Preferred Alternative): Council-led Prioritization Process for Industry-funded Monitoring Programs

Under Omnibus Alternative 2.2, the Regional Administrator and Science and Research Director would inform the Councils of NMFS's available funding to achieve coverage targets for industry-funded monitoring coverage, including supporting NMFS's infrastructure costs and/or any offset of industry costs established in this amendment for the Herring and MSB FMPs and other FMP actions. If available funding in a given year was sufficient, this distribution would be based on the allocation necessary to fully implement the industry-funded monitoring coverage targets specified in each FMP. If available funding was not sufficient, the Councils could apply the weighting approach below to determine the best prioritization of industry-funded monitoring in order to allocate available funding across FMPs with industry-funded monitoring programs to meet regional priorities and make recommendations to NMFS. NMFS and industry's costs would be defined as described by Omnibus Alternative 2. Funding for SBRM, ESA, and MMPA observer coverage would not be changed by this measure.

The prioritization process would have the following steps:

1. If available funding is not sufficient to fully fund all industry-funded monitoring programs, the Councils could work together to develop criteria to evaluate and prioritize industry-funded monitoring programs (example weighting approach detailed below) in order to allocate NMFS resources across FMPs with industry-funded monitoring programs that would include:
    - The total amount of funding and seadays necessary to meet the coverage targets specified by each FMP if each FMP were fully funded, including each FMP's share of the total;
    - The coverage level for each FMP if each FMP maintains its percentage share of the total funding (e.g., a fishery with a bigger proportion of the total funding would absorb a bigger proportion of the shortfall);
    - The coverage levels that incorporate the weighting approach; and
    - The rationale for the recommended prioritization.

2. The Councils would coordinate to propose priorities in order to allocate funding for NMFS infrastructure costs and offsets for industry costs. The Councils would also coordinate any modifications to the prioritization process and recommend a prioritization to NMFS. This would be the opportunity to resolve any differences in prioritization between the two Councils.

3. NMFS would provide the Councils, at the earliest practicable opportunity: (1) The estimated industry-funded monitoring coverage levels that incorporate the recommended prioritization, based on available funding; and (2) the rationale for the recommended prioritization, including the reason for any deviation from the Councils' recommendations. The Councils may recommend revisions and additional considerations to be made by the Regional Administrator and Science and Research Director.

Timing for this process is discussed below.

Weighting Approach

The weighting approach is generally based on the draft processes developed by the MAFMC Scientific and Statistical Committee to prioritize research proposals. The weighting approach could give NMFS or the Council a transparent, deliberative process for prioritizing industry funded monitoring coverage in order to allocate NMFS's available resources for funding of NMFS cost responsibilities required to achieve coverage targets for industry-funded monitoring.

If Alternative 2.1 (NMFS-led Prioritization) is selected, NMFS will use the approach outlined below to prioritize industry-funded programs in order to allocate available NMFS funding. The proposed weighting approach has 2 steps outlined in more detail in the following pages:

Step 1

- Compare industry-funded monitoring criteria to each other to create a criteria weighting

Step 2

- Evaluate how each industry-funded monitoring program meets each criterion

Step 1: Compare industry-funded monitoring criteria to each other to create a criteria weighting

The weighting approach first requires NMFS or the Councils to determine the relative importance of criteria that will be used to evaluate the industry-funded monitoring programs. The list of eight criteria proposed below would be used by NMFS, and could be used by the Councils, for the first prioritization cycle, and every cycle thereafter, unless the Councils change the criteria in a framework adjustment.

1. The industry-funded monitoring program relates to stocks that are overfished or subject to overfishing.

   Overfished stocks have biomass levels depleted to a degree that the stock's capacity to produce maximum sustainable yield (MSY) is jeopardized. Stocks subject to overfishing have a mortality rate that is higher than the rate that produces MSY. Under this criterion, preference would be given to stocks that are in poor condition because those stocks may benefit from additional monitoring support.

2. The species has high commercial or recreational value.

This criterion prioritizes industry-funded monitoring programs related to species with high dollar value in the case of a commercial fishery, or a high number of annual landings or gross weight in the case of a recreational fishery.

3. The industry's daily revenue is high relative to the cost of industry costs for monitoring.

   This criterion evaluates industry's ability to fund its cost responsibilities related to industry-funded monitoring programs requirements established by the Councils. Preference will be given to industry-funded monitoring programs with high daily revenue relative to the daily costs of the industry funded monitoring.

4. The species has special importance to the ecosystem.

   An industry-funded monitoring program may be important because of the biological relationship of the target species to the ecosystem. For example, the species could be a choke species, a forage fish, or have positive or negative impacts on other species. This criterion evaluates the need to prioritize industry-funded monitoring programs species with special ecosystem importance.

5. Industry-funded monitoring program has clear objectives, and a strong statistical basis for the FMP coverage target, including evaluation of the basis for the coverage target.

   Monitoring should have clear objectives and a statistical design for sampling that achieves those objectives. Monitoring programs should also have a clear link to current or future FMP needs. The basis for coverage rates, and/or target coefficient of variation (CV) or variance should be justified. As an example, an industry funded monitoring program with a 100 percent coverage target should have statistical analysis supporting this need (e.g., identification/quantification of significant bias).

6. Fleets monitored under the program are compatible with existing SBRM fleet definitions.

   There are a number of reasons why it is beneficial to design monitoring programs to be compatible with SBRM fleet definitions.

   First, NMFS must be able to identify trips *a priori* in order to deploy coverage effectively. The SBRM fleet definitions (gear, mesh size, area) are robust to this requirement. Some other definitions (e.g., by target species or permit category) have proven difficult to implement coverage for, leading to inefficient use of resources. One example is the design of the coverage requirements for the longfin squid fishery related to the butterfish cap. Vessels intending to land over 2,500 lb longfin squid must notify the observer program 48 hours prior to departure in order to facilitate observer placement. Many vessels fishing with small mesh gear wished to have the option to land large quantities of longfin squid, should they encounter it.

However, in that case, requiring vessels to notify the observer program about intent to target squid could lead to coverage on trips that do not ultimately target squid.

Second, vessel trip reports typically include information on gear and statistical area associated with a trip, but do not include other identifiers to link the landed catch (e.g., several sector exempted fisheries). If a vessel trip report does not include details on a specific type of gear (e.g., Ruhle Trawl) or indicate that the trip is part of an exempted fishery or in an access area, then one cannot properly use the information to obtain expanded discard totals for the fleet.

Finally, increasing coverage for a specific target species or certain permit types can bias discard estimates for a given SBRM fleet.

Overall, industry-funded monitoring programs designed to allocate observer coverage according to SBRM fleets should have priority over those that allocate observers using other criteria because monitors can be deployed effectively, and can provide information to be included in SBRM discard analyses, which makes them more cost-efficient.

7. Uncertainty surrounding catch estimates

This criterion prioritizes industry-funded monitoring programs related to target and non-target species with high uncertainty regarding catch estimates. This means that species with higher CVs related to discards or landings would be rated higher and receive higher priority for funding.

8. Risk to management based on fishery performance

A stock for which the quota is consistently under-harvested is unlikely to face the same management risk as one with a constraining quota. Industry-funded monitoring programs related to fisheries for stocks with constraining quotas should have priority over those for under-harvested stocks.

Some of the information above would be defined or analyzed in the original FMP action that created the industry-funded monitoring program. NMFS or the Council would first look to the original FMP action for information and update or supplement this information as necessary.

The eight criteria may not have equal importance, so NMFS or the Councils can assign weights to the relative importance of these criteria. The end result of this process is just a simple percentage weight for each criterion. For example, one criterion might count for 15% of the decision. The proposed method described below, and shown in Table 15 allows an explicit evaluation of each criterion against all the other criteria so that the final weights are consistent with the values decision makers actually place on the criteria. While it seems intricate, it is a systematic way to arrive at weights for the criteria based on what decision makers really think is important.

- The comparison table is built by entering each criterion to be prioritized into a table, with criteria repeated along both the horizontal and vertical axis.

- The NMFS or the Councils would then compare the criterion to each other to determine importance. For example, first "stock status" is compared to "ecosystem importance", then "stock status" is compared to "SBRM compatibility," and so on, until all of the criteria have been compared to each other. Place an "x" in the boxes where the same two criteria are being compared.

- Each time a weight is recorded in a row cell, its reciprocal value must be recorded in the corresponding column.

- Comparison values:
    - 1 = criteria are equally important
    - 5 = criterion is more important
    - 10 = criterion is much more important
    - 0.2 = criterion is less important
    - 0.1 = criterion is much less important

- After completing the comparisons, total each horizontal row.

- The row totals should then be added to create a grand total.

- Then each row should be divided by the grand total to get a relative weighting value. This value is termed the "IFM Criterion Weighting."

Table 15. Example IFM Criteria Comparison Table

IFM Evaluation Criteria	Stock status	Com/ Rec Value	Ability to pay	Ecosystem importance	Strong statistical basis	SBRM compatibility	Catch estimate uncertainty	Risk to management	Row total	IFM Criterion Weighting	Percent
Stock status	x	10	0.1	5	1	10	1	0.2	27.3	0.15	15%
Com/Rec Value	0.1	x	5	1	10	0.1	0.2	10	26.4	0.14	14%
Ability to pay	10	0.2	x	1	5	0.2	10	5	31.4	0.17	17%
Ecosystem importance	0.2	1	1	x	0.2	1	10	1	14.4	0.08	8%
Strong statistical basis	1	0.1	0.2	5	x	0.2	0.1	0.1	6.7	0.04	4%
SBRM compatibility	0.1	10	5	1	5	x	10	0.2	31.3	0.17	17%
Catch estimate uncertainty	1	5	0.1	0.1	10	0.1	x	10	26.3	0.14	14%
Risk to management	5	0.1	0.2	1	10	5	0.1	x	21.4	0.12	12%
								Grand total	185.2		

In the above example, industry's ability to pay and SBRM compatibility are the most important criteria, and will each contribute 17% to the weight of the score of the industry-funded monitoring programs. The statistical basis for the program is the least important criterion, and will only contribute 4% to the weight of the score.

In practice, a very simple survey of Council members can be used to implement this exercise, and the NEFMC's Observer Policy Committee has already successfully participated in a trial of such a survey.

Once the relative importance of each evaluation criteria is determined, the next step is to compare how the industry-funded monitoring programs measure up against the criteria.

Step 2: Evaluate how each industry-funded monitoring program rates relative to each criterion

Rate each industry-funded monitoring program:

- For criteria, reading across the vertical axis, assign a number based on how much each industry funded monitoring program meets the criterion. These are the ratings in the table below:
    - 0 = doesn't meet criterion at all

- 1 = slightly meets criterion
- 2 = somewhat meets criterion
- 3 = mostly meets criterion
- 4 = fully meets criterion

- After completing the comparisons, multiply the rating assigned to each criterion by the IFM Criterion Weighting in Step 1.

- Total the columns. Now the industry-funded monitoring programs can be ranked.

TABLE 16. EXAMPLE FMP RANKING USING IFM EVALUATION CRITERIA

IFM Evaluation Criteria	IFM Criteria Weighting	FMP 1 Ranking	IFM Criteria Weighting x FMP 1 Ranking	FMP 2 Ranking	IFM Criteria Weighting x FMP 2 Ranking	FMP 3 Ranking	IFM Criteria Weighting x FMP 3 Ranking
Stock status	0.15	4	0.59	0	0.00	2	0.00
Com/Rec Value	0.14	1	0.14	3	0.43	1	0.43
Ability to Pay	0.17	2	0.34	1	0.34	0	0.00
Ecosystem importance	0.08	0	0.00	2	0.00	4	0.00
Strong objective	0.04	3	0.11	3	0.33	1	0.33
SBRM compatibility	0.17	1	0.17	3	0.51	4	2.03
Catch estimate uncertainty	0.14	0	0.00	4	0.00	4	0.00
Risk to management	0.12	1	0.12	1	0.12	4	0.46
IFM Program Overall Ranking			1.46		1.71		3.24

In the example, FMP 3 ranks the highest, followed by FMP 2, then FMP 1.

After the process is complete, NMFS and the Councils may now use the rankings to prioritize the industry-funded monitoring program for allocation of available funding to the FMPs to cover NMFS's costs. One possible way to do this would be to fully fund the highest ranked program, and then work through the ranking list sequentially until funding to cover NFMS's cost was completely allocated. Funding would not be allocated to a program if the available allocation would fund less than ¼ of the necessary funding.

If Alternative 2.2 (Council-led Prioritization) is selected, the Councils have the option to use this weighting approach outlined above, or develop their own joint process for prioritization, provided that criteria used to evaluate industry-funded monitoring programs, as well as the rationale for the recommended prioritization approach, are made available to the public in advance.

Both the MAFMC and the NEFMC have identified a Council-led prioritization process (Omnibus Alternative 2.2) as their preliminary preferred alternative to prioritize new industry-funded monitoring programs in order to allocate available Federal funding across FMPs when funding falls short of Federal cost responsibilities for fully administering new industry-funded monitoring programs.

This action may establish industry-funded monitoring coverage targets for the mackerel and/or herring fisheries. The Council-led prioritization process would apply to those industry-funded monitoring programs, if there is a funding shortfall to support NMFS administrative cost responsibilities. The Councils will need to identify a weighting approach to prioritize industry-funded monitoring programs under the Council-led prioritization process alternative in this action. The Councils may want to consider specifying an equal weighting approach in this action, acknowledging that a more complex weighing approach could be developed in the future. An example of an equal weighting approach would be funding both industry-funded monitoring programs at 70%, if only 70% of the Federal funding needed to administer both programs was available.

Revising the prioritization process (e.g., change from Council-led to NMFS-led) could be done in a future framework action. But, the Councils could also change the weighting approach for the Council-led prioritization process by considering a new weighting approach at a public meeting, where public comment is taken, and asking NMFS to publish a notice or rulemaking modifying the weighting approach. Both Councils would have to agree to any weighting approach. Establishing an equal weighting approach in this action would ensure that the management objectives of both Councils are initially given equal weight and allow time for more complex weighting systems to be developed without delaying implementation.

Timing for discretionary alternatives (Alternatives 2.1 and 2.2)

The discretionary prioritization alternatives (Alternatives 2.1 and 2.2) require a more time-intensive evaluation and ranking of industry funded monitoring programs, and would require rulemaking to solicit public comment on NMFS or the Council's recommended allocation of available funding. The status quo timing outlined under the status quo alternative would still apply, and this new process would apply alongside the existing timeline.

There are two options for this process so that it could be matched with annual funding levels and the SBRM cycle:

1. The Council could choose to have the entire process occur on an as-needed basis (i.e., whenever new IFM programs are approved, or whenever existing IFM programs are adjusted or terminated), with the adjusted prioritization implemented in time for the next SBRM cycle. This path would mean that, once the prioritization

was developed it could be in place indefinitely, until the next industry-funded monitoring program was finalized. Readjusting the weighting approach on an as-needed basis would mean that, after going through the entire timeline, the process outlined in Year 2 below would repeat each year until new programs were added/old programs were adjusted or terminated, at which point the timeline would start over as outlined for Year 1.

2. Alternatively, the Councils could elect to do the process every 3 years unless new IFM programs are approved, or whenever existing IFM programs are adjusted or terminated.

Table 17. Timing for Discretionary Alternatives (Alternatives 2.1 and 2.2)

Year	Month	SBRM/ASM/Scallop Schedule (status quo)	Alternatives 2.1 and 2.2
Year 1	January to April	SBRM analyses are completed late January/early February	• NMFS (2.1) prepares and analyze weighting approach for Year 2 **–OR** • Joint Committee or Council meeting to conduct weighting approach (2.2)
	April to May		Council and NFMS meet to review/finalize ranking of existing IFM programs (2.1 and 2.2)
	May to October		NMFS conducts proposed and final rulemaking to finalize rankings for IFM programs for Years 2-4 (or for indefinite period).
	October to December	• Observer data July Year 0 – June Year 1 available • Begin analysis for SBRM • Work on discard estimation analysis for SBRM from November through early February • Work on analysis for sector ASM using most recent complete fishing year (May Year 0 – April Year 1)	Begin analysis to determine necessary IFM seadays
Year 2	January to February	• Receive Year 2 budget • Sector ASM coverage rates published in proposed rule/collect public comment • Determine scallop compensation rate	
	March	• If funding shortfall, run SBRM prioritization process • Start of scallop Year 2	If funding shortfall, issue funding based on finalized weighting approach
	April	• Begin Year 2 seaday schedule • Sector ASM coverage rates published in final rule	Implement Year 2 IFM coverage levels
	May	Begin Sector ASM Year 2	
	June		NMFS briefs Councils on final year 2 IFM seaday allocation

2.1.2.3 Omnibus Alternative 2.3: Proportional Prioritization Process for Industry-Funded Monitoring Programs

Under Omnibus Alternative 2.3, the amount of Federal funding available to support industry-funded monitoring in each FMP would be reduced by the same percentage as the funding shortfall. If the available Federal funding falls short, the amount of the shortfall would be deducted from the total amount of funding to be allocated to each FMP, proportional to that FMP's share of the total funding need. For example, an FMP that represents 20% of the total funding need would absorb 20% of the total funding shortfall.

There could be a scenario where the available Federal funding for a given FMP would produce a coverage level below the coverage target specified by the FMP as providing sufficient information to meet an FMP's objectives for monitoring. For example, an additional 10 observed trips may provide additional data, but not sufficient data to provide a robust estimate of bycatch of the species of interest. In this case, that FMP would not receive additional coverage and the funding for that FMP would be re-allocated proportionally to other FMPs.

NMFS would determine and provide the Councils with: (1) The estimated industry-funded monitoring coverage levels that incorporates the proportional adjustments, based on available funding; and (2) the rationale for the recommended prioritization, including how it deviates from the fully funded coverage levels across all FMPs. This could be done on an annual basis or the allocation of resources could remain as specified unless revised.

Example FMP 1 needs \$3 million, FMP 2 needs \$5 million, and FMP 3 needs \$2 million to fully implement their coverage targets. The total funding need is \$10 million. If there is only \$8 million in Federal funds for the coming year, then there is a \$2 million shortfall, or a 20% shortfall. Using the proportional prioritization process, NMFS would allocate the \$8 million such that each FMP has a 20% shortfall, i.e., they would all be funded at 80%. FMP 1 would get 80% of \$3 million, or \$2.4 million, FMP 2 would get 80% of \$5 million, or \$4 million, and FMP 3 would get 80% of \$2 million, or \$1.6 million. These would be the total funds available to the FMPs to fund NMFS's costs for coverage days above SBRM.

2.1.2.4 Omnibus Alternative 2.4: Lowest Coverage Ratio-based Prioritization Process for Industry-Funded Monitoring Programs

Under Omnibus Alternative 2.4, the amount of funding would be allocated to each FMP by prioritizing coverage in fisheries that have the lowest coverage needs (based on projections for the coming year) relative to effort (based on vessel trip reports from the previous year). In practice, this would mean that fisheries with the highest ratio of coverage to effort would be sequentially eliminated until the available Federal funding is sufficient to meet the coverage targets of the remaining FMPs. This alternative would favor fleets with low additional needed coverage days and/or high overall activity.

NMFS would determine and provide the Councils with: (1) the estimated industry-funded monitoring coverage levels that incorporate the prioritization, based on available funding; and (2) the rationale for the recommended prioritization, including how it deviates from the fully funded coverage levels across all FMPs. This could be done on an annual basis or the allocation of resources could remain as specified unless revised.

Example FMP 1 needs \$3 million, FMP 2 needs \$5 million, and FMP 3 needs \$2 million to fully implement their coverage targets. The total funding needed is \$10 million, but there is only \$8 million in Federal funds for the coming year, so there is a \$2 million shortfall. Under the coverage ratio-based prioritization approach, NMFS would calculate the following ratio for each FMP:

$$\text{Coverage Ratio} = \frac{\text{Projected coverage days needed in the coming year}}{\text{Level of effort in the previous year}}$$

If FMP 1 had a ratio of 0.1, FMP 2 a ratio of 0.08, and FMP 3 a ratio of 0.2, FMP 3 would be eliminated from coverage first. Because the total funding need of the remaining programs, \$8 million, can be met by the available Federal funding, \$8 million, coverage for FMP 1 and FMP 2 would be fully funded. FMP 3 would receive no additional coverage in the coming year. The key here is that fewer needed coverage days and/or higher levels of effort in the previous year will both lead to a higher prioritization, and it is the interplay of these two factors that would determine the prioritization.

This alternative is based on an approach selected by the Councils in the SBRM amendment. SBRM sets "minimum pilot coverage" levels for each fishing mode to ensure that a fleet is not allocated too few observer sea days to generate meaningful discard estimations. If the total of agency funded sea days is greater than the total minimum pilot coverage, then the Penultimate Cell approach would be applied. If the funded days exactly equals the total minimum pilot coverage sea days then the sea days would be assigned to fishing modes according to the minimum pilot coverage. However, it is theoretically possible that the available funding for SBRM observers in a given year could be so restricted that the minimum pilot coverage for each fleet could not be achieved. In such a case, it would be necessary to determine which fleets would get enough observer coverage to reach the minimum pilot coverage and which would not. The Councils' preferred alternative for adjusting coverage levels below minimum pilot coverage would eliminate the funding shortfall by sequentially removing coverage in fleets that had the highest ratio of minimum pilot coverage to days absent from port based on VTR reports in the previous year. Because the number of days absent from port is typically much larger than the minimum pilot coverage for a fishing mode, this alternative would maintain at-sea observer coverage on the most active fishing modes.

2.1.2.5 Omnibus Alternative 2.5: Highest Coverage Ratio-based Prioritization Process for Industry-Funded Monitoring Programs

Under Omnibus Alternative 2.5, the amount of funding would be allocated to each FMP by prioritizing coverage in fisheries that have the highest coverage needs (based on projections for the coming year) relative to effort (based on vessel trip reports from the previous year). In practice, this would mean that fisheries with the lowest ratio of coverage to effort would be sequentially eliminated until the available Federal funding is sufficient to meet the coverage targets of the remaining FMPs. This alternative would favor fleets with high additional needed coverage days and/or low overall activity.

NMFS would determine and provide the Councils with: (1) the estimated industry-funded monitoring coverage levels that incorporate the prioritization, based on available funding; and (2) the rationale for the recommended prioritization, including how it deviates from the fully funded coverage levels across all FMPs. This could be done on an annual basis or the allocation of resources could remain as specified unless revised.

Example

FMP 1 needs $3 million, FMP 2 needs $5 million, and FMP 3 needs $2 million to fully implement their coverage targets. The total funding needed is $10 million, but there is only $8 million in Federal funds for the coming year, so there is a $2 million shortfall. Under the coverage ratio-based prioritization approach, NMFS would calculate the following ratio for each FMP:

$$\text{Coverage Ratio} = \frac{\text{Projected coverage days needed in the coming year}}{\text{Level of effort in the previous year}}$$

If FMP 1 had a ratio of 0.1, FMP 2 a ratio of 0.08, and FMP 3 a ratio of 0.2, FMP 2 would be eliminated from coverage first. Because the total funding need of the remaining programs, $5 million, can be met by the available Federal funding, $8 million, coverage for FMPs 1 and 3. FMP 2 would receive no additional coverage in the coming year. The key here is that greater needed coverage days and/or lower levels of effort in the previous year will both lead to a higher prioritization, and it is the interplay of these two factors that would determine the prioritization.

Timing for formulaic alternatives (Alternatives 2.3, 2.4 and 2.5)

The formulaic alternatives (Alternatives 2.3, 2.4, and 2.5) could be implemented annually in concert with the existing SBRM cycle. Rulemaking would not be required, and the process outlined in Year 2 below would occur on an annual basis for all subsequent years.

Table 18. Timing for Formulaic Alternatives (Alternatives 2.3, 2.4, and 2.5)

Year	Month	SBRM/ASM/Scallop Schedule (status quo)	Alternatives 2.3, 2.4, and 2.5
Year 1	January to April		
	April/May		
	May to October		
	October	• Observer data July Year 0 – June Year 1 available • Begin analysis for SBRM • Work on discard estimation analysis for SBRM from November through early February • Work on analysis for sector ASM using most recent complete fishing year (May Year 0 – April Year 1)	Begin analysis for required IFM coverage rates
	November		
	December		
Year 2	January	• Receive Year 2 budget • Sector ASM coverage rates published in proposed rule/collect public comment • Determine compensation rate	
	February		
	March	• If funding shortfall, run SBRM prioritization process • Start of scallop Year 2	If funding shortfall exists, run IFM prioritization
	April	• Begin Year 2 sea day schedule • Sector ASM coverage rates published in final rule	Implement Year 2 IFM coverage levels
	May	Begin Sector ASM Year 2	
	June		NMFS briefs Councils on final year 2 IFM sea day allocation

2.1.2.6 Omnibus Alternative 2.6: Monitoring Set-Aside

Omnibus Alternative 2.6 would include general language in the regulations of each FMP that would allow monitoring set-aside provisions to be implemented via a framework adjustment. A monitoring set-aside program would devote a portion of the annual catch limit (ACL) from a fishery to offset the industry cost responsibilities for at-sea, electronic, or dockside monitoring. However, there are many possible ways to structure a monitoring set-aside program, and the details of each program would need to be developed on an FMP-by-FMP basis. All potential monitoring set-aside programs should be considered as an alternative to off-set monitoring cost, and should not be expected to fully cover monitoring costs. Most fisheries will not have enough value, capacity, or abundance/availability (i.e., stock size, distribution, etc.) to fully cover the costs of intense monitoring goals.

One monitoring set-aside model for a fishery that uses possession limits could consist of reserving some percentage of the ACL (e.g., up to 3 percent) to be allocated to certain vessels to help off-set the additional monitoring costs. In this example, if a vessel in that fishery is selected to carry an at-sea observer, that vessel would be granted a certain amount of pounds from the monitoring set-aside allocation to land above the possession limit. The revenue obtained from the sale of the additional landings would help offset the vessel's costs of carrying an at-sea observer. This example is very similar to the monitoring set-aside program that currently operates in the scallop fishery. Preliminary analysis suggests that set-asides for monitoring will work best in profitable fisheries and when only a modest increase in monitoring is desired (like scallops).

Absent this measure, a full FMP amendment would be required for all fisheries to implement a monitoring set-aside to defray industry costs for monitoring programs. Adopting this measure would not implement a monitoring set-aside for any individual FMP. Rather, it would expedite the development of monitoring set-aside provisions for FMPs in future framework adjustments.

Under Omnibus Alternative 2.6, the details and impacts analysis of any monitoring set-aside program would be specified and/or modified in a subsequent framework adjustment to the relevant FMP. These details may include, but are not limited to: (1) the basis for the monitoring set-aside; (2) the amount of the set-aside (e.g., quota, DAS, etc.); (3) how the set-aside is allocated to vessels required to pay for monitoring (e.g., an increased trip limit, differential DAS counting, additional trips, an allocation of the quota, etc.); (4) the process for vessel notification; (5) how funds are collected and administered from the industry to cover the costs of monitoring coverage; and (6) any other measures necessary to develop and implement a monitoring set-aside. Additional NEPA analysis would be required for any action implementing and/or modifying monitoring set-aside provisions, regardless if it required a framework adjustment or full amendment.

Considerations for Monitoring Set-Asides

The text below outlines some of the concepts for the Councils and NMFS to consider when determining whether developing a future monitoring set-aside program for a given fishery could be successful.

Value of the Resource

It is important to determine if the value of a monitoring set-aside program would be significantly beneficial for the goals of off-setting additional monitoring costs.

For example, in 2010, the stock wide Atlantic herring ACL was 201 million lb and the herring ex-vessel price was approximately $0.13/lb. Landings that year were approximately 145 million lb (approximately 72% of the ACL). If 3 percent of the ACL was set-aside for monitoring (6.03 million lb), that would equate to approximately $784,140 to cover monitoring costs in the Atlantic herring fishery. However, the fishery may only catch a portion of the monitoring set-aside. For example, if only approximately 72 percent of the monitoring set-aside was harvested, then only approximately $564,581 (72% of $784,140) would be available to cover monitoring costs for the entire fishery (all gear types and permit categories). There are also costs associated with fishing, and only the extra profits, not the full ex-vessel value, are a benefit to the fishermen.

Depending on the monitoring program in place, a set-aside would only partially cover monitoring costs. The high ex-vessel value of scallops and modest level of additional sampling currently allows for the scallop monitoring set-aside program to fully off-set the monitoring costs in the scallop fishery, but if ex-vessel value of scallops falls to a low enough level, it may not allow full funding in the future.

Management Measures and Fishery Operations

When developing a monitoring set-aside program managers need to consider the operation of the fishery as well as the comprehensive management measures within a fishery to create a successful monitoring set-aside program. It is also important to consider fishery management partners when developing exemptions or measures for a monitoring set-aside program. Finally, and perhaps most importantly, there needs to be incentive and benefit to the vessels associated with the ability to harvest additional pounds to off-set additional monitoring costs.

In the scallop monitoring set-aside program, vessels can harvest additional scallops above the possession limit, or fish at a reduced days-at-sea accrual rate, when they carry an observer. This provides vessels additional revenue from that trip to off-set the costs of the observer. However, in a fishery like Atlantic herring, some limited access vessels do not have a regulated possession limit and often fish to the maximum capacity of the vessel. Since some vessels in this fishery do not have a possession limit, harvesting additional fish on a trip may not be an effective option. However, there could be other management measure incentives such as allowing fishing during a closed season, in a closed area, or following a seasonal closure. However, benefits from such exemptions would only occur in some fisheries and may not offer an immediate return of funds to offset monitoring costs.

In the summer flounder, scup, and black sea bass fisheries, in addition to Federal possession limits, states often implement possession limits for these species. If vessels participating in these fisheries were provided exemptions to the Federal possession limits for a monitoring set-aside program, they would also need to be exempt from a state possession limit in order to land over the possession limit in that state. This type of monitoring set-aside program would require coordination with the states and the Atlantic States Marine Fisheries Commission, and may create additional administrative burden for states.

ACL Allocation Within a Fishery

FMPs use a wide range of structures to apportion ACLs to different fishery participants (e.g., commercial and recreational allocations). Monitoring set-aside program managers must consider how the ACL is distributed within the fishery when deciding how to structure the set-aside program. For example, in the Bluefish FMP, there is only one ACL from which a commercial and a recreational annual catch target (ACT) are derived. If 3 percent of the ACL is allocated for a monitoring set-aside program, both the commercial and recreational ACTs would be reduced proportionally. However, it is most likely that only the commercial sector would have additional monitoring requirements, therefore the commercial fishery would benefit from the additional monitoring set-aside pounds to cover monitoring costs, but the recreational fishery would simply have a reduced quota.

On the other hand, Amendment 16 to the Northeast Multispecies FMP allows the Council to set sub-ACLs for groundfish stocks through framework adjustments. This vehicle could be used to create a monitoring set-aside program by designating sub-ACLs for some, or all, of the groundfish stocks. The landings allocated to those sub-ACLs could then be used to cover additional monitoring costs in that fishery. It is important to consider how quotas are allocated within the fishery and how to most appropriately distribute the monitoring set-aside pounds. As an aside, it is worth exploring whether the sub-ACL approach may be an alternative approach for establishing monitoring set-asides for the groundfish fishery.

Shared Burden and Benefit

It is important to consider whether the reallocation of quota for a monitoring set-aside program will be equally beneficial and/or burdensome to all fishery participants, and how monitoring set-aside programs could affect different permit categories or different gear types within a fishery. For example, in the Atlantic herring fishery, hypothetically a monitoring set-aside program could allocate 3 percent of the ACL to off-set monitoring costs. However, the monitoring alternatives under consideration for the herring fishery apply coverage to a subset of the herring fishery participants. For example, in some alternatives, the midwater trawl vessels may be the only gear type that has industry-funded monitoring requirements. If a monitoring set-aside were established to offset the costs of this program, the midwater trawl vessels would receive the benefits of additional pounds for monitoring costs, but the purse seine vessels would have a smaller annual quota to harvest, and may therefore endure increased hardship despite not having additional monitoring requirements.

In contrast, in the groundfish fishery, the burden of monitoring costs may be more evenly dispersed with the establishment of a monitoring set-aside program. Currently, not all vessels participating in sectors are active in the fishery. Those inactive vessels lease their allocation to the active vessels, but the active vessels would be responsible for additional monitoring costs. If the monitoring set-aside program reserved 3 percent of the overall ACL, then the allocation to each vessel would be equally reduced, therefore sharing the burden more evenly among all participants in the fishery as opposed to just the active vessels.

Availability and Prevalence of the Resource

The health and availability of a fishery will dictate whether the fishery can sustain a monitoring set-aside program. For example, the Atlantic mackerel fishery has continually been underperforming and annual landings have been declining for approximately the past 10 years (Table 65). At this time it is unclear if the mackerel stock is declining or if the fish are behaving differently in terms of migration or schooling. Providing mackerel vessels with additional pounds of fish to land to off-set additional monitoring cost would not be beneficial because the fish are predominately unavailable or unattainable and the quota has not been limiting.

Additionally, it is important to consider whether the monitoring set-aside program would affect fishing pressure on a sub-component of a stock. For example, if monitoring is only required for vessels fishing in certain areas, those vessels would be provided the additional monitoring set-aside pounds, and therefore could increase fishing effort in those areas. In this example, there may be disproportionate fishing pressure on a sub-component of the stock that exists in the area where additional monitoring is required. Managers need to consider the current health of the stock, the recent performance of the fishery, whether the current management measures appropriately address the potential for the effects of catch on different components of the stock, and how to create a dynamic monitoring set-aside program for changes in stock status and performance to develop a successful program.

Enforcement Issues

Fishery managers should also consider methods to enforce a monitoring set-aside program to prevent abuse to the system. The Mid-Atlantic Research Set-Aside (RSA) program was recently suspended, in part due to issues revolving around enforcement and abuse of the program that resulted in overexploitation of some fisheries. Some monitoring set-aside models could be structured similarly to the Mid-Atlantic RSA program where vessels receive exemptions from certain regulations (i.e., possession limits or closed seasons/areas) to harvest monitoring set-aside pounds. Similar enforcement, monitoring, and reporting issues would need to be addressed when developing a monitoring set-aside program to prevent abuse and over-exploitation of a fishery resource.

Estimated Potential Revenue for Certain FMPs

An estimate of the amount of revenue that could be generated from a set aside is shown in the table below. This table is generated using the lowest and highest average ex-vessel price of herring and mackerel from the 2010-2014 fishing years. Inability to locate either the herring or mackerel resources, reductions in ABCs, or lower prices would reduce expected revenues from a monitoring set-aside. In addition, changes to the management program (i.e., changes to the current unlimited possession limits for Category A herring and Tier 1 mackerel permits) may be necessary, depending on the structure of the set aside. For the herring fishery, using 1 to 5 percent of the 2015 annual catch limit could fund 357 to 2,020 NEFOP-level monitoring days at $818 per sea day, and 411 to 2,327 at-sea monitoring days at $710 per sea day. For the mackerel fishery, using 1 to 5 percent of the 2015 annual catch limit could fund 110 to 1,131 NEFOP-level monitoring days at $818 per sea day, and 127 to 1,303 at-sea monitoring days at $710 per sea day.

TABLE 19. POTENTIAL FUNDING TO OFFSET MONITORING COSTS FROM MONITORING SET-ASIDE FOR THE ATLANTIC HERRING AND MACKEREL FISHERIES

	2015 Total ACL	Available set-aside			Price per mt*		Potential funding available to offset monitoring costs					
							5% of the ACL		3% of the ACL		1% of the ACL	
Stock		5%	3%	1%	Low	High	Low	High	Low	High	Low	High
Atlantic herring	104,566	5,228	3,137	1,046	279	316	$ 1,458,696	$1,652,143	$875,217	$991,286	$291,739	$330,429
			Sea days at $818/sea day				1,783	2,020	1,070	1,212	357	404
			Sea days at $710/sea day				2,055	2,327	1,233	1,396	411	465
Atlantic mackerel	25,039	1,252	751	250	360	739	$450,702	$ 925,191	$270,421	$555,115	$ 90,140	$185,038
			Sea days at $818/sea day				551	1,131	331	679	110	226
			Sea days at $710/sea day				635	1303	381	782	127	261

* Per metric ton prices are the average high and low prices during 2010-2014.

2.1.3 Considered But Rejected Omnibus Alternatives

The January 2014 version of the Discussion Document contained a Vessel Cancellation Charge Option. That option included discussion of a fee to be paid by the vessel to the at-sea observer service provider when vessels are a "no show" or when they cancel trips less than 12 hours before the scheduled departure time. That option also discussed that payment of fees would be a vessel permit requirement and that outstanding fees would result in non-renewal of vessel permits.

As the PDT/FMAT further developed this option, the Department of Commerce Office of General Counsel advised that the government may not dictate the terms of a private transaction such as this fee. As a result, the Vessel Cancellation Charge Option is likely not legal because it involves the terms of a private business contract between a vessel and an observer service provider. While an observer service provider or a vessel could specify a cancellation fee as part of a contract, thereby eliminating the necessity of increasing the base rate that all vessels pay, it is unlikely that NMFS could legally require or specify the amount of such a fee.

The August 2014 version of the Discussion Document contained a Cost-based Prioritization Process for Industry-Funded Monitoring Programs Option. Under that option, the Federal funding would be assigned to each FMP by sequentially eliminating coverage in FMPs that have the highest funding need until the available funding is sufficient to meet the funding needs of the FMPs remaining. That process would have prioritized fisheries with the least expensive programs first. NMFS would have determined and provided the Councils with: (1) The estimated industry-funded monitoring coverage levels that incorporates the prioritization, based on available funding; and (2) the rationale for the recommended prioritization, including how it deviates from the fully-funded coverage target across all FMPs. This option could be done on an annual basis or the allocation of resources could remain as specified unless revised.

At its August 19, 2014, meeting the New England's Observer Policy Committee recommended that this option be considered but rejected because cost-based prioritization option lacked rationale and eliminating FMPs with the highest funding needs would not likely meet the goals/objectives of the industry-funded monitoring programs established by the NEFMC.

2.2 ATLANTIC HERRING MONITORING ALTERNATIVES

As described in the Introduction, the NEFMC is interested in increasing catch monitoring in the Atlantic Herring FMP. This increased monitoring is above coverage required through the SBRM, the ESA, or MMPA. Limited Federal funding and legal constraints on the sharing of costs between NMFS and the fishing industry have recently prevented NMFS from approving new industry-funded monitoring programs. Examples of new industry-funded monitoring programs that were not approved include Amendment 5 to the Atlantic Herring FMP, Amendment 14 to the Atlantic Mackerel, Squid, and Butterfish FMP, and Framework

Adjustment 48 to the Northeast Multispecies FMP. This amendment is intended to remedy the industry-funded monitoring program disapproval in Herring Amendment 5 by establishing (1) a process by which available Federal funding could be allocated to the Herring FMP to support industry-funded monitoring and (2) an industry-funded monitoring coverage target to meet Herring FMP objectives.

Establishing monitoring coverage targets would allow NMFS to approve and implement new industry-funded monitoring programs, without committing to support industry-funded monitoring coverage targets above appropriated funding or before funding is determined to be available.

Although this action may select desired coverage targets beyond SBRM requirements, the availability of Federal funds to support industry-funded monitoring may impact the realized coverage level in any given year. The realized coverage level for the Herring FMP in a given year may be constrained if available Federal funding fall short of NMFS cost responsibilities for administering new industry-funded monitoring programs. During years when there is no additional funding to cover NMFS cost responsibilities above SBRM requirements, there would be no additional monitoring coverage in the herring fishery, even if industry is able to fully fund their cost responsibilities. However, if Federal funding is available to allow NMFS to meet its administrative responsibilities for new industry-funded monitoring programs, the specified coverage target levels would likely be met. Therefore, over time, the realized coverage level for the Herring FMP would fall between SBRM requirements and the industry-funded monitoring coverage target.

Amendment 5 to the Atlantic Herring FMP

The NEFMC is interested in improving catch and bycatch monitoring in the herring fishery consistent with recommendations in Amendment 5 to the Herring FMP.

Table 20. Purpose and Need of Amendment 5 to Herring FMP

Purpose	Need
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
** In Amendment 5, "bycatch" was intended to mean fish that are discarded or fish that are retained and/or sold when harvested in the herring fishery.*	

Amendment 5 to the Herring FMP recommended 100% observer coverage on vessels with the All Areas Limited Access Herring Permit (Category A) and the Areas 2/3 Limited Access Herring Permit (Category B). The provisions for observer coverage recommended in Amendment 5 were intended to enhance catch monitoring and achieve many of the goals and objectives of that amendment. Support for 100% observer coverage on Category A and B herring vessels was driven by stakeholders, as well as some members of the herring industry, who believed that 100% observer coverage was necessary for the most active vessels to either confirm or disprove the claims regarding catch and bycatch in the herring fishery.

Amendment 5 also recommended that the requirement for 100% observer coverage should apply to the most active vessels in the herring fishery. Based on analyses in Amendment 5, vessels with Category A and B permits harvest greater than 98% of the herring catch. Recognizing that NMFS would not have sufficient funding to cover the costs of additional observer coverage, Amendment 5 recommended that the industry contribute $325 per sea day to help pay the costs of expanding the herring monitoring program. The recommendation for 100% observer coverage on Category A and B vessels in Amendment 5 was ultimately disapproved. The rationale for the disapproval was described previously in the Introduction.

Amendment 5 to the Herring FMP required 100% observer coverage on midwater trawl vessels fishing in the Groundfish Closed Areas. If the Groundfish Closed Areas are modified or eliminated in the future, coverage requirements for midwater trawl vessels will be reconsidered at that time. Analyses in Amendment 5 suggest that midwater trawl vessels are not catching significant amounts of groundfish either inside or outside the Closed Areas. Additionally, the majority of groundfish catch by midwater trawl vessels is haddock, and the catch of haddock by midwater trawl vessels is already managed through a haddock catch cap for the herring fishery. However, the rationale in Amendment 5 described important to determine the extent and nature of bycatch in the herring fishery. This measure still allowed the herring midwater trawl fishery to operate in the Groundfish Closed Areas, but it ensured that opportunities for sampling were maximized.

Monitoring of the Herring Fishery

Harvest in the herring fishery is managed by annual catch limits (ACLs) and catch caps. Catch (retained and discarded) of herring and other species is tracked against catch limits using data reported by the herring industry (vessels and dealers) and data collected by at-sea observers.

The NEFMC and stakeholders in the herring fishery have expressed interest in increased monitoring in the herring fishery to better estimate catch in the fishery (both of herring and other species that are incidentally caught with herring) and minimize reliance on industry-reported data. Various types of monitoring are being considered in the herring fishery to increase the use of independently collected catch data to verify industry-reported data and track catch against harvest limits.

Table 21. Monitoring Needs of Herring Fishery

Monitoring Needs	Vessels to be Monitored
Sub-ACLs for Herring Management Areas	All permits, gears, and areas
Haddock catch caps	Midwater trawl vessels fishing in Georges Bank and Gulf of Maine haddock stock areas
Groundfish Closed Areas	Midwater trawl vessels fishing in Groundfish Closed Areas
River Herring and Shad Catch Caps	Midwater trawl and small mesh bottom trawl vessels harvesting more than 6,600 lb of herring from Gulf of Maine, Cape Cod, and Southern New England river herring and shad catch cap areas

Sub-ACLs for Herring Management Areas

The herring stock complex is assessed as a unit stock, but is comprised of inshore (Gulf of Maine) and offshore (Georges Bank) stock components. These stock components segregate during spawning and mix during feeding and migration. Herring management areas were developed in recognition of these different stock components and provide a method to manage the fishing mortality of each stock component somewhat independently. The management areas are located in the Gulf of Maine (Areas 1A and 1B), along the New England coast (Area 2), and Georges Bank (Area 3). The inshore herring stock component is found in 3 of the 4 management areas (i.e., Area 1A, 1B, and 2). These same management areas are of particular economic importance to the industry because of herring availability and proximity of the fishing grounds to shore.

The stock-wide herring ACL is divided by the herring management areas to create management area sub-ACLs. If herring catch reaches 92% of the management area sub-ACL before the end of the fishing year, vessels will be prohibited from possessing more than 2,000 lb of herring per trip or calendar day from that management area until the end of the fishing year. Additionally, if herring catch reaches 95% of the stock-wide ACL before the end of the fishing year, vessels will be prohibited from possessing more than 2,000 lb of herring per trip in or from any management area until the end of the fishing year.

If total herring catch exceeds the stock wide-ACL or any management area sub-ACL during a fishing year, then the amount of the overage will be deducted from that ACL or sub-ACL in a subsequent year. Overages are calculated during the year following the fishing year and deducted the next year. For example, any overages in 2015 are calculated during 2016 and deducted during 2017.

If total herring catch does not exceed the stock wide-ACL and if a management area's sub-ACL has not been fully harvested during a fishing year, then the amount of the underage, up to 10% of the sub-ACL, will be carried over and added to the sub-ACL for that management area in a subsequent year, similar to overage deductions. Additional herring harvest added to each sub-ACL will not be added to the stock wide herring ACL.

Haddock Catch Caps

Haddock catch caps for the herring fishery are equivalent to 1% of the haddock acceptable biological catch for each stock of haddock (Gulf of Maine or Georges Bank) for each multispecies fishing year (May 1 – April 30).

When the haddock incidental catch cap for a particular haddock stock (Gulf of Maine or Georges Bank) has been caught, all herring vessels fishing with midwater trawl gear will be prohibited from fishing for, possessing, or landing, more than 2,000 lb of herring in that particular haddock accountability measure area (Gulf of Maine or Georges Bank) for the remainder of the multispecies fishing year. In addition, the haddock possession limit will be reduced to 0 lb, in the applicable haddock accountability measure area.

Midwater Trawl Vessels Fishing in Groundfish Closed Areas

In 2014, Amendment 5 expanded the existing requirements for midwater trawl vessels fishing in Groundfish Closed Area I to all herring vessels fishing with midwater trawl gear in all the Groundfish Closed Areas. These Closed Areas include: Closed Area I, Closed Area II, Nantucket Lightship Closed Area, Cashes Ledge Closure Area, and Western Gulf of Maine Closure Area.

Amendment 5 required vessels with a herring permit fishing with midwater trawl gear in the Groundfish Closed Areas to carry a NMFS-level observer and bring all catch aboard the vessel and make it available for sampling by an observer. Herring vessels not carrying a NMFS-approved observer may not fish for, possess, or land fish in or from the Closed Areas. Vessels may make test tows without pumping catch on board, provided that all catch from test tows is available to the observer when the next tow is brought aboard.

Amendment 5 allowed catch to be released before it was pumped aboard the vessel if: (1) Pumping the catch aboard could compromise the safety of the vessel, (2) mechanical failure prevents the catch from being pumped aboard, or (3) spiny dogfish have clogged the pump and prevent the catch from being pumped aboard. But if catch is released for any of the reasons stated above, the vessel operator would be required to immediately exit the Groundfish Closed Area. The vessel may continue to fish, but it may not fish in any Groundfish Closed Area for the remainder of that trip. Additionally, vessels that release catch before it has been sampled by an observer must complete a midwater trawl released catch affidavit within 48 hr of the end of the fishing trip. The released catch affidavit details: (1) Why catch was released; (2) an estimate of the weight of fish caught and released; and (3) the time and location of the released catch.

In past years, observer coverage for midwater trawl vessels fishing in the Groundfish Closed Areas was allocated by NEFOP independent of the SBRM. However, the revised SBRM prohibited observer coverage from being allocated to midwater trawl vessels fishing in the Groundfish Closed Areas independent of the SBRM. In order to increase monitoring on midwater trawl vessels fishing in the Groundfish Closed Areas, coverage would need to be incorporated in an industry-funded monitoring program.

River Herring and Shad Catch Caps

Once abundant along the East Coast, populations of river herring (alewife and blueback herring) and shad (American and hickory) have declined compared to historical levels due to various factors. Governmental agencies, non-profit organizations, tribal groups, academia, industry, and others are currently engaged in numerous efforts to further river herring and shad conservation.

Vessels fishing for herring and mackerel herring can encounter river herring and shad. Both the NEFMC and MAFMC recommended river herring and shad caps for the herring and mackerel fisheries beginning in 2014. Managers don't currently have enough data to determine biologically based river herring and shad catch caps or to assess the potential effects of such catch caps on river herring and shad populations coastwide. However, the Councils believe river herring and shad catch caps provide a strong incentive for the herring and mackerel fleets to continue avoiding river herring and shad. These catch caps are intended to allow for the full harvest of the mackerel and herring annual catch limits while reducing river herring and shad incidental catch.

Framework 3 to the Herring FMP established river herring and shad catch caps for midwater and bottom trawl gear in the herring fishery beginning in 2014. The amounts of the river herring and shad caps were based on the median of historical catch for the herring fishery specifically for midwater trawl gear in the Gulf of Maine (86 mt), midwater trawl gear in the Cape Cod area (13 mt), and bottom trawl gear (89 mt) and midwater trawl gear (124 mt) in Southern New England. River herring and shad caught on all trips that land 6,600 pounds or more of herring would count against the caps. If the directed herring fishery harvests the river herring and shad caps, NMFS would implement a 2,000-pound herring possession limit, effectively closing the directed herring fishery for that area and gear type.

Monitoring is critical to understanding the nature and extent of river herring and shad catch in the herring and mackerel fisheries. Because the seasonal and inter-annual distribution of river herring and shad are highly variable, the Councils believe that the most effective measures to address river herring and shad catch would be those that increase at-sea sampling, improve catch accounting, and promote cooperative efforts with the industry to minimize catch

Analysis of river herring and shad catch from 2010-2013 done as part of this amendment indicates that the fleets responsible for catching the majority of river herring and shad are the midwater trawl fleet (57%) followed by the small mesh bottom trawl fleet (33%). The analysis also indicated that the purse seine fleet is responsible for a negligible amount of river herring and shad catch (0.3%).

Overview of Herring Industry-Funded Monitoring Coverage Target Alternatives

The NEFMC recommended increased monitoring in the herring fishery to address the following goals: 1) Accurate estimates of catch (retained and discarded), 2) accurate catch estimates for incidental species for which catch caps apply, and 3) affordable monitoring for the herring fishery.

The industry-funded monitoring coverage target alternatives for the herring fishery provide a range of data collections and monitoring costs. This document evaluates how different coverage target alternatives meet specific monitoring goals identified by the NEFMC while comparing the costs of the monitoring programs, particularly costs that would be borne by the fishing industry. The herring coverage target action alternatives include Northeast Fisheries Observer Program-level (NEFOP-level) observer, at-sea monitoring (ASM) coverage, electronic monitoring (EM), and portside sampling coverage.

Under any of the herring coverage target action alternatives, existing industry reporting requirements and observer coverage to meet MSA, ESA, and MMPA requirements under the No Action alternative would continue. Any information collected under the herring coverage target action alternatives would be in addition to existing reporting and monitoring.

Table 22. Range of Industry-Funded Monitoring Herring Coverage Target Alternatives

Gear Type	Midwater Trawl	Purse Seine	Small Mesh Bottom Trawl
Herring Alternative 1: No Coverage Target for IFM Program (No Action)	SBRM		
Herring Alternative 2: Coverage Targets for IFM Program	Includes Sub-Options: 1) Wavier Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold		
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	100% NEFOP-Level Observer		
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	25%, 50%, 75% or 100% ASM		
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	50% or 100% EM/Portside	25%, 50%, 75% or 100% ASM	
Herring Alternative 2.4: EM and Portside Coverage on Midwater Trawl Fleet	50% or 100% EM/Portside	SBRM (No Action)	
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet in Groundfish Closed Areas*	100% NEFOP-Level Coverage	SBRM (No Action)	
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet in Groundfish Closed Areas	Coverage would match selected alternative 2.1-2.4	SBRM (No Action)	

Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	25%, 50%, 75% or 100% ASM or EM/Portside	25%, 50%, 75% or 100% ASM or EM/Portside	25%, 50%, 75% or 100% ASM or EM/Portside
* Sub-Options do not apply to Herring Alternative 2.5.			

2.2.1 Herring Alternative 1: No Coverage Target Specified for Industry-Funded Monitoring Program

Under Herring Alternative 1 (No Action), there would be no coverage target specified for an industry-funded monitoring program in the Herring FMP. Observer coverage for herring vessels would be allocated according to SBRM, and there would be no additional cost to the herring industry for monitoring coverage. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the herring fishery would be evaluated on a case-by-case basis.

Under SBRM, the Atlantic herring fishery receives NEFOP at-sea observer coverage under the following six fleets: New England and Mid-Atlantic small mesh otter trawl; New England and Mid-Atlantic purse seine; and New England and Mid-Atlantic paired and single midwater trawl. The table below describes the sea days proposed for April 2016 through March 2017. The sea days listed below for small mesh otter trawl cover all FMPs that use this gear type, so only a portion would cover trips targeting herring. The purse seine and midwater trawl fleets are largely comprised of vessels targeting herring, so a majority of the sea days in these categories will be used to observe trips targeting herring.

Table 23. Proposed and Observed Sea Days for Fleets that Target Herring

Fleet	Region	Proposed sea days for April 2016 to March 2017	Observed sea days, July 2014 to June 2015	VTR sea days, July 2014 to June 2015	Observed trips, July 2014 to June 2015	VTR trips, July 2014 to June 2015
Small Mesh Bottom Trawl	MA	1,171	997	6,761	360	3,088
Small Mesh Bottom Trawl	NE	798	933	8,847	319	3,381
Purse seine	MA	6	0	174	0	172
Purse seine	NE	19	29	661	13	315
Midwater Trawl (Pair and Single)	MA	30	8	134	1	26
Midwater Trawl (Pair and Single)	NE	440	160	1,189	43	363

Source: 2016 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States; Wigley et al., 2016 (included in Appendix 4).

Under SBRM, NEFOP observers collect the following information on declared herring trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Retained catch on unobserved hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Whole specimens, photos, and biological samples (i.e., scales, otoliths, and/or vertebrae from fish, invertebrates, and incidental takes);
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Currently, NEFOP observers are required to possess a High Volume Fisheries (HVF) certification in order to observe the herring fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in Herring Amendment 5.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

In order to qualify for HVF training, NEFOP observers need to be certified and in a positive data quality standing with all trip data. Prior data and data quality history are critically examined in order to determine if an observer would be a good candidate for certification.

Currently, the HVF training is conducted at the NEFOP training center in Falmouth, MA and is one to two days in duration. Training consists of species identification, sampling and subsampling methodologies, practice and documentation, gear identification and a review of the regulations. Regulations are discussed in order to educate observers in regard to Groundfish Closed Area coverage, haddock and river herring/shad catch accounting, slippage and operational discarding. Sampling and subsampling high volume catch is the main focus of training to ensure that observers understand the challenges that exist in trying to account for and accurately extrapolate catch on a haul-by-haul basis. Training on the use of a Marel scale is also conducted as most of the high volume vessels have volunteered to keep Marel scales onboard for the observers to utilize. An exam is administered at the end of training and if successfully completed, an observer is certified to observe the high volume fisheries.

Vessels with limited access herring permits (Categories A, B, and C) and midwater trawl vessels fishing in the Groundfish Closed Areas are required to bring catch aboard and make it available to the observer for sampling. If catch is discarded prior to making it available to the observer for sampling, discarded catch is considered "slippage." Vessels are prohibited from slipping catch unless it due to safety concerns, mechanical failure, or if excess catch of dogfish prevents catch from being pumped aboard the vessel. Vessels with limited access permits are required to report slippage on the daily herring VMS catch report and complete a released catch affidavit. Vessels that slip catch are subject to slippage consequence measures. Midwater trawl vessels fishing in the Groundfish Closed Areas are required to leave the Groundfish Closed Areas following a slippage event and remain out of the Groundfish Closed Areas for the duration of that fishing trip. Additionally, vessels with Category A and B permits are required to move 15 nautical miles following a slippage event due to safety, mechanical failure, or dogfish and terminate the fishing trip following slippage for any other reason.

2.2.2 Herring Alternative 2: Coverage Target Specified for Industry-Funded Monitoring Program

Under Herring Alternative 2, the NEFMC would specify the details of an industry-funded monitoring program for the Herring FMP. These details may include, but are not limited to:

(1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM and the specified coverage target.

Herring Alternative 2 would allow several sub-options to apply to the herring coverage target alternatives. Sup-options could apply to any of the alternatives except Herring Alternative 2.5.

- Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the NEFMC's intent for additional monitoring in the herring fishery, but would not prevent vessels from participating in the herring fishery if monitoring coverage was not available. Should the NEFMC not select Sub-Option 1, the fishing effort would be reduced to match the available level of monitoring (i.e., the fleet would not fish if NMFS does not have funding for the program). Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards.
- Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not pump or carry any fish onboard.
- Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation.
- Sub-Option 4 would require the NEFMC to examine the results of any increased coverage in the herring fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via a framework adjustment or an amendment to the Herring FMP, as appropriate.
- Sub-Option 5 would exempt trips that land less than 25 mt of herring from industry-funded monitoring requirements.

Omnibus Alternative 2 would include standard monitoring and service provider requirements for industry-funded monitoring, including NEFOP-level observers, at-sea monitors, electronic monitoring, and portside samplers. (See Appendix 2 – Monitoring and

Service Provider Requirements for the details of the standard requirements.) If Omnibus Alternative 2 is not selected by the Councils, service provider requirements for industry-funded monitoring programs would be developed and implemented in individual FMPs.

A monitoring and service provider provisions previously only considered under Herring Alternative 2 was recommend by the NEFMC in January 2016 to be included in the standard monitoring and service provider requirements in Omnibus Alternative 2. That provision would allow NEFOP-level observers and at-sea monitors to be deployed on the same vessel for more than two consecutive multi-day trips or more than twice in a given month.

In addition to the standard monitoring and service provider requirements specified in Omnibus Alternative 2, Herring Alternative 2 would specify that requirements for industry-funded observer and at-sea monitors include a HVF certification for the herring fishery. The existing NEFOP HVF certification training program would be available to industry-funded observers and NEFOP would develop a new HVF certification training program for industry-funded at-sea monitors.

Under Herring Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

2.2.2.1 Herring Alternative 2.1: 100% NEFOP-Level Observer Coverage on Category A and B Vessels

NEFMC would select 100% NEFOP-Level coverage for all Category A and B vessels regardless of gear type.

Herring Alternative 2.1 would require vessels with All Areas (Category A) and Areas 2/3 (Category B) Limited Access Herring Permits to carry a NEFOP-level observer on every declared herring trip.

NEFOP-level observers would be required to possess a NEFFOP certification, including a HVF certification, and they would collect comprehensive catch data consistent with NEFOP protocols for observer data collected under the SBRM.

Prior to any trip declared into the herring fishery, representatives for vessels with Category A and B herring permits would be required to provide notice to NMFS and request a NEFOP-level observer through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative that NEFOP-level observer coverage must be procured through an industry-funded monitoring service provider. The vessel representative would then be required to contact an industry-funded monitoring service provider to obtain and pay for a NEFOP-level observer to carry on its next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any herring without carrying a NEFOP-level observer on its next trip.

NEFOP-level observers would collect the following information on herring trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Retained catch on unobserved hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Whole specimens, photos, length information, and biological samples (i.e., scales, otoliths, and/or vertebrae from fish, invertebrates, and incidental takes);
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

The 100% NEFOP-level observer coverage target for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage to reach the 100% coverage target in a given year. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for vessels with Category A and B herring permits (e.g., 15%) combined with the industry-funded monitoring (e.g., 85%) to reach the 100% target coverage level. Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded observer on the same trip.

The realized observer coverage level for this alternative in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities. The realized observer coverage level would fall anywhere between SBRM coverage and 100% NEFOP-level coverage on vessels with Category A and B herring permits.

Herring Alternative 2.1 would require all vessels with Category A and B permits to carry a NEFOP-level observer on every declared herring trip. If a NEFOP-level observer was not available to cover a specific herring trip (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the herring fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels with Category A and B herring permits to participate in the herring fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Under Herring Alternative 2.1, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with Category A and B herring permits.

Rationale: Amendment 5 recommended 100% NEFOP-level observer coverage on vessels with Category A and B herring permits. The increased coverage recommended in Amendment 5 was intended to help determine the true nature and extent of catch and bycatch in the fishery and better address and manage bycatch issues in the future. The requirement for 100% NEFOP-level observer coverage was recommended to apply to the most active vessel in the herring fishery. Based on analyses in Amendment 5, vessels with Category A and B herring permits harvest greater than 98% of herring catch while vessels with Limited Access Herring Incidental Catch Permits (Category C) harvest only a small percentage of the overall herring catch (0.6%). Because of the costs associated with industry-funded monitoring, Herring Amendment 5 recommended limiting industry-funded observer coverage to vessels with Category A and B permits. The recommendation to increase coverage just on vessels with Category A and B permits was intended to improve catch monitoring in the herring fishery, while minimizing the negative economic impacts associated with industry-funded observer coverage on fishery-related businesses and communities.

Support for 100% NEFOP-level observer coverage on Category A and B herring vessels in Amendment 5 was driven by a majority of fishing industry stakeholders (e.g., groundfish fishing industry, recreational fishery participants, environmental advocates). Those stakeholders, as well as some members of the herring industry, believed that 100% NEFOP-level observer coverage on the most active vessels was important to either confirm or disprove the claims that have been made by many regarding bycatch in the herring fishery.

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Combining SBRM coverage with industry-funded monitoring coverage to achieve the coverage target (100%) is intended to reduce the costs associated with industry-funded monitoring coverage.

2.2.2.2 Herring Alternative 2.2: At-Sea Monitor Coverage on Category A and B Vessels

NEFMC would select one ASM coverage target (25%, 50%, 75%, or 100%) for all Category A and B vessels regardless of gear type.

Herring Alternative 2.2 would require vessels with Category A and B herring permits to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) specified in this action.

Prior to any trip declared into the herring fishery, representatives for vessels with Category A and B herring permits would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that at-sea monitoring coverage is necessary, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on its next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any herring without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not necessary on its next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

At-sea monitors would collect the following information on herring trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Length data on retained and discarded catch;
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Additionally, the NEFMC may recommend that at-sea monitors collect additional biological information upon request. Revising the duties for an at-sea monitor, such that additional biological information would be collected, could be done in a future framework action. The NEFMC may also recommend that at-sea monitors collect additional biological information by considering the issue at a public meeting, where public comment is taken, and asking NMFS to publish a notice or rulemaking modifying the duties for at-sea monitors.

Initially, the NEFMC recommended that at-sea monitors only collect data from discarded and not retained catch. The NEFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the herring fishery. However, the herring fishery only discards a small percentage of it catch, so there was only a minimal gain in information when at-sea monitors only collected data on discarded catch. In April 2016, to increase the data utility of information collected by at-sea monitors, the NEFMC recommended that at-sea monitors collect information on both retained and discarded catch.

The ASM coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for vessels with Category A and B herring permits (e.g., 15%) combined with industry-funded monitoring (e.g., 10%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded at-sea monitor on the same trip.

The realized observer coverage level for this alternative in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities.

The realized observer coverage level would fall anywhere between SBRM coverage and the specified at-sea monitoring coverage level on vessels with Category A and B herring permits.

Herring Alternative 2.2 would require all vessels with Category A and B permits to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. If an at-sea monitor was not available to cover a specific herring trip (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the herring fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels with Category A and B herring permits to participate in the herring fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Under Herring Alternative 2.2, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with Category A and B herring permits.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would not collect whole specimens, photos, or biological samples (other than length data) from catch or sighting data on protected species. The NEFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the herring fishery. (*See Appendix 5 – Analysis of ASM Costs for additional details*.)

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Combining SBRM coverage with industry-funded monitoring coverage to achieve the coverage target (25%, 50%, 75%, or 100%) is intended to reduce the costs associated with industry-funded monitoring coverage.

2.2.2.3 Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet

Category A and B Vessels

NEFMC would select one at-sea monitoring coverage target (25%, 50%, 75%, or 100%) for all Category A and B vessels using either purse seine or bottom trawl gear.

Herring Alternative 2.3 would require vessels with Category A and B herring permits using purse seine and small mesh bottom trawl gear to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) specified in this action.

Prior to any trip declared into the herring fishery, representatives for vessels with Category A or B permits using purse seine or small mesh bottom trawl gear would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs vessel representative that they needed at-sea monitoring coverage, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on its next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any herring without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not needed on its next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

At-sea monitors would collect the following information on herring trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Length data on retained and discarded catch;
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Additionally, the NEFMC may recommend that at-sea monitors collect additional biological information upon request. Revising the duties for an at-sea monitor, such that additional biological information would be collected, could be done in a future framework action. The NEFMC may also recommend that at-sea monitors collect additional biological information by considering the issue at a public meeting, where public comment is taken, and asking NMFS to publish a notice or rulemaking modifying the duties for at-sea monitors.

The ASM coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for vessels with Category A and B herring permits (e.g., 15%) combined with industry-funded monitoring (e.g., 10%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded at-sea monitor on the same trip.

Herring Alternative 2.3 would require all vessels with Category A and B permits using purse seine or small mesh bottom trawl gear to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. If an at-sea monitor was not available to cover a specific herring trip (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the herring fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels to participate in the herring fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Under Herring Alternative 2.3, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with Category A and B herring permits.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would not collect whole specimens, photos, or biological samples (other than length data) from catch or sighting data on protected species. The NEFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the herring fishery. (*See Appendix 5 – Analysis of ASM Costs for additional details.)*

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Combining SBRM coverage with industry-funded monitoring coverage to achieve the coverage target (25%, 50%, 75%, or 100%) is intended to reduce the costs associated with industry-funded monitoring coverage.

Midwater Trawl Fleet

NEFMC would select one electronic monitoring (EM)/portside sampling coverage target (50% or 100%) for all vessels using midwater trawl gear.

Herring Alternative 2.3 would also require midwater trawl vessels to carry an operating EM system on every trip declared into the herring fishery and portside sampling of catch on declared herring trips selected for coverage by NMFS. The intention of the NEFMC would be that all declared herring trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%). However, factors such as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting.

Prior to any trip declared into the herring fishery, representatives for vessels using midwater trawl gear would be required to have an operational EM system installed aboard their vessel and provide notice to NMFS and request a portside sampler through the pre-trip notification system.

NMFS would notify the vessel representative whether or not portside sampling coverage must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that they needed portside sampling coverage, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for a portside sampler for its next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any herring without portside sampling of its offload on its next trip. If NMFS informs the vessel representative that portside sampling coverage is not needed on its next trip, NMFS would issue the vessel a portside sampling coverage waiver.

The EM footage and portside sampling coverage target (50% or 100%) for this alternative would be calculated independent of and in addition to SBRM coverage. To reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Because the coverage target is calculated independent of and in addition to SBRM coverage, a vessel may carry an SBRM observer on the same trip that would be sampled portside.

Electronic Monitoring

Under Herring Alternative 2.3, owners or operators of vessels issued a herring permit and using midwater trawl gear would be required to install EM equipment and maintain the equipment on board for the duration of the fishing year. Though the system would have to be installed for the duration of the fishing year, it would only need to be turned on and recording video footage during declared herring trips using midwater trawl gear.

Video footage would be used to confirm retention of catch on midwater trawl trips to ensure that all catch is available to be sampled portside for a given trip. Video footage would be recorded either throughout the duration of the trip or just around haulback. For analysis purposes, haulback would be defined as the time gear sensors document the start of gear retrieval to some set amount of time after the time gear sensors sense the end of gear retrieval, in order to ensure that all catch has been transferred into the hold or discarded. In addition, one wide angle camera may remain on for the duration of the trip to monitor for discard compliance.

While video footage was intended to only initially be used to verify retention of catch for portside sampling, the NEFMC also recommended that EM would be used to verify compliance with slippage restrictions, reporting requirements, and consequence measures. Footage would not initially be used to identify species, nor estimate the amount of catch released if a haul were slipped. The NEFMC may expand the uses of video footage to include species identification or quantification of released catch in the future, if footage proves useful for these purposes. Such an expansion would be done via a framework adjustment or amendment, as appropriate.

In 2016 and 2017, GARFO and NEFSC, in cooperation with Saltwater Inc., are evaluating the utility of EM aboard midwater trawl vessel participating in the herring and mackerel fisheries. The purpose of the program is to:

- Analyze the utility of EM in monitoring fisheries as a means of informing future EM programs.
- Deploy and test an EM program in an operational setting, allowing analysis and adjustment of EM program requirements.
- Evaluate the range of information that can be gathered with EM systems, such as: Verify slippage events; categorize the types of slippage events; verify other discard

sources; and determine if EM can help estimate the amount of catch retained (if not all catch is retained).
- Refine EM cost estimates for NMFS and the fishing industry.

Equipment

The EM system, installed by a NMFS-approved contractor, would be comprised of video camera(s), recording equipment, and other related equipment with the following components and capabilities:
- Video cameras. Video cameras would need to be mounted so to provide clear, unobstructed, and well illuminated views of the area(s) where the midwater trawl gear is retrieved prior to being placed in the hold. There would need to be a sufficient number of cameras with sufficient resolution for NMFS, the US Coast Guard, and other authorized officers/designees to determine that all catch was brought aboard the vessel during haulback. The EM system must be capable of initiating video recording at the time gear retrieval starts, and record all periods of time when the gear is being retrieved and until catch is placed in the hold or discarded.
- Global Positioning System (GPS) receiver. A GPS receiver would be required to document coordinates, velocity, and heading data.
- Hydraulic and drum rotation sensors. Hydraulic sensors would be required to continuously monitor the hydraulic pressure. Drum rotation sensor would be required to continuously monitor drum rotations.
- EM control box. The system would need to include a control box that receives and stores the raw data provided by the sensors and cameras. The control box would need to contain removable hard drives and sufficient storage system capability to record data for the full duration of a trip (i.e., the longest expected trip length for the vessel).
- EM systems monitor. A wheelhouse monitor would be necessary to provide a graphical user interface for the vessel operator to monitor: 1) The state and performance of the control box, 2) information on the current date and time synchronized via GPS, 3) GPS coordinates, 4) current hydraulic pressure reading, 5) presence of a data disk, 6) percentage used of the data disk, 7) and video recording status.

NMFS would announce specifics about this equipment list, as well as any additional design requirements for the EM system, during the rulemaking and implementation process. Industry will be responsible for contracting with a NMFS-approved provider for technical and maintenance services.

Data Transfer

After completing a fishing trip, a vessel representative would be required to mail or transmit the removable EM system hard drive(s) containing all data to NMFS or a NMFS-approved contractor, according to instructions provided by NMFS. The method of transfer that would be allowed under the EM program will be developed during implementation and included in individual vessel monitoring plans, as described below. Prior to departing on a subsequent trip, a vessel representative would be required to install a replacement EM system hard drive(s) to enable data collection and video recording. A vessel representative would be responsible for contacting NMFS or a NMFS-approved contractor if they have requested but not received a replacement hard drive(s) and for informing NMFS or NMFS-approved contractor of any lapse in the hard drive management procedures described in the vessel monitoring plan.

Retention Requirements

Initially, Herring Alternative 2.3 would maintain the existing retention requirements for the midwater trawl fleet. Vessels would continue to operate under the regulations and possession limits for any fisheries for which they possess permits. There are also some statutory measures under the ESA and MMPA that may dictate retention of protected species.

Under Herring Alternative 2.3, all slippage restrictions and reporting requirements would apply to all midwater trawl vessels with limited access herring permits and slippage consequences would apply to all midwater trawl vessels with Category A and B herring permits.

Review of EM Video Footage

Video footage would be sampled at a predetermined percent of review (50% or 100%) and then compared to released catch affidavits, VMS reports describing discard events, and/or observer data on slippage. The sampling of video footage would evaluate whether or not catch was discarded. To use the optimum and most cost-effective rate to achieve the goal for this action, the rate of review may be adjusted by the NEFMC via a future framework action, or specification action if appropriate.

Compliance Measures

The NEFMC may consider modifications to the rates of video footage recording and/or sampling rates to ensure compliance with slippage measures. For example, if a vessel is found to have undocumented discarding events on more than a specified number of trips during a fishing year, then the NEFMC may adjust the rates of video footage recording and/or sampling.

Vessel Monitoring Plans

Individual Vessel Monitoring Plans (VMPs) would serve as a comprehensive plan for discard documentation, installation and maintenance, protocols for data storage and transfer, and other important information regarding a vessel's specific EM system. Each vessel operator or owner would be responsible for working with NMFS or a NMFS-approved contractor to develop a VMP, and would be required to keep the VMP aboard the vessel at all times. NMFS would specify VMP requirements in the regulations. VMPs may include, but are not limited to, information on the locations of EM system components, contact information for technical support, instructions on how to conduct a pre-trip system test, instructions on how to verify proper system functions, location(s) on deck where fish retrieval should occur to remain in view of the cameras, procedures for how to manage EM system hard drives, catch handling procedures, periodic checks of the monitor during the retrieval of gear to verify proper functioning, and reporting procedures. The VMP should minimize, as much as possible, any impact on the current operating procedures of the vessel, and should help ensure the safety of the crew. NMFS or a NMFS-approved contractor would review VMPs biennially prior to the start of the upcoming fishing year.

Portside Sampling

Under Herring Alternative 2.3, vessels with herring permits using midwater trawl gear would be subject to portside sampling requirements for declared herring trips selected for coverage by NMFS. Portside sampling would be used to verify the amount and species composition of catch in the herring fishery and help track catch against catch caps for haddock and river herring and shad. Portside samplers would also collect age and length data.

Sampling Design

The sampling design for portside sampling alternatives would be based on existing portside sampling programs for the herring fishery, administered by the Massachusetts Division on Marine Fisheries and Maine Department of Marine Resources, and consistent with NEFOP sampling methodology. Midwater trawl vessels returning from a declared herring trip would be sampled portside during the offload. Initially, the level of sampling for midwater trawl trips would be approximately 50% or 100%. However, the sampling rate may be adjusted by the NEFMC to use the optimum and most cost effective rate to achieve management goals. Such factors as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting.

Basket samples would be collected from the vessel's dewatering box at specified intervals throughout the duration of the offload. Basket samples would be sorted and weighed by species and extrapolated based on vessel hail weight to represent the total trip. Actual weights could be verified against the vessel trip report and/or dealer data. Age and length data would be collected consistent with NEFOP sampling methodology.

Landing Ports

Midwater trawl vessels returning from declared herring trips would be required to land catch in specific ports. In past years, the midwater trawl fleet has landed catch in Maine

(Portland, Rockland, Vinalhaven, Prospect Harbor, Jonesport), New Hampshire (Newington), Massachusetts (Boston, Gloucester, New Bedford), Rhode Island (Point Judith, North Kingston), and New Jersey (Cape May).

Approximately 95% of midwater trawl landings are made in ports currently sampled by the state programs. However, if certain ports are not suitable for portside sampling, then vessels may not be able to land in those ports on trips that are selected for portside sampling. Some vessels only land in a single port and that port is not currently sampled. Some vessels land in both sampled and unsampled ports, but changing past practices to land only in sampled ports may not be easy. Without a predictive model, the analysis of requiring vessels to land in specified ports will be qualitative. Additionally, data confidentiality will limit a quantitative analysis. If portside sampling is selected as a preferred alternative for the herring fishery then NMFS would further evaluate how to enable portside sampling in midwater trawl landing ports during implementation of this amendment.

Vessel Responsibilities

Midwater trawl vessels would be responsible for offloading catch consistent with offloading requirements and contracting a service provider to arrange a portside sampler to sample catch from declared herring trips.

Herring Alternative 2.3 would require midwater trawl vessels to carry an operating EM system on every trip declared into the herring fishery and portside sampling of catch on every declared herring trip selected for coverage by NMFS. If an operating EM system or portside sampler was not available to cover a specific herring trip (either due to logistics or lack of funding), that vessel would be prohibited from participating in the herring fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels to participate in the herring fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

As recommended by the NEFMC, Herring Alternative 2.3 would have a pre-implementation plan to help the industry understand any new EM and portside monitoring requirements and become compliant with sampling equipment, notification, sampling, and reporting requirements.

Rationale: Because midwater trawl fleet discards only a small percentage of its catch at sea, EM and portside sampling have the potential to be a cost effective way to address monitoring goals for the midwater trawl fleet harvesting herring. EM would be used to verify retention of catch on the midwater trawl fleet and portside sampling would be used to verify amount and species composition of landed catch.

The implementation of EM in the herring fishery would be informed by NMFS's evaluation of EM aboard midwater trawl vessels participating in the herring and mackerel fisheries as well as the exempted fishing permit program for the West Coast whiting fishery that is expected to be transitioned into regulation by 2017. The implementation of portside sampling in the herring fishery would be informed by the existing portside sampling programs operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because there is value in comparing information on discarding and catch composition collected by an SBRM observer with data collected by EM and portside sampling, the coverage target for EM and portside sampling is calculated independent of and in addition to SBRM coverage.

2.2.2.4 Herring Alternative 2.4: Electronic Monitoring and Portside Sampling on the Midwater Trawl Fleet

NEFMC would select one EM/Portside sampling coverage target (50% or 100%) for all vessels using midwater trawl gear.

Herring Alternative 2.4 would require midwater trawl vessels to carry an operating EM system on every trip declared into the herring fishery and portside sampling of their catch on declared herring trip selected for coverage by NMFS. The intention of the NEFMC would be that all declared herring trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%). However, factors such as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting. For complete details of EM and portside sampling, see the description of Herring Alternative 2.3

Herring Alternative 2.4, similar to Herring Alternative 2.3, would require midwater trawl vessels to carry an operating EM system on every trip declared into the herring fishery and portside sampling of their catch on every declared herring trip selected for coverage by NMFS. If an operative EM system or portside sampler was not available to cover a specific herring trip (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the herring fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of the vessel to participate in the herring fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Both the EM footage and portside sampling coverage targets (50% or 100%) for this alternative would be calculated independent of and in addition to SBRM coverage. To reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Because the coverage target is calculated independent of and in addition to SBRM coverage, a vessel may carry on SBRM observer on that same trip that would be sampled portside.

As recommended by the NEFMC, Herring Alternative 2.4 would have a pre-implementation plan to help the industry understand any new EM and portside monitoring requirements and become compliant with sampling equipment, notification, sampling, and reporting requirements.

Under Herring Alternative 2.4, slippage restrictions and reporting requirements would apply to all midwater trawl vessels with limited access herring permits and slippage consequences would apply to all midwater trawl vessels with Category A and B herring permits.

Rationale: Because the midwater trawl fleet discards only a small percentage of its catch at sea, EM and portside sampling have the potential to be a cost effective way to address monitoring goals for the midwater trawl fleet harvesting herring. EM would be used to verify retention of catch on the midwater trawl fleet and portside sampling would be used to verify amount and species composition of landed catch.

The implementation of EM in the herring fishery would be informed by NMFS's evaluation of EM aboard midwater trawl vessels participating in the herring and mackerel fisheries as well as the exempted fishing permit program for the West Coast whiting fishery that is expected to be transitioned into regulation by 2017. The implementation of portside sampling in the herring fishery would be informed by the existing portside sampling programs operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because there is value in comparing information on discarding and catch composition collected by an SBRM observer with data collected by EM and portside sampling, the coverage target for EM and portside sampling is calculated independent of and in addition to SBRM coverage.

2.2.2.5 Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas

NEFMC would select 100% NEFOP-Level coverage for all vessels using midwater trawl gear and fishing in Groundfish Closed Areas.

Herring Alternative 2.5 would require vessels fishing with midwater trawl gear in the Groundfish Closed Areas to carry a NEFOP-level observer. The sub-options (i.e., waiver allowed, wing vessel exemption, 2 year sunset, 2 year evaluation, and 25 mt threshold) described under Herring Alternative 2 would not apply to Herring Alternative 2.5.

The Groundfish Closed Areas include: Closed Area I, Closed Area II, Nantucket Lightship Closed Area, Cashes Ledge Closure Area, and Western Gulf of Maine Closure Area

Prior to any Groundfish Closed Area trip declared into the herring fishery, representatives for vessels with midwater trawl gear would be required to provide notice to NMFS and request a NEFOP-level observer through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative that NEFOP-level observer coverage must be procured through an industry-funded at-sea monitoring service provider. The vessel representative would then be required to contact an industry-funded monitoring service provider to obtain and pay for a NEFOP-level observer to carry on its next fishing trip within a Groundfish Closed Area. The vessel would be prohibited from fishing for, taking, possessing, or landing any herring on any trip within a Groundfish Closed Area without carrying a NEFOP-level observer for that trip.

NEFOP-level observers would collect the following information on herring trips in Groundfish Closed Areas:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Retained catch on unobserved hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Whole specimens, photos, length information, and biological samples (i.e., scales, otoliths, and/or vertebrae from fish, invertebrates, and incidental takes);
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

The 100% NEFOP-level observer coverage target for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for midwater trawl vessels (e.g., 5%) combined with industry-funded monitoring (e.g., 95%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded observer on the same trip.

Herring Alternative 2.5 would require vessels fishing with midwater trawl gear in the Groundfish Closed Areas to carry a NEFOP-level observer. If a NEFOP-level observer was not available to cover a specific herring trip inside a Groundfish Closed Area (either due to logistics or a lack of funding), that vessel would be prohibited from fishing inside a Groundfish Closed Area on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of the midwater trawl fleet to participate in the herring fishery inside the Groundfish Closed Areas.

Under Herring Alternative 2.5, slippage restrictions and reporting requirements would apply to all midwater trawl vessels with limited access herring permits fishing in Groundfish Closed Areas and slippage consequences would apply to all midwater trawl vessels with Category A and B herring permits fishing in Groundfish Closed Areas.

Rationale: The requirement that midwater trawl vessels fishing in the Groundfish Closed Areas carry a NEFOP-level observer was established in Herring Amendment 5. Analyses in Amendment 5 suggest that midwater trawl vessels are not catching significant amounts of groundfish either inside or outside the Groundfish Closed Areas. Additionally, the majority of groundfish catch by midwater trawl vessels is haddock, and the catch of haddock by midwater trawl vessels is already managed through a haddock catch cap for the herring fishery. However, the rationale in Amendment 5 described the importance of determining the extent and nature of catch and bycatch in the herring fishery. This alternative would still allow the herring midwater trawl fishery to operate in the Groundfish Closed Areas, but it would ensure that opportunities for sampling are maximized.

Revisions to the SBRM in April 2015 affected how funding is used to allocate observer coverage, such that SBRM funding must first be used to provide SBRM coverage. SBRM coverage is used to estimate amount of fish discarded at sea. Since midwater trawl vessels generally discard only a small percentage of catch at sea, SBRM coverage allocated to midwater trawl vessels is relative low compared to coverage allocated to other gear types that have higher discard rates. Thus, the realized coverage level of midwater trawl vessels fishing in Groundfish Closed Areas will only be equivalent to SBRM coverage aboard midwater trawl vessels, likely less than 100% observer coverage. This alternative was added to this amendment to increase observer coverage on midwater trawl vessels and allow those vessels access to the Groundfish Closed Areas with industry-funded monitoring.

2.2.2.6 Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas

If the NEFMC selected Herring Alternative 2.2, 2.3, 2.4, or 2.7 as the preferred alternative, then the monitoring type and coverage target associated with that alternative would apply to vessels using midwater trawl gear and fishing in Groundfish Closed Areas.

Herring Alternative 2.6 would require vessels fishing with midwater trawl gear in the Groundfish Closed Areas to comply with any ASM or EM and portside monitoring requirements specified for the herring fishery in this amendment.

Prior to any Groundfish Closed Area trip declared into the herring fishery, representatives for vessels with midwater trawl gear would be required to provide notice to NMFS and request the appropriate type of industry-funded monitoring coverage through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative that industry-funded monitoring coverage must be procured through an industry-funded at-sea monitoring service provider. The vessel representative would then be required to contact an industry-funded monitoring service provider to obtain and pay the appropriate type of industry-funded monitoring coverage to carry on its next fishing trip within a Groundfish Closed Area. The vessel would be prohibited from fishing for, taking, possessing, or landing any herring on any trip within a Groundfish Closed Area without the appropriate type of monitoring coverage for that trip.

If ASM is selected for the herring fishery, the coverage target under this alternative would be calculated by combining SBRM and industry-funded monitoring coverage. If EM and portside sampling are selected for the herring fishery, the coverage target under this alternative would be calculated independent of and in addition to SBRM coverage.

Herring Alternative 2.6 would require vessels fishing with midwater trawl gear in the Groundfish Closed Areas to comply with any ASM or EM and portside monitoring requirements specified for the herring fishery in this amendment. If the appropriate type of monitoring coverage was not available to cover a specific herring trip inside a Groundfish Closed Area (either due to logistics or a lack of funding), that vessel would be prohibited from fishing inside a Groundfish Closed Area on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of the midwater trawl fleet to participate in the herring fishery inside the Groundfish Closed Areas, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Under Herring Alternative 2.6, slippage restrictions and reporting requirements would apply to midwater trawl vessels with limited access herring permits fishing in Groundfish Closed Areas and slippage consequences would apply to midwater trawl vessels with Category A and B herring permits fishing in Groundfish Closed Areas.

Rationale: This alternative was recommended by the NEFMC to balance stakeholder interest in additional catch monitoring on midwater trawl vessels with the ability of the herring fishery to operate within the Groundfish Closed Areas and the economic impacts of paying for monitoring on trips within the Groundfish Closed Areas.

Revisions to the SBRM in April 2015 affected how funding is used to allocate observer coverage, such that SBRM funding must first be used to provide SBRM coverage. SBRM coverage is used to estimate amount of fish discarded at sea. Since midwater trawl vessels generally discard only a small percentage of catch at sea, SBRM coverage allocated to midwater trawl vessels is relative low compared to coverage allocated to other gear types that have higher discard rates. Thus, SBRM coverage allocated to midwater trawl vessels would likely be less than 100% observer coverage.

This alternative was added to this amendment to increase monitoring on midwater trawl vessels and allow those vessels access to the Groundfish Closed Areas with industry-funded monitoring.

2.2.2.7 Herring Alternative 2.7: At-Sea Monitoring Coverage on Category A and B Vessels, Then Vessels May Choose Either At-Sea Monitoring Coverage or Electronic Monitoring and Portside Sampling Coverage

NEFMC would select ASM coverage targets (25%, 50%, 75%, or 100%) and EM/Portside sampling coverages for all Category A and B vessels. A different coverage target (25%, 50%, 75%, or 100%) may be selected for each monitoring type (ASM or EM/Portside sampling) and each gear type (midwater trawl, purse seine, bottom trawl).

Initially, Herring Alternative 2.7 would require vessels with Category A and B herring permits to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the ASM coverage target (25%, 50%, 75%, or 100%) specified in this action.

Prior to any trip declared into the herring fishery, representatives for vessels with Category A and B herring permits would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that at-sea monitoring coverage is necessary, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on its next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any herring without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not necessary on its next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

At-sea monitors would collect the following information on herring trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Length data on retained and discarded catch;
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Additionally, the NEFMC may recommend that at-sea monitors collect additional biological information upon request. Revising the duties for an at-sea monitor, such that additional biological information would be collected, could be done in a future framework action. The NEFMC may also recommend that at-sea monitors collect additional biological information by considering the issue at a public meeting, where public comment is taken, and asking NMFS to publish a notice or rulemaking modifying the duties for at-sea monitors.

The ASM coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for vessels with Category A and B herring permits (e.g., 15%) combined with industry-funded monitoring (e.g., 10%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded at-sea monitor on the same trip.

Initially, Herring Alternative 2.7 would require all vessels with Category A and B permits to carry an at-sea monitor on every declared herring trip selected for coverage by NMFS. If an at-sea monitor was not available to cover a specific herring trip (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the herring fishery on that trip.

If the NEFMC determines that EM/Portside sampling is an adequate substitute for ASM coverage aboard midwater trawl vessels, then Category A and B vessels using midwater trawl gear would be able to choose whether to use ASM or EM/Portside sampling coverage. The coverage targets (25%, 50%, 75%, or 100%) for each monitoring type (ASM and EM/Portside) and each gear type (midwater trawl, purse seine, bottom trawl) would be selected by the NEFMC.

If in the future, the NEFMC may determine that EM/Portside sampling is an adequate substitute for ASM coverage aboard purse seine or bottom trawl vessels. If so, then the ability of Category A and B vessels using purse seine or bottom trawl gear to choose whether to use ASM or EM/Portside sampling coverage would be considered in a future action, consistent with the NEFMC's process to approve a new gear type.

Once Category A and B vessel using midwater trawl gear are able to choose between ASM and EM/Portside sampling, midwater trawl vessels would be required to: 1) Choose one monitoring type per fishing year and 2) declare their preferred monitoring type six months in advance of the fishing year. After consulting with NMFS, the Councils will establish a minimum participation threshold for each monitoring type for a fishing year. If the minimum participation level for a monitoring type was not achieved for a given year, then midwater trawl vessels would not be able to use that monitoring type during that given year.

If a Category A or B vessel using midwater trawl gear chose EM/Portside monitoring coverage for a given year, that vessel would be required to carry an operating EM system on every trip declared into the herring fishery and allow portside sampling of their catch on declared herring trip selected for coverage by NMFS. The intention of the NEFMC would be that all declared herring trips by midwater trawl vessels would have some percentage of EM footage sampled (25%, 50%, 75%, or 100%) and that same percentage of trips sampled portside (25%, 50%, 75%, or 100%). However, factors such as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting. For complete details of EM and portside sampling, see the description of Herring Alternative 2.3

If an operative EM system or portside sampler was not available to cover a specific herring trip (either due to logistics or a lack of funding), that midwater vessel would be prohibited from participating in the herring fishery on that trip.

The EM footage and portside sampling coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated independent of and in addition to SBRM coverage. To reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Because the coverage target is calculated independent of and in addition to SBRM coverage, a vessel may carry an SBRM observer on that same trip that would be sampled portside.

As recommended by the NEFMC, Herring Alternative 2.7 would have a pre-implementation plan to help the industry understand any new EM and portside monitoring requirements and become compliant with sampling equipment, notification, sampling, and reporting requirements.

Under Herring Alternative 2.7, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with Category A and B herring permits.

The realized observer coverage level for this alternative in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities. The realized observer coverage level would fall anywhere between SBRM coverage and the specified at-sea monitoring coverage level on vessels with Category A and B herring permits. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels with Category A and B herring permits using midwater trawl gear to participate in the herring fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would not collect whole specimens, photos, or biological samples (other than length data) from catch or data on sightings of protected species. The NEFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the herring fishery. (*See Appendix 5 – Analysis of ASM Costs for additional details*.)

Because the midwater trawl fleet discards only a small percentage of its catch at sea, EM and portside sampling have the potential to be a cost effective way to address monitoring goals for the midwater trawl fleet harvesting herring. EM would be used to verify retention of catch on the midwater trawl fleet and portside sampling would be used to verify amount and species composition of landed catch.

The implementation of EM in the herring fishery would be informed by NMFS's evaluation of EM aboard midwater trawl vessels participating in the herring and mackerel fisheries as well as the exempted fishing permit program for the West Coast whiting fishery that is expected to be transitioned into regulation by 2017. The implementation of portside sampling in the herring fishery would be informed by the existing portside sampling programs operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

To ensure an equitable monitoring burden across Category A and B vessels, the NEFMC recommended Category A and B vessels be able to choose between ASM and EM/Portside monitoring coverage for a given fishing year.

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling.

Combining SBRM coverage with industry-funded monitoring coverage to achieve the ASM coverage target (25%, 50%, 75%, or 100%) is intended to reduce the costs associated with industry-funded monitoring coverage. Because there is value in comparing information on discarding and catch composition collected by an SBRM observer with data collected by EM and portside sampling, the coverage target for EM and portside sampling is calculated independent of and in addition to SBRM coverage.

2.2.3 Considered But Rejected Herring Alternatives

The alternative specifying NEFOP-level observer coverage on the midwater trawl fleet to obtain a 30% CV on river herring and shad catch was considered but rejected by the NEFMC.

The monitoring of the river herring and shad catch in the herring fishery was identified as a Herring FMP need in Amendment 5. This alternative was developed from an analysis that evaluated catch of river herring and shad in the herring and mackerel fisheries and was designed to complement SBRM coverage.

This alternative would have focused observer coverage on the midwater trawl fleet because that fleet had caught the majority of river herring and shad (57%) during 2010 to 2013. Additionally, consistent with the need identified in Amendment 5 to monitor all catch in the herring fishery, this alternative would have focused coverage on the fleet that catches the majority of the herring harvest (73%) and on the vessels with Category A and B permits that harvest the majority of the herring harvest (83%) based on analyses in Amendment 5. Based on 2013 data, the percent coverage to achieve a 30% CV on river herring and shad catch by the midwater trawl fleet would have been up to 61%.

The NEFMC recommended this alternative be considered but rejected because it was not considered consistent with the goals of Herring Amendment 5 and it could not be revised to apply only to vessels with Category A and B herring permits.

2.3 ATLANTIC MACKEREL MONITORING ALTERNATIVES

As described in the Introduction, the MAFMC is interested in increasing catch monitoring in the Atlantic mackerel fishery. This increased monitoring would be above coverage required through the SBRM, the ESA, or MMPA. Limited Federal funding and legal constraints on the sharing of costs between NMFS and the fishing industry have recently prevented NMFS from approving new industry-funded monitoring programs. Examples of new industry-funded monitoring programs that were not approved include Amendment 14 to the Atlantic Mackerel, Squid, and Butterfish (MSB) FMP, Amendment 5 to the Atlantic Herring FMP, and Framework Adjustment 48 to the Northeast Multispecies FMP. This amendment is intended to remedy the industry-funded monitoring program disapproval in MSB Amendment 14 by establishing (1) a process by which available Federal funding could be allocated to the MSB FMP to support industry-funded monitoring and (2) an industry-funded monitoring coverage target to meet MSB FMP objectives.

Establishing monitoring coverage targets would allow NMFS to approve and implement new industry-funded monitoring programs, without committing to support industry-funded monitoring coverage targets above appropriated funding or before funding is determined to be available.

Although this action may select desired coverage targets beyond SBRM requirements, the availability of Federal funds to support industry-funded monitoring may impact the realized coverage level in any given year. The realized coverage level for the mackerel fishery in a given year may be constrained if available Federal funding falls short of NMFS cost responsibilities for administering new industry-funded monitoring programs. During years when there is no additional funding to cover NMFS cost responsibilities above SBRM requirements, there would be no additional monitoring coverage in the mackerel fishery, even if industry is able to fully fund their cost responsibilities. However, if Federal funding is available to allow NMFS to meet its administrative responsibilities for new industry-funded monitoring programs, the specified coverage target levels would likely be met. Therefore, over time, the realized coverage level for the mackerel fishery would fall between SBRM requirements and the industry-funded monitoring coverage target.

Amendment 14 to the Atlantic Mackerel, Squid, and Butterfish FMP

In Amendment 14 to the MSB FMP, the MAFMC recommended 100% observer coverage on all limited access mackerel trips using midwater trawl, 100% coverage on Tier 1 mackerel vessels using small mesh bottom trawl, 50% coverage on Tier 2 vessels using small mesh bottom trawl, and 25% coverage on Tier 3 vessels using small mesh bottom trawl. The MAFMC believed that the provisions for observer coverage recommended in Amendment

14 could enhance estimates of river herring and shad catch in the mackerel fishery. Support for high levels of observer coverage on limited access mackerel vessels, especially vessels using midwater trawls, was driven by a majority of stakeholders. Those stakeholders, as well as some members of the mackerel industry, believed that 100% observer coverage was necessary for the most active vessels to either confirm or disprove the claims that have been made regarding incidental river herring and shad catch in the mackerel fishery.

The MAFMC agreed with the need to increase observer coverage in the mackerel fishery to improve the precision of estimates of river herring and shad incidental catch, with the goal of using this information to improve management measures to reduce river herring and shad incidental catch in the mackerel fishery in the future. Recognizing that NMFS would not have sufficient funding to cover the costs of additional observer coverage, the MAFMC recommended that industry contribute $325 per sea day to offset costs of expanding this monitoring program. The MAFMC also recommended lower levels of coverage for Tier 2 and 3 vessels using small mesh bottom trawl to limit the economic impacts of this contribution to the smaller participants in the fleet. The recommendations for increased observer coverage in Amendment 14 were ultimately disapproved. The rationale for the disapproval is included in the Appendix.

Monitoring Interests in the Mackerel Fishery

In Amendment 14 to the MSB FMP, the MAFMC recommended measures to improve the monitoring of river herring and shad catch (RH/S) in the mackerel fishery, and to reduce mackerel fishery interactions with river herring and shad to the extent practicable. These measures included: (1) Establishing river herring and shad catch caps on the mackerel fishery, (2) supporting and evaluation an ongoing river herring avoidance program, and (3) prohibiting slipping on limited access mackerel and longfin squid trips.

Once abundant along the East Coast, populations of river herring (alewife and blueback herring) and shad (American and hickory) have declined compared to historical levels due to various factors. Governmental agencies, non-profit organizations, tribal groups, academia, industry, and others are currently engaged in numerous efforts to further river herring and shad conservation.

Vessels fishing for herring and mackerel herring can encounter river herring and shad. Both the NEFMC and MAFMC recommended river herring and shad caps for the herring and mackerel fisheries beginning in 2014. Managers don't currently have enough data to determine biologically based river herring and shad catch caps or to assess the potential effects of such catch caps on river herring and shad populations coastwide. However, the Councils believe river herring and shad catch caps provide a strong incentive for the herring and mackerel fleets to continue avoiding river herring and shad. These catch caps are intended to allow for the full harvest of the mackerel and herring annual catch limits while reducing river herring and shad incidental catch.

The mackerel specifications established a river herring and shad catch cap of 82 mt for 2016-2018. River herring and shad caught on all trips landing 20,000 lb or more of mackerel would count against the cap. Once the mackerel fishery catches 95 percent of the river herring and shad cap (either 77.9 mt), the directed mackerel fishery will be closed and vessels will be limited to a 20,000-lb incidental catch trip limit for the remainder of the fishing year.

Monitoring is critical to understanding the nature and extent of river herring and shad catch in the herring and mackerel fisheries. Because the seasonal and inter-annual distribution of river herring and shad are highly variable, the Councils believe that the most effective measures to address river herring and shad catch would be those that increase at-sea sampling, improve bycatch accounting of incidental catch, and promote cooperative efforts with the industry to minimize catch.

Analysis of river herring and shad catch from 2010-2013 done as part of this amendment indicates that the fleets responsible for catching the majority of river herring and shad are the midwater trawl fleet (57%) followed by the small mesh bottom trawl fleet (33%). The analysis also indicated that the purse seine fleet is responsible for a negligible amount of river herring and shad catch (0.3%).

Current Monitoring of the Mackerel Fishery

In recent years, observer coverage for the mackerel fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-by-FMP basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

For example, New England vessels using extra-large mesh gillnets catch monkfish, skates, and Northeast multispecies, often on the same fishing trip, and, therefore, most participants in this fishery must operate according to the regulations implemented under three different FMPs. To distinguish between the management units identified in individual FMPs and the fisheries that operate under one or more FMPs, the SBRM is designed around "fishing modes" defined by the type of fishing gear used and the area from which the vessels depart.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through an FMP developed by either the MAFMC or NEFMC.

Overview of Mackerel Industry-Funded Monitoring Alternatives

The MAFMC recommended increased monitoring in the mackerel fishery address the following goals: 1) Accurate estimates of catch (retained and discarded), 2) accurate catch estimates for incidental species for which catch caps apply, and 3) effective and affordable and monitoring for the mackerel fishery.

The industry-funded monitoring coverage target alternatives for the mackerel fishery provide a range of data collections and monitoring costs. This document evaluates how different coverage target alternative meet specific monitoring goals identified by the MAFMC while comparing the costs of the monitoring programs, particularly costs that would be borne by the fishing industry. The mackerel coverage target action alternatives include Northeast Fisheries Observer Program-level (NEFOP-level) observer, at- sea monitoring (ASM), electronic monitoring (EM), and portside sampling coverage.

Under any of the mackerel coverage target action alternatives, existing industry reporting requirements and observer coverage to meet MSA, ESA, and MMPA requirements under the no action alternative would continue. Any information collected under the mackerel coverage target action alternatives would be in addition to existing reporting and monitoring.

Table 24. Range of Mackerel Industry-Funded Monitoring Alternatives

<table>
<tr><th>Gear Type</th><th>MWT</th><th>SMBT</th><th>SMBT</th><th>SMBT</th></tr>
<tr><td>Permit Categories</td><td>All Tiers</td><td>Tier 1</td><td>Tier 2</td><td>Tier 3</td></tr>
<tr><td>Mackerel Alternative 1: No Coverage Target for IFM Program (No Action)</td><td colspan="4">SBRM</td></tr>
<tr><td>Mackerel Alternative 2: Coverage Target for IFM Program</td><td colspan="4">Includes Sub-Options: 1) Waiver Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold</td></tr>
<tr><td>Mackerel Alternative 2.1: NEFOP-Level Coverage</td><td colspan="2">100% NEFOP-Level Observer</td><td>50% NEFOP-Level Observer</td><td>25% NEFOP-Level Observer</td></tr>
<tr><td>Mackerel Alternative 2.2: ASM Coverage</td><td colspan="2">25%, 50%. 75%, or 100% ASM</td><td colspan="2">SBRM (No Action)</td></tr>
<tr><td>Mackerel Alternative 2.3: Combination Coverage</td><td>50% or 100% EM/Portside</td><td>25%, 50%, 75%, or 100% ASM</td><td colspan="2">SBRM (No Action)</td></tr>
<tr><td>Mackerel Alternative 2.4: EM and Portside</td><td>50% or 100% EM/Portside</td><td colspan="3">SBRM (No Action)</td></tr>
</table>

Coverage		
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	25%, 50%, 75% or 100% ASM or EM/Portside	SBRM (No Action)
MWT indicates midwater trawl and SMBT indicates small mesh bottom trawl vessels.		
Mackerel Alternatives would only apply to trips that land greater than 20,000 lb of mackerel. Sub-Options could apply to any of the alternatives.		

2.3.1 Mackerel Alternative 1: No Coverage Target for Industry-Funded Monitoring Program

Under Mackerel Alternative 1 (No Action), there would be no coverage target specified for an industry-funded monitoring program in the mackerel fishery. Observer coverage for mackerel vessels would be allocated according to SBRM, and there would be no additional cost to the mackerel industry for observer coverage. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis.

Under SBRM, the Atlantic mackerel fishery receives NEFOP coverage under the following 4 fleets: New England and Mid-Atlantic small mesh otter trawl and New England and Mid-Atlantic paired and single midwater trawl. Table 25 describes the sea days proposed for April 2016 through March 2017. The sea days listed below for small mesh otter trawl cover all FMPs that use this gear type, so only a portion would cover trips targeting mackerel. The midwater trawl fleets is largely comprised of vessels targeting herring and mackerel.

Table 25. Proposed and Observed Sea Days for Fleets that Target Mackerel

Fleet	Region	Proposed sea days for April 2016 to March 2017	Observed sea days, July 2014 to June 2015	VTR sea days, July 2014 to June 2015	Observed trips, July 2014 to June 2015	VTR trips, July 2014 to June 2015
Small Mesh Bottom Trawl	MA	1,717	997	6,761	360	3,088
Small Mesh Bottom Trawl	NE	798	933	8,847	319	3,381
Midwater Trawl (Pair and Single)	MA	30	8	134	1	26
Midwater Trawl (Pair and Single)	NE	440	160	1,189	43	363

Source: 2016 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States; Wigley et al., 2016 (included in Appendix 4).

Under SBRM, NEFOP collect the following information on mackerel trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Retained catch on unobserved hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Whole specimens, photos, and biological samples (i.e., scales, otoliths, and/or vertebrae from fish, invertebrates, and incidental takes);
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Currently, NEFOP observers are required to possess a HVF certification in order to observe the mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in MSB Amendment 14.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

In order to qualify for HVF training, NEFOP observers need to be certified and in a positive data quality standing with all trip data. Prior data and data quality history are critically examined in order to determine if an observer would be a good candidate for certification.

Currently, the HVF training is conducted at the NEFOP training center in Falmouth, MA and is one to two days in duration. Training consists of species identification, sampling and subsampling methodologies, practice and documentation, gear identification and a review of the regulations. Regulations are discussed in order to educate observers in regard to Groundfish Closed Area coverage, haddock and river herring and shad catch accounting, slippage and operational discarding. Sampling and subsampling high volume catch is the main focus of training to ensure that observers understand the challenges that exist in trying to account for and accurately extrapolate catch on a haul-by-haul basis. Training on the use of a Marel scale is also conducted as most of the high volume vessels have volunteered to keep Marel scales onboard for the observers to utilize. An exam is administered at the end of training and if successfully completed an observer is certified to observe the high volume fisheries.

Vessels with limited access mackerel permits are required to bring catch aboard and make it available to the observer for sampling. If catch is discarded prior to making it available to the observer for sampling, discarded catch is considered "slippage." Vessels are prohibited from slipping catch unless it due to safety concerns, mechanical failure, or if excess catch of dogfish prevents catch from being pumped aboard the vessel. Vessels with limited access permits are required to report slippage on the daily mackerel VMS catch report and complete a released catch affidavit. Additionally, vessels are subject to slippage consequence measures. Specifically, those vessels are required to move 15 nautical miles following a slippage event due to safety, mechanical failure, or dogfish and terminate the fishing trip following slippage for any other reason.

2.3.2 Mackerel Alternative 2: Coverage Target Specified for Industry-Funded Monitoring Program

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the mackerel fishery. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM and the specified coverage target.

Mackerel Alternative 2 would allow several sub-options to apply to the mackerel coverage target alternatives. Sub-Options could apply to any of the mackerel alternatives.

- Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the MAFMC's intent to increase monitoring in the mackerel fishery, but would not prevent vessels from participating in the mackerel fishery if monitoring coverage was not available. Should the MAFMC not select Sub-Option 1, then fishing effort would be reduced to match the available level of monitoring (i.e., the fleet would not fish if NMFS does not have funding for the program). Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards.

- Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not pump or carry any fish onboard.
- Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation.
- Sub-Option 4 would require the MAFMC to examine the results of any increased coverage in mackerel fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via a framework adjustment or an amendment to the MSB FMP, as appropriate.
- Sub-Option 5 would exempt trips that land less than 25 mt of mackerel from industry-funded monitoring requirements.

Omnibus Alternative 2 would include standard monitoring and service provider requirements for industry-funded monitoring, including NEFOP-level observers, at-sea monitors, electronic monitoring, and portside samplers. (See Appendix 2 – Monitoring and Service Provider Requirements for the details of the standard requirements.) If Omnibus Alternative 2 is not selected by the Councils, service provider requirements for industry-funded monitoring programs would be developed and implemented in individual FMPs.

A monitoring and service provider provision previously only considered under Mackerel Alternative 2 was recommended by the MAFMC in February 2016 to be included in the standard monitoring and service provider requirements in Omnibus Alternative 2. That provision would allow NEFOP-level observers and at-sea monitors to be deployed on the same vessel for more than two consecutive multi-day trips or more than twice in a given month.

In addition to the standard monitoring and service provider requirements specified in Omnibus Alternative 2, Mackerel Alternative 2 would specify that requirements for industry-funded observer and at-sea monitors include a HVF certification for the mackerel fishery. The existing NEFOP HVF certification training program would be available to industry-funded observers and NEFOP would develop a new HVF certification training program for industry-funded at-sea monitors.

Under Mackerel Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

2.3.2.1 Mackerel Alternative 2.1: NEFOP-Level Coverage on Limited Access Vessels

MAFMC would select specific NEFOP-Level coverages for vessels with mackerel permits.

Mackerel Alternative 2.1 would require the following levels of NEFOP-level observer coverage on declared mackerel trips (trips landing more than 20,000 lb of mackerel):

- 100% coverage on all limited access vessels using midwater trawl gear,
- 100% coverage on vessels with Tier 1 mackerel permits using small mesh bottom trawl gear,
- 50% coverage on vessels with Tier 2 mackerel permits using small mesh bottom trawl gear, and
- 25% coverage on vessels with Tier 3 mackerel permits using small mesh bottom trawl gear.

NEFOP-level observers would be required to possess a NEFOP certification, including an HVF certification, and they would collect comprehensive catch data consistent with NEFOP protocols for observer data collected under the SBRM.

Prior to any trip declared into the mackerel fishery, representatives for vessels with limited access mackerel permits using midwater trawl or small mesh bottom trawl would be required to provide notice to NMFS and request a NEFOP-level observer through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not NEFOP-level observer coverage must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that NEFOP-level observer coverage is necessary, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for a NEFOP-level observer to carry on the vessel's next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing in excess of the incidental mackerel trip limit (i.e., 20,000 lb) without carrying an NEFOP-level observer on its next trip. If NMFS informs the vessel representative that NEFOP-level coverage is not necessary on the next trip, NMFS would issue the vessel a NEFOP-level observer coverage waiver.

NEFOP-level observers would collect the following information on mackerel trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Retained catch on unobserved hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Whole specimens, photos, length information, and biological samples (i.e., scales, otoliths, and/or vertebrae from fish, invertebrates, and incidental takes);
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

The NEFOP-level observer coverage target (25%, 50%, or 100%) for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to reach a 25% coverage target in a given year would be to use an estimate of the previous year's SBRM coverage for vessels with limited access mackerel permits (e.g., 15%) combined with industry-funded monitoring (e.g., 10%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded observer on the same trip.

The realized observer coverage level for this alternative in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities. The realized observer coverage level would fall anywhere between SBRM coverage and specified coverage target.

If a NEFOP-level observer was not available to cover a mackerel trip selected for coverage (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the mackerel fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels with limited access mackerel permits to participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Under Mackerel Alternative 2.1, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with limited access mackerel permits.

Rationale: MSB Amendment 14 recommended high levels of NEFOP-level observer coverage on vessels with limited access mackerel permits. The increased coverage was intended to enhance catch estimates of river herring and shad catch in the mackerel fishery and better address and manage bycatch issues in the future. The requirement for 100% NEFOP-level observer coverage was recommended to apply to vessels that used midwater trawl gear and vessels with Tier 1 mackerel permit using small mesh bottom trawl gear because those vessels account for most mackerel landings. Lower coverage levels were recommended for vessels with Tier 2 and Tier 3 mackerel permit, with the rationale that those vessels do not need as much coverage given their lower contribution to landings/effort in the mackerel fishery.

Support for high levels of NEFOP-level observer coverage on limited access mackerel vessels, especially for vessels using midwater trawl gear, was supported by a majority of stakeholders (e.g., groundfish fishing industry, recreational fishery participants, environmental advocates). Those stakeholders, as well as some members of the mackerel industry, believed that high levels of NEFOP-level observer coverage was important for the most active vessels to either confirm or disprove the claims that have been made by many regarding river herring and shad incidental catch in the mackerel fishery.

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Combining SBRM coverage with industry-funded monitoring coverage to achieve the coverage target (25%, 50%, or 100%) is intended to reduce the costs associated with industry-funded monitoring coverage.

2.3.2.2 Mackerel Alternative 2.2: At-Sea Monitor Coverage on Midwater Trawl Vessels (25%-100%) and Tier 1 Small Mesh Bottom Trawl Vessels (25%-100%)

MAFMC would select one ASM coverage target (25%, 50%, 75%, or 100%) for midwater trawl vessels and one ASM coverage target (25%, 50%, 75%, or 100%) for Tier 1 vessels using small mesh bottom trawl gear.

Mackerel Alternative 2.2 would require vessels with limited access mackerel permits using midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear to carry an at-sea monitor on every declared mackerel trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) specified in this action. These at-sea monitor coverage requirements only apply to trips landing more than 20,000 lb of mackerel.

Prior to any trip declared into the mackerel fishery, representatives for vessels with limited access mackerel permits using midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that at-sea monitoring coverage is necessary, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on the vessel's next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any mackerel without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not necessary on the next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

At-sea monitors would collect the following information on mackerel trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Length data on retained and discarded catch;
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Additionally, the MAFMC may recommend that at-sea monitors collect additional biological information upon request. Revising the duties for an at-sea monitor, such that additional biological information would be collected, could be done in a future framework action. The MAFMC may also recommend that at-sea monitors collect additional biological information by considering the issue at a public meeting, where public comment is taken, and asking NMFS to publish a notice or rulemaking modifying the duties for at-sea monitors.

Initially, the MAFMC recommended that at-sea monitors only collect data from discarded and not retained catch. The MAFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the mackerel fishery. However, the mackerel fishery only discards a small percentage of it catch, so there was only a minimal gain in information when at-sea monitors only collected data on discarded catch. In April 2016, to increase the data utility of information collected by at-sea monitors, the MAFMC recommended that at-sea monitors collect information on both retained and discarded catch.

The ASM coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to reach a 25% coverage target in a given year would be to use an estimate of the previous year's SBRM coverage for vessels with limited access permits using midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear (e.g., 15%) combined with industry-funded monitoring (e.g., 10%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded at-sea monitor on the same trip.

Currently, there are slippage restrictions and reporting requirements when an observer is aboard vessels with limited access mackerel permits. Slippage restrictions and reporting requirements could be extended to vessels with at-sea monitors aboard.

The realized observer coverage level for this alternative in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities. The realized coverage level would fall anywhere between SBRM coverage and the specified at-sea monitoring coverage level on vessels with limited access mackerel permits using midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear.

If an at-sea monitor was not available to cover mackerel trips selected for coverage (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the mackerel fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels with limited access mackerel permits to participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Under Mackerel Alternative 2.2, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with limited access mackerel permits using midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would not collect whole specimens, photos, or biological samples (other than length data) from catch, or sighting data on protected species. The Councils recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for maximum cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the mackerel fishery. (*See Appendix 5 – Analysis of ASM Costs for additional details.)*

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Combining SBRM coverage with industry-funded monitoring coverage to achieve the coverage target (25%, 50%, 75%, or 100%) is intended to reduce the costs associated with industry-funded monitoring coverage.

2.3.2.3 Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 Small Mesh Bottom Trawl Vessels

Tier 1 Small Mesh Bottom Trawl Vessels

MAFMC would select one at-sea monitoring coverage target (25%, 50%, 75%, or 100%) for all Tier 1 vessels using small mesh bottom trawl gear.

Mackerel Alternative 2.3 would require vessels with Tier 1 mackerel permits and using small mesh bottom trawl gear to carry an at-sea monitor on every declared mackerel trip landing more than 20,000 lb of mackerel and selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the at-sea monitor coverage target (25%, 50%, 75%, or 100%) that is specified in this action.

Prior to any trip declared into the mackerel fishery, representatives for vessels with Tier 1 mackerel permits using small mesh bottom trawl gear would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that they needed at-sea monitoring coverage, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on the vessel's next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing mackerel in excess of the incidental mackerel trip limit (20,000 lb) without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not needed on the next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

At-sea monitors would collect the following information on mackerel trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Length data on retained and discarded catch; and
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Additionally, the MAFMC may recommend that at-sea monitors collect additional biological information upon request. Revising the duties for an at-sea monitor, such that additional biological information would be collected, could be done in a future framework action. The MAFMC may also recommend that at-sea monitors collect additional biological information by considering the issue at a public meeting, where public comment is taken, and asking NMFS to publish a notice or rulemaking modifying the duties for at-sea monitors.

The ASM coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to reach a 25% coverage target in a given year would be to use an estimate of the previous year's SBRM coverage for vessels with Tier 1 mackerel permits using small mesh bottom trawl gear (e.g., 15%) combined with industry-funded monitoring (e.g., 10%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded at-sea monitor on the same trip.

If an at-sea monitor was not available to cover a mackerel trip selected for coverage (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the mackerel fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels with limited access mackerel permits to participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Under Mackerel Alternative 2.3, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with Tier 1 mackerel permits using small mesh bottom trawl gear.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would not collect whole specimens, photos, or biological samples (other than length data) from catch, or sighting data on protected species. The MAFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the mackerel fishery. (*See Appendix 5 – Analysis of ASM Costs for additional details.)*

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Combining SBRM coverage with industry-funded monitoring coverage to achieve the coverage target (25%, 50%, 75%, or 100%) is intended to reduce the costs associated with industry-funded monitoring coverage.

Midwater Trawl Fleet

MAFMC would select one electronic monitoring (EM)/portside sampling coverage target (50% or 100%) for all vessels with limited access permits using midwater trawl gear.

Mackerel Alternative 2.3 would require vessel with limited access mackerel permits using midwater trawl gear to carry an operating EM system on every trip declared into the mackerel fishery landing over 20,000 lb of mackerel and portside sampling of their catch on every declared mackerel trip selected for coverage by NMFS. The intention of the MAFMC would be that all declared mackerel trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%). However, factors such as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting.

Prior to any trip declared into the mackerel fishery, representatives for vessels with limited access mackerel permits using midwater trawl gear would be required to have an operational EM system installed aboard their vessel and provide notice to NMFS and request a portside sampler through the pre-trip notification system.

NMFS would notify the vessel representative whether or not portside sampling coverage must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that they needed portside sampling coverage, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for a portside sampler for the vessel's next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing mackerel in excess of the incidental mackerel trip limit (20,000 lb) without portside sampling of its offload on its next trip. If NMFS informs the vessel representative that portside sampling coverage is not needed on its next trip, NMFS would issue the vessel a portside sampling coverage waiver.

Both the EM footage and portside sampling coverage targets (50% or 100%) for this alternative would be calculated independent of and in addition to SBRM coverage. To reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Because the coverage target is calculated independent of and in addition to

SBRM coverage, a vessel may carry on SBRM observer on the same trip that would be sampled portside.

Electronic Monitoring

Under Mackerel Alternative 2.3, owners or operators of vessels issued a mackerel limited access permit and using midwater trawl gear would be required to install EM equipment and maintain the equipment on board for the duration of the fishing year. Though the system would have to be installed duration of the fishing year, it would only need to be turned on and recording video footage during declared mackerel trips using midwater trawl gear.

Video footage would be used to confirm retention of catch on midwater trawl trips to ensure that all catch is available to be sampled portside for a given trip. Video footage would be recorded either throughout the duration of the trip or just around haulback. For analysis purposes, haulback would be defined as the time gear sensors document the start of gear retrieval to some set amount of time after the time gear sensors sense the end of gear retrieval, in order to ensure that all catch has been transferred into the hold or discarded. In addition, one wide angle camera may remain on for the duration of the trip to monitor for discard compliance.

While video footage was intended to only initially be used to verify retention of catch for portside sampling, the MAFMC also recommended that EM would be used to verify compliance with slippage restrictions and reporting requirements. Footage would not initially be used to identify species, estimate the amount of catch released if a haul were slipped, or monitor compliance with slippage consequence measures. The MAFMC may expand the uses of video footage to include species identification, quantification of released catch, or monitoring compliance with slippage consequence measures in the future, if footage proves useful for these purposes. Such an expansion would be done via a framework adjustment or amendment, as appropriate.

In 2016 and 2017, GARFO and NEFSC, in cooperation with Saltwater Inc., are evaluating the utility of EM aboard midwater trawl vessel participating in the herring and mackerel fisheries. The purpose of the program is to:

- Analyze the utility of EM in monitoring fisheries as a means of informing future EM programs.
- Deploy and test an EM program in an operational setting, allowing analysis and adjustment of EM program requirements.
- Evaluate the range of information that can be gathered with EM systems, such as: Verify slippage events; categorize the types of slippage events; verify other discard sources; and determine if EM can help estimate the amount of catch retained (if not all catch is retained).
- Refine EM cost estimates for NMFS and the fishing industry.

Equipment

The EM system, installed by a NMFS-approved contractor, would be comprised of video camera(s), recording equipment, and other related equipment with the following components and capabilities:

- Video cameras. Video cameras would need to be mounted to provide a clear, unobstructed, and well illuminated view of the area(s) where the midwater trawl gear is retrieved prior to being placed in the hold. There would need to be a sufficient number of cameras with sufficient resolution for NMFS, the US Coast Guard, and other authorized officers/designees to determine that all catch was brought aboard the vessel after haulback. The EM system must be capable of initiating video recording at the time gear retrieval starts, and record all periods of time when the gear is being retrieved and until catch is placed in the hold or discarded.
- Global Positioning System (GPS) receiver. A GPS receiver would be required to document coordinates, velocity, and heading data.
- Hydraulic and drum rotation sensors. Hydraulic sensors would be required to continuously monitor the hydraulic pressure. Drum rotation sensor would be required to continuously monitor drum rotations.
- EM control box. The system would need to include a control box that receives and stores the raw data provided by the sensors and cameras. The control box would need to contain removable hard drives and sufficient storage systems capability to record data for the full duration of a trip (i.e., the longest expected trip length for the vessel).
- EM systems monitor. A wheelhouse monitor would be necessary to provide a graphical user interface for the vessel operator to monitor: 1) The state and performance of the control box, 2) information on the current date and time synchronized via GPS, 3) GPS coordinates, 4) current hydraulic pressure reading, 5) presence of a data disk, 6) percentage used of the data disk, 7) and video recording status.

NMFS would announce specifics about this equipment list, as well as any additional design requirements for the EM system, during the rulemaking and implementation process. Industry will be responsible for contracting with a NMFS-approved provider for technical and maintenance services.

Data Transfer

After completing a fishing trip, the vessel representative would be required to mail or transmit the removable EM system hard drive(s) containing all data to NMFS or a NMFS-approved contractor, according to instructions provided by NMFS. The method of transfer that would be allowed under the EM program will be developed during implementation. Prior to departing on a subsequent trip, a vessel representative would be required to install a replacement EM system hard drive(s) to enable data collection and video recording. A vessel representative would be responsible for contacting NMFS or NMFS-approved contractor if they have requested but not received a replacement hard drive(s) and for informing NMFS or NMFS-approved contractor of any lapse in the hard drive management procedures described in the vessel monitoring plan.

Retention Requirements

Initially, Mackerel Alternative 2.3 would maintain the existing retention requirements for the midwater trawl fleet. Vessels would continue to operate under the regulations and possession limits for any fisheries for which they possess permits. There are also some statutory measures under the ESA and MMPA that dictate retention of protected species.

Under Mackerel Alternative 2.3, all slippage restrictions, reporting requirements, and consequence measures would apply to all midwater trawl vessels with limited access mackerel permits.

Review of EM Video Footage

Video footage would be sampled at some Council-specified and predetermined percent of review (50% or 100%), and then compared to released catch affidavits, VMS reports describing slippage events, and/or observer data on slippage. The sampling of video footage would evaluate whether or not catch was discarded. The rate of review may be adjusted by the MAFMC via a framework action, to use the optimum and most cost effective rate to achieve the management goal.

Compliance Measures

The MAFMC may consider alterations to the rates of video footage recording and/or sampling to ensure compliance. For example, if a vessel is found to have undocumented discarding events on more than a specified number of trips during a fishing year, then the MAFMC may adjust the rates of video footage recording and/or sampling.

Vessel Monitoring Plans

Individual Vessel Monitoring Plans (VMPs) would serve as a comprehensive plan for discard documentation, installation and maintenance, protocols for data storage and transfer, and other important information regarding a vessel's specific EM system. Each vessel operator or owner would be responsible for working with NMFS or a NMFS-approved contractor to develop a VMP, and would be required to keep the VMP aboard the vessel at all times. NMFS would specify VMP requirements in the regulations. VMPs may include, but are not limited to, information on the locations of EM system components, contact information for technical support, instructions on how to conduct a pre-trip system test, instructions on how to verify proper system functions, location(s) on deck where fish retrieval should occur to remain in view of the cameras, procedures for how to manage EM system hard drives, catch handling procedures, periodic checks of the monitor during the retrieval of gear to verify proper functioning, and reporting procedures. The VMP should minimize, as much as possible, any impact on the current operating procedures of the vessel, and should help ensure the safety of the crew. NMFS or a NMFS-approved contractor would review VMPs biennially prior to the start of the upcoming fishing year.

Portside Sampling

Under Mackerel Alternative 2.3, vessels with limited access mackerel permits using midwater trawl gear would be subject to portside sampling requirements for declared mackerel trips selected for coverage by NMFS. Portside sampling would be used to verify the amount and species composition of catch in the mackerel fishery and help track catch against catch caps for river herring and shad. Portside samplers would also collect age and length data.

Sampling Design

The sampling design for portside sampling alternatives would be based on existing portside sampling programs for the mackerel fishery, administered by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources, and consistent with NEFOP sampling methodology. Midwater trawl vessels returning from a declared mackerel trip would be sampled portside during the offload. Initially, the level of sampling for midwater trawl trips would be approximately 50% or 100%. However, the sampling rate may be adjusted by the MAFMC to use the optimum and most cost effective rate to achieve management goals. Such factors as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting.

Basket samples would be collected from the vessel's dewatering box at specified intervals throughout the duration of the offload. Basket samples would be sorted and weighed by species and extrapolated based on vessel hail weight to represent the total trip. Actual weights could be verified using the vessel trip report and/or dealer data. Age and length data would be collected consistent with NEFOP sampling methodology.

Landing Ports

Midwater trawl vessels returning from declared mackerel trips would be required to land catch in specific ports. In past years, the midwater trawl fleet has landed catch in Maine (Portland, Rockland, Vinalhaven, Prospect Harbor, Jonesport), New Hampshire (Newington), Massachusetts (Boston, Gloucester, New Bedford), Rhode Island (Point Judith, North Kingston), and New Jersey (Cape May).

Approximately 95% of midwater trawl landings are made in ports currently sampled by the state programs. However, if certain ports are not suitable for portside sampling, then vessels may not be able to land in those ports on trips that are selected for portside sampling. Some vessels only land in a single port and that port is not currently sampled. Some vessels land in both sampled and unsampled ports, but changing past practices to land only in sampled ports may not be easy. Without a predictive model, the analysis of requiring vessels to land in specified ports will be qualitative. Additionally, data confidentiality will limit a quantitative analysis. If portside sampling is selected as a preferred alternative for the mackerel fishery then NMFS would further evaluate how to enable portside sampling in midwater trawl landing ports during implementation of this amendment.

Vessel Responsibilities

Midwater trawl vessels would be responsible for offloading catch consistent with offloading requirements and contracting with a service provider to arrange a portside sampler to sample catch from declared mackerel trips.

The realized observer coverage level for Mackerel Alternative 2.3 in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities. The realized observer coverage level would fall anywhere between SBRM coverage and the specified coverage target on vessels with Tier 1 mackerel permits using small mesh bottom trawl gear and limited access mackerel permits using midwater trawl gear.

Mackerel Alternative 2.3 would require midwater trawl vessels to carry an operating EM system on every trip declared into the mackerel fishery and portside sampling of catch on every declared mackerel trip selected for coverage by NMFS. If an operating EM system or portside sampler was not available to cover a specific mackerel trip (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the mackerel fishery on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels to participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

As recommended by the MAFMC, Mackerel Alternative 2.3 would have a pre-implementation plan to help the industry understand any new EM and portside monitoring requirements and become compliant with sampling equipment, notification, sampling, and reporting requirements.

Rationale: Because the midwater trawl fleet discards only a small percentage of its catch at sea, EM and portside sampling have the potential to be a cost effective way to address monitoring goals for the midwater trawl fleet harvesting mackerel. EM would be used to verify retention of catch on the midwater trawl fleet and portside sampling would be used to verify amount and species composition of landed catch.

The implementation of EM in the mackerel fishery would be informed by NMFS's evaluation of EM aboard midwater trawl vessels participating in the herring and mackerel fisheries as well as the exempted fishing permit program for the West Coast whiting fishery that is expected to be transitioned into regulation by 2017. The implementation of portside sampling in the mackerel fishery would be informed by the existing portside sampling programs operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

Slippage restrictions, reporting requirements, and consequences are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because there is value in comparing information on discarding and catch composition collected by an SBRM observer with data collected by EM and portside sampling, the coverage target for EM and portside sampling is calculated independent of and in addition to SBRM coverage.

2.3.2.4 Mackerel Alternative 2.4: Electronic Monitoring and Portside Sampling on Midwater Trawl Vessels

MAFMC would select one EM/Portside sampling coverage target (50% or 100%) for all limited access vessels using midwater trawl gear.

Mackerel Alternative 2.4 would require vessel with limited access mackerel permits using midwater trawl gear to carry an operating EM system on every trip declared into the mackerel fishery landing over 20,000 lb of mackerel and portside sampling of their catch on every declared mackerel trip selected for coverage by NMFS. The intention of the MAFMC would be that all declared mackerel trips by midwater trawl vessels would have some percentage of EM footage sampled (50% or 100%) and that same percentage of trips sampled portside (50% or 100%). However, factors such as where catch is landed, ability to access the offload, and infrastructure limitations may prevent the program from achieving 100% coverage, even if funding is not limiting. For complete details of EM and portside sampling, see the description of Mackerel Alternative 2.3

Mackerel Alternative 2.4, similar to Mackerel Alternative 2.3, would vessels with limited access mackerel permits using midwater trawl gear to carry an operating EM system on every trip declared into the mackerel fishery and portside sampling of their catch on every declared mackerel trip selected for coverage by NMFS. If an operative EM system or portside sampler was not available to cover a specific mackerel trip (either due to logistics or a lack of funding), that vessel would be prohibited from fishing for, taking, possessing, or landing mackerel in excess of the incidental mackerel trip limit (20,000 lb) on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of the vessel to participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

The EM footage and portside sampling coverage target (50% or 100%) for this alternative would be calculated independent of and in addition SBRM coverage. To reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Because the coverage target is calculated independent of and in addition to SBRM coverage, a vessel may carry an SBRM observer on that same trip that would be sampled portside.

As recommend by the MAFMC, Mackerel Alternative 2.4 would have a pre-implementation plan to help the industry understand any new EM and portside monitoring requirements and become compliant with the sampling equipment, notification, sampling, and reporting requirements.

Under Mackerel Alternative 2.4, all slippage restrictions and reporting requirements would apply to all midwater trawl vessels with limited access mackerel permits. The MAFMC will evaluate whether slippage consequence measures should apply to vessels using EM in a future framework.

Rationale: Because the midwater trawl fleet discards less only a small percentage of its catch at sea, EM and portside sampling have the potential to be a cost effective way to address monitoring goals for the midwater trawl fleet harvesting mackerel. EM would be used to verify retention of catch on the midwater trawl fleet and portside sampling would be used to verify amount and species composition of landed catch.

The implementation of EM in the mackerel fishery would be informed by NMFS's evaluation of EM aboard midwater trawl vessels participating in the herring and mackerel fisheries as well as the exempted fishing permit program for the West Coast whiting fishery that is expected to be transitioned into regulation by 2017. The implementation of portside sampling in the mackerel fishery would be informed by the existing portside sampling programs operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

Slippage restrictions and reporting requirements are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because there is value in comparing information on discarding and catch composition collected by an SBRM observer with data collected by EM and portside sampling, the coverage target for EM and portside sampling is calculated independent of and in addition to SBRM coverage.

2.3.2.5 Mackerel Alternative 2.5: At-Sea Monitoring Coverage on Limited Access Midwater Trawl Vessels, Then Vessels May Choose Either At-Sea Monitoring Coverage or Electronic Monitoring and Portside Sampling

MAFMC would select an ASM coverage target (25%, 50%, 75%, or 100%) and an EM/Portside sampling coverage for all limited access vessels using midwater trawl gear.

Initially, Mackerel Alternative 2.5 would require vessels with limited access vessels using midwater trawl gear to carry an at-sea monitor on every declared mackerel trip selected for coverage by NMFS. Vessels would be selected to carry an at-sea monitor by NMFS to meet the ASM coverage target (25%, 50%, 75%, or 100%) specified in this action.

Prior to any trip declared into the mackerel fishery, representatives for vessels with limited access permits using midwater trawl gear would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that at-sea monitoring coverage is necessary, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on its next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any mackerel without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not necessary on its next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

At-sea monitors would collect the following information on mackerel trips:

- Fishing gear information (i.e., size of nets, mesh sizes, and gear configurations);
- Tow-specific information (i.e., depth, water temperature, wave height, and location and time when fishing begins and ends);
- All retained and discarded catch (fish, sharks, crustaceans, invertebrates, and debris) on observed hauls (species, weight, and disposition);
- Actual catch weights whenever possible, or alternatively, weight estimates derived by sub-sampling;
- Length data on retained and discarded catch;
- Information on interactions with protected species, such as sea turtles, marine mammals, and sea birds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Additionally, the MAFMC may recommend that at-sea monitors collect additional biological information upon request. Revising the duties for an at-sea monitor, such that additional biological information would be collected, could be done in a future framework action. The MAFMC may also recommend that at-sea monitors collect additional biological information by considering the issue at a public meeting, where public comment is taken, and asking NMFS to publish a notice or rulemaking modifying the duties for at-sea monitors.

The ASM coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for vessels with limited access permits using midwater trawl gear (e.g., 15%) combined with industry-funded monitoring (e.g., 10%). Because the coverage target is calculated by combining SBRM and industry-funded monitoring coverage, a vessel would not carry an SBRM observer and industry-funded at-sea monitor on the same trip.

Initially, Mackerel Alternative 2.5 would require all vessels with limited access permits and using midwater trawl gear to carry an at-sea monitor on every declared mackerel trip selected for coverage by NMFS. If an at-sea monitor was not available to cover a specific mackerel trip (either due to logistics or a lack of funding), that vessel would be prohibited from participating in the mackerel fishery on that trip.

If the MAFMC determines that EM/Portside sampling is an adequate substitute for ASM coverage aboard midwater trawl vessels, then limited access vessels using midwater trawl gear would be able to choose whether to use ASM or EM/portside sampling coverage. The coverage targets (25%, 50%, 75%, or 100%) for each monitoring type (ASM and EM/Portside) would be selected by the MAFMC.

If in the future, the MAFMC may determine that EM/Portside sampling is an adequate substitute for ASM coverage aboard bottom trawl vessels. If so, then the ability of limited access vessels using bottom trawl gear to choose whether to use ASM or EM/Portside sampling coverage would be considered in a future action.

Once limited access vessels using midwater trawl gear are able to choose between ASM and EM/Portside sampling, midwater trawl vessels would be required to: 1) Choose one monitoring type per fishing year and 2) declare their preferred monitoring type six months in advance of the fishing year. After consulting with NMFS, the Councils will establish a minimum participation threshold for each monitoring type for a fishing year. If the minimum participation level for a monitoring type was not achieved for a given year, then midwater trawl vessels would not be able to use that monitoring type during that given year.

If a limited access vessel using midwater trawl gear chose EM/Portside monitoring coverage for a given year, that vessel would be required to carry an operating EM system on every trip declared into the herring fishery and allow portside sampling of their catch on declared herring trip selected for coverage by NMFS. The intention of the NEFMC would be that all declared herring trips by midwater trawl vessels would have some percentage of EM footage sampled (25%, 50%, 75%, or 100%) and that same percentage of trips sampled portside (25%, 50%, 75%, or 100%). However, factors such as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting. For complete details of EM and portside sampling, see the description of Mackerel Alternative 2.3

If an operative EM system or portside sampler was not available to cover a specific mackerel trip (either due to logistics or a lack of funding), that midwater vessel would be prohibited from participating in the mackerel fishery on that trip.

The EM footage and portside sampling coverage target (25%, 50%, 75%, or 100%) for this alternative would be calculated independent of and in addition to SBRM coverage. To reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Because the coverage target is calculated independent of and in addition to SBRM coverage, a vessel may carry an SBRM observer on that same trip that would be sampled portside.

As recommended by the MAFMC, Mackerel Alternative 2.5 would have a pre-implementation plan to help the industry understand any new EM and portside monitoring requirements and become compliant with sampling equipment, notification, sampling, and reporting requirements.

Under Mackerel Alternative 2.5, all slippage restrictions, reporting requirements, and slippage consequences would apply to vessels with limited access permits using midwater trawl gear.

The realized observer coverage level for this alternative in a given year would be determined by the amount of Federal funding available to cover NMFS cost responsibilities. The realized observer coverage level would fall anywhere between SBRM coverage and the specified coverage target. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of vessels with limited access permits using midwater trawl gear to participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would not collect whole specimens, photos, or biological samples (other than length data) from catch or sighting data on protected species. The MAFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the herring fishery. (*See Appendix 5 – Analysis of ASM Costs for additional details.)*

Because midwater trawl vessels discard only a small percentage of catch at sea, EM and portside sampling have the potential to be a cost effective way to address monitoring goals for the midwater trawl fleet harvesting mackerel. EM would be used to verify retention of catch on midwater trawl vessels and portside sampling would be used to verify amount and species composition of landed catch.

The implementation of EM in the mackerel fishery would be informed by NMFS's evaluation of EM aboard midwater trawl vessels participating in the herring and mackerel fisheries as well as the exempted fishing permit program for the West Coast whiting fishery that is expected to be transitioned into regulation by 2017. The implementation of portside sampling in the mackerel fishery would be informed by the existing portside sampling programs operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

The MAFMC recommended that limited access vessels using midwater trawl gear be able to choose between ASM and EM/Portside monitoring coverage for a given fishing year to allow flexibility meeting industry-funded monitoring requirements.

Slippage restrictions and reporting requirements are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling.

Combining SBRM coverage with industry-funded monitoring coverage to achieve the ASM coverage target (25%, 50%, 75%, or 100%) is intended to reduce the costs associated with industry-funded monitoring coverage. Because there is value in comparing information on discarding and catch composition collected by an SBRM observer with data collected by EM and portside sampling, the coverage target for EM and portside sampling is calculated independent of and in addition to SBRM coverage.

2.3.3 Considered But Rejected Mackerel Alternatives

The alternative specifying NEFOP-level observer coverage on the midwater trawl fleet to obtain a 30% CV on river herring and shad catch was considered but rejected by the MAFMC.

The monitoring of catch and bycatch of river herring and shad in the mackerel fishery was identified as an FMP need in MSB Amendment 14. This alternative was developed from an analysis that evaluated catch of river herring and shad catch in the herring and mackerel fisheries and was designed to complement SBRM monitoring coverage.

This alternative would have focused observer coverage on the midwater trawl fleet because that fleet had caught the majority of river herring and shad (57%) during 2010 to 2013. Based on 2013 data, the percent coverage to achieve a 30% CV on river herring and shad catch by the midwater trawl fleet would have been up to 61%.

The MAFMC recommended this alternative be considered but rejected because it was not considered consistent with the goals of MSB Amendment 14.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The purpose of this action is to consider measures that would allow the Councils to implement industry-funded monitoring coverage in New England and Mid-Atlantic FMPs. This amendment would allow industry funding to be used in conjunction with available Federal funding to pay for additional monitoring to meet FMP-specific coverage targets. This amendment also considers (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) a process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, (3) standard administrative requirements for industry-funded monitoring service providers, (4) a process to prioritize industry-funded monitoring programs in order to allocate Federal resources across all FMPs, and (5) a process for monitoring set-aside programs to be implemented via a future framework adjustment action. Additionally this amendment considers monitoring coverage targets for the Atlantic Herring FMP and the Atlantic Mackerel, Squid, Butterfish (MSB) FMP, which are anticipated to enhance the catch monitoring of herring, mackerel, river herring, shad, haddock, and other species harvested in the herring and mackerel fisheries.

This section will provide specific information on the FMPs subject to this amendment and summarize the relevant environmental features at a broader scale that crosses all subject FMPs and their constituent fisheries.

Because the omnibus portion of this amendment is concerned with the process to create and prioritize industry-funded monitoring programs across FMPs, the scope of the "environment" affected by this amendment is atypical for an FMP amendment. As the focus of the omnibus portions of the process to creating and prioritizing industry-funded monitoring programs for available Federal funds, the impacts of the omnibus alternatives are procedural in nature. Therefore, a detailed description of the environmental components including the biological resources, physical environment, and socio-economic structure that could be affected by the alternatives under consideration is not necessary. Instead, this section of the amendment will include a brief overview of the areas in which the fishing activities affected by the subject FMPs occur, a brief overview of the primary ports engaged in the subject fishing activities, and a brief overview of the fishery and non-fishery living marine resources most frequently encountered by the subject fishing activities. This section will also include references for more detailed information on these topics, should any reader wish to become more familiar with the features of the environment in which the subject fisheries occur.

The herring and mackerel specific alternatives in this amendment are consistent with typical FMP amendments. The potential increases in monitoring for the herring and mackerel fisheries may directly impact fishing vessel operations (by modifying where, when, and/or how fishing may take place), and the ways in which herring and mackerel fishing activities directly or indirectly interact with living marine resources, marine habitat, and the socio-economic constructs of the human environment. Thus, where necessary, as in the "Affected Environment" section for a standard FMP amendment, detailed information is included regarding the herring and mackerel resources, non-target and protected species encountered in these fisheries, the habitats of these species, and the fishing businesses and communities expected to be directly or indirectly affected by the proposed action.

3.1.1 TARGET SPECIES

The fishery resources of the Greater Atlantic Region include a variety of managed and non-managed species that are caught and landed by commercial and recreational fishermen operating in the region (Table 26). These fishery resources include many species of both demersal and pelagic finfish, several species of crustaceans, mollusks, and other invertebrates. These species occupy broad ranges within the Greater Atlantic Region (Table 26) and a wide variety of habitats from the pelagic waters of the open ocean to sand, mud, gravel, and rock beds in coastal waters.

In 2011, over 157 species were recorded in Federal VTRs as being landed. Of the 157 species recorded, only 39 species comprised the top 99 percent, by weight, of the reported landings, all but three are the subject of an FMP by the MAFMC, the NEFMC, or the ASMFC.

Of the three non-FMP species in this group, two are managed by at least one state (channeled whelk and knobbed whelk), and one is likely to be subject to a forthcoming Council FMP (Atlantic hagfish).

The 40 species managed under the FMPs subject to this amendment comprised 81 percent, by weight, of the species reported as landed in the 2011 VTR data. Additional information regarding these species, and the management programs established under the subject FMPs, is discussed below. An additional 17 percent, by weight, of all landed species incorporates the 15 species managed solely under ASMFC FMPs, and the federally managed Atlantic highly migratory species represent another 0.1 percent of total reported landings by vessels submitting VTRs. In sum, 97.5 percent, by weight, of all reported landings in 2011 were comprised by species subject to either Federal or ASMFC FMPs.

All of the FMP summaries below incorporate data from the seafood dealer purchase report database, from 2010-2014, inclusive. For some FMPs, the fishing year is offset from the calendar year, and starts on March 1 (Sea Scallops and Deep-Sea Red Crab), May 1 (Northeast Multispecies, Spiny Dogfish, and Skates), or on November 1 (Tilefish). For ease of analysis and consistency of presentation, the landings data for these FMPs are summarized based on calendar year, not fishing year.

TABLE 26. LIST OF EXAMPLE BIOLOGICAL RESOURCES AND THE GEOGRAPHIC REGIONS WHERE THE RESOURCES ARE MOST COMMONLY FOUND.

	Species	Gulf of Maine	Georges Bank	Middle Atlantic Bight
Fishery Resources	American lobster	X	X	X
	American plaice	X		
	Atlantic bluefish	X		X
	Atlantic cod	X	X	
	Atlantic croaker			X
	Atlantic halibut	X		
	Atlantic herring	X	X	X
	Atlantic mackerel	X	X	X
	Atlantic sea scallop		X	X
	Atlantic surfclam	X	X	X
	Atlantic wolffish	X	X	
	Black sea bass		X	X
	Blue crab			X
	Butterfish		X	X
	Clearnose skate			X
	Deep-sea red crab	X	X	X
	Golden tilefish			X
	Haddock	X	X	
	Hagfish	X	X	X
	Horseshoe crab	X	X	X
	Jonah crab	X	X	
	King whiting			X
	Little skate		X	X
	Longfin squid		X	X
	Menhaden	X	X	X
	Monkfish	X	X	X
	Ocean pout	X	X	X
	Ocean quahog	X	X	X
	Offshore hake		X	X
	Pandalid shrimp	X		
	Pollock	X	X	
	Red hake	X	X	X
	Redfish	X		
	Rock crab	X	X	X
	Rosette skate			X
	Scup			X
	Shortfin squid	X	X	X
	Silver hake	X	X	X
	Smooth dogfish		X	X
	Spiny dogfish	X	X	X
	Spot			X
	Striped bass	X	X	X
	Summer flounder		X	X
	Whelks	X	X	X
	White hake	X	X	X
	Windowpane		X	X
	Winter flounder	X	X	X
	Winter skate	X	X	X
	Witch flounder	X		
	Yellowtail flounder	X	X	X

	Species	Gulf of Maine	Georges Bank	Middle Atlantic Bight
Other Non-fishery Resources	Amphipods (spp.)	X	X	X
	Annelid worm (spp.)	X	X	X
	Barndoor skate		X	
	Brittle star (spp.)	X	X	X
	Coral (spp.)	X	X	X
	Greater shearwater	X		
	Grenadier (spp.)	X	X	X
	Hermit crab (spp.)	X	X	X
	Jellyfish (spp.)	X	X	X
	Kelp (spp.)	X	X	X
	Lumpfish	X	X	X
	Northern gannet	X	X	X
	Northern stone crab	X	X	X
	Sand dollar (spp.)	X	X	X
	Sand lance (spp.)	X	X	X
	Sculpin (spp.)	X	X	X
	Sea anemone (spp.)	X	X	X
	Sea cucumber (spp.)	X		X
	Sea raven	X	X	X
	Sea robin (spp.)	X	X	X
	Sea squirt (spp.)	X	X	X
	Snail (spp.)	X	X	X
	Spider crab (spp.)	X		X
	Sponge (spp.)	X	X	X
	Spotted hake		X	X
	Starfish (spp.)	X	X	X
	Thorny skate	X	X	
	Zooplankton (spp.)	X	X	X

3.1.1.1 Atlantic Bluefish FMP

Bluefish is a migratory pelagic species found in most temperate and tropical marine waters throughout the world. Along the U.S. Atlantic coast, bluefish commonly are found in estuarine and continental shelf waters. Bluefish are a schooling species that migrate in response to seasonal changes, moving north and inshore during spring and south and offshore in the late autumn. The Atlantic bluefish fishery exploits what is considered to be a single stock of fish.

The MAFMC began developing the Atlantic Bluefish FMP in 1979 in response to a petition by concerned fishermen reacting to developments in international markets for bluefish. The final FMP was adopted as a joint plan between the Council and the ASMFC in 1989. The FMP was approved and implemented in 1990. Amendment 1 to the FMP was developed in response to the Sustainable Fisheries Act amendments to the Magnuson-Stevens Act and implemented in 2000. Amendment 2 to the FMP was the 2007 SBRM Omnibus Amendment. In order to come into compliance with the revised Magnuson-Stevens Act, the MAFMC developed an Annual Catch Limit (ACL) and Accountability Measure (AM) Omnibus Amendment for all of its FMPs. The ACL/AM Omnibus Amendment (Amendment 3 to Atlantic Bluefish FMP) implemented ACLs and AMs for this fishery.

The FMP established a state-by-state commercial quota system and a coastwide recreational harvest limit. The Council and the ASMFC decide annually on a total allowable landings (TAL) level, that is divided between the commercial and recreational sectors (the commercial quota is further allocated to the states from Maine through Florida based on percentage shares specified in the FMP). The FMP calls for 83 percent of the TAL to be allocated to the recreational sector and 17 percent allocated to the commercial sector, but provides for a transfer of quota to the commercial sector from the recreational sector within certain limits. The Bluefish FMP is the only Greater Atlantic Region FMP that allocates specific quota to the states of South Carolina, Georgia, and Florida.

Amendment 1 to the FMP established a plan to rebuild the stock within 9 years through a gradual reduction in fishing mortality rate. The bluefish stock was declared to be rebuilt in 2009. In recent years, commercial catch has ranged from 7.0 million lb in 2010 down to 4.0 million lb in 2013 (Table 27). The major ports associated with bluefish are listed in Table 28.

The primary gear types used in the commercial fisheries that land bluefish include gillnets, rod and reel, and otter trawls, although there are small localized fisheries, such as the beach seine fishery that operates along the Outer Banks of North Carolina that also catch bluefish. Many of these fisheries do not fish exclusively for bluefish, but target a combination of species including croaker, mullet, Spanish mackerel, spot, striped bass, and weakfish. Recreational fishing, which dominates the catch of bluefish, is almost exclusively rod and reel, and includes shoreside recreational anglers, party/charter boats, and private recreational boats. There is a lot of seasonality to both the commercial and recreational fisheries for bluefish due to the migratory nature of the species.

TABLE 27. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUES OF BLUEFISH.

	Commercial Landings (lb)	Ex-vessel Value
2010	6,967,791	$2,854,798
2011	5,079,532	$2,989,883
2012	4,662,660	$3,124,340
2013	3,969,567	$2,832,099
2014	4,931,608	$3,130,052

TABLE 28. PRIMARY PORTS ASSOCIATED WITH THE BLUEFISH FISHERY (VALUES ARE AVERAGED FOR 2010-2014).

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
WANCHESE, NC	1,073,220	$483,262
POINT JUDITH, RI	365,423	$233,136
BARNEGAT LIGHT/LONG BEACH, NJ	351,052	$168,496
MONTAUK, NY	321,419	$265,638
HATTERAS, NC	271,449	$85,508
HAMPTON BAYS, NY	248,781	$192,241
POINT PLEASANT, NJ	172,826	$87,717

3.1.1.2 Atlantic Herring FMP

Atlantic herring are distributed along the Atlantic coast from North Carolina to the Canadian Maritime provinces. Schooling, or the formation of large aggregations for feeding and migration, is characteristic of herring species. This behavior begins as early as the onset of metamorphosis during larval development. Although herring schools are sometimes visible at the water's surface during the day, they typically undertake diurnal vertical migrations, sinking to the seafloor during the day and rising to the surface after dusk. Schools of adult herring make extensive migrations to areas where they feed, spawn, and overwinter.

Spawning occurs in the summer and fall, starting earlier along the eastern Maine coast and southwest Nova Scotia (August-September) than in the southwestern GOM (early to mid-October in the Jeffreys Ledge area) and GB (as late as November-December; Reid et al. 1999). In general, GOM herring migrate from summer feeding grounds along the Maine coast and on GB to SNE/MA areas during winter, with larger individuals tending to migrate farther distances. Presently, herring from the GOM (inshore) and GB (offshore) stock components are combined for assessment purposes into a single coastal stock complex.

Atlantic sea herring stocks were first managed in 1972 through the International Commission for the Northwest Atlantic Fisheries (ICNAF),[3] which regulated the high-seas international fishery. Upon implementation of the original Magnuson Fishery Conservation and Management Act in 1976, the NEFMC developed an FMP for herring. This FMP was implemented in late 1978; however, the FMP was withdrawn in 1982 due to concerns over the lack of enforcement of state waters quotas. In 1996, the Council began development of a new FMP for herring that was intended to closely coordinate Federal management with that of the ASMFC. This FMP was implemented in 2000.

The Atlantic Herring FMP established total allowable catches (TACs) for each of four management areas in the Gulf of Maine and Georges Bank. This FMP established requirements for vessel, dealer, and processor permits, as well as reporting requirements and restrictions on the size of vessels that can catch herring. Amendment 1 to the FMP was completed in 2006 and implemented a limited access qualification program, changes to management areas, and improved monitoring of catch. Amendment 2 to the FMP was part of the 2007 SBRM Omnibus Amendment. In 2011, Amendment 4 implemented a process for establishing ACLs and AMs in the herring fishery and brought the Herring FMP into compliance with the recently reauthorized Magnuson-Stevens Act.

Although some herring are caught incidentally in recreational fisheries for Atlantic mackerel and silver hake, this is limited to coastal New Jersey, and almost all herring are caught for commercial purposes. There are two primary uses of commercially-caught herring: As bait (in either the tuna fishery or the lobster fishery) or as a food fish. Other than tuna vessels catching their own herring to use as bait, almost all herring is caught with either midwater trawls (single and paired) or purse seines. The majority of herring landings are made with midwater trawls; purse seines accounted for approximately one-fifth to one-fourth of landings from 2008-2014. Herring is also targeted by small-mesh bottom trawl vessels.

While herring is caught over a wide range, there are seasonal patterns to the fishery. During the winter months (December-March), the fishery is most active in the coastal waters south of New England, as adult herring move into this area. The fishery generally moves offshore and into the Gulf of Maine as spring approaches, and by late summer or early fall, the fishery concentrates on the coastal waters of Maine, New Hampshire, and Massachusetts as herring move into these areas prior to spawning. The Georges Bank fishery is most active in summer and early fall. Table 29 lists recent landings, and Table 30 identifies the major herring ports.

[3] ICNAF formerly coordinated management of many fisheries off the east coast of North America. ICNAF lasted until 1979, when it was partly replaced by Northwest Atlantic Fisheries Organization (NAFO).

Table 29. Recent Commercial Landings and Ex-vessel Values of Atlantic Herring.

	Commercial Landings (lb)	Ex-vessel Value
2010	144,977,070	$18,367,932
2011	177,107,581	$23,274,094
2012	193,505,848	$26,508,368
2013	208,029,532	$29,867,601
2014	207,142,256	$29,043,286

Table 30. Primary Ports Associated with the Atlantic Herring Fishery (values are averaged for 2010-2014).

Primary Ports	Commercial Landings	Ex-vessel Value of Landings
PORTLAND, ME	44,303,973	$6,702,608
GLOUCESTER, MA	39,013,924	$5,198,761
NEW BEDFORD, MA	32,145,797	$2,816,966
ROCKLAND, ME	30,422,155	$4,683,919
POINT JUDITH, RI	8,690,315	$922,628

3.1.1.3 Atlantic Salmon FMP

Atlantic salmon are a migratory anadromous fish with a complex life history, going through several distinct phases marked by changes in physiology and behavior. Spawning and juvenile development of Atlantic salmon occur in fresh water New England streams, with adults undergoing a highly migratory life on the open ocean and returning to fresh water to reproduce. North American origin Atlantic salmon are either from migratory stocks, undergoing long ocean migrations, or resident stocks, with more limited ocean migrations. Northern Canadian stocks are residential, while New England stocks tend to be migratory, traveling vast distances across open ocean to feeding grounds off the coast of southwestern Greenland and later returning to their New England spawning grounds. Although rivers from Maine to Connecticut once supported healthy populations of Atlantic salmon, native Atlantic salmon have since become extirpated in all but a portion of Maine supporting the remaining Gulf of Maine Distinct Population Segment.

The NEFMC developed an FMP for Atlantic salmon that was implemented by NMFS in 1988. The FMP established explicit U.S. management authority over all Atlantic salmon of U.S. origin. The plan was intended to complement state management programs in coastal and inland waters and Federal management authority on the high seas (conferred to the U.S. as a signatory nation to the North Atlantic Salmon Conservation Organization).

The FMP prohibits possession of Atlantic salmon and any directed or incidental (bycatch) commercial fishery for Atlantic salmon in Federal waters. The Council's Atlantic salmon plan strengthens the efforts of local groups, such as the Connecticut River Atlantic Salmon Commission, that are working towards the restoration of salmon stocks in New England river systems. The first change to the Atlantic Salmon FMP, Amendment 1, was implemented in 1999 to designate essential fish habitat and provide for a framework adjustment mechanism related to aquaculture. Amendment 2 to this FMP was the 2007 SBRM Omnibus Amendment.

The Atlantic salmon fishery expanded during the late 1800s from a reported 183 weirs and nets capturing 7,320 salmon in 1867, to 230 weirs and 36 gillnets capturing over 10,016 salmon in 1880. The catch peaked in 1889 with over 17,000 salmon and began a steady decline during the 20th century, with landings falling to as low as 40 salmon in 1947 (Collette and Klein-MacPhee 2002). Because no reporting requirements were established for the fishery, landings data are incomplete. In 1989, all state and Federal commercial salmon fisheries in New England were closed by law. Recreational fishing for sea-run Atlantic salmon is currently prohibited in all New England States. A small local fishery is ongoing for captive reared domestic Atlantic salmon released into select rivers in Connecticut and New Hampshire; these fisheries are individually regulated by each State. In spite of the decline of wild salmon populations, Atlantic salmon remains an important fishery resource in New England through the development of fish farming efforts (aquaculture and mariculture). Salmon mariculture is especially important in Maine, where harvest of farmed Atlantic salmon typically averages between 10 to 12 million pounds and reached almost 25 million pounds in 2010.

3.1.1.4 Atlantic Sea Scallop FMP

The Atlantic sea scallop is a bivalve mollusk that is highly valued for the meat in the large adductor muscle that holds the top and bottom portions of the shell together. Sea scallops are semi-mobile, bottom dwelling organisms. They are most abundant on coarse sand, gravel, and cobble. Mature females are highly fecund and produce millions of eggs during the late summer and autumn months. The Atlantic sea scallop is managed as a single unit throughout its range in United States waters. Five stock components are recognized: The Gulf of Maine; eastern Georges Bank; the Great South Channel; the New York Bight; and the waters adjacent to Delaware, Maryland, and Virginia.

The Atlantic Sea Scallop FMP, prepared by the NEFMC, was implemented in 1982 to restore adult scallop stocks and reduce year-to-year fluctuations in stock abundance caused by variation in recruitment. Amendments 4 and 7 significantly reduced fishing effort by limiting access to the resource, instituting day-at-sea (DAS) allocations (limiting the number of days a vessel is allowed to fish for scallops each year), implementing gear restrictions to improve escapement of small scallops and finfish, and limiting crew size. Area closures in New England and the Mid-Atlantic and above-average recruitment have resulted in increased scallop biomass both within and outside of the Groundfish Closed Areas.

One of the foundations of the Scallop FMP is its area rotational management programs, established in 2004 under Amendment 10. Under this program, areas are defined and closed and reopened to fishing on a rotational basis, depending on the condition and size of the scallop resource in the areas. As a result of Amendment 10, controls on scallop effort differ depending on whether a fishing trip occurs in an access area or in an open area. Vessels either fish in access areas under allocated trips, or in open areas under DAS. Amendment 12 was the 2007 SBRM Omnibus Amendment, and Amendment 13 permanently re-activated the industry funded observer program in the same year. Amendment 11, implemented in 2008, included measures to control capacity and mortality in the general category scallop fishery. Primary measures included a limited entry program for general category vessels, as well as other permit provisions including an individual fishing quota program (IFQ). The most recent amendment, Amendment 15, introduced annual catch limits and accountability measures to the Scallop FMP in 2011, as required by the Magnuson-Stevens Act. Various frameworks have set annual or biennial scallop specifications and have included a variety of other management measures aimed at improving the effectiveness of the various aspects of scallop fishery management.

Under current regulations, the scallop fleet can be differentiated by vessel permit category: Limited access vessels that are subject to area-specific DAS controls and trip allocations; and limited access general category vessels that are not subject to DAS controls, but are subject to a possession limit per fishing trip. There are three types of limited access general category permits: IFQ permits with a possession limit of 600 lb per trip; Northern Gulf of Maine permits with a possession limit of 200 lb per trip; and incidental permits with a possession limit of 40 lb. per trip. The limited access and limited access general category scallop fleets receives a total allocation of 94.5 percent and 5 percent, respectively, of the scallop fishery's ACL, with the remaining 0.5 percent allocated to IFQ permits on vessels that have both limited access general category IFQ and limited access scallop permits. There are no open access permits in this fishery.

Another unique aspect of the Scallop FMP is its industry-funded observer program. Every year, 1 percent of the ACL allocated to the scallop fishery is set-aside to be used as compensation for limited access or limited access general category IFQ vessels that are assigned an observer in open or access areas. If a limited access vessel is assigned an observer while fishing on an open area DAS trip, it will accrue DAS at a reduced rate for the trip. For limited access vessels on access area trips, and IFQ vessels on any trip, vessels receive additional scallop catch above the possession limit on observed trips in order to pay for the observer. If the set-aside is exhausted in a given fishing year, vessel owners must continue to pay for observers assigned to their vessel without receiving any compensation. NMFS sets the compensation rates (i.e., the appropriate scallop lb/trip for each observed trip) at the start of each fishing year based on that year's observer set-aside allocation and closely monitors the set-aside usage each year to avoid fully harvesting it whenever possible.

Scallops are harvested primarily through the use of scallop dredges and trawls. In recent years (2007-2011), almost 98 percent of all scallop landings are by dredge vessels. During the 2007-2011 fishing years, trawl vessels landed another 1-2 percent, with other gear types contributing only trace amounts of scallop landings.

The Atlantic sea scallop fishery is rebuilt to sustainable levels, following declines in fishing mortality from effort reductions, gear restrictions, and closed areas, combined with above average recruitment in some areas and in multiple years since 1999. Revenues from commercial scallop landings for New England and Mid-Atlantic states in the year 2000 were estimated at $161 million. Increased landings since the early 2000's were made possible by an increase in scallop biomass and favorable recruitment. In recent years, total commercial landings have remained relatively constant while revenue has increased by over 50 percent (Table 31). The majority of limited access vessels are based in Massachusetts, Virginia, New Jersey, and North Carolina, and the primary scallop ports are located in New Bedford, MA, Cape May, NJ, and Newport News, VA (Table 32).

TABLE 31. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUES OF ATLANTIC SEA SCALLOPS.

	Commercial Landings (lb)	Ex-vessel Value
2010	57,060,115	$450,801,783
2011	58,900,068	$582,252,024
2012	57,131,552	$559,565,071
2013	41,203,699	$466,710,023
2014	33,895,977	$424,489,183

TABLE 32. PRIMARY PORTS ASSOCIATED WITH THE SEA SCALLOP FISHERY (VALUES ARE AVERAGED FOR 2010-2014). *DATA EXCLUDED FOR CONFIDENTIALITY.

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
NEW BEDFORD, MA	27,888,156	$285,450,065
CAPE MAY, NJ	5,913,650	$55,983,038
NEWPORT NEWS, VA	3,187,051	$28,824,513
BARNEGAT LIGHT/LONG BEACH, NJ	2,019,534	$20,801,691
SEAFORD, VA	*	*

3.1.1.5 Deep-Sea Red Crab FMP

The deep-sea red crab is a deep-water brachyuran crab that occurs in a patchy distribution on the continental shelf and slope from Nova Scotia to Florida. Though the species is found primarily within a 200-1800 meter depth band along the continental shelf and slope, red crabs have also been located in some deep-water canyons along the shelf and can also be found in the Gulf of Maine. Preferred depth depends, in part, on the characteristics of individual crabs. Young crabs dwell in considerably deeper water than adults and males are typically found deeper than females. The red crab is a slow-growing species that may not spawn annually. It is long-lived, with some individuals surviving for up to 15 years. These characteristics make it particularly susceptible to depletion by overfishing.

There has been a small directed fishery off the coast of New England and in the Mid-Atlantic for deep-sea red crab since the early 1970s. Though the size and intensity of this fishery has fluctuated, it has remained consistently small relative to more prominent New England fisheries such as groundfish, sea scallops, and lobster. Landings increased substantially after 1994, when implementation of Amendment 5 to the Northeast Multispecies FMP may have led some fishing effort to redirect onto "under-exploited" fishery resources such as red crab.

In 1999, at the request of members of the red crab fishing industry, the NEFMC began development of an FMP to prevent overfishing of the red crab resource and address a threat of overcapitalization of the red crab fishery. A control date was established in 2000 to discourage "speculative entry," or rapid entry of new vessels into the fishery and, in 2001, NMFS implemented emergency regulations to prevent overfishing of the resource during the time the FMP was being developed. The FMP was implemented in 2002. The primary management control was to establish a limited access permit program for qualifying vessels with documented history in the fishery. Other measures implemented under the FMP included DAS limits, trip limits, gear restrictions, and limits on processing crabs at sea. Framework Adjustment 1 provided for a 3-year, rather than annual, specification-setting process. Amendment 3 was implemented in 2011 to bring the FMP into compliance with the revised Magnuson-Stevens Act by implementing annual catch limits and accountability measures. Amendment 3 also revised the management measures, by eliminating DAS and the vessel trip limit. The directed, limited access red crab fishery is a male-only fishery, that is currently managed with a "hard" quota (i.e., the fishery is closed when the quota is reached), gear restrictions, and limits on processing crabs at sea.

Although there is an open access permit category, the small possession limit of 500 lb per trip has kept this sector of the fishery very small. The directed red crab fishery is limited to using parlor-less crab pots, and is considered to have little, if any, incidental catch of other species. There is no known recreational fishery for deep-sea red crab. Landings of red crab varied somewhat before the implementation of the FMP, but have stabilized since (see Table 33). All vessels with limited access permits now fish out of Fall River, MA.

TABLE 33. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUES OF DEEP-SEA RED CRABS. *DATA EXCLUDED FOR CONFIDENTIALITY.

	Commercial Landings (lb)	Ex-vessel Value
2010	3,124,311	$3,060,452
2011	3,607,148	$3,492,893
2012	*	*
2013	*	*
2014	*	*

3.1.1.6 Mackerel, Squid, and Butterfish FMP

Atlantic mackerel, *Illex* and longfin squid, and butterfish are all schooling pelagic species that range from at least the Gulf of St. Lawrence south to at least Cape Lookout, NC.[4] Butterfish and the two squids are fast-growing, short-lived species, while Atlantic mackerel grows more slowly and lives several years longer. All four species are most abundant from Georges Bank to Cape Hatteras, NC, and follow seasonal migration patterns based largely on water temperature. Longfin inshore squid was previously referred to as *Loligo* squid. Due to a recent change in the scientific name of longfin inshore squid from *Loligo pealeii* to *Doryteuthis (Amerigo) pealeii*, the common name ''longfin squid'' is now used in all official documents to avoid confusion.

The FMP was developed by the MAFMC and was implemented in 1983. Early amendments to the FMP changed permit and reporting requirements, the fishing year, quota adjustment mechanisms, foreign fishing and joint venture provisions, and implemented limited access systems for butterfish and the two squid fisheries. In recent years, amendments have been implemented to rebuild the butterfish stock and address bycatch in the longfin squid fishery (Amendment 10, in 2010), limit access in the mackerel fishery (Amendment 11, in 2011), and establish ACLs and AMs for the mackerel and butterfish fisheries (Amendment 13, in 2012). Amendment 12 to this FMP was the 2007 SBRM Omnibus Amendment. Amendment 14, in 2014, improved monitoring in the mackerel, squid, and butterfish fisheries and developed measures to reduce river herring and shad bycatch. Amendment 15 was intended to add river herring and shad as stocks in the Mackerel, Squid, and Butterfish FMP, but the Council determined not to pursue this action. Other amendments are currently under development to address interactions with deep-sea corals (Amendment 16), and to address latent effort in the squid fishery.

The mackerel, squid, and butterfish fisheries are all managed by directly controlling harvest. The directed mackerel fishery can be closed when landings are projected to reach 95 percent of the total domestic harvest. The mackerel incidental catch fishery can be closed when landings are projected to reach 100 percent of the total domestic harvest. The directed longfin squid fishery is managed via trimester quota allocations and the directed fishery is closed when 90 percent of the trimester quota allocations or 95 percent of the total domestic harvest is projected to be landed. There is also a cap on butterfish discards in the longfin squid fishery that is allocated by trimester, and closes the longfin squid fishery to directed harvest once it has been exceeded. The directed *Illex* fishery closes when 95 percent of the total domestic harvest is projected to be landed. Finally, the butterfish possession limit is reduced when annual landings have reached a limit that is 1,411 mt less than the total domestic harvest, and the fishery is closed when the total

[4] Atlantic mackerel ranges from the Gulf of St. Lawrence to Cape Lookout, NC; *Loligo* squid ranges from Newfoundland to the Gulf of Venezuela; *Illex* squid ranges from the Labrador Sea to the Florida Straits; and butterfish range from the Gulf of St. Lawrence to the coast of Florida.

domestic harvest has been landed. During closures of the directed longfin squid, *Illex*, or butterfish fisheries, incidental catch fisheries for these species are permitted.

Although 1.5 percent of butterfish landed from 2007-2011 were reported as caught with gillnets, and trace amount of these species were reported as caught with a variety of fishing gears, more than 98 percent of reported landings of all four species during this period were caught with otter trawls (midwater and bottom). Management measures implemented under this FMP restrict only the commercial fishing sectors, although there is a recreational fishery for Atlantic mackerel.

Fishing for Atlantic mackerel occurs year-round, although most fishing activity occurs from January through April. The *Illex* squid fishery occurs largely from June through October, although this can vary somewhat from year to year. In some years, the longfin squid fishery remains relatively consistent throughout the year, but in most years, landings peak during October through April. Butterfish are landed year-round, with no apparent seasonal patterns. Table 34 and Table 35 identify the recent landings, ex-vessel value, and primary ports for these fisheries.

TABLE 34. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUES IN THE ATLANTIC MACKEREL, BUTTERFISH, AND SQUID FISHERIES.

	Atlantic mackerel		Butterfish		*Illex* squid		Longfin squid	
	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)	Commercial Landings (1,000 lb)	Ex-vessel Value ($1,000)
2010	21,775	3,808	1,270	836	34,887	11,459	14,878	15,811
2011	1,170	401	1,463	1,141	41,440	18,976	21,049	24,872
2012	11,756	3,879	1,410	1,034	25,813	10,630	28,222	31,339
2013	9,119	1,773	2,382	1,621	8,359	2,343	24,667	26,434
2014	13,178	2,991	6,923	4,596	19,332	5,856	26,564	25,954

TABLE 35. PRIMARY PORTS ASSOCIATED WITH THE ATLANTIC MACKEREL, BUTTERFISH, AND SQUID FISHERIES (VALUES ARE AVERAGED FOR 2010-2014). *DATA EXCLUDED FOR CONFIDENTIALITY

Atlantic mackerel		Butterfish		*Illex* squid		Longfin squid	
Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value
NEW BEDFORD, MA	$487,918	NORTH KINGSTOWN, RI	$715,128	CAPE MAY, NJ	$4,467,948	POINT JUDITH, RI	$9,441,237
GLOUCESTER, MA	$486,364	POINT JUDITH, RI	$381,804	NORTH KINGSTOWN, RI	*	CAPE MAY, NJ	$2,885,825
NORTH KINGSTOWN, RI	*	MONTAUK, NY	$293,912	HAMPTON, VA	*	MONTAUK, NY	$3,575,063
CAPE MAY, NJ	$168,671	NEW BEDFORD, MA	$83,127	WANCHESE, NC	$114,807	NORTH KINGSTOWN, RI	$2,177,443
PORTLAND, ME	$118,672	STONINGTON, CT	$42,241	POINT JUDITH, RI	$163,069	HAMPTON BAYS, NY	$2,081,842

3.1.1.7 Monkfish FMP

The monkfish (also known as goosefish) is a member of the anglerfish family Lophiidae, fishes distinguished by an appendage on the head known as the illicium which has a fleshy end (esca) that acts as a lure to attract prey to within range of its large mouth. Monkfish have a large, bony head and are harvested for their livers and the tender meat in their tails. The species is distributed widely throughout the Northwest Atlantic, from the northern Gulf of St. Lawrence to Cape Hatteras, NC, and is known to inhabit waters from the tide-line to depths as great at 840 meters across a wide range of temperatures.

Adults have been found on a variety of substrate types including hard sand, gravel, broken shell, and soft mud. Spawning occurs in May and June from Cape Hatteras to southern New England. Mature females, which are slightly larger than males, produce a non-adhesive, mucoid egg raft or veil which can reach 20-40 feet in length and ½-5 feet in width. During spawning, this large mass of eggs can account for up to 50 percent of a female's body mass. Monkfish are managed as two stocks, a northern stock from Maine to Cape Cod, MA, and a southern stock from Cape Cod to North Carolina.

During the early 1990s, fishermen and dealers in the monkfish fishery addressed both the New England and MAFMCs with concerns about the increasing amount of small fish being landed, the increasing frequency of gear conflicts between monkfish vessels and those in other fisheries, and the expanding directed trawl fishery. In response, the Councils developed a joint FMP that was implemented in 1999. The FMP was designed to stop overfishing and rebuild the stocks through a number of measures, including: Limiting the number of vessels with access to the fishery and allocating DAS to those vessels; setting trip limits for vessels fishing for monkfish; minimum fish size limits; gear restrictions; mandatory time out of the fishery during the spawning season; and a framework adjustment process.

Reported landings of monkfish increased dramatically from the late 1970s until the mid-1990s and have remained high (Table 36). Burgeoning markets for monkfish tails and livers in the 1980s allowed fishermen to fish profitably for monkfish, landing increasingly smaller monkfish as the stocks became depleted. Since the implementation of the FMP, however, vessels are more commonly landing large, whole monkfish for export to Asian markets. Revenues have generally increased since the mid-1980s and the relative value of monkfish is currently at its highest point since 1996 (Table 36 and Table 37).

TABLE 36. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUES OF MONKFISH.

	Commercial Landings (lb)	Ex-vessel Value
2010	8,840,157	$19,210,647
2011	10,647,111	$26,589,688
2012	11,505,017	$27,133,777
2013	9,844,989	$18,708,988
2014	9,549,031	$19,047,301

TABLE 37. PRIMARY PORTS ASSOCIATED WITH THE MONKFISH FISHERY (VALUES ARE AVERAGED FOR 2010-2014).

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
NEW BEDFORD, MA	1,874,329	$4,697,797
GLOUCESTER, MA	1,053,099	$3,127,155
BARNEGAT LIGHT/LONG BEACH, NJ	1,004,247	$1,951,212
POINT JUDITH, RI	900,255	$2,028,754
BOSTON, MA	591,428	$1,802,295
CHATHAM, MA	544,087	$925,923
MONTAUK, NY	541,351	$939,915
LITTLE COMPTON, RI	530,971	$796,790
NEW LONDON, CT	431,321	$707,725

The majority of commercial landings are made using gillnets (67 percent) with another 26 percent landed by otter trawls (according to the VTR database, 2007-2011). Scallop dredges also catch monkfish, but in much smaller amounts (7 percent of reported landings, 2007-2011). No other gear types account for more than trace landings of monkfish. There is no recreational component to this fishery.

The Monkfish FMP has been modified by three amendments and 7 framework adjustment actions since 1999. Amendments have implemented more substantial changes to the FMP, while framework adjustments implement less substantive revisions to existing measures, or specify annual catch levels. Amendment 1 implemented the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Act in 1999. Amendment 2, implemented in 2005, included restrictions on otter trawls in certain areas, made the minimum fish size consistent in all areas, closed two offshore canyons to monkfish fishing, created a monkfish research DAS set-aside program, and created new permit categories for fishing in designated areas, among other measures. Amendment 3 was the 2007 SBRM Omnibus Amendment. In 2011, Amendment 5 implemented a process to establish acceptable biological catch amounts and annual catch limits, along with accountability measures to prevent overfishing if such catch limits are exceeded, to bring the FMP into compliance with the Magnuson-Stevens Reauthorization Act. Framework adjustments have generally specified appropriate fishing measures (DAS and trip limits) for each management area to achieve, but not exceed annual catch targets.

3.1.1.8 Northeast Multispecies FMP

Sixteen species of groundfish are managed under this FMP. Thirteen species are managed as part of the large-mesh complex, based on fish size and type of gear used to harvest the fish, and five species are managed under a separate small-mesh multispecies FMP. While these eighteen groundfish species exhibit unique body types, behaviors, and habitat preferences, all are demersal, living near the bottom and feeding on benthic organisms. Groundfish are found throughout New England waters, from the Gulf of Maine to southern New England.

In 1977, the NEFMC's first groundfish FMP, including only cod, haddock, and yellowtail flounder, was implemented. This plan was primarily developed by NMFS and its individual species quotas were a continuation of the International Commission for the Northwest Atlantic quota-based management system. Although the quotas did reduce the catch of these species, the system had a number of serious flaws. Because there was no limit on the number of participants, the number of vessels increased dramatically as the stocks improved between 1977 and 1980. The increasing number of vessels caught the quota in less time causing the fishery to be closed more frequently and for longer periods of time. The quotas forced vessels to catch fish as fast as possible to get the largest possible share before the fishery was closed (known as a "derby" fishery). In 1977, the Gulf of Maine cod quota was taken in 5 months and the Georges Bank quota was caught in 6 months.

The Council implemented a system of individual vessel trip limits that helped to prevent long closures that disrupted market supplies. This action was also intended to mitigate the derby fishery, which caused safety concerns, and to give small boats a greater chance to catch a share of fish proportional to their traditional participation levels. Limits were set for each species and stock area for each of three vessel categories. Because of problems associated with data reliability, enforcement, and equity among the vessel sectors, the Council eliminated the quota-based management system when it adopted the Interim Groundfish FMP in 1982. This plan replaced the catch quotas with minimum fish size and codend mesh size regulations for Georges Bank and the Gulf of Maine. It also allowed small-mesh fishing to continue throughout the Gulf of Maine. Closed areas intended to protect spawning haddock were left in place.

What we now consider the Northeast Multispecies FMP was implemented in 1986. It was the first plan in the world to set biological targets in terms of maximum spawning potential. This mechanism allows the Council to meet its biological objectives either by increasing the age-at-first capture (size of fish caught) or by controlling fishing mortality. The plan also greatly expanded the number of species included in the management unit. In its first year, the plan set minimum fish sizes for some species and changed minimum fish sizes for others. The plan also enlarged one of the haddock spawning closed areas, Area I, and established a large closed area off of southern New England to protect spawning yellowtail and to help reduce fishing mortality. The Exempted Fisheries Program substantially reduced the area and time period available for small-mesh fishing in the Gulf of Maine.

In 1987, the Council adopted Amendment 1 to the FMP, which decreased the area for the silver hake exempted fishery, increased the large-mesh area to include some important yellowtail flounder grounds to the south, and tightened existing mesh size regulations and regulations for the southern New England yellowtail flounder area. Amendment 2 eliminated a scheduled increase in codend mesh size, and implemented the following measures: (1) Trip bycatch limits and stricter non-reporting penalties in the Exempted Fisheries Program; (2) increased some minimum fish sizes; (3) established a seasonal large-mesh area on Nantucket Shoals to protect cod; (4) applied mesh size regulations to the whole nets rather than only to the codend; (5) set all recreational minimum sizes to be consistent with commercial minimum sizes; and (6) excluded trawlers from Closed Area II during the closure to improve enforcement of the closure.

Amendment 3, implemented in 1989, established the Flexible Area Action System. Its purpose was to enable the Council and NMFS to respond quickly to protect large concentrations of juvenile, sub-legal (smaller than the minimum legal size) and spawning fish. Amendment 4 was implemented in 1991 and added more restrictions to the Exempted Fisheries Program; established a procedure for the Council to make recommendations for modifying northern shrimp gear to reduce the bycatch of groundfish; expanded the management unit to include silver hake, ocean pout, and red hake; established management measures for the Cultivator Shoals silver hake fishery; further tightened restrictions on the carrying of small mesh while fishing in the Regulated Mesh Area; and established a minimum mesh size in the southern New England yellowtail flounder area.

Amendment 5 was implemented in 1994 to address the overfishing of principal groundfish stocks that occurred in the late 1980s and early 1990s and reflected a significant turning point in the management of the Northeast multispecies fishery. Amendment 5 established a moratorium on new vessel permits during the rebuilding period (creating the current limited access permit system based on history in the fishery), implemented a DAS effort reduction program (the first of its kind), added additional mesh size restrictions, and also included interim gillnet regulations to reduce harbor porpoise bycatch, a mandatory vessel trip reporting system for landings, a prohibition on pair-trawling, a requirement for a finfish excluder device for shrimp fishery, changed some minimum fish sizes, and expanded the size of Closed Area II. Amendment 6 followed shortly after to implement additional haddock conservation measures.

Amendment 7, implemented in 1996, accelerated the DAS effort reduction program established in Amendment 5, eliminated significant exemptions from the current effort control program, provided incentives to fish exclusively with mesh larger than the minimum required, broadened the area closures to protect juvenile and spawning fish, and increased the haddock possession limit. It established a rebuilding program for Georges Bank and Southern New England yellowtail flounder, Georges Bank and Gulf of Maine cod, and Georges Bank haddock based primarily on DAS controls, area closures, and minimum mesh size. Additionally, the amendment changed existing permit categories and initiated several new ones, including an open access multispecies permit for limited access sea scallop vessels. Amendment 7 also created a program for reviewing the management measures annually and making changes to the regulations through the framework adjustment process to insure that plan goals would be met.

Amendment 8 was implemented to address gear conflict issues between the mobile gear participants of the groundfish and scallop fisheries and the fixed gear participants of the lobster fishery. Amendment 9 established new status determination criteria (overfishing definitions) and set optimum yield for twelve groundfish species to bring the plan into compliance with the Sustainable Fisheries Act. Amendment 9 also added Atlantic halibut to the FMP's management unit. Amendment 10, known as the "consistency amendment," was developed to make the vessel upgrading and replacement provisions consistent across all New England and MAFMC FMPs. Amendment 11 addressed the Sustainable Fisheries Act EFH requirements. Amendment 12 addressed the Sustainable Fisheries Act requirements for silver hake, red hake, and offshore hake through a separate small-mesh multispecies management program implemented in 2000.

In addition to the amendments implemented prior to Amendment 13, the FMP was modified through a number of framework adjustments designed to achieve the Amendment 7 fishing mortality targets or to fulfill the requirement for annual adjustments to management measures. Several joint frameworks with the Sea Scallop FMP were implemented to provide scallop vessels access to the groundfish closed areas. Frameworks 32, 35, 37, and 38 instituted additional changes to management of the small-mesh fishery, including several new small-mesh gear exemption areas and elimination of default rebuilding measures.

The Council began work on Amendment 13 in February 1999. The purpose for this amendment included a need to develop rebuilding programs to meet the Amendment 9 status determination criteria and to address problems identified with the effort control program (DAS). After this amendment was begun, the Council submitted Framework 33 to meet the Amendment 7 requirement for an annual adjustment to the FMP. This framework was implemented May 1, 2000. On May 19, 2000, a coalition of conservation organizations challenged Framework 33 alleging that it failed to implement programs necessary to rebuild groundfish stocks to the Amendment 9 targets and did not meet bycatch requirements of the Magnuson-Stevens Act (*Conservation Law Foundation et al*. v. *Evans et al*.). The Court found in favor of the plaintiffs on December 28, 2001. After a series of negotiations among various parties, interim measures were adopted by the Court in 2002 and NMFS was instructed to submit a management plan that complied with the Magnuson-Stevens Act. Amendment 13–already in development–was recognized as the most appropriate vehicle to meet the Court's requirement.

Amendment 13 was implemented in 2004, and included several new management features. The amendment classified multispecies DAS into three categories (unrestricted A DAS, restricted use B DAS, and C DAS, which cannot be used at this time); enables the Council to create/allow "special access programs" (SAPs)[5] for healthy stocks, such as Georges Bank haddock; allows sectors of the groundfish fishing industry to develop their own sector allocation plan; includes an adaptive approach for rebuilding groundfish stocks that requires biennial adjustments to management measures; and implements several provisions of the U.S./Canada Resource Sharing Understanding.[6] Since Amendment 13 was implemented, several framework adjustments have been developed to modify, fully implement, and/or comply with various provisions of Amendment 13. Several environmental groups challenged Amendment 13, claiming that the rebuilding programs did not comply with the Magnuson-Stevens Act, the management measures would be ineffective, an SBRM was not included, and the amendment did not consider a sufficiently broad range of alternatives. The Court upheld the amendment with the exception of the reference to the SBRM.

Amendment 16 was implemented May 1, 2010, and provided major changes in the realm of groundfish management. Notably, it greatly expanded the sector program and implemented Annual Catch Limits in compliance with 2006 revisions to the Magnuson-Stevens Act. As a result of this amendment, about 95 percent of the fishery chose to operate in a form of cooperative referred to as a sector, subject to strict limits on catch. These vessels are not subject to trip limit or days-at-sea controls. This management system drastically changed the way the fishery operates. At the time of its implementation, Amendment 16 was expected to reduce bycatch as it reduces regulatory discards. Possession of some species was prohibited to reduce catches (ocean pout, windowpane flounder, wolffish, SNE/MA

[5] There are three SAPs currently in place: The Closed Area I Hook Gear Haddock SAP is open to NE multispecies DAS vessels fishing with hook gear in a portion of Closed Area I; the Eastern U.S./Canada Haddock SAP Pilot Program is open to NE multispecies DAS vessels using a haddock "separator" trawl in portions of the Eastern U.S./Canada Area and Closed Area II; and the Closed Area II Yellowtail Flounder SAP is open to NE multispecies DAS vessels fishing for yellowtail flounder in the southern portion of Closed Area II.

[6] The U.S./Canada Resource Sharing Understanding (Understanding) was reached between the United States and Canada regarding the management of Georges Bank cod, Georges Bank haddock, and Georges Bank yellowtail flounder resources found within the waters of both countries in an area known as the U.S./Canada Management Area. Amendment 13 implements certain measures consistent with the Understanding, including a requirement to use VMS, an area declaration requirement, and specific gear requirements (flatfish net or haddock separator trawl).

winter flounder). The amendment also included a host of mortality reduction measures for "common pool" (i.e., non-sector) vessels and the recreational component of the fishery.

The NEFMC developed Amendment 19 with the initial goal of bringing the small-mesh multispecies portion of the NE Multispecies FMP into compliance with the ACL and AM requirements of the reauthorized Magnuson-Stevens Act. However, development of Amendment 19 was delayed for several reasons, so NMFS implemented ACLs and AMs for the small-mesh multispecies in 2012 through a Secretarial Amendment. The Council continued development of Amendment 19 in order to adopt the ACL framework used by the Secretarial Amendment, as well as to modify other management measures for the small-mesh multispecies fishery. The management measures in the Secretarial Amendment and Amendment 19 include an incidental trip limit trigger to prevent the ACL from being exceeded, a year-round trip limit for red hake, and the potential to implement a quarterly quota system in the southern area, should landings increase rapidly. Because these species are caught incidentally in many fisheries, landings are never prohibited if a quota is projected to be reached, just reduced to an incidental limit to discourage directed fishing. In general, the small-mesh multispecies portion of the fishery is managed using mesh-size dependent trip limits for whiting (silver and offshore hake, combined), area restrictions on small-mesh, and a new year-round trip limit for red hake.

The NE Multispecies FMP has been modified through a number of framework adjustments designed to achieve fishing mortality targets or to fulfill the requirement for annual adjustments to management measures. Several joint frameworks with the Atlantic Scallop FMP were implemented to provide scallop vessels access to the groundfish closed areas. Frameworks 32, 35, 37, and 38 each instituted additional changes to management of the small-mesh fishery, including several new small-mesh gear exemption areas and elimination of default rebuilding measures.

There are a variety of fishing gears used in the commercial groundfish fishery. Otter trawls are the primary gear type used for all species in both the large-mesh and small-mesh complexes and flatfish and silver hake are caught almost exclusively with otter trawls. Based on VTR data for 2007-2011, gillnets contribute substantial amounts of Atlantic cod, pollock, redfish, and white hake. Other gears identified in the FVTR data associated with landings of groundfish include handlines, longlines, and fish pots. Recreational fishing for groundfish is focused primarily Atlantic cod, pollock, haddock, red hake, and winter flounder. Recreational fishing is conducted by shore-based anglers and anglers with private boats, as well as by anglers aboard party/charter vessels. See below for recent commercial landings of large-mesh (Table 38) and small-mesh (Table 40) multispecies, aggregated across the complexes. Table 39 and Table 41 identify the primary ports associated with the large-mesh and small-mesh multispecies complexes, respectively, along with the average recent landings and ex-vessel values for each of the primary ports.

Table 38. Recent Commercial Landings and Ex-vessel Values of Large-mesh Multispecies (aggregated).

	Commercial Landings (lb)	Ex-vessel Value
2010	62,165,855	$85,239,958
2011	63,161,506	$91,237,378
2012	55,095,497	$82,169,154
2013	44,894,643	$63,362,159
2014	48,139,099	$65,853,590

Table 39. Primary Ports Associated with the Large-mesh Multispecies Fishery (values are aggregated and averaged for 2010-2014).

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
GLOUCESTER, MA	17,615,768	$24,212,104
NEW BEDFORD, MA	17,037,387	$24,821,492
BOSTON, MA	8,903,765	$11,379,312
PORTLAND, ME	3,679,354	$5,199,408
POINT JUDITH, RI	1,148,478	$1,946,519

Table 40. Recent Commercial Landings and Ex-vessel Values of Small-mesh Multispecies (aggregated).

	Commercial Landings (lb)	Ex-vessel Value
2010	19,072,767	$11,550,525
2011	18,347,731	$11,584,240
2012	17,674,293	$11,329,843
2013	14,872,507	$9,318,464
2014	17,495,471	$12,030,911

Table 41. Primary Ports Associated with the Small-mesh Multispecies Fishery (values are aggregated and averaged for 2010-2014).

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
NEW BEDFORD, MA	6,263,913	$3,816,393
POINT JUDITH, RI	3,092,415	$1,600,930
MONTAUK, NY	2,710,013	$2,055,788
NEW LONDON, CT	1,376,807	$1,079,459
GLOUCESTER, MA	1,082,682	$742,413

3.1.1.9 Northeast Skate FMP

There are seven species included in the Northeast skate complex: Barndoor skate, clearnose skate, little skate, rosette skate, smooth skate, thorny skate, and winter skate. The Northeast skate complex is distributed along the coast of the northeastern United States from near the tide line to depths exceeding 700 meters. Within the complex, the ranges of the individual species vary. The center of distribution for little and winter skates is Georges Bank and southern New England. Barndoor skate is most common in the offshore Gulf of Maine, on Georges Bank, and in southern New England. Thorny and smooth skates are commonly found in the Gulf of Maine. Clearnose and rosette skates have a more southern distribution, and are found in southern New England and the Chesapeake Bight. Skates are not known to undertake large-scale migrations, but they do move seasonally in response to changes in water temperature, moving offshore in summer and early autumn and returning inshore during winter and spring.

A Northeast Skate Complex FMP was developed by the NEFMC and was implemented in 2003. The regulations implementing the FMP require the Council to monitor the status of the subject skates and the fishery on an annual basis. The initial regulations under the FMP included the following: Permit requirements for vessels possessing skates and dealers purchasing skates; reporting requirements; a possession limit for skate wings; an exemption from the wing possession limit for vessels fishing only for skates for the bait market; and prohibitions on the possession of smooth skates from or in the Gulf of Maine, and barndoor and thorny skates throughout their range. The original FMP also incorporated a baseline of management measures implemented under other FMPs (Northeast Multispecies, Sea Scallops, and Monkfish) that directly or indirectly control fishing effort on skates. Any proposed changes to these FMPs that could result in an increase in fishing effort on skates were required to first undergo a “skate baseline review” to determine whether, and to what degree, the change may have an impact on skate conservation. The FMP was developed, in part, to collect more complete and accurate information on the catch and disposition of skates in Northeast fisheries, at the species level. Stock assessments and efforts to manage fishing mortality have been hampered by a lack of species-specific catch information. The first amendment to the Skate FMP was the 2007 SBRM Omnibus Amendment.

Amendment 3 to the Skate FMP was implemented in 2010, to establish ACLs and AMs for the skate complex as required by the re-authorized Magnuson-Stevens Act, and to implement measures to rebuild overfished skate stocks. Amendment 3 implemented a stock complex ACL for skates, but created separate landing quotas for the skate wing and bait fisheries, and reduced the skate wing and bait possession limits. The skate bait fishery annual total allowable landings were divided into three separate seasonal quotas to maintain year-round supply of bait. AMs would be triggered if the total allowable landings or ACL were exceeded. Amendment 3 also replaced the skate baseline review with annual review and specification procedures. Framework Adjustment 1 to the Skate FMP was subsequently implemented in 2011, to further reduce the skate wing possession limits, and adjust the in-season trigger of the incidental possession limit. Skates are harvested for two very different commercial markets—one market supplies whole skates to be used as bait in the lobster fishery, and one market supplies skate wings for human consumption. The skate bait fishery is a directed fishery and is more traditional, involving vessels primarily from southern New England ports that target a combination of little skates (>90 percent) and, to a much lesser extent, juvenile winter skates (<10 percent). The vessels supplying skates for the bait market tend to make dedicated trips targeting skates and land large quantities of skates per trip.

The skate wing fishery developed in the 1990s when skates were promoted as "underutilized species," and fishermen shifted effort from groundfish and other fisheries to skates and spiny dogfish. The wing fishery is largely an incidental catch fishery that involves vessels that also participate in the groundfish and/or monkfish fisheries. Although some vessels will make trips specifically targeting winter skates for the wing market, most skates caught for this market are retained by vessels engaged in other fisheries. Most skates are caught using an otter trawl (according to the VTR) database for 2007-2011, almost 65 percent of landings were from an otter trawl), although gillnets are also used (the remaining 35 percent of 2007-2011 landings were from gillnets). Small amounts of landings are associated with hook and line gear and scallop dredges.

Even though skates are now managed under a Federal FMP, reported landings remain incomplete at the species level. Although some skates are caught by recreational fishermen, recreational landings of skates are negligible both in the context of all recreational fisheries and in the context of the overall skate fisheries. Thus, Table 42 reports recent commercial landings and the ex-vessel value of skates aggregated across all species. Table 43 identifies the primary ports associated with the skate fishery.

TABLE 42. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUES OF SKATES (AGGREGATED).

	Commercial Landings (lb)	Ex-vessel Value
2010	24,581,085	$7,624,482
2011	22,345,312	$8,425,052
2012	22,968,345	$7,937,143
2013	20,377,800	$7,303,131
2014	21,394,736	$9,623,271

TABLE 43. PRIMARY PORTS ASSOCIATED WITH THE SKATE FISHERY (2010-2014 VALUES ARE AVERAGED). *DATA EXCLUDED FOR CONFIDENTIALITY.

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
POINT JUDITH, RI	7,382,750	$1,415,613
NEW BEDFORD, MA	3,050,385	$1,642,701
CHATHAM, MA	2,822,778	$1,634,998
NEWPORT, RI	2,440,504	$497,633
FALL RIVER, MA	*	*

3.1.1.10 Spiny Dogfish FMP

Spiny dogfish are the most abundant sharks in the western North Atlantic, and range from Labrador to Florida, although they are most abundant from Nova Scotia to Cape Hatteras, North Carolina. Spiny dogfish are highly migratory, often traveling in large troops, and they move northward in the spring and summer and southward in the fall and winter. Spiny dogfish are known to be opportunistic predators, consuming whatever prey are readily abundant in their environment, including pelagic and benthic invertebrates and fishes. Although dogfish have a varied diet, most of what they eat are invertebrates (ctenophores in particular) and a recent study of 40,000 stomachs found that less than 1 percent of their diet was composed of principal groundfish species (Link et al. 2002).

In spite of their large numbers and opportunistic feeding, spiny dogfish, like many elasmobranches, suffer from several reproductive constraints. Females may take 7-12 years to reach maturity, growing more than one-third larger than their mature male counterparts before becoming sexually mature. Fertilization and egg development are internal, and gestation takes roughly 2 years, resulting in litters that usually average 6-7 dogfish "pups." As a result of these factors (long time to maturity, long gestation periods, and low fecundity), spiny dogfish are vulnerable to overfishing, particularly if fishing activities focus on the largest individuals, which are almost all mature females.

As a result of increased fishing pressure, spiny dogfish were classified as overfished in 1998. The Mid-Atlantic and NEFMCs jointly developed an FMP for spiny dogfish. This plan was partially approved in 1999 and implemented in 2000 and the management measures included an overall commercial quota, allocated into two semiannual periods; restrictive trip limits; a prohibition on finning; an annual quota adjustment process; and permit and reporting requirements. The Atlantic States Marine Fisheries Commission implements complementary management measures for spiny dogfish in state waters. The most significant effect of the original FMP measures was the elimination of the directed dogfish fishery in Federal waters.[7] Framework Adjustment 1 to the FMP, implemented in 2006, provided for a multi-year, rather than annual, specification-setting process. Framework Adjustment 2, implemented in 2009, adjusted the FMP to allow for more efficient implementation of new scientific information on stock status and biological reference points. The spiny dogfish stock was officially declared to be rebuilt in 2010, and commercial quotas have been significantly increased in recent years. Amendment 1 to the Spiny Dogfish FMP was the 2007 SBRM Omnibus Amendment. Amendment 2 was implemented in 2011 to bring the FMP into compliance with the revised Magnuson-Stevens Act by implementing annual catch limits and accountability measures.

By far most spiny dogfish landings are the result of commercial fishing activities, as reported recreational landings comprise less than 2 percent of the total catch. Sink gillnets, bottom longlines, and bottom otter trawls are the primary commercial fishing gears that catch spiny dogfish and these three gear types accounted for 97 percent of all dogfish landed in 2007-2011. Over the last several years, commercial landings ranged from 6.6 million lb in 2007 up to as 20.9 million lb in 2011 (see Table 44). For fishing years 2007-2011 combined, the Massachusetts ports had the most commercial landings (42.5 percent), with another 19 percent made in Virginia, and 10 percent in New Hampshire. Table 45 identifies the primary ports of spiny dogfish landings from 2007 to 2011.

TABLE 44. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUES OF SPINY DOGFISH.

	Commercial Landings (lb)	Ex-vessel Value
2010	12,141,697	$2,499,603
2011	20,901,761	$4,549,273
2012	23,335,350	$5,005,201
2013	16,023,231	$2,399,488
2014	23,711,400	$4,080,792

[7] Directed fishing for spiny dogfish continued in state waters until 2004, by which time the states had followed suit to implement restrictive trip limits and eliminate the directed dogfish fishery.

TABLE 45. PRIMARY PORTS ASSOCIATED WITH THE SPINY DOGFISH FISHERY (VALUES AVERAGED FOR 2010-2014). *DATA EXCLUDED FOR CONFIDENTIALITY.

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
CHATHAM, MA	3,708,318	$699,407
GLOUCESTER, MA	2,060,339	$442,056
HATTERAS, NC	1,733,815	$207,335
VIRGINIA BEACH/LYNNHAVEN, VA	*	*
SCITUATE, MA	918,516	$192,327

3.1.1.11 Summer Flounder, Scup, and Black Sea Bass FMP

Summer flounder, scup, and black sea bass are three demersal finfish species that occur primarily in the Middle Atlantic Bight from Cape Cod, MA, to Cape Hatteras, NC.[8] All three species exhibit seasonal movement or migration patterns. Summer flounder move inshore to shallow coastal and estuarine waters during warmer months and move offshore during colder months. Scup is a schooling species that undertakes extensive migrations between the coastal waters in the summer and outer continental shelf waters in the winter. Black sea bass are most often found in association with structured habitats, and they migrate offshore and to the south as waters cool in the fall, returning north and inshore to coastal areas and bays as waters warm in the spring.

The FMP was developed by the MAFMC, initially just for summer flounder, and approved by the Secretary of Commerce in 1988. This original Summer Flounder FMP was based largely on the ASMFC plan. The first major amendment, Amendment 2, was implemented in 1993 and it established much of the current management regime, including a commercial quota allocated to the states, a recreational harvest limit, minimum size limits, gear restrictions, permit and reporting requirements, and an annual review process to establish specifications for the coming fishing year. Amendments 4 through 7 made relatively minor adjustments to the management program.

Although initially intended to be separate FMPs, work on the development of the Scup FMP and the Black Sea Bass FMP was folded into the Summer Flounder FMP, which was broadened to incorporate management measures for scup and black sea bass through Amendments 8 and 9, respectively. These amendments included management measures for scup and black sea bass such as commercial quotas and

[8] Summer flounder range from Nova Scotia to Florida; scup range from the Bay of Fundy to Florida; and black sea bass range from southern Nova Scotia to southern Florida and into the Gulf of Mexico.

quota periods, commercial fishing gear requirements, minimum fish size limits, recreational harvest limits, and permit and reporting requirements. Both amendments were implemented in 1996. Amendments 10 and 11 made relatively minor changes to the management systems for these fisheries, including removing the sunset provisions related to the limited access (moratorium) permits, gear requirements, and to achieve consistency among all Mid-Atlantic and NEFMC FMPs regarding vessel replacement and upgrade provisions.

Amendment 12 was developed to bring the FMP into compliance with the provisions of the Sustainable Fisheries Act. This amendment included revised overfishing definitions for all three species, established rebuilding programs, addressed bycatch and habitat issues, and established a framework adjustment procedure for the FMP to allow relatively minor changes to management measures to be implemented through a streamlined process. Amendment 12 was implemented in 1999, although not all of the elements of the amendment were approved by NMFS. In particular, the EFH provisions for all three species and the rebuilding program for scup were not approved.

Implemented in 2003, Amendment 13 focused primarily on the commercial black sea bass fishery, although it also served to bring the FMP into compliance with the Sustainable Fisheries Act regarding the EFH requirements for all three species. The most significant change to the commercial black sea bass fishery eliminated the quarterly quota system, replaced with an annual coastwide quota. This change provided a framework for the ASMFC to allocate the annual quota on a state-by-state basis.

Amendment 14 to the FMP, implemented in 2007, addressed the requirement to establish a rebuilding program for scup, which was declared in 2005 to be overfished. Scup was declared rebuilt as of 2009, and is no longer under a rebuilding plan. An upcoming amendment (Amendment 18) is planned to address a wide range of issues associated with the management of scup (including the commercial/recreational split and the allocation of commercial scup quota among the three quota periods, among other issues). Amendment 17 has been initiated, but not yet completed, to discuss the potential for the black sea bass recreational fishery to be managed using conservation equivalency.

In order to come into compliance with the revised Magnuson-Stevens Act, the MAFMC developed an omnibus amendment for all of its FMPs. The ACL/AM Omnibus Amendment (Amendment 15 to the Summer Flounder, Scup, and Black Sea Bass FMP) implemented ACLs and AMs for these three fisheries. Amendment 16 to the FMP was the 2007 SBRM Omnibus Amendment.

For each of these three species, an annual acceptable biological catch (ABC) is established by the Council. The ABC is then divided, using percentages identified in the FMP[9], into a commercial ACL and a recreational ACL. The Council then sets corresponding annual catch targets (ACT) for each fishing sector. The commercial quota and recreational harvest limit are the amount of landings remaining after deducting discards from the respective ACTs. The commercial fisheries for all three species are managed through a combination of limited access (moratorium) fishing vessel permits, annual quotas that result in closures of the fisheries upon reaching the quota, gear restrictions, and minimum fish sizes. The summer flounder and black sea bass commercial quotas are managed on an annual basis, but the scup commercial quota is sub-divided into three quota periods (Winter I, Summer, and Winter II); although the black sea bass and scup quotas are managed on a coastwide basis, the summer flounder quota is managed on a state-by-state basis.[10] The annual specifications for these three fisheries may be set each year or for up to 3 years in advance.

The recreational fisheries are not subject to a "hard" quota, but instead are subject to a set of management measures designed to constrain catch to a target level. Management measures used include minimum fish sizes, bag (possession) limits, and fishing seasons. AMs for the recreational fisheries include a pound-for-pound payback of any overage of the ACL.[11] Party/charter vessels operating in Federal waters are required to obtain Federal permits. Coastwide management measures are established for the black sea bass and scup recreational fisheries operating in Federal waters, but for summer flounder, the states have the option to develop state-by-state measures that, in sum, would achieve the equivalent level of conservation as would the coastwide measures. All decisions regarding annual quotas and management measures for these commercial and recreational fisheries are made in conjunction with the ASMFC.

All three of these species support significant recreational as well as commercial fisheries. On average, commercial landings over the last several years accounted for slightly more than half to two-thirds of the total landings of summer flounder and

[9] The summer flounder TAL is allocated 60 percent to the commercial fishery and 40 percent to the recreational. The scup TAL is allocated 78 percent to the commercial fishery, while 22 percent is allocated to the recreational fishery. The black sea bass TAL is allocated 49 percent to the commercial fishery, with 51 percent allocated to the recreational fishery.

[10] Similar to the percentage allocation of the TAL to the commercial and recreational fisheries, the FMP allocates the commercial summer flounder quota among the states from North Carolina to Maine according to specific percentage shares.

[11] An Omnibus Amendment (Amendment 19 to the Summer Flounder, Scup, and Black Sea Bass FMP) is under development that may revise the AMs for the Mid-Atlantic Council's recreational fisheries.

scup, while black sea bass recreational landings typically exceed commercial landings. The primary gears used in the commercial fisheries for these species vary. Based on fishing vessel trip report data from 2007-2011, summer flounder are caught almost exclusively (95 percent) with bottom otter trawls; scup are caught primarily (92 percent) with bottom otter trawls, but handlines/rod and reel combined with pots, traps, and weirs accounted for another 6 percent; and black sea bass are caught in roughly equal amounts by bottom otter trawls (47 percent), and pots and traps (46 percent), and to a much lesser extent by handlines/rod and reel (5 percent). Recreational fishing for these species is enjoyed by shore-based anglers, private recreational boat anglers, and anglers on party and charter vessels. Table 46 and Table 47 identify the recent commercial landings as well as the primary ports and ex-vessel value of the commercial fishery.

Table 46. Recent Commercial Landings and Ex-vessel Values in the Summer Flounder, Scup, and Black Sea Bass Fisheries.

	Summer Flounder		Scup		Black Sea Bass	
	Commercial Landings (lb)	Ex-vessel Value	Commercial Landings (lb)	Ex-vessel Value	Commercial Landings (lb)	Ex-vessel Value
2010	13,400,584	$26,980,011	10,437,483	$6,912,378	1,734,077	$5,367,706
2011	16,567,658	$30,184,226	15,017,382	$8,362,455	1,688,258	$5,508,102
2012	13,049,845	$30,254,138	14,885,859	$10,438,115	1,724,548	$5,747,616
2013	12,441,067	$29,051,149	17,869,273	$9,791,416	2,262,330	$7,381,708
2014	10,999,319	$30,206,753	15,964,207	$9,526,277	2,621,123	$8,383,370

Table 47. Primary Ports Associated with the Summer Flounder, Scup, and Black Sea Bass Commercial Fisheries (values are averaged for 2010-2014).

Summer Flounder		Scup		Black Sea Bass	
Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value	Primary Ports	Ex-vessel Value
POINT JUDITH, RI	$5,645,826	POINT JUDITH, RI	$2,853,004	OCEAN CITY, MD	$563,564
NEWPORT NEWS, VA	$2,896,245	MONTAUK, NY	$1,852,083	POINT PLEASANT, NJ	$624,918
HAMPTON, VA	$2,440,962	POINT PLEASANT, NJ	$547,945	POINT JUDITH, RI	$569,412
POINT PLEASANT, NJ	$2,243,934	NEW BEDFORD, MA	$529,606	CAPE MAY, NJ	$433,635
CHINCOTEAGUE, VA	$1,289,621	LITTLE COMPTON, RI	$312,836	HAMPTON, VA	$422,115
WANCHESE, NC	$1,172,201	CAPE MAY, NJ	$232,319	CHINCOTEAGUE, VA	$413,046

3.1.1.12 Surfclam and Ocean Quahog FMP

The Atlantic surfclam and ocean quahog are both bivalve mollusks that are found in continental shelf waters from Cape Hatteras, NC, north to the Gulf of St. Lawrence/Newfoundland. Major concentrations of surfclams are found on Georges Bank, south of Cape Cod, off Long Island, southern New Jersey, and the Delmarva Peninsula. The greatest concentrations of ocean quahogs are fished in offshore waters south of Nantucket to the Delmarva Peninsula. In general, surfclams are found in water shallower than that in which ocean quahogs are found.

The MAFMC developed the FMP in the mid 1970's (it was the first FMP the Council developed) and the FMP was implemented in 1977. Initially, the FMP instituted a moratorium on participation in the surfclam fishery, while a more detailed limited entry system could be developed, and established quarterly quotas for surfclams and an annual quota for ocean quahogs. The first several amendments dealt mostly with the duration of the management measures and permit moratorium (made indefinite in Amendment 3), reporting requirements, management areas (Amendment 2 divided the surfclam portion of the management unit into the New England and Mid-Atlantic areas) minimum size limits, cage tags, and quota period issues.

Amendment 8 to the FMP, implemented in 1990, established an individual transferable quota (ITQ) system for the fisheries. The fishing vessel owners that received allocation under the ITQ system were those whose vessels had reported landings under the mandatory logbook requirement in place since 1978. The initial allocation was based on the vessel's average historical catch and vessel size, calculated as a percentage of historical quota allocations. Quota shareholders are allowed to purchase, sell, or lease quota to and from other shareholders. This amendment also merged the Mid-Atlantic and New England management areas back into a single management area.

Amendment 9 revised the overfishing definitions, and Amendment 10 incorporated management measures for the Maine "mahogany clam."[12] Amendment 11 represented the "consistency amendment" to bring all New England and MAFMC FMPs into consistency in regards to vessel replacement and upgrade provisions. Amendment 12 was intended to bring the FMP into compliance with the provisions of the Sustainable Fisheries Act, and included revisions to overfishing definitions, the designation of EFH, a provision allowing framework adjustments to the FMP, and a requirement for an operator permit. Amendment 13 rectified aspects of Amendment 12 that were not approved (surfclam overfishing definition and an analysis of the impacts of fishing on EFH), and included provision for multiple year quota setting. A framework adjustment in 2007 implemented a

[12] The Maine mahogany clam is the same species as the ocean quahog, but is found in the inshore waters of the State of Maine and supports a small artisanal fishery. This fishery had been operating on an experimental basis since 1990, but was beginning to move offshore into Federal waters.

requirement to use VMS for all vessels participating in the surfclam or ocean quahog fisheries. Amendment 14 to this FMP was the 2007 SBRM Omnibus Amendment, and Amendment 16 was the 2011 ACL/AM Omnibus Amendment.

Both species live in the sediment and are not vulnerable to most types of fishing gears. Almost 100 percent of landings are associated with the hydraulic clam dredge, although the relatively small Maine fishery uses the so-called "dry" dredge. Landings of surfclams and ocean quahogs from recreational fishing are negligible. Table 48 identifies the recent commercial landings and ex-vessel value of both species, and Table 49 identifies the primary ports of landings for both species.

Waters of the Gulf of Maine and Georges Bank are subject to intermittent harmful algal blooms, or "red tide," caused by the dinoflagellate *Alexandrium fundyense*, which produces a toxin known to cause paralytic shellfish poisoning (PSP) in people consuming contaminated clams. Because of a history of harmful algal blooms and limited testing in the area, eastern Georges Bank has been closed to the harvest of clams since 1990. In 2013 a portion of Georges Bank was opened for the harvest of surfclams and ocean quahog by vessels using a new PSP testing protocol. Other areas in the Gulf of Maine and western Georges Bank have been closed since 2005 due to an outbreak of *A. fundyense* in these areas.

Table 48. Recent Commercial Landings and Ex-vessel Values in the Surfclam and Ocean Quahog Fisheries.

	Atlantic Surfclam		Ocean Quahog	
	Commercial Landings (lb)	Ex-vessel Value	Commercial Landings (lb)	Ex-vessel Value
2010	44,049,455	$30,336,346	36,071,850	$23,184,691
2011	43,885,111	$30,086,829	31,771,210	$22,094,549
2012	45,131,331	$32,436,365	35,119,940	$25,867,115
2013	44,062,576	$31,483,011	32,267,010	$23,654,062
2014	43,254,654	$30,979,326	31,391,827	$23,839,278

TABLE 49. PRIMARY PORTS ASSOCIATED WITH THE SURFCLAM AND OCEAN QUAHOG COMMERCIAL FISHERIES (VALUES ARE AVERAGED FOR 2010-2014). *DATA EXCLUDED FOR CONFIDENTIALITY.

Atlantic Surfclam			Ocean Quahog		
Primary Ports	**Landings (lb)**	**Ex-vessel Value**	**Primary Ports**	**Landings (lb)**	**Ex-vessel Value**
ATLANTIC CITY, NJ	20,032,756	$12,451,256	NEW BEDFORD, MA	*	*
NEW BEDFORD, MA	10,680,503	$8,465,441	POINT PLEASANT, NJ	*	*
OTHER BARNSTABLE, MA	2,390,581	$2,274,196	ATLANTIC CITY, NJ	7,572,472	$6,289,987
POINT PLEASANT, NJ	2,154,607	$1,039,619	OCEAN CITY, MD	1,413,696	$1,193,949
OCEAN CITY, MD	2,146,733	$1,371,187	WARREN, RI	*	*

3.1.1.13 Tilefish FMP

The golden tilefish is the largest and longest lived of all the tilefish species, and in U.S. waters ranges from Georges Bank to Key West, FL, and throughout the Gulf of Mexico. Golden tilefish occupy a fairly restrictive band along the outer continental shelf and are most abundant in depths of 100-240 meters. Temperature may also constrain their range, as they are most abundant near the 15° C isotherm. Although this species occupies a variety of habitats, it is somewhat unique in that they create and modify existing vertical burrows in the sediment as their dominant habitat in U.S. waters.

The Tilefish FMP was developed by the MAFMC to implement management measures for the tilefish fishery north of the Virginia/North Carolina border intended to address the overfished status of the species.[13] The FMP was implemented in 2001, and in the FMP's short existence it has been the subject of two legal challenges. *Natural Resources Defense Council* v. *Evans* (2001) challenged the essential fish habitat provisions of the FMP, and *Hadaja* v. *Evans* (2001) challenged the ban on trawl gear and the permit category designations. The latter temporarily voided the limited access permit categories in the FMP.

Amendment 1 to the Tilefish FMP, implemented in 2009, eliminated the limited access permit categories and adopted an IFQ program. Initially, thirteen allocation holders

[13] The tilefish fishery south of the Virginia/North Carolina border is currently managed as part of the Snapper-Grouper Complex FMP developed by the South Atlantic Fishery Management Council.

received quota share based primarily on historical participation in the fishery. Any vessel is required to have an open access permit in order to land tilefish. The open access permit alone authorizes a vessel to land tilefish under a 500 lb per trip incidental possession limit. If the vessel is authorized to land under tilefish an IFQ allocation permit, it is exempt from the possession limit. Each year, 95 percent of the total allowable landings are allocated to the IFQ fishery. The remaining 5 percent is allocated to the incidental fishery. If landings in the incidental fishery reach or exceed the amount allocated, the incidental fishery would be shut down for the remainder of the fishing year. Amendment 2 was the 2007 SBRM Omnibus Amendment, and Amendment 3 was the 2011 ACL/AM Omnibus Amendment.

The commercial tilefish fishery is relatively small, with only a dozen vessels participating in the IFQ fishery. Tilefish are primarily caught with bottom longlines (98 percent of landings reported in the fishing vessel trip report database from 2007-2011), and approximately 1.8 percent of landings are associated with bottom otter trawls. There is a minimal recreational fishery for this species, with less than 8,300 lb landed annually for the last 30 years and in only two years since 2000 does the MRIP database report trips with tilefish as the primary target species. Table 50 and Table 51 identify the recent commercial landings as well as the primary ports and ex-vessel value of the commercial fishery.

TABLE 50. RECENT COMMERCIAL LANDINGS AND EX-VESSEL VALUE OF GOLDEN TILEFISH.

	Commercial Landings (lb)	Ex-vessel Value
2010	1,866,799	$5,185,807
2011	1,750,152	$5,633,296
2012	1,686,401	$5,466,872
2013	1,710,344	$5,877,742
2014	1,649,080	$5,689,066

TABLE 51. PRIMARY PORTS ASSOCIATED WITH THE GOLDEN TILEFISH FISHERY (VALUES ARE AVERAGED FOR 2010-2014).

Primary Ports	Commercial Landings (lb)	Ex-vessel Value of Landings
MONTAUK, NY	1,129,561	$3,628,707
BARNEGAT LIGHT/LONG BEACH, NJ	344,015	$1,128,285
HAMPTON BAYS, NY	214,551	$701,704
POINT JUDITH, RI	17,141	$34,112

3.1.2 NON-TARGET AND BYCATCH SPECIES

Various species are caught incidentally by the Atlantic herring and mackerel fisheries. For non-target species that are managed under their own FMP incidental catch/discards are considered as part of the management of that fishery. These species will be impacted to some degree by the prosecution of the herring and mackerel fisheries. The primary non-target species of current concern for herring and mackerel fisheries are river herring (alewife and blueback herring) and shad (American shad and hickory shad) so additional information is provided below. In the directed Atlantic herring fishery, haddock is also a primary non-target species.

River Herring

In the most recent Atlantic States Marine Fisheries Commission river herring stock assessment (ASMFC 2012), of the 24 river herring stocks for which sufficient data are available to make a conclusion, 23 were depleted relative to historic levels and one was increasing. The status of 28 additional stocks could not be determined because the time-series of available data was too short. Estimates of coastwide abundance and fishing mortality could not be developed because of the lack of adequate data. The “depleted” determination was used instead of “overfished” because of the many factors that have contributed to the declining abundance of river herring, which include not just directed and incidental fishing, but likely also habitat issues (including dam passage, water quality, and water quantity), predation, and climate change. There are no coastwide reference points. The NEFSC trawl survey, which is the only coastwide fisheries-independent survey, showed increasing trends in relative abundance beginning in 2008 (ASMFC 2012).

As part of a recent river herring status review under the Endangered Species Act, NMFS completed an extinction risk analysis (http://www.greateratlantic.fisheries.noaa.gov/protected/pcp/soc/river_herring.html). This analysis investigated trends in river herring relative abundance for each species range-wide as well as for each identified stock complex. This analysis found that "the abundance of alewife range-wide significantly increased over time (mid 1970s-2012), but the increase in blueback herring abundance was not significant (page 7 and Figures 8 and 9 of the referenced document). These range-wide analyses incorporated data from fishery independent surveys with the widest geographic extent, specifically the Northeast Fisheries Science Center spring and fall bottom trawl surveys and Canada’s Department of Fisheries and Oceans (DFO) Scotian Shelf survey. Stock-specific analyses incorporated run count data and stock-specific fishery-independent surveys. Stock-specific analyses indicated that the abundance of the Canadian alewife stock complex was significantly increasing, the abundance of the mid-Atlantic blueback herring stock complex was significantly decreasing, and all other analyzed stock complexes were not significantly increasing or decreasing in abundance. The status review concluded that the species did not currently warrant listing under the ESA.

NMFS and the ASMFC are engaged in a proactive conservation strategy for river herring and the Council is also involved in the endeavor. This strategy is described at http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/index.html, and will bring a variety of management partners and stakeholders together to address river herring threats and plan conservation and data gathering activities.

Shad

The most recent American shad stock assessment report (ASMFC 2007) identified that American shad stocks are highly depressed from historical levels. Of the 24 stocks of American shad for which sufficient information was available, 11 were depleted relative to historic levels, 2 were increasing, and 11 were stable (but still below historic levels). The status of 8 additional stocks could not be determined because the time-series of data was too short or analyses indicated conflicting trends. Taken in total, American shad stocks do not appear to be recovering. The assessment concluded that current restoration actions need to be reviewed and new ones need to be identified and applied. These include fishing rates, dam passage, stocking, and habitat restoration. There are no coastwide reference points for American shad. There is no stock assessment available for hickory shad.

3.1.3 PHYSICAL ENVIRONMENT

The fishing activities affected by the FMPs subject to this amendment occur off the Atlantic coast of the U.S., primarily from Cape Hatteras, NC, to the U.S./Canada border. This area of the Northwest Atlantic Ocean is also known as the Northeast U.S. Continental Shelf Large Marine Ecosystem (Sherman et al. 1996) and includes the subsystems known as the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight. For more information about the physical characteristics of the environment described below, reference NEFMC (2004a); NEFMC (2004b); Sherman et al. (1996); and Stevenson et al. (2004). See Figure 1 for a map of the Greater Atlantic Region with the three major subsystems identified.

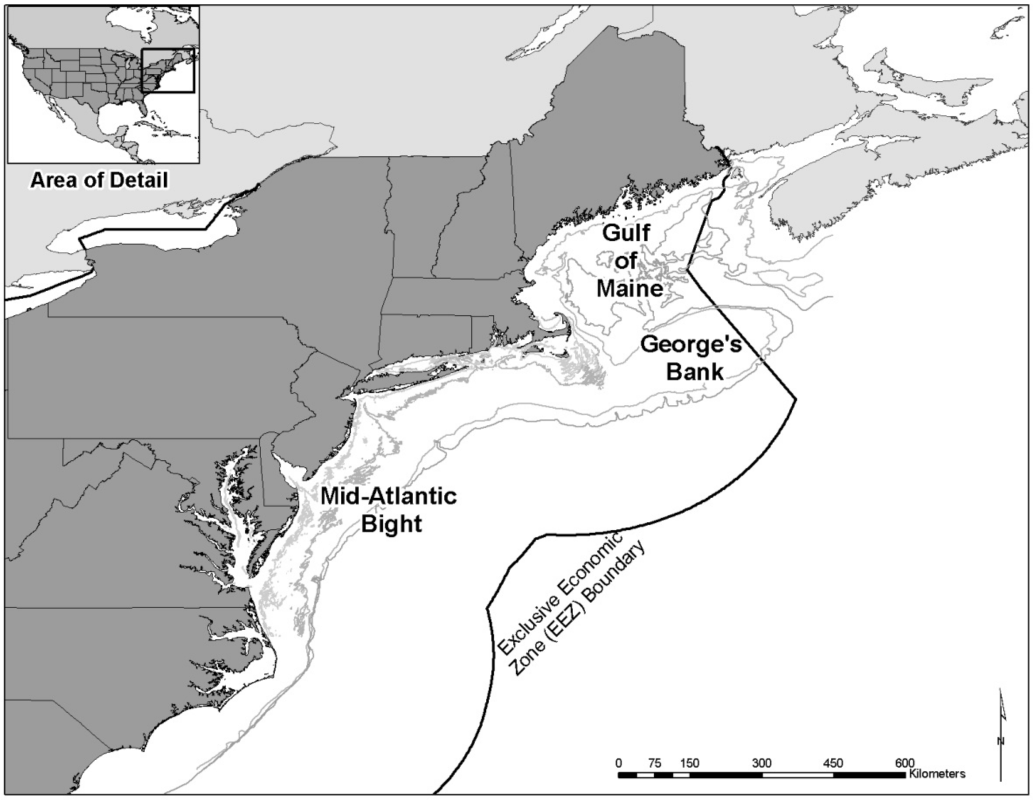


Figure 1. Map of the Gulf of Maine, Georges Bank, and Mid-Atlantic Bight.

Gulf of Maine

The Gulf of Maine is an enclosed coastal sea characterized by relatively cold waters and deep basins. The Gulf of Maine is bounded on the east by Browns Bank, on the north by Maine and Nova Scotia, on the west by Maine, New Hampshire, and Massachusetts, and on the south by Cape Cod and Georges Bank. Retreating glaciers (18,000-14,000 years ago) formed a complex system of deep basins, moraines, and rocky protrusions, leaving behind a variety of sediment types including silt, sand, clay, gravel, and boulders. These sediments are patchily distributed throughout the Gulf of Maine, and are largely related to the topography of the bottom.

Water patterns in the Gulf of Maine exhibit a general counterclockwise current, influenced primarily by cold water masses moving in from the Scotian Shelf and offshore. Although large-scale water patterns are generally counterclockwise around the Gulf, many small gyres and minor currents do occur. Freshwater runoff from the many rivers along the coast of the Gulf of Maine influences coastal circulation, as well. These water movements feed into and affect the circulation patterns on Georges Bank and in Southern New England, both of which are discussed below.

Georges Bank

Georges Bank is a shallow, elongate extension of the northeastern U.S. continental shelf, and it is characterized by a steep slope on its northern edge and a broad, flat, and gently sloping southern flank. The Gulf of Maine lies to the north of Georges Bank, the Northeast Channel (between Georges Bank and Browns Bank) is to the east, the continental slope lies to the south, and the Great South Channel separates Georges Bank and Southern New England to the west. Although the top of Georges Bank is predominantly sandy sediment, glacial retreat during the late Pleistocene era resulted in deposits of gravel along the northern edge of the Bank, and some patches of silt and clay can be found.

The most dominant oceanographic features of Georges Bank include a weak but persistent clockwise gyre that circulates over the whole of the Bank, strong tidal flows (predominantly northwest and southeast), and strong but intermittent storm-induced currents. The strong tidal currents result in waters over the Bank that are well-mixed vertically. The clockwise Georges Bank gyre is in part driven by the southwestern flow of shelf and slope water that forms a countervailing current to the Gulf Stream.

Mid-Atlantic Bight and Southern New England

The Mid-Atlantic Bight includes the continental shelf and slope waters from Georges Bank to Cape Hatteras, North Carolina. Occasionally discussed separately, most texts consider Southern New England a sub-region within the Mid-Atlantic Bight.[14] The basic morphology and sediments of the Mid-Atlantic Bight were shaped during the retreat of the last ice sheet. The continental shelf south of New England is broad and flat, dominated by fine grained sediments (sand and silt). Patches of gravel can be found in places, such as on the western flank of the Great South Channel.

The shelf slopes gently away from the shore out to 100-200 km offshore, where it transforms into the continental slope at the shelf break (at water depths of 100-200 m). Along the shelf break, numerous deep-water canyons incise the slope and into the shelf. The sediments and topography of the canyons are much more heterogeneous than the predominantly sandy top of the shelf, with steep walls and outcroppings of bedrock and deposits of clay.

The southwestern flow of cold shelf water feeding out of the Gulf of Maine and off Georges Bank dominates the circulatory patterns in this area. The countervailing Gulf Stream provides a source of warmer water along the coast as warm-core rings and meanders break off from the Gulf Stream and move shoreward, mixing with the colder shelf and slope

[14] Southern New England is generally considered to be the area of the continental shelf off the coasts of Massachusetts, Rhode Island, and Long Island, New York, from the Great South Channel to Hudson Canyon.

water. As the shelf plain narrows to the south (the extent of the continental shelf is narrowest at Cape Hatteras), the warmer Gulf Stream waters run closer to shore.

3.1.4 ENDANGERED AND OTHER PROTECTED SPECIES

3.1.4.1 Omnibus discussion of endangered and other protected species

There are many protected species inhabiting the Northeast Continental Shelf Large Marine Ecosystem. These include Atlantic salmon, two species of listed sturgeon, several species of endangered and threatened sea turtles, and several species of whales, small cetaceans, and pinnipeds. Although there may be many species that occur in this area, this section will not provide a detailed description of protected species in the affected environment as the omnibus potion of this amendment focuses on the process of creating and allocating Federal funds to industry-funded monitoring programs and therefore, any impacts are procedural in nature and will not cause any direct or indirect effects to protected species. As a result, a detailed description of these species that could be affected by omnibus alternatives in this amendment is not warranted.

3.1.4.2 Herring and Mackerel Fisheries discussion of endangered and protected species interactions

The herring and mackerel coverage target alternatives in this amendment are consistent with typical FMP amendments. The potential changes in monitoring for the herring and mackerel fisheries may directly or indirectly impact fishing vessel operations (by modifying where, when, and/or how fishing may take place), and the ways in which herring and mackerel fishing activities directly or indirectly interact with living marine resources, including protected species. As a result, this section will provide information on protected species that may be affected by the action alternatives in herring and mackerel sections of the amendment. Specifically, protected species may be caught in or otherwise interact with one or more of the fishing gears utilized in a fishery addressed in this amendment (i.e., midwater trawl, bottom trawl, and purse seine). Therefore, information on protected species gear interaction risks with specific gear types used in the herring and/or mackerel fisheries will be provided.

Most of the following information is adapted from Framework Adjustment 9 to the Atlantic Mackerel, Squid, and Butterfish FMP (MAFMC 2015) and Framework Adjustment 4 to the Atlantic Herring FMP (NEFMC 2015). Data on endangered and protected species is generally collected, analyzed, and presented by gear type. Both the Atlantic herring and mackerel fisheries primarily use midwater and bottom trawls; therefore most of this information is applicable to both the herring and mackerel fisheries. The Atlantic herring fishery also uses purse seines, stop seines, and weirs; however, purse seines are the primary gear type used to prosecute this fishery and therefore, will also be addressed in addition to the trawl gear used in this fishery.

There are numerous species of fish, marine mammals, and sea turtles which inhabit the management unit of the Atlantic Herring and MSB FMPs that are afforded protection under the Endangered Species Act (ESA) of 1973 (i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act (MMPA) of 1972 (Table 52). Detailed information on the range-wide status of marine mammal and sea turtle species that occur in the area can be found in a number of published documents. These include sea turtle status reviews, biological reports, and recovery plans (Conant et al. 2009; NMFS and USFWS 1991a, 1991b, 1992, 1995, 1998a, 1998b, 2007a, 2007b, 2008, 2013, 2015; Hirth 1997; Turtle Expert Working Group (TEWG) 1998, 2000, 2007, 2009; Seminoff et al. 2015; NMFS et al. 2011). For marine mammals this includes marine mammal stock assessment reports and recovery plans (e.g., Waring et al. 2014; Waring et al. 2015; NMFS 1991, 2005, 2010, 2011, 2012). Additional background information on the Gulf of Maine Distinct Population Segment of Atlantic salmon and the five distinct population segments of Atlantic sturgeon can be found in the respective status reviews (Fay et al. 2006; ASSRT 2007) and listing determinations for Atlantic salmon (74 FR 29344; June 19, 2009) and Atlantic sturgeon (77 FR 5880 and 77 FR 5914; February 3, 2012). Additional information on the species provided in the table below (e.g., life history, distribution, stock status) can also be found at the following sites: http://www.greateratlantic.fisheries.noaa.gov/Protected/ and http://www.nmfs.noaa.gov/pr/sars/region.htm.

Table 52. Species Protected Under the ESA and/or MMPA that May Occur in the Affected Environment of the Atlantic Herring and MSB FMPs.

Species	Status	Potentially affected by this action?
Cetaceans		
North Atlantic right whale (*Eubalaena glacialis*)	Endangered	Yes
Humpback whale (*Megaptera novaeangliae*)[1]	Protected	Yes
Fin whale (*Balaenoptera physalus*)	Endangered	Yes
Sei whale (*Balaenoptera borealis*)	Endangered	Yes
Blue whale (*Balaenoptera musculus*)	Endangered	No
Sperm whale (*Physeter macrocephalus*	Endangered	No
Pygmy sperm whale (Kogia breviceps)	Protected	No
Dwarf sperm whale (Kogia sima)	Protected	No
Minke whale (*Balaenoptera acutorostrata*)	Protected	Yes
Pilot whale (*Globicephala spp.*)[2]	Protected	Yes
Risso's dolphin (*Grampus griseus*)	Protected	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected	Yes
Short Beaked Common dolphin (*Delphinus delphis*)[3]	Protected	Yes
Atlantic Spotted dolphin (*Stenella frontalis*)	Protected	No
Striped dolphin (Stenella coeruleoalba)	Protected	No
Beaked whales (Ziphius and Mesoplodon spp)[4]	Protected	No
Bottlenose dolphin (*Tursiops truncatus*)[5]	Protected	Yes
Harbor porpoise (*Phocoena phocoena*)	Protected	Yes

Species	Status	Potentially affected by this action?
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes
Green sea turtle, North Atlantic distinct population segment (DPS)(*Chelonia mydas*)	Threatened[6]	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No
Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk (*Brosme brosme)*	Candidate	No
Thorny skate (*Amblyraia radiate*)	Candidate	No
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected	Yes
Gray seal (*Halichoerus grypus*)	Protected	Yes
Harp seal (*Phoca groenlandicus*)	Protected	Yes
Hooded seal (*Cystophora cristata*)	Protected	Yes
Critical Habitat		
North Atlantic Right Whale[7]		No
Northwest Atlantic DPS of Loggerhead Sea Turtle		No

Notes:

[1] On September 8, 2016, a final rule was issued revising the ESA listing status of humpback whales (81 FR 62259). Fourteen DPSs were designated: one as threatened, four as endangered, and nine as not warranting listing. The DPS found in U.S. Atlantic waters, the West Indies DPS, is delisted under the ESA; however, this DPS is still protected under the MMPA. [2]There are 2 species of pilot whales: short finned (*G. melas melas*) and long finned (*G. macrorhynchus*). Due to the difficulties in identifying the species at sea, they are often just referred to as *Globicephala spp*.

[3] Prior to 2008, this species was called "common dolphin."

[4] There are multiple species of beaked whales in the Northwest Atlantic. They include the Cuvier's (*Ziphius cavirostris*), Blainville's (*Mesoplodon densirostris*), Gervais' (*Mesoplodon europaeus*), Sowerby's (*Mesoplodon bidens*), and True's (*Mesoplodon mirus*) beaked whales. Species of Mesoplodon are difficult to identify at sea, and therefore, much of the available characterization for beaked whales is to the genus level only.

[5] This includes the Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks of Bottlenose Dolphins (see Waring *et al*. 2014 and Waring et al. 2015 for further details).

[6] On April 6, 2016, a final rule was issued removing the current range-wide listing of green sea turtles and, in its place, listing eight green sea turtle DPSs as threatened and three DPSs as endangered (81 FR 20057). The green sea turtle DPS located in the Northwest Atlantic is the North Atlantic DPS of green sea turtles;

Species	Status	Potentially affected by this action?
this DPS is considered threatened under the ESA.		
[7]Originally designated June 3, 1994 (59 FR 28805); Expanded on January 27, 2016 (81 FR 4837).		

In Table 52, please note that cusk and thorny skate are NMFS "candidate species" under the ESA. Candidate species are those petitioned species that NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. If a species is proposed for listing the conference provisions under Section 7 of the ESA apply (see 50 CFR 402.10); however candidate species receive no substantive or procedural protection under the ESA. As a result these species will not be discussed further in this and the following sections; however, NMFS recommends that project proponents consider implementing conservation action to limit the potential for adverse effects on candidate species from any proposed action. Additional information on cusk and thorny skate can be found at http://www.nmfs.noaa.gov/pr/species/esa/candidate.htm.

Protected Species and Critical Habitat Not Likely to be Affected by the Proposed Action

In Table 52, protected species or critical habitat that are not likely to be affected by the proposed action are provided. This determination has been made because either the occurrence of the protected species is not known to overlap with the herring or mackerel fishery and/or there have never been documented interactions between the species and either fishery (Waring et al. 2014, 2015; NMFS 2013; NMFS NEFSC FSB 2015; See: http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html). In the case of critical habitat, this determination has been made because the herring or mackerel fishery will not affect the essential physical or biological features of the critical habitat, and therefore, will not result in the destruction or adverse modification of critical habitat (NMFS 2014; NMFS 2015).

Protected Species Potentially Affected by the Proposed Action

Large Whales

Humpback, North Atlantic right, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean. In general, these species follow an annual pattern of migration between low latitude (south of 35°N) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41°N; Waring et al. 2015a; NMFS 1991, 2005; 2010b, 2011; 2012). This, however, is a simplification of whale movements, particularly as it relates to winter movements. It remains unknown if all individuals of a population migrate to low latitudes in the winter, although, increasing evidence suggests that for some species (e.g., right and humpback whales), some portion of the population remains in higher latitudes throughout the winter (Brown et al. 2002; Clapham et al. 1993; Cole et al 2013; Khan et al. 2010; 2011; 2012; Khan et al. 2009; NOAA

2008; Swingle et al. 1993; Vu et al. 2012; Waring et al. 2014a, 2015a). Although further research is needed to provide a clearer understanding of large whale movements and distribution in winter, the distribution and movements of large whales to foraging ground in the spring/summer is well understood and in fact, these foraging areas re consistently returned to annually, and therefore, can be considered important, high use areas for whales (Baumgartner et al. 2003; Baumgartner & Mate 2003; Brown et al. 2002; Kenney 2001; Kenney et al. 1986; Kenney et al. 1995; Mayo & Marx 1990; Payne et al. 1986; Payne et al. 1990; Schilling et al. 1992). For additional information on the biology, status, and range wide distribution of each whale species please refer to: Waring et al. 2014a, 2015a; NMFS 1991, 2005; 2010b, 2011; 2012.

Small Cetaceans

Numerous small cetacean species (dolphins, pilot whales, harbor porpoise) occur within the area from Cape Hatteras through the Gulf of Maine. Seasonal shifts in 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, bottlenose dolphin, harbor porpoise), while others are found primarily in continental shelf edge and slope waters (e.g., Risso's and short beaked common dolphin). For additional information on the biology and range wide distribution of all small cetacean species identified in Table 52, please refer to Waring et al. 2014 and Waring et a. 2015.

Pinnipeds

Of the four species of seals expected to occur in the area, harbor and gray are the most common seal species in EEZ waters of the United States. Gray and harbor seals are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals, gray seals) may be extending their range seasonally into Mid-Atlantic waters as far south as the Cape Hatteras, North Carolina (35°N) (Waring et al. 2014a, 2015a). Harp and hooded seals are less commonly observed in EEZ waters; however, individuals of both species are also known to travel south into EEZ waters and sightings, as well as strandings of each species have been recorded for both New England and Mid-Atlantic waters (Waring et al. 2007; Waring et al. 2015). For additional information on the biology and range wide distribution of gray, harbor, harp, and hooded seals, please refer to Waring et al. 2007; Waring et al. 2014; and Waring et al. 2015.

Sea Turtles

In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, MA, although their presence varies with the seasons due to changes in water temperature (Braun-McNeill et al. 2008; Braun & Epperly 1996; Epperly et al. 1995a,b; Mitchell et al. 2003; Shoop & Kenney 1992; TEWG 2009; Blumenthal et al. 2006; Braun-McNeill & Epperly 2004; Griffin et al. 2013; Hawkes et al. 2006; Hawkes et al. 2011; Mansfield et al. 2009; McClellan & Read 2007; Mitchell et al.

2003; Morreal & Standora 2005). As coastal water temperatures warm in the spring, hard-shelled sea turtles begin to migrate north up the Atlantic Coast from southeastern waters, occurring in Virginia foraging areas as early as late April and on the most northern foraging ground in the GOM in June (Braun-McNeill & Epperly 2004; Epperly et al. 1995a,b,c; Griffin et al. 2013; Morreale & Standora 2005; Shoop & Kenney 1992). The trend is reversed in the fall as water temperatures cool, with a large majority leaving the GOM by September, and some remaining in Mid-Atlantic and Northeast areas until late fall (i.e., November). By December, sea turtles have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, and further south (Epperly et al. 1995b; Griffin et al. 2013; Hawkes et al. 2011; Shoop & Kenney 1992).[15] Leatherback sea turtles also engage in routine migrations between northern temperate and tropical waters (Dodge et al. 2014; James et al. 2005; James et al. 2006; NMFS & USFWS 1992). As leatherbacks have a greater tolerance for colder water in comparison to hard-shelled sea turtles they are found in more northern waters later in the year, with most leaving the Northwest Atlantic shelves by mid-November (Dodge et al. 2014; James et al. 2005; James et al. 2006).

Atlantic Sturgeon

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range (ASSRT 2007; Dovel and Berggren 1983; Dadswell et al. 1984; Kynard et al. 2000; Stein et al. 2004a; Dadswell 2006; Laney et al. 2007; Dunton et al. 2010; Erickson et al. 2011; Wirgin et al. 2012; Waldman et al. 2013; O'Leary et al. 2014; Wirgin et al. 2015). Based on fishery-independent and –dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein et al. 2004a,b; Erickson et al. 2011; Dunton et al. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein et al. 2004a, b; Dunton et al 2010; Erickson et al. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that Atlantic sturgeon may undertake seasonal movements along the coast (Dunton et al. 2010; Erickson et al. 2011); however, there is no evidence to date that all Atlantic sturgeon make these seasonal movements and therefore, may be present throughout the marine environment throughout the year. For additional information on the biology, status, and range wide distribution of each distinct population segment of Atlantic sturgeon please refer to 77 FR 5880 and 77 FR 5914 (finalized February 6, 2012), as well as the Atlantic Sturgeon Status Review Team's (ASSRT) 2007 status review of the Atlantic sturgeon (ASSRT 2007).

Atlantic Salmon

[15] Hard-shelled sea turtles can occur year-round in waters off Cape Hatteras and waters south of this area.

The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, while the marine range of the GOM DPS extends from the GOM (primarily northern portion of the GOM), to the coast of Greenland (NMFS and USFWS 2005; Fay et al. 2006). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the GOM and coastal waters of Maine in the spring (beginning in April), and adults may be present throughout the summer and fall months (Baum 1997; Fay et al. 2006; USASAC 2004; Hyvarinen et al. 2006; Lacroix & McCurdy 1996; Lacroix et al. 2004, 2005; Reddin 1985; Reddin & Short 1991; Redding & Friedland 1993; Sheehan et al. 2012; NMFS and USFWS 2005; Fay et al. 2006). For additional information on the biology, status, and range wide distribution of the GOM DPS of Atlantic salmon please refer to NMFS and USFWS 2005; Fay et al. 2006.

Protected Species Interactions with Commercial Trawl Gear and Purse Seines

The Atlantic herring and mackerel fisheries are prosecuted primarily with midwater trawls, but bottom trawls are also used to some extent. The Atlantic herring fishery is also prosecuted by purse seines, stop seines, and weirs. Weirs and stop seines are responsible for only a small fraction of herring landings, operate exclusively within State waters, and are not regulated by the Federal Atlantic Herring FMP, and therefore will not be discussed further in this document relative to protected species. A subset of protected species of fish, marine mammals, and sea turtles (see Table 52) are known to be vulnerable to interactions with midwater trawl, bottom trawl, and purse seines. In the following sections, available information on protected species interactions with these gear types will be provided. Please note, these sections are not a comprehensive review of all fishing gear types know to interact with a given species; emphasis is only being placed on those gear types primarily used to prosecute the Atlantic herring and MSB fisheries.

Marine Mammals

Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annual, classifying U.S. commercial fisheries into one of the three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions; 79 FR 77919 (December 29, 2014)). The categorization in the LOF determines whether participants in that fishery are subject to certain provisions of the MMPA such as registration, observer coverage, and take reduction plan requirements. Individuals fishing in Category I or II fisheries must comply with requirements of any applicable take reduction plan. Table 53 provides fishing gear types considered in the herring or mackerel fisheries and the prescribed LOF fishery Category for commercial fisheries in the (Northwestern) Atlantic Ocean.

TABLE 53. LOF FISHERIES LIKELY TO OCCUR IN THE AFFECTED ENVIRONMENT OF THE HERRING OR MACKEREL FISHERIES.

Fishery	Category
Mid-Atlantic Midwater Trawl (Including Pair Trawl)	II
Northeast Midwater Trawl (Including Pair Trawl)	II
Northeast Bottom Trawl	II
Mid-Atlantic Bottom Trawl	II
Purse Seine (GOM Atlantic Herring)	III

Large Whales

Trawl (Bottom and Midwater) Gear

With the exception of one species, there has been no confirmed serious injury or mortality, or documented interactions with large whales and trawl gear. The one exception is minke whales. Minke whales are the only species of large whales that have been observed seriously injured and killed in trawl gear. In bottom trawl gear, the frequency of minke whale interactions have declined since 2006 (estimated annual mortality=3.7 whales), with zero observed interactions in 2010 and 2011, and the annual average estimated mortality and serious injury from the Northeast bottom trawl fishery from 2007 to 2011 equaling 1.8 whales (Waring et al. 2014; Waring et al. 2015). Since 2003, there has also been only one observed minke whale incidentally taken in midwater trawl gear; this incidence was observed in 2013 (see http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html). Based on this information, trawl gear is likely to pose a low interaction risk to any large whale species and therefore, is expected to be a low source of serious injury or mortality to any large whale.

Purse Seine Gear

Since 2008, three (3) humpback whales and one (1) fin/sei whale have been documented as interacting with purse seines, specifically those operating in the GOM targeting Atlantic herring (see: http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html). All interactions; however, resulted in the animals being released from the nets unharmed (Waring et al. 2015; Henry et al. 2015; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html). Based on this information, although interactions are possible with large whales, we do not expect purse seines to pose a serious injury or mortality risk to these species.

Small Cetaceans and Pinnipeds

Trawl (Bottom and Midwater) Gear

Small cetaceans and pinnipeds are vulnerable to interactions with trawl (bottom or midwater) gear (Table 54). Small cetacean and pinniped species that have been observed incidentally injured and/or killed by Category II trawl fisheries (see LOF 79 FR 77919 (December 29, 2014)) that operate in the affected environment of the herring or mackerel fisheries are provided in Table 54. Based on the best available information provided in Waring et al. (2014), Waring et al. (2015), and the December 29, 2014 LOF (79 FR 77919), of the trawl fisheries that operate in the affected environment of these fisheries, the Northeast and Mid-Atlantic bottom trawl fisheries (Category I and II fisheries, respectively) pose the greatest risks of serious injury and mortality to small cetaceans and pinnipeds (i.e., approximately 97.0% of the estimated total mean annual mortality to marine mammals (small cetaceans and seals, large whales excluded) is attributed to bottom trawl fisheries (Mid-Atlantic and Northeast combined), 2.0% attributed to midwater trawl (Mid-Atlantic and Northeast combined).

Table 54. Small Cetacean and Pinniped Species Observed Seriously Injured and/or Killed by Trawl Fisheries in the Affected Environment of the Amendment.

Fishery	Category	Species Observed or reported Injured/Killed
Mid-Atlantic Midwater Trawl (Including Pair Trawl)	II	Risso's dolphin
		White-sided dolphin
		Bottlenose dolphin (offshore)
		Short-beaked common dolphin
		Pilot whales (spp)
Northeast Midwater Trawl (Including Pair Trawl)	II	White-sided dolphin
		Short-beaked common dolphin
		Pilot whales (spp)
		Gray seal
		Harbor seal
Northeast Bottom Trawl	II	Harp seal
		Harbor seal
		Gray seal
		Pilot whales (spp)
		Short-beaked common dolphin
		White-sided dolphin
		Harbor porpoise
		Bottlenose dolphin (offshore)
		Risso's dolphin
Mid-Atlantic Bottom Trawl	II	White-sided dolphin
		Pilot whales (spp)
		Short-beaked common dolphin
		Risso's dolphin
		Bottlenose dolphin (offshore)

		Gray seal
		Harbor seal
Sources: Waring et al. 2014; Waring et al. 2015; LOF 79 FR 77919 (December 29, 2014).		

Atlantic Trawl Gear Take Reduction Strategy (ATGTRS). In 2006, the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened to address the incidental mortality and serious injury of long-finned pilot whales (*Globicephala melas*), short-finned pilot whales (*Globicephala macrorhynchus*), common dolphins (*Delphinus delphis*), and white sided dolphins (*Lagenorhynchus acutus*) incidental to bottom and midwater trawl fisheries operating in both the Northeast and Mid-Atlantic regions. Because none of the marine mammal stocks of concern to the ATGTRT are classified as a "strategic stock," nor do they currently interact with a Category I fishery, it was determined at the time that development of a take reduction plan was not necessary.[16]

In lieu of a take reduction plan, the ATGTRT agreed to develop an ATGTRS. The ATGTRS identifies informational and research tasks, as well as educational and outreach needs the ATGTRT believes are necessary, to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero mortality and serious injury rates. 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. For additional details on the ATGTRS, please visit: http://www.greateratlantic.fisheries.noaa.gov/Protected/mmp/atgtrp/.

Purse Seine Gear

There have been no observed small cetacean interactions with purse seines used to prosecute any of the Council fisheries (primarily GOM Atlantic herring). As a result, this gear type is not expected to pose an interaction risk with small cetacean species. However, purse seines, specifically those operating in the GOM targeting Atlantic herring, are known to interact with pinniped species (i.e., gray and harbor seals; see http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; Waring et al. 2014, 2015). However, most observed interactions to date have resulted in the release of the animals unharmed (Table 55); only two unknown seal species have been observed seriously injured and killed in the GOM Atlantic herring purse seine fishery (see http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; Waring et al. 2014, 2015). As a result, although interactions are possible with seals, purse seines are not expected to pose

[16] A strategic stock is defined under the MMPA as a marine mammal stock: for which the level of direct human-caused mortality exceeds the potential biological removal level; which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; or which is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA.

a significant serious injury or mortality risk to these species. This conclusion is further supported by the fact that the LOF has identified the Gulf of Maine Atlantic herring purse seine fishery as a Category III fishery; a fishery that has a remote to no likelihood of causing serious injury or mortality to marine mammals (Table 55).

TABLE 55. 2005-2014 OBSERVED GRAY AND HARBOR SEAL INTERACTION WITH THE GOM ATLANTIC HERRING PURSE SEINE FISHERY

Seal Species	Number of Observed Interactions	Released Alive
Unknown	13	11-Yes/2-No
Harbor Seal	10	Yes
Gray Seal	101	Yes

Sea Turtles

Bottom Trawl Gear

Trawl gear poses an interaction risk to sea turtles. Although sea turtle interactions with trawl gear have been observed in waters from the Gulf of Maine (GOM) to the Mid-Atlantic, most of the observed interactions have occurred in the Mid-Atlantic. As few sea turtle interaction have been observed in the GOM and Georges Bank regions of the Northwest Atlantic, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with trawl gear in these regions and therefore, produce a bycatch estimate for these regions. As a result, the following bycatch estimates are based on observed sea turtle interactions in bottom trawl gear in the Mid-Atlantic.

Green, Kemp's ridley, leatherback, loggerhead, and unidentified sea turtles have been documented interacting with bottom trawl gear. However, estimates are available only for loggerhead sea turtles. Warden (2011a), estimated that from 2005-2008, the average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic (i.e., south of Cape Cod, Massachusetts, to approximately the North Carolina/South Carolina border) was 292 (CV=0.13, 95% CI=221-369), with an additional 61 loggerheads (CV-0.17, 95% CI=41-83) interacting with trawls, but being released through a Turtle Excluder Device.[17] Of the 292 average annual observable loggerhead interactions, approximately 44 of those were adult equivalents (Warden 2011a).[18] Most recently, Murray (2015) estimated that from 2009-2013, the total average annual loggerhead interaction in bottom trawl gear in the Mid-

[17] TED's allow sea turtles to escape the trawl net, reducing injury and mortality resulting from capture in the net. For specific information on TEDs see 50 CFR 223.206.

[18] Adult equivalence considers the reproductive value of the animal (Warden 2011a, Murray 2013), providing a "common currency" of expected reproductive output from the affected animals (Wallace *et al*. 2008), and is an important metric for understanding population level impacts (Haas 2010).

Atlantic (i.e., defined by the boundaries of the Mid-Atlantic Ecological Production; roughly waters west of 71°W to the North Carolina/South Carolina border) was 231 (CV=0.13, 95% CI=182-298). Of the 231 total average annual loggerhead interactions, approximately 33 of those were adult equivalents (Murry 2015b). Bycatch estimates provided in Warden (2011a) and Murray (2015) are a decrease from the average annual loggerhead bycatch in bottom otter trawls during 1996-2004, which Murray (2008) estimated to be 616 sea turtles (CV=0.23, 95% CI over the nine-year period: 367-890). This decrease is likely due to decreased fishing effort in high-interaction areas (Warden 2011a). Based on data collected by observers for reported sea turtle captures in bottom otter trawl gear from 2005-2008, Warden (2011b), using species landed, also estimated total loggerhead interactions attributable to managed species. The estimated average annual bycatch of loggerhead sea turtles in bottom otter trawl gear for trips primarily landing mackerel or herring during 2005-2008 was zero loggerheads (95% CI=0 for either fishery; Warden 2011b). Murray (2015) provided similar estimates of loggerhead interactions by managed fished species from 2009-2013. Specifically, and estimated average annual take of zero loggerheads (95% CI=0) were attributed to the scallop fishery; the herring fishery was not reported. In addition, although not specific to a particular fishery, NEFOP and ASM observer data since 1989 has observed a total of three green, six Kemp's ridley, six leatherback, 250 loggerhead, and 16 unidentifiable species of sea turtles in bottom trawl gear (NMFS NEFSC FSB 2015).

Midwater Trawl Gear

NEFOP and ASM observer data from 1989-2013 have recorded five sea turtle interactions with midwater trawl gear; the primary species landed during these interactions was tuna (NMFS NEFS FSB 2015). These takes were in an experimental Highly Migratory Species fishery that no longer operates. No takes have been documents in other midwater trawl fisheries. Based on the best available information, sea turtle interactions in midwater trawl gear are expected to be rare.

Purse Seine Gear

Sea turtle interactions with this gear type are possible; however, based on available information (NMFS NEFSC FSB 2015), the risk of a sea turtle interacting with purse seine is expected to be low. NEFOP and ASM observer data from 1989-2014 have recorded several sea turtle interactions with purse seine gear (i.e., on loggerhead in 2008 and one loggerhead in 2009; NMFS NEFSC FSB 2015). Based on this information, while sea turtle interactions with purse seines are possible, these interactions are not expected to pose a significant serious injury or mortality risk to any sea turtle species.

Atlantic Sturgeon

Bottom Trawl Gear

Atlantic sturgeon are known to interact with bottom trawl gear and in fact, have been observed over the last 10 years (NEFOP and ASM) in bottom otter trawl gear where the primary species being targeted was Atlantic mackerel (NMFS NEFSC FSB 2015). To understand the interaction risk between bottom otter trawls and Atlantic sturgeon, there are three documents that use data collected by the NEFOP to describe bycatch of Atlantic sturgeon; Stein et al. (2004b); ASFMC (2007); and Miller and Shepard (2011). None of these provide estimates of Atlantic sturgeon bycatch by DPS. Information provided in all three documents indicate that sturgeon bycatch occurs in bottom otter trawl gear, with the most recent document estimating, based on fishery observer data and VTR data from 2006-2010, that annual bycatch of Atlantic sturgeon was 1,239 animals (Miller and Shepard 2011). Specifically, Miller and Shepard (2011) observed Atlantic sturgeon interactions in trawl gear with small (< 5.5 inches) and large (≥ 5.5 inches).[19] Although Atlantic sturgeon were observed to interact with trawl gear with various mesh sizes, based on observer data, Miller and Shepard (2011) concluded that of the possible fishing gear types, in general, trawl gear posed less of a mortality risk to Atlantic sturgeon than gillnet gear (i.e., estimated mortality rates in gillnet gear were 20.0%, while those in otter trawl gear were 5.0%); similar conclusions were reached in Stein et al. 2004b and ASMFC 2007. However, although Atlantic sturgeon deaths have rarely been reported in otter trawl gear (ASMFC 2007), it is important to recognize that effects of an interaction may occur long after the interaction and therefore, until additional studies are conducted, it remains uncertain what the overall impacts to Atlantic sturgeon survival are from trawl interactions (Beardsall et al. 2013). As a result, trawls should not be completely discounted as a form of gear that poses a mortality risk to Atlantic sturgeon. Further, even if an animal is released alive, pursuant to the ESA, any Atlantic sturgeon interaction with fishing gear is considered take.

Midwater Trawl Gear

To date, there have been no observed/documented interactions with Atlantic sturgeon in midwater trawl gear (NMFS NEFSC FSB 2015). Based on this information, midwater trawl gear is not expected to pose a significant interaction risk to any Atlantic sturgeon and therefore, is not expected to be a source of serious injury or mortality to this species.

Purse Seine Gear

Capture of sturgeon in purse seine gear type is possible; however, interactions have been extremely rare over the past 25 years. NEFOP and ASM observer data from 1989-2014 have recorded two Atlantic sturgeon interactions with purse seine gear targeting Atlantic herring in the GOM (NMFS NEFSC FSB 2015); these interactions were recorded in 2004 and 2005, prior to the listing of Atlantic sturgeon under the ESA. Based on this information, although Atlantic sturgeon interactions with purse seine gear are possible, the risk of an

[19] The regulatory bottom otter trawl mesh size for summer flounder, scup, and black sea bass is 5.5”, 5.0”, and 4.5” respectively.

interaction is expected to be low. Therefore, purse seine gear is not expected to pose a significant serious injury or mortality risk to this species.

Atlantic Salmon

Bottom Trawl Gear

According to the Biological Opinion issued by NMFS Greater Atlantic Regional Fisheries Office on December 16, 2013, NMFS NEFSC NEFOP and ASM program documented a total of 15 individual salmon incidentally caught on over 60,000 observed commercial fishing trips from 1989 through August 2013 (NMFS 2013; Kocik et al. 2014). Four out of the 15 individuals were observed bycaught in bottom otter trawl gear, the remainder were observed in gillnet gear (Kocik NEFSC), pers. comm (February 11, 2013) in NMFS 2013). Based on this information, it suggests that interactions with Atlantic salmon are rare events (NMFS 2013; Kocik et al. 2014); however, it is important to recognize that observer program coverage is not 100 percent. As a result, it is likely that some additional interactions with Atlantic salmon have occurred, but have not been observed or reported.

Midwater Trawl and Purse Seine Gear

To date, there have been no observed/documented interactions with Atlantic salmon and midwater trawl or purse seine gear (NMFS NEFSC FSB 2015). Based on this information, midwater trawl and purse seine gear are not expected to pose a significant interaction risk to any Atlantic salmon and therefore, are not expected to be source of serious injury or mortality to this species.

3.1.5 HUMAN COMMUNITIES

3.1.5.1 ATLANTIC HERRING FISHERY INFORMATION

The following information is adapted from Framework Adjustment 4 to the Atlantic Herring FMP (NEFSC, 2015). Additional description of the herring fishery is included in section 3.1.1.2 of this document.

The herring resource is managed as one stock complex, but this stock is thought to be comprised of inshore and offshore components that segregate during spawning. In recognition of the spatial structure of the herring resource, the herring annual catch limit (ACL) is divided into sub-ACLs and assigned to four herring management areas. Area 1 is the Gulf of Maine (GOM) divided into an inshore (Area 1A) and offshore section (Area 1B); Area 2 is located in the coastal waters between MA and NC, and Area 3 is on Georges Bank (GB) (Figure 2).

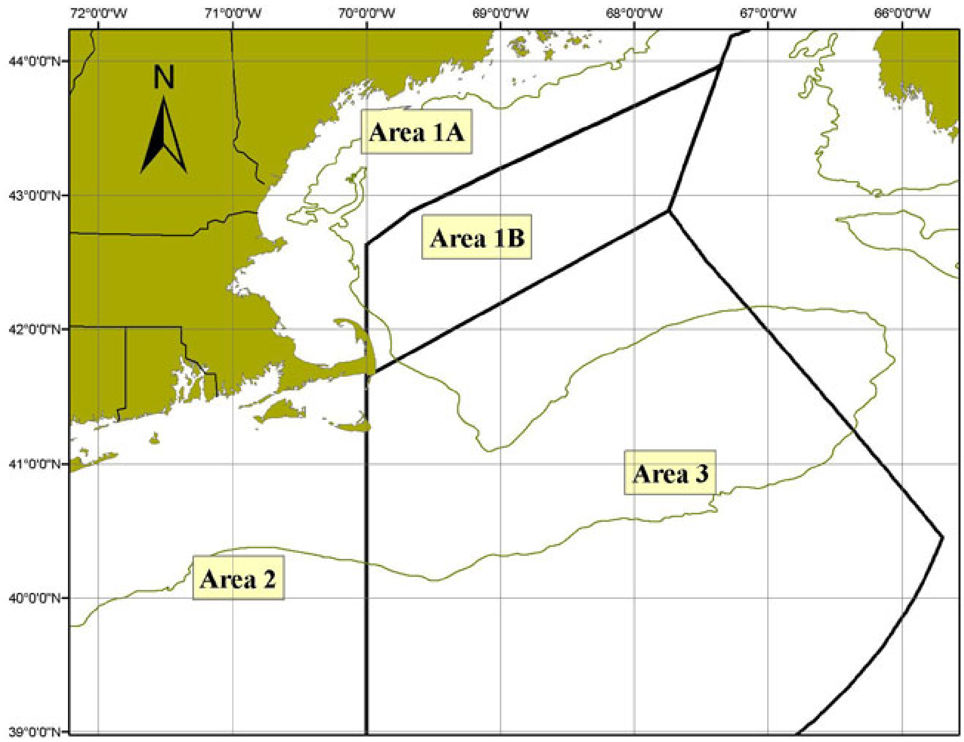


FIGURE 2. ATLANTIC HERRING MANAGEMENT AREAS.

The Atlantic herring fishery is generally prosecuted south of New England in Area 2 during the winter (January-April), and oftentimes as part of the directed mackerel fishery. There is 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 GOM in Areas 1A, 1B and in Area 3 (GB) as fish are available. Restrictions in Area 1A have pushed the fishery in the inshore GOM to later months (late summer). The midwater trawl (single and paired) fleet is restricted from fishing in Area 1A in the months of January through September because of the Area 1A sub-ACL split (0% January-May) and the purse seine-fixed gear only area (all of Area 1A) that is effective June-September. A sub-ACL split for Area 1B (0% January-April, 100% May-December) is effective for all vessels during the 2014 and 2015 fishing years.

Fall fishing (September-December) tends to be more variable and dependent on fish availability; the Area 1A sub-ACL 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.

Businesses related to the Atlantic herring fishery include fishing vessel owners and employees (captains/crew) and herring dealers and processors. Refer to the Herring

Amendment 5 FEIS (Section 4.5) for information in addition to that provided in the following subsections.

The 2013-2015 Atlantic herring fishery specifications were approved by NMFS concurrently with Framework 2 to the Herring FMP, which allows the Council to split sub-ACLs seasonally (by month) and establishes provisions for the carryover of some un-utilized sub-ACL during the specifications process. The specifications summarized below in Table 56 are effective for the 2013-2015 fishing years (initial allocations, not including overage deductions, carryovers, or set-aside deductions).

Table 56. 2013-2015 Atlantic Herring Fishery Specifications (Initial allocations).

	2013-2015
Overfishing Limit	169,000 – 2013 136,000 – 2014 114,000 – 2015
Acceptable Biological Catch (ABC)	114,000
Optimum Yield/ACL	107,800
Domestic Annual Harvest (DAH)	107,800
Border Transfer	4,000
Domestic Annual Processing (DAP)	103,800
U.S. At-Sea Processing (USAP)	0
Area 1A Sub-ACL	31,200
Area 1B Sub-ACL	4,600
Area 2 Sub-ACL	30,000
Area 3 Sub-ACL	42,000
Fixed Gear Set-Aside	295
Research Set-Aside	3 percent of each sub-ACL

* Sub-ACL numbers do not include overage deductions, carryovers, or RSA deductions.

Atlantic Herring Catch

The Atlantic herring ACL and management area sub-ACLs are tracked/ monitored based on the total catch – landings and discards – which are provided and required by herring permitted vessels through daily VMS and weekly VTRs as well as through Federal/state dealer data. Herring harvesters are required to report discards in addition to landed catch through these independent methods.

NMFS' catch estimation methods for the Atlantic herring fishery are described in detail in both Framework Adjustment 2 and Framework Adjustment 3 to the Atlantic Herring FMP (see Section 3.6.1 of Framework 3, NEFMC 2014).

Table 57 summarizes recent Atlantic herring catch estimates by year and management area from 2004-2014. The following bullets describe how these estimates were derived:

- 2004-2006 herring catch estimates are provided from quota management implemented by NMFS through the Atlantic Herring FMP and are based on interactive voice reporting (IVR) data from the call-in system used to monitor TACs. Reported herring discards are included in the totals.
- 2007-2009 herring catch estimates are based on IVR data supplemented with dealer data. Reported discards are included in the totals.
- 2010-2014 Atlantic herring catch estimates are based on a comprehensive methodology developed by NMFS in response to Amendment 4 provisions and the need to better monitor sub-ACLs. The methodology for estimating catch is based on landings data obtained from dealer reports (Federal and State) supplemented with VTRs (Federal and State of Maine) and VMS catch reports with the addition of discard data from extrapolated observer data.

Table 57. Atlantic Herring Catch by Year and Management Area, 2004-2014

Year	Area (sub-ACL)	Catch (mt)	Quota (mt)	Percent of quota caught
2004	1A	60,095	60,000	100%
	1B	9,044	10,000	90%
	2	12,992	50,000	26%
	3	11,074	60,000	18%
2005	1A	61,102	60,000	102%
	1B	7,873	10,000	79%
	2	14,203	30,000	47%
	3	12,938	50,000	26%
2006	1A	59,989	60,000	100%
	1B	13,010	10,000	130%
	2	21,270	30,000	71%
	3	4,445	50,000	9%
2007	1A	49,992	50,000	100%
	1B	7,323	10,000	73%
	2	17,268	30,000	58%
	3	11,236	55,000	20%
2008	1A	42,257	43,650	97%
	1B	8,671	9,700	89%

	2	20,881	30,000	70%
	3	11,431	60,000	19%
2009	1A	44,088	43,650	101%
	1B	1,799	9,700	19%
	2	28,032	30,000	93%
	3	30,024	60,000	50%
2010	1A	28,424	26,546	107%
	1B	6,001	4,362	138%
	2	20,831	22,146	94%
	3	17,596	38,146	46%
2011	1A	30,676	29,251	105%
	1B	3,530	4,362	81%
	2	15,001	22,146	68%
	3	37,038	38,146	97%
2012	1A	24,302	27,668	88%
	1B	4,307	2,723	158%
	2	22,482	22,146	102%
	3	39,471	38,146	103%
2013	1A	29,820	29,775	100%
	1B	2,458	4,600	53%
	2	27,569	30,000	92%
	3	37,833	42,000	90%
2014	1A	32,898	33,031	100%
	1B	4,399	2,878	153%
	2	19,626	28,764	68%
	3	36,323	39,415	92%

Source: NMFS

Table 58 summarizes total Atlantic herring catch as a percentage of the total available catch in each year from 2003-2014 based on NMFS catch estimation methods. Atlantic herring catch has been somewhat consistent over the time period (and in previous years), averaging about 91,500 mt, with the highest catch of the time series observed in 2009 and lowest in 2008. However, the quota allocated to the fishery (stockwide ACL/OY) has decreased 50% over the ten-year period. The herring fishery has therefore become more fully utilized in recent years and utilized 100% of the total ACL in 2012. The 2013-2015 Atlantic herring fishery specifications increased the stockwide Atlantic herring ACL available to the fishery by more than 15,000 mt; an additional 7,000 mt was caught under the higher quota in 2013, and overall, the fishery utilized 92% of the stockwide herring ACL.

Table 58. Total Annual Atlantic Herring Catch 2003-2014

Year	Total Herring Catch (mt)	Total quota allocated (mt)	Percent of total quota caught
2003	101,607	180,000	57%
2004	93,205	180,000	52%
2005	96,116	150,000	64%
2006	98,714	150,000	66%
2007	85,819	145,000	59%
2008	83,240	143,350	58%
2009	103,943	143,350	73%
2010	72,852	91,200	80%
2011	86,245	93,905	92%
2012	90,561	90,683	100%
2013	97,680	106,375	92%
2014	93,247	104,088	90%

Source: NMFS

Atlantic Herring Vessels

This section provides summary information regarding the vessels participating in the Atlantic herring fishery from 2008-2014. Additional information can be found in the FEIS for Amendment 5 to the Herring FMP. In this section, a herring trip is defined broadly as any trip in which at least one pound of Atlantic herring is retained.

Atlantic Herring Permits

Atlantic herring vessel permit categories are: Category A limited access all management areas; Category B limited access Areas 2 and 3 only; Category C limited access incidental catch of 25 mt per trip; Category D open access incidental catch of 3 mt per trip; and Category E limited access mackerel vessels that did not qualify for a limited access herring permit with a 20,000 pound herring possession limit in Areas 2/3. At this time, Category A and B vessels comprise the majority of the directed herring fishery. Many of the Category A, B, and C (limited access) vessels are also active in the Atlantic mackerel fishery (managed by the MAFMC). It is expected that only a few vessels will obtain a Category E permit.

Aside from a small increase in 2013, the number of vessels with either a limited access or an open access Atlantic herring permit has decreased annually since 2008 (Table 59). This includes a general annual decrease in limited access directed fishery vessels (Categories A and B), with a low of 40 vessels permitted in 2012. One cause could have been the substantial cuts in herring catch limits from prior levels beginning with the 2010-2012 specifications.

In 2014, 28 of the 43 (65%) Category A and B vessels were active (defined broadly as landing at least one pound of Atlantic herring during the fishing year). For the Category C vessels, 9 of 42 (23%) were active. Just 55 of the 1,842 (3%) Category D vessels were active. Although there have been far fewer active limited access versus open access vessels, data presented in the remainder of this section show that the limited access fishery comprises over 99% of the fishery in terms of revenues.

Table 59. Fishing Vessels with Federal Atlantic Herring Permits, 2009-2014

Permit Category		A	B,C	C	Total LA	D
2009	All	44	4	51	99	2,373
	Active	29	3	15	47	78
2010	All	42	4	49	95	2,277
	Active	29	3	19	51	99
2011	All	38	4	44	86	1,991
	Active	29	2	10	41	84
2012	All	36	4	41	81	1869
	Active	24	3	13	40	80
2013	All	40	4	44	88	1,909
	Active	25	3	15	43	76
2014	All	39	4	42	85	1,842
	Active	26	2	9	37	55

Source: NMFS Permit database and VTR database
Notes: Active vessels are defined as having landed at least one pound of Atlantic herring. This includes pair trawl vessels whose partner vessels landed the catch. Permit data for 2009-2011 are as of November 2012. Permit data for 2012-2013 are as of August 23, 2013.

Atlantic Herring Fishing Gear

Atlantic herring vessels primarily use purse seines, single midwater trawls or midwater pair trawls for fishing gear, with the combined single and pair midwater trawl fleet harvesting the majority of landings from 2008 to 2014 (70%; Tables 60 and 61). Some vessels use multiple fishing areas. The midwater trawl fleet uses all management areas, while the purse seine fishery focuses in Area 1A. Small mesh bottom otter trawls comprise about 5% of the fishery, and other gear types (e.g., pots, traps, shrimp trawls, handlines) comprise less than 1% of the herring fishery.

Tables 60, 61 and 62 show the distribution of Atlantic herring landings by gear type, permit category, and management area. The data indicate that the vast majority of midwater trawl vessels are Category A permit holders. All pair trawl vessels possess Category A permits, and a small number of single midwater trawl vessels have both Category B and C herring permits.

Table 60. Fishing Gear Distribution of Total Herring Landings from Atlantic Herring Management Areas (2008-2011)

Gear Type	Area 1A (mt)	Area 1B (mt)	Area 2 (mt)	Area 3 (mt)	Total
Single Midwater Trawl	6,340 (5%)	3,246 (17%)	4,886 (5%)	12,830 (14%)	**27,302 (8%)**
Midwater Pair Trawl	56,769 (43%)	12,612 (64%)	68,336 (76%)	78,518 (86%)	**216,235 (65%)**
Purse Seine	69,074 (52%)	3,696 (19%)	2,221 (2%)	0 (0%)	**74,991 (22%)**
Small Mesh Bottom Trawl	463 (0.3%)	* (0%)	14,288 (16%)	117 (0.1%)	**14,869 (4%)**
Other	817 (0.6%)	0 (0%)	17 (0%)	* (0%)	**834 (0.2%)**
Total	**133,463 (100%)**	**19,555 (100%)**	**89,748 (100%)**	**91,466 (100%)**	**334,231 (100%)**

**Data Confidentiality Concern*
Source: VTR database. Data are updated as of September, 2012.

Table 61. Fishing Gear Distribution of Total Herring Landings from Atlantic Herring Management Areas (2012-2014)

Gear Type	Area 1A (mt)	Area 1B (mt)	Area 2 (mt)	Area 3 (mt)	Total
Single and Pair Midwater Trawl	14,677 (18%)	9,068 (34%)	44,746 (100%)	110,227 (100%)	**178,718 (67%)**
Purse Seine	68,409 (82%)	310 (1%)	0 (0%)	0 (0%)	**68,719 (26%)**
Small Mesh Bottom Trawl	534 (1%)	16,967 (64%)	0 (0%)	267 (0%)	**17,768 (7%)**
Other	3 (0%)	0 (0%)	3 (0%)	0 (0%)	**6 (0%)**
Total	**83,623 (100%)**	**26,345 (100%)**	**44,749 (100%)**	**110,494 (100%)**	**265,211 (100%)**

Source: VTR database. Data are updated as of August 2015.

TABLE 62. FISHING GEAR DISTRIBUTION OF HERRING LANDINGS BY PERMIT CATEGORY (2008-2011)

Gear Type	Category A (mt)	Category B/C (mt)	Category C (mt)	Category D (mt)	Total
Single Midwater Trawl	26,915 (8%)	383 (9%)	0 (0.0%)	5 (0%)	27,302 (8%)
Midwater Pair Trawl	216,235 (66%)	0 (0%)	0 (0.0%)	0 (0%)	216,235 (65%)
Purse Seine	73,261 (22%)	0 (0%)	1,350 (62%)	514 (41%)	74,991 (22%)
Small Mesh Bottom Trawl	9,922 (3%)	3,990 (91%)	538 (25%)	418 (34%)	14,869 (4%)
Other	249 (0%)	0 (0%)	278 (13%)	307 (25%)	834 (0%)
Total	326,583 (100%)	4,373 (100%)	2,166 (100%)	1,244 (100%)	334,365 (100%)

Atlantic Herring Prices

Average Atlantic herring prices have increased from approximately $221/mt in 2009 to approximately $300/mt in 2012. For January-June 2013, herring prices averaged $306/mt. Figure 3 plots the monthly average nominal prices for Atlantic herring, omitting December of 2011 and 2012 (prices were quite high during these months, but quantities were very low, and these months are not representative of normal operating conditions for the directed herring fishery).

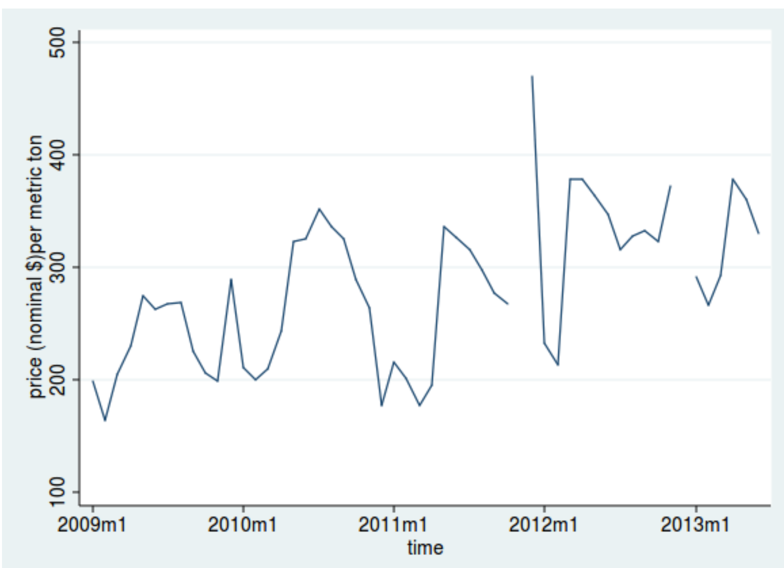


FIGURE 3. MONTHLY AVERAGE PRICE PER METRIC TON FOR ATLANTIC HERRING.

Atlantic Herring Fishing 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 (NS 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 NS 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. A description concerning NS 8 is seen below.

In the 1996 amendments to the MSA, Congress added provisions directly related to social and economic factors for consideration by Councils and NMFS. NS 8 of the MSA 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.

NS 8 requires the consideration of impacts on fishing communities. Section 316 of MSA 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."

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.

NS 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.

Atlantic Herring Communities of Interest

The following five criteria were used in Amendments 1 and 5 to the Herring FMP to define *Communities of Interest* for the Atlantic herring fishery, which must meet at least one criterion:

1. Atlantic herring landings of at least 10M pounds (4,536 mt) per year from 1997-2008, or anticipated landings above this level based on interviews and documented fishery-related developments.
2. Infrastructure dependent in part or whole on Atlantic herring.
3. Dependence on herring as lobster and/or tuna bait.
4. Geographic isolation in combination with some level of dependence on the Atlantic herring fishery.
5. Utilization of Atlantic herring for value-added production.

Based on the above criteria, there are 11 *Communities of Interest* for the Atlantic herring fishery, identified below and further evaluated in Amendment 5 to the FMP for Atlantic Herring (Section 4.5.3). Also, community profiles of each are available from the NEFSC Social Sciences Branch website (Clay et al. 2007). Since Amendment 1, this list has changed slightly with changes in harvesting and processing sectors.

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

Atlantic Herring Home Ports

Of the Atlantic herring *Communities of Interest*, Gloucester and New Bedford, Southern RI, and Cape May are homeports with largest concentrations of vessels that have Atlantic Herring limited access directed fishery permits, Categories A and B (Table 63). Mid-Coast ME, Portland and Seacoast NH also are home to a few of these permit holders. Beyond the communities of interest, a few Category A and B permit holders have homeports in Bath, Cundys Harbor, Hampden, Owls Head, and West Rockport ME; Boston and Woods Hole MA; and Wanchese NC. For the most part, these vessels use a community of interest as a landing port (NMFS 2012).

The communities of interest also reflect concentrated locations of other stakeholders such as the lobster fishing industry members who use herring as bait. Another community of interest that is more dispersed and thus may not be reflected in this listing is that comprised of the stakeholders who rely on herring as forage to attract their target species (e.g., tuna fishermen, recreational fishermen and whale watch companies).

Table 63. Distribution of 2012 Atlantic Herring Permit Holders that have an Atlantic Herring Community of Interest as a Homeport

Homeport		Permit Category				
		A	B,C	C	D	Total
Maine	Portland	2	0	1	36	39
	Rockland	1	0	0	3	4
	Stonington/Deer Isle	1	0	0	0	1
	Vinalhaven	0	0	0	2	2
	Lubec/Eastport	0	0	0	2	2
	Sebasco Estates	0	0	0	3	3
	Maine, other	5	0	5	180	190
New Hampshire	Seacoast	2	0	4	90	96
Massachusetts	Gloucester	5	0	2	155	162
	New Bedford	5	0	2	195	202
	Massachusetts, other	5	1	1	356	363
Rhode Island	Southern	3	3	7	115	128
New Jersey	Cape May	6	0	8	85	99
	New Jersey, other	0	0	0	184	184
Other States		1	0	11	463	475

Source: NMFS

Atlantic Herring Landing Ports

Atlantic herring harvested from Areas 1A and 1B are landed in fishing communities in Maine, New Hampshire, and Massachusetts, whereas herring from Areas 2 and 3 are landed in a wider range of ports (Table 64). Communities in Rhode Island and New Jersey fish in Area 2 for herring almost exclusively. Portland, Rockland, Gloucester, and New Bedford are ports with the most herring landings in recent years. Within New Jersey, Cape May is the most active landing port.

Table 64. Atlantic Herring Landing Distribution by Port and Management Area

Landing Port		Area 1A	Area 1B	Area 2	Area 3
Maine	Portland	25%	20%	0%	26%
	Rockland	27%	14%	0%	11%

	Stonington/Deer Isle	8%	12%	0%	0%
	Vinalhaven	1.7%	3.9%	0%	2.3%
	Lubec/Eastport	0%	0%	0%	0%
	Sebasco Estates	0%	0%	0%	0%
	Maine, other	6.1%	1.1%	0%	4%
New Hampshire	Seacoast	2.5%	0.7%	0.1%	0.9%
Massachusetts	Gloucester	22%	45%	10%	44%
	New Bedford	6.9%	4.4%	53%	12%
	Massachusetts, other	1.1%	0.1%	3.6%	0%
Rhode Island	Southern	0%	0%	22%	0.1%
New Jersey	Cape May	0%	0%	12%	0%
	New Jersey, other	0%	0%	0%	0%
Other States		0%	0%	0.1%	0%
Total		163,269 (100%)	23,289 (100%)	101,542 (100%)	133,368 (100%)

Source: NMFS

Atlantic Herring Community Descriptions

1. Portland, Maine

Portland is the largest city in Maine, with a population of 66,194 (Bureau 2010). Of the civilian employed population 16 years and older, 0.3% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (29.3%) is the largest industry sector (Bureau 2011). Portland's waterfront provides most of the community's fishing industry infrastructure (e.g., Portland Fish Exchange) alongside other industries including recreation, tourism, light industry, transportation, cargo, and marine-related research. Portland's landings come primarily from the large mesh groundfish species and from lobster. Herring brings in about 8.6% of the dollar value of landings in Portland. Portland ranked third in herring landings in the region, taking a six-year (2005-2010) average (13.5K mt). Taking a four-year average (2007-2010), Portland ranked fourth among ports with herring revenue ($3.1M) (Dealer and VTR data).

2. Rockland, Maine

Rockland has a total population of 7,297 (Bureau 2010). Of the civilian employed population 16 years and older, 3.1% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (18.3%) is the largest industry sector (Bureau 2011). Other than fishing and boat building/repair, other stabilizing businesses include furniture and playground equipment manufacturing, biotechnology industries, wholesale distribution, marine-related businesses, seaweed processing, metal fabricating, and food related industries. Rockland's landings come primarily from lobster and herring. Herring brings in about 36% of the dollar value of landings in Rockland. Rockland ranked fourth in herring landings in the region, taking a six-year (2005-2010) average (12.5K mt) Taking a four-year average (2007-2010), Rockland ranked second among ports with herring revenue ($3.4M), though 2009 and 2010 revenues were noticeably lower (Dealer and VTR data).

3. Stonington/Deer Isle, Maine

Stonington and Deer Isle have a total population of 3,018 (Bureau 2010). Of the civilian employed population 16 years and older, 29% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). This is the largest industry sector (Bureau 2011). Deer Isle is home to the Commercial Fisheries News, the widely-read monthly fishing industry newspaper for the Atlantic coast. Stonington is one of the few Maine fishing communities that have secured waterfront access for commercial fishing, because property values have remained stable relative to other coastal cities. Stonington's landings come primarily from lobster. Herring brings in about 0.10% of the dollar value of landings in Stonington and Deer Isle. Stonington and Deer Isle landed 3.9K mt of herring on average over six years (2005-2010). Taking a four-year average (2007-2010), Stonington ranked fifth among ports with herring revenue ($1.0M), though 2009 and 2010 revenues were noticeably lower (Dealer and VTR data). Stonington and Deer Isle are involved in the Atlantic herring fishery primarily through their dependence on herring for lobster bait.

4. Vinalhaven, Maine

The island town of Vinalhaven has a total population of 1,165 (Bureau 2010). Of the civilian employed population 16 years and older, 32.4% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). This is the largest industry sector (Bureau 2011). Vinalhaven is intimately involved with the Atlantic herring fishery because of its dependence on lobster bait. Many of the year-round residents are participants in the lobster fishery. Several lobster bait dealers, including floating stations and a co-op, are located in Vinalhaven. Vinalhaven has several packaging and wholesale companies, including Vinalhaven Lobster Co., Vinalhaven Fishermen's Co-op, Inland Seafood and Alfred Osgood, that ship lobster to Portland and other mainland locations for processing and distribution. Bait dealers on Vinalhaven pay a higher price for bait than dealers on the mainland, as there is limited bait storage capacity on the island and insufficient space on the ferry that transports goods and people from the mainland to make regular bait transshipments during the height of the lobster season. Herring brings in about 2.7% of the dollar value of landings in Vinalhaven. Vinalhaven ranked ninth in herring landings in 2004 (2,674 mt) and tenth cumulatively from 1995-2004 (24,779 mt).

5. Lubec/Eastport, Maine

Lubec and Eastport have a total population of 2,690 (Bureau 2010). Of the civilian employed population 16 years and older, 5.4% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (31%) is the largest industry sector (Bureau 2011). Lubec and Eastport have a diversity of employment, including medical centers, schools, an apparel company, and an Atlantic salmon aquaculture facility. Eastport also has the only Nori seaweed processing plant in the US. Eastport and Lubec are involved in a diversity of fisheries, including lobster, scallops, urchins, clams, and sea cucumbers. No herring landings were reported in Lubec/Eastport in 2004. Lubec and Eastport are representative of geographically isolated small ports that depend on herring for lobster bait.

6. Sebasco Estates, Maine

Sebasco Estates is a small village within the town of Phippsburg, which has a total population of 2,216 (Bureau 2010). Of the civilian employed population of Phippsburg 16 years and older, 5.2% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (22.6%) is the largest industry sector (Bureau 2011). Herring brings in about 0.076% of the dollar value of landings in Sebasco Estates. Several lobster bait dealers, large and small, are located in this area. Sebasco Estates is involved in the Atlantic herring fishery primarily due to its dependence on herring for lobster bait, and is representative of small ports that depend on herring for lobster bait.

7. NH Seacoast – Newington, Portsmouth, Hampton/Seabrook

Newington has a total population of 753 (Bureau 2010). Of the civilian employed population of Newington 16 years and older, 1.0% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (15.8%) is the largest industry sector (Bureau 2011). Major employers in Newington include Fox Run Mall (retail) and Neslab (light manufacturing lab equipment). Herring brings in about 4.8% of the dollar value of landings in Newington. Newington ranked fifth in herring landings in 2004 (5,660 mt) and 12th cumulatively from 1995-2004 (16,805 mt), with herring landings increasing in more recent years. Newington is primarily dependent on the herring fishery because of the bait it provides for lobster operations based in Great Bay estuary. Commercial fisheries in the Great Bay estuary include herring, alewives, mummichogs (*Fundulus sp.*) and tomcod, eels, and smelt. Newington has several large and small herring bait dealers, and freezer facilities to store lobster bait. The Little Bay Lobster Company and the Shafmaster Fleet Services both harvest and deliver lobster nationally and internationally. The Newington fishing industry also competes with other water-dependent industries, including tallow, steel scrap and wood chip export industries.

Portsmouth has a total population of 20,779 (Bureau 2010). Of the civilian employed population of Portsmouth 16 years and older, 0.7% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (25.5%) is the largest industry sector (Bureau 2011). Portsmouth is somewhat involved in the herring fishery, primarily through its dependence on herring for lobster and tuna bait. Herring brings in about 1.2% of the dollar value of landings in Portsmouth. The port is centrally-located with 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).

Hampton and Seabrook have a total population of 24,123 (Bureau 2010). Of the civilian employed population 16 years and older, 0.5% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (21.5%) and retail trade (21.8%) are the largest industry sector, in Hampton and Seabrook, respectively (Bureau 2011). Hampton and Seabrook are somewhat involved in the herring fishery through their dependence on herring for lobster and tuna bait. Herring brings in about 0.2% of the dollar value of landings in Hampton and Seabrook. Only 2 mt of herring were reported to have been landed in Hampton in 2004. Seabrook ranked 17th in herring landings in 2004 (96 mt).

8. Gloucester, Massachusetts

Gloucester has a total population of 28,789 (Bureau 2010). Of the civilian employed population of Gloucester 16 years and older, 2.2% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (25.5%) is the largest industry sector (Bureau 2011). Herring brings in about 11% of the dollar value of landings in Gloucester. Gloucester was the top-ranked port for herring landings in 2004 (26,891 mt) and cumulatively from 1995-2004 (227,579 mt). Taking a four-year average (2007-2010), Gloucester ranked first among ports with herring revenue ($6.4M) (Dealer and VTR data). Gloucester lobster fishermen depend on the harvested herring as bait for their traps and tuna fishermen use herring as bait for their lines. 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.

9. New Bedford, Massachusetts

New Bedford has a total population of 95,072 (Bureau 2010). Of the civilian employed population of New Bedford 16 years and older, 1.2% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (26.1%) is the largest industry sector (Bureau 2011). New Bedford contains approximately 44 fish wholesale companies, 75 seafood processors and some 200 shore side industries (Hall-Arber et. al. 2001). Maritime International, which has one of the largest U.S. Department of Agriculture-approved cold treatment centers on the East Coast, is also located in New Bedford. Herring brings in about 0.7% of the dollar value of landings in New Bedford. New Bedford ranked fourth in herring landings in 2004 (7,791 mt) and seventh cumulatively from 1995-2004 (31,089 mt). Taking a four-year average (2007-2010), New Bedford ranked third among ports with herring revenue ($6.4M) (Dealer and VTR data).

10. Southern Rhode Island – Point Judith, Newport, North Kingstown

Census data are not available for Point Judith itself, but are available for the county subdivision "Narragansett Pier CDP" which includes Point Judith. Narragansett Pier CDP has a total population of 3,409 (Bureau 2010). Of the civilian employed population of Narragansett Pier CDP 16 years and older, 0.5% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (27.7%) is the largest industry sector (Bureau 2011). Several lobster bait dealers are located in Point Judith, and some herring is trucked to Maine from Point Judith for processing. Landings of herring in Point Judith were much higher in the early 1990s, possibly due to increased participation in the Atlantic mackerel fishery. Today, herring brings in about 1.2% of the dollar value of landings in Point Judith. Point Judith ranked 10th in herring landings in 2004 (2,129 mt) and fourth cumulatively from 1995-2004 (71,289 mt). Taking a four-year average (2007-2010), Point Judith ranked seventh among ports with herring revenue ($469K) (Dealer and VTR data).

Newport has a total population of 24,672 (Bureau 2010). Of the civilian employed population of Newport 16 years and older, less than 0.01% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (25.1%) is the largest industry sector (Bureau 2011). Herring brings in less than 0.01% of the dollar value of landings in Newport. Newport is marginally involved in the Atlantic herring fishery, and ranked 15th in herring landings in 2004 (313 mt) and 17th cumulatively from 1995-2004 (3,757 mt). Aquidneck Lobster Co., Dry Dock Seafood, International Marine Industries Inc., Long Wharf Seafood, Neptune Trading Group Ltd., Parascandolo and Sons Inc., and Omega Sea are wholesalers and retailers of seafood in Newport.

North Kingstown has a total population of 26,486 (Bureau 2010). Of the civilian employed population of North Kingstown 16 years and older, 1.1% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Educational services and health care and social assistance (25.4%) is the largest industry sector (Bureau 2011). Herring brings in about 6.9% of the dollar value of landings in North Kingstown, which is involved in the herring fishery primarily through its involvement in the bait market. North Kingstown ranked 12th in herring landings in 2004 (1,065 mt) and fifth cumulatively from 1995-2004 (69,094 mt). 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 Kingston's Sea Freeze, Ltd. is the largest producer of sea-frozen fish on the U.S. east coast. It supplies sea-frozen and land-frozen fish to domestic and international markets including bait products to long-line fleets. Sea Freeze owns two freezer trawlers that provide *Illex* and *Loligo* squid, mackerel and herring to the Sea Freeze facilities. Although herring is among the least financially valuable species that Sea Freeze harvests and processes, it is nevertheless important to the business due to its year round availability.

11. Cape May, New Jersey

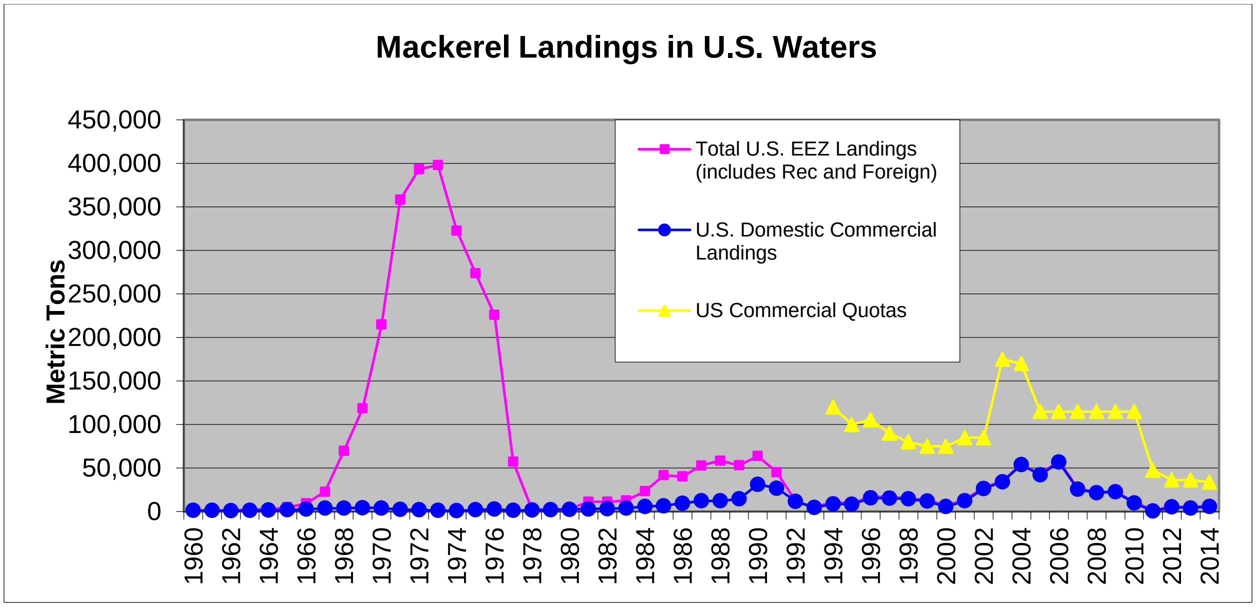
Cape May has a total population of 3,607 (Bureau 2010). Of the civilian employed population of Cape May 16 years and older, less than 0.01% are employed in the agriculture, forestry, fishing, hunting, or mining sectors (2007-2011 average). Arts, entertainment, recreation, accommodation and food services (19.3%) is the largest industry sector (Bureau 2011). Herring brings in about 0.6% of the dollar value of landings in Cape May. Only 8 mt of herring were reported to have been landed in Cape May in 2004. A pumping station for offloading herring and Lund's Fisheries, a processor of herring and mackerel, are located in Cape May. Lund's' also owns a number of dedicated pelagic fishing vessels, and is a member of the Garden State Seafood Association. There are also two other exporters of seafood in Cape May: the Atlantic Cape Fisheries Inc., which exports marine fish and shellfish, oysters, scallops, clams and squids; and the Axelsson and Johnson Fish Company Inc., which exports shad, marine fish, conch, American lobster, lobster tails, scallops and whole squid.

3.1.5.2 ATLANTIC MACKEREL FISHERY INFORMATION

The following information is adapted from 2015-2017 Specifications and Management Measures for the Atlantic Mackerel, Squid, and Butterfish FMP (MAFMC, 2014). Additional description of the mackerel fishery is included in section 3.1.1.6 of this document.

Historical Atlantic Mackerel Commercial Fishery

The modern northwest mackerel fishery began with the arrival of the European distant-water fleets in the early 1960's. Total international commercial landings (Northwest Atlantic Fisheries Organization Subareas 2-6,) peaked at 437,000 mt in 1973 and then declined sharply to 77,000 by 1977 (Overholtz 1989). The MSA established control of the portion of the mackerel fishery occurring in US waters (Northwest Atlantic Fisheries Organization Subareas 5-6) under the auspices of the Council. Reported foreign landings in US waters declined from an unregulated level of 385,000 mt in 1972 to less than 400 mt from 1978-1980 under the MSA (the foreign mackerel fishery was restricted by NOAA Foreign Fishing regulations to certain areas or "windows"). Under the MSB FMP foreign mackerel catches were permitted to increase gradually to 15,000 mt in 1984 and then to a peak of almost 43,000 mt in 1988 before being phased out again.

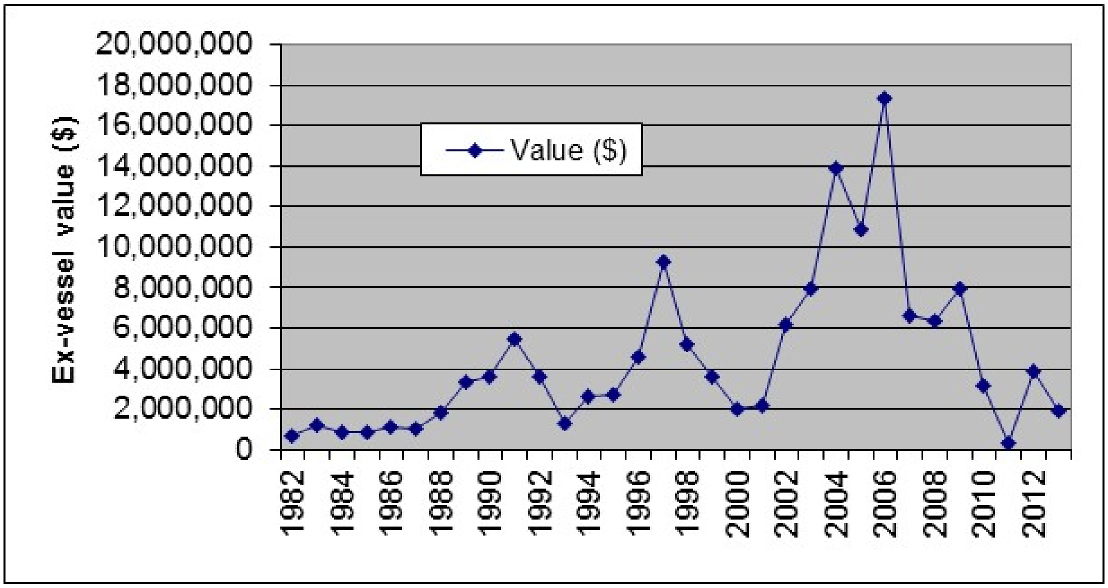


Source: TRAC 2010, unpublished NEFSC dealer reports

FIGURE 4. HISTORICAL ATLANTIC MACKEREL LANDINGS IN THE U.S. EEZ.

US commercial landings of mackerel increased steadily from roughly 3000 mt in the early 1980s to greater than 31,000 mt by 1990. US mackerel landings declined to relatively low levels 1992-2000 before increasing in the early 2000's. The most recent years have seen a significant drop-off in harvest. In 2014, 6,726 mt of mackerel was landed.

Nominally ex-vessel price has generally varied between about $200-$700 per mt but when inflation is taken into account there was erosion in the ex-vessel per-pound value of mackerel from 1982-2010. 2011 and 2012 prices increased substantially (near $700/mt), which is likely at least partially related to the low levels of mackerel landed. 2014 ex-vessel prices were about $491/mt. Total ex-vessel value tracks both price and the quantity of fish landed (see Fishery Information Document at http://www.mafmc.org/ssc-meetings/2013/april-may for details). 2014 landings totaled 5,490 mt and generated $2.9 million in ex-vessel revenues.



Source: unpublished NEFSC dealer reports

FIGURE 5. MACKEREL NOMINAL EX-VESSEL REVENUES 1982-2013.

Atlantic Mackerel Fishery Performance

Weekly dealer data triggers in-season management actions that institute relatively low trip limits when 90% of the commercial DAH is landed. Table 65 lists the performance of the mackerel fishery (commercial and recreational together) compared to the effective quota from 2005-2014. There have been no quota overages over this period, and the fisheries have not approached the quotas. Since 2012 any ABC overages must be repaid pound for pound. Discard information is not available since 2011, but it does not appear that mackerel would have approached anywhere near its ABC since discards are usually quite low according to the most recent assessment (TRAC 2010). The 2013 and 2014 ABC was 43,781 mt.

TABLE 65. ATLANTIC MACKEREL QUOTA PERFORMANCE

Year	Harvest (mt) (Commercial and Recreational)	Quota (mt) (Rec+Com)	Percent of Quota Landed
2005	43,275	115,000	38%
2006	58,352	115,000	51%
2007	26,142	115,000	23%
2008	22,498	115,000	20%
2009	23,235	115,000	20%
2010	10,739	115,000	9%
2011	1,478	47,395	3%
2012	6,015	36,264	17%
2013	5,029	36,264	14%
2014	6,726	33,821	20%

Source: Unpublished NMFS dealer reports and MRIP data

Participation in the fishery was low in 2014 related to the low availability of mackerel. The tables and figures below and on the following pages describe vessel participation, vessel dependency, distribution of landings by state/month/gear/port, dealer participation, and the general at-sea location of recent mackerel landings/catches.

Table 66. 2014 Data for Permitted and Active Atlantic Mackerel Vessels

Landings (lb)	1,000,000 or more	100,000-1,000,000	50,000-100,000	10,000-50,000
No. of Vessels (All States)	6	5	1	14

Source: Unpublished NMFS dealer reports and permit data. Data confidentiality rules do not allow state by state breakdowns.

The mackerel fishery became a limited access fishery in 2013 except for open-access incidental catch permits. The current numbers of permits are approximately 31 Tier 1 permits, 24 Tier 2 permits, and 80 Tier 3 permits. When the directed fishery is open, there are no trip limits for Tier 1, Tier 2 has a 135,000 pound trip limit and Tier 3 has a 100,000 pound trip limit. Tier 3's trip limit is reduced to 20,000 pounds if it catches 7% of the commercial quota. Open access incidental permits have a 20,000 pound per trip limit. Only a few vessels accounted for most mackerel landings in 2014 (Table 66).

Table 67. 2014 Vessel Dependence on Mackerel (revenue-based)

Dependence on Mackerel	Number of Vessels in Each Dependency Category
1%-5%	10
5%-25%	12
25%-50%	3
More than 50%	1

Source: Unpublished NMFS dealer reports – not at state level due to data confidentiality issues

Table 68. Recent Landings by State (mt)

YEAR	CT	MA	ME	NJ	NY	RI	Other
2012	4	1,874	19	915	25	2,493	2
2013	9	3,302	465	21	9	324	5
2014	9	4,924	622	13	57	245	71

Source: Unpublished NMFS dealer reports

Table 69. Recent Landings by Month (mt)

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	668	3,576	948	19	48	4	5	1	35	18	5	4
2013	109	2,075	1,149	148	26	9	29	28	21	23	33	485
2014	109	2,560	936	67	21	13	29	33	42	61	1,958	111

Source: Unpublished NMFS dealer reports

Table 70. Recent Landings by Gear (mt)

YEAR	Gill Nets	Bottom Trawl	Single Mid-Water Trawl	Pair Mid-Water Trawl	Trap/Pots/Pound Nets/Weir	Other/ Unknown
2012	4	3,059	576	1,488	24	181
2013	6	749	166	2,338	15	861
2014	33	1,126	1,299	1,484	16	1,981

Source: Unpublished NMFS dealer reports

Because of data confidentiality issues, details for port revenues from mackerel cannot be provided. Ports that had at least $100,000 in ex-vessel revenues from mackerel over 2011-2014 (combined) included (from more mackerel dollars to less): North Kingstown, RI; Gloucester, MA; New Bedford, MA; Portland, ME; Cape May, NJ; Marshfield, MA; Provincetown, MA; and Point Judith, RI. (Source: Unpublished NMFS dealer reports.). Descriptions of these communities are provided in Section 3.1.5.1.

Permit data is public, and the tables below provide the homeport and principal landing port for the 57 mackerel vessels with Tier 1 and Tier 2 permits, which land almost all of the mackerel in a given year and would be the most likely to be affected by this action. While more principal ports are listed in the permit data, the majority of mackerel would be expected to be landed in the above listed ports with recent substantial landings even if mackerel became more available and landings increased substantially.

Table 71. Tier 1/2 Homeports

HOME PORT STATE	HOME PORT CITY	Total
MA	BOSTON	4
	GLOUCESTER	4
	NEW BEDFORD	8
	WOODS HOLE	1
MA Total		17
ME	BATH	1
	CUNDYS HARBOR	1
	PORTLAND	1
	ROCKLAND	1
ME Total		4
NC	WANCHESE	1
NC Total		1
NH	NEWINGTON	2
NH Total		2
NJ	CAPE MAY	21
NJ Total		21
NY	GREENPORT	1
	MONTAUK	2
NY Total		3
PA	PHILADELPHIA	2
PA Total		2
RI	DAVISVILLE	1
	NARRAGANSETT	1
	POINT JUDITH	4
	TIVERTON	1
RI Total		7
Grand Total		57

Table 72. Tier 1/2 Principal Ports

PRINCIPAL PORT STATE	PRINCIPAL PORT CITY	Total
MA	FAIRHAVEN	1
	GLOUCESTER	4
	NEW BEDFORD	7
	WOODS HOLE	1
MA Total		13
ME	PORTLAND	3
	ROCKLAND	1
	VINALHAVEN	1
ME Total		5
NH	NEWINGTON	2
NH Total		2
NJ	CAPE MAY	22
	WILDWOOD	1
NJ Total		23
NY	GREENPORT	1
	MONTAUK	2
NY Total		3
RI	DAVISVILLE	2
	NARRAGANSETT	2
	POINT JUDITH	5
	TIVERTON	1
RI Total		10
VA	HAMPTON	1
VA Total		1
Grand Total		57

Source: NMFS

Table 73. Recent Numbers of Active Dealers

	Number of dealers buying at least $10,000 Mackerel	Number of dealers buying at least $100,000 Mackerel
2012	5	5
2013	16	4
2014	18	5

Source: Unpublished NMFS dealer reports

TABLE 74. KEPT CATCH (MT) IN STATISTICAL AREAS WITH AT LEAST 1,000 MT OF MACKEREL CAUGHT IN AT LEAST ONE RECENT YEAR

YEAR	_612	_521	_616	_522
2011	4	.	100	13
2012	2,393	38	1,527	45
2013	15	2,010	.	1,511

Source: Unpublished NMFS vessel trip reports

Data confidentiality concerns preclude listing mackerel catch by statistical area, but statistical areas with more than 1,000 mt of mackerel catch combined over 2012-2014 include (in descending order of catch amounts) 522, 612, 521, 616, and 514.

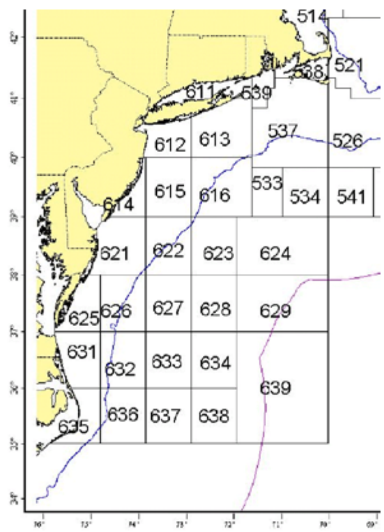
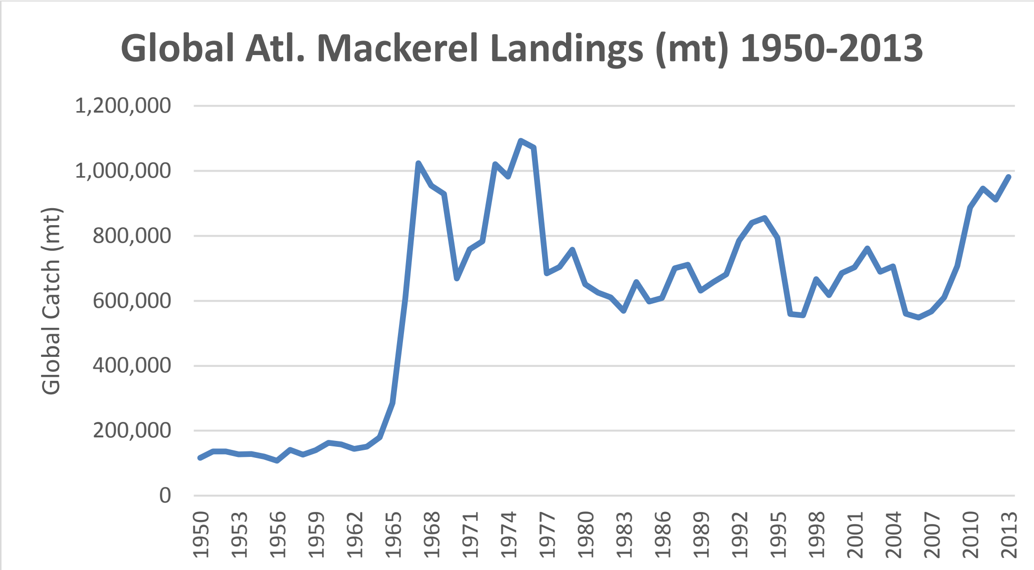


FIGURE 6. NMFS STATISTICAL AREAS

Current Market Overview for Mackerel and World Production (Required by FMP)

U.S. mackerel (western Atlantic) are a substitute for European mackerel (eastern Atlantic), which are caught in much larger quantities. It is unclear how demand for U.S. mackerel may be impacted by European catches, but the MSB advisory panel has indicated that the demand for mackerel is high enough to support catches near the quotas if the product is of high quality.



Source: http://www.fao.org/fishery/statistics/

FIGURE 7. WORLD PRODUCTION OF MACKEREL, 1950-2013.

Recreational Atlantic Mackerel Fishery

Mackerel can be seasonally important to the recreational fisheries of the Mid-Atlantic and New England regions. They may be available to recreational anglers in the Mid-Atlantic primarily during the winter and spring, depending on annual conditions. Mackerel are caught in New England in the summer and fall and are often targeted for purposes of collecting live bait, especially for large striped bass. 2005-2014 recreational landings of mackerel, as estimated from the Marine Recreational Information Program ("MRIP"), are given in Table 75. Most mackerel are caught in the private/rental mode but some are caught in the party/charter and shore modes as well. Approximately 20% of all mackerel caught (by number) are released (2013-2014 combined). Compared to other recreationally-important species, estimates for mackerel recreational harvest have low precisions due to low encounter rates. Earlier years (1980s-1991) had higher catches (consistently in the 1,000-4,000 mt range) but recent years have been below 1,000 mt.

TABLE 75. RECREATIONAL HARVEST (ROUNDED TO NEAREST MT) OF MACKEREL, 2005-2014.

Year	Harvest (MT)
2005	1,005
2006	1,491
2007	596
2008	755
2009	600
2010	845
2011	947
2012	683
2013	888
2014	792

Source: Personal Communication from NMFS Fisheries Statistics Division.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The National Environmental Policy Act requires that an EA briefly describe the probable environmental impacts of the proposed action and alternatives to the proposed action considered by the action agency (NEPA, section 102(2)(E)). The following sections address the reasonably foreseeable direct, indirect, and cumulative effects of the alternatives being considered under the industry-funded monitoring amendment.

General discussion of Omnibus alternative impacts

As noted above in the introduction to the Affected Environment (section 3.1), the omnibus alternatives (Omnibus Alternatives 1, 2, and 2.1-2.6) in this amendment are procedural in nature—focused on the definition of cost responsibilities between NMFS and industry, the process that will be used to prioritize industry-funded monitoring programs for the Greater Atlantic Region fisheries in order to allocate Federal funding for NMFS cost responsibilities, industry-funded monitoring program service provider standards, and the establishment of future industry-funded monitoring programs. Subsequently, there are no expected direct physical or biological impacts associated with the alternatives under consideration for the omnibus portions of the action. Due to the nature of the omnibus alternatives evaluated in this amendment, there very few functional differences (as far as environmental effects are concerned) between the status quo alternatives and the other alternatives under consideration.

The expected direct effects are generally well-defined for most fishery management actions, but indirect effects are often less so. During the development of this amendment, there have been occasions when discussions began to diverge from how bycatch data may best be collected into discussions about the likely management implications of an "improved" data collection program. These discussions generally focused on the potential for improvements in stock assessments and on the types of management measures that may be necessary to address bycatch concerns where they may exist.

There are three reasons why these types of potential downstream effects (e.g., subsequent management measures to address bycatch issues) of this action are considered too remote and speculative to be appropriate for consideration in this amendment. First, while this amendment is focused on potentially expanding monitoring coverage above the level required under SBRM, implementation of this amendment does not, by itself, automatically allow for higher monitoring coverage in Greater Atlantic Region fisheries or coverage above status quo. While increases in target monitoring coverage levels for some fisheries may be expected to improve data quality, realization of an improvement in data quality is contingent upon sufficient funding to expand coverage beyond SBRM.

The second reason these types of potential effects are too remote and speculative to be appropriate for consideration in this amendment is that there is no way to predict the effect that an improvement in data quality would have for managing the affected fisheries.

Improvements in data quality would give assessment scientists and fishery managers more confidence in the data. However, there is no way to predict the type of new information that would arise from future catch estimations (e.g., higher or lower discard estimates). Because any change in direction of catch estimation cannot be predicted at this time, there is no way to predict whether changes in management would be required to address any potential issues that may arise.

The third reason is that the management measures that might be implemented, should action be determined to be necessary to address a bycatch or other concern, also cannot be predicted. Depending on the specific fishery, resource species, time, area, and manner of interaction leading to the concern, different types of management measures would be appropriate. Some types of concerns may best be addressed with a bycatch quota, others may best be addressed with an area or seasonal closure, and yet others may best be addressed through changes to the fishing gear used. As the actual environmental impacts of these potential management changes would vary with and depend upon the type of measure proposed, the management system to be changed, and the time, area, and species fished, there is no way to speculate as to what the most likely environmental impacts may be.

Therefore, because these types of potential management actions, which may eventually stem from implementation of the industry-funded monitoring amendment, are too remote and speculative to be adequately or meaningfully addressed in this amendment, this analysis focuses solely on the potential direct, indirect, and cumulative effects expected to be immediately associated with the proposed action and primary alternatives. Any future management actions that may result from the information collected through industry-funded monitoring programs would be subject to all the requirements of NEPA at the appropriate time.

The discussion of environmental effects that follows is organized to present the relevant biological, physical, and socio-economic considerations for each of the omnibus alternatives. Thus, the effects on biological resources of the each of the omnibus alternatives are discussed, followed by the effects on the physical environment (habitat) of each of the omnibus alternatives, and finally followed by the socio-economic effects of each of the omnibus alternatives. In this way, the effects of each of the alternatives on each portion of the affected environment can be appropriately compared.

Due to the administrative nature of much of this action (i.e., the action is focused on establishing a process) in many cases there are no environmental impacts associated with the omnibus alternative under consideration. In these cases, an explanation for this conclusion is presented, but no separate discussion of the alternatives is provided. Separate discussion of the likely impacts of alternatives is only provided where there are measurable differences in impacts between the alternatives.

General discussion of herring and mackerel coverage target alternative impacts

In contrast with the omnibus alternatives, the impacts of each of the coverage target alternatives for the Atlantic herring and Atlantic mackerel fisheries are more reflective of a typical FMP action. Thus, the impacts associated with the coverage target alternatives for the Atlantic herring and Atlantic mackerel fisheries will be discussed for the target and non-target species, protected resources, the physical environment and human communities. This discussion is presented separately from the impacts of the omnibus alternatives.

4.1 OMNIBUS ALTERATIVE IMPACTS

This section considers the potential impacts of omnibus alternatives considered by the NEFMC and MAFMC to establish a common structure for industry-funded monitoring programs that would apply to all Greater Atlantic Region FMPs.

Alternatives under consideration include the following:

- Alternative 1: Case-by-case Industry-Funded Monitoring Programs (No Action); and
- Alternative 2: Standardized Industry-Funded Monitoring Programs.

The standardized industry-funded monitoring program under consideration includes (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) a process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, (3) standard administrative requirements for industry-funded monitoring service providers, and (4) a process to prioritize industry-funded monitoring programs in order to allocate Federal resources across all FMPs, and (5) a process for monitoring set-aside programs to be implemented via a future framework adjustment action.

There are five alternative processes for prioritizing industry-funded monitoring programs in order to allocate available Federal funding across all FMPs, including:

- Alternative 2.1: NMFS-led prioritization process;
- Alternative 2.2: Council-led prioritization process;
- Alternative 2.3: Proportional prioritization process;

- Alternative 2.4: Lowest coverage ratio prioritization process; and
- Alternative 2.5: Highest coverage ratio prioritization process.

4.1.1 OMNIBUS ALTERNATIVE IMPACTS TO BIOLOGICAL RESOUCES

Under Omnibus Alternative 1 (No Action), there would be no standardized structure developed for Greater Atlantic Region industry-funded monitoring programs, meaning that there would be no standard definition of cost responsibilities for industry-funded monitoring in the New England and Mid-Atlantic fisheries, no standard administrative requirements for industry-funded monitoring service providers, no framework adjustment process to implement FMP-specific industry-funded monitoring, and no process to prioritize industry-funded monitoring programs to allocate available Federal funding to meet Council desired monitoring coverage target above SBRM coverage. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for Greater Atlantic Region FMPs would be evaluated on a case-by-case basis. If no Federal funding were available after SBRM coverage requirements were met, then none of the established industry-funded monitoring programs would operate and there would be no additional observer coverage above SBRM levels.

In contrast, Omnibus Alternative 2 would establish a standardized structure for industry-funded monitoring programs that would apply to all New England and Mid-Atlantic FMPs that choose to use industry funding to increase monitoring. This industry-funded monitoring program structure would include the following components: (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, and (3) standard administrative requirements for industry-funded monitoring service providers. Under Omnibus Alternative 2, if enough Federal funding available after SBRM coverage requirements were met to cover NMFS costs for all of the established industry-funded monitoring programs, they would all operate at the target coverage levels established through each individual FMP. If there is some Federal funding available after SBRM coverage requirements are met, but not enough to cover all of the industry-funded monitoring programs, one of five possible prioritization processes would be used to decide how to prioritize industry-funded monitoring programs in order to allocate available Federal funding across FMPs. If no Federal funding were available after SBRM coverage requirements were met, then, similar to the No Action alternative, none of the established industry-funded monitoring programs would operate and there would be no additional observer coverage above SBRM levels.

Compared to the No Action alternative, the establishment of standardized cost responsibilities and the framework adjustment process to allow for the future establishment of industry-funded monitoring programs in individual FMPs under Omnibus Alternative 2 has a negligible impact on biological resources when compared with the No Action alternative. These aspects of Omnibus Alternative 2 are entirely focused on the process of developing industry-funded monitoring programs, and thus do not directly affect the level of fishing activity, fishing operations, the species targeted, or areas fished in the Greater Atlantic Region. As there are no biological impacts associated with the cost responsibility and framework adjustment aspects of the Omnibus Alternative 2 and the No Action alternative, there are no differences among them.

In general, there are no direct impacts on biological resources (target, non-target, and protected species) related to either Omnibus Alternative 1 (No Action), or the various permutations of Omnibus Alternative 2. Again, these alternatives are entirely focused on the process of developing industry-funded monitoring programs, and thus, as noted above, do not directly affect the level of fishing activity, fishing operations, the species targeted, or areas fished in the Greater Atlantic Region. The indirect impacts of the various aspects of the Omnibus Alternatives on biological resources are discussed below.

There is a low positive indirect impact on biological resources related to establishment of standardized industry-funded monitoring service provider requirements. Standardized service provider requirements may lead to greater consistency in the information collected about target, non-target, and protected species through industry-funded monitoring programs, provided that individual FMPs do not drastically alter the service provider requirements when establishing monitoring programs. Improved catch information that results from greater consistency in information collection may lead to better management of biological resources. In contrast, under the No Action alternative, there is a low negative impacted on biological resources because industry-funded monitoring service provider requirements would need to be established separately for each FMP, which could take more time and be less consistent in providing data and information.

The magnitude of the potential indirect impacts of the prioritization process on biological resources varies depending on the selected prioritization process. The impacts discussed in this paragraph apply at times when there is some Federal funding available after SBRM coverage requirements are met, but not enough to cover all of the established industry-funded monitoring programs. Under the Omnibus Alternative 1 (No Action), the absence of a process to prioritize between established industry-funded monitoring programs means that Federal funding available after SBRM coverage requirements are met is allocated to industry-funded monitoring programs on a first-come, first-served basis. There is a potential low negative impact to biological resources under the No Action alternative if industry-funded monitoring programs necessary to gather important catch information go unfunded because they are developed on a case-by-case basis. Without the funding to gather important catch information, there could be potential low negative indirect biological impacts because it could limit the information needed to develop and implement appropriate management to conserver or protect species. Similarly, it may inhibit management decision due to the lack of information provided for these fisheries (i.e., decreased catch monitoring). In general, the establishment of a prioritization process under Omnibus Alternative 2 provides a low positive impact on biological resources compared to the No Action alternative because all established industry-funded monitoring programs will be considered when deciding how to allocate available Federal funding, and funding will either be allocated proportionally to all industry-funded monitoring programs (under Alternative 2.3), or will be distributed among industry-funded programs based on a method selected by the Councils (under Alternatives 2.1, 2.2, 2.4, and 2.5).

The discretionary prioritization processes (Alternatives 2.1 and 2.2) have the greatest potential for positive impacts to biological resources compared to the No Action and formulaic alternatives (Alternatives 2.3-2.5) because they allow for the evaluation of program need and design when assigning priority. This means that, in years where there is Federal funding available to allocate to prioritized industry-funded monitoring programs, the discretionary prioritization alternatives allow the potential to direct funding towards monitoring programs that improve information about specific target, non-target, and protected species. For example, if monitoring programs were developed for fisheries that were interested in increased monitoring in order to address issue concerned with the precision of bycatch of target, non-target, or protected resources the discretionary prioritization processes (Alternatives 2.1 and 2.2) would allow for NMFS or the Council to give those programs prioritization over other monitoring programs that do not address the same biological concerns. In this example, prioritizing the monitoring programs that address bycatch concerns, those programs would be allocated greater amounts of Federal funding, and therefore be able to gather and provide increased information on biological resources.

The formulaic prioritization alternatives (Alternative 2.3-2.5) all provide a low positive impact on biological resources compared to No Action because they consider all established Greater Atlantic Region industry-funded monitoring programs when deciding how to allocate available Federal funds, rather than considering funding allocation on a case-by-case basis under the No Action alternative. In the case of the proportional prioritization process (Alternative 2.3), available Federal funding would be allocated proportionally to all established industry funded monitoring programs, rather than on a first-come, first-served basis under the No Action alternative. This means that, in years where there is Federal funding available to prioritize, all industry-funded monitoring programs would result in some additional monitoring, which may have low positive impacts on biological resources in terms of information collection. The lowest coverage ratio based alternative (Alternative 2.4) would favor coverage for the FMPs that don't need much additional coverage to meet targets and the most active fisheries. The highest coverage ratio based alternative (Alternative 2.5) would favor coverage for the FMPs that need more coverage to meet targets and the least active fisheries. While both of these alternatives could result in certain industry-funded monitoring programs receiving no funding, there is still some benefit to biological resources that results from evaluating the allocation of available Federal funding across all Greater Atlantic Regional industry-funded monitoring programs in a structured way, rather than on a case-by-case basis. While the formulaic prioritization alternatives do not allow for the evaluation of program needs, they still allow for Federal funding to be allocated more efficiently to established monitoring programs compared to the No Action alternatives which would require development of monitoring programs on a case-by-case basis. The efficiency of allocating Federal funding under Alternatives 2.3-2.5 would benefit biological resources by maintaining increased monitoring in some fisheries in order to gather more information which could improve catch monitoring or other management decisions.

Due to the nature of Alternative 2.6 (Monitoring Set-Aside), which is limited to a decision regarding creating the mechanism needed to develop and implement monitoring set-aside programs, rather than actually implementing such programs, there are no direct or indirect effects on any biological resources (fishery resources, protected resources, or other non-fishery resources) anticipated for this alternative. Any impacts that may be associated with actually implementing a monitoring set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

4.1.2 OMNIBUS ALTERNATIVE IMPACTS TO PHYSICAL ENVIRONMENT

Because neither the status quo omnibus alternative nor the other omnibus alternatives (2.1-2.5) would directly impose or likely result in any changes in fishing effort or behavior, fishing gears used, or areas fished, there are no potential impacts to the physical environment (including EFH) associated with the omnibus alternatives under consideration for this item. There are also no differences among the various omnibus alternatives.

Due to the nature of Alternative 2.6 (Monitoring Set-Aside), which is limited to a decision regarding creating the mechanism needed to develop and implement monitoring set-aside programs, there are no direct or indirect effects on any physical environment (including EFH) anticipated for this alternative. Any impacts that may be associated with actually implementing a monitoring set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

4.1.3 OMNIBUS ALTERNATIVE IMPACTS TO HUMAN COMMUNITIES

Under Omnibus Alternative 1 (No Action), there would be no standardized structure developed for Greater Atlantic Region industry-funded monitoring programs, meaning that there would be no standard definition of cost responsibilities for industry-funded monitoring in the New England and Mid-Atlantic fisheries, no standard administrative requirements for industry-funded monitoring service providers, no framework adjustment process to implement FMP-specific industry-funded monitoring, and no process to prioritize industry-funded monitoring programs in order to allocate available Federal funding to meet Council desired monitoring coverage target above SBRM coverage. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for Greater Atlantic Region FMPs would be evaluated on a case-by-case basis. If no Federal funding were available after SBRM coverage requirements were met, then none of the established industry-funded monitoring programs would operate and there would be no additional observer coverage above SBRM levels.

In contrast, Omnibus Alternative 2 would establish a standardized structure for industry-funded monitoring programs that would apply to all New England and Mid-Atlantic FMPs that choose to use industry funding to increase monitoring. This industry-funded monitoring program structure would include the following components: (1) standard cost responsibilities associated with industry-funded monitoring for NMFS and the fishing industry, (2) process for FMP-specific industry-funded monitoring to be implemented via a future framework adjustment action, and (3) standard administrative requirements for industry-funded monitoring service providers. Under Omnibus Alternative 2, if enough Federal funding available after SBRM coverage requirements were met to cover NMFS costs for all of the established industry-funded monitoring programs, they would all operate at the target coverage levels established through each individual FMP. If there is some Federal funding available after SBRM coverage requirements are met, but not enough to cover all of the industry-funded monitoring programs, one of five possible prioritization processes would be used to decide how to prioritize industry-funded monitoring programs in order to allocate available Federal funding across FMPs If no Federal funding were available after SBRM coverage requirements were met, then, similar to the No Action alternative, none of the established industry-funded monitoring programs would operate and there would be no additional observer coverage above SBRM levels. No individual FMP would be subject to an industry-funded monitoring program as a result of implementation of this action. Rather, any FMP that wishes to develop an industry-funded monitoring program would need to develop the program that meets the specifications of this action in a separate framework or amendment.

Overall, there will be negative direct economic impacts to fishing vessels as a result of selecting Omnibus Alternative 2 if both of the following occur: 1) There is an established industry-funded monitoring program for the FMP; and 2) There is Federal funding available to cover all, or a portion, of the costs of industry-funded monitoring programs after SBRM coverage requirements are met. The estimated vessel contribution, further described in section 2.0, is between $106 and $818 per sea day. If no Federal funding were available after SBRM coverage requirements were met, then, similar to the No Action alternative, none of the established industry-funded monitoring programs would operate and there would be no additional observer coverage above SBRM levels. It is important to reiterate that the economic impacts associated with coverage targets for industry-funded monitoring programs must be evaluated on an FMP-by-FMP basis at the time each program is established (e.g., the economic analysis of coverage target impacts is provided for the Atlantic herring and Atlantic mackerel fisheries in Sections 4.2 and 4.3). The indirect impacts of the various aspects of the Omnibus Alternatives on fishery-related business and communities are discussed below, but should be interpreted within the context of the economic impacts being overall negative.

Compared to the No Action alternative, the establishment of the framework adjustment process to allow for the future establishment of industry-funded monitoring programs in individual FMPs under Omnibus Alternative 2 has a negligible impact on fishery-related businesses and human communities when compared with the No Action alternative. This aspect of Omnibus Alternative 2 is entirely focused on the process of developing industry-funded monitoring programs, and thus does not directly affect fishing vessels, fleets, or ports. As there is no direct impact to fishery-related businesses and communities associated with the framework adjustment aspects of the Omnibus Alternative 2 and the No Action alternative, there are no differences between the alternatives.

There is a potential low positive indirect impact on fishery-related businesses and communities associated with the establishment of standardized industry-funded monitoring service provider requirements. The service provider requirements generally match the existing service provider requirements codified for other industry-funded monitoring programs in the Greater Atlantic Region. Standardized service provider requirements may allow for efficiencies in the administration of industry-funded monitoring programs (e.g., initial applications to be approved as service providers, training for monitors, etc.) compared to the No Action alternative, which could ultimately reduce industry's contribution to monitoring costs. In addition, standardized service provider requirements could lead to greater consistency in the information collected about through industry-funded monitoring programs, provided that individual FMPs do not drastically alter the service provider requirements when establishing monitoring programs. Improved catch information that results from greater consistency in information collection may lead to better management of biological resources, which could eventually lead to greater fisheries yields. In contrast, under the No Action alternative, industry-funded monitoring service provider requirements would need to be established separately for each FMP.

The establishment of standardized cost responsibility definitions could have low positive impacts compared to No Action. While industry cost responsibilities are not codified in this action, the categorization and characterization of cost responsibilities in this action could provide industry members information necessary to negotiate contracts with industry-funded monitoring service providers, which may ultimately reduce industry cost responsibilities.

The magnitude of the potential indirect impacts of the prioritization process on fishery-related businesses and communities varies depending on the selected prioritization process. The impacts discussed in this paragraph apply at times when there is some Federal funding available after SBRM coverage requirements are met, but not enough to cover all of the established industry-funded monitoring programs. Under the Omnibus Alternative 1 (No Action), the absence of a process to prioritize between established industry-funded monitoring programs means that Federal funding available after SBRM coverage requirements are met is allocated to industry-funded monitoring programs on a first-come, first-served basis. There is a potential low negative impact to human communities under the No Action alternative if industry-funded monitoring programs necessary to gather important information catch information go unfunded because they are developed after other programs. In general, the establishment of a prioritization process under Omnibus Alternative 2 provides a low positive impact on fishery-related businesses and communities compared to the No Action alternative because all established industry-funded monitoring programs will be considered when deciding how to allocate available Federal funding, and funding will either be allocated proportionally to all industry-funded monitoring programs (under Alternative 2.3), or will be distributed among industry-funded programs based on a method selected by the Councils (under Alternatives 2.1, 2.2, 2.4, and 2.5).

The discretionary prioritization processes (Alternatives 2.1 and 2.2) both provide a low positive impact on fishery-related businesses and communities compared to No Action because they consider all established Greater Atlantic Region industry-funded monitoring programs when deciding how to allocate available Federal funds, rather than considering funding allocation on a case-by-case basis under the No Action alternative. These alternatives have the greatest potential for positive impacts to fishery-related businesses and communities compared to the No Action and formulaic alternatives (Alternatives 2.3-2.5) because they allow for the evaluation of program need and design when assigning priority. This means that, in years where there is Federal funding available to allocate, the discretionary prioritization alternatives allow the potential to direct funding towards monitoring programs with specific characteristics. These alternatives could allow the Council or NMFS to preferentially support industry-funded monitoring programs for species with economic value, programs where industry is most able to bear the cost of additional monitoring, or programs that gather information about species with special ecosystem importance (e.g., choke species or forage species). Improved catch information that results from the opportunity to focus funding on the most important industry-funded monitoring programs may lead to better management of biological resources, which could eventually lead to greater fisheries yields.

The formulaic prioritization alternatives (Alternative 2.3-2.5) all provide a low positive impact on fishery-related businesses and communities compared to No Action because they consider all established Greater Atlantic Region industry-funded monitoring programs when deciding how to allocate available Federal funds, rather than considering funding allocation on a case-by-case basis under the No Action alternative. In the case of the proportional prioritization process (Alternative 2.3), available Federal funding would be allocated proportionally to all established industry funded monitoring programs, rather than on a first-come, first-served basis under the No Action alternative. This means that, in years where there is Federal funding available to allocate, all industry-funded monitoring programs would result in some additional monitoring, which may have low positive impacts on human communities in terms of information collection. The lowest coverage ratio based alternative (Alternative 2.4) would prioritize industry-funded monitoring programs associated with the most active fisheries. The highest coverage ratio based alternative (Alternative 2.5) would prioritize industry-funded monitoring programs associated with the least active fisheries. While both of these alternatives could result in certain industry-funded monitoring programs receiving no funding, there is still some benefit to fishery-related businesses and communities that results from evaluating the allocation of available Federal funding across all Greater Atlantic Regional industry-funded monitoring programs in a structured way, rather than on a case-by-case basis.

The monitoring set-aside (Alternative 2.6) concept has the potential cost of removing harvest from a fishery, but the potential benefit of allowing parts of the fishery to defray costs for additional monitoring, essentially spreading the cost among more fishery participants. However, due to the nature of this alternative, which is limited to decisions regarding creating the mechanisms needed to develop and implement monitoring set-aside programs, there are no direct or indirect socio-economic effects on fishing vessels, fleets, or ports anticipated for this alternative. Any impacts that may be associated with actually implementing a monitoring set-aside program through a framework adjustment to an FMP would be fully analyzed in the documents supporting the action.

4.1.4 OMNIBUS ALTERNATIVE IMPACTS SUMMARY

As previously noted, the omnibus alternatives (Omnibus Alternatives 1, 2, and 2.1-2.6) in this amendment are procedural in nature—focused on the definition of cost responsibilities between NMFS and industry, the process that will be used to prioritize industry-funded monitoring programs for the Greater Atlantic Region fisheries in order to allocate Federal funding for NMFS cost responsibilities, industry-funded monitoring program service provider standards, and the establishment of future industry-funded monitoring programs. Subsequently, there are no expected direct physical or biological impacts associated with the alternatives under consideration for the omnibus portions of the action, the indirect impacts of the omnibus alternatives on the biological resources (target species, non-target species, and protected species) are summarized in Table 76.

Overall, there will be negative direct economic impacts to fishing vessels as a result of selecting Omnibus Alternative 2 if both of the following occur: 1) There is an established industry-funded monitoring program for the FMP; and 2) There is Federal funding available to cover all, or a portion, of the costs of industry-funded monitoring programs after SBRM coverage requirements are met. The indirect impacts of the various aspects of the Omnibus Alternatives on fishery-related business and human communities are summarized in Table 76, but should be interpreted within the context of the economic impacts being overall negative.

Table 76. Summary of the Indirect Impacts of Omnibus Alternatives Compared to Each Other

<table>
<tr><th>Alternatives</th><th>Impacts on Biological Resources</th><th>Impacts on Fishery-Related Businesses and Human Communities</th></tr>
<tr><td>Alternative 1: No Industry-Funded Monitoring Programs (No Action)</td><td>Potential low negative impact related to allocating funding to industry-funded monitoring programs on a case-by-case basis (rather than aligning to Council priorities)</td><td>Potential low negative impact related to continued uncertainty about true discard rates (could lead to overly cautious management)</td></tr>
<tr><td>Alternative 2: Industry-Funded Monitoring Programs (Action Alternative)</td><td>Negligible impact related to standardized cost responsibilities and process for future industry-funded programs implemented via framework

Potential low positive impact related to standardized service provider requirements and process to prioritize additional monitoring</td><td>Potential low positive impact related to standardized cost responsibilities and process for future industry-funded programs implemented via framework

Potential low positive impact related to establishing service provider requirements, and process to prioritize additional monitoring</td></tr>
<tr><td>Alternative 2.1: NMFS-Led Prioritization Process</td><td rowspan="2">Potential low positive impact because all industry-funded programs are considered; compared to other prioritization processes allows an evaluation of program need/design when assigning priority</td><td rowspan="2">Potential low positive impact because all industry-funded programs are considered; compared to other prioritization processes allows an evaluation of program need/design when assigning priority</td></tr>
<tr><td>Alternative 2.2: Council-Led Prioritization Process</td></tr>
<tr><td>Alternative 2.3: Proportional Prioritization Process</td><td>Potential low positive impact related to information collection because process considers all industry-funded programs</td><td>Potential low positive impact related to information collection because process considers all industry-funded programs</td></tr>
</table>

Alternative 2.4 and 2.5: Coverage Ratio-Based Prioritization Processes	Does not allow for prioritization based on program need/design	Does not allow for prioritization based on program need/design
Alternative 2.6 Monitoring Set-Aside	Negligible impact related to standardized process for monitoring set-asides implemented via framework	Negligible impact related to standardized process for monitoring set-asides implemented via framework
Impacts to physical environment were not discussed in this table because they are negligible. These alternatives will not alter fishing behavior, or directly impact fishing regulations (gears used or areas fished).		

4.2 ATLANTIC HERRING ALTERNATIVE IMPACTS

The NEFMC recommended that increased monitoring in the herring fishery address the following goals: (1) Accurate estimates of catch (retained and discarded), (2) accurate catch estimates for incidental species for which catch caps apply, and (3) affordable monitoring for the herring fishery.

This section considers the potential impacts of alternatives considered by the NEFMC to specify industry-funded monitoring coverage targets for the herring fishery on valued ecosystem components (VEC), including target species, non-target species, protected species, physical environment, and human communities.

For each VEC, the impacts associated with Herring Alternatives 1 and 2 will be discussed, followed by a discussion of impacts associated with Herring Alternatives 2.1-2.7.

TABLE 77. RANGE OF INDUSTRY-FUNDED MONITORING HERRING COVERAGE TARGET ALTERNATIVES

Gear Type	Midwater Trawl	Purse Seine	Small Mesh Bottom Trawl
Herring Alternative 1: No Coverage Target for IFM Program (No Action)	SBRM		
Herring Alternative 2: Coverage Targets for IFM Program	Includes Sub-Options: 1) Wavier Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold		
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	100% NEFOP-Level Observer		
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	25%, 50%, 75% or 100% ASM		
Herring Alternative 2.3: Combination	50% or 100%	25%, 50%, 75% or 100% ASM	

Coverage on Category A and B Vessels and Midwater Trawl Fleet	EM/Portside		
Herring Alternative 2.4: EM and Portside Coverage on Midwater Trawl Fleet	50% or 100% EM/Portside	SBRM (No Action)	
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet in Groundfish Closed Areas*	100% NEFOP-Level Coverage	SBRM (No Action)	
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet in Groundfish Closed Areas	Coverage would match selected alternative 2.1-2.4	SBRM (No Action)	
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	25%, 50%, 75% or 100% ASM or EM/Portside	25%, 50%, 75% or 100% ASM or EM/Portside	25%, 50%, 75% or 100% ASM or EM/Portside
* Sub-Options do not apply to Herring Alternative 2.5.			

When evaluating industry-funded monitoring for the herring fishery, one major consideration is whether a monitoring alternative provides the type and quality of data necessary to meet the Council's information collection goals for the herring fishery.

Type of Information Collected

Different types of monitoring can provide different kinds of information with varying levels of verification (Table 78).

Currently, vessel trip reports (VTRs) provide information on fishing effort, retained catch, and discarded catch. Dealer reports provide information on retained catch and vessel monitoring systems (VMS) provided information on fishing location and behavior. Affidavits of slippage events and discard reports can provide details of why slippage and/or discard events occur.

Under the industry-funded herring coverage target alternatives, NEFOP-level observers and at-sea monitors would both provide information on fishing effort. NEFOP-level observers and at-sea monitors would be collecting species composition data on retained and discarded catch, while portside samplers would be collecting species composition data on retained catch. NEFOP-level observers and portside samplers would be collecting age and length data, while at-sea monitors would be collecting length data. EM would be used to confirm retention of catch.

Table 78. Comparison of Information Collected Across Herring Coverage Target Alternatives

Herring Data Interests	Current Information Collections That Would Continue Under Any Alternative	HER Alt 1	HER Alt 2.1	HER Alt 2.2	HER Alts 2.3 & 2.7	HER Alt 2.4	HER Alt 2.5
		Ability to meet data interest: High / Medium / Low					
		No Action (NEFOP coverage for SBRM only)	100% NEFOP on Category A and B Vessels	ASM (25, 50, 75, or 100%) on Category A and B Vessels	ASM and/or EM/Portside (25, 50, 75, or 100%) on Category A and B vessels and/or MWT vessels	EM/Portside (50 or 100%) on MWT vessels	100% NEFOP On MWT Vessels Fishing in Groundfish Closed Areas
Retained Catch	• Vessel trip reports • Dealer reports • VMS catch reports	Information on effort, area, gear, and economics Species composition data	Information on effort, area, gear, and economics Species composition data	Information on effort, area, gear, and economics Species composition data	ASM - Information on effort, area, gear, economics; species composition data EM/Portside - Confirms retention; species composition data	Confirms retention Species composition data	Information on effort, area, gear, and economics Species composition data
Discarded Catch	• Vessel trip reports • VMS catch reports	Discard estimate Species composition data	Discard estimate Species composition data	Discard estimate Species composition data	ASM - Discard estimate; species composition data EM - Flags discarding	Flags discarding	Discard estimate Species composition of discarded catch
Catch Cap Monitoring	• Vessel trip reports • Dealer reports • VMS catch reports • Affidavits	Species composition of retained catch Discard estimate and species composition of discarded catch	Species composition of retained catch Discard estimate and species composition of discarded catch	Species composition of retained catch Discard estimate and species composition of discarded catch	ASM - Discard estimate; species composition data on catch EM/Portside - Confirms retention; species composition data on retained catch	Confirms retention Species composition of retained catch	Species composition of retained catch Species composition of discarded catch
Stock Assess-ments	• Vessel trip reports	Age and length data on catch	Age and length data on catch	Length data on catch	ASM - Length data on catch EM/Portside - Age and length data on retained catch	Age and length data on retained catch	Age and length data on catch
Data collected under HER Alt 2.6 would be consistent with the data collected by ASM (25, 50, 75, or 100%) or EM/PRT (25, 50, 75, 100%) on MWT vessels fishing in Groundfish Closed Areas.							

Amount of Monitoring Coverage

The amount of coverage can affect the uncertainty around catch estimates. The table below describes NEFOP coverage by gear type. Revisions to the SBRM in April 2015 affected how funding is used to allocate observer coverage. Therefore, the level of observer coverage during 2015 may be more indicative of future observer coverage levels than observer coverage levels from previous years.

Table 79. 2015 Midwater Trawl[1], Purse Seine[2], and Small Mesh Bottom Trawl[3] Observer Coverage Rates

Gear	Observer Coverage[4]
Midwater Trawl	4.7%
Purse Seine	2.5%
Small Mesh Bottom Trawl	9.1%

Source: DMIS and ODBS databases as of 2016-05-21

[1]Midwater Trawl: Includes both single and paired midwater trawl gears

[2]Purse Seine: Includes all purse seine gears (including tuna)

[3]Small Mesh Bottom Trawl: Includes bottom trawl gear w/codend mesh size less than 5.5" excluding bottom otter twin trawl, scallop and shrimp trawl trips

[4]Includes observer trips w/at least 1 observed haul divided by VTR trips reporting kept catch

Monitoring Catch Caps in the Herring Fishery

The proposed observer coverage levels in the herring fishery described in Herring Alternatives 2.1 and 2.2 were evaluated with regard to their impact on haddock and river herring/shad catch estimate precision. Only fishing years (FYs) when catch caps were in effect were included in the analysis. The haddock catch cap analysis includes 2011-2015 and the river herring/shad catch cap analysis includes 2014-2015. The FY2015 data for these catch caps are not finalized, and should be considered preliminary. Herring discards were not evaluated. Herring discards are generally a small component of the overall herring catch. Herring discards are estimated by extrapolating discards from NEFOP observed hauls only. In recent years, herring discards have accounted for well less than 1% of the total herring catch.

The herring fishery currently has six catch caps: (1) Haddock: Georges Bank (GB) Midwater Trawl, (2) Haddock: Gulf of Maine (GOM) Midwater Trawl, (3) River Herring/Shad (RHS): Cape Cod (CC) Midwater Trawl, (4) RHS: GOM Midwater Trawl, (5) RHS: Southern New England (SNE) Bottom Trawl, and (6) SNE Midwater Trawl.

The GB and GOM Haddock Catch Caps were implemented through NE Multispecies Framework 46 in 2011, which separated the previous existing haddock catch cap into GB and GOM stock areas and adjusted the estimation methodology to the current extrapolation method. Herring Framework Adjustment 3 implemented RHS Catch Caps for 2014-2015; caps were effective on December 4, 2014. The haddock catch caps operate on a May-April Fishing Year, while the river herring/shad catch caps operate on a January-December Fishing Year. For river herring/shad catch caps, trips landing greater than 6,600 pounds of herring are counted against an individual catch cap, depending on the gear and area of the trip. For haddock catch caps, all midwater trawl trips in GB and GOM are counted against the catch caps.

Catch cap estimates in the herring fishery are comprised of both incidental kept and discard components. Current quota monitoring methodology for these catch caps employs the cumulative method to extrapolate incidental catch (kept and discard) to the fleet based on a ratio estimator (incidental catch divided by total catch) derived from NEFOP data. Only observed trips are used to derive the ratio estimator. Fleet kept all (KALL) is obtained from VTRs and dealer data, which provides effort information (gear and area) and landings information respectively. Actual observed incidental catch amounts are used in lieu of estimated incidental catch amounts whenever possible.

This analysis uses the same data sources as quota monitoring. However, this analysis focuses strictly on the precision of the incidental catch ratio estimator in each catch cap, and does not incorporate the replacement of actual observed values for estimated incidental catch based on the ratio estimator (described above). Furthermore, this analysis is constrained to trips that count towards a specific catch cap (e.g., river herring/shad cap trips must land >6,600 pounds of herring regardless of gear). Trips that would not be count against a catch cap are not included in the analysis.

The coefficient of variation (CV), defined for this analysis as the ratio of the standard error of total catch (incidental kept and discards) to was used to quantify the precision of the estimated catch. The CV is sensitive to sample size. In a finite population, the CV will converge to zero as the sample size approaches the population size. The total fishing trips within a stratum is considered finite, therefore, as sampling coverage approaches 100%, the CV will converge to zero for that stratum. The CV analysis follows the guidelines detailed by the SBRM and uses the trip as the sampling unit. Only observed trips (trips with at least one observed haul) and trips reporting kept catch on their VTR were used in the CV analysis. This distinction is important to understand when interpreting observer coverage rates (referred to below as “realized” observer coverage) because in the paired midwater trawl fishery it is not uncommon for wing vessels to carry observers and but not carry any catch. These trips would not be reflected in the observer coverage rates described in this analysis. Furthermore, trips that did not yield any observed hauls are excluded from this analysis.

At-sea monitors would collect both retained and discarded catch composition in a manner consistent with existing NEFOP protocols. Therefore it is assumed that there will be no difference in the catch composition data collected by NEFOP observers and at-sea monitors under Herring Alternatives 2.1 and 2.2. This analysis uses NEFOP data as a proxy for potential future ASM coverage estimate simulations. Also, observer and ASM coverage targets proposed in the IFM Amendment are additive, so simulated CV estimates based on proposed coverage targets assume both SBRM and IFM coverage will contribute to the target.

Monitoring Catch Caps Under Herring Alternative 1

Table #80 and Figure #8 summarize the CV calculated according to SBRM methodology as well as the realized observer coverage for each catch cap during the years when catch caps were in place. For each year and catch cap, the CV and the realized observer coverage in italics are shown in Table #80.

Although there is no defined CV target, a 30% CV was provided for context. The GB Haddock Catch Cap remained below a CV of 30% for all years except for 2015, while the GOM haddock had a CV of 0% for all years because no GOM haddock catch was observed. The river herring/shad catch cap CVs are more variable, but it is difficult to infer a trend based on the limited data.

Table #80 and Figure #8 characterize the history of catch cap estimate precision produced from NEFOP coverage (Herring Alternative 1). It must be noted that due to the implementation of river herring/shad catch caps in late 2014, most of the 2014 effort was not subject to the river herring/shad catch caps. Furthermore, the 2015 GB Haddock Catch Cap was closed in October, effectively truncating the May-April fishing year

TABLE 80. HERRING CATCH CAP CV AND OBSERVER COVERAGE, 2011-2015

	Fishing Year[1]: CV (Observer Coverage)				
Catch Cap Fishery	**2011**	**2012**	**2013**	**2014**	**2015[3]**
Haddock: GB Midwater Trawl	17.6% *(41.7%)*	12.3% *(62.9%)*	21.3% *(35.6%)*	20.5% *(27.2%)*	61.4% *(4.9%)***
Haddock: GOM Midwater Trawl	0.0% *(30.4%)*	0.0% *(29.2%)*	0.0% *(34.8%)*	0.0% *(46.3%)*	0.0% *(8.6%)*
Herring-RHS: CC Midwater Trawl				36.2% *(48.0%)**	81.4% *(10.1%)*
Herring-RHS: GOM Midwater Trawl				37.3% *(50.0%)**	94.8% *(8.7%)*
Herring-RHS: SNE Bottom Trawl				28.4% *(17.4%)**	24.5% *(15.0%)*
Herring-RHS: SNE Midwater Trawl				70.2% *(3.4%)**	11.8% *(2.3%)*

Source: GARFO Quota Monitoring Database as of 5/22/2016

[1]Catch cap fishing year: river herring/shad = calendar year; haddock = May-April

[3]Fishing Year 2015 data are PRELIMINARY

*2014 Herring RHS fishing year partially covered by RHS Catch Caps which was implemented on December, 4 2014

**2015 GB Haddock fishing year truncated due to the closure of the GB Haddock AM Area on October 22, 2015

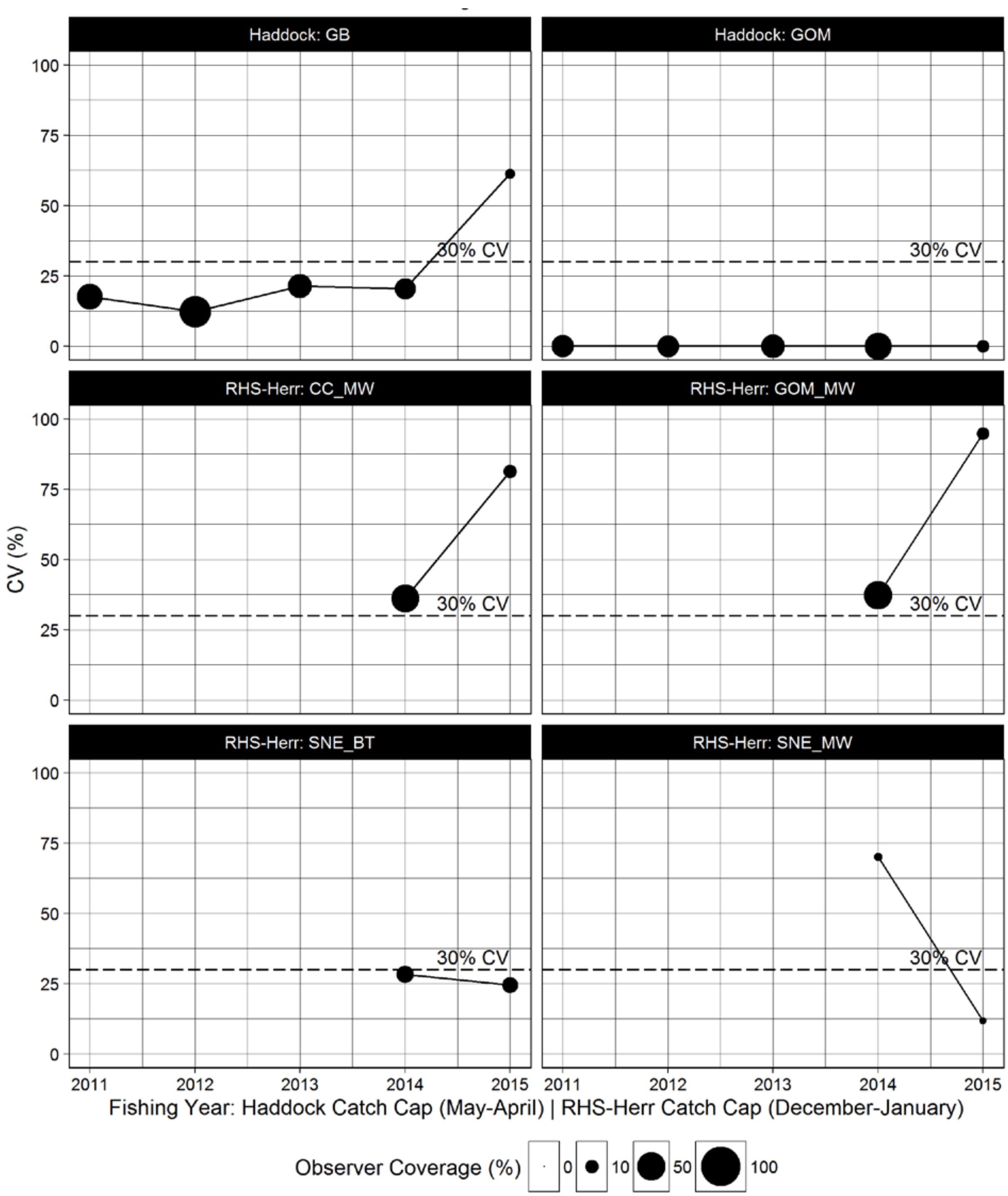


FIGURE 8. HERRING CATCH CAP CV AND OBSERVER COVERAGE (DOT SIZE) IN RELATION TO A 30% CV

Figure #9 details CV curves calculated according to SBRM methodology across varying coverage levels in relation to a 30% CV. These curves are solely based on observer data within each catch cap and year and are estimated on those data and how observer coverage was assigned for that particular year.

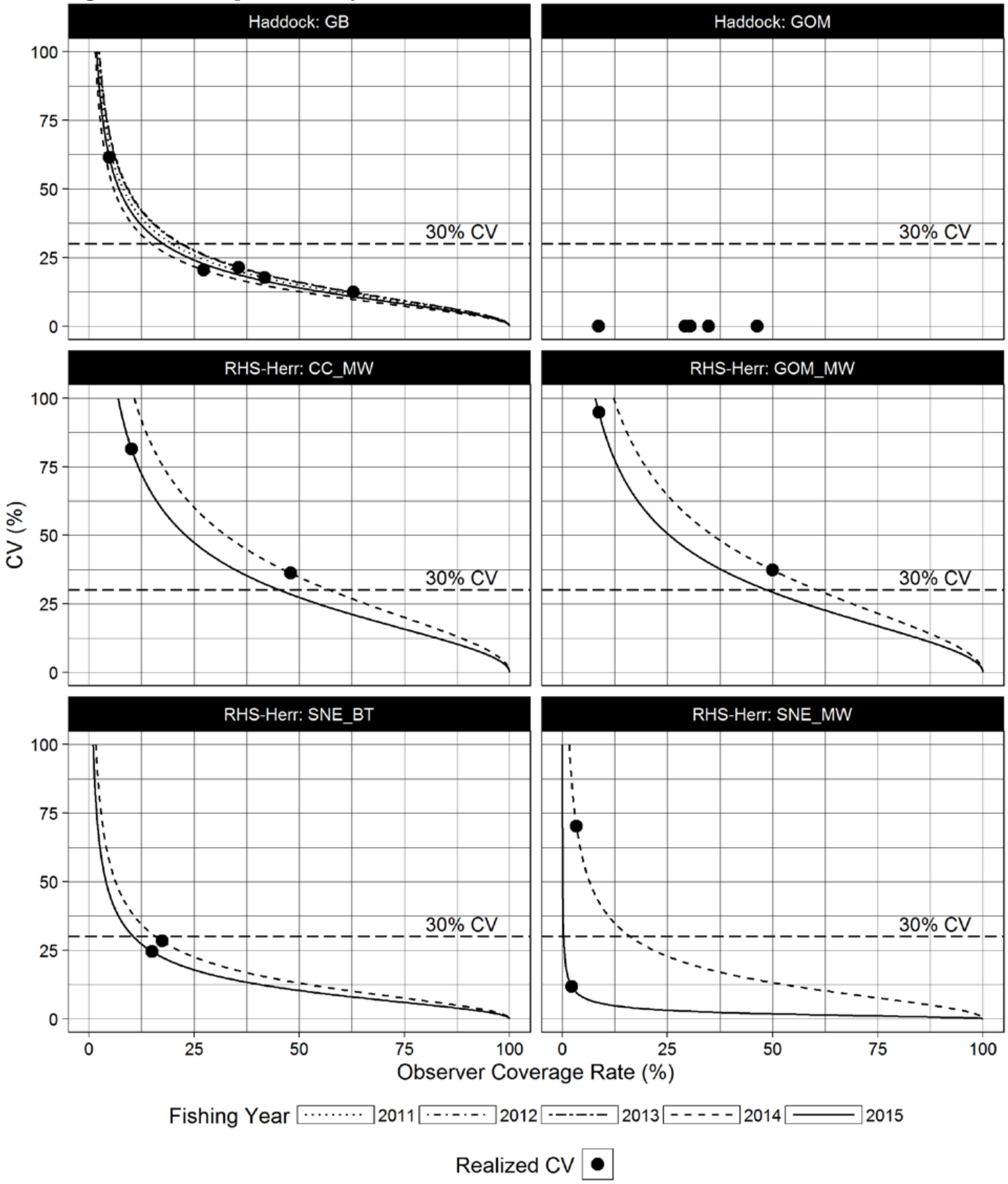


FIGURE 9. 2011-2015 DERIVED CV CURVE FOR EACH CATCH CAP BASED ON SBRM SAMPLE SIZE ANALYSIS METHODOLOGY, WITH REALIZED CV FOR EACH CATCH CAP YEAR (BLACK DOT)

Monitoring Catch Caps Under Herring Alternatives 2.1 and 2.2

Due to the structure of Herring Alternatives 2.1 and 2.2, and how coverage is being selectively assigned based on gear, permit, category, and a 25 mt landings threshold, estimated CVs based on proposed coverage levels could not be estimated formulaically according to SBRM, and instead required simulation based on resampling of observed trips.

Simulations were performed for each catch cap and year and based on NEFOP observer data. Proposed coverage levels were simulated by resampling the required amount of observer trips to obtain the target coverage level based on the effort profile for a particular catch cap and year. Herring Alternatives 2.1 and 2.2 focus coverage on Category A and B herring vessels. Due to this, simulated increasing coverage was confined to Category A and B vessel trips until 100% of those trips were simulated as observed. Observed non-category A and B herring vessel trips were assumed to be SBRM coverage and were fully resampled in each simulation without increasing coverage. Within each simulation, a CV was calculated for the catch cap based on the specified coverage level. This process was repeated 1,000 times for each proposed coverage level, which yielded a distribution of simulated CVs. Table #81 summarizes the mean CV from those distributions for each proposed coverage level, and Table #82 provides the simulated results if a 25 mt trip exemption existed. This process was repeated for each catch cap and year.

Due to the amount of observer data available within each catch cap, different approaches were taken in order to obtain a minimum sampling pool. Haddock catch cap strata yielded higher numbers of observed trips within each year allowing for simulation of observed trips within each fishing year, observer data from multiple fishing years were not grouped. However, due to the GB Haddock accountability measure closure in 2015 a small number (n<10) of observed trips were simulated. The river herring/shad catch cap strata yielded smaller amounts of observed trips and needed to be combined across 2014 and 2015 into a single resampling group that was used to simulate 2014 and 2015 based on their respective effort profiles (total trips in strata for each year). Even after grouping 2014 and 2015, the RHS SNE Midwater Trawl Catch Cap had a small number (n<10) of trips to simulate. The RHS SNE Bottom Trawl Catch Cap also suffered from a small number of observed trips to simulate from when the 25 mt trip exemption was applied (this was not the case when the 25 mt trip exemption was removed).

For catch caps where all of the effort is comprised of Category A and B herring vessels, the CV should converge to zero in 100% coverage scenarios. This was the case for all catch caps confined to midwater trawl trips except for RHS SNE Midwater Trawl, which includes non-Category A and B vessels. The effect of mixed permit categories in RHS SNE Midwater Trawl Catch Cap is that proposed coverage will not cover all trips in that catch cap at 100% coverage of Category A and B vessels and results in the CV not converging to zero. The effect is more pronounced in the RHS SNE Bottom Trawl Catch Cap where on average 38% of 2014-2015 trips were by non-Category A and B vessels.

The 25 mt trip exemption has a similar effect as the Category A and B permit coverage criteria because it allows for a certain number of trips within each catch cap to go unobserved and therefore impacts the simulated CV. This effect is demonstrated in Table #82 and impacts all catch caps (GOM Haddock is not impacted because the CV is always zero due to no observed incidental haddock catch). The effect is much more pronounced in catch caps comprised of trips that yield smaller catches. The effect is very small in the GB Haddock Catch Cap where there trips tend to be consistently above 25 mt compared to the river herring/shad catch caps where trip catches are either small or more variable.

Due to the structure of Herring Alternatives 2.1 and 2.2, and how coverage is being selectively assigned based on gear, permit, category, and a 25 mt landings threshold, estimated CVs based on proposed coverage levels could not be estimated formulaically according to SBRM, and instead required simulation based on resampling of observed trips. Simulations were performed for each catch cap and year and based on NEFOP observer data. Proposed coverage levels were simulated by resampling the required amount of observer trips to obtain the target coverage level based on the effort profile for a particular catch cap and year. Herring Alternatives 2.1 and 2.2 focus IFM coverage on Category A/B herring vessels. Due to this, simulated increasing coverage was confined to Category A/B vessel trips until 100% of those trips were simulated as observed. Observed non-category A/B herring vessel trips were assumed to be SBRM coverage and were fully resampled in each simulation without increasing coverage. Within each simulation, a CV was calculated for the catch cap based on the specified coverage level. This process was repeated 1,000 times for each proposed coverage level, which yielded a distribution of simulated CVs. Table #81 summarizes the mean CV from those distributions for each proposed coverage level, and Table #82 provides the simulated results if a 25 mt trip exemption existed. This process was repeated for each catch cap and year.

Due to the amount of observer data available within each catch cap, different approaches were taken in order to obtain a minimum sampling pool. Haddock Catch Cap strata yielded higher numbers of observed trips within each year allowing for simulation of observed trips within each fishing year, observer data from multiple fishing years were not grouped. However, due to the GB Haddock AM closure in 2015 a small number (n<10) of observed trips were simulated. The RHS Catch Cap strata yielded smaller amounts of observed trips and needed to be combined across 2014 and 2015 into a single resampling group that was used to simulate 2014 and 2015 based on their respective effort profiles (total trips in strata for each year). Even after grouping 2014 and 2015, the RHS SNE Midwater Trawl Catch Cap had a small number (n<10) of trips to simulate. The RHS SNE Bottom Trawl Catch Cap also suffered from a small number of observed trips to simulate from when the 25 mt trip exemption was applied (this was not the case when the 25 mt trip exemption was removed).

For catch caps where all of the effort is comprised of Category A /B herring vessels, the CV should converge to zero in 100% coverage scenarios. This was the case for all catch caps confined to midwater trawl trips except for RHS SNE Midwater Trawl, which includes non-Category A/B vessels. The effect of mixed permit categories in RHS SNE Midwater Trawl Catch Cap is that proposed IFM coverage will not cover all trips in that catch cap at 100% coverage of Category A/B vessels and results in the CV not converging to zero. The effect is more pronounced in the RHS SNE Bottom Trawl Catch Cap where on average 38% of

2014-2015 trips were by non-Category A/B vessels.

The 25 mt trip exemption has a similar effect as the Category A/B permit IFM coverage criteria because it allows for a certain number of trips within each catch cap to go unobserved and therefore impacts the simulated CV. This effect is demonstrated in Table 82 and impacts all catch caps (GOM Haddock is not impacted because the CV is always zero due to no observed incidental haddock catch). The effect is much more pronounced in catch caps comprised of trips that yield smaller catches. The effect is very small in the GB Haddock Catch Cap where there trips tend to be consistently above 25 mt compared to the RHS Catch Caps where trip catches are either small or more variable.

TABLE 81. ALTERNATIVE 2.2: SIMULATED MEAN CV AT 25%, 50%, 75% AND 100% ASM COVERAGE

	Simulated Mean CV (%)				
Catch Cap	**Fishing Year[1]**	**25% Coverage**	**50% Coverage**	**75% Coverage**	**100% Coverage**
Haddock: GB Midwater Trawl	2011	25.8%	14.8%	8.6%	0.0%
	2012	24.2%	14.9%	8.8%	0.0%
	2013	26.4%	15.5%	9.1%	0.0%
	2014	21.7%	12.5%	7.2%	0.0%
	2015[3]**	22.7%	13.1%	7.5%	0.0%
Haddock: GOM Midwater Trawl	2011	0.0%	0.0%	0.0%	0.0%
	2012	0.0%	0.0%	0.0%	0.0%
	2013	0.0%	0.0%	0.0%	0.0%
	2014*	0.0%	0.0%	0.0%	0.0%
	2015[3]**	0.0%	0.0%	0.0%	0.0%
Herring-RHS: CC Midwater Trawl	2014*	63.2%	39.5%	22.7%	0.0%
	2015[3]	62.4%	41.8%	24.9%	0.0%
Herring-RHS: GOM Midwater Trawl	2014*	64.3%	39.1%	22.8%	0.0%
	2015[3]	61.1%	35.3%	20.8%	0.0%
Herring-RHS: SNE Bottom Trawl	2014*	24.1%	17.3%	13.2%	9.8%
	2015[3]	28.0%	18.6%	13.3%	9.2%
Herring-RHS: SNE Midwater Trawl	2014*	23.0%	13.6%	8.5%	3.9%
	2015[3]	22.7%	13.1%	7.5%	0.0%

Source: GARFO Quota Monitoring Database as of 5/22/2016
[1]Catch cap fishing year: river herring/shad = calendar year;
haddock = May-April
[3]Fishing Year 2015 data are PRELIMINARY
*2014 Herring RHS fishing year partially covered by RHS Catch Caps which was implemented on December, 4 2014
**2015 GB Haddock fishing year truncated due to the closure of the GB Haddock AM Area on October 22, 2015

TABLE 82. ALTERNATIVE 2.2: SIMULATED MEAN CV AT 25%, 50%, 75% AND 100% ASM COVERAGE WITH 25 MT TRIP EXEMPTION

		Simulated Mean CV (%)			
Catch Cap	**Fishing**	**25%**	**50%**	**75%**	**100%**
Haddock: GB Midwater Trawl	2011	25.4%	15.0%	8.9%	2.4%
	2012	24.8%	15.4%	9.7%	4.0%
	2013	26.1%	15.5%	9.3%	2.2%
	2014	22.2%	12.9%	7.6%	2.2%
	2015[3]**	23.1%	13.5%	8.1%	2.7%
Haddock: GOM Midwater Trawl	2011	0.0%	0.0%	0.0%	0.0%
	2012	0.0%	0.0%	0.0%	0.0%
	2013	0.0%	0.0%	0.0%	0.0%
	2014*	0.0%	0.0%	0.0%	0.0%
	2015[3]**	0.0%	0.0%	0.0%	0.0%
Herring-RHS: CC Midwater Trawl	2014*	61.9%	39.7%	23.4%	4.5%
	2015[3]	63.7%	42.0%	24.2%	5.0%
Herring-RHS: GOM Midwater Trawl	2014*	62.8%	41.8%	25.8%	11.5%
	2015[3]	63.6%	39.8%	25.0%	13.4%
Herring-RHS: SNE Bottom Trawl	2014*	24.2%	17.5%	14.1%	11.5%
	2015[3]	24.8%	19.3%	15.4%	12.6%
Herring-RHS: SNE Midwater Trawl	2014*	32.5%	21.7%	16.2%	12.4%
	2015[3]	34.3%	22.1%	15.9%	11.5%

Source: GARFO Quota Monitoring Database as of 5/22/2016
[1]Catch cap fishing year: river herring/shad = calendar year; haddock = May-April
[3]Fishing Year 2015 data are PRELIMINARY
*2014 Herring RHS fishing year partially covered by RHS Catch Caps which was implemented on December 4, 2014
**2015 GB Haddock fishing year truncated due to the closure of the GB Haddock AM Area on October 22, 2015

Figures 10 and 11 detail the simulation results by year and catch cap. The dotted line represents the mean simulated CV based on increasing Category A and B vessel coverage, while the solid line indicates the same simulation with the 25 mt trip exemption applied. The grey area around the solid and dashed lines represents the two standard error envelope around the mean simulated CV. It is important to understand that these are simulated CVs, therefore by their nature there is a range of resulting CVs for each coverage rate. The variability of the simulated CV (expressed by the standard error) is related to the variability of the underlying incidental catch data. The overlap (black dots on Figures 10 and 11) between the realized CV for these catch caps and the range of simulated CVs is a good indicator of that variability. All realized CVs fell within +/- 2 standard errors of the mean simulated CV, which implies the simulation is reasonable within that margin of error. For catch caps, the realized CV does not closely track the mean simulated CV. This effect is likely due to underlying variability in incidental catch data and/or small numbers of observed trips. The simulated GOM Haddock CV Catch Cap was not shown because no haddock catch was observed from 2011-2015.

Overall, the GB Haddock Catch Cap, RHS SNE Bottom Trawl, and RHS SNE Midwater Trawl catch caps yielded a mean simulated CV < 30% for all simulated years at or below a 25% coverage rate.

The performance was nearly identical under the 25 mt trip exemption option with the exception of RHS SNE Midwater Trawl Catch Cap, which shows the simulated mean CV slightly increase above 30%. RHS CC Midwater Trawl and RHS GOM Midwater Trawl Catch Caps were the only catch caps that clearly did not reduce below 30% at a 25% observer coverage rate. Given the broad range in the simulated CV for these caps (wide standard error envelope) it is difficult to draw strong conclusions from these results. Furthermore the relatively short (2 years) worth of data available from the river herring/shad catch caps adds to this difficulty.

The simulated CV results must be interpreted as an estimate of what may happen in the future based on existing information. The simulations were based on past fishing behavior and observed incidental catch from within the catch caps. Therefore, they may not hold if either factor changes in the future.

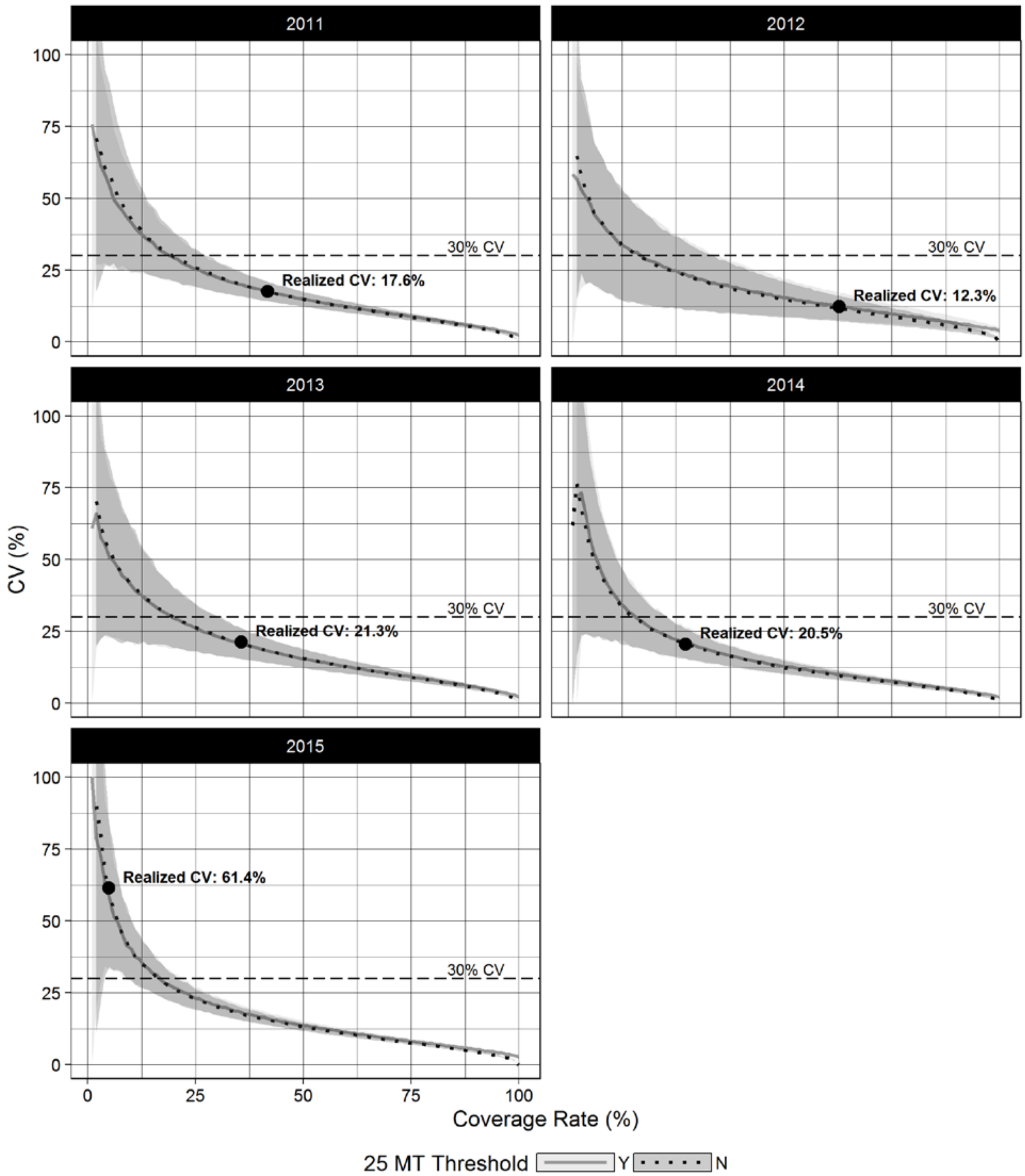


FIGURE 10. 2011-2015 SIMULATED GB HADDOCK CATCH CAP MEAN CV (+/- 2 STANDARD ERRORS) IN RESPONSE TO INCREASING OBSERVER COVERAGE ON CATEGORY A/B HERRING VESSELS, WITH REALIZED CV FOR EACH FISHING YEAR (BLACK DOT). INCLUDES 25 MT TRIP EXEMPTION OPTION.

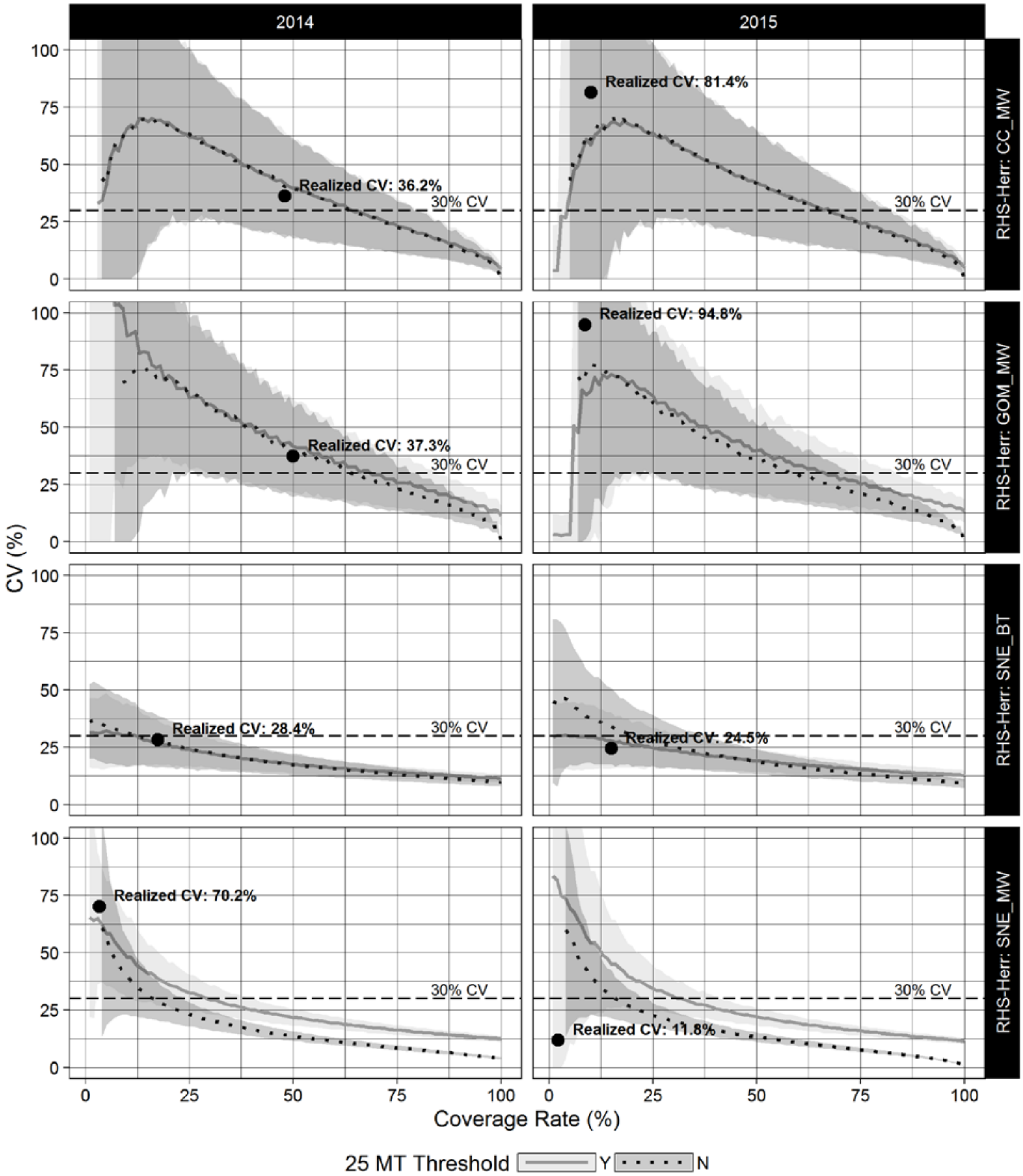


FIGURE 11. 2014-2015 SIMULATED RHS CATCH CAP MEAN CV (+/- 2 STANDARD ERRORS) IN RESPONSE TO INCREASING OBSERVER COVERAGE ON CATEGORY A/B HERRING VESSELS, WITH REALIZED CV FOR EACH FISHING YEAR (BLACK DOT). INCLUDES 25 MT TRIP EXEMPTION OPTION

Allocation of Monitoring Coverage

The allocation of monitoring, or the basis of selecting a vessel for monitoring coverage, affects how the resulting data can be used for management.

Under SBRM, vessels are selected for observer coverage by fishing fleet (based on gear, mesh and area), not based on FMP or permit category. Valid estimates of catch or bycatch (and their variances) rely on formulas that are consistent with the underlying sampling design. Estimates that are inconsistent with the sampling design may be biased, which may impact the utility of the data.

Observed trips that were selected for coverage based on permit category, and not fleet, may be treated separately by the NEFSC in catch and bycatch analyses. These data may not be used in stock assessments or total catch estimation because the vessel selection for observer coverage is no longer done in a randomized way and is inconsistent with SBRM's sampling design. Data collected by permit category could be used to track catch against annual catch limits (ACLs) or fishery catch caps that are specific to the permits that are being targeted for coverage because the data collection and catch estimation method would match. However, the utility of data collected by permit category would likely be limited as compared to data that were collected by fishing fleet because the catch estimate method does not match SBRM's sampling design.

To summarize, the decision to allocate observer coverage by FMP (i.e., permits) or fishing fleet depends on the objectives of the additional coverage and how the data will subsequently be used. If one of the objectives of additional coverage is to improve catch estimates for use in stock assessments, and not just solely for monitoring harvest, then monitoring coverage should be allocated by fishing fleet and not FMP, fishery, or permit category.

Table 83. Pros and Cons of Allocating Monitoring Coverage by Fleet Versus Permit Category

	Pros	Cons
Permit-Based Coverage Target Alternatives	Councils manage fisheries by FMP and vessel permit	Not consistent with how SBRM allocates observers
	Can be used to monitor FMP-specific quotas and catch caps	Resulting data may be biased and not used for stock assessment and/or total removals
	Can be used to monitor FMP-specific quotas and catch caps	Difficult to design, deploy and analyze results because vessels typically don't structure trips by permit category
Fleet-Based Coverage	Consistent with how SBRM	Typically extends across

Target Alternatives	allocates observer coverage	FMPs
	Resulting data may be combined with SBRM data for stock assessments and/or total removals	Not consistent with how Councils manage fisheries by FMP and vessel permit

4.2.1 IMPACTS OF HERRING COVERAGE TARGET ALTERNATIVES ON TARGET SPECIES

4.2.1.1 Impacts of Herring Alternatives 1 and 2 on the Herring Resource

Herring Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the Herring FMP. Monitoring for herring vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the herring fishery would be evaluated on a case-by-case basis.

In recent years, observer coverage for the herring fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-specific basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

For example, New England vessels using extra-large mesh gillnets catch monkfish, skates, and Northeast multispecies, often on the same fishing trip, and, therefore, most participants in this fishery must operate according to the regulations implemented under three different FMPs. To distinguish between the management units identified in individual FMPs and the fisheries that operate under one or more FMPs, the SBRM is designed around "fishing modes" defined by the type of fishing gear used and the area from which the vessels depart.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through a FMP developed by either the MAFMC or NEFMC. Current observer coverage allocated to the herring fishery through SBRM is described in Table 84.

Under SBRM, the Atlantic herring fishery will receive at-sea observer coverage under the following 6 fleets: New England and Mid-Atlantic small mesh otter trawl; New England and Mid-Atlantic purse seine; and New England and Mid-Atlantic paired and single midwater trawl. The table below describes the sea days proposed for April 2016 through March 2017. The sea days listed below for small mesh otter trawl cover all FMPs that use this gear type, so only a portion would cover trips targeting herring. The purse seine and midwater trawl fleets are largely comprised of vessels targeting herring, so a majority of these sea days in these categories will be used to observe trips targeting herring.

Table 84. Proposed and Observed Sea Days for Fleets that Target Herring

Fleet	Region	Proposed sea days for April 2016 to March 2017	Observed sea days, July 2014 to June 2015	VTR sea days, July 2014 to June 2015	Observed trips, July 2014 to June 2015	VTR trips, July 2014 to June 2015
Small Mesh Bottom Trawl	MA	1,171	997	6,761	360	3,088
Small Mesh Bottom Trawl	NE	798	933	8,847	319	3,381
Purse seine	MA	6	0	174	0	172
Purse seine	NE	19	29	661	13	315
Midwater Trawl (Pair and Single)	MA	30	8	134	1	26
Midwater Trawl (Pair and Single)	NE	440	160	1,189	43	363

Source: 2016 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States; Wigley et al., 2016 (included in Appendix 4).

The herring fishery is managed through a stock-wide ACL (reduced from the overfishing limit and acceptable biological catch to address scientific uncertainty and management uncertainty) and sub-ACLs (allocated by herring management area) that are designed to prevent overfishing on individual stock components. Currently, the herring resource is not overfished, and overfishing is not occurring. Additionally, in recent years, the fleet has had the ability to fully harvest the stock-wide ACL and the sub-ACLs. Selection of Herring Alternative 1 will not likely affect the setting of herring harvest specifications but it may affect the ability of the herring fishery to fully harvest the ACLs if less monitoring (when compared to herring Alternative 2) results in catch caps for haddock and river herring/shad limiting effort in the herring fishery.

Under Herring Alternative 2, the NEFMC would specify the details of an industry-funded monitoring program for the Herring FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Herring Alternative 2 is intended to allow for additional monitoring in the herring fishery by specifying coverage targets, above SBRM (Herring Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM and the specified coverage target. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, Herring Alternative 2 may have a positive impact on the herring resource by increasing monitoring in the herring fishery. While the benefits to the herring resource may be difficult to quantify under Herring Alternative 2, they may not be realized under Herring Alternative 1.

Under Herring Alternative 2, long-term benefits to the herring resource would vary with the type and amount of monitoring coverage target specified for the herring fishery but could result from increased monitoring to verify catch and bycatch. As catch information increases, the uncertainty around catch and bycatch in the herring fishery may be reduced, potentially improving the tracking of harvest against ACLs and allowing for discard estimates to be incorporated into future herring stock assessments. The magnitude of positive impacts to the herring resource associated with additional catch information is expected to vary with the type of coverage target specified and the realized coverage level in a given year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified coverage target (Herring Alternatives 2.1-2.7).

Similar to Herring Alternative 1, the selection of Herring Alternative 2 will not likely affect the setting of herring harvest specifications. However, similar to Herring Alternative 1, the selection of Herring Alternative 2 may affect the ability of the herring fishery to fully harvest ACLs. Under Herring Alternative 2, if fishing effort is limited by the availability of monitoring coverage or increased monitoring results in catch caps for haddock and river herring/shad limiting effort in the herring fishery, then the herring fishery may not be able to fully harvest the ACLs.

Herring Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the NEFMC's intent to increase monitoring in the herring fishery, but would not prevent vessels from participating in the herring fishery if monitoring coverage was not available. Should the NEFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the herring fishery. Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the NEFMC to examine the results of any increased coverage in herring fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the Herring FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of herring from industry-funded monitoring requirements.

If the increased monitoring associated with Herring Alternative 2 is reduced or minimized by selection of any of the sub-options, the benefits of additional monitoring to the herring resource may be reduced and/or be similar to impacts under Herring Alternative 1. Additionally, under Herring Alternative 2, because the 25 mt threshold differs from the triggers used to determine which trips count against catch caps for haddock (1 lb of herring) and river herring and shad (6,600 lb of herring) the data generated by selecting Sub-Option 5 may bias (either higher or lower) the catch tracked against catch caps when compared to not selecting Sub-Option 5. Therefore, the selection of Sub-Option 5 may reduce any benefits associated with Herring Alternative 2.

Both Herring Alternative 1 and Herring Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because these measures apply similarly to both Herring Alternatives 1 and 2, the benefits of improved catch monitoring to the herring resource would be similar under both alternatives.

Coverage Target Alternatives

Herring Alternative 2 would specify a level and type of industry-funded monitoring for the herring fishery. The types of industry-funded monitoring considered by NEFMC for the herring fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring (EM), and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category. Monitoring requirements could apply across all herring management areas or to just midwater trawl vessels fishing in the Groundfish Closed Areas.

Under Herring Alternative 2, the amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the herring fishery. Impacts on the herring resource associated with specific coverage target alternatives (Herring Alternatives 2.1-2.7) are discussed in the following section.

Monitoring and Service Provider Requirements

Herring Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the herring fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in Herring Amendment 5.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having an additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

Observers in the herring fishery are currently required to possess a HVF certification under Herring Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Herring Alternative 2. Therefore, the impacts of a HVF certification requirement under Herring Alternative 2 on the herring resource would be similar to the impacts under Herring Alternative 1.

Under Herring Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

To the extent that increased information on herring catch benefits the herring resource under Herring Alternative 2, those benefits may not be realized under Herring Alternative 1.

4.2.1.2 Impacts of Herring Coverage Target Alternatives 2.1- 2.7 on the Herring Resource

Herring Alternatives 2.1-2.7 are intended to allow for increased monitoring in the herring fishery by specifying coverage targets, above SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, the increased monitoring associated with Herring Alternatives 2.1-2.7 may have a positive impact on the herring resource. That positive impact would result from reducing the uncertainty around catch and bycatch estimates of herring and potentially increasing the amount of information available for use in the herring stock assessment. While the benefits to the herring resource may be difficult to quantify under Herring Alternatives 2.1-2.7, they may not be realized under Herring Alternative 1.

The magnitude of positive impacts to the herring resource associated with additional catch information is expected to vary with the monitoring coverage target specified and the realized coverage level in that year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified monitoring coverage target (Herring Alternatives 2.1-2.7).

Herring Alternatives 2.1-2.7 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated.

Currently, vessel and dealer data are used to track retained herring catch and SBRM observer data are used to track discarded herring catch. Additionally, vessel (i.e., catch and effort) and portside sampler (i.e., age and length) data are used in herring stock assessments.

Herring Alternative 2.1 would specify NEFOP-level observer coverage, Herring Alternative 2.2 would specify ASM coverage, Herring Alternatives 2.3 and 2.7 would specify ASM coverage and/or EM and portside sampling coverage, and Herring Alternative 2.4 would specify EM and portside sampling coverage. Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discarded catch. While EM cannot estimate the amount of discarded catch, it can verify retention of catch. Because discarding in the herring fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Herring Alternatives 2.1, 2.2, 2.3, and 2.7) will likely have the same potential to benefit the herring resource as alternatives that increase the amount of information on retained catch (Herring Alternative 2.4).

Both NEFOP-level observers and portside samplers would collect age and length on herring, while at-sea monitors would collect length data on herring. Currently, age and length data collected portside by Maine Department of Marine Resources are used in the herring stock assessment. Because Herring Alternatives 2.1, 2.3 (portside sampling), 2.4, and 2.7 (portside sampling) would collect both age and length data on herring, those alternatives have the potential to benefit the herring resource more than Herring Alternatives 2.2, 2.3 (ASM), and 2.7 (ASM) that would just collect length data on herring.

Herring Alternative 2.1 specifies monitoring coverage at 100% while Herring Alternatives 2.2-2.4 and 2.7 allow monitoring coverage to range between 25% and 100%. The monitoring objectives for the herring coverage targets are accurate estimates of herring catch and the catch of haddock and river herring/shad to track against catch caps. While high levels of monitoring are not always necessary to address a monitoring goal, more monitoring could be more effective to meet monitoring goals than less monitoring.

Therefore, across alternatives, choosing a higher coverage target has the potential to benefit the herring resource by improving management through better data.

Herring Alternatives 2.1, 2.2, and 2.7 would allocate monitoring coverage by vessel permit category (i.e., Category A and B herring permits), Herring Alternative 2.4 would allocate monitoring coverage by fishing fleet (i.e., midwater trawl fleet), and Herring Alternative 2.3 would allocate monitoring coverage by permit category and fishing fleet. The extent to which the allocation of industry-funded coverage is consistent SBRM fishing fleet will determine how the resulting data can be used. The additional information on catch and bycatch estimates in the herring fishery obtained via Herring Alternatives 2.1, 2.2, 2.3 (ASM data), and 2.7 (ASM data) could be used for tracking catch against ACLs and catch caps, but it is unlikely that those data could be used to estimate discards for the herring stock assessment. Additional data on catch estimates in herring fishery obtained via Herring Alternatives 2.3 (EM and portside sampling data) and 2.4 could also be used for catch monitoring. Therefore, across alternatives, the potential benefit to the herring resource is similar.

Vessels with Category A and B herring permits harvested approximately 98% of recent herring catch (2008-2011) and the midwater trawl fleet harvested approximately 73% of recent herring catch (2008-2012). Based on recent catch, allocating coverage by Category A and B herring permits (Herring Alternatives 2.1, 2.1, 2.3, and 2.7) would increase monitoring on vessels that harvest the majority of catch in the herring fishery as compared to allocating coverage to the midwater trawl fleet (Herring Alternative 2.4). Therefore, any benefit to the herring resources associated with increased monitoring may be higher under Herring Alternatives 2.1-2.3 and 2.7 than under Herring Alternative 2.4

The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Herring Alternatives 2.1-2.4 and 2.7 specify that the vessel would be prohibited from participating in the herring fishery on that trip. The selection of Herring Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the herring fishery, even if monitoring coverage is not available. Should fishing effort be limited by the availability of monitoring coverage, such that herring ACLs in a given year are not harvested, there is the potential for a positive impact on the herring resource associated with Herring Alternatives 2.1-2.4 and 2.7. The positive impact would result from the increased reproductive potential of the individuals that are unharvested. However, larger numbers of spawning fish do not guarantee increased recruitment and high densities of fish may result in slow growth and poor condition. The selection of Herring Alternative 2 - Sub-Option 1 would enable monitoring coverage requirements to be waived on a specific trip, allowing a vessel to continue participating in the herring fishery, even if monitoring coverage is not available. For this reason, any benefits to the herring resource under Herring Alternatives 2.1-2.4 and 2.7 may not be realized under Herring Alternative 2 – Sub-Option 1.

Because discarding in the herring fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Herring Alternatives 2.1, 2.2, and 2.3) will likely have the same likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just retained catch (Herring Alternative 2.4). Increased monitoring of haddock and river herring and shad catch may help reduce variability in estimates of catch that is tracked against catch caps, when that variability may have otherwise led to effort restrictions in the herring fishery. Conversely, additional monitoring may illustrate higher than expected catch of haddock and river herring and shad, resulting in catch caps that are fully harvested earlier than expected and reduced opportunities to harvest herring. Increased information to help track catch against catch caps may help allow the herring fishery to fully harvest the ACLs or it may curtail the harvest of herring by the herring fishery.

Herring Alternative 2.5 specifies that midwater trawl vessels fishing in the Groundfish Closed Areas must carry a NEFOP-level observer while Herring Alternative 2.6 would specify that coverage for midwater trawl vessels fishing in Groundfish Closed Areas would match the coverage targets recommended by the NEFMC for the rest of the fishery. The Herring Alternative 2 Sub-Options would apply to Herring Alternative 2.6 but not to Herring Alternative 2.5. Even though Herring Alternative 2.5 would not allow coverage requirements to be waived for a trip inside the Groundfish Closed Areas, it is unlikely that monitoring availability would reduce fishing effort such that the herring ACLs are not able to be harvested.

During 2005-2010, prior to any observer coverage requirements for midwater trawl vessels fishing in Groundfish Closed Areas, less than 12% of total catch by the midwater trawl fleet came from inside the Groundfish Closed Areas. Because a relatively small percentage of the midwater trawl fleet's herring harvest comes from inside Groundfish Closed Areas, any positive impact to the herring resource associated with additional catch information under Herring Alternatives 2.5 and 2.6 would be similar, but likely reduced, compared to impacts under Herring Alternatives 2.1-2.4 and 2.7.

In summary, the benefits of these herring alternatives to the herring resource are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to the herring resource are possible if increased monitoring can reduce uncertainty of catch tracked against ACLs and generate more information for the herring stock assessment. However, these alternatives may lead to direct positive impacts on the herring resource if fishing effort is limited, either through monitoring availability or catch caps, leading to increased reproductive potential of the herring stock. The impacts of these herring alternatives on the herring resource are not significant because they would not cause the herring resource to become overfished and would not result in overfishing.

Table 85. Impacts Summary of Herring Coverage Target Alternatives on Herring Resource

Alternatives	Impacts on Herring Resource
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Herring Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be primarily dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Positive impact associated with Sub-Option 1 not being selected if fishing effort is limited and herring reproductive potential is increased • Negative impact associated with Sub-Option 5 if it biases data used to track catch against catch caps
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and herring reproductive potential is increased
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	• Low positive impact associated with additional information reduce around uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and herring reproductive potential is increased
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and herring reproductive potential is increased
Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet • Positive impact if fishing effort is limited and herring reproductive potential is increased
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet • Negligible impact associated with changes in fishing effort

Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet • Negligible impact associated with changes in fishing effort
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and herring reproductive potential is increased

4.2.2 IMPACTS OF HERRING COVERAGE TARGET ALTERNATIVES ON NON-TARGET SPECIES

The non-target species of interest that are harvested by the herring fishery are haddock, river herring and shad, and mackerel.

Current management of the herring fishery specifies gear and area specific catch caps for non-target species of interest harvested in the herring fishery. River herring/shad catch (RHS) caps for vessels using midwater trawl gear exist for the Gulf of Maine (GOM), Cape Cod (CC), and Southern New England (SNE). River herring and shad catch caps for vessels using small mesh bottom trawl gear exist for Southern New England. The haddock catch cap in the herring fishery applies to vessels using midwater trawl gear in the GOM and Georges Bank (GB).

4.2.2.1 Impacts of Herring Alternatives 1 and 2 on Non-Target Species

Herring Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the Herring FMP. Monitoring for herring vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the herring fishery would be evaluated on a case-by-case basis.

In recent years, observer coverage for the herring fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-specific basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

For example, New England vessels using extra-large mesh gillnets catch monkfish, skates, and Northeast multispecies, often on the same fishing trip, and, therefore, most participants in this fishery must operate according to the regulations implemented under three different FMPs. To distinguish between the management units identified in individual FMPs and the fisheries that operate under one or more FMPs, the SBRM is designed around "fishing modes" defined by the type of fishing gear used and the area from which the vessels depart.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through a FMP developed by either the MFMC or NEFMC. Current observer coverage allocated to the herring fishery through SBRM is described in Table 84.

The catch of mackerel in the herring fishery is managed by the MAFMC in the mackerel fishery specifications and the catch of haddock in the herring fishery is managed by the NEFMC in the Northeast multispecies specifications. The catch of haddock, river herring, and shad in the herring fishery is managed by fishery specific catch caps established by the NEFMC. Selection of Herring Alternative 1 will not likely affect the setting of harvest specifications for mackerel or haddock, but less monitoring (when compared to Herring Alternative 2) may affect the setting of catch caps and tracking catch against fishery specific catch caps.

Under Herring Alternative 2, the NEFMC would specify the details of an industry-funded monitoring program for the Herring FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Herring Alternative 2 is intended to allow for additional monitoring in the herring fishery by specifying coverage targets, above SBRM (Herring Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified coverage target (Herring Alternatives 2.1-2.7). If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, Herring Alternative 2 may have a positive impact on non-target species by increasing monitoring in the herring fishery. While the benefits to non-target species may be difficult to quantify under Herring Alternative 2, they may not be realized under Herring Alternative 1.

Under Herring Alternative 2, long-term benefits to non-target species would vary with the type and amount of monitoring coverage target specified for the herring fishery but could result from increased monitoring to verify catch and bycatch. The potential for increased monitoring under Herring Alternative 2 may help reduce variability in the catch of haddock and river herring and shad tracked against catch caps. Additionally, increased monitoring may result in higher or lower documented catch of haddock and river herring and shad, potentially leading to changes to the basis for setting catch caps and/or fishery catch caps being fully harvested more often or less often than expected. These benefits may not be realized under Herring Alternative 1.

Herring Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the NEFMC's intent to increase monitoring in the herring fishery, but would not prevent vessels from participating in the herring fishery if monitoring coverage was not available. Should the NEFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the herring fishery. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the NEFMC to examine the results of any increased coverage in the herring fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the Herring FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of herring from industry-funded monitoring requirements.

If the increased monitoring associated with Herring Alternative 2 is reduced or minimized by selection of any of the sub-options, the benefits of additional monitoring to non-target species may be reduced and/or similar to impacts under Herring Alternative 1. Additionally, under Herring Alternative 2, because the 25 mt threshold differs from the triggers used to determine which trips count against catch caps for haddock (1 lb of herring) and river herring and shad (6,600 lb of herring) the data generated by selecting Sub-Option 5 may bias (either higher or lower) the catch tracked against catch caps when compared to not selecting Sub-Option 5. Therefore, the selection of Sub-Option 5 may reduce any benefits associated with Herring Alternative 2.

Both Herring Alternative 1 and Herring Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because these measures apply similarly to both Herring Alternatives 1 and 2, the benefits of improved catch monitoring to the non-target species would be similar under both alternatives.

Coverage Target Alternatives

Herring Alternative 2 would specify a level and type of industry-funded monitoring for the herring fishery. The types of industry-funded monitoring considered by the NEFMC for the herring fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category. Monitoring requirements could apply across all herring management areas or to just midwater trawl vessels fishing in the Groundfish Closed Areas.

Under Herring Alternative 2, the amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the herring fishery.

A CV analysis was used to simulate the precision associated with tracking catch against catch caps. Although there is no defined CV target, results are compared to a 30% CV for context. Under Herring Alternative 1, based on data from 2011-2015, CVs for the GB Haddock Catch Cap were generally less than 30%, except in 2015. Since there has not been any observed GOM haddock catch, the CV is zero. In comparison, under Herring Alternative 2, coverage targets of 25% and higher will generate CVs less than 30% for the GB Haddock Catch Cap. Results of the CV simulation are more varied for river herring/shad catch caps. Under Herring Alternative 1, CVs for SNE catch caps were less than 30%, while CVs for GOM and CC caps ranged from 61.4% to 94.8%. Under Herring Alternative 2, coverage targets of 25% and higher would generated CVs less than 30% for the SNE catch caps. Additionally, for the GOM and CC catch caps, coverage targets of 50% and higher would generate CVs around 30% and lower.

Additional impacts on non-target species associated with specific coverage target alternatives (Herring Alternatives 2.1-2.7) are discussed in the following section.

Monitoring and Service Provider Requirements

Herring Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the herring fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in Herring Amendment 5.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having an additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

Observers in the herring fishery are currently required to possess a HVF certification under Herring Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Herring Alternative 2. Therefore, the impacts of a HVF certification requirement under Herring Alternative 2 on non-target species would be similar to the impacts under Herring Alternative 1.

Under Herring Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

To the extent that increased information on non-target species catch benefits non-target species under Herring Alternative 2, those benefits may not be realized under Herring Alternative 1.

4.2.2.2 Impacts of Herring Coverage Target Alternatives 2.1- 2.7 on Non-Target Species

Herring Alternatives 2.1-2.7 are intended to allow for increased monitoring in the herring fishery by specifying coverage targets, above SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, the increased monitoring associated with Herring Alternatives 2.1-2.7 may have a positive impact on non-target species. That positive impact would result from reducing the uncertainty around catch and bycatch estimates of non-target species in the herring fishery and potentially increasing the amount of information available for use in stock assessments for non-target species. While the benefits to non-target species may be difficult to quantify under Herring Alternatives 2.1-2.7, they may not be realized under Herring Alternative 1.

The magnitude of positive impacts to non-target species associated with additional catch information is expected to vary with the monitoring coverage target specified and the realized coverage level in that year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified monitoring coverage target (Herring Alternatives 2.1-2.7).

Herring Alternatives 2.1-2.7 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated.

Currently, vessel and dealer data are used to track retained catch of mackerel and haddock while SBRM observer data are used to track retained and discarded catch of river herring and shad, as well as the discarded catch of mackerel and haddock. Additionally, SBRM observer (i.e., discard and length) and survey (i.e., age) data are used for stock assessments and to estimate total removals.

Herring Alternatives 2.1 would specify NEFOP-level observer coverage, Herring Alternatives 2.2 would specify ASM coverage, Herring Alternatives 2.3 and 2.7 would specify ASM coverage and/or EM and portside sampling coverage, and Herring Alternative 2.4 would specify EM and portside sampling coverage. Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discarded catch. While EM cannot estimate the amount of discarded catch, it can verify retention of catch. Because discarding in the herring fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Herring Alternatives 2.1, 2.2, 2.3, and 2.7) will likely have the same potential to benefit non-target species as alternatives that increase the amount of information on retained catch (Herring Alternative 2.4).

Both NEFOP-level observers and portside samplers would collect age and length on non-target species, while at-sea monitors would collect length data on non-target species. Currently, length data collected by SBRM observers and age data collected during NMFS research surveys are considered in the stock assessments for haddock, mackerel, river herring, and shad. Because Herring Alternatives 2.1, 2.3 (portside sampling), 2.4, and 2.7 (portside sampling) would collect both age and length data on non-target species, those alternatives have the potential to benefit non-target species more than Herring Alternatives 2.2, 2.3 (ASM), and 2.7 (ASM) that would collect just length data on non-target species.

Herring Alternative 2.1 specifies monitoring coverage at 100% while Herring Alternatives 2.2-2.4 and 2.7 allow monitoring coverage to range between 25% and 100%. The monitoring objectives for the herring coverage targets are accurate estimates of herring catch and the catch of haddock and river herring/shad to track against catch caps. While high levels of monitoring are not always necessary to address a monitoring goal, more monitoring could be more effective to meet monitoring goals than less monitoring. Therefore, across alternatives, choosing a higher coverage target has the potential to benefit the non-target species by improving management through better data.

A CV analysis of Herring Alternatives 2.1 and 2.2 was used simulate the precision associated with tracking catch against catch caps. For the GB Haddock Catch Cap, coverage targets of 25% and higher would have generated CVs less than 30%. For the RHS SNE catch caps, coverage targets of 25% and higher would generated CVs less than 30%. For the RHS GOM and CC catch caps, coverage targets of 50% and higher would generate CVs around 30% and lower. Based on this analysis, coverage targets of 50%, and often times even 25%, would generate CVs on the catch tracked against catch caps of 30% or lower.

Herring Alternatives primarily 2.1, 2.2, and 2.7 would allocate monitoring coverage by vessel permit category (i.e., Category A and B herring permits), Herring Alternative 2.4

would allocate monitoring coverage by fishing fleet (i.e., midwater trawl fleet), and Herring Alternative 2.3 would allocate monitoring coverage by permit category and fishing fleet. The extent to which the allocation of industry-funded coverage is consistent SBRM fishing fleet will determine how the resulting data can be used. Unless vessel permit category is equivalent to fishing fleet, the resulting information from Herring Alternatives 2.1 and 2.2 may have limited utility when compared to Herring Alternatives 2.3 and 2.4. The additional information on catch and bycatch estimates on non-target species obtained via Herring Alternatives 2.1, 2.2, 2.3 (ASM data), and 2.7 (ASM data) could be used for tracking catch against ACLs and catch caps, but it is unlikely that those data could be used to estimate discards for the haddock, mackerel, river herring, and shad stock assessments. Additional data on catch estimates in herring fishery obtained via Herring Alternatives 2.3 (EM and portside sampling data) and 2.4 could be used for catch monitoring and well as stock assessments. However, discard estimates would not be generated under alternatives with EM and portside sampling. Therefore, across alternatives, the potential benefit to non-target species is similar.

Vessels with Category A and B herring permits harvested approximately 98% of recent herring catch (2008-2011) and the midwater trawl fleet harvested approximately 73% of recent herring catch (2008-2012). Based on recent catch, allocating coverage by Category A and B herring permits (Herring Alternatives 2.1, 2.1, 2.3, and 2.7) would increase monitoring on vessels that harvest the majority of catch in the herring fishery as compared to allocating coverage to the midwater trawl fleet (Herring Alternative 2.4). Therefore, any benefit to non-target species associated with increased monitoring may be higher under Herring Alternatives 2.1-2.3 and 2.7 than under Herring Alternative 2.4

The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Herring Alternatives 2.1-2.4 and 2.7 specify that the vessel would be prohibited from participating in the herring fishery on that trip. The selection of Herring Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the herring fishery, even if monitoring coverage is not available. Should fishing effort be limited by the availability of monitoring coverage, such that the harvest of non-target species is limited, there is the potential for a positive impact on river herring and shad, and possibly haddock, associated with Herring Alternatives 2.1-2.4 and 2.7. The positive impact would result from the increased reproductive potential of the individuals that are unharvested. However, larger numbers of spawning fish do not guarantee increased recruitment and high densities of fish may result in slow growth and poor condition. The selection of Herring Alternative 2 - Sub-Option 1 would enable monitoring coverage requirements to be waived on a specific trip, allowing a vessel to continue participating in the herring fishery, even if monitoring coverage is not available. For this reason, any benefits to non-target species under Herring Alternatives 2.1-2.4 and 2.7 may not be realized under Herring Alternative 2 – Sub-Option 1.

Because discarding in the herring fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Herring Alternatives 2.1, 2.2, 2.3, and 2.7) will likely have the same likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just retained catch (Herring Alternative 2.4). Increased monitoring of haddock, river herring, and shad catch may help reduce variability in estimates of catch that is tracked against catch caps. Additionally, increased monitoring may lead to changes to the basis for setting catch caps and/or fishery catch caps being fully harvested more often or less often than expected.

Herring Alternative 2.5 specifies that midwater trawl vessels fishing in the Groundfish Closed Areas must carry a NEFOP-level observer while Herring Alternative 2.6 would specify that coverage for midwater trawl vessels fishing in Groundfish Closed Areas would match the coverage targets recommended by the NEFMC for the rest of the fishery. Herring Alternative 2 Sub-Options would apply to Herring Alternative 2.6 but not to Herring Alternative 2.5. If increased monitoring associated with Herring Alternative 2.6 is reduced or minimized by the selection of any of the sub-options, the benefits of additional monitoring to the non-target species may be less than under Herring Alternative 2.6 than under Herring Alternative 2.5.

Haddock is the only non-target species of interest that is typically harvested by midwater vessels inside the Groundfish Closed Areas. The catch of haddock by midwater trawl vessels inside Groundfish Closed Areas would be tracked against the haddock catch caps. Because a relatively small percentage of the midwater trawl fleet's harvest comes from inside Groundfish Closed Areas, any positive impact to haddock associated with additional catch information under Herring Alternatives 2.5 and 2.6 would be similar, but likely reduced, compared to impacts under Herring Alternatives 2.1-2.4.

In summary, the benefits of these herring alternatives to non-target species are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to non-target species are possible if increased monitoring can reduce uncertainty of catch and bycatch tracked against catch caps and, possibly, better inform the setting of catch caps. However, these alternatives may lead to direct positive impacts on non-target species if fishing effort is limited, either through monitoring availability or catch caps, leading to increased reproductive potential of non-target species. The impacts of these herring alternatives on non-target species are not significant because they would not cause the non-target species to become overfished and would not result in overfishing

Table 86. Impacts Summary of Herring Coverage Target Alternatives on Non-target Species

Alternatives	Impacts on Non-Target Species (Haddock, River Herring and Shad, Mackerel)
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates

Herring Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be primarily dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Positive impact associated with Sub-Option 1 not being selected if fishing effort is limited and the reproductive potential of non-target species is increased • Negative impact associated with Sub-Option 5 if it biases data used to track catch against catch caps
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels and to track against catch caps • Positive impact if fishing effort is limited and the reproductive potential of non-target species is increased
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels and to track catch around catch caps • Positive impact if fishing effort is limited and the reproductive potential of non-target species is increased
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet and to track against catch caps • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels and to track catch against catch caps • Positive impact if fishing effort is limited and the reproductive potential of non-target species is increased
Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet and to track against catch caps • Positive impact if fishing effort is limited and the reproductive potential of non-target species is increased
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet and to track catch against catch caps • Negligible impact associated with changes in fishing effort
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with the midwater trawl fleet and to track catch against catch caps • Negligible impact associated with changes in fishing effort

Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Category A and B vessels and to track catch against catch caps • Positive impact if fishing effort is limited and the reproductive potential of non-target species is increased

4.2.3 IMPACTS OF HERRING COVERAGE TARGET ALTERNATIVES ON PROTECTED RESOURCES

Protected species include fish, turtles, and marine mammals listed under the ESA and marine mammals protected under the MMPA.

4.2.3.1 Impacts of Herring Alternatives 1 and 2 on Protected Species

Herring Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the Herring FMP. Monitoring for herring vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the herring fishery would be evaluated on a case-by-case basis.

In recent years, observer coverage for the herring fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-specific basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

For example, New England vessels using extra-large mesh gillnets catch monkfish, skates, and Northeast multispecies, often on the same fishing trip, and, therefore, most participants in this fishery must operate according to the regulations implemented under three different FMPs. To distinguish between the management units identified in individual FMPs and the fisheries that operate under one or more FMPs, the SBRM is designed around “fishing modes” defined by the type of fishing gear used and the area from which the vessels depart.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through a FMP developed by either the MAFMC or NEFMC. Current observer coverage allocated to the herring fishery through SBRM is described in Table 84.

Under Herring Alternative 2, the NEFMC would specify the details of an industry-funded monitoring program for the Herring FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Herring Alternative 2 is intended to allow for additional monitoring in the herring fishery by specifying coverage targets, above SBRM (Herring Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM and the specified coverage target. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, Herring Alternative 2 may have a positive impact on protected species by increasing monitoring in the herring fishery. While the benefits to protected species may be difficult to quantify under Herring Alternative 2, they may not be realized under Herring Alternative 1.

Under Herring Alternative 2, long-term benefits to protected species would vary with the type and amount of monitoring coverage target specified for the herring fishery but could result from increased monitoring to verify catch and bycatch. As catch information increases, the uncertainty around catch and bycatch of protected species in the herring fishery may be reduced, potentially improving catch estimates to be incorporated into future stock assessments and improving the available information for protected species management decisions. The magnitude of positive impacts to protected species associated with additional catch information is expected to vary with the type of coverage target specified and the realized coverage level in a given year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified coverage target (Herring Alternatives 2.1-2.7).

Herring Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the NEFMC's intent to increase monitoring in the herring fishery, but would not prevent vessels from participating in the herring fishery if monitoring coverage was not available. Should the NEFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the herring fishery. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the NEFMC to examine the results of any increased coverage in the herring fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the Herring FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of herring from industry-funded monitoring requirements.

If increased monitoring associated with Herring Alternative 2 is reduced or minimized by selection of any of the sub-options, the benefits of improved catch estimates in stock assessments and improving the available information for protected species management decisions may be reduced and/or similar to impacts under Herring Alternative 1. If sub-Option 1 is not selected by the NEFMC and fishing effort is limited by monitoring availability, then interactions between the herring fishery and protected species may be reduced under Herring Alternative 2.

Both Herring Alternative 1 and Herring Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding. Because these measures apply similarly to both Herring Alternatives 1 and 2, the benefits of improved catch monitoring to protected species would be similar under both alternatives.

Coverage Target Alternatives

Herring Alternative 2 would specify a level and type of industry-funded monitoring for the herring fishery. The types of industry-funded monitoring considered by the NEFMC for the herring fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category. Monitoring requirements could apply across all herring management areas or to just midwater trawl vessels fishing in the Groundfish Closed Areas.

Under Herring Alternative 2, the amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the herring fishery. Impacts on protected species associated with specific coverage target alternatives (Herring Alternatives 2.1-2.7) are discussed in the following section.

Monitoring and Service Provider Requirements

Herring Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the herring fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in Herring Amendment 5.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having an additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

Observers in the herring fishery are currently required to possess a HVF certification under Herring Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Herring Alternative 2. Therefore, the impacts of a HVF certification requirement under Herring Alternative 2 on protected species would be similar to the impacts under Herring Alternative 1.

Under Herring Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

To the extent that increased information on protected species catch benefits protected species under Herring Alternative 2, those benefits may not be realized under Herring Alternative 1.

4.2.3.2 Impacts of Herring Coverage Target Alternatives 2.1- 2.7 on Protected Species

Herring Alternatives 2.1-2.7 are intended to allow for increased monitoring in the herring fishery by specifying coverage targets, above SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, the increased monitoring associated with Herring Alternatives 2.1-2.7 may have a positive impact on protected species. That positive impact may result from reducing uncertainty around catch and bycatch of protected species in the herring fishery, thereby, potentially improving catch estimates to be incorporated into future stock assessments and improving the available information for protected species management decisions. While the benefits to protected species may be difficult to quantify under Herring Alternatives 2.1-2.7, they may not be realized under Herring Alternative 1.

The magnitude of positive impacts to protected species associated with additional catch information is expected to vary with the monitoring coverage target specified and the realized coverage level in that year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified monitoring coverage target (Herring Alternatives 2.1-2.7).

Herring Alternatives 2.1-2.7 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated.

Herring Alternatives 2.1 would specify NEFOP-level observer coverage, Herring Alternatives 2.2 would specify at-sea monitor coverage, Herring Alternatives 2.3 and 2.7 would specify ASM coverage and/or EM and portside sampling coverage, and Herring Alternative 2.4 would specify EM and portside sampling coverage. Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discarded catch. While EM cannot estimate the amount of discarded catch, it can verify retention of catch. Because discarding in the herring fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Herring Alternatives 2.1, 2.1, 2.3, and 2.7) will likely have the same potential benefit to protected species as alternatives that increase the amount of information on retained catch (Herring Alternative 2.4).

NEFOP-level observers would collect data on interactions with protected species, such as sea turtles, marine mammals, and sea birds, as well as sighting data on protected species. In contrast, at-sea monitors would collect data on interactions with protected species, but not sighting data. Therefore, Herring Alternative 2.1 would generate more information on the protected species than Herring Alternatives 2.2-2.4 and 2.7.

Herring Alternative 2.1 specifies monitoring coverage at 100% while Herring Alternatives 2.2-2.4 and 2.7 allow monitoring coverage to range between 25% and 100%. While high levels of monitoring are not always necessary to generate information, more monitoring could be more effective at generating information on the interactions between protected species and the herring fishery than less information, especially when interactions between protected species and the herring fishery occur infrequently. Therefore, across alternatives, choosing a higher coverage target has the potential to benefit the protected species by improving management through better data.

The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Herring Alternatives 2.1-2.4 and 2.7 specify that the vessel would be prohibited from participating in the herring fishery on that trip. The selection of Herring Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the herring fishery, even if monitoring coverage is not available. If the NEFMC does not select Sub-Option 1, and herring fishing effort is limited by the availability of monitoring coverage such that the harvest of protected species or interactions with protected species is reduced, there is the potential for a positive impact protected species associated with Herring Alternatives 2.1-2.4 and 2.7. The positive impact would result from the increased reproductive potential of the individuals that are unharvested. If the NEFMC selects Sub-Option 1, and monitoring coverage requirements are waived on the majority of herring trips, there would be no additional information to potentially improve catch information for stock assessments or improve the available information for protected species management decisions. For these reason, any benefits to protected species under Herring Alternatives 2.1-2.4 and 2.7 may not be realized under Herring Alternative 2 – Sub-Option 1.

Herring Alternative 2.5 specifies that midwater trawl vessels fishing in the Groundfish Closed Areas must carry a NEFOP-level observer while Herring Alternative 2.6 would specify that coverage for midwater trawl vessels fishing in Groundfish Closed Areas would match the coverage targets recommended by the NEFMC for the rest of the fishery. The Herring Alternative 2 Sub-Options would apply to Herring Alternative 2.6 but not to Herring Alternative 2.5. If increased monitoring associated with Herring Alternative 2.6 is reduced or minimized by the selection of any of the sub-options, the benefits of additional monitoring to the protected species may be less than under Herring Alternative 2.6 than under Herring Alternative 2.5.

Because only a relatively small percentage of the midwater trawl fleet's harvest comes from inside the Groundfish Closed Areas, any positive impact to protected species associated with additional monitoring under Herring Alternatives 2.5 and 2.6 would be similar, but likely reduced, compared to impacts under Herring Alternatives 2.1-2.4 and 2.7.

In summary, the benefits of these herring alternatives to protected species are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to protected species are possible if increased monitoring of the herring fishery generates additional information on protected species, potentially improving catch and bycatch estimates to be incorporated into future stock assessments and improving the available information for protected species management decisions. However, these alternatives may lead to direct positive impacts on protected species if fishing effort is limited, either through monitoring availability or catch caps, leading to increased reproductive potential of protected species. The impacts of these herring alternatives on protected species are not significant because they would not cause a change in population status.

Table 87. Impacts Summary of Herring Coverage Target Alternatives on Protected Species

Alternatives	Impacts on Protected Species
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates

Herring Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be primarily dependent on the type of information collected, how coverage is allocated, amount of coverage, and amount of available Federal funding • Positive impacts associated with Sub-Option 1 not being selected if fishing effort is limited and reproductive potential of protected species is increased
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	• Low positive impact associated with additional information to reduce uncertainty of catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	• Low positive impact associated with additional information to reduce uncertainty of catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty of catch estimates associated with the midwater trawl fleet • Low positive impact associated with additional information to reduce uncertainty of catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	• Low positive impact associated with additional information to reduce uncertainty of catch estimates associated with the midwater trawl fleet • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Low positive impact associated with additional to reduce uncertainty of catch estimates associated with the midwater trawl fleet • Negligible impact associated with changes in fishing effort
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Low positive impact associated with additional to reduce uncertainty of catch estimates associated with the midwater trawl fleet • Negligible impact associated with changes in fishing effort
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Low positive impact associated with additional information to reduce uncertainty of catch estimates associated with Category A and B vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased

4.2.4 IMPACTS OF HERRING COVERAGE TARGET ALTERNATIVES ON THE PHYSICAL ENVIRONMENT

4.2.4.1 Impacts of Herring Alternatives on the Physical Environment

Herring Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the Herring FMP. Monitoring for herring vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the herring fishery would be evaluated on a case-by-case basis.

Under Herring Alternative 2, the NEFMC would specify the details of an industry-funded monitoring program for the Herring FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Herring Alternative 2 is intended to allow for increased monitoring in the herring fishery by specifying coverage targets, above SBRM (Herring Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM requirements (Herring Alternative 1) and the specified coverage target (Herring Alternatives 2.1-2.7).

The impact of the herring fishery on the physical environment is thought to be minimal and temporary. Therefore, the expected impact on the physical environment of increased monitoring in the herring fishery is expected to be negligible under both Herring Alternatives 1 and 2.

Herring Alternative 2 would specify a level and type of industry-funded monitoring for the herring fishery. The monitoring levels under consideration by the NEFMC range from 25% to 100%. The types of monitoring under consideration include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category. Monitoring requirements could apply across all herring management areas or to just midwater trawl vessels fishing in the Groundfish Closed Areas. The amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative (Herring Alternatives 2.1-2.7) specified for the herring fishery.

The realized coverage level would be determined by the amount of funding available to cover NMFS cost responsibilities in a given year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Herring Alternatives 2.1-2.7 specify that the vessel would be prohibited from participating in the herring fishery on that trip. The selection of Herring Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the herring fishery, even if monitoring coverage is not available. Additionally, the amount and quality of information collected under Herring Alternatives 2.1-2.4 and 2.7 has the potential to affect the amount of effort in the herring fishery.

Should fishing effort be limited by the availability of monitoring coverage or additional data collected, there is the potential for a positive impact on the physical environment. However, the magnitude of any potential positive impact is low because the herring fishery has only minimal and temporary impacts on the environment. Additionally, vessels may switch gear modes to minimize economic impacts associated with gear-specific requirements. However changes to gear modes associated with Herring Alternatives 2.1-2.7 are not expected to affect the overall impact of the herring fishery on the physical environment. Therefore, impacts on the physical environment are expected to be similar under Herring Alternatives 1 and 2.

TABLE 88. SUMMARY OF PHYSICAL ENVIRONMENT IMPACTS OF HERRING COVERAGE TARGET ALTERNATIVES

Alternatives	Impacts on Physical Environment
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Negligible impact associated with minimal and temporary effects on the environment from herring fishery
Herring Alternative 2: Coverage Target Specified For IFM Programs	• Negligible impact associated with minimal and temporary effects on the environment from herring fishery • Low positive impact if fishing effort is limited by monitoring availability • Negligible impact associated with switching gear modes

4.2.5 IMPACTS OF HERRING COVERAGE TARGET ALTERNATIVES ON HUMAN COMMUNITIES

Another major consideration when evaluating an industry-funded monitoring program is the cost of the monitoring program. The requirement to pay for monitoring coverage increases operating costs for fishing vessels, which in turn reduces vessel revenues.

There are two primary approaches for minimizing the cost of monitoring paid by industry.

The first approach is to select the most cost effective type of coverage to meet program goals. For example, it may be more cost effective to use electronic monitoring rather than observers to confirm retention of catch on herring vessels.

The second approach to limit costs to industry is to set coverage levels at the lowest level necessary to gather information to meet program goals. For example, it may be possible to increase precision around catch estimates for a certain species by setting a coverage target of 50%, rather than a coverage target of 100%.

Table 89 shows the range of costs associated with the different types of monitoring being considered for the herring fishery. A detailed description of industry cost responsibilities associated with each of these types of monitoring can be found in Appendix 6 – Monitoring Cost Estimates.

TABLE 89. MONITORING COST ESTIMATES FOR THE HERRING FISHERY

Types of Monitoring	NMFS Cost	Vessel Cost
NEFOP-Level Observer	\$479 per sea day	\$818 per sea day
At-Sea Monitor	\$530 per sea day	\$710 per sea day
Electronic Monitoring[1]	Year 1: \$36,000 startup plus \$97 per sea day Year 2: \$97 per sea day	Year 1: \$15,000 startup plus \$325-\$172 per sea day (depending on coverage target) Year 2: \$325-\$172 per sea day (depending on coverage target)
Portside Sampling[2]	\$479-\$530 per sea day	\$5.12[1] or \$3.84[2] per mt

1 – EM cost assumptions: EM on every vessel, video collected throughout the duration of a trip (100%) or only around haulback (25%, 50%, or 75%), and 25%, 50%, 75% or 100% video review. Costs for coverage targets are: \$325 for 100%, \$202 for 75%, \$187 for 50%, and \$172 for 25%.
2 – Portside cost assumptions: \$5.12 includes portside administration costs. \$3.84 does not include portside administration. \$5.12 mt would apply to 100% of trips, while \$3.84 would apply to 25%, 50%, or 75% of trips.

Assumptions used to generate estimates of industry cost responsibilities

While the cost of a sea day can vary between service providers, the individual components of a sea day cost are necessary to successfully execute a monitoring program. Because each of these components is essential, in most cases, it is not appropriate to reduce industry's cost responsibilities by removing or adjusting components of the sea day cost.

<u>NEFOP-Level Observer Cost Estimate</u>

The \$818 per sea day industry cost responsibility related to NEFOP-level observer coverage is based on sampling costs from October 2012 through May 2014 averaged across 3 service providers. The program elements and activities covered in this cost would include, but are not limited to, costs to the provider for deployments and sampling (e.g., travel and salary for observer deployments and debriefing), equipment, costs to the provider for observer time and travel to a scheduled deployment that does not sail and was not canceled by the vessel prior to the sail time, and provider overhead.

At-Sea Monitor Cost Estimate

The $710 per sea day industry cost responsibility related to a herring at-sea monitoring program is based on the current sea day rate for the groundfish at-sea monitoring program. However, herring at-sea monitors would be collecting data on discards only. This may reduce training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the herring fishery resulting in a lower sea day rate than the groundfish at-sea monitoring program rate. (*See Appendix 5 – Analysis of ASM Costs for additional information*.) In the absence of an estimate specific to the herring at-sea monitoring program, the PDT/FMAT determined that using the groundfish at-sea monitoring sea day rate was appropriate, but the actual cost of a herring at-sea monitor may be more or less.

Table 90. Industry Cost Responsibilities for NEFOP-level Observer and At-Sea Monitors

Industry Cost Responsibilities	NEFOP-level observer cost per sea day	At-sea monitoring cost per sea day
Provider costs for deployments and sampling (e.g., travel and salary for observer deployments and debriefing)	Sea day charges paid to providers: $640 Travel: $71 Meals: $22 Other non-sea day charges: $12	Sea day charge paid to providers: $561 Travel: $67 Meals: $18 Other non-sea day charges: $14
Equipment, as specified by NMFS, to the extent not provided by NMFS	$11	
Provider costs for observer time and travel to a scheduled deployment that doesn't sail and was not canceled by the vessel prior to the sail time.	$1	
Provider overhead and project management costs not included in sea day charges above (e.g., per diem costs for trainees)	Training: $61	Training: $50
Provider costs to meet performance standards laid out by a fishery management plan	TBD – won't know these costs until an industry funded observer coverage program is implemented in a	TBD – won't know these costs until an industry funded observer coverage program is implemented in

	fishery	a fishery
Total (not including other costs)	$818	$710

Electronic Monitoring Cost Estimate

Because no Federal electronic monitoring program exists for the herring fishery, industry cost responsibilities associated with an electronic monitoring program were difficult to estimate. Electronic monitoring cost estimates include a one-time implementation cost, as well as ongoing annual operational program costs. Cost components include equipment, field services, data services, and program management. The implementation costs associated with EM are summarized in Table 91 and the ongoing costs associated with EM are summarized in Table 92. Additional details on monitoring costs are available in Appendix 6 – Monitoring Cost Estimates.

Table 91. Industry Cost Responsibilities for Electronic Monitoring Implementation

Industry Cost Responsibilities	Electronic Monitoring Implementation Costs Per Vessel
Equipment, including initial purchase and installation of the cameras, associated sensors, integrated GPS, control box, and hard drives	$9,018
Field Services, including technician's labor and travel associated with the installation of equipment	$2,952
Program Management, including one-time labor, equipment, facilities, and administrative costs associated with getting the new EM program operational	$3,493
Total	$15,463

Initially, the sea day cost for EM was estimated at $325. The $325 cost estimate is likely high because it assumes video footage is collected for the duration of a trip and 100% of the video footage is reviewed. Subsequently, the PDT/FMAT generated cost estimates for other coverage targets (25%, 50%, and 75%) with the assumption that video footage is just collected around haulback and that the level of video footage review matches the coverage target. The breakdown of these costs is shown in Table 92.

Table 92. Industry Cost Responsibilities for Ongoing Electronic Monitoring Costs per Sea Day

Industry Cost Responsibilities	100% Coverage	75% Coverage	50% Coverage	25% Coverage
Equipment, including annual equipment costs	$11	$11	$11	$11

estimated here include spare parts to replace broken or aging equipment, as well as licenses for the use of proprietary software				
Field Services, including labor, travel, and other costs associated with repairs, technical support, and retrieving hard drives from the vessels and shipping them to the service provider for analysis	$78	$47	$47	$47
Data Services, including the costs associated with review and analysis of the video, reporting to NMFS, and archiving of the data	$160	$67	$52	$37
Program Management, including costs of the day-to-day operations of the service provider for running the EM program	$77	$77	$77	$77
Total	$325	$202	$187	$172

Portside Sampling Cost Estimate

The analysis assumes the cost per amount of fish landed is the most accurate way to represent the potential industry costs for monitoring. Because no Federal portside sampling program exists for the midwater trawl fleet, industry cost responsibilities associated with a portside sampling program for the midwater trawl fleet were difficult to estimate.

The average cost per pound of groundfish landed for the Northeast Multispecies dockside monitoring program ranged from $0.01 - $0.12 per pound for all sectors. The average cost per pound landed per trip is inversely related to the average pounds landed – that is, trips that land larger amounts are less expensive to monitor than trips that land smaller amounts. Larger trips are less expensive to monitor because they typically land in principle ports with a dedicated monitor, therefore, there are no additional costs for monitors to travel to offload locations.

Initially, the industry cost responsibility associated with portside sampling was estimated to be as much as $5.12 per mt. This cost estimate was generated using information from the Massachusetts Division of Marine Fisheries portside sampling program for the herring fishery. The $5.12 per mt cost estimate is likely high as it includes program administration costs as well as sampling costs and was intended to apply to all trips for a target sampling rate of 100%.

Subsequently, the PDT/FMAT generated a revised cost estimate ($3.84 per mt) that does not include portside administration costs. This cost estimate may be closer to the actual industry cost responsibilities associated with portside sampling and would apply to 25%, 50%, or 75% of trips, consistent with the coverage target selected by the NEFMC.

Midwater trawl vessels returning from declared herring trips would be required to land catch in specific ports for sampling. Table 93 describes the ports where midwater trawl vessel currently land catch and whether those ports are currently sampled by existing portside sampling program for the midwater trawl fleet operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

TABLE 93. LANDING PORTS FOR MWT VESSELS AND PORTSIDE SAMPLING ISSUES

Ports	Currently Sampled (Y/N)	Issues Affecting Sampling
Maine		
Portland	Y	None
Rockland	Y	None
Vinalhaven	N	Not cost effective; fish sold over the side of vessels
Prospect Harbor	Y	None
Jonesport	Y	None
Massachusetts		
Boston	N	Costly to sample; logistically challenging; unsafe area
Gloucester	Y	Only a few landings during the year
New Bedford	Y	Logistically challenging; safety issues
Rhode Island		
Point Judith	Y	None
North Kingstown	N	Only frozen product is landed
Newport	N	Safety issues
New Jersey		
Cape May	Y	None

Approximately 95% of midwater trawl landings are made in ports currently sampled by the state programs. However, if certain ports are not suitable for portside sampling, then vessels may not be able to land in those ports on trips that are selected for portside sampling. Some vessels only land in a single port and that port is not currently sampled. Some vessels land in both sampled and unsampled ports, but changing past practices to land only in sampled ports may not be easy.

Travel time and seller/buyer arrangements are likely to be most affected by requiring midwater trawl vessels to land in specified ports. Seasonal fishing conditions may make travel time to specified ports an issue of concern. But seller/buyer arrangements are likely the larger concern. A vessel may need to substantially revise its business plan if it must land in a port not previously used.

Without a predictive model, the analysis of requiring vessels to land in specified ports will be qualitative. Additionally, data confidentiality will limit a quantitative analysis. However, if certain ports are not suitable for portside sampling, then vessels may not be able to land in those ports on trips that are selected for portside sampling.

Table 94. Summary of Economic Impacts of Herring Coverage Target Alternatives

Alternatives	Impacts on Fishery Related-Businesses
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Herring Alternative 2: Coverage Target Specified For IFM Programs	• Negative impact associated with potential reduction in return to owner (RTO) • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional monitoring to reduce uncertainty around catch estimates in the herring fishery • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Magnitude of impacts associated with selection of Sub-Options
Herring Alternative 2.1: 100% NEFOP-Level Coverage on Category A and B Vessels	• Negative impact associated with potential 44.7%-11.5% reduction in RTO • Negative impact associated with potential 42.2%-5.8% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery

Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	• Negative impact associated with potential 38.9%-3.0% reduction in RTO • Negative impact associated with potential 36.7%-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	• Negative impact associated with potential 38.5%-3.0% reduction in RTO • Negative impact associated with potential 36.7%-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery
Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	• Negative impact associated with potential 29.1%*-6.9% reduction in RTO • Negative impact associated with potential 27.5%*-2.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the herring fishery
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Negative impact associated with potential 5.4%-1.0% reduction in RTO • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the Groundfish Closed Areas • Negligible impact associated with changes in fishing effort
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	• Negative impact associated with potential reduction in RTO • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the Groundfish Closed Areas • Negligible impact associated with changes in fishing effort
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Negative impact associated with potential 29.2%*-0.8%* reduction in RTO • Negative impact associated with potential 27.1%*-1.0%* reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and herring ACLs are not harvested • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the herring fishery
* Reflects RTO from Year 2	

The previous analysis of economic impacts of herring coverage target alternatives on the herring industry was based on trip cost data collected by NEFOP and showed the economic impact of the alternatives on partial vessel net revenues (gross revenues less certain trip costs). Because NEFOP only collects a limited amount of cost data, industry participants expressed concern that an analysis of net revenues underestimated vessel costs. In response, Jason Didden, staff of the MAFMC, offered to coordinate a survey of herring and mackerel vessels to collect more detailed cost information.

The survey requested information from vessel owners on total trip costs in 2014. The cost survey collected information on variable costs; payments to crew; the cost of repairs, maintenance, upgrades; and fixed costs. These data were used to update the impact analyses. To profile vessels, data were averaged across vessel types, by vessel characteristics, and by primary species caught. The cost profiles of vessels, as adjusted by the estimated industry cost responsibilities of each herring coverage target alternative, were used to describe the economic impact on herring vessels. Economic impacts are described at an annual level. Surveys were sent to approximately 18 vessel owners (representing about 26 vessels) in the herring and/or mackerel fisheries. Surveys were sent in May 2015 and information was submitted for 16 of the 26 vessels. A copy of the survey is included in Appendix 7.

Analysis of the economic impact of industry-funded monitoring herring coverage target alternatives on fishery-related businesses compared industry cost responsibilities to 2014 herring vessel returns-to owner (RTO). RTO is calculated by subtracting fixed and operational costs from gross revenue (Table 95) and was used rather than net revenues to more accurately reflect income from fishing trips. RTO is similar to net income from a financial income statement. Other financial statement approaches, such as a balance sheet or a cash flow statement, are not used. These approaches consider other financial aspects of a business, such as total assets and liabilities and the ability to cover expenses within a particular time frame. Principal payments on loans, which matter from a balance sheet and cash flow perspective, are not typically sued in the calculation of RTO/net income. Depreciation of capital assets is typically part of a RTO/net income calculation. In this analysis, depreciation of vessel improvements is included but the depreciation of the vessel is not included because that information was not collected in the survey.

TABLE 95. SUMMARY OF TOTAL TRIP COSTS FOR HERRING AND MACKEREL VESSELS IN 2014

Cost Category	Description	Average Percent of 2014 Gross Revenue for Herring and Mackerel Vessels	Average Percent of 2014 Gross Revenue for Squid Vessels
Variable Costs	Annual fuel, oil, food, water, ice, carrier vessel, communication, fishing supplies, crew supplies, and catch handling costs	25%	35%
Crew Share	Total annual payments to crew	28%	26%
Repair, Maintenance, Upgrades, Haulout (RMUH)	Annual cost of repairs to engines, deck equipment, machinery, hull, fishing gear, electronics, processing equipment, refrigeration, safety equipment, upgrades and haulout. Because these costs vary considerably from year to year and are typically spread out over several years, only a portion of these costs were applied to 2014 revenue	13%	11%
Fixed Costs	Annual mooring, dockage, permits and licenses, insurance, quota and DAS lease, crew benefits, vessel monitoring, workshop and storage, office, vehicle, travel, association, professional, interest, taxes, and non-crew labor costs Note: depreciation expense of the vessel is not included in fixed costs.	19%	21%
Return to Owner	Gross revenue less variable, crew share, RMUH, and fixed costs	15%	7%

The NEFMC is considering four types of industry-funded monitoring for the herring fishery, including NEFOP-level observers, at-sea monitors, EM, and portside sampling coverage. NEFOP-level and at-sea monitoring coverage would function independently, but EM and portside are intended to be used together.

Prior to any trip declared into the herring fishery, vessel representatives would be required contact NMFS and request monitoring coverage. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether monitoring coverage must be procured through an industry-funded monitoring service provider. For the purposes of this analysis, however, it is assumed that there would be no SBRM coverage of trips. Therefore, the economic impacts of industry-funded monitoring cost alternatives described in this section may be an overestimate of actual costs.

Summary of Economic Analyses

In general, the paired midwater trawl vessels have the highest monitoring costs as a percentage of RTO. This is because these vessels have, on average, more sea days declared into the herring fishery than other gear types. Therefore, midwater trawl vessels have more sea days that would be subject to monitoring costs than vessels that use other gear types.

There are differences across gear types regarding the sources of revenue that would be used to pay for monitoring costs. For example, for small mesh bottom trawl vessels, roughly half of their revenue is generated by participating in the herring fishery and the other half is generated by participating in other fisheries. This means that if small mesh bottom trawl vessels want to continue to declare herring trips, they may need to use revenue from other fisheries to pay the industry-funded monitoring costs associated with the herring fishery. A metric for considering different revenue sources across gear types is evaluating monitoring costs as a percent of herring revenue. For small mesh bottom trawl vessels, industry-funded monitoring costs as a percent of herring revenue are higher than for other gear types.

Another method for accounting for these differential impacts on small mesh bottom trawl vessels is to apportion the overall RTO to the different fisheries and then reduce the herring RTO by the monitoring cost. However, to properly apportion RTO to fisheries, much more detailed cost data is required. If data were available on a trip basis, costs that are specific to the fishery pursued on that trip could be assigned. Fuel is a good example of this type of cost. However, the trip related cost data used in the RTO analysis is at an annual level. Even with highly detailed cost information there are still costs that do not vary by trip, such as insurance costs. It is unclear in this instance what method should be used to apportion these costs. For these reasons, herring as a percentage of revenue, rather than herring RTO, is shown in the following tables to evaluate impacts on small mesh bottom trawl vessels.

Exempting trips that land less than 25 mt of herring (Herring Alternative 2 Sub-Option 5) from industry-funded monitoring costs reduces the monitoring cost substantially in many cases. The degree of saving varies by gear type. Using Alternative 2.1 as an example, aggregate NEFOP-level observer costs decline by 48% for purse seine vessels ($320k to $166k). For paired midwater trawl vessels, the percentage difference (20%; $673k to $541k) is not as great.

Selecting Herring Alternative 2.5 rather than Herring Alternative 2.1 reduces total industry monitoring costs from $811,000 to $75,000 – a 91% reduction. However, Herring Alternative 2.5 only provides increased monitoring in the Groundfish Closed Areas.

Initial industry cost assumptions for Herring Alternative 2.4 estimated $325 per sea day for electronic monitoring (cameras on every midwater trawl vessel, video collected for the duration of the trip, 100% vide review) and $5.12 per mt for portside sampling (administration and sampling cost) on close to 100% of trips. Revised industry cost assumptions for Herring Alternative 2.4 estimated $187 per sea day for electronic monitoring (cameras on every midwater trawl vessel, video collected around haulback, 50% video review) and $3.84 per mt for portside sampling (only sampling costs) on close to 50% of trips. Using the revised cost assumptions rather than the initial cost assumption for Herring Alternative 2.4 reduces total industry monitoring costs by 51% ($457,595 to $222,958) in Year 2 for paired midwater trawl vessels and reduces costs by 54% ($134,165 to $61,067) in Year 2 for single midwater trawl vessels.

Many of the vessels that would be impacted by industry-funded monitoring costs in the herring fishery would also be impacted by industry-funded monitoring costs in the mackerel fishery. For example, all the vessels impacted by Herring Alternative 2.1 would also be impacted by Mackerel Alternative 2.1.

A trip must be a declared herring trip in order to land 1 lb or more of herring. The economic analysis focused on trips that landed 1 lb or more of herring because those are the trips that would be subject to industry-funded monitoring. However, industry participants also requested consideration of the economic impacts associated with declared herring trips that did not land any herring.

In 2014, there were 121 sea days for 22 trips that had no herring landings. If 100% NEFOP-level observer coverage was required on those trips, then $98,978 would have been spent monitoring those trips. If 100% at-sea monitoring coverage was required on those trips, then $85,910 would have been spent monitoring those trips. The breakdowns of these costs by gear type as well as other coverage levels and monitoring types are provided in Table 96.

TABLE 96. MONITORING COSTS ASSOCIATED WITH DECLARED HERRING TRIPS THAT DID NOT LAND HERRING IN 2014.

	Small Mesh Bottom Trawl	Single Midwater Trawl	Paired Midwater Trawl	Total
Permit Category	A	A	A	
Total Number of Days	111	6	4	121
Total NEFOP Cost – 100% Coverage	$90,586	$5,217	$3,212	$99,015
Total ASM Cost –	$78,626	$4,528	$2,788	$85,943

100% Coverage				
Total ASM Cost – 75% Coverage	$58,970	$3,396	$2,091	$64,457
Total ASM Cost – 50% Coverage	$39,313	$2,264	$1,394	$42,971
Total ASM Cost – 25% Coverage	$19,657	$1,132	$697	$21,486
Total EM Cost, Year 2 – $325 per day		$2,073	$1,276	$3,349
Total EM Cost, Year 2 – $187 per day		$1,193	$734	$1,927

The tables and box plots on the following pages provide summarized economic data for each of the herring coverage target alternatives. The economic impact on vessels associated with paying for monitoring coverage is described as a percentage of RTO for each herring coverage target alternative in the following figures. The tables provide the mean and median number of sea days per vessel that would result from each of the alternatives, as well as the mean and median RTO that would ultimately be reduced by the industry-funded monitoring costs. Additionally, fleet level effort, revenue, and monitoring cost information for each herring coverage target alternative are also provided. Additional economic analysis is available in Appendix 8.

4.2.5.1 Impacts of Herring Alternatives 1 and 2 on Fishery-Related Businesses

Herring Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the Herring FMP. Monitoring for herring vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the herring fishery would be evaluated on a case-by-case basis. Under Herring Alternative 1, additional costs to vessels participating in the herring fishery associated with monitoring coverage, if there were any, would be evaluated on a case-by-case basis.

In recent years, observer coverage for the herring fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-by-FMP basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

Currently, the herring resource is not overfished, and overfishing is not occurring. Additionally, in recent years, the fleet has had the ability to fully harvest the stock-wide ACL and the sub-ACLs. Selection of Herring Alternative 1 will not likely affect the setting of herring harvest specifications but it may affect the ability of the herring fishery to fully harvest the ACLs if less monitoring (when compared to Herring Alternative 2) results in catch caps for haddock and river herring/shad limiting effort in the herring fishery.

Under Herring Alternative 2, the NEFMC would specify the details of an industry-funded monitoring program for the Herring FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Herring Alternative 2 is intended to allow for increased monitoring in the herring fishery by specifying coverage targets, above SBRM (Herring Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year and would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified coverage target (Herring Alternatives 2.1-2.7).

If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, Herring Alternative 2 may have both positive and negative economic impacts on vessels participating in the herring fishery.

Indirect positive impacts on herring vessels associated with Herring Alternative 2 may result from increased monitoring helping to reduce variability around catch and bycatch estimates in the herring fishery leading to additional harvesting opportunities. If increased monitoring reduces the variability in the catch of haddock and river herring and shad tracked against catch caps, herring vessels may be less likely to be constrained by catch caps and more likely to be able to fully harvest herring sub-ACLs.

Direct negative impacts on herring vessels associated with Herring Alternative 2 would likely result from reduced RTO after paying for monitoring coverage. The magnitude of the economic impact associated with paying for monitoring coverage would vary with herring coverage target alternative (Herring Alternatives 2.1-2.7). If increased monitoring results in fishery catch caps being harvested more often than expected, an indirect negative impact on herring vessels may that vessels are not able to fully harvest herring sub-ACLs. While the full extent of positive and negative impacts to herring vessels may be difficult to quantify under Herring Alternative 2, the impacts may not be realized under Herring Alternative 1.

If Federal funding is not available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, fishing effort may be reduced under Herring Alternative 2 to match available levels of monitoring coverage. If fishing effort is reduced to match available monitoring levels, herring vessels may not be able to fully harvest herring sub-ACLs. This direct negative economic impact associated with Herring Alternative 2 would be less likely to be realized under Herring Alternative 1.

Herring Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the NEFMC's intent to increase monitoring in the herring fishery, but would not prevent vessels from participating in the herring fishery if monitoring coverage was not available. Should the NEFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the herring fishery. Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the NEFMC to examine the results of any increased coverage in the herring fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the Herring FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of herring from industry-funded monitoring requirements.

If selection of the sub-options under Herring Alternative 2 minimizes the likelihood of positive or negative economic impacts on herring vessels, then the economic impacts associated with the sub-options may be reduced and/or similar to impacts under Herring Alternative 1. Additionally, under Herring Alternative 2, because the 25 mt threshold differs from the triggers used to determine which trips count against catch caps for haddock (1 lb of herring) and river herring and shad (6,600 lb of herring), the data generated by selecting Sub-Option 5 may bias (either higher or lower) the catch tracked against catch caps when compared to not selecting Sub-Option 5.

Both Herring Alternative 1 and Herring Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding. Because these measures apply to both Herring Alternatives 1 and 2, the cost of complying with these requirements may be similar under Herring Alternatives 1 and 2, unless monitoring coverage is substantially higher under Herring Alternative 2. In that case, the cost of complying with these requirements may be higher under Herring Alternative 2.

Impacts under Herring Alternative 2 assume that the future behavior of fishery participants will be similar to that in past years, when in reality fishery participants are likely to engage in a range of mitigation behaviors to reduce the economic impact associated with industry-funded monitoring. For example, vessels that have historically participated in many fisheries may stop fishing for herring and only participate in fisheries that do not have industry-funded monitoring requirements. However, if a vessel does not have the ability to participate in other fisheries, it may not be able to mitigate the impacts of industry-funded monitoring in that way. At this time, it is not possible to predict what, if any, mitigation behaviors may be used by herring fishery participants.

Coverage Target Alternatives

Herring Alternative 2 would specify a level and type of industry-funded monitoring for the herring fishery. The types of industry-funded monitoring considered by the NEFMC for the herring fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category. Monitoring requirements could apply across all herring management areas or to just midwater trawl vessels fishing in the Groundfish Closed Areas.

Under Herring Alternative 2, the amount, quality, and cost of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the herring fishery. Economic impacts on vessels participating in the herring fishery associated with specific coverage target alternatives (Herring Alternatives 2.1-2.7) are discussed in the following section.

Monitoring and Service Provider Requirements

Herring Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the herring fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in Herring Amendment 5.

Observers in the herring fishery are currently required to possess a HVF certification under Herring Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Herring Alternative 2. Herring vessels do not pay for observer training under Herring Alternative 1, but vessels would be responsible for additional observer and at-sea monitor training costs under Herring Alternative 2. Therefore, the economic impact on herring vessels of a HVF certification requirement under Herring Alternative 2 would be more negative than under Herring Alternative 1.

Under Herring Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

The direct economic impacts on herring vessels would be more negative under Herring Alternative 2 than under Herring Alternative 1 because vessels would be paying for additional monitoring coverage. To the extent that increased information on herring catch has indirect economic impacts on herring vessels under Herring Alternative 2, those indirect impacts may not be realized under Herring Alternative 1.

4.2.5.2 Impacts of Herring Coverage Target Alternatives 2.1- 2.7 on Fishery-Related Businesses

Herring Alternatives 2.1-2.7 are intended to allow for increased monitoring in the herring fishery by specifying coverage targets, above SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the herring fishery, Herring Alternative 2 may have both positive and negative economic impacts on vessels participating in the herring fishery.

While the positive and negative economic impacts on herring vessels may be difficult to quantify under Herring Alternatives 2.1-2.7, the impacts would be less likely to be realized under Herring Alternative 1.

The magnitude of positive and negative economic impacts on herring vessels is expected to vary with the monitoring coverage target specified and the realized coverage level in a given year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in that year and would fall somewhere between no additional coverage above SBRM (Herring Alternative 1) and the specified monitoring coverage target (Herring Alternatives 2.1-2.7).

Herring Alternatives 2.1-2.7 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated. Both the type of information collected and the amount of monitoring coverage will have a direct economic impact on vessels paying for monitoring coverage in the herring fishery.

Currently, vessel and dealer data are used to track retained catch of herring, haddock, and mackerel and SBRM observer data are used to track catch of river herring and shad as well as the discarded catch of herring, haddock, and mackerel. Additionally, vessel, SBRM observer data, and portside sampler data are used for stock assessments.

The herring fishery is managed with gear and area specific catch caps for haddock and river herring and shad. If a catch cap is harvested, effort in the fishery using that gear in that area is restricted. River herring and shad catch caps are in place for vessels using midwater trawl gear (Gulf of Maine, Cape Cod, and Southern New England catch caps) and small mesh bottom trawl gear (Southern New England catch cap), while the haddock catch cap is only specified for vessels using midwater trawl gear (Gulf of Maine and Georges Bank catch cap).

Herring Alternatives 2.1 would specify NEFOP-level observer coverage, Herring Alternatives 2.2 would specify at-sea monitor coverage, Herring Alternatives 2.3 and 2.7 would specify ASM coverage and/or EM and portside sampling coverage, and Herring Alternative 2.4 would specify EM and portside sampling coverage.

The industry cost responsibility associated with NEFOP-level observer coverage is the most expensive ($818 per sea day) followed by at-sea monitor coverage ($717 per sea day), and EM ($172-$325 per sea day) and portside sampling ($3.84-$5.12 per mt).

The following table describes the potential reduction to RTO associated with paying for monitoring coverage across herring coverage target alternatives. Shaded cells in the following table indicate when the potential reduction to RTO associated with paying for monitoring coverage exceeds 10%. Additional background and summary information can be found in the tables and box plots displayed starting on page 312.

Table 97. Potential Reduction to Return-To-Owner for Herring Coverage Target Alternatives.

Herring Coverage Target Alternatives										
Alternative	Gear Type	Paired MWT		Single MWT		Purse Seine		SMBT	
	Median potential reduction to RTO from coverage	≥1 lb	> 25 MT	≥1 lb	> 25 MT	≥1 lb	> 25 MT	≥1 lb	> 25 MT
2.1	100% NEFOP-level	44.7%	42.2%	24.4%	5.8%	13.9%	10.4%	11.5%	14.2%
2.2 and 2.3	100% ASM	38.9%	36.7%	21.3%	5.1%	12.1%	9.1%	10.0%	12.3%
	75% ASM	29.5%	28.2%	15.9%	3.8%	9.1%	6.8%	7.5%	9.4%
	50% ASM	20.4%	18.9%	10.5%	2.5%	6.0%	4.5%	5.4%	6.4%
	25% ASM	10.1%	9.6%	5.6%	1.4%	3.0%	2.2%	3.5%	3.8%
2.3 and 2.4	100% EM/PS Year 1	42.2%	40.1%	37.3%	19.5%	N/A		N/A	
	100% EM/PS Year 2	29.1%	27.5%	12.8%	4.9%				
	50% EM/PS Year 1	25.1%	24.2%	26.7%	16.9%				
	50% EM/PS Year 2	14.4%	13.3%	6.9%	2.4%				
2.5	100% NEFOP-level	5.4%	5.4%	1.0%	1.0%				
2.6	Potential Reduction to RTO would depend on which other Herring Alternative was selected (2.2-2.4 or 2.7)								
2.7	Potential Reduction to RTO would be the same as Herring Alternatives 2.2 and 2.3								
	100% EM/PS Year 1	42.3%	39.7%	38.1%	29.2%	19.4%	18.3%	21.0%	19.9%
	100% EM/PS Year 2	29.2%	27.1%	17.3%	6.2%	15.3%	14.1%	6.3%	8.8%
	75% EM/PS Year 1	25.6%	24.8%	27.6%	23.5%	13.0%	12.6%	16.8%	15.4%
	75% EM/PS Year 2	14.8%	13.7%	8.5%	3.3%	8.1%	7.6%	3.0%	4.3%
	50% EM/PS Year 1	19.8%	19.3%	23.7%	21.1%	10.5%	10.3%	14.3%	13.8%
	50% EM/PS Year 2	9.5%	8.8%	5.4%	2.1%	5.3%	4.9%	1.8%	2.7%
	25% EM/PS Year 1	14.4%	14.2%	20.0%	18.8%	8.2%	8.4%	13.3%	12.4%
	25% EM/PS Year 2	4.5%	4.2%	2.5%	1.0%	2.6%	2.4%	0.8%	1.3%

For EM/Portside Costs = Year 1 includes $15,000 for purchase and installation of EM equipment and Year 2 does not include the $15,000 purchase and installation costs.

In general, the negative economic impact on herring vessels of paying for monitoring coverage (as measures by the potential reduction in the RTO) is greatest with Herring Alternative 2.1. The scale of negative economic impact on vessels of paying for monitoring coverage associated with the other alternatives (Herring Alternatives 2.2-2.4 and 2.7) largely depends on the type of information collected and amount of coverage specified. Because paired midwater trawl vessels average more sea days than other gear types, paired midwater trawl vessels have a greater negative economic impact associated with paying for observer coverage, followed by purse seine, single midwater trawl, and small mesh bottom trawl vessels.

Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discards. EM cannot estimate the amount of discards, but EM can verify retention of catch.

Because discarding in the herring fishery is minimal, Alternatives that increase the amount of information on retained and discarded catch (Herring Alternatives 2.1, 2.2, 2.3, and 2.7) will likely have the same likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just retained catch (Herring Alternative 2.4). Increased monitoring of haddock and river herring and shad catch may help reduce variability in estimates of catch that is tracked against catch caps, when that variability may have otherwise led to effort restrictions in the herring fishery. Conversely, additional monitoring may illustrate higher than expected catch of haddock and river herring and shad, resulting in catch caps that are fully harvested earlier than expected and reduced opportunities to harvest herring. Increased information to help track catch against catch caps may help allow the herring fishery to fully harvest the ACLs or it may curtail the harvest of herring by the herring fishery.

Herring Alternative 2.1 specifies monitoring coverage at 100% while Herring Alternatives 2.2-2.4 and 2.7 allow monitoring coverage to range between 25% and 100%. The economic impact on herring vessels of paying for higher levels of monitoring coverage would be more negative than paying for lower levels of monitoring. Therefore, alternatives that specify higher coverage rates may have a more negative direct impact on herring vessels paying for monitoring coverage than alternatives with lower coverage rates.

While high levels of monitoring are not always necessary to address a monitoring goal, because the NEFMC is interested in increasing monitoring to improve the accuracy of catch estimates, in particular the ability to track catch against catch caps, more monitoring could be more effective than less monitoring. Additionally, because the catch of river herring and shad is highly variable, both spatially and temporally, increased monitoring for those species may be more effective than less monitoring. To the extent that increased monitoring helps reduce the variability of data tracked against catch caps and helps increase the likelihood that vessels can fully harvest herring sub-ACLs, specifying a higher coverage target may have more indirect positive economic impacts on herring vessels than specifying a lower coverage target.

A CV analysis of Herring Alternatives 2.1 and 2.2 was used simulate the precision associated with tracking catch against catch caps. For the GB Haddock Catch Cap, coverage targets of 25% and higher would have generated CVs less than 30%. For the RHS SNE catch caps, coverage targets of 25% and higher would generated CVs less than 30%. For the RHS GOM and CC catch caps, coverage targets of 50% and higher would generate CVs around 30% and lower. Based on this analysis, coverage targets of 50%, and often times even 25%, would generate CVs on the catch tracked against catch caps of 30% or lower.

Herring Alternatives 2.1, 2.2, and 2.7 would allocate monitoring coverage by vessel permit category (i.e., Category A and B herring permits), Herring Alternative 2.4 would allocate monitoring coverage by fishing fleet (i.e., midwater trawl fleet), and Herring Alternatives 2.3 would allocate monitoring coverage by permit category and fishing fleet. The extent to which the allocation of industry-funded coverage is consistent SBRM fishing fleet will determine how the resulting data can be used. The additional information on catch and bycatch estimates in the herring fishery obtained via Herring Alternatives 2.1, 2.2, and 2.3 (ASM data), and 2.7 (ASM data) could be used for tracking catch against ACLs and catch caps, but it is unlikely that those data could be used to estimate discards for stock assessments. Additional data on catch estimates in herring fishery obtained via Herring Alternatives 2.3 and 2.7 (EM and portside sampling data) and 2.4 could also be used for catch monitoring. Any indirect economic benefits for herring vessels related to data utility would be similar across alternatives.

The coverage targets for NEFOP-level observer and at-sea monitoring coverage would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for herring vessels (e.g., 15%) combined with industry-funded monitoring (e.g., 85%) to reach a 100% target coverage level. In contrast, the coverage targets for both EM and portside sampling would be calculated independent of and in addition SBRM coverage. For example, to reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Alternatives that specify NEFOP-level observer or at-sea monitoring coverage may have less of a direct negative economic impact on herring vessels than alternatives that specify EM or portside sampling coverage, even if the same coverage target is selected, because vessels would not be paying for the SBRM coverage.

The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Herring Alternatives 2.1-2.4 and 2.7 specify that the vessels would be prohibited from participating in the herring fishery on that trip. The selection of Herring Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the herring fishery, even if monitoring coverage is not available. Should fishing effort be limited by the availability of monitoring coverage, such that the herring sub-ACLs in a given year are not harvested, there is the potential for additional negative economic impacts on herring vessels. The selection of Herring Alternative 2 - Sub-Option 1 would enable monitoring coverage requirements to be waived on a specific trip, allowing a vessel to continue participating in the herring fishery, even if monitoring coverage is not available.

Herring Alternative 2.5 specifies that midwater trawl vessels fishing in the Groundfish Closed Areas must carry a NEFOP-level observer while Herring Alternative 2.6 would specify that coverage for midwater trawl vessels fishing in Groundfish Closed Areas matches the coverage target recommend by the NEFMC for the rest of the fishery. The Herring Alternative 2 Sub-Options would apply to Herring Alternative 2.6 but not to Herring Alternative 2.5.

Even though Herring Alternative 2.5 would not allow coverage requirements to be waived (Sub-Option 1) for a trip inside the Groundfish Closed Areas, it is unlikely that monitoring availability would reduce fishing effort such that the herring ACLs are not able to be harvested. If the benefits associated with increased monitoring and/or the negative economic impacts of paying for monitoring coverage associated with Herring Alternative 2.6 are reduced or minimized by the selection of any of the sub-options, then the benefits of increased monitoring and/or negative economic impacts associated with paying for monitoring coverage may be less under Herring Alternative 2.6 than under Herring Alternative 2.5.

During 2005-2010, less than 10% of the herring effort, less than 12% of the herring harvest, and less than 13% of the herring revenue for the midwater trawl fleet came from inside the Groundfish Closed Areas. Additionally, herring catch accounted for almost 100% of the revenue generated by the midwater trawl fleet. Haddock is the only non-target species of interest that is typically harvested by midwater vessels inside the Groundfish Closed Areas. The haddock catch by midwater trawl vessels inside Groundfish Closed Areas is tracked against the haddock catch caps and haddock ACL. The magnitude of potential reduction to RTO associated with Herring Alternative 2.5 is much less than under Herring Alternatives 2.1-2.4 and 2.7 because of the limited amount of time the midwater trawl fleet spends inside the Groundfish Closed Areas. The benefits of increased monitoring to herring vessels associated with Herring Alternative 2.5 would be similar to other alternatives that specify NEFOP-level observer coverage (Herring 2.1) and allocate monitoring coverage by midwater trawl fleet (Herring Alternatives 2.3-2.4) or permit category (Herring Alternatives 2.2 and 2.7). However, the magnitude of those benefits would be less than Herring Alternatives 2.1-2.4 and 2.7 because increased monitoring would be focused on effort in the Groundfish Closed Areas and not across all herring management areas.

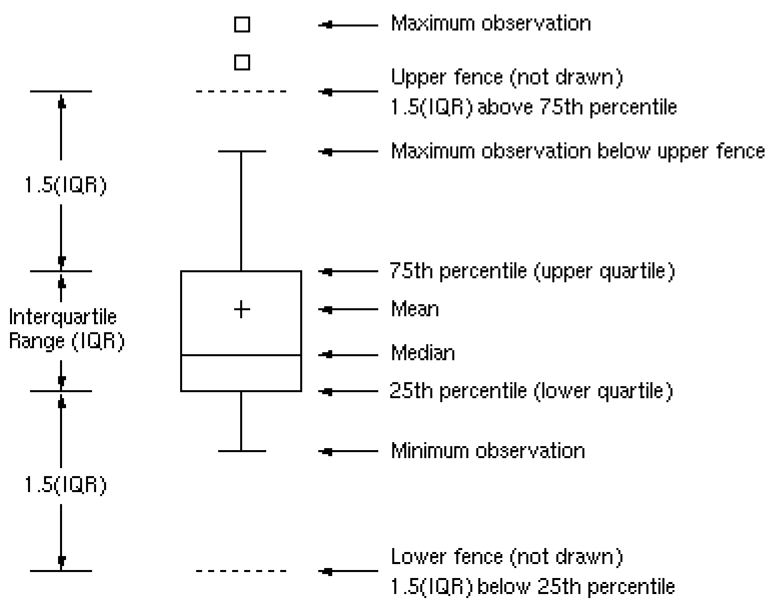
Herring Alternative 2.6 specifies that industry-funded monitoring requirements inside Groundfish Closed Areas would match monitoring requirements for the general herring fishery. Therefore, the economic impacts, both positive and negative, associated with Herring Alternative 2.6 have already been accounted for in Herring Alternatives 2.1-2.4 and 2.7. The magnitude of economic impacts associated with Herring Alternative 2.6 is expected to be similar to the magnitude of impacts associated with Herring Alternative 2.5.

Indirect positive impacts on herring vessels associated with Herring Alternative 2 may result from increased monitoring helping to reduce variability around catch and bycatch estimates in the herring fishery leading to additional harvesting opportunities. If increased monitoring reduces the variability in the catch of haddock and river herring and shad tracked against catch caps, herring vessels may be less likely to be constrained by catch caps and more likely to be able to fully harvest herring sub-ACLs.

Direct negative impacts on herring vessels associated with Herring Alternative 2 would likely result from reduced RTO after paying for monitoring coverage. The magnitude of the economic impact associated with paying for monitoring coverage would vary with herring coverage target alternative (Herring Alternatives 2.1-2.7). If increased monitoring results in fishery catch caps being harvested more often than expected, an indirect negative impact on herring vessels may be that vessels are not able to fully harvest herring sub-ACLs. While the full extent of positive and negative impacts to herring vessels may be difficult to quantify under Herring Alternative 2, the impacts may not be realized under Herring Alternative 1.

In summary, the direct economic impacts on herring vessels associated with Herring Alternatives 2.1-2.7 are negative. Impacts result from reductions in RTO related to paying for monitoring coverage and possible reductions in fishing effort to match monitoring availability and would vary in magnitude by alternative. Indirect economic impacts on herring vessels result from increased monitoring and relate to whether or not vessels would be able to fully harvest the herring ACL. An indirect positive impact would result if increased monitoring decreases the uncertainty around catch estimates tracked against catch caps such that vessels would be more likely to be able to fully harvest the herring ACL without being constrained by catch caps. An indirect negative impact would result if increased monitoring shows higher than expected catch of haddock, river herring, and shad such that vessels would be less likely to be able to fully harvest the herring ACL because they were constrained by catch caps.

The following box plots show of the distribution of monitoring costs and the distribution of monitoring costs as a percent of a vessel's RTO. Box plots are a useful tool to show how data are distributed. The following schematic shows what the various pieces of a box plot show regarding the distribution of data.



When examining the box plots, it is important to note the differences between mean and median values by gear type and by alternatives, as well as the differences in the variability of values by these criteria. For example, in the first figure (Herring Alternative 2.1) there is a much wider range of costs for purse seine vessels than small mesh bottom trawl vessels, as represented by the length of the rectangle. Further, the difference between alternatives for purse seine vessels shows that the mean and median values are lower under the 25 mt threshold (Sub-Option 5) but also that the likely range of NEFOP costs are much narrower.

Table 98. Herring Alternatives 2.1, 2.2, 2.3, 2.7 (purse seine and SMBT) – Annual Average Per Vessel Summary

	Paired MWT		Purse Seine		Single MWT		SMBT	
	> 1 lb	> 25 mt	> 1 lb	> 25 mt	> 1 lb	> 25 mt	> 1 lb	> 25 mt
Mean RTO	$163,080		$241,180		$141,169		$144,125	$163,329
Median RTO	$159,529		$253,048		$60,156		$121,026	$135,782
Mean Sea Days (100%)	103	83	56	29	28	19	21	20
Median Sea Days (100%)	104	84	57	26	23	16	17	15
Mean Sea Days (75%)	77	62	42	22	21	15	17	15
Median Sea Days (75%)	77	63	43	20	18	12	13	11
Mean Sea Days (50%)	52	42	28	15	14	10	12	10
Median Sea Days (50%)	51	42	29	13	12	8	9	8
Mean Sea Days (25%)	26	21	14	8	8	6	8	7
Median Sea Days (25%)	26	21	14	7	7	5	6	6

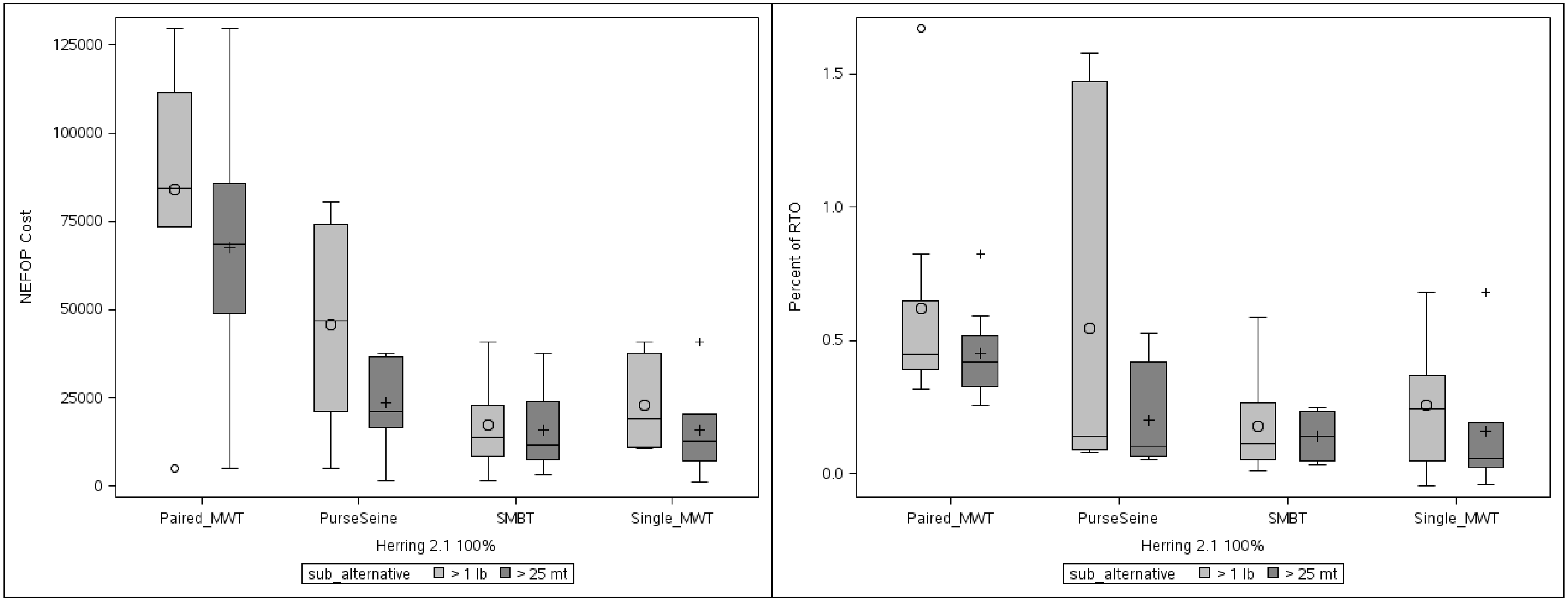


FIGURE 12. HERRING ALTERNATIVE 2.1 100% NEFOP COST AND PERCENT OF RTO

Figure 12 describes the approximate costs that applicable vessels with various gear types would incur annually from Herring Alternative 2.1, which would require 100% coverage by NEFOP-level observers on Category A and B vessels (includes vessels that use midwater trawl, small-mesh bottom trawl, and purse seine gear). The NEFMC included thresholds of >1 lb (light grey) or > 25 mt (55,115 pounds) (darker grey) for trips that would require monitoring – a 25 mt threshold would reduce the number of trips that had to be monitored and thus reduce costs.

Since this type of figure is used often in this document, additional detail on how to interpret the figure is provided to serve as a guide for interpreting other similar figures. All costs are based on the fleets operating as they did in 2014, and are derived from the number of days that they fished in 2014 on trips when they landed either 1 lb of herring or 25 mt of herring (the two thresholds being considered that would trigger monitoring). The line in the bar is the median (half of vessels would have higher or lower costs than the median cost) and the "o" or "+" within the bar shows the mean (average). Where the mean and median do not align there is some degree of skewedness to the data (generally if the mean is higher than the median there are a few unusually high values and if the median is higher than the mean there are a few unusually low values). When the median and mean are substantially different the median is more illustrative of the typical monitoring costs for vessels, so the median is the focus of this analysis.

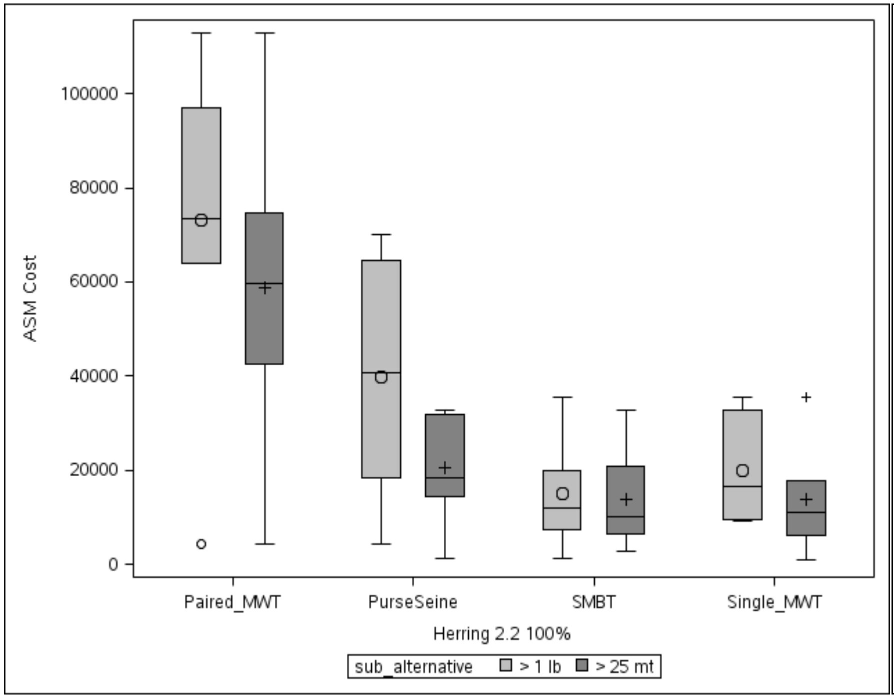
The shaded bars show where 50% of the data are (the "interquartile range") and the whiskers show the range of values that lie within 1.5 times the interquartile percentile range. Together, the bars and whiskers illustrate whether the data are tightly grouped or highly variable (here highly variable would mean that some vessels would have high costs and some vessels would have low costs). An "o" or "+" outside the whiskers shows an extreme outlier. For example, there is a low outlier data point with the costs for paired midwater trawl vessels at a 1-lb threshold for monitoring.

For Herring Alternative 2.1, due to the higher number of trips that landed herring, paired midwater trawl vessels are most impacted, followed by purse seine. Single midwater trawl and small mesh bottom trawl vessels are least impacted. Median costs for the gear types at the 1 lb of herring threshold (light grey bars) would have been approximately $85,000 for paired midwater trawl vessels, $47,000 for purse seine vessels, $14,000 for small mesh bottom trawl vessels, and $19,000 for single midwater trawl vessels. Recall the median is the point at which half of the vessels would pay more and half would pay less than that amount, and that wide bars and long whiskers indicate a wider range of costs/impacts across vessels.

Costs are generally lower when a 25 mt threshold is used since not as many trips trigger a monitoring requirement. For the analysis of the 25mt threshold, some vessels had no qualifying trips and drop out of the analysis, so even if the medians/averages stay similar the total fleet costs may still substantially decline. If a 25 mt threshold is used (darker grey bars), median costs are approximately $69,000 for paired midwater trawl vessels, $21,000 for purse seine vessels, $12,000 for small mesh bottom trawl vessels, and $13,000 for single midwater trawl vessels.

Percent of RTO at the 1 lb threshold is most impacted for paired midwater trawl vessels, followed by single midwater trawl vessels, and then purse seine and small mesh bottom trawl. For the 1-lb threshold, RTO for paired midwater trawl vessels is 44.7%, while RTO for single midwater trawl vessels is 24.4%. Purse seine and small mesh bottom trawl vessel RTO is about 12-14%. At the 25 mt threshold, RTO for paired midwater trawl vessels is 42.2%, while the RTO for single midwater trawl, small mesh bottom trawl, and purse seine vessels is less than 15%. Purse seine vessel RTO (especially at the 1-lb threshold) displayed a high level of variance and also skewed very high, indicating that a portion of vessels face substantially higher impacts to RTO.

Additionally, since vessels would have to declare their intent to fish for herring and the monitoring would be triggered based on that declaration of intent, costs may be higher if vessels want the option to fish for herring on more days than they actually caught herring in 2014.



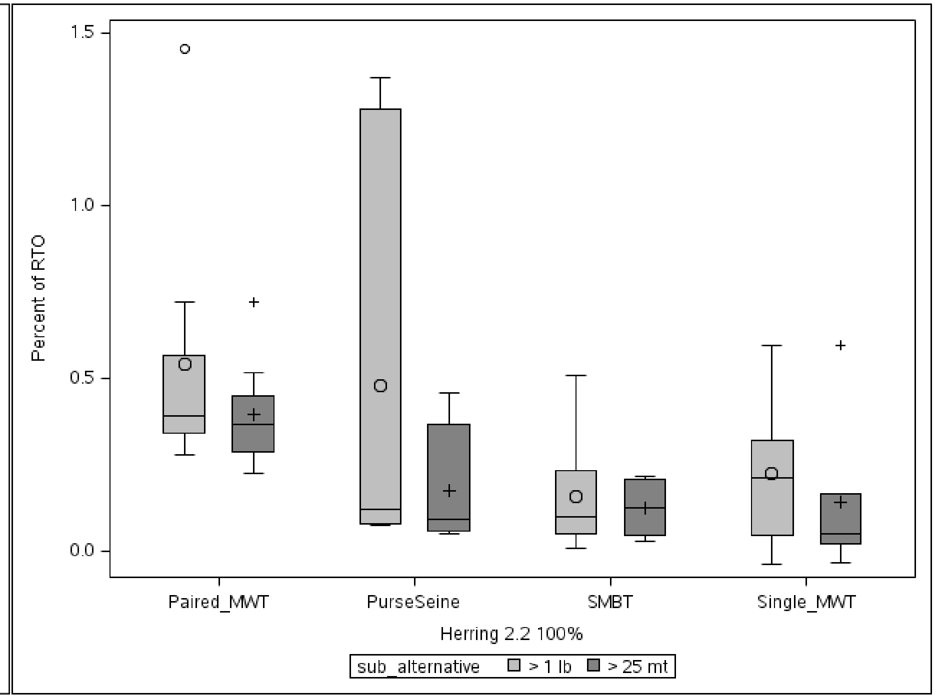


Figure 13. Herring Alternative 2.2 100% ASM Cost and Percent of RTO

Due to the higher number of trips that landed herring, paired midwater trawl vessels are most impacted, followed by purse seine vessels. Single midwater trawl and small mesh bottom trawl vessels are least impacted. Median costs for the gear types at the 1 lb of herring threshold (light grey bars) are $73,000 for paired midwater trawl vessels, $41,000 for purse seine vessels, $12,000 for small mesh bottom trawl vessels, and $17,000 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $60,000 for paired midwater trawl vessels, $18,000 for purse seine vessels, $10,000 for small mesh bottom trawl vessels, and $11,000 for single midwater trawl vessels.

Percent of RTO at the 1 lb threshold is most impacted for paired midwater trawl vessels, followed by single midwater trawl vessels, and then purse seine and small mesh bottom trawl vessels. For the 1-lb threshold, RTO for paired midwater trawl vessels is 38.9%, while RTO for single midwater trawl vessels is 21.3%. Purse seine and small mesh bottom trawl vessel RTO is about 10-12%. At the 25 mt threshold, RTO for paired midwater trawl vessels is 36.7% and 12.3% for small mesh bottom trawl vessels. RTO for single midwater trawl and purse seine vessels is less than 10%. Purse seine vessel RTO (especially at the 1-lb threshold) displayed a high level of variance and also skewed very high, indicating that a portion of vessels face substantially higher impacts to RTO.

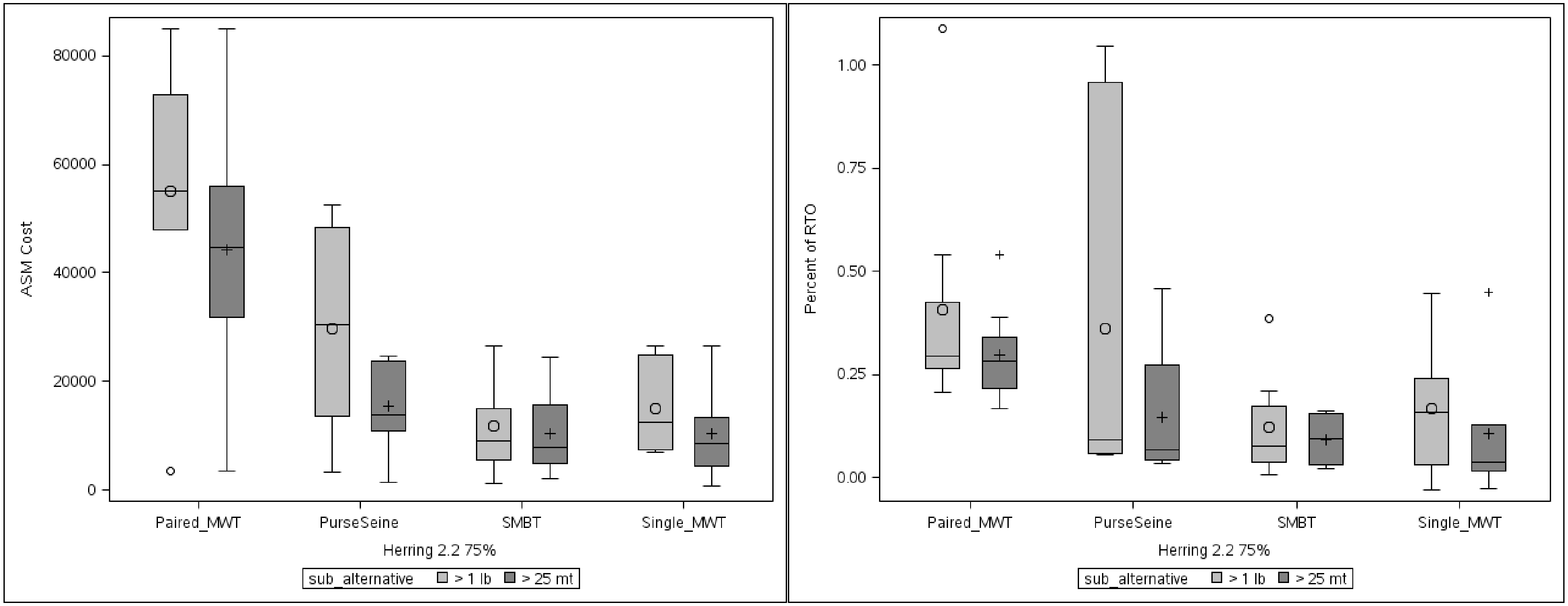


FIGURE 14. HERRING ALTERNATIVE 2.2 75% ASM COST AND PERCENT OF RTO

At 75% ASM coverage, paired midwater trawl vessels are most impacted, followed by purse seine vessels. Single midwater trawl and small mesh bottom trawl vessels are least impacted. Median costs for the gear types at the 1 lb of herring threshold (light grey bars) are $55,000 for paired midwater trawl vessels, $31,000 for purse seine vessels, $9,000 for small mesh bottom trawl vessels, and $12,000 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $45,000 for paired midwater trawl vessels, $14,000 for purse seine vessels, $8,000 for small mesh bottom trawl vessels, and $8,000 for single midwater trawl vessels.

Percent of RTO at the 1 lb threshold is most impacted for paired midwater trawl vessels, followed by single midwater trawl vessels, and then purse seine and small mesh bottom trawl vessels. For the 1 lb threshold, RTO for paired midwater trawl vessels is 29.7%, while RTO for single midwater trawl vessels is 15.9%. Purse seine vessel and small mesh bottom trawl vessel RTO are less than 10%. At the 25 mt threshold, RTO for paired midwater trawl vessels is 28.2 %, while RTO for single midwater trawl, small mesh bottom trawl, and purse seine vessels is less than 10%. Purse seine vessel RTO (especially at the 1 lb threshold) displayed a high level of variance and also skewed very high, indicating that a portion of vessels face substantially higher impacts to RTO.

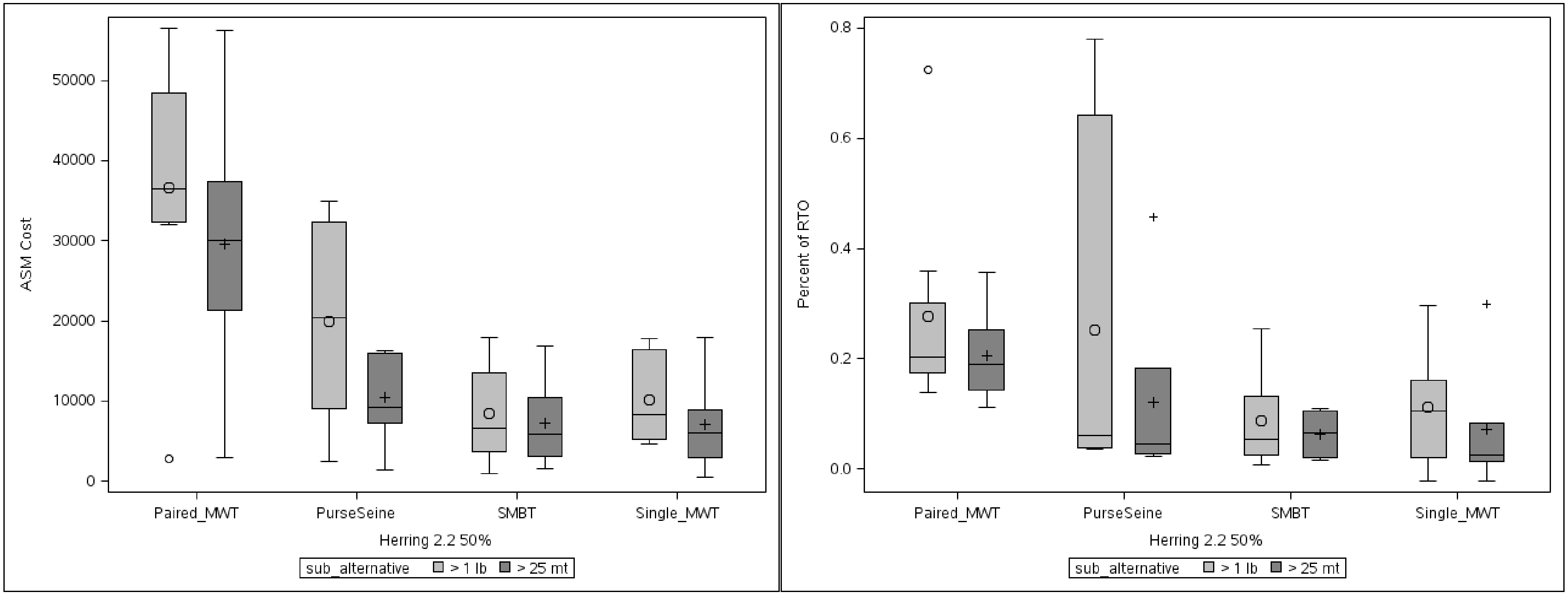


Figure 15. Herring Alternative 2.2 50% ASM Cost and Percent of RTO

At 50% ASM coverage, paired midwater trawl vessels are most impacted, followed by purse seine vessels. Single midwater trawl and small mesh bottom trawl vessels are least impacted. Median costs for the gear types at the 1 lb of herring threshold (light grey bars) are $36,000 for paired midwater trawl vessels, $20,000 for purse seine vessels, $7,000 for small mesh bottom trawl vessels and $8,000 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $30,000 for paired midwater trawl vessels, $9,000 for purse seine vessels, $6,000 for small mesh bottom trawl vessels, and $6,000 for single midwater trawl vessels.

Percent of RTO at the 1 lb threshold is most impacted for paired midwater trawl vessels, followed by single midwater vessels, and then purse seine and small mesh bottom trawl vessels. For the 1lb threshold, RTO for paired midwater trawl vessels is 20.4%, while RTO for single midwater trawl vessels is 10.5%. Purse seine and small mesh bottom trawl vessels RTO is less than 6%. At the 25 mt threshold, RTO for paired midwater trawl vessels is approximately 18.9%, while RTO for single midwater trawl, small mesh bottom trawl, and purse seine vessels is less than 7%. Purse seine vessel RTO (especially at the 1 lb threshold) displayed a high level of variance and also skewed very high, indicating that a portion of vessels face substantially higher impacts to RTO.

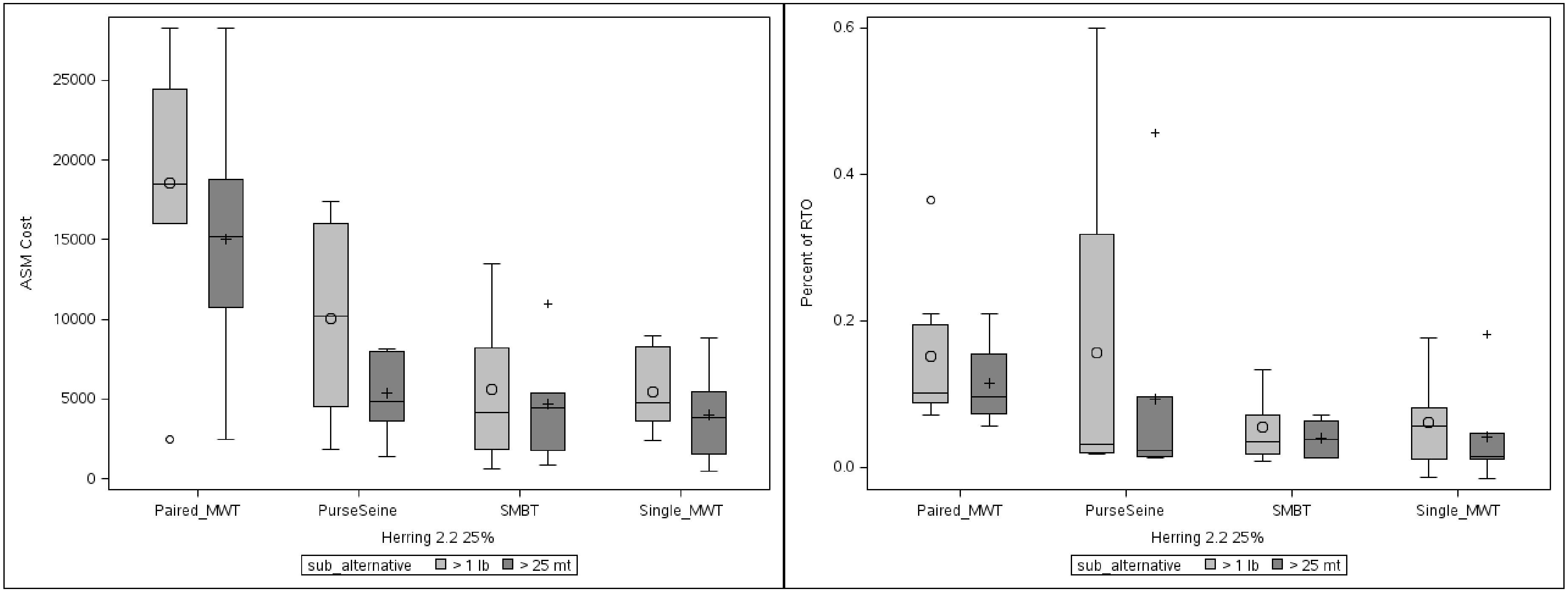


Figure 16. Herring Alternative 2.2 25% ASM Cost and Percent of RTO

At 25% ASM coverage, paired midwater trawl vessels are most impacted, followed by purse seine vessels. Single midwater trawl and small mesh bottom trawl vessels are least impacted. Median costs for the gear types at the 1 lb of herring threshold (light grey bars) are $19,000 for paired midwater trawl vessels, $10,000 for purse seine vessels, $4,000 for small mesh bottom trawl vessels, and $5,000 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $15,000 for paired midwater trawl vessels, $5,000 for purse seine vessels, $4,000 for small mesh bottom trawl vessels, and $4,000 for single midwater trawl vessels.

Percent of RTO at the 1 lb threshold is most impacted for paired midwater trawl vessels, followed by single midwater trawl vessels, and then purse seine and small mesh bottom trawl vessels. For the 1 lb threshold, RTO for paired midwater trawl vessels is 10.1%, while RTO for single midwater trawl vessels is 5.6%. Purse seine and small mesh bottom trawl vessel RTO is less than 4%. At the 25 mt threshold, RTO for paired midwater trawl vessels is 9.6%, while RTO for single midwater trawl, small mesh bottom trawl, and purse seine vessels is less than 4%. Purse seine vessel RTO (especially at the 1 lb threshold) displayed a high level of variance and also skewed very high, indicating that a portion of vessels face substantially higher impacts to RTO.

Note: The box plots for purse seine and small mesh bottom trawl vessels shown in Figures 13-16 under Herring Alternative 2.2 also describe the distribution of values for Herring Alternative 2.3.

Table 99. Herring Alternatives 2.1, 2.2, 2.3 (purse seine and SMBT) – Annual Fleet Summary

Fleet Level	Paired MWT ≥ 1 LB	Paired MWT > 25 MT	Single MWT ≥ 1 LB	Single MWT > 25 MT	Purse Seine ≥ 1 LB	Purse Seine > 25 MT	SMBT ≥ 1 LB	SMBT > 25 MT
Number of Vessels	8	8	6	6	7	7	9	6
Days at Sea	825	663	170	116	392	204	192	117
Total NEFOP Cost (2.1)	$673k	$541k	$138k	$95k	$320k	$166k	$156k	$96k
Total ASM Cost (2.2)	$586k	$471k	$120k	$82k	$278k	$145k	$136k	$83k
Total Revenue	$10.6M	$9.8M	$4.5M	$4.2M	$11.0M	$10.3M	$2.6M	$1.8M
% Revenue Herring	89%	93%	86%		100%		58%	78%
% Revenue Mackerel	11%	7%	13%		-		3%	2%
% Revenue Squid	-		-		-		20%	10%
Data shown by trips harvesting ≥ 1 lb of herring and > 25 mt of herring								

Table 100. Herring Alternatives 2.3 and 2.4 – Annual Average Per Midwater Trawl Vessel Summary

	Paired MWT		Single MWT	
	> 1 lb	> 25 mt	> 1 lb	> 25 mt
Mean RTO	$163,080		$134,205	$149,714
Median RTO	$159,529		$60,156	$80,070
Mean EM Days (100%)	103	83	22	17
Median EM Days (100%)	104	84	18	13

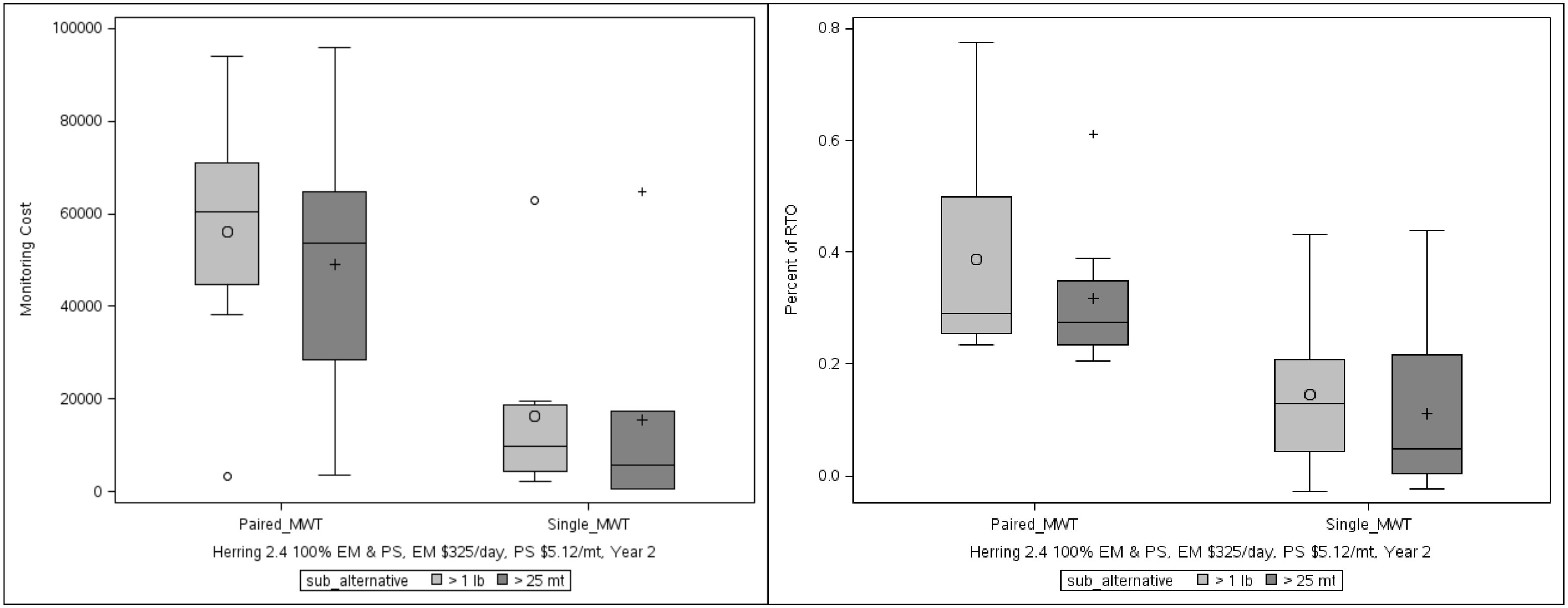


Figure 17. Herring Alternative 2.4 100% EM and Portside Cost and Percent of RTO

100% EM and portside monitoring costs are substantially higher for paired midwater trawl vessels than for single midwater trawl vessels at both the 1 lb threshold and the 25 mt threshold. Median costs for the gear types at the 1 lb threshold (light grey bars) is $60,000 for paired midwater trawl vessels and $10,000 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $54,000 for paired midwater trawl vessels and $6,000 for small mesh bottom trawl and single midwater trawl vessels.

Percent of RTO for paired midwater trawl vessels is substantially greater than for single midwater trawl vessels at both the 1 lb and 25 mt thresholds. For the 1 pound threshold, RTO for paired midwater trawl vessels is 29.1%, while RTO for single midwater trawl vessels is 12.8%. At the 25 mt threshold, RTO for paired midwater trawl vessels is 27.5%, while RTO for single midwater trawl vessels is 4.9%.

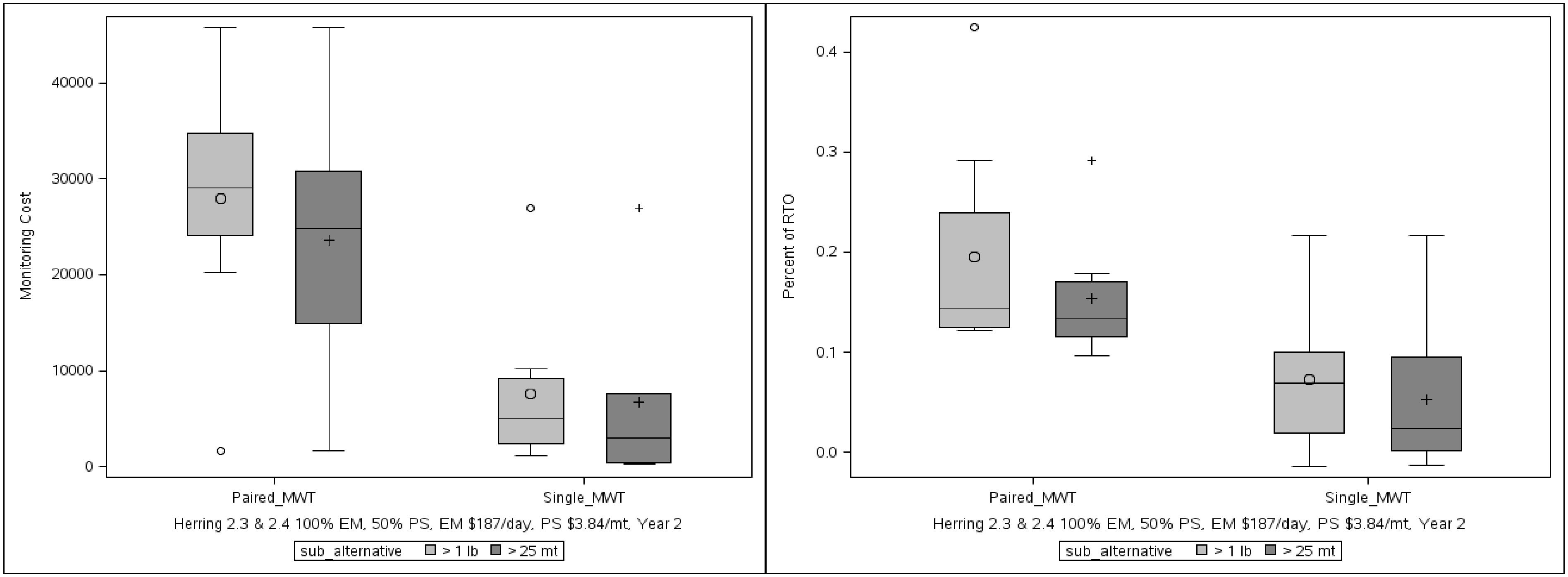


FIGURE 18. HERRING ALTERNATIVE 2.4 50% EM AND PORTSIDE COST AND PERCENT OF RTO

50% EM and portside monitoring costs are substantially higher for paired midwater trawl vessels than for single midwater trawl vessels at both the 1 lb threshold and the 25 mt threshold. Median costs for the gear types at the 1 lb threshold (light grey bars) is $29,000 for paired midwater trawl vessels and $5,000 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $25,000 for paired midwater trawl vessels and $3,000 for small mesh bottom trawl and single midwater trawl vessels.

Percent of RTO for paired midwater trawl vessels is substantially greater than for single midwater trawl vessels at both the 1 lb and 25 mt thresholds. For the 1 lb threshold, RTO for paired midwater trawl vessels is 14.4%, while RTO for single midwater trawl vessels is 6.9%. At the 25 mt threshold, RTO for paired midwater trawl vessels is 13.3%, while RTO for single midwater trawl vessels is 2.4%.

TABLE 101. HERRING ALTERNATIVES 2.3 AND 2.4 – ANNUAL MIDWATER TRAWL FLEET SUMMARY

Fleet Level	Paired MWT ≥ 1 LB	Paired MWT > 25 MT	Single MWT ≥ 1 LB	Single MWT > 25 MT
Number of Vessels	8	8	8	7
Days at Sea	825	663	180	117
Total Monitoring Cost (100% EM at $325/day, 100% PS at $5.12/mt, year 2)	$457,595	$393,117	$134,165	$107,580
Total Monitoring Cost (100% EM at $187/day, 50% PS at $3.84/mt, year 2)	$222,958	$188,376	$61,067	$47,083
Total Revenue	$10.6M	$9.8M	$4.5M	$4.2M
% Revenue Herring	89%	93%	86%	86%
% Revenue Mackerel	11%	7%	13%	14%
% Revenue Squid	-		-	
Data shown by trips harvesting ≥ 1 lb of herring and > 25 mt of herring				

Table 102. Herring Alternative 2.5 – Annual Average Per Midwater Trawl Vessel Summary

	Paired MWT		Single MWT	
	> 1 lb	> 25 mt	> 1 lb	> 25 mt
Mean RTO	$172,922		$545,609	
Median RTO	$159,529		$545,609	
Mean Sea Days	14	9	4	4
Median Sea Days	11	9	4	4

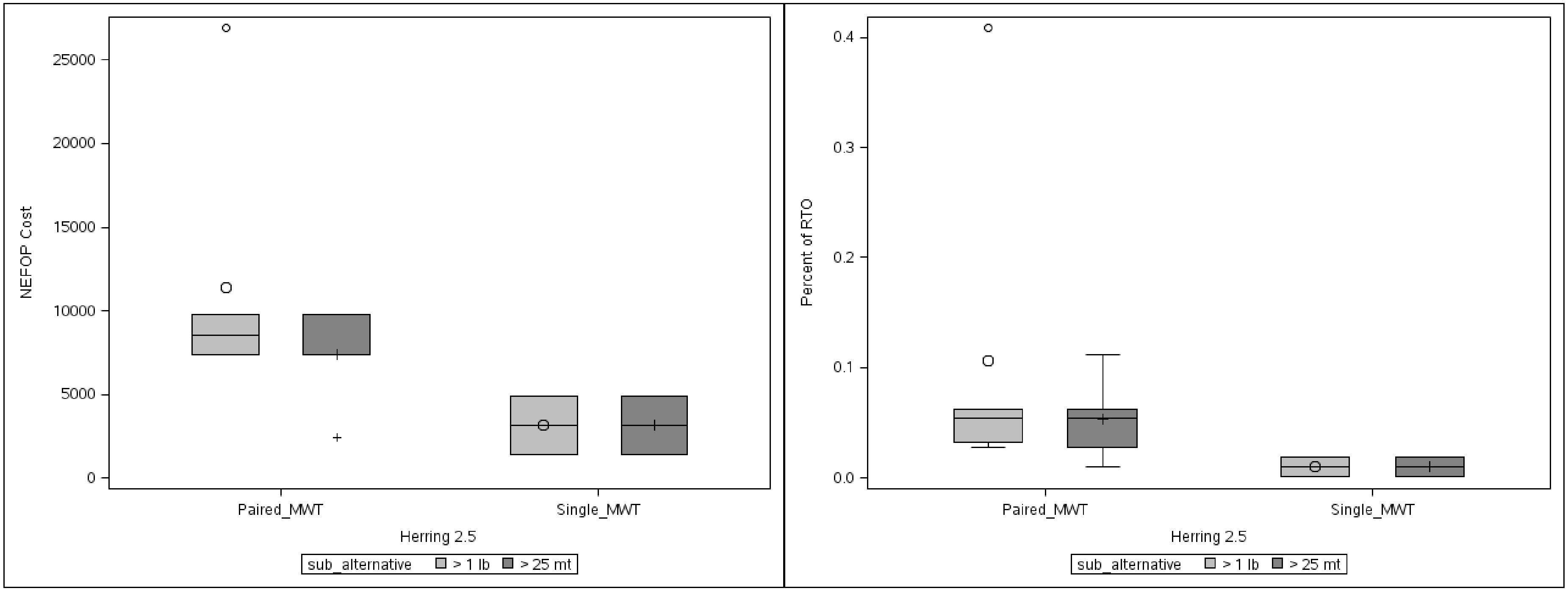


FIGURE 19. HERRING ALTERNATIVE 2.5 100% NEFOP FOR MIDWATER TRAWL VESSELS IN GROUNDFISH CLOSED AREAS COST AND PERCENT OF RTO

Monitoring costs 100% NEFOP for midwater trawl vessels in Groundfish Closed Areas are substantially higher for paired midwater trawl vessels than for single midwater trawl vessels at both the 1 lb threshold and the 25 mt threshold. Median costs for the gear types at the 1 lb threshold (light grey bars) is $9,000 for paired midwater trawl vessels and $3,000 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $7,000 for paired midwater trawl vessels and $3,000 for small mesh bottom trawl and single midwater trawl vessels.

Percent of RTO for paired midwater trawl vessels is substantially greater than for single midwater trawl vessels at both the 1 lb and 25 mt thresholds. For both the 1 lb and the 25 mt thresholds, RTO for paired midwater trawl vessels is 5.4%, while RTO for single midwater trawl vessels is 1.0%.

Table 103. Herring Alternative 2.5 – Annual Midwater Trawl Fleet Summary

Fleet Level	Single and Paired MWT ≥ 1 LB	Single and Paired MWT > 25 MT
Number of Vessels	8	8
Days at Sea	92	62
Total NEFOP Cost	$74,827	$50,347
Total Revenue	$1.4M	$1.4M
% Revenue Herring	99.9%	100%
% Revenue Mackerel	-	-
% Revenue Squid	-	-
% Other Species	0.1%	0%
Data shown by trips harvesting ≥ 1 lb of herring and > 25 mt of herring		

Economic and effort data for Herring Alternative 2.6 is included in tables for Herring Alternatives 2.1-2.4.

Table 104. Herring Alternative 2.7 – Annual Fleet Summary

Fleet Level	Paired MWT ≥ 1 LB	Paired MWT > 25 MT	Single MWT ≥ 1 LB	Single MWT > 25 MT	Purse Seine ≥ 1 LB	Purse Seine > 25 MT	SMBT ≥ 1 LB	SMBT > 25 MT
Number of Vessels	8	8	6	6	7	7	9	6
Days at Sea	825	663	170	116	392	204	192	117
Total EM & PS Costs, year 2 (100% EM and PS. EM at $325/day. PS at $5.12/mt)	$451k	$387k	$128k	$105k	$293k	$220k	$88k	$59k
Total EM & PS Costs, year 2	$228k	$197k	$65k	$55k	$152k	$118k	$43k	$29k

(75% EM and PS. EM at $202/day. PS at $3.84/mt)								
Total EM & PS Costs, year 2 (50% EM and PS. EM at $187/day. PS at $3.84/mt)	$146k	$126k	$43k	$36k	$99k	$77k	$27k	$19k
Total EM & PS Costs, year 2 (25% EM and PS. EM at $172/day. PS at $3.84/mt)	$70k	$61k	$21k	$18k	$48k	$38k	$13k	$9k
Total Revenue	$10.6M	$9.8M	$4.5M	$4.2M	$11.0M	$10.3M	$2.6M	$1.8M
% Revenue Herring	89%	93%	86%	100%	58%	78%		
% Revenue Mackerel	11%	7%	13%		-		3%	2%
% Revenue Squid	-	-	-		20%		10%	
Data shown by trips harvesting ≥ 1 lb of herring and > 25 mt of herring								

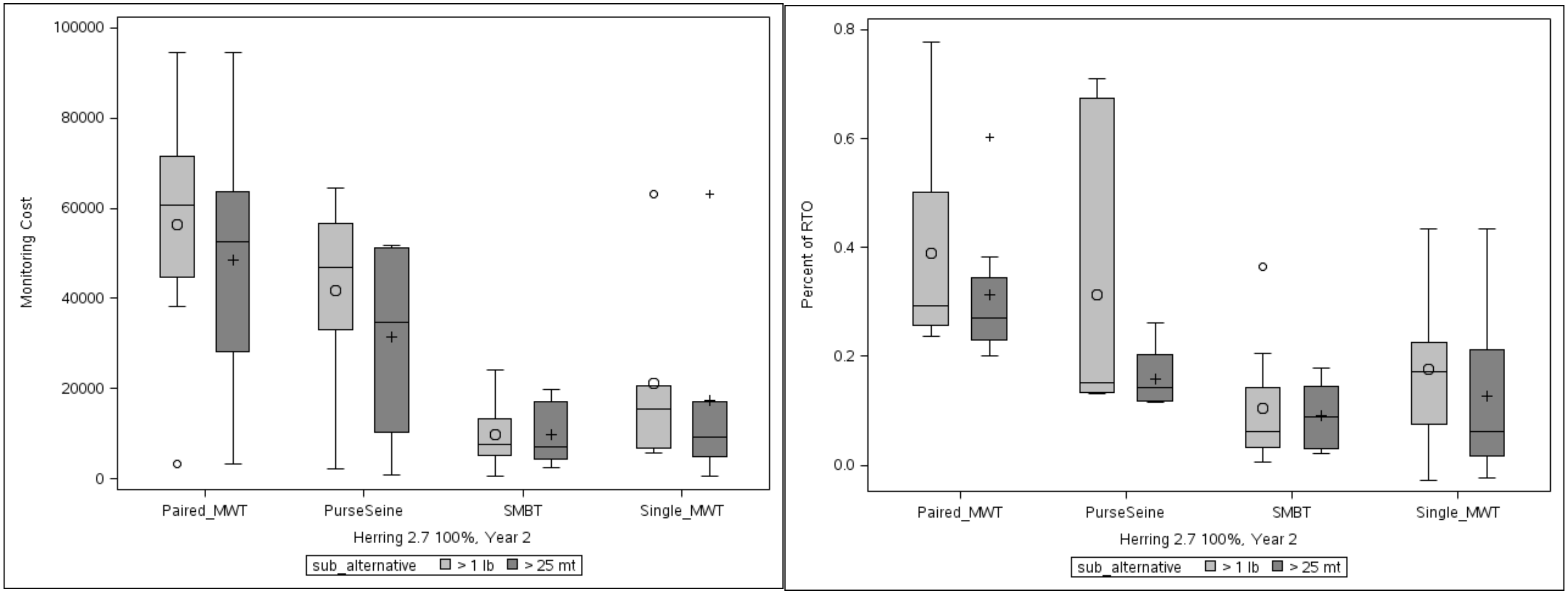


Figure 20. Herring Alternative 2.7 100% EM and Portside on all vessels

100% EM and portside monitoring costs, at both the 1 lb threshold and the 25 mt threshold, are greatest for paired midwater trawl vessels, followed by purse seine vessels. Single midwater trawl vessels and small mesh bottom trawl vessels have similar levels of monitoring costs. Median costs for the gear types at the 1 lb threshold (light grey bars) is $61,000 for paired midwater trawl vessels, $47,000 for purse seine vessels, $16,000 for single midwater trawl vessels, and $8,000 for SMBT vessels. If a 25 mt threshold is used (darker grey bars), median costs are $53,000 for paired midwater trawl vessels $35,000 for purse seine vessels, $9,000 for single midwater trawl vessels, and $7,000 for SMBT vessels.

Percent RTO reductions at the 1 lb threshold are greatest for paired midwater trawl vessels, followed by single midwater trawl vessels, purse seine vessels, and then SMBT vessels. For the 1 pound threshold, the median RTO reduction for paired midwater trawl vessels is 29.3%, while RTO reductions for single midwater trawl vessels is 17.3%, 15.3 % for purse seine vessels, and 6.3% for SMBT vessels. At the 25 mt threshold, RTO reductions for paired midwater trawl vessels are 27.1%, 14.1% for purse seine vessels, 8.8% for SMBT vessels, and 6.2% for single midwater trawl vessels.

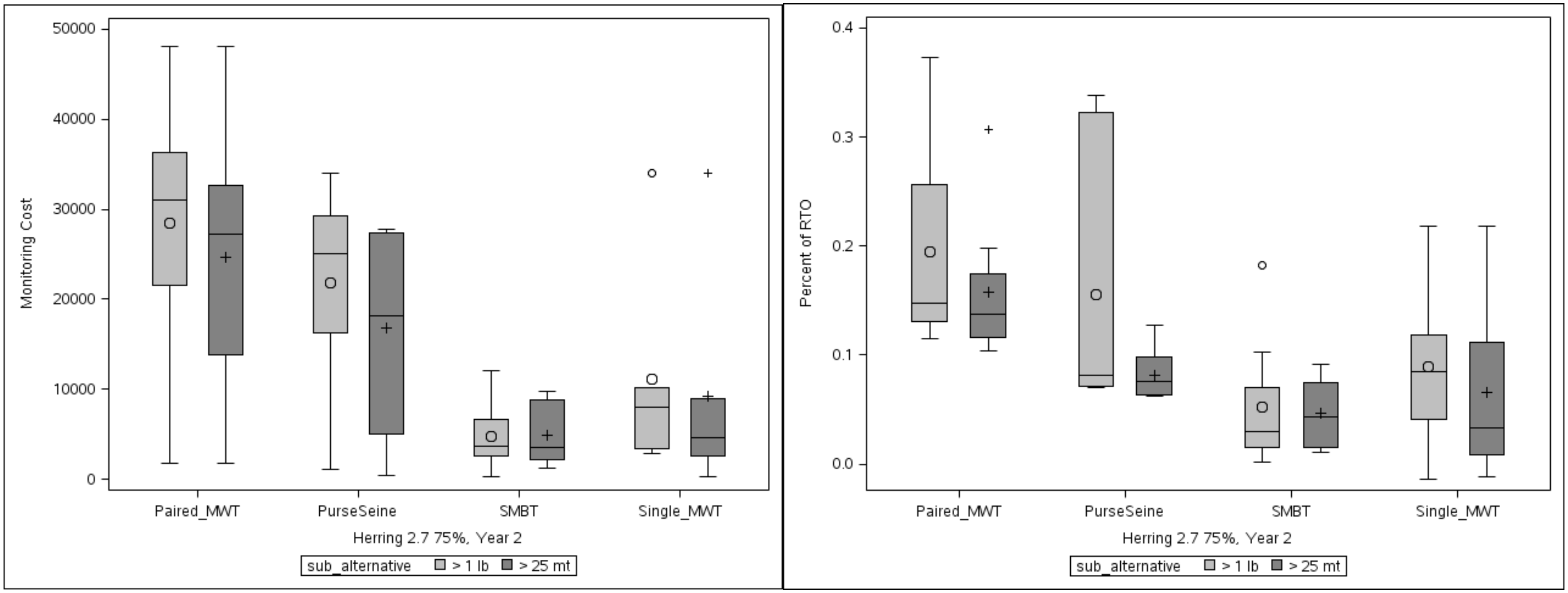


FIGURE 21. HERRING ALTERNATIVE 2.7 75% EM AND PORTSIDE ON ALL VESSELS

75% EM and portside monitoring costs, at both the 1 lb threshold and the 25 mt threshold, are greatest for paired midwater trawl vessels, followed by purse seine vessels. Single midwater trawl vessels and small mesh bottom trawl vessels have similar levels of monitoring costs. Median costs for the gear types at the 1 lb threshold (light grey bars) are $31,000 for paired midwater trawl vessels, $25,000 for purse seine vessels, $8,000 for single midwater trawl vessels, and $4,000 for SMBT vessels. If a 25 mt threshold is used (darker grey bars), median costs are $27,000 for paired midwater trawl vessels $18,000 for purse seine vessels, $5,000 for single midwater trawl vessels, and $4,000 for SMBT vessels.

Percent RTO reductions at the 1 lb threshold are greatest for paired midwater trawl vessels, followed by single midwater trawl vessels, purse seine vessels, and then SMBT vessels. For the 1 pound threshold, the median RTO reduction for paired midwater trawl vessels is 14.8%, while RTO reductions for single midwater trawl vessels are 8.5%, 8.1 % for purse seine vessels, and 3.0% for SMBT vessels. At the 25 mt threshold, RTO reductions for paired midwater trawl vessels are 13.7%, 7.6% for purse seine vessels, 4.3% for SMBT vessels, and 3.3% for single midwater trawl vessels.

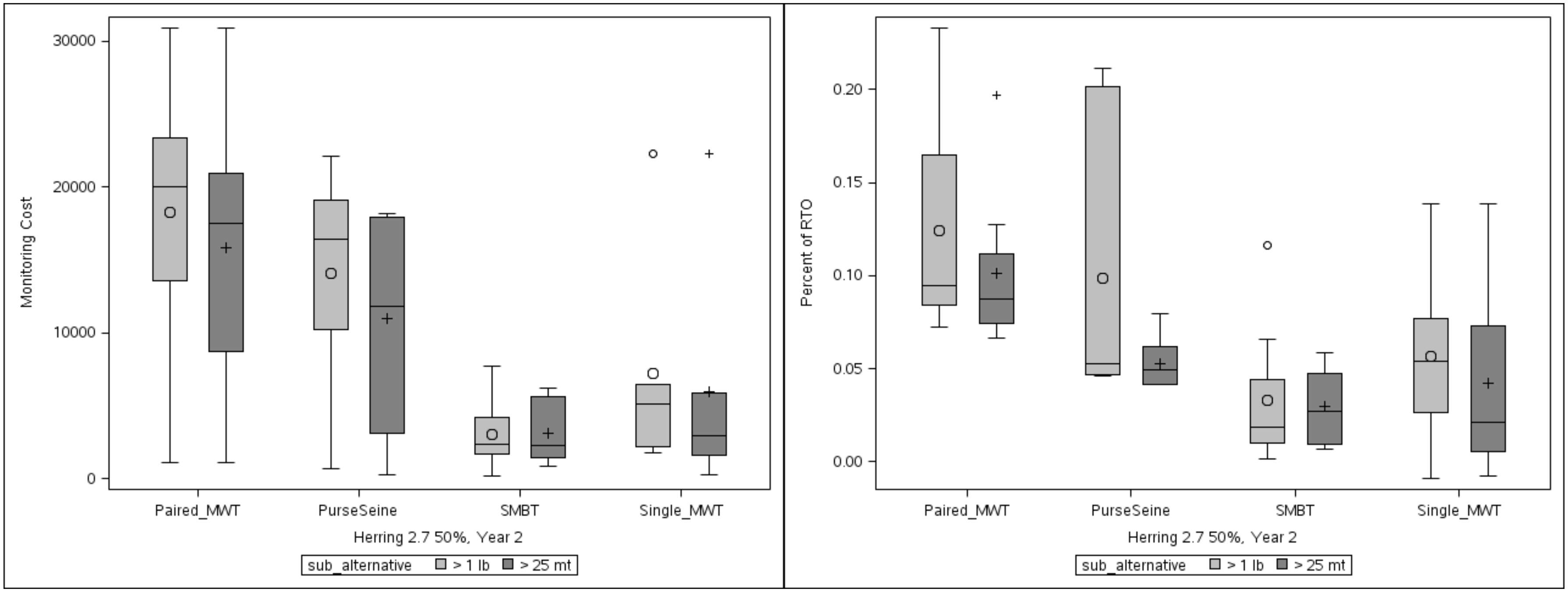
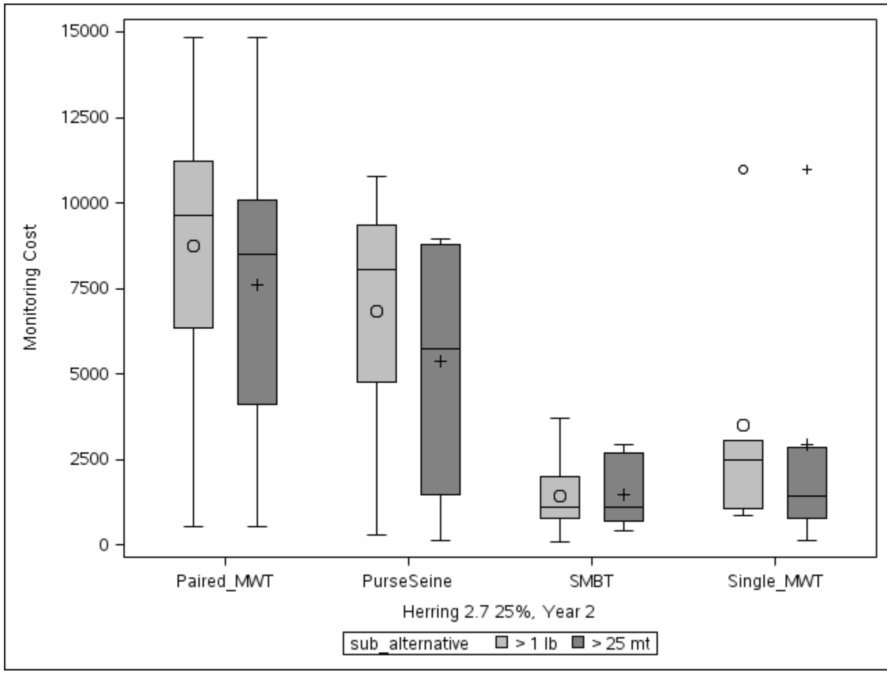


FIGURE 22. HERRING ALTERNATIVE 2.7 50% EM AND PORTSIDE ON ALL VESSELS

50% EM and portside monitoring costs, at both the 1 lb threshold and the 25 mt threshold, are greatest for paired midwater trawl vessels, followed by purse seine vessels. Single midwater trawl vessels and small mesh bottom trawl vessels have similar levels of monitoring costs. Median costs for the gear types at the 1 lb threshold (light grey bars) is $20,000 for paired midwater trawl vessels, $16,000 for purse seine vessels, $5,000 for single midwater trawl vessels, and $2,000 for SMBT vessels. If a 25 mt threshold is used (darker grey bars), median costs are $18,000 for paired midwater trawl vessels, $12,000 for purse seine vessels, $3,000 for single midwater trawl vessels, and $2,000 for SMBT vessels.

Percent RTO reductions at the 1 lb threshold is greatest for paired midwater trawl vessels, followed by single midwater trawl vessels, purse seine vessels, and then SMBT vessels. For the 1 pound threshold, the median RTO reduction for paired midwater trawl vessels is 9.5%, while RTO reductions for single midwater trawl vessels are 5.4%, 5.3% for purse seine vessels, and 1.8% for SMBT vessels. At the 25 mt threshold, RTO reductions for paired midwater trawl vessels are 8.8%, 4.9% for purse seine vessels, 2.7% for SMBT vessels, and 2.1% for single midwater trawl vessels.



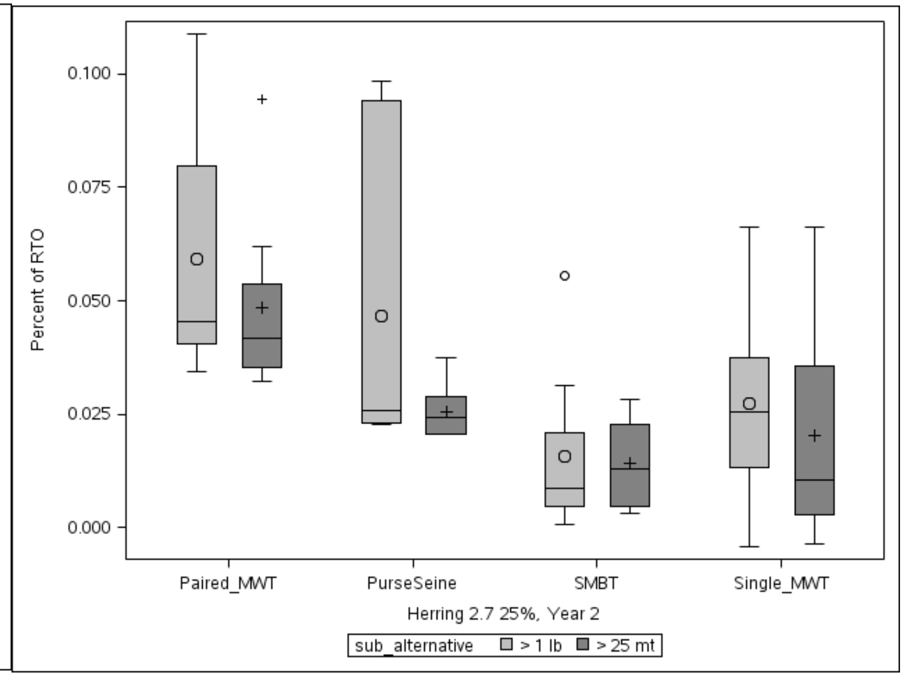


FIGURE 23. HERRING ALTERNATIVE 2.7 25% EM AND PORTSIDE ON ALL VESSELS

25% EM and portside monitoring costs, at both the 1 lb threshold and the 25 mt threshold, are greatest for paired midwater trawl vessels, followed by purse seine vessels. Single midwater trawl vessels and small mesh bottom trawl vessels have similar levels of monitoring costs. Median costs for the gear types at the 1 lb threshold (light grey bars) are $10,000 for paired midwater trawl vessels, $8,000 for purse seine vessels, $2,000 for single midwater trawl vessels, and $1,000 for SMBT vessels. If a 25 mt threshold is used (darker grey bars), median costs are $8,000 for paired midwater trawl vessels, $6,000 for purse seine vessels, $1,500 for single midwater trawl vessels, and $1,000 for SMBT vessels.

Percent RTO reductions at the 1 lb threshold is greatest for paired midwater trawl vessels, followed by single midwater trawl vessels, purse seine vessels, and then SMBT vessels. For the 1 pound threshold, the median RTO reduction for paired midwater trawl vessels is 4.5%, while RTO reductions for single midwater trawl vessels are 2.5%, 2.6% for purse seine vessels, and 0.8% for SMBT vessels. At the 25 mt threshold, RTO reductions for paired midwater trawl vessels are 4.1%, 2.4% for purse seine vessels, 1.3% for SMBT vessels, and 1.0% for single midwater trawl vessels.

4.2.6 SUMMARY OF IMPACTS OF ATLANTIC HERRING ALTERNATIVES

TABLE 105. SUMMARY OF OVERALL IMPACTS ASSOCIATED WITH HERRING COVERAGE TARGET ALTERNATIVES

Alternatives	Herring Resource	Non-Target Species	Protected Species	Physical Environment	Fishery-Related Businesses
Herring Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	Low Positive	Low Positive	Low Positive	Negligible	Low Positive
Herring Alternative 2: Coverage Target Specified For IFM Programs	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.1: 100% NEFOP-Level Observers Coverage on Category A and B Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.2: ASM Coverage on Category A and B Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.3: Combination Coverage on Category A and B Vessels and Midwater Trawl Fleet	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.4: EM and Portside Sampling on Midwater Trawl Fleet	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.5: 100% NEFOP-Level Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.6: Combination Coverage on Midwater Trawl Fleet Fishing in Groundfish Closed Areas	Low Positive	Low Positive	Low Positive	Negligible	Negative
Herring Alternative 2.7: ASM Coverage on Category A and B Vessels, then Vessels may choose either ASM or EM/Portside Coverage	Low Positive	Low Positive	Low Positive	Negligible	Negative

4.3 ATLANTIC MACKEREL ALTERNATIVE IMPACTS

The MAFMC recommended that increased monitoring in the mackerel fishery address the following goals: (1) Accurate estimates of catch (retained and discarded), (2) accurate catch estimates for incidental species for which catch caps apply, and (3) effective and affordable and monitoring for the mackerel fishery.

This section considers the potential impacts of alternatives considered by the MAFMC to specify industry-funded monitoring coverage targets for the mackerel fishery on valued ecosystem components (VEC), including target species, non-target species, protected species, physical environment, and human communities.

For each VEC, the impacts associated with Mackerel Alternatives 1 and 2 will be discussed, followed by a discussion of impacts associated with Mackerel Alternatives 2.1-2.5.

Table 106. Range of Industry-Funded Monitoring Mackerel Coverage Target Alternatives

Gear Type	**MWT**	**SMBT**	**SMBT**	**SMBT**
Permit Categories	All Tiers	Tier 1	Tier 2	Tier 3
Mackerel Alternative 1: No Coverage Target for IFM Program (No Action)	SBRM			
Mackerel Alternative 2: Coverage Target for IFM Program	Includes Sub-Options: 1) Waiver Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold			
Mackerel Alternative 2.1: NEFOP-Level Coverage	100% NEFOP-Level Observer	50% NEFOP-Level Observer	25% NEFOP-Level Observer	
Mackerel Alternative 2.2: ASM Coverage	25%, 50%. 75%, or 100% ASM	SBRM (No Action)		
Mackerel Alternative 2.3: Combination Coverage	50% or 100% EM/Portside	25%, 50%, 75%, or 100% ASM	SBRM (No Action)	
Mackerel Alternative 2.4: EM and Portside Coverage	50% or 100% EM/Portside	SBRM (No Action)		
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	25%, 50%, 75% or 100% ASM or EM/Portside	SBRM (No Action)		
MWT indicates midwater trawl and SMBT indicates small mesh bottom trawl vessels.				
Mackerel Alternatives would only apply to trips that land greater than 20,000 lb of mackerel. Sub-Options could apply to any of the alternatives.				

When evaluating industry-funded monitoring for the mackerel fishery, one major consideration is whether a monitoring alternative provides the type and quality of data necessary to meet the Council's information collection goals for the mackerel fishery.

Type of Information Collected

Different types of monitoring can provide different kinds of information with varying levels of verification (Table 107).

Currently, vessel trip reports (VTRs) provide information on fishing effort, retained catch, and discarded catch. Dealer reports provide information on retained catch and vessel monitoring systems (VMS) provided information on fishing location and behavior. Affidavits of slippage events and discard reports can provide details of why slippage and/or discard events occur.

Under the industry-funded herring coverage target alternatives, NEFOP-level observers and at-sea monitors would both provide information on fishing effort. NEFOP-level observers and at-sea monitors would be collecting species composition data on retained and discarded catch, while portside samplers would be collecting species composition data on retained catch. NEFOP-level observers and portside samplers would be collecting age and length data, while at-sea monitors would be collecting length data. EM would be used to confirm retention of catch.

Table 107. Comparison of Information collected Across Mackerel Coverage Target Alternatives

Mackerel Data Interests	Current Information Collections That Would Continue Under Any Alternative	MACK Alt 1	MACK Alt 2.1	MACK Alt 2.2	MACK Alt 2.3	MACK Alt 2.4	MACK Alt 2.5
		Ability to meet data interest: ☐ High ☐ Medium ■ Low					
		No Action (NEFOP coverage for SBRM only)	NEFOP-Level Coverage (100, 50, 25%) on Limited Access Vessels	ASM (25, 50, 75, or 100%) on MWT and Tier 1 SMBT Vessels	EM/Portside on MWT Vessels ASM (25, 50, 75, or 100%) on Tier 1 SMBT Vessels	EM/Portside (50 or 100%) on MWT vessels	ASM and/or EM/Portside (25, 50, 75, or 100%) On MWT vessels
Retained Catch	• Vessel trip reports • Dealer reports • VMS catch reports	Information on effort, area, gear, and economics Species composition data	Information on effort, area, gear, and economics Species composition data	Information on effort, area, gear, and economics Species composition data	ASM - Information on effort, area, gear, economics; species composition data EM/Portside - Confirms retention; species composition data	Confirms retention Species composition data	ASM - Information on effort, area, gear, economics; species composition data EM/Portside - Confirms retention; species composition data
Discarded Catch	• Vessel trip reports • VMS catch reports	Discard estimate Species composition of discarded catch	Discard estimate Species composition of discarded catch	Discard estimate Species composition of discarded catch	ASM - Discard estimate; species composition data EM - Flags discarding	Flags discarding	ASM - Discard estimate; species composition data EM - Flags discarding
River herring and Shad Catch Cap Monitoring	• Vessel trip reports • Dealer reports • VMS catch reports • Affidavits	Species composition of retained catch Species composition of discarded catch	Species composition of retained catch Species composition of discarded catch	Discard estimate Species composition of discarded catch ASM - Discard estimate; species composition data on discarded catch	ASM - ASM - Discard estimate; species composition data on catch EM/Portside - Confirms retention; species composition data on retained catch	EM/Portside - Confirms retention; species composition data on retained catch Confirms retention	ASM - ASM - Discard estimate; species composition data on catch EM/Portside - Confirms retention; species composition data on retained catch
Stock Assess-ments	• Vessel trip reports	Age and length data on catch	Age and length data on catch	Length data on catch	ASM - Length data on catch EM/Portside - Age and length data on retained catch	Age and length data on retained catch	ASM - Length data on catch EM/Portside - Age and length data on retained catch

MWT = midwater trawl vessels. SMBT = small mesh bottom trawl vessels. Mackerel alternatives would only apply to trips that land greater than 20,000 lb of mackerel.

Amount of Monitoring Coverage

The amount of coverage can affect the uncertainty around catch estimates.

Monitoring the River Herring and Shad Catch Cap

The table below describes NEFOP coverage by gear type. Revisions to the SBRM in April 2015 affected how funding is used to allocate observer coverage. Therefore, the level of observer coverage during 2015 may be more indicative of future observer coverage levels than observer coverage levels from previous years.

TABLE 108. 2015 MIDWATER TRAWL[1], PURSE SEINE[2], AND SMALL MESH BOTTOM TRAWL[3] OBSERVER COVERAGE RATES

Gear	Observer Coverage[4]
Midwater Trawl	4.7%
Purse Seine	2.5%
Small Mesh Bottom Trawl	9.1%

Source: DMIS and ODBS databases as of 2016-05-21
[1]Midwater Trawl: Includes both single and paired midwater trawl gears
[2]Purse Seine: Includes all purse seine gears (including tuna)
[3]Small Mesh Bottom Trawl: Includes bottom trawl gear w/codend mesh size less than 5.5" excluding bottom otter twin trawl,
scallop and shrimp trawl trips
[4]Includes observer trips w/at least 1 observed haul divided by VTR trips reporting kept catch

The observer coverage levels in the mackerel fishery described in Mackerel Alternative 1 was evaluated with regard to its impact on River Herring/Shad (RHS) Catch Cap catch estimate precision. Fishing years (FY) 2014-2015 were included in the analysis because they were the only years when the catch cap was effective. The FY2015 data for these catch caps are not finalized, and should be considered preliminary. Mackerel discards were not evaluated.

The mackerel fishery currently has a single RHS catch cap that covers all trips landing greater than 20,000 pounds of mackerel regardless of gear or area. Atlantic Mackerel, Squid, and Butterfish Amendment 14 implemented the RHS Catch Cap and was effective on April 4, 2014, for all of fishing year 2014 (January-December).

Catch cap estimates in the mackerel fishery are comprised of both incidental kept and discard components. Current quota monitoring methodology for the catch cap employs the cumulative method to extrapolate incidental catch (kept and discard) to the fleet based on a ratio estimator (incidental catch divided by total catch) derived from NEFOP data. Only observed trips are used to derive the ratio estimator. Fleet kept all (KALL) is obtained from VTR and dealer data, which provides effort information (gear and area) and landings information respectively. Actual observed incidental catch amounts are used in lieu of estimated incidental catch amounts whenever possible.

This analysis uses the same data sources as quota monitoring. However, this analysis focuses strictly on the precision of the incidental catch ratio estimator in the catch cap, and does not incorporate the replacement of actual observed values for estimated incidental catch based on the ratio estimator (described above). Furthermore, this analysis is constrained to trips that count towards the catch cap (e.g., trip must land >20,000 pounds of mackerel). Trips that would not be counted against the catch cap are not included in this analysis. The CV defined for this analysis as the ratio of the standard error of total catch (incidental kept and discards), was used to quantify the precision of the estimated catch. The CV is sensitive to sample size. In a finite population the CV will converge to zero as the sample size approaches the population size. The total fishing trips within a stratum is considered finite, therefore as sampling coverage approaches 100%, the CV will converge to zero for that stratum. The CV analysis follows the guidelines detailed by the SBRM and uses the trip as the sampling unit. Only observed trips (trips with at least one observed haul) and trips reporting kept catch on their VTR were used in the CV analysis. This distinction is important to understand when interpreting observer coverage rates (referred to below as "realized" observer coverage) because in the paired midwater trawl fishery it is not uncommon for wing vessels to carry observers but not carry any catch. These trips would not be reflected in the observer coverage rates described in this analysis. Furthermore, trips that did not yield any observed hauls are excluded from this analysis.

An at-sea monitor would collect both retained and discarded catch composition in a manner consistent with existing NEFOP protocols. Therefore it is assumed that there will be no difference in the catch composition data collected by NEFOP observers and ASMs under Mackerel Alternatives 2.1 and 2.2.

The design of Mackerel Alternatives 2.1-2.5 (by permit and gear) along with the limited amount of data tracked against the catch cap (only 2 years) made a simulation of the CVs associated with river herring and shad catch infeasible under these alternatives. Instead, an analysis of 2014 and 2015 was performed to describe the CVs associated with catch tracked against the catch cap, as well as a general fleet profile of the vessels covered by the Mackerel RHS Catch Cap.

For 2014 and 2015, the CVs associated with river herring and shad catch and the realized observer coverage levels are shown in Table 109. Both the CVs and observer coverage levels decreased from 2014 to 2015. However, given the limited time-series, it is difficult to infer a trend. Additionally, it is important to note the very small number of trips that were observed in 2015. Table 109 and Figure 24 characterize the history of catch cap estimate precision associated with Mackerel Alternative 1.

TABLE 109. Mackerel RHS Catch Cap CV and Observer Coverage, 2014-2015

	Fishing Year[1]: CV (Observer Coverage)	
Catch Cap	**2014**	**2015[3]**
RHS-Mackerel	48.9% *(37.8%)*	22.7% *(7.3%)*[3]

Source: GARFO Quota Monitoring Database as of 5/22/2016

[1]Catch cap fishing year: river herring/shad = calendar year; haddock = May-April

[3]Fishing Year 2015 data are PRELIMINARY

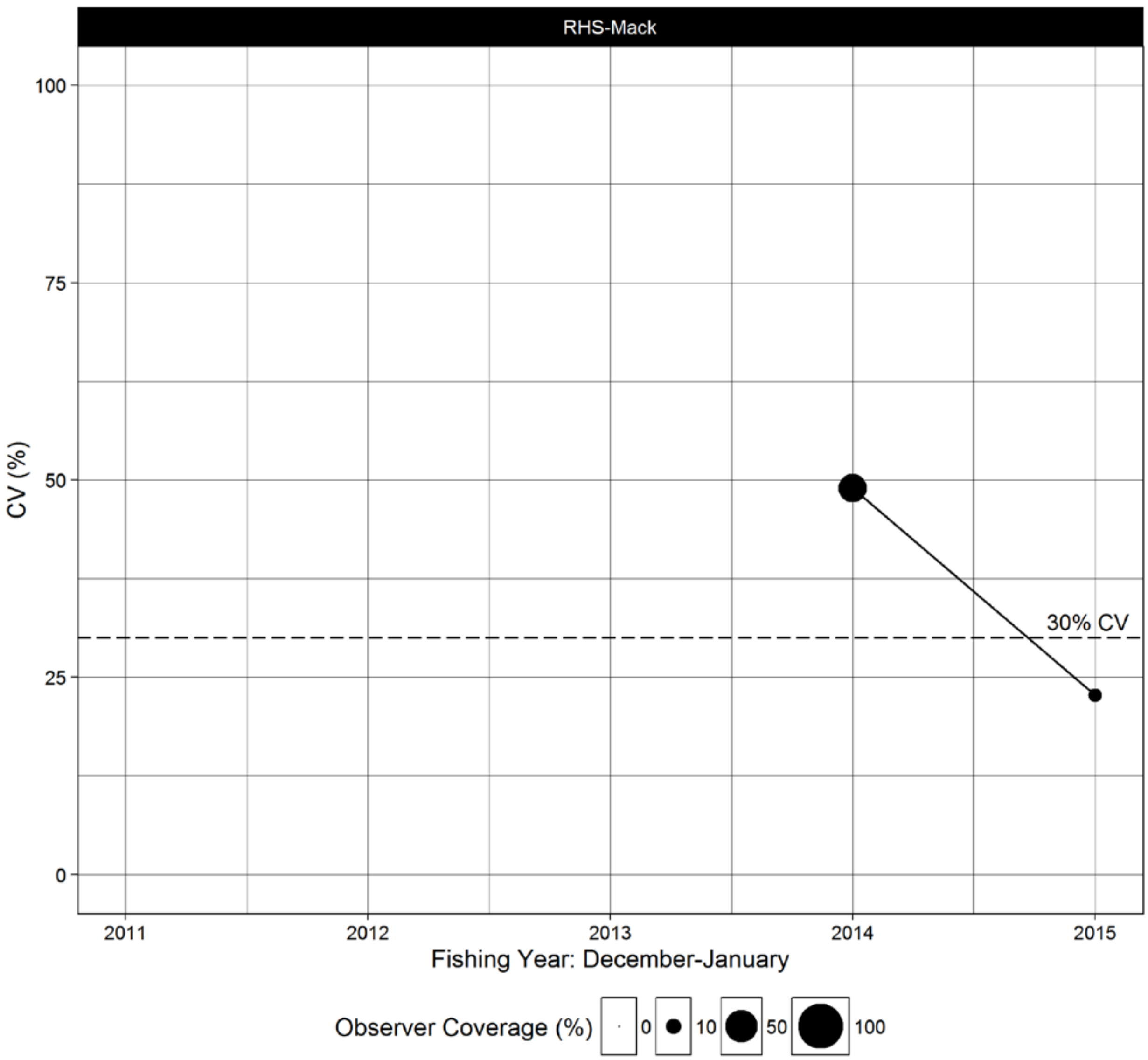


FIGURE 24. MACKEREL RHS CATCH CAP CV AND OBSERVER COVERAGE (DOT SIZE) IN RELATION TO A 30% CV.

Figure 25 details a CV curve calculated according to SBRM methodology across varying coverage levels in relation to a 30% CV. This curve is solely based on observer data within 2014 and 2015 and influenced by how observer coverage was assigned for each particular year.

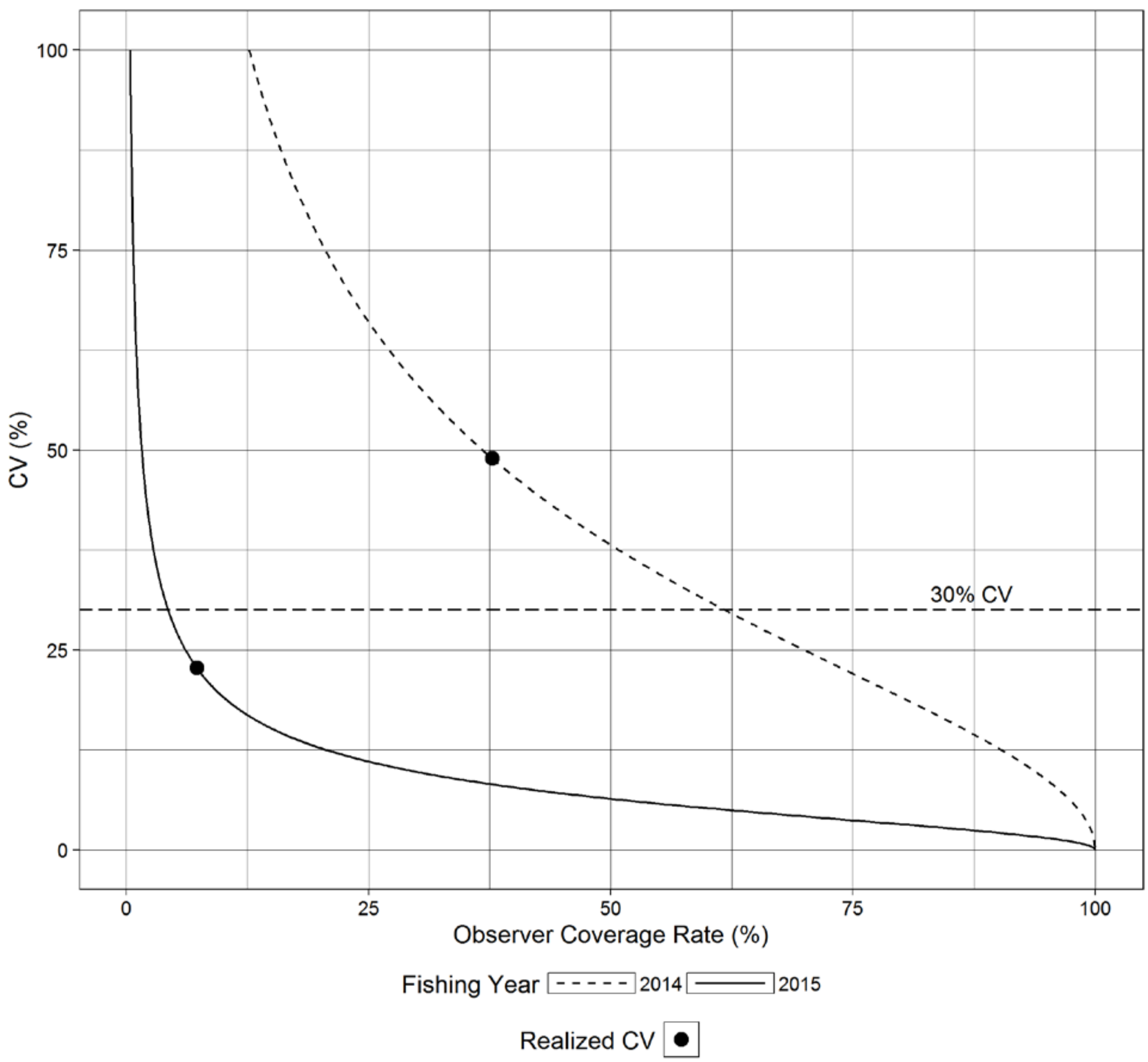


FIGURE 25#. 2014-2015 DERIVED CV CURVE FOR MACKEREL RHS CATCH CAP BASED ON SBRM SAMPLE SIZE ANALYSIS METHODOLOGY, WITH REALIZED CV FOR THE CATCH CAP YEAR (BLACK DOT)

Mackerel RHS Catch Cap trips between 2014 and 2015 were comprised of both midwater and bottom trawl vessels. On average, 84% of Mackerel RHS Catch Cap trips between 2014 and 2015 were conducted by Tier 1 midwater trawl vessels. Out of those trips, 76% of them landed greater than 25 mt. Overall, the amount effort in the Mackerel RHS Catch Cap was low in 2014-2015, and therefore CVs could change if effort increases in the future.

Allocation of Monitoring Coverage

The allocation of monitoring, or the basis of selecting a vessel for monitoring coverage, affects how the resulting data can be used for management.

Under SBRM, vessels are selected for observer coverage by fishing fleet (based on gear, mesh and area), not based on FMP or permit category. Valid estimates of catch or bycatch (and their variances) rely on formulas that are consistent with the underlying sampling design. Estimates that are inconsistent with the sampling design may be biased, which may impact the utility of the data.

Observed trips that were selected for coverage based on permit category, and not fleet, may be treated separately by the NEFSC in catch and bycatch analyses. These data may not be used in stock assessments or total catch estimation because the vessel selection for observer coverage would be inconsistent with SBRM's sampling design and produce biased estimates. Data collected by permit category could be used to track catch against annual catch limits (ACLs) or fishery catch caps that are specific to the permits that are being targeted for coverage because the data collection and catch estimation method would match. However, the utility of data collected by permit category would likely be limited as compared to data that were collected by fishing fleet because the catch estimate method does not match SBRM's sampling design. Increasing coverage by permit types would also affect the current cap estimates to the degree that sampling causes some part of the fishery that is regulated by the cap to be over or under sampled.

To summarize, the decision to allocate observer coverage by FMP (i.e., permits) or fishing fleet depends on the objectives of the additional coverage and how the data will subsequently be used. If one of the objectives of additional coverage is to improve catch estimates for use in stock assessments, and not just solely for monitoring harvest, then monitoring coverage should be allocated by fishing fleet (i.e., aligned with SBRM), and not FMP, fishery, or permit category.

Table 110. Pros and Cons of Allocating Monitoring Coverage By Permit Versus Fleet

	Pros	**Cons**
Permit-Based Coverage Target Alternatives	Councils manage fisheries by FMP and vessel permit	Not consistent with how SBRM allocates observers
	Can be used to monitor FMP-specific quotas and catch caps	Resulting data may be biased and not used for stock assessment and/or total removals
	Can be used to monitor FMP-	Difficult to design, deploy and

	specific quotas and catch caps	analyze results because vessels typically don't structure trips by permit category
Fleet-Based Coverage Target Alternatives	Consistent with how SBRM allocates observer coverage	Typically extends across FMPs
	Resulting data may be combined with SBRM data for stock assessments and/or total removals	Not consistent with how Councils manage fisheries by FMP and vessel permit

4.3.1 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON TARGET SPECIES

4.3.1.1 Impacts of Mackerel Alternatives 1 and 2 on the Mackerel Resource

Mackerel Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the MSB FMP. Monitoring for mackerel vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis.

In recent years, observer coverage for the mackerel fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-specific basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through a FMP developed by either the MAFMC or NEFMC. Current observer coverage allocated to the mackerel fishery through SBRM is described in Table 111.

Under SBRM, the Atlantic mackerel fishery will primarily receive at-sea observer coverage under the following 4 fleets: New England and Mid-Atlantic small mesh otter trawl and New England and Mid-Atlantic paired and single midwater trawl. The table below describes the sea days proposed for April 2016 through March 2017. The sea days listed below for small mesh otter trawl cover all FMPs that use this gear type, so only a portion would cover trips targeting mackerel. The midwater trawl fleets is largely comprised of vessels targeting mackerel and mackerel.

Table 111. Proposed and Observed Sea Days for Fleets that Target Mackerel

Fleet	Region	Proposed sea days for April 2016 to March 2017	Observed sea days, July 2014 to June 2015	VTR sea days, July 2014 to June 2015	Observed trips, July 2014 to June 2015	VTR trips, July 2014 to June 2015
Small Mesh Bottom Trawl	MA	1,717	997	6,761	360	3,088
Small Mesh Bottom Trawl	NE	798	933	8,847	319	3,381
Midwater Trawl (Pair and Single)	MA	30	8	134	1	26
Midwater Trawl (Pair and Single)	NE	440	160	1,189	43	363

Source: 2016 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States; Wigley et al., 2016 (included in Appendix 4).

The mackerel fishery is managed through an ACL (reduced from the overfishing limit and stockwide acceptable biological catch to address scientific uncertainty and management uncertainty) and commercial and recreational annual catch targets (ACTs - reduced from the ACL to account for additional management uncertainty) that are designed to prevent overfishing of the mackerel stock. Currently, it is unknown if the mackerel stock is overfished or if overfishing is occurring. There is concern about the mackerel fishery and indications of reduced productivity related to low catches in recent years (TRAC 2010). Possible explanations include: (1) Mackerel have moved away from traditional fishing grounds (as has occurred in Europe), (2) environmental conditions have resulted in a less productive or less fishable stock, or (3) the stock is overfished. A combination of these factors could also be possible. In recent years, the fleet has not been able to harvest the ACL or ACTs. Selection of Mackerel Alternative 1 will not likely affect the setting of mackerel harvest specifications, but it may affect the ability of the mackerel fishery to fully harvest the ACLs if less monitoring (when compared to Mackerel Alternative 2) results in catch caps for river herring and shad limiting effort in the mackerel fishery.

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the MSB FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Mackerel Alternative 2 is intended to allow for additional monitoring in the mackerel fishery by specifying coverage targets, above SBRM (Mackerel Alternative 1), for industry-funded monitoring. To focus coverage on the directed mackerel fishery, monitoring coverage requirements would only apply to trips landing more than 20,000 lb of mackerel. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM and the specified coverage target. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, Mackerel Alternative 2 may have a positive impact on the mackerel resource by increasing monitoring in the mackerel fishery. While the benefits to the mackerel resource may be difficult to quantify under Mackerel Alternative 2, they may not be realized under Mackerel Alternative 1.

Under Mackerel Alternative 2, long-term benefits to the mackerel resource would vary with the type and amount of monitoring coverage target specified for the mackerel fishery but could result from increased catch monitoring. As catch information increases, the uncertainty around retained and discarded catch in the mackerel fishery may be reduced, potentially improving the tracking of harvest against ACLs and the river herring and shad catch cap. The magnitude of positive impacts to the mackerel resource associated with additional catch information is expected to vary with the type of coverage target specified and the realized coverage level in a given year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in a given year and would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified coverage target (Mackerel Alternatives 2.1-2.5).

Similar to Mackerel Alternative 1, the selection of Mackerel Alternative 2 will not likely affect the setting of mackerel harvest specifications. However, similar to Mackerel Alternative 1, the selection of Mackerel Alternative 2 may affect the ability of the mackerel fishery to fully harvest the ACL. Under Mackerel Alternative 2, if fishing effort is limited by the availability of monitoring coverage or increased monitoring results in the river herring and shad catch cap limiting effort in the mackerel fishery, then the mackerel fishery may have a limited ability to harvest mackerel.

Mackerel Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the MAFMC's intent to increase monitoring in the mackerel fishery, but would not prevent vessels from participating in the mackerel fishery if monitoring coverage was not available.

Should the MAFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the mackerel fishery. Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the MAFMC to examine the results of any increased coverage in the mackerel fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the MSB FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of mackerel from industry-funded monitoring requirements.

If the increased monitoring associated with Mackerel Alternative 2 is reduced or minimized by selection of any of the sub-options, the benefits of additional monitoring to the mackerel resource may be reduced. Additionally, under Mackerel Alternative 2, because the 25 mt threshold differs from the triggers used to determine which trips count against the catch cap for river herring and shad (20,000 lb of mackerel) the data generated by selecting Sub-Option 5 may bias (either higher or lower) the catch tracked against the catch cap when compared to not selected Sub-Option 5. Therefore, the selection of Sub-Option 5 may further reduce any benefits associated with the Mackerel Alternative 2.

Both Mackerel Alternative 1 and Mackerel Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because these measures apply similarly to both Mackerel Alternatives 1 and 2, the benefits of improved catch monitoring to the mackerel resource would be similar under both alternatives.

Coverage Target Alternatives

Mackerel Alternative 2 would specify a level and type of industry-funded monitoring for the mackerel fishery. The types of industry-funded monitoring considered by the MAFMC for the mackerel fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category.

Under Mackerel Alternative 2, the amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the mackerel fishery. Impacts on the mackerel resource associated with specific coverage target alternatives (Mackerel Alternatives 2.1-2.5) are discussed in the following section.

Monitoring and Service Provider Requirements

Mackerel Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in MSB Amendment 14.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having an additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

Observers in the mackerel fishery are currently required to possess a HVF certification under Mackerel Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Mackerel Alternative 2. Therefore, the impacts of a HVF certification requirement under Mackerel Alternative 2 on the mackerel resource would be similar to the impacts under Mackerel Alternative 1.

Under Mackerel Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

To the extent that increased information on mackerel catch benefits the mackerel resource under Mackerel Alternative 2, those benefits may not be realized under Mackerel Alternative 1.

4.3.1.2 Impacts of Mackerel Coverage Target Alternatives 2.1- 2.5 on the Mackerel Resource

Mackerel Alternatives 2.1-2.5 are intended to allow for increased monitoring in the mackerel fishery by specifying coverage targets, above and beyond SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, the increased monitoring associated with Mackerel Alternatives 2.1-2.5 may have a positive impact on the mackerel resource. That positive impact would result from reducing the uncertainty around catch and bycatch estimates of mackerel and potentially increasing the amount of information available for use in the mackerel stock assessment. While the benefits to the mackerel resource may be difficult to quantify under Mackerel Alternatives 2.1-2.5, they may not be realized under Mackerel Alternative 1.

The magnitude of positive impacts to the mackerel resource associated with additional catch information is expected to vary with the type of coverage and the realized coverage level in that year. The realized coverage level in a given year would be largely driven by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified monitoring coverage target (Mackerel Alternatives 2.1-2.5).

Mackerel Alternatives 2.1-2.5 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated.

Vessel, dealer, and SBRM data are used to track retained and discarded mackerel catch. Additionally, SBRM observer (i.e., length) and survey (i.e., age) data are used in mackerel stock assessments.

Mackerel Alternative 2.1 would specify NEFOP-level observer coverage, Mackerel Alternative 2.2 would specify at-sea monitor coverage, Mackerel Alternatives 2.3 and 2.5 would specify ASM coverage and/or EM and portside sampling coverage, and Mackerel Alternative 2.4 would specify EM and portside sampling coverage. Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discarded catch. While EM cannot estimate the amount of discarded catch, it can verify retention of catch. In the mackerel fishery, discards are a small percentage of total catch. Because discarding in the mackerel fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Mackerel Alternatives 2.1, 2.2, 2.3, and 2.5) will likely have the same potential to benefit the mackerel resource as alternatives that increase the amount of information on retained catch (Mackerel Alternative 2.4).

Both NEFOP-level observers and portside samplers would collect age and length on mackerel, while at-sea monitors would collect length data on mackerel. Currently, age and length data collected by SBRM observers are available for use in the mackerel stock assessment. Because Mackerel Alternatives 2.1, 2.3 (portside sampling), 2.4, and 2.5 (portside sampling) would collect both age and length data on mackerel, those alternatives have the potential to benefit the mackerel resource more than Mackerel Alternatives 2.2, 2.3 (ASM), and 2.5 (ASM) that would just collect length data on mackerel.

Mackerel Alternatives 2.1, 2.2, and 2.3 allow some aspect of monitoring coverage to range between 25% and 100%, while Mackerel Alternative 2.4 allows monitoring coverage to range between 50% and 100%. The monitoring goals for the mackerel coverage targets are accurate estimates of mackerel catch and especially the catch of river herring and shad to track against the catch cap. While high levels of monitoring are not always necessary to address a monitoring goal, more monitoring could be more effective to meet monitoring goals than less monitoring. Therefore, across alternatives, choosing a higher coverage target has the potential to benefit the mackerel resource by improving management through better data.

Mackerel Alternatives 2.1 – 2.5 primarily would allocate monitoring coverage by vessel permit category. The extent to which the allocation of industry-funded coverage is consistent SBRM fishing fleet will determine how the resulting data can be used. Unless vessel permit category is equivalent to fishing fleet, the resulting information from the mackerel alternatives may have limited utility. The additional information on catch and bycatch estimates in the mackerel fishery obtained via Mackerel Alternatives 2.1 – 2.5 could be used for tracking catch against ACLs and catch caps, but it is unlikely that those data could be used to estimate discards for the mackerel stock assessment.

The realized coverage level in a given year would be determined by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Mackerel Alternatives 2.1-2.5 specify that the vessel would be prohibited from participating in the mackerel fishery on that trip. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the mackerel fishery, even if monitoring coverage is not available. Should fishing effort/catch be limited as such, there is the potential for a positive impact on the mackerel resource associated with Mackerel Alternatives 2.1-2.5. The positive impact would result from the increased reproductive potential of the individuals that are unharvested. However, larger numbers of spawning mackerel do not guarantee increased recruitment and high densities of mackerel may result in slow growth and poor condition. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable monitoring coverage requirements to be waived on a specific trip, allowing a vessel to continue participating in the mackerel fishery, even if monitoring coverage is not available. For this reason, any benefits to the mackerel resource under Mackerel Alternatives 2.1-2.5 may not be realized under Mackerel Alternative 2 – Sub-Option 1.

Because discarding in the mackerel fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Mackerel Alternatives 2.1, 2.2, 2.3 and 2.5) will likely have the same likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just retained catch (Mackerel Alternative 2.4). Increased monitoring of river herring and shad catch may help reduce variability in estimates of catch that is tracked against the catch cap, when that variability may have otherwise led to effort restrictions in the mackerel fishery. Conversely, additional monitoring may illustrate higher than expected catch of river herring and shad, resulting in catch caps that are fully harvested earlier than expected and reduced opportunities to harvest mackerel

In summary, the benefits of these mackerel alternatives to the mackerel resource are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to the mackerel resource are possible if increased monitoring can reduce uncertainty of catch tracked against ACLs and generate more information for the mackerel stock assessment. However, these alternatives may lead to direct positive impacts on the mackerel resource if fishing effort is limited, either through monitoring availability or the river herring and shad catch cap, leading to increased reproductive potential of the mackerel stock. Specific impacts of these mackerel alternatives are summarized below.

The impacts of these mackerel alternatives on the mackerel resource are not significant because they would not cause the mackerel resource to become overfished and would not result in overfishing.

Table 112. Summary of Mackerel Coverage Target Alternatives on Mackerel Resource

Alternatives	Impacts on Mackerel Resource
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be primarily dependent on the type of information collected, amount of coverage, and amount of available Federal funding • Positive impact associated with Sub-Option 1 not being selected if fishing effort is limited and mackerel reproductive potential is increased • Negative impact associated with Sub-Option 5 if it biases data used to track catch against catch caps
Mackerel Alternative 2.1: NEFOP-Level Coverage on Limited Access Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates for Tier 1-3 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and mackerel reproductive potential is increased
Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates for Tier 1-3 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and mackerel reproductive potential is increased
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and mackerel reproductive potential is increased

Mackerel Alternative 2.4: EM and Portside Sampling Midwater Trawl Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Positive impact if fishing effort is limited and mackerel reproductive potential is increased
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Positive impact if fishing effort is limited and mackerel reproductive potential is increased

4.3.2 IMPACTS ON MACKEREL COVERAGE TARGET ALTERNATIVES ON NON-TARGET SPECIES

The non-target species of interest that are harvested by the mackerel fishery are river herring, shad, and Atlantic herring.

4.3.2.1 Impacts of Mackerel Alternatives 1 and 2 on Non-Target Species

Mackerel Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the MSB FMP. Monitoring for mackerel vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis.

In recent years, observer coverage for the mackerel fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-specific basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through an FMP developed by either the Mid-Atlantic or MAFMC. Current observer coverage allocated to the mackerel fishery through SBRM is described in Table 111.

The catch of river herring and shad in the mackerel fishery is managed by a catch cap established by the MAFMC. The catch of herring in the mackerel fishery is managed by the NEFMC in the herring fishery specifications. Selection of Mackerel Alternative 1 will not likely affect the setting of harvest specifications for herring, but less monitoring (when compared to Mackerel Alternative 2) may affect the setting of and tracking catch against the river herring and shad catch cap.

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the MSB FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Mackerel Alternative 2 is intended to allow for additional monitoring in the mackerel fishery by specifying coverage targets, above SBRM (Mackerel Alternative 1), for industry-funded monitoring. To focus coverage on the directed mackerel fishery, monitoring coverage requirements would only apply to trips landing more than 20,000 lb of mackerel. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified coverage target (Mackerel Alternatives 2.1-2.5). If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, Mackerel Alternative 2 may have a positive impact on non-target species by increasing monitoring in the mackerel fishery. While the benefits to non-target species may be difficult to quantify under Mackerel Alternative 2, they may not be realized under Mackerel Alternative 1.

Under Mackerel Alternative 2, long-term benefits to non-target species would vary with the type and amount of monitoring coverage target specified for the mackerel fishery but could result from increased catch monitoring. As catch information increases, the uncertainty around retained and discarded catch of non-target species in the mackerel fishery may be reduced, potentially improving the tracking of harvest against ACLs. The potential for increased monitoring under Mackerel Alternative 2 may also help reduce variability in the catch of river herring and shad tracked against catch caps. The increased monitoring may result in higher or lower documented catch of river herring and shad, potentially leading to changes to the basis for setting catch caps and/or fishery catch caps being fully harvested more often or less often than expected. These benefits may not be realized under Mackerel Alternative 1.

Mackerel Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the MAFMC's intent to increase monitoring in the mackerel fishery, but would not prevent vessels from participating in the mackerel fishery if monitoring coverage was not available. Should the MAFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the mackerel fishery. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the MAFMC to examine the results of any increased coverage in the mackerel fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the MSB FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of mackerel from industry-funded monitoring requirements.

If the increased monitoring associated with Mackerel Alternative 2 is reduced or minimized by selection of any of the sub-options, the benefits of additional monitoring to the mackerel resource may be reduced. Additionally, under Mackerel Alternative 2, because the 25 mt threshold differs from the triggers used to determine which trips count against the catch cap for river herring and shad (20,000 lb of mackerel) the data generated by selecting Sub-Option 5 may bias (either higher or lower) the catch tracked against the catch cap when compared to not selecting Sub-Option 5. Therefore, the selection of Sub-Option 5 may reduce any benefits associated with Mackerel Alternative 2.

Both Mackerel Alternative 1 and Mackerel Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding events to help ensure that total catch is available for sampling. Because these measures apply similarly to both Mackerel Alternatives 1 and 2, the benefits of improved catch monitoring to the non-target species would be similar under both alternatives.

Coverage Target Alternatives

Mackerel Alternative 2 would specify a level and type of industry-funded monitoring for the mackerel fishery. The types of industry-funded monitoring considered by the MAFMC for the mackerel fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category.

Under Mackerel Alternative 2, the amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the mackerel fishery.

A CV analysis was attempted to simulate the precision associated with tracking catch against the river herring/shad catch cap. However, a simulation was infeasible because of the limited data available to track catch against the river herring/shad catch cap. The previous analysis associated with the considered but rejected mackerel alternative showed approximately 26%-54% NEFOP-level coverage would generate a 30% CV on river herring and shad catch in the mackerel fishery.

Impacts on non-target species associated with specific coverage target alternatives (Mackerel Alternatives 2.1-2.5) are discussed in the following section.

Monitoring and Service Provider Requirements

Mackerel Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in MSB Amendment 14.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having an additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

Observers in the mackerel fishery are currently required to possess a HVF certification under Mackerel Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Mackerel Alternative 2. Therefore, the impacts of a HVF certification requirement under Mackerel Alternative 2 on non-target species would be similar to the impacts under Mackerel Alternative 1.

Under Mackerel Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

To the extent that increased information on non-target species catch benefits non-target species under Mackerel Alternative 2, those benefits may not be realized under Mackerel Alternative 1.

4.3.2.2 Impacts of Mackerel Coverage Target Alternatives 2.1- 2.5 on Non-Target Species

Mackerel Alternatives 2.1-2.5 are intended to allow for increased monitoring in the mackerel fishery by specifying coverage targets, above and beyond SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, the increased monitoring associated with Mackerel Alternatives 2.1-2.5 may have a positive impact on non-target species. That positive impact would result from reducing the uncertainty around catch and bycatch estimates of non-target species in the mackerel fishery and potentially increasing the amount of information available for use monitoring catch against ACLs and catch caps. While the benefits to non-target species may be difficult to quantify under Mackerel Alternatives 2.1-2.5, they may not be realized under Mackerel Alternative 1.

The magnitude of positive impacts to non-target species associated with additional catch information is expected to vary with the type of coverage and the realized coverage level in that year. The realized coverage level in a given year would be largely driven by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified monitoring coverage target (Mackerel Alternatives 2.1-2.5).

Mackerel Alternatives 2.1-2.5 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated.

Currently, SBRM observer data are used to track the retained and discarded catch of river herring and shad catch. Additionally, SBRM observer (i.e., length) data are considered for river herring and shad stock assessments. Vessel and dealer data are used to track retained herring catch and SBRM observer data are used to track discarded herring catch. Additionally, vessel (i.e., catch and effort) and portside sampler (i.e., age and length) data are used in herring stock assessments.

Mackerel Alternative 2.1 would specify NEFOP-level observer coverage, Mackerel Alternative 2.2 would specify at-sea monitor coverage, Mackerel Alternatives 2.3 and 2.5 would specify ASM coverage and/or EM and portside sampling coverage, and Mackerel Alternative 2.4 would specify EM and portside sampling coverage. Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discarded catch. While EM cannot estimate the amount of discarded catch, it can verify retention of catch. Because discarding in the mackerel fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Mackerel Alternatives 2.1, 2.2, 2.3, and 2.5) will likely have the same potential to benefit non-target species as alternatives that increase the amount of information on retained catch (Mackerel Alternative 2.4).

Both NEFOP-level observers and portside samplers would collect age and length on non-target species, while at-sea monitors would collect length data on non-target species. Currently, length data collected by SBRM observers and age data are collected during NMFS research surveys are considered in the stock assessments for river herring and shad.

Additionally, age and length data collected by the Maine Department of Marine Resources portside sampling program is used in the stock assessment for herring. Because Mackerel Alternatives 2.1, 2.3 (portside sampling), 2.4, and 2.5 (portside sampling) would collect both age and length data on non-target species, those alternatives have the potential to benefit non-target species more than Mackerel Alternatives 2.2, 2.3 (ASM), and 2.5 (ASM) that would collect just length data on non-target species.

Mackerel Alternatives 2.1, 2.2, 2.3, and 2.5 allow some aspect of monitoring coverage to range between 25% and 100%, while Mackerel Alternative 2.4 allows monitoring coverage to range between 50% and 100%. The monitoring goals for the mackerel coverage targets are accurate estimates of mackerel catch and especially the catch of river herring and shad to track against the catch cap. While high levels of monitoring are not always necessary to address a monitoring goal, more monitoring could be more effective to meet monitoring goals than less monitoring. Therefore, across alternatives, choosing a higher coverage target has the potential to benefit non-target species by improving management through better data.

Mackerel Alternatives 2.1 – 2.5 primarily would allocate monitoring coverage by vessel permit category. The extent to which the allocation of industry-funded coverage is consistent SBRM fishing fleet will determine how the resulting data can be used. Unless vessel permit category is equivalent to fishing fleet, the resulting information from the mackerel alternatives may have limited utility. The additional information on catch and bycatch estimates in the mackerel fishery obtained via Mackerel Alternatives 2.1 – 2.5 could be used for tracking catch against ACLs and catch caps, but it is unlikely that those data could be used to estimate discards in stock assessments of non-target species. Therefore, across alternatives, the potential benefit to non-target species is similar.

The realized coverage level in a given year would be determined by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Mackerel Alternatives 2.1-2.5 specify that the vessel would be prohibited from participating in the mackerel fishery on that trip. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the mackerel fishery, even if monitoring coverage is not available. Should fishing effort/catch be limited as such, there is the potential for a positive impact on river mackerel and shad, associated with Mackerel Alternatives 2.1-2.5. The positive impact would result from the increased reproductive potential of the individuals that are unharvested. However, larger numbers of spawning fish do not guarantee an increased recruitment and high densities of fish may result in slow growth and poor condition. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable monitoring coverage requirements to be waived on a specific trip, allowing a vessel to continue participating in the mackerel fishery, even if monitoring coverage is not available. For this reason, any benefits to non-target species under Mackerel Alternatives 2.1-2.5 may not be realized under Mackerel Alternative 2 – Sub-Option 1.

Because discarding in the mackerel fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Mackerel Alternatives 2.1, 2.2, 2.3, and 2.5) will likely have the same likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just retained catch (Mackerel Alternative 2.4). Increased monitoring of river herring and shad catch may help reduce variability in estimates of catch that is tracked against the catch cap. Additionally, increased monitoring may lead to changes to the basis for setting catch caps and/or fishery catch cap being fully harvested more often or less often than expected.

In summary, the benefits of these mackerel alternatives to non-target species are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to non-target species are possible if increased monitoring can reduce uncertainty of river herring and shad catch tracked against the catch cap and, possibly, better inform the setting of the catch cap. However, these alternatives may lead to direct positive impacts on non-target species if fishing effort is limited, either through monitoring availability or the river herring and shad catch cap, leading to increased reproductive potential of non-target species. Alternatively, if more precise data leads to additional effort then there could be negative impacts for biological resources. Specific impacts of these mackerel alternatives are summarized below. The impacts of these mackerel alternatives on non-target species are not significant because they would not cause the non-target species to become overfished and would not result in overfishing.

Table 113. Impacts of Mackerel Coverage Target Alternatives on Non-Target Species

Alternatives	Impacts on Non-Target Species (River Herring and Shad)
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be primarily dependent on the type of information collected, amount of coverage, and amount of available Federal funding • Positive impact associated with Sub-Option 1 not being selected if fishing effort is limited and non-target species reproductive potential is increased • Negative impact associated with Sub-Option 5 if it biases data used to track against the catch cap

Mackerel Alternative 2.1: NEFOP-Level Coverage on Limited Access Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels and to track catch against the catch cap • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1-3 small mesh bottom trawl vessels and to track catch against the catch cap • Positive impact if fishing effort is limited and non-target species reproductive potential is increased
Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels and to track catch against the catch cap • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1 small mesh bottom trawl vessels and to track catch against the catch cap • Positive impact if fishing effort is limited and non-target species reproductive potential is increased
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels and to track catch against the catch cap • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1 small mesh bottom trawl vessels and to track catch against the catch cap • Positive impact if fishing effort is limited and non-target species reproductive potential is increased
Mackerel Alternative 2.4: EM and Portside Sampling Midwater Trawl Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels and to track catch against the catch cap • Positive impact if fishing effort is limited and non-target species reproductive potential is increased
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels and to track catch against the catch cap • Positive impact if fishing effort is limited and non-target species reproductive potential is increased

4.3.3 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON PROTECTED RESOURCES

Protected species include fish, turtles, and marine mammals listed under the ESA and marine mammals protected under the MMPA.

4.3.3.1 Impacts of Mackerel Alternatives 1 and 2 on Protected Species

Mackerel Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the MSB FMP. Monitoring for mackerel vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis.

In recent years, observer coverage for the mackerel fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-specific basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

There are 56 fishing modes defined in the SBRM, some of which further subdivide a fishery by the mesh size of the gear used (for gillnets and otter trawls), or by the type of permit and access area program (for sea scallop dredges). Although there are differences among the modes, the participants in these fishing modes fish throughout the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight, and land their catch across a large number of fishing ports from the Outer Banks of North Carolina to Downeast Maine. The SBRM is limited to those fisheries that are prosecuted in the Federal waters of the Greater Atlantic Region and managed through a FMP developed by either the MAFMC or NEFMC. Current observer coverage allocated to the mackerel fishery through SBRM is described in Table 111.

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the MSB FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Mackerel Alternative 2 is intended to allow for additional monitoring in the mackerel fishery by specifying coverage targets, above SBRM (Mackerel Alternative 1/the status quo), for industry-funded monitoring. To focus coverage on the directed mackerel fishery, monitoring coverage requirements would only apply to trips landing more than 20,000 lb of mackerel. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM and the specified coverage target. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, Mackerel Alternative 2 may have a positive impact on protected species by increasing monitoring in the mackerel fishery. While the benefits to protected species may be difficult to quantify under Mackerel Alternative 2, they may not be realized under Mackerel Alternative 1.

Under Mackerel Alternative 2, long-term benefits to protected species would vary with the type and amount of monitoring coverage target specified for the mackerel fishery but could result from increased catch monitoring. As catch information increases, the uncertainty around catch and bycatch of protected species in the mackerel fishery may be reduced, potentially improving catch estimates to be incorporated into future stock assessments and improving the available information for protected species management decisions. The magnitude of positive impacts to protected species associated with additional catch information is expected to vary with the type of coverage target specified and the realized coverage level in a given year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified coverage target (Mackerel Alternatives 2.1-2.5).

Mackerel Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the MAFMC's intent to increase monitoring in the mackerel fishery, but would not prevent vessels from participating in the mackerel fishery if monitoring coverage was not available. Should the MAFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the mackerel fishery. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the MAFMC to examine the results of any increased coverage in mackerel fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the MSB FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of mackerel from industry-funded monitoring requirements.

If increased monitoring associated with Mackerel Alternative 2 is reduced or minimized by selection of any of the sub-options, the benefits of improved catch estimates in stock assessments and improving the available information for protected species management decisions may be reduced. If Sub-Option 1 is not selected by the MAFMC and fishing effort is limited by monitoring availability, then interactions between the mackerel fishery and protected species may be reduced under Mackerel Alternative 2.

Both Mackerel Alternative 1 and Mackerel Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding. Because these measures apply similarly to both Mackerel Alternatives 1 and 2, the benefits of improved catch monitoring to protected species would be similar under both alternatives.

Coverage Target Alternatives

Mackerel Alternative 2 would specify a level and type of industry-funded monitoring for the mackerel fishery. The types of industry-funded monitoring considered by the MAFMC for the mackerel fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category.

Under Mackerel Alternative 2, the amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the mackerel fishery. Impacts on protected species associated with specific coverage target alternatives (Mackerel Alternatives 2.1-2.5) are discussed in the following section.

Monitoring and Service Provider Requirements

Mackerel Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in MSB Amendment 14.

NEFOP determined that data quality was sub-optimal when collected by observers without specialized training, potentially resulting in data loss. In addition, the high variety of deck configurations, fish handling practices and fast-paced operations proved more demanding for observers. Having an additional training to identify these practices allowed for improved decision-making while at sea, which, ultimately, improved data accuracy and maximized data collection.

Observers in the mackerel fishery are currently required to possess a HVF certification under Mackerel Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Mackerel Alternative 2. Therefore, the impacts of a HVF certification requirement under Mackerel Alternative 2 on protected species would be similar to the impacts under Mackerel Alternative 1.

Under Mackerel Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

To the extent that increased information on protected species catch benefits protected species under Mackerel Alternative 2, those benefits may not be realized under Mackerel Alternative 1.

4.3.3.2 Impacts of Mackerel Coverage Target Alternatives 2.1- 2.5 on Protected Species

Mackerel Alternatives 2.1-2.5 are intended to allow for increased monitoring in the mackerel fishery by specifying coverage targets, above and beyond SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, the increased monitoring associated with Mackerel Alternatives 2.1-2.5 may have a positive impact on protected species. That positive impact may result from reducing uncertainty around catch and bycatch of protected species in the mackerel fishery, thereby, potentially improving catch estimates to be incorporated into future stock assessments and improving the available information for protected species management decisions. While the benefits to protected species may be difficult to quantify under Mackerel Alternatives 2.1-2.5, they may not be realized under Mackerel Alternative 1.

The magnitude of positive impacts to protected species associated with additional catch information is expected to vary with the type of coverage and the realized coverage level in that year. The realized coverage level in a given year would be largely driven by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in a given year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified monitoring coverage target (Mackerel Alternatives 2.1-2.5).

Mackerel Alternatives 2.1-2.5 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated.

Mackerel Alternative 2.1 would specify NEFOP-level observer coverage, Mackerel Alternative 2.2 would specify at-sea monitor coverage, Mackerel Alternatives 2.3 and 2.5 would specify ASM coverage and/or EM and portside sampling coverage, and Mackerel Alternative 2.4 would specify EM and portside sampling coverage. Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discarded catch. While EM cannot estimate the amount of discarded catch, it can verify retention of catch. Because discarding in the mackerel fishery is minimal, alternatives that increase the amount of information on retained and discarded catch (Mackerel Alternatives 2.1, 2.1, 2.3, and 2.5) will likely have the same potential benefit to protected species as alternatives that increase the amount of information on retained catch (Mackerel Alternative 2.4).

NEFOP-level observers would collect data on interactions with protected species, such as sea turtles, marine mammals, and sea birds, as well as sighting data on protected species. In contrast, at-sea monitors would collect data on interactions with protected species, but not sighting data. Therefore, Mackerel Alternative 2.1 would generate more information on the protected species than Mackerel Alternatives 2.2-2.5.

Mackerel Alternatives 2.1, 2.2, 2.3, and 2.5 allow some aspect of monitoring coverage to range between 25% and 100%, while Mackerel Alternative 2.4 allows monitoring coverage to range between 50% and 100%. While high levels of monitoring are not always necessary to generate information, more monitoring could be more effective at generating information on the interactions between protected species and the mackerel fishery than less information, especially when interactions between protected species and the mackerel fishery occur infrequently. Therefore, across alternatives, choosing a higher coverage target has the potential to benefit the protected species by improving management through better data.

The realized coverage level in a given year would be determined by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Mackerel Alternatives 2.1-2.5 specify that the vessel would be prohibited from participating in the mackerel fishery on that trip. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the mackerel fishery, even if monitoring coverage is not available. If the MAFMC does not select Sub-Option 1, and mackerel fishing effort is limited by the availability of monitoring coverage such that the harvest of protected species or interactions with protected species is reduced, there is the potential for a positive impact protected species associated with Mackerel Alternatives 2.1-2.5. The positive impact would result from the increased reproductive potential of the individuals that are unharvested. If the MAFMC selects Sub-Option 1, and monitoring coverage requirements are waived on the majority of herring trips, there would be no additional information to potentially improve catch information for stock assessments or improve the available information for protected species management decisions. For these reason, any benefits to protected species under Mackerel Alternatives 2.1-2.5 may not be realized under Mackerel Alternative 2 – Sub-Option 1.

In summary, the benefits of these mackerel alternatives to protected species are indirect because they affect levels of monitoring rather than harvest specifications. Indirect benefits to protected species are possible if increased monitoring of the mackerel fishery generates additional information on protected species, potentially improving catch and bycatch estimates to be incorporated into future stock assessments and improving the available information for protected species management decisions. However, these alternatives may lead to direct positive impacts on protected species if fishing effort is limited, either through monitoring availability or the river herring and shad catch cap, leading to increased reproductive potential of protected species. Alternatively, if more precise data leads to additional effort then there could be negative impacts for biological resources. The impacts of these mackerel alternatives are summarized below. The impacts of these mackerel alternatives on protected species are not significant because they would not cause a change in population status.

Table 114. Impacts of Mackerel Coverage Target Alternatives on Protected Species

Alternatives	Impacts on Protected Species
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Positive impact associated with additional monitoring to reduce uncertainty around catch estimates • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Positive impact associated with Sub-Option 1 not being selected if fishing effort is limited and the reproductive potential of protected species is increased
Mackerel Alternative 2.1: NEFOP-Level Coverage on Limited Access Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1-3 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with Tier 1 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Mackerel Alternative 2.4: EM and Portside Sampling Midwater Trawl Vessels	• Low positive impact associated with additional information to reduce uncertainty around catch estimates associated with limited access midwater trawl vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased
Mackerel Alternative	• Low positive impact associated with additional information to reduce

2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	uncertainty around catch estimates associated with limited access midwater trawl vessels • Positive impact if fishing effort is limited and the reproductive potential of protected species is increased

4.3.4 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON THE PHYSICAL ENVIRONMENT

4.3.4.1 Impacts of Mackerel Alternatives on the Physical Environment

Mackerel Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the MSB FMP. Monitoring for mackerel vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis.

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the MSB FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Mackerel Alternative 2 is intended to allow for increased monitoring in the mackerel fishery by specifying coverage targets, above and beyond SBRM (Mackerel Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. The realized coverage for the fishery in a given year would fall somewhere between no additional coverage above SBRM requirements (Mackerel Alternative 1) and the specified coverage target (Mackerel Alternative 2.1-2.5).

The impact of the mackerel fishery on the physical environment is thought to be minimal and temporary. Therefore, the expected impact on the physical environment of increased monitoring in the mackerel fishery is expected to be negligible under both Mackerel Alternatives 1 and 2 and any of the associated coverage options.

Mackerel Alternative 2 would specify a level and type of industry-funded monitoring for the mackerel fishery. The monitoring levels under consideration by the MAFMC range from 25% to 100%. The types of monitoring under consideration include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category. The amount and quality of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative (Mackerel Alternatives 2.1-2.5) specified for the mackerel fishery.

The realized coverage level would be determined by the amount of funding available to cover NMFS cost responsibilities in a given year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Mackerel Alternatives 2.1-2.5 specify that the vessel would be prohibited from participating in the mackerel fishery on that trip. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the mackerel fishery, even if monitoring coverage is not available. Additionally, the amount and quality of information collected under Mackerel Alternatives 2.1-2.5 has the potential to affect the amount of effort in the mackerel fishery.

Should fishing effort be limited by the availability of monitoring coverage or additional data collected, there is the potential for a positive impact on the physical environment. However, the magnitude of any potential positive impact is low because the mackerel fishery has only minimal and temporary impacts on the environment. Additionally, vessels may switch gear modes to minimize economic impacts associated with gear-specific requirements. However changes to gear modes associated with Mackerel Alternatives 2.1-2.5 are not expected to affect the overall impact of the mackerel fishery on the physical environment. Therefore, impacts on the physical environment are expected to be similar under Mackerel Alternatives 1 and 2.

TABLE 115. IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON PHYSICAL ENVIRONMENT

Alternatives	Impacts on Physical Environment
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Negligible impact associated with minimal and temporary effects on the environment from mackerel fishery
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Negligible impact associated with minimal and temporary effects on the environment from mackerel fishery • Low positive impact if fishing effort is limited by monitoring availability • Negligible impact associated with switching gear modes

4.3.5 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON HUMAN COMMUNITIES

Another major consideration when evaluating an industry-funded monitoring program is the cost of the monitoring program. The requirement to pay for monitoring coverage increases operating costs for fishing vessels, which in turn reduces net vessel revenues and overall profitability.

There are two primary approaches for minimizing the cost of monitoring paid by industry. The first approach is to select the most cost effective type of coverage to meet program goals. For example, it may be more cost effective to use electronic monitoring rather than at-sea observers to confirm retention of catch on mackerel vessels.

The second approach to limit costs to industry is to set coverage levels at the lowest level necessary to gather information to meet program goals. For example, it may be possible to sufficiently increase precision around catch estimates for a certain species by setting a coverage target of 50%, rather than a coverage target of 100%.

Table 116 shows the range of costs associated with the different types of monitoring being considered for the mackerel fishery. A detailed description of industry cost responsibilities associated with each of these types of monitoring can be found in Appendix 6 – Monitoring Cost Estimates.

TABLE 116. MONITORING COST ESTIMATES FOR THE MACKEREL FISHERY

Types of Monitoring	NMFS Cost	Vessel Cost
NEFOP-Level Observer	$479 per sea day	$818 per sea day
At-Sea Monitor	$530 per sea day	$710 per sea day
Electronic Monitoring[1]	Year 1: $36,000 startup plus $97 per sea day Year 2: $97 per sea day	Year 1: $15,000 startup plus $325-$172 per sea day (depending on coverage target) Year 2: $325-$172 per sea day (depending on coverage target)
Portside Sampling[2]	$479-$530 per sea day	$5.12[1] or $3.84[2] per mt

1 – EM cost assumptions: EM on every vessel, video collected throughout the duration of a trip (100%) or only around haulback (25%, 50%, or 75%), and 25%, 50%, 75% or 100% video review. Costs for coverage targets are: $325 for 100%, $202 for 75%, $187 for 50%, and $172 for 25%.
2 – Portside cost assumptions: $5.12 includes portside administration costs. $3.84 does not include portside administration. $5.12 mt would apply to 100% of trips, while $3.84 would apply to 25%, 50%, or 75% of trips.

Assumptions used to generate estimates of industry cost responsibilities

While the cost of a sea day can vary between service providers, the individual components of a sea day cost are necessary to successfully execute a monitoring program. Because each of these components is essential, in most cases, it is not appropriate to reduce industry's cost responsibilities by arbitrarily removing or adjusting components of the sea day cost.

<u>NEFOP-Level Observer Cost Estimate</u>

The $818 per sea day industry cost responsibility related to NEFOP-level observer coverage is based on sampling costs from October 2012 through May 2014 averaged across 3 service providers. The program elements and activities covered in this cost would include, but are not limited to, costs to the provider for deployments and sampling (e.g., travel and salary for observer deployments and debriefing), equipment, costs to the provider for observer time and travel to a scheduled deployment that does not sail and was not canceled by the vessel prior to the sail time, and provider overhead.

At-Sea Monitor Cost Estimate

The $710 per sea day industry cost responsibility related to a mackerel at-sea monitoring program is based on the current sea day rate for the groundfish at-sea monitoring program. However, mackerel at-sea monitors would be collecting data on discards only. This may reduce training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the mackerel fishery resulting in a lower sea day rate than the groundfish at-sea monitoring program rate. (*See Appendix 5 – Analysis of ASM Costs for additional information.*) In the absence of an estimate specific to the mackerel at-sea monitoring program, the PDT/FMAT determined that using the groundfish at-sea monitoring sea day rate was appropriate, but the actual cost of a mackerel at-sea monitor may be more or less.

Table 117. Industry cost Responsibilities for NEFOP-level Observers and At-Sea Monitors

Industry Cost Responsibilities	NEFOP-level observer cost per sea day	At-sea monitoring cost per sea day
Provider costs for deployments and sampling (e.g., travel and salary for observer deployments and debriefing)	Sea day charges paid to providers: $640 Travel: $71 Meals: $22 Other non-sea day charges: $12	Sea day charge paid to providers: $561 Travel: $67 Meals: $18 Other non-sea day charges: $14
Equipment, as specified by NMFS, to the extent not provided by NMFS	$11	
Provider costs for observer time and travel to a scheduled deployment that doesn't sail and was not canceled by the vessel prior to the sail time.	$1	
Provider overhead and project management costs not included in sea day charges above (e.g., per diem costs for trainees)	Training: $61	Training: $50
Provider costs to meet	TBD – won't know these costs	TBD – won't know these costs

performance standards laid out by a fishery management plan	until an industry funded observer coverage program is implemented in a fishery	until an industry funded observer coverage program is implemented in a fishery
Total (not including other costs)	$818	$710

Midwater Trawl Electronic Monitoring Cost Estimate

Because no Federal electronic monitoring program exists for the midwater trawl fleet, industry cost responsibilities associated with an electronic monitoring program for the midwater trawl fleet were difficult to estimate. Electronic monitoring cost estimates include a one-time implementation cost, as well as ongoing annual operational program costs. Cost components include equipment, field services, data services, and program management. The implementation costs associated with EM are summarized in Table 118 and the ongoing costs associated with EM are summarized in Table 119. Additional details on monitoring costs are available in Appendix 6 – Monitoring Cost Estimates.

TABLE 118. INDUSTRY COST RESPONSIBILITIES FOR ELECTRONIC MONITORING IMPLEMENTATION

Industry Cost Responsibilities	Electronic Monitoring Implementation Costs Per Vessel
Equipment, including initial purchase and installation of the cameras, associated sensors, integrated GPS, control box, and hard drives	$9,018
Field Services, including technician's labor and travel associated with the installation of equipment	$2,952
Program Management, including one-time labor, equipment, facilities, and administrative costs associated with getting the new EM program operational	$3,493
Total	$15,463

Initially, the sea day cost for EM was estimated at $325. The $325 cost estimate is likely high because it assumes video footage is collected for the duration of a trip and 100% of the video footage is reviewed. Subsequently, the PDT/FMAT generated cost estimates for other coverage targets (25%, 50%, and 75%) with the assumption that video footage is just collected around haulback and that the level of video footage review matches the coverage target. The breakdown of these costs is shown in Table 119.

Table 119. Industry Cost Responsibilities for Ongoing electronic Monitoring Costs per sea day

Industry Cost Responsibilities	100% Coverage	75% Coverage	50% Coverage	25% Coverage
Equipment, including annual equipment costs estimated here include spare parts to replace broken or aging equipment, as well as licenses for the use of proprietary software	$11	$11	$11	$11
Field Services, including labor, travel, and other costs associated with repairs, technical support, and retrieving hard drives from the vessels and shipping them to the service provider for analysis	$78	$47	$47	$47
Data Services, including the costs associated with review and analysis of the video, reporting to NMFS, and archiving of the data	$160	$67	$52	$37
Program Management, including costs of the day-to-day operations of the service provider for running the EM program	$77	$77	$77	$77
Total	$325	$202	$187	$187

Midwater Trawl Portside Sampling Cost Estimate

The analysis assumes the cost per amount of fish landed is the most accurate way to represent the potential industry costs for monitoring. Because no Federal portside sampling program exists for the midwater trawl fleet, industry cost responsibilities associated with a portside sampling program for the midwater trawl fleet were difficult to estimate.

The average cost per pound of groundfish landed for the Northeast Multispecies dockside monitoring program ranged from $0.01 - $0.12 per pound for all sectors. The average cost per pound landed per trip is inversely related to the average pounds landed – that is, trips that land larger amounts are less expensive to monitor than trips that land smaller amounts. Larger trips are less expensive to monitor because they typically land in principle ports with a dedicated monitor, therefore, there are no additional costs for monitors to travel to offload locations.

Initially, the industry cost responsibility associated with portside sampling was estimated to be as much as $5.12 per mt. This cost estimate was generated using information from the Massachusetts Division of Marine Fisheries portside sampling program for the herring fishery. The $5.12 per mt cost estimate is likely high as it includes program administration costs as well as sampling costs and was intended to apply to all trips for a target sampling rate of 100%.

Subsequently, the PDT/FMAT generated a revised cost estimate ($3.84 per mt) that does not include portside administration costs. This cost estimate may be closer to the actual industry cost responsibilities associated with portside sampling and would apply to 25%, 50%, or 75% of trips, consistent with the coverage target selected by the NEFMC.

Midwater trawl vessels returning from declared herring trips would be required to land catch in specific ports for sampling. Table 120 describes the ports where midwater trawl vessel currently land catch and whether those ports are currently sampled by existing portside sampling program for the midwater trawl fleet operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

TABLE 120. LANDING PORTS FOR MWT VESSELS AND PORTSIDE SAMPLING ISSUES

Ports	Currently Sampled (Y/N)	Issues Affecting Sampling
Maine		
Portland	Y	None
Rockland	Y	None
Vinalhaven	N	Not cost effective; fish sold over the side of vessels
Prospect Harbor	Y	None
Jonesport	Y	None
Massachusetts		
Boston	N	Costly to sample; logistically challenging; unsafe area
Gloucester	Y	Only a few landings during the year

New Bedford	Y	Logistically challenging; safety issues
Rhode Island		
Point Judith	Y	None
North Kingstown	N	Only frozen product is landed
Newport	N	Safety issues
New Jersey		
Cape May	Y	None

Approximately 95% of midwater trawl landings are made in ports currently sampled by the state programs. However, if certain ports are not suitable for portside sampling, then vessel may not be able to land in those ports on trips that are selected for portside sampling. Some vessels only land in a single port and that port is not currently sampled. Some vessels land in both sampled and unsampled ports, but changing past practices to land only in sampled ports may not be easy.

Travel time and seller/buyer arrangements are likely to be most affected by requiring midwater trawl vessels to land in specified ports. Seasonal fishing conditions may make travel time to specified ports an issue of concern. But seller/buyer arrangements are likely the larger concern. A vessel may need to substantially revise its business plan if it must land in a port not previously used.

Without a predictive model, the analysis of requiring vessels to land in specified ports will be qualitative. Additionally, data confidentiality will limit a quantitative analysis. However, if certain ports are not suitable for portside sampling, then vessels may not be able to land in those ports on trips that are selected for portside sampling.

Table 121. Summary of Economic Impacts of Mackerel Coverage target Alternatives

Alternatives	Impacts on Fishery Related-Businesses
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	• Low positive impact associated with observer coverage allocated by SBRM • Low negative impact associated with no additional monitoring to reduce uncertainty around catch estimates

Mackerel Alternative 2: Coverage Target Specified For IFM Programs	• Negative impact associated with potential reduction in return to owner (RTO) • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional monitoring to reduce uncertainty around catch estimates in the mackerel fishery • Low negative impact associated with no additional monitoring unless available Federal funding can cover NMFS cost responsibilities • Magnitude of impacts associated with additional monitoring would be dependent on the type of information collected, amount of coverage, how coverage is allocated, and amount of available Federal funding • Magnitude of impacts associated with selection of Sub-Options
Mackerel Alternative 2.1: NEFOP-Level Coverage	• Negative impact associated with potential 11.9%-5.1% reduction in RTO • Negative impact associated with potential 6.9%-4.3% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery
Mackerel Alternative 2.2: ASM Coverage	• Negative impact associated with potential 10.3%-1.4% reduction in RTO • Negative impact associated with potential 6.0%-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery
Mackerel Alternative 2.3: Combination Coverage	• Negative impact associated with potential 10.3%-1.4% reduction in RTO • Negative impact associated with potential 16.4%*-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery
Mackerel Alternative 2.4: EM and Portside Sampling on Midwater Trawl Vessels	• Negative impact associated with potential 8.3%*-1.8% reduction in RTO • Negative impact associated with potential 7.0%*-1.6% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the mackerel fishery

Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	• Negative impact associated with potential 8.2%*-0.6%* reduction in RTO • Negative impact associated with potential 16.0%*-0.6%* reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery

The previous analysis of economic impacts of mackerel coverage target alternatives on the mackerel industry was based on trip cost data collected by NEFOP and showed the economic impact of the alternatives on partial vessel net revenues (gross revenues less certain trip costs). Because NEFOP only collects a limited amount of cost data, industry participants expressed concern that an analysis of net revenues underestimated vessel costs. In response, Jason Didden, staff of the MAFMC, offered to coordinate a survey of herring and mackerel vessels to collect more detailed cost information.

The survey requested information from vessel owners on total trip costs in 2014. The cost survey collected information on variable costs; payments to crew; the cost of repairs, maintenance, upgrades; and fixed costs. These data were used to update the impact analyses. To profile vessels, data were averaged across vessel types, by vessel characteristics, and primary species caught. The cost profiles of vessels, as adjusted by the estimated industry cost responsibilities of each mackerel coverage target alternative, were used to describe the economic impact on mackerel vessels. Economic impacts are described at an annual level. Surveys were sent to approximately 18 vessel owners (representing about 26 vessels) in the herring and/or mackerel fisheries. Surveys were sent in May 2015 and information was submitted for 16 of the 26 vessels. A copy of the survey is included in Appendix 7.

Analysis of the economic impact of industry-funded monitoring mackerel coverage target alternatives on fishery-related businesses compared industry cost responsibilities to 2014 mackerel vessel returns-to owner (RTO). RTO is calculated by subtracting fixed and operational costs from gross revenue (Table 1) and was used rather than net revenues to more accurately reflect income from fishing trips. RTO is similar to net income from a financial income statement. Other financial statement approaches, such as a balance sheet or a cash flow statement, are not used. These approaches consider other financial aspects of a business, such as total assets and liabilities and the ability to cover expenses within a particular time frame. Principal payments on loans, which matter from a balance sheet and cash flow perspective, are not typically used in the calculation of RTO/net income. Depreciation of capital assets is typically part of a RTO/net income calculation. In this analysis, depreciation of vessel improvements is included but the depreciation of the vessel is not included because that information was not collected in the survey.

Table 122. Summary of Total Trip Costs for Herring and Mackerel Vessels in 2014

Cost Category	Description	Average Percent of 2014 Gross Revenue for Herring and Mackerel Vessels	Average Percent of 2014 Gross Revenue for Squid Vessels
Variable Costs	Annual fuel, oil, food, water, ice, carrier vessel, communication, fishing supplies, crew supplies, and catch handling costs	25%	35%
Crew Share	Total annual payments to crew	28%	26%
Repair, Maintenance, Upgrades, Haulout (RMUH)	Annual cost of repairs to engines, deck equipment, machinery, hull, fishing gear, electronics, processing equipment, refrigeration, safety equipment, upgrades and haulout Because these costs vary considerably from year to year and are typically spread out over several years, only a portion of these costs were applied to 2014 revenue	13%	11%
Fixed Costs	Annual mooring, dockage, permits and licenses, insurance, quota and DAS lease, crew benefits, vessel monitoring, workshop and storage, office, vehicle, travel, association, professional, interest, taxes, and non-crew labor costs Note: depreciation expense of the vessel is not included in fixed costs.	19%	21%
Return to Owner	Gross revenue less variable, crew share, RMUH, and fixed costs	15%	7%

The MAFMC is considering four types of industry-funded monitoring for the mackerel fishery, including NEFOP-level observers, at-sea monitors, EM, and portside sampling coverage. NEFOP-level and at-sea monitoring coverage would function independently, but EM and portside are intended to be used together.

Prior to any trip declared into the mackerel fishery, vessel representatives would be required contact NMFS and request monitoring coverage. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether monitoring coverage must be procured through an industry-funded monitoring service provider. For the purposes of this analysis, however, it is assumed that there would be no SBRM coverage of trips. Therefore, the economic impacts of industry-funded monitoring cost alternatives described in this section may be an overestimate of actual costs.

Summary of Economic Analyses

In general, the economic analyses evaluated two groups of vessels, one group was paired midwater trawl vessels and the second group included single midwater trawl vessels and small mesh bottom trawl vessels. The single midwater trawl vessels were combined with small mesh bottom trawl vessels to avoid data confidentiality violations.

Sea day costs are similar across Mackerel Alternatives 2.1, 2.2, and 2.3 for all vessel types. However, median at-sea monitoring costs as a percent of RTO are about twice as high for single midwater trawl and Tier 1 small mesh bottom trawl vessels (combined) as they are for paired midwater trawl vessels.

Median EM and portside monitoring costs as a percent of RTO in Year 2 under Mackerel Alternatives 2.3 and 2.4 for single midwater trawl vessels are about twice as high than for paired midwater trawl vessels at the 20,000 lb threshold and four times as high at the 25 mt threshold.

Mackerel revenue comprises a smaller portion of total revenue for vessels participating in the mackerel fishery than herring revenue does for vessels participating in the herring fishery. Therefore, revenue from other fisheries would contribute more significantly to covering industry-funded monitoring costs in the mackerel fishery than revenue from other fisheries would be covering industry-funded monitoring costs in the herring fishery. Meaning that if vessels wanted to continue to declare mackerel trips, they may need to use revenue from other fisheries to pay the industry-funded monitoring costs associated with the mackerel fishery. For all participants in the mackerel fishery, the average percentage of revenue that comes from the mackerel fishery never exceeded 75% in 2014. Additionally, average mackerel revenue from single midwater trawl vessels is about 20% lower than average mackerel revenue from paired midwater trawl vessels. For this reason, single midwater trawl vessel would likely rely more on revenue from other fisheries to cover industry-funded monitoring costs in the mackerel fishery than paired midwater trawl vessels.

Another method for accounting for these differential impacts on vessels using revenue from other fisheries to cover monitoring costs in the mackerel fishery would be to apportion the overall RTO to the different fisheries and then reduce the mackerel RTO by the monitoring cost. However, to properly apportion RTO to fisheries, much more detailed cost data is required. If data were available on a trip basis, costs that are specific to the fishery pursued on that trip could be assigned. Fuel is a good example of this type of cost. However, the trip related cost data used in the RTO analysis is at an annual level. Even with highly detailed cost information there are still costs that do not vary by trip, such as insurance costs. It is unclear in this instance what method should be used to apportion these costs. For these reasons, mackerel as a percentage of revenue, rather than mackerel RTO, is shown in the following tables to evaluate impacts on vessels using revenue from other fisheries to cover monitoring costs in the mackerel fishery.

Exempting trips that land less than 25 mt of mackerel (Mackerel Alternative 2 Sub-Option 5) reduces monitoring costs more for Mackerel Alternatives 2.1 and 2.2 (about 30%) than for Mackerel Alternatives 2.3 and 2.4 (about 23%).

Monitoring costs associated with EM and portside sampling are similar to the costs associated with at-sea monitoring in Year 1 for paired midwater trawl vessels, but EM and portside sampling costs are 14% less than at-sea monitoring costs in Year 2 for paired midwater trawl vessels at EM of $325/day and portside of $5.12/mt. For EM at $187/day and 50% portside coverage at $3.84/mt the monitoring costs are 60% less. For single midwater trawl and small mesh bottom trawl vessels, the monitoring costs associated with EM and portside are about half of the at-sea monitoring costs in Year 1 and about a quarter of the at-sea monitoring costs in Year 2.

Initial industry cost assumptions for Mackerel Alternative 2.4 estimated $325 per sea day for electronic monitoring (cameras on every midwater trawl vessel, video collected for the duration of the trip, 100% vide review) and $5.12 per mt for portside sampling (administration and sampling cost) on close to 100% of trips. Revised industry cost assumptions for Mackerel Alternative 2.4 estimated $187 per sea day for electronic monitoring (cameras on every midwater trawl vessel, video collected around haulback, 50% video review) and $3.84 per mt for portside sampling (only sampling costs) on 50% of trips. Using the revised cost assumptions rather than the initial cost assumption for Mackerel Alternative 2.4 reduces total industry monitoring costs by 52% ($45,812 to $21,796) in Year 2, at the 20,000 lb threshold, for paired midwater trawl vessels and reduces costs by 55% ($34,421 to $15,364) in Year 2, at the 20,000 lb threshold, for single midwater trawl vessels.

Many of the vessels that would be impacted by industry-funded monitoring costs in the mackerel fishery would also be impacted by industry-funded monitoring costs in the herring fishery. For example, all the vessels impacted by Mackerel Alternative 2.1 would also be impacted by Herring Alternative 2.1 (100% NEFOP-level observer coverage on Herring Category A and B vessels).

The tables and box plot figures ("box plots") on the following pages provide summarized economic data for each of the mackerel coverage target alternatives. The economic impact on vessels associated with paying for monitoring coverage is described as a percentage of RTO for each mackerel coverage target alternative in the following figures. The tables provide the mean and median number of sea days per vessel that would result from each of the alternatives, as well as the mean and median RTO that would ultimately be reduced by the industry-funded monitoring costs. Additionally, fleet level effort, revenue, and monitoring cost information for each mackerel coverage target alternative are also provided. Additional economic analysis is available in Appendix 9.

4.3.5.1 Impacts of Mackerel Alternatives 1 and 2 on Fishery-Related Businesses

Mackerel Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the MSB FMP. Monitoring for mackerel vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis. Under Mackerel Alternative 1, additional costs to vessels participating in the mackerel fishery associated with monitoring coverage, if there were any, would be evaluated on a case-by-case basis.

In recent years, observer coverage for the mackerel fishery has largely been allocated as part of the SBRM. The SBRM is the combination of sampling design, data collection procedures, and analyses used to estimate bycatch in multiple fisheries. The SBRM provides a structured approach for evaluating the effectiveness of the allocation of fisheries observer effort across multiple fisheries to monitor a large number of species. Although management measures are typically developed and implemented on an FMP-by-FMP basis, from the perspective of developing a bycatch reporting system, there is overlap among the FMPs and the fisheries that occur in New England and the Mid-Atlantic that could result in redundant and wasteful requirements if each FMP is addressed independently.

Currently, it is unknown if the mackerel stock is overfished or if overfishing is occurring. There is concern about the mackerel fishery and indications of reduced productivity related to low catches in recent years (TRAC 2010). Possible explanations include: (1) mackerel have moved away from traditional fishing grounds (as has occurred in Europe), (2) environmental conditions have resulted in a less productive or less fishable stock, or (3) the stock is overfished. A combination of these factors could also be possible. In recent years, the fleet has not been able to harvest the ACL or ACTs. Selection of Mackerel Alternative 1 will not likely affect the setting of mackerel harvest specifications, but it may affect the ability of the mackerel fishery to harvest mackerel. If less monitoring (when compared to Mackerel Alternative 2) results in the catch cap for river herring and shad limiting effort in the mackerel fishery.

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the MSB FMP. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of coverage, (3) minimum level of coverage necessary to meet coverage goals, (4) consideration of coverage waivers if coverage target cannot be met, (5) process for vessel notification and selection, (6) process for payment of industry cost responsibilities, (7) standards for monitoring service providers, and (8) any other measures necessary to implement the industry-funded monitoring program. Additional NEPA analysis would be required for any subsequent FMP framework adjustment action implementing and/or modifying the specified industry-funded monitoring programs.

Mackerel Alternative 2 is intended to allow for increased monitoring in the mackerel fishery by specifying coverage targets, above and beyond SBRM (Mackerel Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be determined by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in that year and would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified coverage target (Mackerel Alternatives 2.1-2.5).

If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, Mackerel Alternative 2 may have both positive and negative economic impacts on vessels participating in the mackerel fishery.

Indirect positive impacts on mackerel vessels associated with Mackerel Alternative 2 may result from increased monitoring helping reduce variability around catch and bycatch estimates in the mackerel fishery leading to additional harvesting opportunities. If increased monitoring reduces the variability in the catch of river herring and shad tracked against catch caps, mackerel vessels may benefit from increased stability in the fishery.

Direct negative impacts on mackerel vessels associated with Mackerel Alternative 2 would likely result from reduced RTO after paying for monitoring coverage. The magnitude of the economic impact associated with paying for monitoring coverage would vary by mackerel coverage target alternative (Mackerel Alternatives 2.1-2.5). While the full extent of positive and negative impacts to mackerel vessels may be difficult to quantify under Mackerel Alternative 2, the impacts may not be realized under Mackerel Alternative 1.

If Federal funding is not available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, fishing effort may be reduced under Mackerel Alternative 2 to match available levels of monitoring coverage. If fishing effort is reduced to match available monitoring levels, mackerel vessels may be less able to harvest mackerel. This direct negative economic impact associated with Mackerel Alternative 2 would be less likely to be realized under Mackerel Alternative 1.

Mackerel Alternative 2 would allow several sub-options to apply to the industry-funded monitoring alternatives. Sub-Option 1 would allow vessels to be issued waivers to exempt them from industry-funded monitoring requirements, for either a trip or the fishing year, if coverage was unavailable due to funding or logistics. Selection of this sub-option preserves the MAFMC's intent to increase monitoring in the mackerel fishery, but would not prevent vessels from participating in the mackerel fishery if monitoring coverage was not available. Should the MAFMC not select Sub-Option 1, then any industry-funded monitoring requirements established in this amendment would have the potential to reduce effort in the mackerel fishery. Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the MAFMC to examine the results of any increased coverage in the mackerel fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework adjustment, or an amendment to the MSB FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of mackerel from industry-funded monitoring requirements.

If selection of the sub-options under Mackerel Alternative 2 minimizes the likelihood of positive or negative economic impacts on mackerel vessels, then the economic impacts associated with the sub-options may be reduced and/or similar to impacts under Mackerel Alternative 1. Additionally, under Mackerel Alternative 2, because the 25 mt threshold differs from the triggers used to determine which trips count against catch caps for river herring and shad (20,000 lb of mackerel), the data generated by selecting Sub-Option 5 may bias (either higher or lower) the catch tracked against catch caps when compared to not selecting Sub-Option 5.

Both Mackerel Alternative 1 and Mackerel Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding. Because these measures apply to both Mackerel Alternatives 1 and 2, the cost of complying with these requirements may be similar under Mackerel Alternatives 1 and 2, unless monitoring coverage is substantially higher under Mackerel Alternative 2. In that case, the cost of complying with these requirements may be higher under Mackerel Alternative 2.

Impacts under Mackerel Alternative 2 assume that the future behavior of fishery participants will be similar to that in past years, when in reality fishery participants are likely to engage in a range of mitigation behaviors to reduce the economic impact associated with industry-funded monitoring. For example, vessels that have historically participated in many fisheries may stop fishing for mackerel and only participate in fisheries that do not have industry-funded monitoring requirements. However, if a vessel does not have the ability to participate in other fisheries, it may not be able to mitigate the impacts of industry-funded monitoring in that way. At this time, it is not possible to predict what, if any, mitigation behaviors may be used by mackerel fishery participants.

Coverage Target Alternatives

Mackerel Alternative 2 would specify a level and type of industry-funded monitoring for the mackerel fishery. The types of industry-funded monitoring considered by the MAFMC for the mackerel fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category.

Under Mackerel Alternative 2, the amount, quality, and cost of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the mackerel fishery. Economic impacts on vessels participating in the mackerel fishery associated with specific coverage target alternatives (Mackerel Alternatives 2.1-2.5) are discussed in the following section.

Monitoring and Service Provider Requirements

Mackerel Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. This certification was developed to prepare observers for changes in the regulations and new requirements that were under consideration in MSB Amendment 14.

Observers in the mackerel fishery are currently required to possess a HVF certification under Mackerel Alternative 1 and both observers and at-sea monitors would be required to possess a HVF certification under Mackerel Alternative 2. Mackerel vessels do not pay for observer training under Mackerel Alternative 1, but vessels would be responsible for additional observer and at-sea monitor training costs under Mackerel Alternative 2. Therefore, the economic impact on mackerel vessels of a HVF certification requirement under Mackerel Alternative 2 would be more negative than under Mackerel Alternative 1.

Under Mackerel Alternative 2, the process for vessel notification and selection and payment of industry cost responsibilities would be developed during the rulemaking and amendment approval process.

The direct economic impacts on mackerel vessels would be more negative under Mackerel Alternative 2 than under Mackerel Alternative 1 because vessels would be paying for additional monitoring coverage. To the extent that increased information on mackerel catch has indirect economic impacts on mackerel vessels under Mackerel Alternative 2, those indirect impacts may not be realized under Mackerel Alternative 1.

4.3.5.2 Impacts of Mackerel Coverage Target Alternatives 2.1- 2.5 on Fishery-Related Businesses

Mackerel Alternatives 2.1-2.5 are intended to allow for increased monitoring in the mackerel fishery by specifying coverage targets, above and beyond SBRM, for industry-funded monitoring. If Federal funding is available to cover NMFS cost responsibilities associated with industry-funded monitoring in the mackerel fishery, Mackerel Alternative 2 may have both positive and negative economic impacts on vessels participating in the mackerel fishery.

While the positive and negative economic impacts on mackerel vessels may be difficult to quantify under Mackerel Alternatives 2.1-2.5, the impacts would be less likely to be realized under Mackerel Alternative 1.

The magnitude of positive and negative economic impacts on mackerel vessels is expected to vary with the monitoring coverage target specified and the realized coverage level in a given year. The realized coverage level in a given year would be largely driven by the amount of funding available to cover NMFS cost responsibilities in that year and would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified monitoring coverage target (Mackerel Alternatives 2.1-2.5).

Mackerel Alternatives 2.1-2.5 differ by (1) the type of information collected, (2) the specified amount of coverage, and (3) how coverage is allocated. Both the type of information collected and the amount of monitoring coverage will have a direct economic impact on vessels paying for monitoring coverage in the mackerel fishery.

Vessel, dealer, and SBRM data are used to track retained and discarded catch of mackerel as well as river herring and shad. These data are also used to track catch of other not-target species and catch of protected species.

The mackerel fishery is managed with a catch cap for river herring and shad. If the catch cap is harvested, effort in the mackerel fishery is restricted.

Mackerel Alternatives 2.1 would specify NEFOP-level observer coverage, Mackerel Alternatives 2.2 would specify at-sea monitor coverage, Mackerel Alternatives 2.3 and 2.5 would specify ASM and/or EM and portside sampling coverage, and Mackerel Alternative 2.4 would specify EM and portside sampling coverage.

The industry cost responsibility associated with NEFOP-level observer coverage is the most expensive ($818 per sea day) followed by at-sea monitor coverage ($717 per sea day), and EM ($17-$325 per sea day) and portside sampling ($3.84-$5.12 per mt).

The following table describes the potential reduction to RTO associated with paying for monitoring coverage across mackerel coverage target alternatives. Shaded cells in the following table indicate when the potential reduction to RTO associated with pay for monitoring coverage exceeds 10%. Additional background and summary information can be found in tables and box plots displayed starting on page 333.

Table 123. Potential Reduction to Return-To-Owner for Mackerel Coverage Target Alternatives 2.1 – 2.4

Alternative	Gear Type	Paired MWT		Single MWT and SMBT (T1)	
	Median potential reduction to RTO from coverage	≥20k lb	> 25 MT	≥20k lb	> 25 MT
2.1	100% NEFOP-level	5.1%	4.3%	11.9%	6.9%
2.2 and 2.3	100% ASM	4.4%	3.7%	10.3%	6.0%
	75% ASM	3.3%	2.8%	7.9%	6.0%
	50% ASM	2.3%	2.0%	5.2%	5.3%
	25% ASM	1.4%	1.4%	3.1%	3.1%
		Paired MWT		Single MWT	
2.3 and 2.4	100% EM/PS Year 1	10.7%	10.1%	22.6%	35.1%
	100% EM/PS Year 2	3.8%	3.7%	8.3%	16.4%
	50% EM/PS Year 1	9.1%	8.2%	18.3%	25.7%
	50% EM/PS Year 2	1.8%	1.6%	3.8%	7.0%
2.5	100% EM/PS Year 1	10.6%	10.0%	22.5%	34.8%

	100% EM/PS Year 2	3.8%	3.6%	8.2%	16.0%
	75% EM/PS Year 1	9.1%	8.3%	18.4%	27.3%
	75% EM/PS Year 2	1.9%	1.9%	4.1%	8.6%
	50% EM/PS Year 1	8.7%	7.7%	16.9%	24.3%
	50% EM/PS Year 2	1.2%	1.2%	2.7%	5.6%
	25% EM/PS Year 1	8.3%	7.1%	15.6%	21.5%
	25% EM/PS Year 2	0.6%	0.6%	1.3%	2.7%
For EM/Portside Costs = Year 1 includes $15,000 for purchase and installation of EM equipment and Year 2 does not include the $15,000 purchase and installation costs.					

In general, the negative economic impact on mackerel vessels of paying for monitoring coverage (as measures by the potential reduction in the RTO) largely depends on the type of information collected and amount of coverage specified.

Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discards. EM cannot estimate the amount of discards, but EM can verify retention of catch.

Because discarding in the mackerel fishery is minimal, Alternatives that increase the amount of information on retained and discarded catch (Mackerel Alternatives 2.1, 2.2, 2.3, and 2.5) will likely have the same likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just retained catch (Mackerel Alternative 2.4). Increased monitoring of river herring and shad catch may help reduce variability in estimates of catch that is tracked against catch caps, when that variability may have otherwise led to effort restrictions in the mackerel fishery. Conversely, additional monitoring may illustrate higher than expected catch of river herring and shad, resulting in catch caps that are fully harvested earlier than expected and reduced opportunities to harvest mackerel. Increased information to help track catch against catch caps may help allow more opportunity to harvest mackerel or it may curtail the harvest of mackerel by the mackerel fishery.

Mackerel Alternatives 2.1, 2.2, 2.3, and 2.5 allow some aspect of monitoring coverage to range between 25% and 100%, while Mackerel Alternative 2.4 allows monitoring coverage to range between 50% and 100%. The economic impact on mackerel vessels of paying for higher levels of monitoring coverage would be more negative than paying for lower levels of monitoring. Therefore, alternatives that specify higher coverage rates may have a more negative direct impact on mackerel vessels paying for monitoring coverage than alternatives with lower coverage rates.

While high levels of monitoring are not always necessary to address a monitoring goal, because the MAFMC is interested in increasing monitoring to improve the accuracy of catch estimates, in particular the ability to track catch against catch caps, more monitoring could be more effective than less monitoring. Additionally, because the catch of river herring and shad is highly variable, both spatially and temporally, increased monitoring for those species may be more effective than less monitoring. To the extent that increased monitoring helps reduce the variability of data tracked against catch caps and helps increase the likelihood that vessels can harvest mackerel, specifying a higher coverage target may have more indirect positive economic impacts on mackerel vessels than specifying a lower coverage target.

Mackerel Alternatives 2.1 – 2.5 primarily would allocate monitoring coverage by vessel permit category. The extent to which the allocation of industry-funded coverage is consistent SBRM fishing fleet will determine how the resulting data can be used. Unless vessel permit category is equivalent to fishing fleet, the resulting information from the mackerel alternatives may have limited utility. The additional information on catch and bycatch estimates in the mackerel fishery obtained via Mackerel Alternatives 2.1 – 2.5 could be used for tracking catch against ACLs and catch caps, but it is unlikely that those data could be used to estimate discards for stock assessments. Any indirect economic benefits for mackerel vessels related to data utility would be similar across alternatives.

The coverage targets for NEFOP-level observer and at-sea monitoring coverage would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for mackerel vessels (e.g., 15%) would be combined with industry-funded monitoring (e.g., 85%) to reach a 100% target coverage level. In contrast, the coverage targets for both EM and portside sampling would be calculated independent of and in addition SBRM coverage. For example, to reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Alternatives that specify NEFOP-level observer or at-sea monitoring coverage may have less of a direct negative economic impact on mackerel vessels than alternatives that specify EM or portside sampling coverage, even if the same coverage target is selected, because vessels would not be paying for the SBRM coverage.

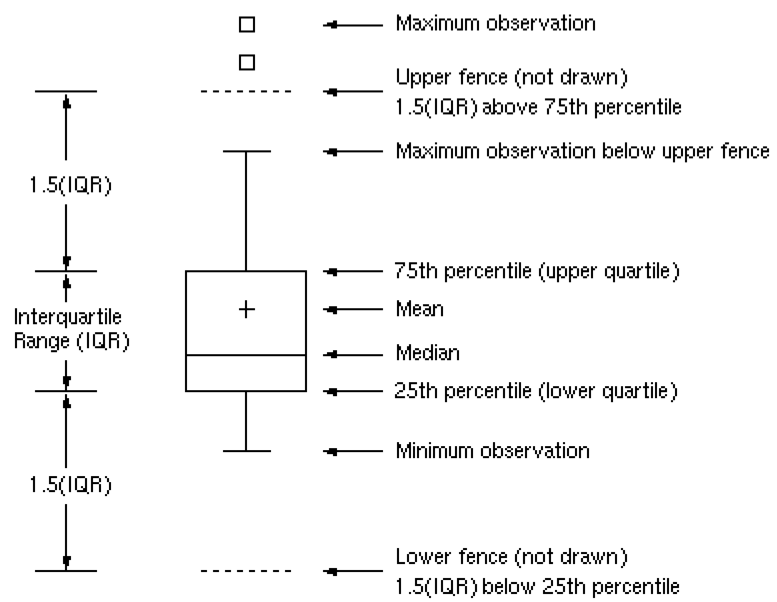
The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Mackerel Alternatives 2.1-2.5 specify that the vessels would be prohibited from participating in the mackerel fishery on that trip. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable coverage requirements to be waived on a specific trip to allow vessels to continue participating in the mackerel fishery, even if monitoring coverage is not available. Should fishing effort be limited by the availability of monitoring coverage, such that mackerel harvest is limited, there is the potential for additional negative economic impacts on mackerel vessels. The selection of Mackerel Alternative 2 - Sub-Option 1 would enable monitoring coverage requirements to be waived on a specific trip, allowing a vessel to continue participating in the mackerel fishery, even if monitoring coverage is not available.

Indirect positive impacts on mackerel vessels associated with Mackerel Alternative 2 may result from increased monitoring helping to reduce variability around catch and bycatch estimates in the mackerel fishery leading to additional harvesting opportunities. If increased monitoring reduces the variability in the catch of river herring and shad tracked against the catch cap, mackerel vessels may be less likely to be constrained by the catch cap.

Direct negative impacts on mackerel vessels associated with Mackerel Alternative 2 would likely result from reduced RTO after paying for monitoring coverage. The magnitude of the economic impact associated with paying for monitoring coverage would vary with mackerel coverage target alternative (Mackerel Alternatives 2.1-2.5). If increased monitoring results in the river herring and shad catch cap being harvested more often than expected, an indirect negative impact on mackerel vessels may be that the harvest of mackerel is constrained. While the full extent of positive and negative impacts to mackerel vessels may be difficult to quantify under Mackerel Alternative 2, the impacts may not be realized under Mackerel Alternative 1.

In summary, the direct economic impacts on mackerel vessels associated with Mackerel Alternatives 2.1-2.5 are negative. The negative impacts result from reductions in RTO related to paying for monitoring coverage and possible reductions in fishing effort to match monitoring availability, and vary in magnitude by alternative. An indirect positive impact would result if increased monitoring deceased the uncertainty around river herring and shad catch such that it was less likely that mackerel harvest was constrained by catch caps. An indirect negative impact would result if increased monitoring showed higher than expected catch of river herring and shad such that it was more likely that mackerel harvest would be inappropriately constrained by catch caps.

The following box plots show of the distribution of monitoring costs and the distribution of monitoring costs as a percent of a vessel's RTO. Box plots are a useful tool to show how data are distributed. The following schematic shows what the various pieces of a box plot show regarding the distribution of data.



When examining the box plots, it is important to note the differences between mean and median values by gear type and by alternatives, as well as the differences in the variability of values by these criteria. For example, in the first figure (Mackerel Alternative 2.1) there is a wider range of costs for single midwater and small mesh bottom trawl vessels than for paired midwater trawl vessels, as represented by the length of the rectangle. Further, the difference between alternatives for both vessel categories shows that the mean and median values are lower under the 25 mt threshold (Sub-Option 5) but also that the likely range of NEFOP costs are much narrower.

Table 124. Mackerel Alternative 2.1 & 2.2 – Annual Average Per Vessel

	Paired MWT		Single MWT & SMBT (T1)	
	> 20k lb	> 25 mt	> 20k lb	> 25 mt
Mean RTO	$204,514	$213,005	$245,704	$304,352
Median RTO	$195,500	$228,943	$121,026	$152,773
Mean Sea Days (100%)	13	11	14	13
Median Sea Days (100%)	15	12	12	13
Mean Sea Days (75%)	10	8	11	11
Median Sea Days (75%)	11	9	9	10
Mean Sea Days (50%)	7	6	9	9
Median Sea Days (50%)	8	6	6	7
Mean Sea Days (25%)	5	4	7	7
Median Sea Days (25%)	5	4	4	6

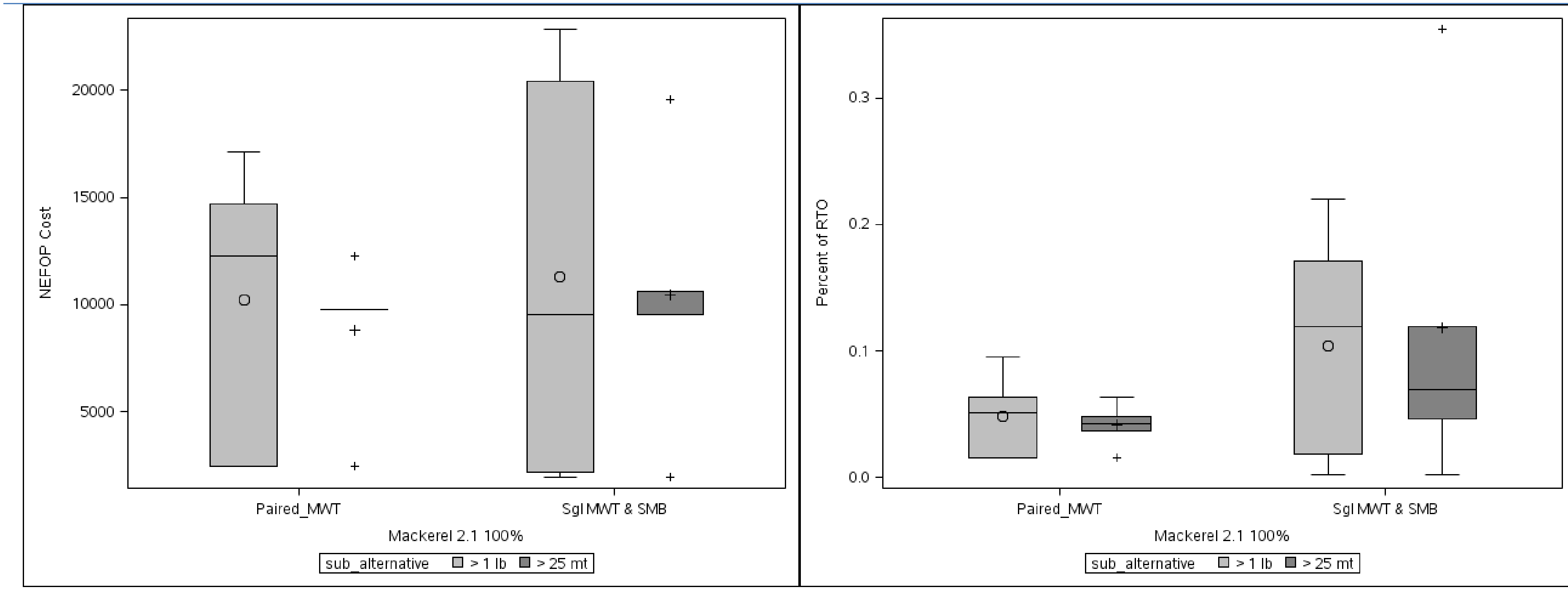


FIGURE 26. MACKEREL ALTERNATIVE 2.1 100% NEFOP COST AND PERCENT OF RTO

Figure 26 describes the approximate costs that applicable vessels with various gear types would incur annually from Alternative 2.1, which would require 100% coverage by NEFOP-level observers on vessels with limited access mackerel permits (includes vessels that use midwater trawl and small mesh bottom trawl gear). The MAFMC included thresholds of >20,000 lb (light grey) and > 25 mt (55,115 lb) (darker grey) for trips that would require monitoring – a 25 mt threshold would reduce the number of trips that had to be monitored and thus reduce costs.

Since this type of figure is used often in this document, additional detail on how to interpret the figure is provided to serve as a guide for interpreting other similar figures. All costs are based on the fleets operating as they did in 2014, and are derived from the number of days that they fished in 2014 on trips when they landed either 20,000 lb of mackerel or 25 mt of mackerel (the two thresholds being considered that would trigger monitoring). The line in the bar is the median (half of vessels would have higher or lower costs than the median cost) and the "o" or "+" within the bar shows the mean (average). Where the mean and median do not align there is some degree of skewedness to the data (generally if the mean is higher than the median there are a few unusually high values and if the median is higher than the mean there are a few unusually low values). When the median and mean are substantially different the median is more illustrative of the typical monitoring costs for vessels, so the median is the focus of this analysis.

The shaded bars show where 50% of the data are (the "interquartile range") and the whiskers show the range of values that lie within 1.5 times the interquartile percentile range. Together, the bars and whiskers illustrate whether the data are tightly grouped or highly variable (here highly variable would mean that some vessels would have high costs and some vessels would have low costs). An "o" or "+" outside the whiskers shows an extreme outlier. For example, there is a high outlier data point with the percent of RTO for single midwater trawl and small mesh bottom trawl vessels at a 25 mt threshold for monitoring.

For Mackerel Alternative 2.1 NEFOP costs, paired midwater trawl vessels are slightly more impacted than single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are comparable at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the NEFOP monitoring costs for vessels may be similar. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) are approximately $12,000 for paired midwater trawl vessels, and $10,000 for small mesh bottom trawl and single midwater trawl vessels. Recall the median is the point at which half of the vessels would pay more and half would pay less than that amount, and that wide bars and long whiskers indicate a wider range of costs/impacts across vessels. The lack of shaded bars and whiskers seen in portions of this plot stems from the small number of applicable trips represented in this analysis. For example, the plot representing NEFOP costs for paired midwater trawl vessels at the 25 mt threshold comprises only four trips, and thus lacks any bars or whiskers.

Costs are generally lower when a 25 mt threshold is used since not as many trips trigger a monitoring requirement. For the analysis of the 25 mt threshold, some vessels had no qualifying trips and drop out of the analysis, so even if the medians/averages stay similar the total fleet costs may still substantially decline). If a 25 mt threshold is used (darker grey bars), median costs are approximately $10,000 for paired midwater trawl vessels and $11,000 for small mesh bottom trawl and single midwater trawl vessels.

For Mackerel Alternative 2.1 costs as a percent of RTO, single midwater trawl and small mesh bottom trawl vessels are more impacted than paired midwater trawl vessels at both the 20,000 lb and 25 mt threshold. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 5.1%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 11.9%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 4.3%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 6.9%. The lack of small shaded bars and lack of whiskers seen in portions of this plot stems from the small number of applicable trips represented in this analysis. For example, the plot representing percent of RTO for paired midwater trawl vessels at the 25 mt threshold comprises only four trips, and thus has a very small bar with no lower whiskers.

In implementation, since vessels would have to declare their intent to fish for mackerel and the monitoring would be triggered based on that declaration of intent, costs may be higher if vessels want the option to fish for mackerel on more days than they actually caught mackerel in 2014.

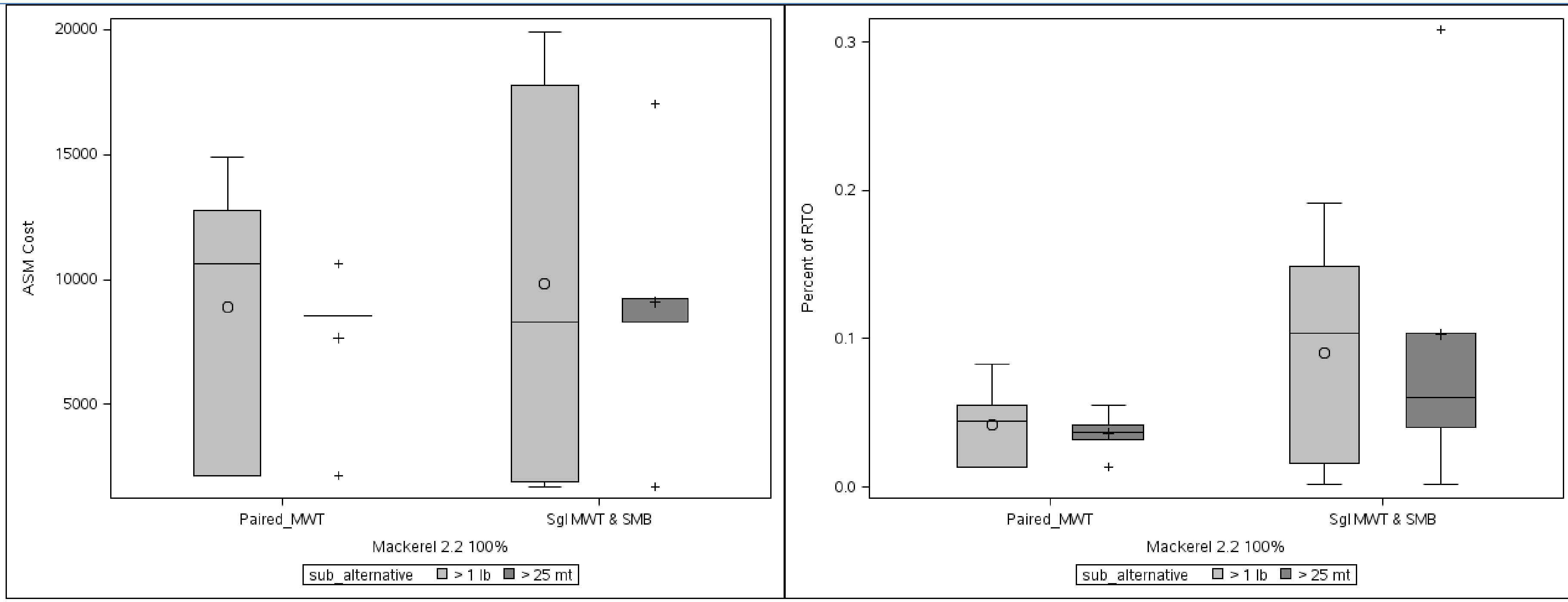


FIGURE 27. MACKEREL ALTERNATIVE 2.2 100% ASM COST AND PERCENT OF RTO

ASM costs for paired midwater trawl vessels are slightly more impacted than single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are comparable at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the ASM monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) are approximately $11,000 for paired midwater trawl vessels, and $8,000 for small mesh bottom trawl and single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $8,500 for paired midwater trawl vessels and $9,000 for small mesh bottom trawl and single midwater trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is higher for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 4.4%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 10.3%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 3.7%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 6.0%.

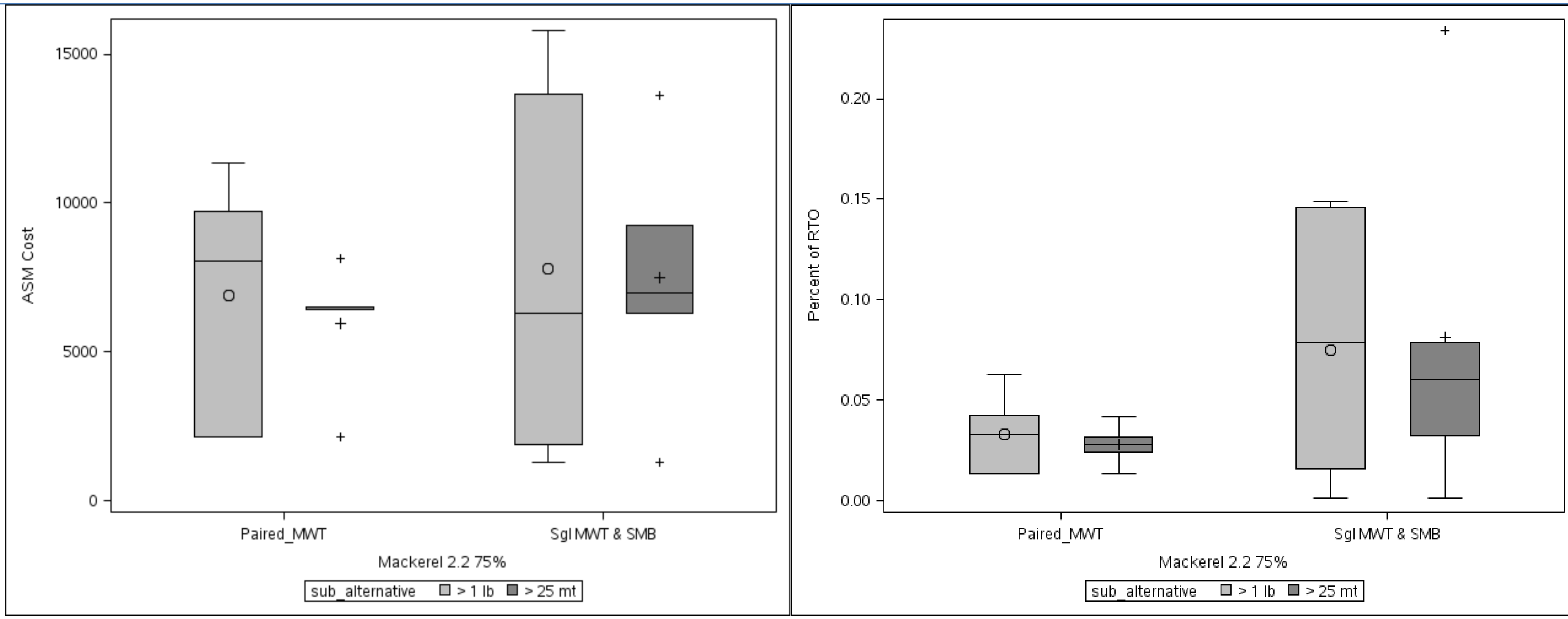


FIGURE 28. MACKEREL ALTERNATIVE 2.2 75% ASM COST AND PERCENT OF RTO

ASM costs (75%) for paired midwater trawl vessels are slightly higher than for single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are comparable at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the ASM monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb mackerel threshold (light grey bars) are approximately $8,000 for paired midwater trawl vessels, and $6,000 for small mesh bottom trawl and single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $6,000 for paired midwater trawl vessels, and $7,000 for small mesh bottom trawl and single midwater trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is higher for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 3.3%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 7.9%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 2.8%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 6.0%.

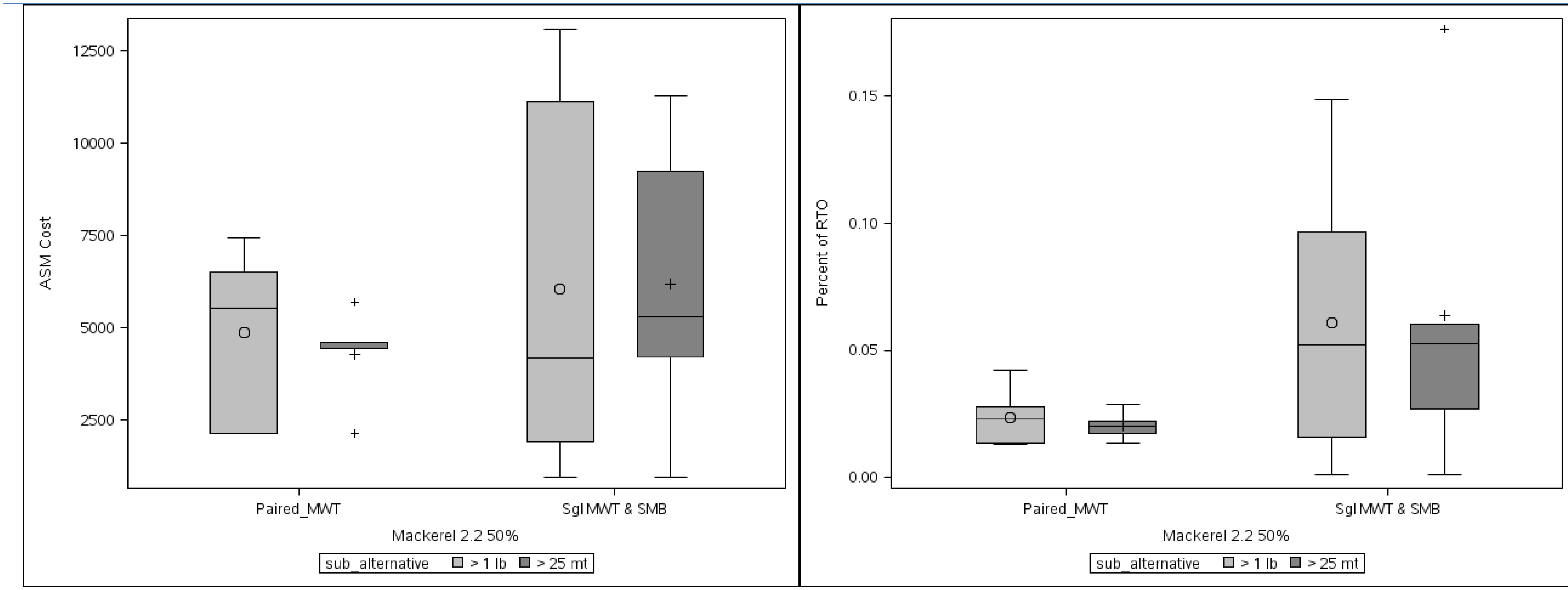


Figure 29. Mackerel Alternative 2.2 50% ASM Cost and Percent of RTO

ASM costs (50%) for paired midwater trawl vessels are slightly higher than for single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are slightly lower at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the NEFOP monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb mackerel threshold (light grey bars) are approximately $6,000 for paired midwater trawl vessels, and $4,000 for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $5,000 for paired midwater trawl vessels, and $5,000 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is more impacted than paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 2.3%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 5.2%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 2.0%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 5.3%.

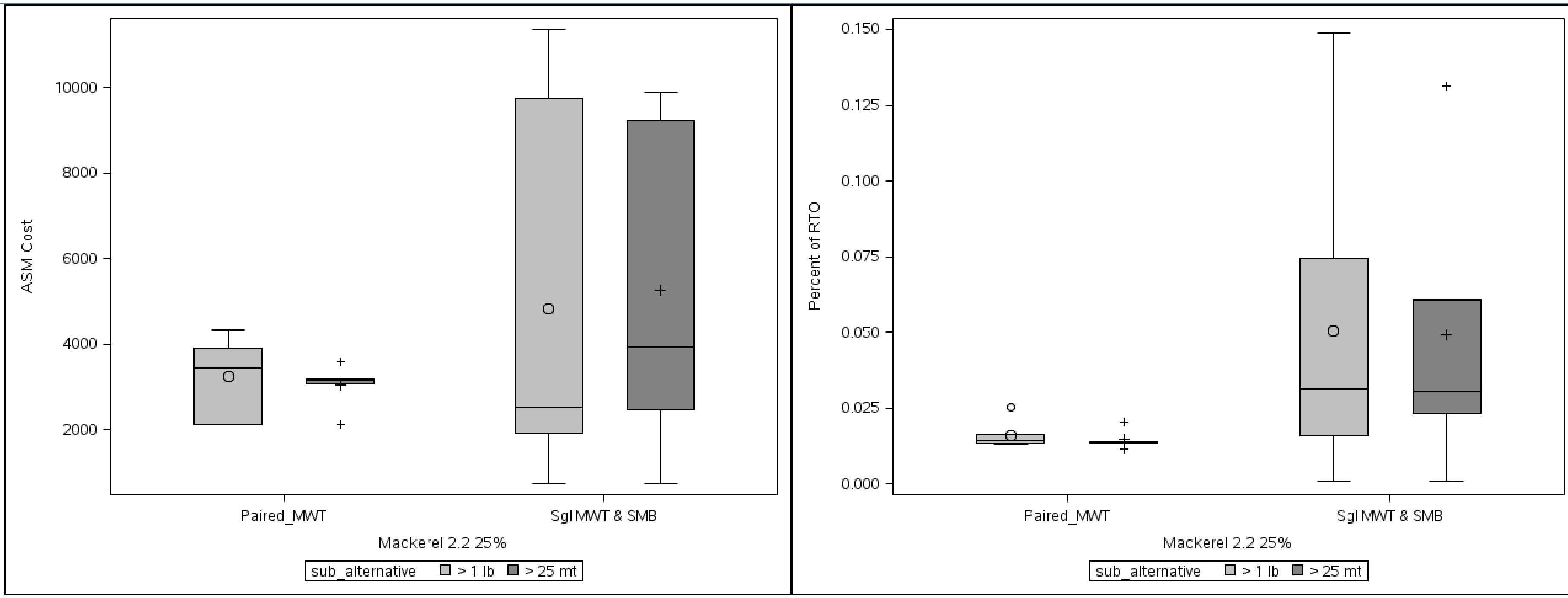


FIGURE 30. MACKEREL ALTERNATIVE 2.2 25% ASM COST AND PERCENT OF RTO

ASM costs (25%) for paired midwater trawl vessels are slightly higher than for single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are slightly lower at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the ASM monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb mackerel threshold (light grey bars) are approximately $3,500 for paired midwater trawl vessels, and $2,500 for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $3,000 for paired midwater trawl vessels, and $4,000 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is more impacted than paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 1.4%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 3.1%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 1.4%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 3.1%.

Table 125. Mackerel Alternative 2.1 and 2.2 – Annual Fleet Level Summary

Fleet Level	Paired MWT ≥ 20k LB	Paired MWT > 25 MT	Single MWT & SMBT ≥ 20k LB	Single MWT & SMBT > 25 MT
Number of Vessels	6	5	7	5
Days at Sea	75	54	97	64
Total NEFOP Cost at 100%	$61,200	$44,064	$78,926	$52,257
Total ASM Cost at 100%	$53,250	$38,340	$68,673	$45,468
Total Revenue	$1.5M	$1.3M	$2.4M	$2.0M
% Revenue Herring	18.8%	15.4%	28.9%	23.8%
% Revenue Mackerel	80.9%	84.4%	35.7%	41.4%
% Revenue Squid	-		3.9%	0.2%
Data shown by trips harvesting ≥ 20,000 lb of mackerel and > 25 mt of mackerel				

Table 126. Mackerel Alternative 2.3 & 2.4 – Annual Average per Vessel For MWT Vessels Only (At: 100% EM at $325 per day, 100% PS at $5.12 per mt And at: 100% EM at $187 per day, 50% PS at $3.84 per mt)

	Paired MWT		Single MWT	
	> 20k lb	> 25 mt	> 20k lb	> 25 mt
Mean RTO	$204,514	$213,005	$282,398	$315,247
Median RTO	$195,500	$228,943	$106,891	$80,070
Mean EM Days (100%)	13	11	10	9
Median EM Days (100%)	15	12	7	12

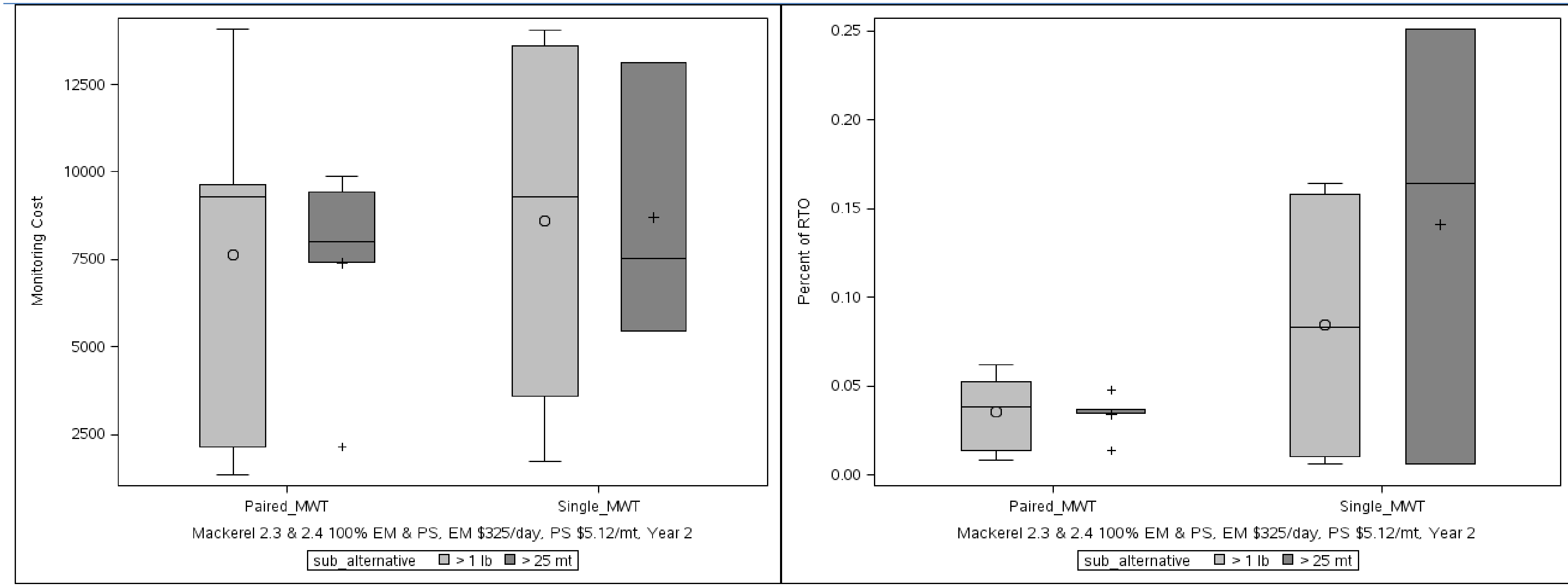


FIGURE 31. MACKEREL ALTERNATIVES 2.3 AND 2.4 100% EM AND PORTSIDE COST AND PERCENT OF RTO

100% EM and portside monitoring costs are approximately equal for paired midwater trawl vessels and single midwater trawl and small mesh bottom trawl vessels at both the 20,000 lb mackerel threshold and the 25 mt threshold. At the 20,000 lb threshold, all vessel types skewed lower, but distribution of costs within the interquartile range was more even about the median in single midwater trawl and small mesh bottom trawl vessels. This indicates that a substantial range exists for midwater trawl vessels in the highest quartile, while single midwater trawl and small mesh bottom trawl vessel costs are more evenly distributed about the median. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) was approximately $9,000 for paired midwater trawl vessels and for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $8,000 for paired midwater trawl vessels, and $7,500 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is substantially greater than for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 3.8%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 8.3%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 3.7%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 16.4%.

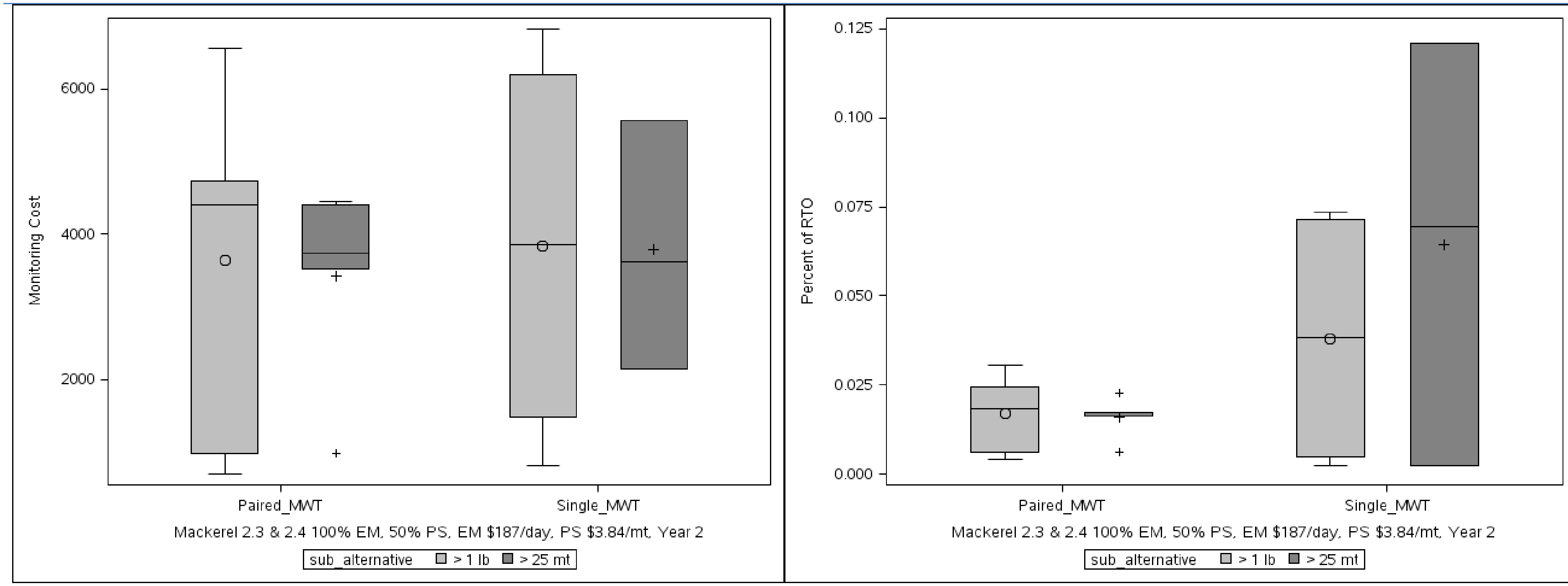


Figure 32. Mackerel Alternatives 2.3 and 2.4 50% EM and Portside Cost and Percent of RTO

50% EM and portside monitoring costs are slightly greater for paired midwater trawl vessels than single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are approximately equal at the 25 mt threshold. At the 20,000 lb threshold, paired midwater trawl vessels skewed lower, indicating that most paired midwater trawl vessels have monitoring costs above the average, while single midwater trawl and small mesh bottom trawl vessel costs are more evenly distributed about the median. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) were approximately $4,500 for paired midwater trawl vessels and $4,000 for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $4,000 for paired midwater trawl vessels and $3,500 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is substantially greater than for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 1.8%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 3.8%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 1.6%, while RTO single midwater trawl and small mesh bottom trawl vessels was 7.0%.

Table 127. Mackerel Alternative 2.3 & 2.4 – Annual Fleet Level Summary (MWT Vessels Only)

Fleet Level	Paired MWT ≥ 20k LB	Paired MWT > 25 MT	Single MWT ≥ 20k LB	Single MWT > 25 MT
Number of Vessels	6		4	
Days at Sea	75		42	
Total Monitoring Cost (100% EM at $325/day, 100% PS at $5.12/mt, year 2)	$45,812	$36,898	$34,421	$26,122
Total Monitoring Cost (100% EM at $187/day, 50% PS at $3.84/mt, year 2)	$21,796	17,112	$15,364	$11,340
Total Revenue	$1.4M		$1.2M	
% Revenue Herring	18.8%		51.8%	
% Revenue Mackerel	81.0%		48.0%	
% Revenue Squid	-		-	
Data shown by trips harvesting ≥ 20k lb of herring and > 25 mt of herring				

Table 128. Mackerel Alternative 2.5 – Annual Fleet Level Summary

Fleet Level	Paired MWT ≥ 1 LB	Paired MWT > 25 MT	Single MWT ≥ 1 LB	Single MWT > 25 MT	Purse Seine ≥ 1 LB	Purse Seine > 25 MT	SMBT ≥ 1 LB	SMBT > 25 MT
Number of Vessels	8	8	6	6	7	7	9	6
Days at Sea	825	663	170	116	392	204	192	117
Total EM & PS Costs, year 2 (100% EM and PS. EM at $325/day. PS at $5.12/mt)	$451k	$387k	$128k	$105k	$293k	$220k	$88k	$59k
Total EM & PS Costs, year 2 (75% EM and PS. EM at $202/day. PS at $3.84/mt)	$228k	$197k	$65k	$55k	$152k	$118k	$43k	$29k
Total EM & PS Costs, year 2 (50% EM and PS. EM at $187/day.	$146k	$126k	$43k	$36k	$99k	$77k	$27k	$19k

PS at $3.84/mt)								
Total EM & PS Costs, year 2 (25% EM and PS. EM at $172/day. PS at $3.84/mt)	$70k	$61k	$21k	$18k	$48k	$38k	$13k	$9k
Total Revenue	$10.6M	$9.8M	$4.5M	$4.2M	$11.0M	$10.3M	$2.6M	$1.8M
% Revenue Herring	89%	93%	86%	100%	58%	78%		
% Revenue Mackerel	11%	7%	13%		-		3%	2%
% Revenue Squid	-	-	-		20%		10%	
Data shown by trips harvesting ≥ 1 lb of herring and > 25 mt of herring								

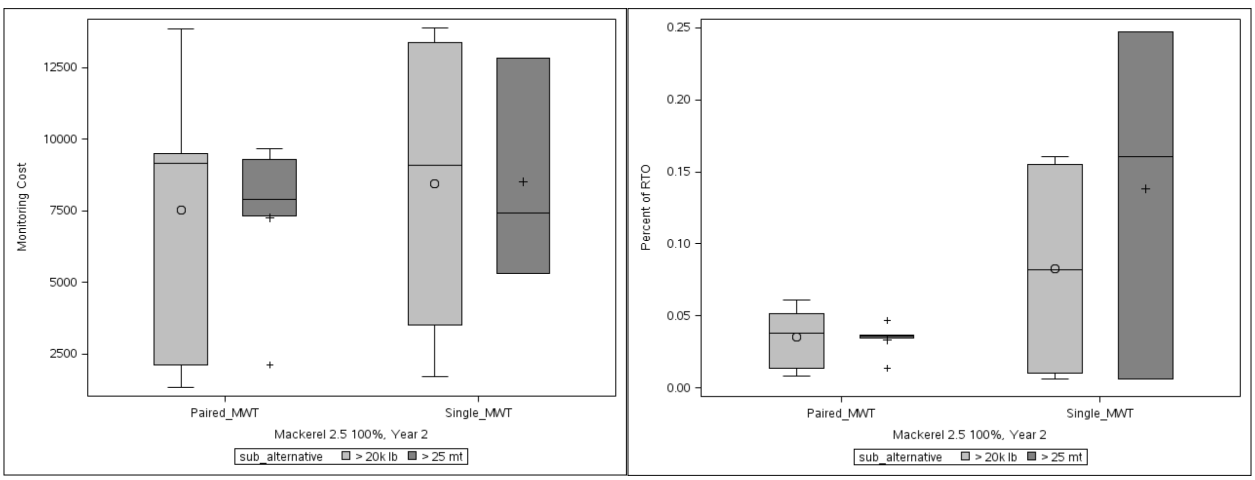


FIGURE 33. MACKEREL ALTERNATIVES 2.5 100% EM AND PORTSIDE COST AND PERCENT OF RTO

100% EM and portside monitoring costs for paired midwater trawl vessels are similar to those for single midwater trawl vessels at both the 1 lb threshold and the 25 mt threshold. Median costs for the gear types at the 1 lb threshold (light grey bars) are $9,000 for both paired and single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $8,000 for paired midwater trawl vessels and $7,000 for single midwater trawl vessels.

Percent RTO reductions for single midwater trawl vessels are greater than for paired midwater trawl vessels at both the 1 lb and 25 mt thresholds. For the 1 pound threshold, the median RTO reduction is 8.2% for single midwater trawl vessels and 3.8% for paired midwater trawl vessels. At the 25 mt threshold, RTO reduction is 16.0% for single midwater trawl vessels and 3.6% for paired midwater trawl vessels.

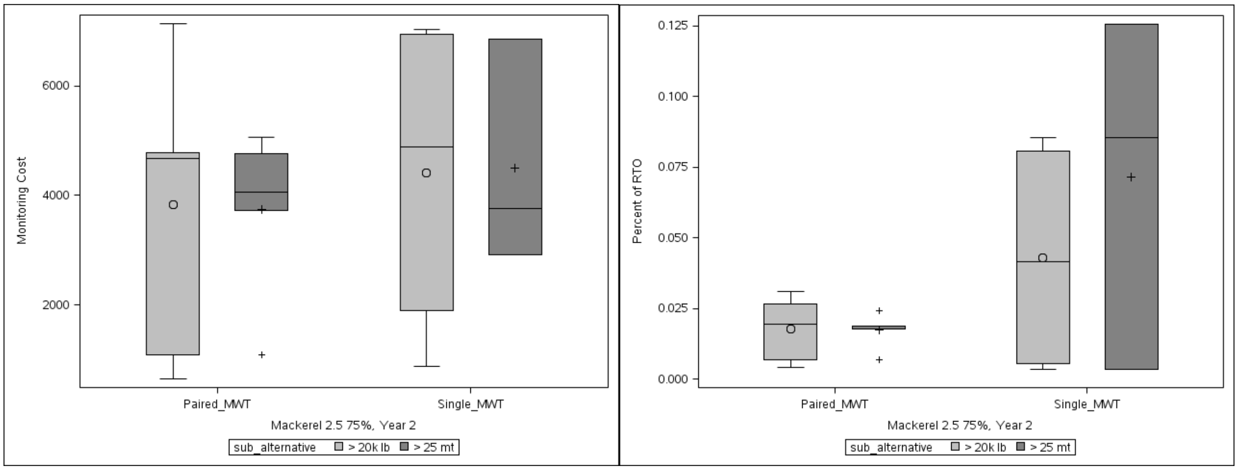


FIGURE 34. MACKEREL ALTERNATIVES 2.5 75% EM AND PORTSIDE COST AND PERCENT OF RTO

75% EM and portside monitoring costs for paired midwater trawl vessels are similar to those for single midwater trawl vessels at both the 1 lb threshold and the 25 mt threshold. Median costs for the gear types at the 1 lb threshold (light grey bars) are $4,700 for paired midwater trawl vessels and $4,900 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $4,000 for paired midwater trawl vessels and $3,700 for single midwater trawl vessels.

Percent RTO reductions for single midwater trawl vessels are greater than for paired midwater trawl vessels at both the 1 lb and 25 mt thresholds. For the 1 pound threshold, the median RTO reduction is 4.1% for single midwater trawl vessels and 1.9% for paired midwater trawl vessels. At the 25 mt threshold, RTO reduction is 8.6% for single midwater trawl vessels and 1.9% for paired midwater trawl vessels.

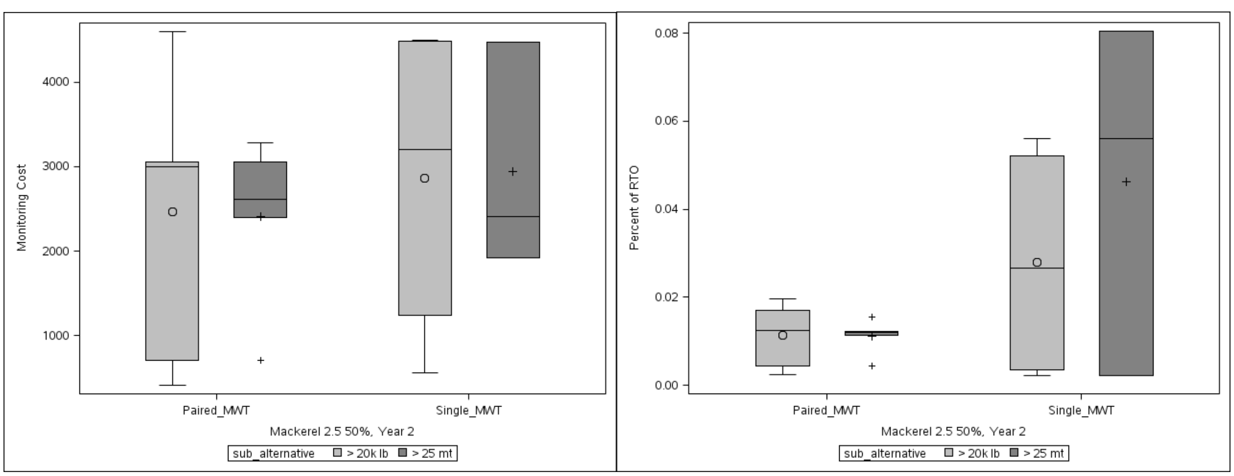


FIGURE 35. MACKEREL ALTERNATIVES 2.5 50% EM AND PORTSIDE COST AND PERCENT OF RTO

50% EM and portside monitoring costs for paired midwater trawl vessels are similar to those for single midwater trawl vessels at both the 1 lb threshold and the 25 mt threshold. Median costs for the gear types at the 1 lb threshold (light grey bars) are $3,000 for paired midwater trawl vessels and $3,200 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $2,600 for paired midwater trawl vessels and $2,400 for single midwater trawl vessels.

Percent RTO reductions for single midwater trawl vessels are greater than for paired midwater trawl vessels at both the 1 lb and 25 mt thresholds. For the 1 pound threshold, the median RTO reduction is 2.7%for single midwater trawl vessels and 1.2% for paired midwater trawl vessels. At the 25 mt threshold, RTO reduction is 5.6% for single midwater trawl vessels and 1.2% for paired midwater trawl vessels.

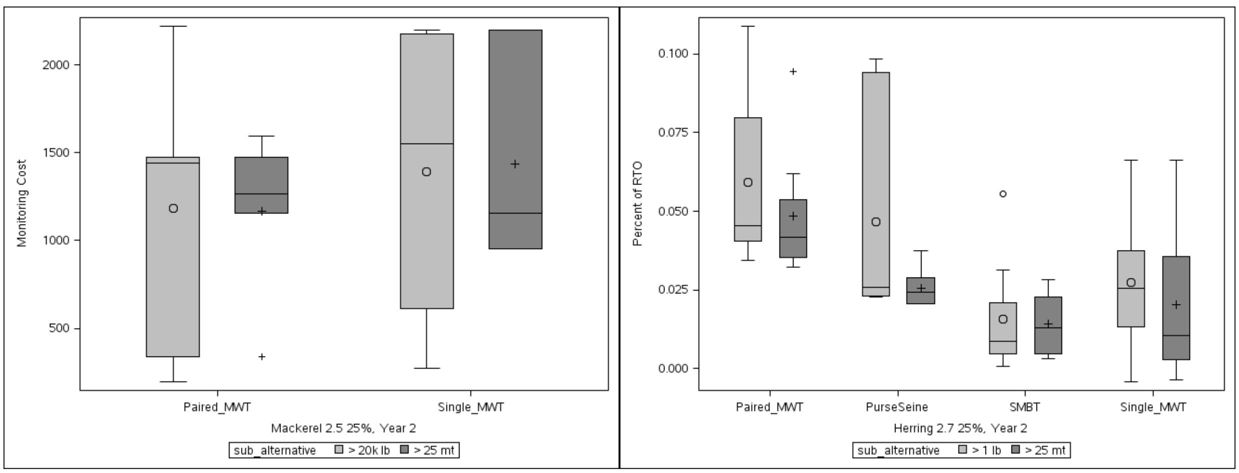


FIGURE 36. MACKEREL ALTERNATIVES 2.5 25% EM AND PORTSIDE COST AND PERCENT OF RTO

25% EM and portside monitoring costs for paired midwater trawl vessels are similar to those for single midwater trawl vessels at both the 1 lb threshold and the 25 mt threshold. Median costs for the gear types at the 1 lb threshold (light grey bars) are $1,400 for paired midwater trawl vessels and $1,500 for single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are $1,300 for paired midwater trawl vessels and $1,200 for single midwater trawl vessels.

Percent RTO reductions for single midwater trawl vessels are greater than for paired midwater trawl vessels at both the 1 lb and 25 mt thresholds. For the 1 pound threshold, the median RTO reduction is 1.3% for single midwater trawl vessels and 0.6% for paired midwater trawl vessels. At the 25 mt threshold, RTO reduction is 2.7% for single midwater trawl vessels and 0.6% for paired midwater trawl vessels.

4.3.6 ATLANTIC MACKEREL ALTERNATIVES

Table 129. Summary of Overall Impacts Associated with Mackerel Coverage Target Alternatives

Alternatives	Mackerel Resource	Non-Target Species	Protected Species	Physical Environment	Fishery-Related Businesses
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	Low Positive	Low Positive	Low Positive	Negligible	Low Positive
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.1: NEFOP-Level Coverage on Midwater Trawl Vessels and Tier 1-3 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.4: EM and Portside Sampling Midwater Trawl Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.5: ASM Coverage on MWT Vessels, then Vessels may choose either ASM or EM/Portside Coverage	Low Positive	Low Positive	Low Positive	Negligible	Negative

5.0 CUMULATIVE EFFECTS ANALYSIS

[Not developed until complete draft]

5.1 TARGET SPECIES

[Not developed until complete draft]

5.2 NON-TARGET AND BYCATCH SPECIES
[Not developed until complete draft]

5.3 PHYSICAL ENVIRONMENT AND EFH
[Not developed until complete draft]

5.4 ENDANGERED AND PROTECTED SPECIES
[Not developed until complete draft]

5.5 HUMAN COMMUNITIES
[Not developed until complete draft]

5.6 NON-FISHING ACTIVITIES
[Not developed until complete draft]

6.0 OTHER APPLICABLE LAWS

6.1 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT
[Not developed until complete draft]

6.2 NATIONAL ENVIRONMENTAL POLICY ACT
[Not developed until complete draft]

6.2.1 FINDING OF NO SIGNIFICANT IMPACT
[Not developed until complete draft]

6.3 MARINE MAMMAL PROTECTION ACT
The impacts of the preferred alternatives on protected species are considered in sections 4.1.1, 4.2.3, and 4.3.3, and, based on the procedural nature of the action, the Councils have concluded preliminarily that there would be no direct or indirect impacts on marine mammals, that the preferred alternatives appear consistent with the provisions of the MMPA, and that the preferred alternatives would not alter existing measures to protect the species likely to inhabit the management units of the subject fisheries.

6.4 ENDANGERED SPECIES ACT
Section 7 of the ESA requires Federal agencies conducting, authorizing, or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. The impacts of the proposed alternatives on protected species are considered in chapter 5, section 5.4, and, based on the procedural nature of the action, the Councils have determined preliminarily that there would be no direct or indirect impacts on protected resources, including endangered or threatened species or their habitat.

6.5 PAPERWORK REDUCTION ACT

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 preferred alternatives currently associated with this action do not propose to modify any existing collections, or to add any new collections; therefore, no review under the PRA is necessary.

6.6 INFORMATION QUALITY ACT

[Not developed until complete draft]

6.7 IMPACTS OF FEDERALISM/EXECTIVE ORDER 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. However, no federalism issues or implications have been identified relative to the measures under consideration in the Industry-funded Monitoring Omnibus Amendment. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under E.O. 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Councils (all affected states are represented as voting members of at least one Regional Fishery Management Council). Thus far, no comments were received from any state officials relative to any federalism implications that may be associated with this action.

6.8 ADMINISTRATIVE PROCEDURES ACT

Section 553 of the APA 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 Councils are not requesting any abridgement of the rulemaking process for this action.

6.9 COASTAL ZONE MANAGEMENT ACT

[Not developed until complete draft]

6.10 REGULATORY FLEXIBILITY ACT/EXECUTIVE ORDER 12866

[Not developed until complete draft]

6.10.1 Regulatory Impact Review and Initial Regulatory Flexibility Analysis
6.10.2 Description of Management Objectives
6.10.3 Description of the Fishery
6.10.4 Statement of the Problem
6.10.5 Description of the Alternatives
6.10.6 Economic Analysis
6.10.7 Determination of Significance Under E.O. 12866
6.10.8 Initial Regulatory Flexibility Analysis
6.10.8.1 Reasons for Considering the Action
6.10.8.2 Objectives and Legal Basis for the Action
6.10.8.3 Description and Number of Small Entities to Which the Rule Applies
6.10.8.4 Recordkeeping and Reporting Requirements
6.10.8.5 Duplication, Overlap, or Conflict with Other Federal Rules
6.10.8.6 Economic Impacts on Small Entities Resulting from the Proposed Action

7.0 LITERATURE CITED

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8.0 LIST OF PREPARERS

[Not developed until complete draft]

9.0 AGENCIES CONSULTED

[Not developed until complete draft]

10.0 GLOSSARY OF TERMS

Accuracy. The closeness of a measured or estimated value (e.g., population parameter) to its true value. Accuracy should not be confused with precision, which relates to the variability of the measured or estimated value (i.e., the closeness of repeated measurements of the same quantity).

Allocation. The practice of apportioning resources among various entities. Under the SBRM, allocation often regards the assignment of observer effort across the various sampling strata; i.e., geographical region (by port of departure), fishing modes (gear type and mesh size), access area, and trip category.

Bias. A systematic difference between the expected value of a statistical estimate and the quantity it estimates. Absent bias, precision will lead to accuracy; thus, bias and accuracy are used interchangeably, but bias is generally associated with the design of sampling program. Eliminating potential sources of bias improves the accuracy of the results.

Biomass (B). (1) The total weight of a group (or stock) of living organisms (e.g., fish, plankton) or of some defined fraction of it (e.g., spawners) in an area, at a particular time. (2) Measure of the quantity, usually by weight in pounds or metric tons (2,205 lb or 1 metric ton), of a stock at a given time.

Bycatch. According to the Magnuson-Stevens Act, bycatch includes all fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Fish released alive under a recreational catch and release fishery management program are not considered bycatch. The words bycatch and discard are used interchangeably in SBRM documents.

Catch. (1) To undertake any activity that results in taking fish out of its environment dead or alive. To bring fish on board a vessel dead or alive. (2) The total number (or weight) of fish caught by fishing operations, including retained catch (landings) and discarded catch (bycatch). (3) The component of fish encountering fishing gear that is retained by the gear.

Coefficient of variation (CV). A standard measure of precision, calculated as the ratio of the square root of the variance of the bycatch estimate (i.e., the standard error) to the bycatch estimate itself. The higher the CV, the larger the standard error is relative to the estimate. A lower CV reflects a smaller standard error relative to the estimate. A 0-percent CV means there is no variance in the sampling distribution. Alternatively, CVs of 100 percent or higher indicate that there is considerable variance in the estimate.

Discard. To release or return fish to the sea, dead or alive, whether or not such fish are brought fully on board a fishing vessel. Fish (or parts of fish) can be discarded for a variety of reasons such as having physical damage, being a non-target species for the trip, and compliance with management regulations such as minimum size limits or quotas. The terms discard and bycatch are used interchangeably in SBRM documents.

Effort. The amount of time and fishing power used to harvest fish; includes gear size, boat size, and horsepower.

Environmental assessment (EA). As part of the National Environmental Policy Act (NEPA) process, an EA is a concise public document that provides evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI).

Finding of no significant impact (FONSI). As part of the National Environment Policy Act (NEPA) process, a FONSI is a document that explains why an action that is not otherwise excluded from the NEPA process, and for which an environmental impact statement (EIS) will not be prepared, will not have a significant effect on the human environment.

Fish. Means finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds.

Fishing mode. A way of grouping fishing activities according to the fishing gears used, port of departure, mesh size, and, in some cases, regulatory fishing program, rather than by FMP or species of fish landed. There are 56 fishing modes defined in the Greater Atlantic Region for the purpose of the SBRM Omnibus Amendment.

Fishing vessel trip report (FVTR) or **Logbook.** A detailed, usually official, record of a vessel's fishing activity registered systematically onboard the fishing vessel, usually including information on catch and its species composition, the corresponding fishing effort, and location. Some form of trip report must be completed and submitted by every holder of a Federal fishing permit in the Greater Atlantic Region, except those who hold a Federal permit only for lobster.

Marine Recreational Fisheries Statistical Survey (MRFSS). An annual national survey conducted by NMFS, in cooperation with the coastal states, to estimate the number, catch, and effort of recreational fishermen. MRFSS was phased out and replaced by MRIP in 2011.

Marine Recreational Information Program (MRIP). An annual national survey conducted by NMFS, in cooperation with the coastal states, along with the supporting statistical methods, that are used to estimate the number, catch, and effort of recreational fishermen.

National Standard 9. A provision in the Magnuson-Stevens Act that requires that "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." NMFS has defined the term "to the extent practicable" to include a consideration of the effects of reducing bycatch and bycatch mortality on the overall benefit to the Nation.

Observer. At-sea fishery observers are generally biologists trained to collect information on board fishing vessels. They may be deployed for various reasons including monitoring interactions with protected species, measuring catch composition and disposition (including discards), validating or adjusting self-reported data, tracking in-season quotas (including bycatch quotas), or a variety of other reasons. The regional observer program is administered by the Northeast Fisheries Science Center.

Precision. The degree of agreement of repeated measurements of the same quantity or object.

Sampling design. The sampling design of a scientific survey refers to the statistical techniques and methods adopted for selecting a sample and obtaining estimates of the survey variables from the selected sample.

Standardized bycatch reporting methodology (SBRM). The combination of sampling design, data collection procedures, and analyses used to estimate bycatch in fisheries. An SBRM is required to be implemented for each fishery under section 303(a)(11) of the Magnuson-Stevens Act.

Stock assessment. The process of collecting and analyzing biological and statistical information to determine the changes in the abundance of fishery stocks in response to fishing, and, to the extent possible, to predict future trends of stock abundance. Stock assessments are based on resource surveys; knowledge of the habitat requirements, life history, and behavior of the species; the use of environmental indices to determine impacts on stocks; and catch statistics. Stock assessments are used as a basis to assess and specify the present and probable future condition of a fishery.

Stock Assessment and Fishery Evaluation (SAFE) report. A report that provides a summary of the most recent biological condition of a stock of fish and the economic and social condition of the recreational fishermen, commercial fishermen, and seafood processors who use the fish. The report provides information to the fishery management councils for determining harvest levels.

Total allowable catch (TAC). The annual recommended or specified regulated catch for a species or species group. The regional fishery management council sets the TAC from the range of acceptable biological catch (ABC).

11.0 Appendices

Appendix 1

Text from Greater Atlantic Region disapprovals regarding industry-funded monitoring

Excerpt from the Final Rule for Framework Adjustment 48 to the Northeast Multispecies FMP (78 FR 26118; May 3, 2013)

At-Sea Monitoring Cost-Sharing

To serve as a more long-term solution to the cost burden of at-sea monitoring to sectors, Framework 48 proposed a mechanism for sharing of at-sea monitoring costs between sectors and NMFS. Framework 48 proposed that the industry would only ever be responsible for paying the direct costs of at-sea monitoring, specifically the daily salary of the at-sea monitor. All other programmatic costs would be the responsibility of NMFS, including, but not limited to: Briefing, debriefing, training and certification costs (salary and non-salary); sampling design development; data storage, management and security; data quality assurance and control; administrative costs; maintenance of monitoring equipment; at-sea monitor recruitment, benefits, insurance and taxes; logistical costs associated with deployment; and at-sea monitor travel and lodging. This measure was intended to reduce the cost burden of at-sea monitoring to sectors and thereby increase their profitability.

NMFS has disapproved this cost-sharing measure because it is not consistent with other applicable laws as developed. Specifically, the Anti-Deficiency Act and other appropriations law prohibits Federal agencies from obligating the Federal government except through appropriations and from sharing the payment of government obligations with private entities. Framework 48 proposed to require NMFS to pay for some portion of the costs of at-sea activities, such as logistical costs generated by deployment, which are outside its statutory obligations under the Magnuson-Stevens Act. As written, this measure would also have required NMFS and sectors to share payment of obligations defined as belonging to one or the other. For example, Framework 48 proposed to require NMFS to pay some costs related to at-sea activities, such as benefits and insurance for at-sea monitors, while sectors would pay other portions of at-sea costs, like the salary for at-sea monitors. Because such action would be prohibited under the law, NMFS has disapproved this measure in Framework 48.

Although this measure was not approvable as developed, NMFS shares the Council and industry’s concern about the ability of sectors to bear the full costs of monitoring in future fishing years. NMFS believes this approach to cost sharing, which defines the items that NMFS versus sectors should be responsible for, could be viable if restructured and may be worth pursuing in a future action. NMFS is already working with the New England and Mid-Atlantic Councils’ joint Herring/Mackerel Plan Development Team (PDT)/Fishery Management Action Team (FMAT) to pursue cost-sharing options such as this one for those fisheries for FY 2014. The Council could consider including the NE Multispecies FMP in this joint effort to develop a workable and consistent cost-sharing mechanism for the Northeast region.

Excerpt from the Final Rule for Amendment 5 to the Atlantic Herring FMP

Increased Observer Coverage Requirements

As described previously, the NEFSC determines observer coverage levels in the herring fishery based on the SBRM. Observer coverage in the herring fishery is currently fully funded by NMFS. Amendment 5 proposed increasing observer coverage in the herring fishery by requiring 100-percent observer coverage on Category A and B vessels. Many stakeholders believe this measure is necessary to accurately determine the extent of bycatch and incidental catch in the herring fishery. The Council recommended this measure to gather more information on the herring fishery so that it may better evaluate and, if necessary, implement additional measures to address issues involving catch and discards. The 100-percent observer requirement is coupled with a target maximum industry contribution of $325 per day. There are two types of costs associated with observer coverage: (1) Observer monitoring costs, such as observer salary and travel costs, and (2) NMFS support and infrastructure costs, such as observer training and data processing. The monitoring costs associated with an observer in the herring fishery are higher than $325 per day. Cost-sharing of monitoring costs between NMFS and the industry would violate the Anti-Deficiency Act. Therefore, there is no current legal mechanism to allow cost-sharing of monitoring costs between NMFS and the industry.

Throughout the development of Amendment 5, NMFS advised the Council that Amendment 5 must identify a funding source for increased observer coverage because NMFS's annual appropriations for observer coverage are not guaranteed. Some commenters claim that the $325 per day industry contribution was not a limit, but a target, and that the Council intended the industry to pay whatever was necessary to ensure 100-percent observer coverage. NMFS disagrees, and does not believe the amendment specifies that the industry would pay all the monitoring costs associated with 100-percent observer coverage, nor does it analyze the economic impacts of the industry paying all the monitoring costs. The FEIS for Amendment 5 analyzed alternatives with the industry paying $325 per day or $1,200 per day (estimated sum of observer monitoring costs and NMFS support and infrastructure costs), but it did not analyze a range of alternatives that would approximate total monitoring costs. Budget uncertainties prevent NMFS from being able to commit to paying for increased observer coverage in the herring fishery. Requiring NMFS to pay for 100-percent observer coverage would amount to an unfunded mandate. Because Amendment 5 did not identify a funding source to cover the costs of increased observer coverage, the measure is not sufficiently developed to approve at this time. Therefore, NMFS had to disapprove the 100-percent observer coverage requirement. With the disapproval of this measure, this action maintains the existing SBRM observer coverage levels and Federal observer funding for the herring fishery.

Recognizing funding challenges, Amendment 5 specified status quo observer coverage levels and funding for up to 1 year following the implementation of Amendment 5, with the 100-percent observer coverage and partial industry funding requirement to become effective 1 year after the implementation of Amendment 5. During that year, the Council and NMFS, in cooperation with the industry, were to attempt to develop a way to fund 100-percent observer coverage.

During 2013, a working group was formed to identify a workable, legal mechanism to allow for industry-funded observer coverage in the herring fishery; the group includes staff from the New England and Mid-Atlantic Councils and NMFS. To further explore the legal issues surrounding industry-funded observer coverage, NMFS formed a working group of Northeast Regional Office, NEFSC, General Counsel, and Headquarters staff. The NMFS working group identified an administrative mechanism to allow for industry funding of observer monitoring costs in Northeast Region fisheries, as well as a potential way to help offset funding costs that would be borne by the industry, subject to available funding. This administrative mechanism would be an option to fund observer coverage targets that are higher than SBRM coverage levels. The mechanism to allow for industry-funded observer coverage is a potential tool for all Northeast Region FMPs, but it would need to be added to each FMP through an omnibus amendment to make it an available tool, should the Council want to use it. Additionally, this omnibus amendment could establish the observer coverage targets for Category A and B herring vessels.

In a September 20, 2013, letter to the Council, NMFS offered to be the technical lead on an omnibus amendment to establish the administrative mechanism to allow for industry-funded observer coverage in New England and Mid-Atlantic FMPs. At its September 2013 meeting, the Council considered NMFS's offer and encouraged NMFS to begin development of the omnibus amendment. At this time, NMFS expects to present a preliminary range of alternatives for the omnibus amendment to the New England and Mid-Atlantic Councils in early 2014.

Additionally, other Amendment 5 measures implemented in this action help improve monitoring in the herring fishery. These measures include the requirement for vessels to contact NMFS at least 48 hr in advance of a fishing trip to facilitate the placement of observers, observer sample station and reasonable assistance requirements to improve an observer's ability collect quality data in a safe and efficient manner, and the slippage prohibition and the sampling requirements for midwater trawl vessels fishing in groundfish closed areas to minimize the discarding of unsampled catch.

The same measure that would have required 100-percent observer coverage, coupled with a $325 contribution by the industry, would have also required that: (1) The 100-percent coverage requirement be re-evaluated by the Council 2 years after implementation; (2) the 100-percent coverage requirement be waived if no observers were available, but not waived for trips that enter the River Herring Monitoring/Avoidance Areas; (3) observer service provider requirements for the Atlantic sea scallop fishery apply to observer service providers for the herring fishery; and (4) states be authorized as observer service providers. NMFS believes these additional measures are inseparable from the 100-percent observer coverage requirement; therefore, NMFS had to disapprove these measures too. With the disapproval of these measures, the existing waiver and observer service provider requirements remain in effect.

Excerpt from Amendment 14 to the Atlantic Mackerel, Squid, and Butterfish FMP (79 FR 10029; February 24, 2014)

Increased Observer Coverage Requirements

Currently, the NMFS Northeast Fisheries Science Center (NEFSC) determines observer coverage levels in the mackerel fishery based on the standardized bycatch reporting methodology (SBRM) and after consultations with the Council. Observer coverage in the mackerel fishery is currently fully funded by NMFS. In Amendment 14, the Council recommended increases in the observer coverage in the mackerel fishery, specifically 100-percent observer coverage on all limited access mackerel vessels using midwater trawl (i.e., Tiers 1, 2 and 3) and Tier 1 mackerel vessels using small-mesh bottom trawl, 50-percent coverage on Tier 2 mackerel vessels using small-mesh bottom trawl, and 25-percent on Tier 3 mackerel vessels using small-mesh bottom trawl. Many stakeholders believe this measure is necessary to accurately determine the extent of bycatch and incidental catch in the mackerel fishery. The Council recommended this measure to gather more information on the mackerel fishery so that it may better evaluate and, if necessary, implement additional measures to address catch and discards of river herring and shad. The increased observer coverage level recommendations were coupled with a target maximum industry contribution of $325 per day. There are two types of costs associated with observer coverage: Observer monitoring costs, such as observer salary and travel costs; and NMFS support and infrastructure costs, such as observer training, data processing, and infrastructure. The monitoring costs associated with an observer in the mackerel fishery are higher than $325 per day. Upon legal analysis of this measure, the cost-sharing of monitoring costs between NMFS and the industry would violate the Anti-Deficiency Act. Therefore, based on this analysis, there is no current legal mechanism to allow cost-sharing of monitoring costs between NMFS and the industry.

Throughout the development of Amendment 14, NMFS advised the Council that Amendment 14 must identify a funding source for increased observer coverage because NMFS's annual appropriations for observer coverage are not guaranteed. Some commenters asserted that the $325 per day industry contribution was not a limit, but a target, and that the Council intended the industry to pay whatever is necessary to ensure 100-percent observer coverage. NMFS disagrees, and does not believe the amendment specifies that the industry would pay all the monitoring costs associated with 100-percent observer coverage, nor does the amendment analyze the economic impacts of the industry paying all the monitoring costs. The FEIS for Amendment 14 analyzes the industry paying $325 per day, and the DEIS analyzes the cost of vessels paying $800 per day (estimated sum of observer monitoring costs), but it does not analyze a range of that would approximate total monitoring costs. Budget uncertainties prevent NMFS from being able to commit to paying for increased observer coverage in the mackerel fishery. Requiring NMFS to pay for 100-percent observer coverage would amount to an unfunded mandate. Because Amendment 14 does not identify a funding source to cover the costs of increased observer coverage, the measure is not sufficiently developed to approve at this time. Therefore, NMFS had to disapprove the 100-percent observer coverage requirement. With the disapproval of this measure, this action maintains the existing observer coverage levels and full Federal funding for observer coverage the mackerel fishery.

In 2013, a working group was formed to identify a workable, legal mechanism to allow for industry-funded observer coverage in the herring fishery, including staff from the New England and Mid-Atlantic Councils and NMFS. To further explore the legal issues surrounding industry-funded observer coverage, NMFS formed a working group of Greater Atlantic Regional Fisheries Office, NEFSC, General Counsel, and Headquarters staff. The NMFS working group is currently exploring possibilities.

In the November 7, 2013, partial approval letter to the Council, NMFS offered to be the technical lead on an omnibus amendment to establish an administrative mechanism to allow for industry-funded observer coverage in New England and Mid-Atlantic FMPs. At its October 2013 meeting, the Council considered NMFS's offer and encouraged NMFS to begin development of the omnibus amendment. NMFS expects to present a preliminary range of alternatives for the omnibus amendment to the New England and Mid-Atlantic Councils in early 2014.

Additionally, other measures implemented in this action help improve monitoring in the mackerel fishery. These measures include the requirement for vessels to contact NMFS at least 48 hr in advance of a fishing trip to facilitate the placement of observers, observer sample station and reasonable assistance requirements to improve an observer's ability collect quality data in a safe and efficient manner, and the slippage prohibition and the sampling requirements for midwater trawl vessels fishing in groundfish closed areas to minimize the discarding of unsampled catch.

The same measure that would have required increased observer coverage, coupled with a $325 contribution by the industry, would have also required that: (1) The Council would re-evaluate the increased observer coverage level 2 yr after implementation; and (2) observer service provider requirements for the Atlantic sea scallop fishery would apply to observer service providers for the mackerel fishery. NMFS believes these additional measures are inseparable from the 100-percent observer coverage requirement; therefore, NMFS also disapproved these measures. With the disapproval of these measures, this action maintains the existing SBRM-based observer coverage provisions for the mackerel fishery.

Appendix 2 – Monitor and Service Provider Requirements

The following sections are based on the existing regulations for monitoring service providers. This appendix includes minor revisions that NEFOP staff made to the existing regulations. Omnibus Alternative 2 would apply these revised requirements to all new industry-funded monitoring programs in the New England and Mid-Atlantic FMPs.

§ 648.11 At-sea sea sampler/observer coverage.

(g)(5)(3) Vessel owners shall pay observer service providers for observer services within 45 days of the end of a fishing trip on which an observer deployed.

(h) Observer service provider approval and responsibilities—(1) General. An entity seeking to provide observer services must apply for and obtain approval from NMFS following submission of a complete application. A list of approved observer service providers shall be distributed to vessel owners and shall be posted on the NMFS Fisheries Sampling Branch (FSB) website at: www.nefsc.noaa.gov/femad/fsb/.

(2) [Reserved]

(3) Contents of application. An application to become an approved observer service provider shall contain the following:

(i) Identification of the management, organizational structure, and ownership structure of the applicant's business, including identification by name and general function of all controlling management interests in the company, including but not limited to owners, board members, officers, authorized agents, and staff. If the applicant is a corporation, the articles of incorporation must be provided. If the applicant is a partnership, the partnership agreement must be provided.

(ii) The permanent mailing address, phone and fax numbers where the owner(s) can be contacted for official correspondence, and the current physical location, business mailing address, business telephone and fax numbers, and business email address for each office.

(iii) A statement, signed under penalty of perjury, from each owner or owners, board members, and officers, if a corporation, that they are free from a conflict of interest as described under paragraph (h)(6) of this section.

(iv) A statement, signed under penalty of perjury, from each owner or owners, board members, and officers, if a corporation, describing any criminal conviction(s), Federal contract(s) they have had and the performance rating they received on the contracts, and previous decertification action(s) while working as an observer or observer service provider.

(v) A description of any prior experience the applicant may have in placing individuals in remote field and/or marine work environments. This includes, but is not limited to, recruiting, hiring, deployment, and personnel administration.

(vi) A description of the applicant's ability to carry out the responsibilities and duties of a fishery observer services provider as set out under paragraph (h)(5) of this section, and the arrangements to be used.

(vii) Evidence of holding adequate insurance to cover injury, liability, and accidental death for observers during their period of employment (including during training). Workers' Compensation and Maritime Employer's Liability insurance must be provided to cover the observer, vessel owner, and observer provider. The minimum coverage required is $5 million (unless otherwise specified on the NMFS/FSB website at: www.nefsc.noaa.gov/femad/fsb/). Observer service providers shall provide copies of the insurance policies to observers to display to the vessel owner, operator, or vessel manager, when requested.

(viii) Proof that its observers, whether contracted or employed by the service provider, are compensated with salaries that meet or exceed the U.S. Department of Labor (DOL) guidelines for observers. Observers shall be compensated as Fair Labor Standards Act (FLSA) non-exempt employees. Observer providers shall provide any other benefits and personnel services in accordance with the terms of each observer's contract or employment status.

(ix) The names of its fully equipped, NMFS/FSB certified, observers on staff or a list of its training candidates (with resumes) and a request for an appropriate NMFS/FSB Observer Training class. All observer training classes have a minimum class size of eight individuals, which may be split among multiple vendors requesting training. Requests for training classes with fewer than eight individuals will be delayed until further requests make up the full training class size.

(x) An Emergency Action Plan (EAP) describing its response to an “at sea” emergency with an observer, including, but not limited to, personal injury, death, harassment, or intimidation. The observer provider shall develop and NMFS shall approve an Emergency Action Plan that details contractor response to emergencies involving observers or vessel personnel. The EAP shall include communications protocol and appropriate contact information in an emergency.

(4) Application evaluation. (i) NMFS shall review and evaluate each application submitted under paragraph (h)(3) of this section. Issuance of approval as an observer provider shall be based on completeness of the application, and a determination by NMFS of the applicant's ability to perform the duties and responsibilities of a fishery observer service provider, as demonstrated in the application information. A decision to approve or deny an application shall be made by NMFS within 15 business days of receipt of the application by NMFS.

(ii) If NMFS approves the application, the observer service provider's name will be added to the list of approved observer service providers found on the NMFS/ FSB website specified in paragraph (h)(1) of this section, and in any outreach information to the industry. Approved observer service providers shall be notified in writing and provided with any information pertinent to its participation in the fishery observer program.

(iii) An application shall be denied if NMFS determines that the information provided in the application is not complete or the evaluation criteria are not met. NMFS shall notify the applicant in writing of any deficiencies in the application or information submitted in support of the application. An applicant who receives a denial of his or her application may present additional information to rectify the deficiencies specified in the written denial, provided such information is submitted to NMFS within 30 days of the applicant's receipt of the denial notification from NMFS. In the absence of additional information, and after 30 days from an applicant's receipt of a denial, an observer provider is required to resubmit an application containing all of the information required under the application process specified in paragraph (h)(3) of this section to be re-considered for being added to the list of approved observer service providers.

(5) Responsibilities of observer service providers. (i) An observer service provider must provide observers certified by NMFS/FSB pursuant to paragraph (i) of this section for deployment in a fishery when contacted and contracted by the owner, operator, or vessel manager of a fishing vessel, unless the observer service provider refuses to deploy an observer on a requesting vessel for any of the reasons specified at paragraph (h)(5)(viii) of this section.

(ii) An observer service provider must provide to each of its observers:

(A) All necessary transportation, lodging costs and support with arrangements and logistics of travel for observers to and from the initial location of deployment, to all subsequent vessel assignments, to any debriefing locations, and for appearances in Court for observer-related trials as necessary;

(B) Lodging, per diem, and any other services necessary for observers assigned to a fishing vessel or to attend an appropriate NMFS/FSB observer training class;

(C) The required observer equipment, in accordance with equipment requirements listed on the NMFS/FSB website specified in paragraph (h)(1) of this section, prior to any deployment and/or prior to NMFS observer certification training; and

(D) Individually assigned communication equipment, in working order, such as a mobile phone, for all necessary communication. An observer service provider may alternatively compensate observers for the use of the observer's personal mobile phone, or other device, for communications made in support of, or necessary for, the observer's duties.

(iii) Observer deployment logistics. Each approved observer service provider must assign an available certified observer to a vessel upon request. Each approved observer service provider must be accessible 24 hours per day, 7 days per week, to enable an owner, operator, or manager of a vessel to secure observer coverage when requested. The telephone system must be monitored a minimum of four times daily to ensure rapid response to industry requests. Observer service providers approved under paragraph (h) of this section are required to report observer deployments to NMFS daily for the purpose of determining whether the predetermined coverage levels are being achieved in the appropriate fishery.

(iv) Observer deployment limitations. (A) A candidate observer's first several deployments and the resulting data shall be immediately edited and approved after each trip by NMFS/FSB prior to any further deployments by that observer. If data quality is considered acceptable, the observer would be certified. Refer to the NMFS/FSB website for program-specific observer training certifications, http://www.nefsc.noaa.gov/fsb.

(v) Communications with observers. An observer service provider must have an employee responsible for observer activities on call 24 hours a day to handle emergencies involving observers or problems concerning observer logistics, whenever observers are at sea, stationed shoreside, in transit, or in port awaiting vessel assignment.

(vi) Observer training requirements. A request for a NMFS/FSB Observer Training class must be submitted to NMFS/FSB 45 calendar days in advance of the requested training. The following information must be submitted to NMFS/FSB at least 15 business days prior to the beginning of the proposed training: A list of observer candidates; observer candidate resumes, cover letters and academic transcripts; and a statement signed by the candidate, under penalty of perjury, that discloses the candidate's criminal convictions, if any. A medical report certified by a physician for each candidate is required 7 business days prior to the first day of training. CPR/First Aid certificates and a final list of training candidates with observer candidate contact information (email, phone, number, mailing address and emergency contact information) are due 7 business days prior to the first day of training. NMFS may reject a candidate for training if the candidate does not meet the minimum qualification requirements as outlined by NMFS/FSB minimum eligibility standards for observers as described on the NMFS/FSB website.

(vii) Reports—(A) Observer deployment reports. The observer service provider must report to NMFS/FSB when, where, to whom, and to what vessel an observer has been deployed, as soon as possible, and according to requirements outlined on the NMFS/FSB website. .The Observer deployment report must be available and accessible to NMFS electronically 24 hours a day, 7 days a week. The observer service provider must ensure that the observer reports back to NMFS its required electronic data, as described in the NMFS/FSB observer training. Electronic data submission will be outlined in observer training and may include accessing government websites via personal computers/devices or submitting data through government issued electronics. The observer service provider shall provide the raw (unedited) data collected by the observer to NMFS at the specified time per program; refer to the NMFS/FSB website for program specific observer training certifications, http://www.nefsc.noaa.gov/fsb.

(B) Safety refusals. The observer service provider must report to NMFS any trip that has been refused due to safety issues, e.g., failure to hold a valid USCG Commercial Fishing Vessel Safety Examination Decal or to meet the safety requirements of the observer's pre-trip vessel safety checklist, within 12 hours of the refusal(C) Biological samples. The observer service provider must ensure that biological samples, including whole marine mammals, sea turtles, and sea birds, are stored/handled properly and transported to NMFS within 7 days of landing. If transport to NMFS/FSB Observer Training Facility is not immediately available then whole animals requiring freezing shall be received by the nearest NMFS freezer facility within twenty four (24) hours of vessel landing. NMFS freezer locations and availability can be found at http://www.nefsc.noaa.gov/fsb/memos/2012/Freezer%20List%2007-2012.pdf

(D) Observer debriefing. The observer service provider must ensure that the observer remains available to NMFS, either in-person or via phone, at NMFS' discretion, including NMFS Office for Law Enforcement, for debriefing for at least 2 weeks following any observed trip. If requested by NMFS, an observer that is at sea during the 2-week period must contact NMFS upon his or her return. Observer service providers must pay for travel and land hours for any requested debriefings.

(E) Observer availability report. The observer service provider must report to NMFS any occurrence of inability to respond to an industry request for observer coverage due to the lack of available observers by 5 p.m., Eastern Time, of any day on which the provider is unable to respond to an industry request for observer coverage.

(F) Incident reports. The observer service provider must report possible observer harassment, discrimination, concerns about vessel safety or marine casualty, or observer illness or injury; and any information, allegations, or reports regarding observer conflict of interest or breach of the standards of behavior, to NMFS/ FSB within 12 hours of the event or within 12 hours of learning of the event. See FSB website for all incident reporting procedures, timelines and requirements. http://www.nefsc.noaa.gov/fsb/forms/.

(G) Observer status report. The observer service provider must provide NMFS/FSB with an updated list of contact information for all observers that includes the observer identification number, observer's name, mailing address, email address, phone numbers, homeports or fisheries/trip types assigned, and must include whether or not the observer is “in service,” indicating when the observer has requested leave and/or is not currently working for an industry funded program. Any observer not working for 30 days will be placed on Leave of Absence (LOA) status (or as specified by NMFS/FSB according to most recent Information Technology Security Guidelines on the FSB website). Observers on LOA for 90 days or more will need to conduct an exit interview with NMFS/FSB, return any NMFS/FSB issued gear and Common Access Card (CAC), unless alternative arrangements are approved by NMFS/FSB. NMFS/FSB requires 2 week notification of when an observer is leaving the program so that an exit interview may be arranged and gear returned.

(H) Vessel contract. The observer service provider must submit to NMFS/FSB, if requested, a copy of each type of signed and valid contract (including all attachments, appendices, addendums, and exhibits incorporated into the contract) between the observer provider and those entities requiring observer services.

(I) Observer contract. The observer service provider must submit to NMFS/FSB, if requested, a copy of each type of signed and valid contract (including all attachments, appendices, addendums, and exhibits incorporated into the contract) between the observer provider and specific observers.

(J) Additional information. The observer service provider must submit to NMFS/FSB, if requested, copies of any information developed and/or used by the observer provider and distributed to vessels or observers, such as informational pamphlets, payment notification, description of observer duties, etc.

(viii) Refusal to deploy an observer. (A) An observer service provider may refuse to deploy an observer on a requesting fishing vessel if the observer service provider does not have an available observer within the required time(see website for information on requirements for notifications and waivers for each fishery http://www.nefsc.noaa.gov/fsb/notification.html), and must report all refusals to NMFS/FSB.

(B) An observer service provider may refuse to deploy an observer on a requesting fishing vessel if the observer service provider has determined that the requesting vessel is inadequate or unsafe pursuant to the reasons described at §600.746, and a vessel may not legally sail if the safety deficiency is not fixed.

(C) The observer service provider may refuse to deploy an observer on a fishing vessel that is otherwise eligible to carry an observer for any other reason, including failure to pay for previous observer deployments, provided the observer service provider has received prior written confirmation from NMFS authorizing such refusal.

(6) Limitations on conflict of interest. An observer service provider:

(i) Must not have a direct or indirect interest in a fishery managed under Federal regulations, including, but not limited to, a fishing vessel, fish dealer, and/or fishery advocacy group; (other than providing observer services)

(ii) Must assign observers without regard to any preference by representatives of vessels other than when an observer will be deployed for the trip that was selected for coverage; and

(iii) Must not solicit or accept, directly or indirectly, any gratuity, gift, favor, entertainment, loan, or anything of monetary value from anyone who conducts fishing or fishing related activities that are regulated by NMFS, or who has interests that may be substantially affected by the performance or nonperformance of the official duties of observer providers.

(7) Removal of observer service provider from the list of approved observer service providers. An observer service provider that fails to meet the requirements, conditions, and responsibilities specified in paragraphs (h)(5) and (6) of this section shall be notified by NMFS, in writing, that it is subject to removal from the list of approved observer service providers. Such notification shall specify the reasons for the pending removal. An observer service provider that has received notification that it is subject to removal from the list of approved observer service providers may submit written information to rebut the reasons for removal from the list. Such rebuttal must be submitted within 30 days of notification received by the observer service provider that the observer service provider is subject to removal and must be accompanied by written evidence rebutting the basis for removal. NMFS shall review information rebutting the pending removal and shall notify the observer service provider within 15 days of receipt of the rebuttal whether or not the removal is warranted. If no response to a pending removal is received by NMFS, the observer service provider shall be automatically removed from the list of approved observer service providers. The decision to remove the observer service provider from the list, either after reviewing a rebuttal, or if no rebuttal is submitted, shall be the final decision of NMFS and the Department of Commerce. Removal from the list of approved observer service providers does not necessarily prevent such observer service provider from obtaining an approval in the future if a new application is submitted that demonstrates that the reasons for removal are remedied. Certified observers under contract with an observer service provider that has been removed from the list of approved service providers must complete their assigned duties for any fishing trips on which the observers are deployed at the time the observer service provider is removed from the list of approved observer service providers. An observer service provider removed from the list of approved observer service providers is responsible for providing NMFS with the information required in paragraph (h)(5)(vii) of this section following completion of the trip. NMFS may consider, but is not limited to, the following in determining if an observer service provider may remain on the list of approved observer service providers:

(i) Failure to meet the requirements, conditions, and responsibilities of observer service providers specified in paragraphs (h)(5) and (h)(6) of this section;

(ii) Evidence of conflict of interest as defined under paragraph (h)(6) of this section;

(iii) Evidence of criminal convictions related to:

(A) Embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property; or

(B) The commission of any other crimes of dishonesty, as defined by state law or Federal law, that would seriously and directly affect the fitness of an applicant in providing observer services under this section;

(iv) Unsatisfactory performance ratings on any Federal contracts held by the applicant; and

(v) Evidence of any history of decertification as either an observer or observer provider.

(i) Observer certification. (1) To be certified, employees or sub-contractors operating as observers for observer service providers approved under paragraph (h) of this section must meet NMFS/FSB certification requirements, refer to the program specific observer training certifications on the website at: http://www.nefsc.noaa.gov/fsb.

(2) Observer training. In order to be deployed on any fishing vessel, a candidate observer must have passed an appropriate NMFS/FSB Observer Training course. and must maintain all NMFS/FSB program standards and policies, refer to website for program standards, http://www.nefsc.noaa.gov/fsb If a candidate fails training, the candidate and observer service provider shall be notified immediately by NMFS/FSB. Observer training shall include an observer training trip, as part of the observer's training, aboard a fishing vessel with a trainer. Refer to the NMFS/FSB website for the required number of program-specific observer training certification trips for full certification following an observer training, http://www.nefsc.noaa.gov/fsb.

(3) Observer requirements. All observers must:

(i) Have a valid NMFS/FSB fisheries observer certification pursuant to paragraph (i)(1) of this section;

(ii) Be physically and mentally capable of carrying out the responsibilities of an observer on board fishing vessels, pursuant to standards established by NMFS. Such standards are available from NMFS/FSB website specified in paragraph (h)(1) of this section and shall be provided to each approved observer service provider;

(iii) Have successfully completed all NMFS-required training and briefings for observers before deployment, pursuant to paragraph (i)(2) of this section; and

(iv) Hold a current Red Cross (or equivalence) CPR/First Aid certification.

(v) Accurately record their sampling data, write complete reports, and report accurately any observations relevant to conservation of marine resources or their environment.

(4) Probation and decertification. NMFS may review observer certifications and issue observer certification probation and/or decertification as described in NMFS policy found on the NMFS/ FSB website specified in paragraph (h)(1) of this section.

(5) Issuance of decertification. Upon determination that decertification is warranted under paragraph (i)(4) of this section, NMFS shall issue a written decision to decertify the observer to the observer and approved observer service providers via certified mail at the observer's most current address provided to NMFS. The decision shall identify whether a certification is revoked and shall identify the specific reasons for the action taken. Decertification is effective immediately as of the date of issuance, unless the decertification official notes a compelling reason for maintaining certification for a specified period and under specified conditions. Decertification is the final decision of NMFS and the Department of Commerce and may not be appealed.

Appendix 5: Analysis of ASM Costs

Omnibus Industry-Funded Monitoring (IFM) Amendment

Amendment 7 to the Atlantic Herring FMP

DRAFT

Options Under Consideration

to Establish IFM in the Atlantic Herring Fishery

(Coverage Targets, Program Requirements, Sea Day Costs)

Lori Steele, NEFMC Staff, Herring Plan Development Team (PDT) Chairman

Industry-Funded Monitoring FMAT

DATE: 8/7/15 for Draft Omnibus IFM Amendment/EA

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1.0 Summary of Herring IFM Options Under Consideration

The options under consideration to establish industry-funded monitoring (IFM) in the Atlantic herring fishery are described in detail in the Draft omnibus IFM amendment. The options under consideration are grouped into two categories: (1) options for industry-funded observer coverage (herring OBS options, HER OBS); and (2) options for industry-funded at-sea monitoring (herring ASM options, HER ASM). The primary difference between these options is that the herring OBS options require comprehensive sampling (catch and bycatch) to provide data that is consistent with NEFOP observer data collected to meet the requirements of the standardized bycatch reporting methodology (SBRM). The herring ASM options require comprehensive sampling of bycatch only, i.e., any catch that is not retained on board the vessel for any reason, including full and partial slippage events, operational discards, and catch that is sorted on board the vessel and then discarded. The industry (vessels/vessel owners) would pay for at-sea monitors to collect bycatch data, while NEFOP observers would continue to be deployed to collect observer data on herring vessels to meet SBRM requirements. The details of the industry-funded herring OBS and ASM options under consideration are discussed in the following subsections of this document.

The intent of considering two different kinds of industry-funded monitoring programs for the Atlantic herring fishery is to address specific monitoring needs identified by the Council while providing a basis for understanding and comparing the costs of the monitoring program, particularly those which will be borne by the fishing industry. This approach also provides a mechanism to consider options that may reduce costs for the industry. For comparison purposes, information about the current multispecies (groundfish) at-sea monitoring program (GF ASM) for sector vessels is provided throughout this document as well. Since the sea day costs of the GF ASM program are better understood and current estimates of these costs are available, the sea day costs of a herring ASM program can be estimated based on a comparison to the groundfish ASM program, with particular consideration of the factors that can drive sea day costs up (see Section 2.1, p. 3).

Under the herring OBS options, vessels would be required to hire/pay sea day costs for NMFS-approved observers on some number of trips (based on coverage targets) above those on which vessels are required to carry an observer deployed through the standardized bycatch reporting methodology (SBRM). The industry-funded observers would require NEFOP certification to collect observer data, including a high-volume certification, and they would collect comprehensive catch/bycatch data consistent with NEFOP protocols for observer data collected under the SBRM. Under the herring ASM options, vessels would be required to hire/pay sea day costs for NMFS-approved at-sea monitors on trips (based on coverage targets) other than those on which vessels are required to carry an observer deployed through the SBRM. The industry-funded at-sea monitors would require NEFOP certification for the herring ASM program (HER ASM), and they would collect bycatch (discard) data consistent with NEFOP protocols.

Each set of options for IFM in the Atlantic herring fishery includes sub-options to consider allowances for waivers in the event that an observer or at-sea monitor cannot be provided for a fishing trip (to allow the vessel to fish). Additional sub-options are under consideration to exempt wing vessels (in a pair trawl operation) that do not take on fish from requirements to carry observers/monitors under the industry-funded monitoring program. These vessels would be required to notify NMFS ahead of time (through the pre-trip call-in and/or VMS) and would be prohibited from fishing for or possessing herring on exempted trips.

Some of the herring IFM options under consideration in the IFM amendment would apply to all Category A/B Atlantic herring vessels (single and paired midwater trawl, purse seine, small mesh bottom trawl) on trips declared into the herring fishery, while other options would apply only to midwater trawl vessels (single and paired, all permit categories). The options that apply only to midwater trawl vessels are based on SBRM fleet divisions (gear type and area).

2.0 What is a Sea Day Cost?

For the purposes of this discussion document, the *sea day cost* is amount that the participants in the fishery (vessels/vessel owners) pay to service provider companies for deploying an observer/at-sea monitor for a fishing trip to meet the requirements of an industry-funded monitoring program. As described in the Draft omnibus IFM amendment, the *sea day cost* incurred by the industry generally includes travel and salary for observer training, deployment and debriefing; service provider overhead and project management costs; special equipment costs; and other expenses determined by the service provider to meet the monitoring program requirements. Sea day costs are usually estimated based on a 24-hour day but can be billed based on full days, partial days, or hours. In many cases, vessel owners will enter into contracts with service providers to negotiate and secure a specific sea day cost for an agreed-upon number of sea days. Vessels may enter into contracts with multiple service providers to meet the monitoring requirements for a fishery. There are several elements of a sea day cost that can be negotiated through these contracts.

In an industry-funded monitoring program, a primary component of a *sea day cost* (sometimes upwards of 50% of the sea day cost) is **labor**, i.e., wages/salary for observers, which can be estimated by the service provider based on the anticipated number of days per month that each observer will work in the monitoring program. **Insurance** is another significant component of the sea day cost, the annual cost of which (per observer) is spread across the estimated number of sea days. Additional costs related to observer **training** (daily stipend, travel, and lodging), employee **benefits** (health insurance, vacation), and project management and **overhead** (staff, offices) are estimated for the year and then distributed across the estimated number of sea days for the monitoring program.*

**Insurance and workers compensation expenses are higher in the Northeast Region than in west coast fisheries.*

There are currently no industry-funded monitoring programs in the Greater Atlantic Region that include contracts between service provider companies and fishing industry participants. Until now, all contracts for observer coverage and at-sea monitoring have been entered into by the Federal government and service providers, administered by NMFS/NEFOP. The contract for NEFOP observer coverage under the SBRM requirements is signed for five years with one provider (currently MRAG Americas). Until recently, the Federal government has been covering industry sea day costs in the groundfish at-sea monitoring program through contracts with three service providers. Later in 2015, when groundfish sectors will become responsible for paying their at-sea monitoring sea day costs, there will be an opportunity for sector vessels to enter into contracts with provider companies to negotiate sea day costs. There is likely to be some reduction in sea day costs that will result from “privatizing” contracts and eliminating the Federal government as a party entering into the contract (see following discussion). Several industry-funded monitoring programs in U.S. west coast fisheries use vessel/provider contracts; reviewing these programs is helpful to understand the factors that drive sea day costs up and the ways that the monitoring program can be structured to reduce these costs.

Sea day costs are determined by individual service providers based on their overhead and the estimated costs associated with deploying their employees as observers in the monitoring program. There are many elements of the sea day cost that will be unique to individual service provider companies and cannot be predicted or estimated with any certainty. In addition, sea day costs can be variable, and service providers can bid different sea day costs to different vessels under the same monitoring program, depending on the details of the individual contracts. Ultimately, it will be up to the participants in the fishing industry to negotiate sea day costs with service providers in contracts designed to better meet their individual needs. To the extent that vessels that fish out of the same ports can work together to negotiate costs with service provider companies, there may be savings by reducing observer travel costs and offering more days in total for the providers to distribute overhead costs. In addition, there may be opportunities for the industry to reduce their sea day costs by allowing some costs (travel, meals, cancellations) to be negotiated in the contracts with service providers.

A large part of the sea day cost is determined by service providers based on predictions/assumptions of how vessels participating in the monitoring program will operate over the course of a fishing year and how the fishery will respond. If service providers have adequate information to accurately predict their overhead and related costs, then they can increase their efficiency and transfer these cost savings to the industry.

2.1 What Drives Sea Day Costs Up?

There are several factors that can significantly affect sea day costs in any industry-funded monitoring program. During the development of this discussion document, representatives from the NEFOP, service provider companies in the northeast U.S., and representatives from U.S. west coast service provider companies identified the following factors that most commonly increase sea day costs. In an effort to reduce sea day costs, the elements of the herring ASM options under consideration (described in Section 3.0 of this document) specifically address the following factors, to the extent possible. *Discussion of each of these factors with respect to the herring ASM options is provided below in italics.*

- **Requirements for New Data Collection/New Equipment.** New or different sampling protocols require modifications to observer training, which could increase training costs for both the government and service providers. If new or different sampling equipment is required to meet the monitoring program needs, the expense of the additional equipment will be incurred by the service provider. In addition, re-designing existing observer databases to incorporate new data introduces a significant administrative expense.

  The herring ASM options build on existing observer data collection protocols and do not require the collection of new/different data and/or new/additional sampling equipment. The protocols for the herring ASM options focus on the sampling of bycatch and is based on existing protocols for sampling bycatch and completing a NEFOP discard log for observed herring trips (see Section 3.1 for more information).

- **SCA and FLSA Requirements.** Requirements associated with the Service Contract Act (SCA) and Fair Labor Standards Act (FLSA) apply to any contracts in which the Federal government is involved. There is likely to a reduction in sea day cost associated with eliminating any legal requirements that apply specifically to contracts involving the Federal government. However, service provider companies would still be subject to FLSA requirements and other applicable labor laws.

  The SCA applies to every contract entered into by the United States (government) or the District of Columbia. Contractors and subcontractors performing on these Federal contracts must observe minimum wage standards (based on the prevailing wage for a locality, as determined by the Department of Labor) as well as safety and health standards, and they must maintain certain records. The SCA requires that every employee working under the contract must be paid not less than the monetary wages, and must be furnished fringe benefits, which are determined based on locality. Fringe benefits include paid holiday leave, vacation time, and minimum requirements for health and welfare (80/20 compensation for health insurance). Because contracts in the Atlantic herring industry-funded monitoring program will be between service providers and participants in the fishing industry, it will not be necessary for these contracts to meet the requirements of the SCA.
  However, even without the SCA requirements, service provider companies will still be required to pay employees not less than the federal minimum wage provided in the Fair Labor Standards Act (FLSA). The FLSA establishes minimum wage, overtime pay, recordkeeping, and youth employment standards affecting employees *in the private sector as well as in Federal, State, and local governments.* Covered non-exempt workers are entitled to a minimum wage of not less than $7.25 per hour effective July 24, 2009. Overtime pay at a rate not less than one and one-half times the regular rate of pay is required after 40 hours of work in a workweek.
  According to a report published by MRAG Americas (June 2012), Northern Economics (2011) estimated that the SCA and FLSA requirements are likely to add $50-$100 to the sea day cost for an industry-funded monitoring program. However, eliminating SCA requirements by privatizing contracts in this region is not likely to decrease sea day costs by as much as $100 for two reasons:

(1) FLSA requirements for minimum wage and overtime would still apply to vessel/provider contracts; and (2) employees working for companies currently providing observer coverage and at-sea monitoring services in this region have been working (some for many years) under government contracts, which are consistent with SCA requirements for wages and fringe benefits. It may be very difficult for service providers in this region to change the wage and benefit structure they offer to their employees, many of whom have been working in observer and ASM programs in this region for several years. Therefore, the reduction in sea day cost that can be expected from the privatization of contracts cannot be estimated with certainty but is likely to be on the lower end of the range predicted in the MRAG Report.
**This savings is not reflected in the current estimate of sea day costs for the groundfish ASM program.*

- **Ability to Predict the Fishery.** Sea day costs will likely be higher if service providers cannot predict how the fishery will operate (numbers of vessels/trips, length of trips, seasonality and spatial distribution of trips) in order to accurately estimate costs (administrative, overhead, communications, logistics) associated with deploying observers to meet the needs of the monitoring program. Predictability increases efficiency and therefore reduces costs. With limited information to predict the fishery, service providers are more likely to over-estimate costs associated with travel and observer deployment to ensure that they cover their costs.

  The Atlantic herring fishery is a small group of vessels that fish in a relatively predictable manner. Ultimately, in order to reduce costs, it will be up to industry participants to provide as much detail as possible about their fishing patterns to the service providers when they negotiate contracts for sea days.

- **Complicated Logistics (Vessel Selection and Observer Deployment).** The more infrastructure necessary to efficiently deploy observers to meet the needs of the monitoring program (field offices, coordinators, communications networks), then the higher the sea day costs will be. If pre-trip notification systems need to be expanded to determine observer/monitor deployment, this will likely increase costs.

  The existing pre-trip notification system (PTNS) can be utilized for vessel selection under the herring ASM options. The coverage targets are relatively simple and should not create overhead/staff costs associated with vessel selection/notification and observer deployment. In addition, travel costs associated with deploying observers on Category A/B herring vessels may be less than those for other IFM programs. The Atlantic herring fishery operates with a relatively small number of boats in a limited geographical area (versus the area covered by west coast fisheries), so observers can reach a number of deployment ports across several states more easily (ex., driving vs. flying).

2.2 How Can Sea Day Costs be Reduced?

Table 1 summarizes the ways that sea day costs can be in an industry-funded monitoring program. The discussion provided in Table 1 was generated from information provided by NEFOP personnel, observers, and representatives from service providers in the northeast and U.S. west coast. To the extent that the issues identified in Table 1 can be addressed through the management measures that establish/implement the IFM program, sea day costs borne by the fishing industry can be reduced.

Table 1 Summary Discussion – How to Reduce Sea Day Costs

How to Reduce Sea Day Costs	Discussion/Rationale
Build from existing observer sampling protocols; do not require new/different data to be collected	• Collecting data in a new/different way will require modifications to existing observer sampling protocols and training procedures, new/revised manuals/logs, possibly new/additional sampling equipment, and database design or restructure; this could increase administrative and training costs
Eliminate SCA and related regulatory requirements for Federal contracts	• Federal requirements for wage structure/overtime/paid holidays/vacation are not necessary for contracts between vessels/providers; without specifically implementing these requirements as part of the IFM regulations, wage structure and benefits for employees would be determined by individual service provider companies; MRAG report (June 2012) estimates that eliminating these requirements may reduce costs by $50-$100 per sea day; • FLSA and other Federal labor laws would still apply to service provider companies; however, eliminating the SCA requirements from IFM regulations is likely to result in some reduction in sea day cost; • Not likely to result in $100 per sea day cost savings in this region due to existing pay structure/benefits for observers required by Federal contracts; • *Needs NOAA GC Input**
"Grandfather in" current service providers approved for NEFOP observer coverage and GF ASM programs – approve these providers immediately for Herring ASM program	• Reduces expense of applying/re-approving service provider companies already approved for other programs in the region; observers/monitors for approved service providers would still need NEFOP certification for Herring ASM program; • Allows herring vessels to select from multiple service providers when program is established; increases negotiating opportunities for vessels at onset of program by creating competition between companies; • Provides opportunity for existing service providers in GF ASM program to offer more work days to their observers (could reduce staff/overhead expenses for both programs)
Allow cross-certification of NEFOP and GF ASM observers for HER ASM program; combine/overlap training and recertification whenever	• Cross-training and applying training courses to multiple certification reduces training costs (travel, hotel, per diem for service providers); • Reduces equipment costs for service providers – no need to purchase duplicative equipment • As previously noted, this may reduce overhead costs for GF ASM

possible	service providers by providing their observers with a greater number of days to work (improving ability for service providers to retain full-time employees)

Table 1 continued. Summary Discussion – How to Reduce Sea Day Costs

How to Reduce Sea Day Costs	Discussion/Rationale
Provide detailed information about fishing patterns for vessels participating in the industry-funded monitoring program	• Allows providers to more accurately estimate manpower/resources needed, logistics, overhead, and travel costs - reduces need for providers to over-estimate these costs to cover expenses that cannot be predicted prior to the start of the year; • Increases predictability of fishery for observer/monitor deployment; • Increases efficiency for service providers
Minimize observer deployment logistics	• Simplifying the selection process for vessels/trips that require industry-funded observers/monitors reduces costs for service providers because vessel selection/notification would not require additional staff or resources; • Pre-trip notification and selection for Herring ASM options could be built into existing herring PTNS; 100% coverage target options (and 50% coverage target options) eliminate need for service provider to develop a plan to meet specified coverage targets for the monitoring program;
Allow industry to negotiate less significant costs with providers	• Structure the provisions in the industry-funded monitoring program to allow the industry to negotiate as many minor costs as possible with service providers, to better meet their individual vessel needs circumstances; • These may include costs for trip cancellations and no-shows, meal reimbursements, partial day/hourly billing (see below), land-hour rates (if necessary), or other costs
Encourage service providers/industry to negotiate billing by partial days (versus 24 hour days)	• Sea scallop regulations 648.11(g)(5)(i)(A)(2) state that "For the purposes of determining a daily rate…a service provider may charge a vessel owner for not more than the time an observer boards a vessel until the vessel disembarks (dock to dock), where a day is defined as a 24-hour period, and portions of other days would be pro-rated at an hourly charge." • Industry participants should be aware that this can be negotiated in contracts with providers; may be opportunity to reduce sea day costs for some vessels depending on fishing operations; • Consideration should be given to the possibility of land hour time for observers/monitors, which may be necessary if days are billed partially or by the hour
Allow observers to be deployed on the same vessel for more than two	• Prohibited in current regulations for industry-funded observer coverage (Herring OBS options), implemented in SBRM amendment • Increases flexibility and reduces travel costs for service providers;

consecutive multi-day trips, and more than twice in any given month for multi-day deployments	appears to be consistent with regulations for Groundfish ASM

Table 1 continued. Summary Discussion – How to Reduce Sea Day Costs

How to Reduce Sea Day Costs	Discussion/Rationale
Encourage vessels in close proximity to negotiate contracts together so that they can utilize the same observers and minimize travel expenses	• Industry can reduce costs by collaborating with vessels that fish from same ports and/or during same seasons to reduce travel and related costs for observers/monitors
Streamline debriefing and re-certification requirements	• Reduces costs to service providers (travel/per diem)
Insurance	• There may be ways to reduce/streamline insurance requirements to reduce costs for providers. To the extent that duplicative or redundant insurance requirements can be eliminated, costs can be reduced. This issue requires further investigation.
Combine the IFM programs for herring and mackerel fisheries	• Would reduce complexity (PTNS, deployment, travel) and increase efficiency for service providers; increases number of sea days for amortizing travel/training expenses over the year; • Could increase the total number of work days available for ASM-certified observers/monitors and may reduce staff/overhead costs for service providers • The New England and Mid-Atlantic Councils should consider this further when the goals/objectives for IFM programs in the Atlantic herring and mackerel fisheries are more clearly articulated.

As noted in Table 1, one way to reduce sea day costs is to provide service provider companies with accurate, detailed information about the fishery characteristics to better predict how vessels participating in the industry-funded monitoring program will operate over the course of the upcoming year. This allows providers to more accurately estimate the staff, resources, and overhead that will be needed to meet their contractual requirements. This information also helps service providers predict any travel expenses they may incur, therefore reducing the need to over-estimate these costs to cover expenses that cannot be anticipated ahead of time. Table 2 describes the types of fishery data that can help to better predict how vessels in the fishery will operate over the upcoming fishing year. Ultimately, in order to reduce sea day costs, it will be up to industry participants to provide as much detail as possible about their fishing patterns to the service providers when they negotiate contracts for sea days.

Table 2 Types of Information/Data That Can Improve Predictability of the Fishery

<table>
<tr><td>Number of vessels and trips by gear type, area, and month</td><td rowspan="7">This information helps service providers estimate:
No. of observers are needed for the monitoring program
Number of days per month observers may work
Staff/overhead to deploy observers and maintain communications
Travel expenses and other logistics</td></tr>
<tr><td>Length of vessels, other vessel characteristics</td></tr>
<tr><td>Length of fishing trips</td></tr>
<tr><td>Percentage/proportion of back-to-back trips</td></tr>
<tr><td>Port sailed/port landed; geographical extent of fishing
Proportion of trips with different port sail/land</td></tr>
<tr><td>Total ports sailed from (by month or season)</td></tr>
<tr><td>How many boats will be out fishing at any given time?</td></tr>
<tr><td>Number of hauls per trip (per day)</td><td>This helps to determine minimum number of hours of work per sea day; some service providers may pay their observers differently, depending on the work schedule at sea.</td></tr>
</table>

3.0 Elements of Herring Options Under Consideration

The following subsections describe the elements of the options under consideration in the IFM amendment to establish industry-funded monitoring (IFM) in the Atlantic herring fishery, including the options for industry-funded observer coverage (Herring OBS) and the options for industry-funded at-sea monitoring (Herring ASM). The primary focus of the discussion in this document is regarding the details of the herring ASM options, which were added to the IFM amendment by the New England Council in January 2015. (The Mid-Atlantic Council added similar options for industry-funded monitoring in the Atlantic mackerel fishery.)

To the extent possible, the herring ASM options were developed based on the current multispecies (groundfish) at-sea monitoring (GF ASM) program for sectors. However, the elements of the herring ASM options have been designed with a more explicit intent of reducing sea day costs (borne by the fishing industry) to the extent possible. For comparison purposes, and for a better understanding of the factors that can increase sea day costs, the elements of the Groundfish ASM program are discussed throughout the following subsections. Since the sea day costs of the GF ASM program are currently better understood and recent estimates of these costs are available, the sea day costs of a herring ASM program can be estimated based on a comparison to the Groundfish ASM program.

In addition to the coverage targets specified within each option (see Draft IFM Amendment), the elements of the options for industry-funded monitoring in the Atlantic herring fishery include the sampling objectives, sampling design, data to be collected, service provider requirements, training and certification requirements, sampling equipment, logistics (trip notification) and related provisions, debriefing, and data management.

Under all of the herring at-sea monitoring options (HER ASM), to reduce sea day costs for vessels that are subject to the industry-funded monitoring requirements, the following provisions would apply:

- Existing service providers approved for observer coverage (NEFOP) and groundfish at-sea monitoring (GF ASM) would be "grandfathered in" as approved service providers for Herring ASM (observers working for these companies would still require certification for Herring ASM – see Section 3.2 for more information). Re-approval of the Herring ASM service providers after Year 1 would be consistent with the process for re-approving Groundfish ASM service providers.
- Cross-certification of observers from NEFOP and GF ASM programs would be allowed to certify observers for Herring ASM (see Section 3.2 for more information). Any training that is completed for a NEFOP and/or GF ASM certification could be applied to a Herring ASM certification during the same year. Training, certification, debriefing, and re-certification would be streamlined and combined with the NEFOP and GF ASM programs to the extent possible.

3.1 Sampling Objectives, Sampling Design, Data Collected

The herring OBS options under consideration in the IFM amendment focus on the collection of comprehensive catch and bycatch data, along with other environmental and economic information, consistent with the NEFOP sampling protocols for high-volume fisheries. The herring ASM options focus on the collection of bycatch data, including documentation of full and partial slippage events, operational discards, and catch that is discarded after being brought on board the vessel, i.e., any catch that is not kept/landed by the vessel. The intent of focusing the herring ASM options on the collection of bycatch (discard) data only is to reduce some of the training and equipment expenses associated with the monitoring program, thereby reducing sea day costs for the industry. The herring ASM options also represent one component of a comprehensive long-term catch monitoring program for the Atlantic herring fishery, which will also incorporate portside sampling and electronic monitoring (EM).

There would be no new or different data collection requirements under the herring ASM options; rather, the ASM options would require that a subset of the catch data that is currently collected by NEFOP observers on a limited number of herring trips (determined by the SBRM) be collected on more trips,. i.e., trips with an industry-funded at-sea monitor. The sampling protocols for the ASM options would be developed by NEFOP based on information needed to document catch that is not kept/landed by the vessels, including slippage events and operational discards. In order to streamline training and equipment costs, the bycatch data (data elements and sampling protocols) collected by herring at-sea monitors would be consistent with bycatch data collected by groundfish at-sea monitors.

In general, data elements collected under the Herring ASM options would be identified based on existing NEFOP haul logs and the NEFOP discard log that was developed in 2010 specifically for vessels that pump fish. Table 3 represents a generic NEFOP haul log, and Table 4 represents a NEFOP discard log, which was developed by the NEFOP in 2010 specifically to meet the monitoring needs of the herring fishery. The discard log is currently required to be completed by observers on all hauls in which fish are pumped, as well as any significant discard events on vessels that do not pump fish. Under the herring ASM options, the discard log would be required to be completed by at-sea monitors on all observer hauls, regardless of gear type or fishing method. Basing the Herring ASM sampling design on the NEFOP discard log allows data collected by herring at-sea monitors to be compared to observer data since the discard log was created in 2010.

Table 3 NEFOP Generic Haul Log (Example)

"GENERIC" HAUL LOG
NMFS FISHERIES OBSERVER PROGRAM
OBHAU OBSPP 05/01/13

OBS/ TRIP ID	A
DATE LAND (mm/yy)	B /
PAGE #	C ☐ OF ☐

GEAR CODE D	GEAR # E	HAUL # F	HAUL OBS?	ON-EFFORT?	CATCH?	INC TAKE?	WEATHER CODE	WIND		WAVE HEIGHT	DEPTH,
								SPEED	DIRECTION		HAUL BEGIN
☐☐☐	☐☐	☐☐☐	NO 0 ___ YES 1 G	NO 0 ___ YES 1 H	NO 0 ___ YES 1 I	NO 0 ___ YES 1 J	K	L kn	M °	N ft	O fm

SET INFO	DATE mm/dd/yy	AND TIME 24 hours	LATITUDE / LONGITUDE (DD MM.M) - LORAN (XXXXX)			
			Station 1	Latitude / Bearing	Station 2	Longitude / Bearing
SET BEGIN	/ /	:	9960 -	P	9960 -	
SET END	/ /	:	9960 -		9960 -	
HAUL INFO						
HAUL BEGIN	/ /	:	9960 -		9960 -	
HAUL END	/ /	:	9960 -		9960 -	

TARGET SPECIES	CODE(S)
Q	R

COMMENTS

SAMPLE WEIGHT MULTIPLIER
Z
___/___

SPECIES					WEIGHT		SPECIES					WEIGHT	
NAME	CODE	SUB-SAMPLE WEIGHT	POUNDS	DISP CODE	D/R	EST METHOD CODE	NAME	CODE	SUB-SAMPLE WEIGHT	POUNDS	DISP CODE	D/R	EST METHOD CODE
S	T	U	V	W	X	Y							
1		.					11		.				
2		.					12		.				
3		.					13		.				
4		.					14		.				
5		.					15		.				
6		.					16		.				
7		.					17		.				
8		.					18		.				
9		.					19		.				
10		.					20		.				

OMB Control No.: 0648-0593
[illegible]

TABLE 4 NEFOP DISCARD LOG (EXAMPLE)

DISCARD LOG
NMFS FISHERIES OBSERVER PROGRAM
OBPDQ 05/01/13

OBS/ TRIP ID	
DATE LAND (mm/yy)	/
PAGE #	☐ OF ☐

GEAR CODE ☐☐☐ | GEAR # ☐☐ | HAUL # ☐☐☐

Were there discards for this tow?
__ No (0)
__ Yes (1)
__ Unknown (9)

When the pumping/hauling process was complete were you able to see the contents of the codend/ bunt?
__ No (0)
__ Yes, all contents seen on deck (1)
__ Yes, all/some contents seen in water (2)

Why was the catch discarded on this haul? *(CHECK ALL THAT APPLY)*
☐ Unknown (0) (comment)
☐ Market (1)
☐ Regulations (2)
☐ Quality (4)
☐ Not brought onboard (5)
☐ Other (9) (comment)
☐ Not applicable

Who estimated the weight of the discarded catch?
__ Observer (1)
__ Captain (2)
__ Combination (8)
__ Not applicable

Was any of the catch pumped to another vessel?
__ No (0)
__ Yes (1)
__ Unknown (9)

Was there an observer onboard the other vessel? If yes, provide the Tripid and Haul Number.
__ No (0)
__ Yes (1)
__ Unknown (9)
TRIPID: ____________
HAUL #: ____________

Check off the discard event. *(CHECK ALL THAT APPLY)*
☐ Unknown (0) (comment)
☐ Operational discards (1)
☐ Tow was partially released (2)
☐ Tow was fully released (3)
☐ Discarded after being brought onboard (4)
☐ Other (9) (comment)
☐ Not applicable

REASONS NOT BROUGHT ONBOARD: Describe any reasons why the catch could not be pumped/hauled onboard.

CATCH COMPOSITION OF DISCARDED CATCH: Describe the catch composition of the discarded catch and how those determinations were made.

CHALLENGES OBSERVING THIS HAUL: Describe any challenges that occurred with observing this haul:

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Expires on: 11/30/2015

Different kinds of reporting and/or monitoring can provide different kinds of information with varying levels of verification, as illustrated for the Atlantic herring and mackerel fisheries in Table 5 and Table 6. These tables were developed by the IFM FMAT based on similar tables provided in the 2013 Fisheries Monitoring Roadmap Report (Lowman et al, 2013).

For landings, vessel trip reporting and dealer landings reporting provide dual records of reported landings with the general location coming from the vessel trip report. If specific location of catch is important, VMS, observers, and monitors can provide independent verification of location. Portside sampling can provide independent verification of total landings amounts but no information on location of catch. If small amounts of incidentally-caught species are typically mixed in and retained with the target species, portside sampling may be the best way to estimate/document those landings.

For discards (of targeted or incidental species), vessel trip reporting provides reported discards, but independent verification of discards is often desired. Observers and monitors can provide detailed location-specific discard information, though monitors may or may not collect species composition and may limit their data collection to confirming retention and generally documenting discarding frequency. Cameras (electronic monitoring) can also confirm retention. If retention is confirmed (by whatever means), then portside monitoring can provide full catch verification. Affidavits of discard/slippage events can provide details of why discard/slippage events occur. If retention is not confirmed, then portside sampling can provide independent verification of landings composition but uncertainty regarding discards will persist (assuming observer coverage is not complete).

Biological information (age/length data) must generally be collected by observers/monitors at sea or dockside samplers/port agents on land.

Depending on the level of detail desired for tracking landings and/or discards, some combination of the above monitoring and reporting requirements should address Council needs (the costs of the various requirements are described in Section 4.0 of this document). If independent verifications of both landings and discards are desired, then having either a high level of observer/monitor coverage that subsamples catch or verification of retention (by monitors or cameras) coupled with portside sampling should address that objective.

Table 5 Monitoring Approaches for the Atlantic Herring Fishery Based on Data Needs

		Self-Reporting			Independent monitoring					
Data Need		Vessel	Dealer	Affidavits	VMS	NEFOP Observers	Cameras	Portside	At-sea monitors	At-sea monitors
									With sampling for species comp	w/o sampling for species comp
Total herring catch accounting [ACL monitoring]	Verifying retained	Vessels report by species	Dealer reports by species		Can verify location fishing activity	Verifying location of fishing activity	Not quantifying, but confirming retention	Not useful for vessels fishing in more than one area	Verifying location of fishing activity	Not quantifying, but confirming retention
	Quantifying discards	Vessels report by species			Can verify location fishing activity	Species composition data Estimates amount of discards	Not quantifying, but confirming retention		Species composition data	Not quantifying, but confirming retention
Non-target catch accounting	Haddock catch cap monitoring [ACL monitoring]	Used for total retained		Can help with details of why slippage occurs	Can verify location fishing activity	Species composition data Estimates amount of discards	Not quantifying, but confirming retention	Not useful for vessels fishing in more than one area	Species comp and estimates of discarded catch	Not quantifying, but confirming retention

	River herring and shad catch cap monitoring	Used for total retained		Can help with details of why slippage occurs	Can verify location fishing activity	Species composition data Estimates amount of discards	Not quantifying, but confirming retention	Not useful for vessels fishing in more than one area	Species comp and estimates of discarded catch	Not quantifying, but confirming retention
Scientific information	Stock assessments for herring	VTR only				Collect age, length data		Collect age, length data	Collect age, length data for discards only	
	Stock assessments for non-target species	VTR only				Collect age, length data		Collect age, length data	Collect age, length data for discards only	
	Spawning information					Collect age, length data		Collect age, length data	Collect age, length data for discards only	

Table 6 Monitoring Approaches for the Atlantic Mackerel Fishery Based on Data Needs

		Self-Reporting			Independent monitoring					
Data Need		Vessel	Dealer	Affidavits	VMS	NEFOP Observers	Cameras	Portside	At-sea monitors	At-sea monitors
									With sampling for species comp	Without sampling for species comp
Total mackerel catch accounting [ACL monitoring]	Verifying retained	Vessels report by species	Dealer reports by species		Can verify location fishing activity	Verifying location of fishing activity	Not quantifying, but confirming retention	Not useful for vessels fishing in more than one area	Verifying location of fishing activity	Not quantifying, but confirming retention
	Quantifying discards	Vessels report by species			Can verify location fishing activity	Species comp data Estimates amount of discards	Not quantifying, but confirming retention		Species comp data	Not quantifying, but confirming retention
Non-target catch accounting	River herring and shad catch cap monitoring	Used for total retained		Can help with details of why slippage occurs	Can verify location fishing activity	Species comp data Estimates amount of discards	Not quantifying, but confirming retention	Not useful for vessels fishing in more than one area	Species comp and estimates of discarded catch	Not quantifying, but confirming retention

Scientific information	Stock assessments for mackerel	VTR only	[redacted]	Collect age, length data	[redacted]	Collect age, length data	Collect age, length data for discards only	[redacted]
	Stock assessments for non-target species	VTR only	[redacted]	Collect age, length data	[redacted]	Collect age, length data	Collect age, length data for discards only	[redacted]

Table 7 summarizes the sampling objectives, the primary elements of the sampling design, and the data to be collected under the options for industry-funded monitoring in the Atlantic herring fishery (herring OBS and herring ASM options – see description of options in the Draft IFM Amendment); the elements of the current groundfish ASM program are also provided in the table for comparison purposes. Under all of the options, the details of the sampling protocols and logs to be completed would be determined by NEFOP upon implementation of the IFM amendment.

TABLE 7 HERRING IFM OPTIONS: SAMPLING OBJECTIVES, SAMPLING DESIGN, DATA COLLECTED

	Industry-Funded Observer Coverage Options (OBS)	***NE GROUNDFISH ASM PROGRAM***	**Industry-Funded Herring ASM Options (Herring ASM)**
Sampling Objectives	SBRM, MMPA, MSA, ESA Stock Assessment, Discard Estimation	MSA Catch monitoring; discard estimation	*Bycatch documentation* - catch that is not kept/landed on Herring Category A/B herring vessels, including full and partial slippage events and operational discards; also including catch that may be brought aboard, sorted, and then discarded *Elements of data collection based on GF ASM; Herring ASM program is intended to complement portside sampling/EM for comprehensive catch monitoring program (landings + discards)*
Sampling Design	Comprehensive catch and bycatch data collection program; protected species documentation; biological sampling; environmental parameters; economic information	Catch monitoring to ensure that ACLs are not exceeded; data on catch composition to estimate total discards by sectors and common pool vessels, by gear type and stock area	Sampling protocols based on NEFOP Haul Log ("modified" - discards); Discard Log; Documentation of bycatch (discards); Protected species interactions; *(in addition to pre-trip safety checklist and other logs/reports as determined by NEFOP)*
Data Collected	Comprehensive catch/bycatch catch/bycatch; biological samples; protected species; fishery information; environmental parameters	Catch/Bycatch	Catch not brought on board the vessel for any reason; Slippage events; Operational discards; Discards brought on board *No subsampling for kept catch estimation*

**The elements of the Groundfish ASM program are provided in the table above for comparison purposes.*

3.2 Service Provider Requirements

Under the herring OBS options, the requirements for approving service providers and certifying observers for observer coverage (HER OBS) are proposed to be consistent with those implemented recently through the SBRM amendment (CFR 648.11(h)). Under the herring ASM options, the requirements for approving service providers and certifying observers for the herring at-sea monitoring program (HER ASM) are proposed to be consistent with those for the groundfish sector ASM program, implemented through Amendment 16 to the Multispecies FMP (CFR 648.47(b)(4) and (b)(5)). This approach is consistent with the January 2015 Council motion regarding the addition of the Herring ASM options.

Appendix I of this document provides a detailed comparison of the service provider regulatory requirements for approval/certification under the herring observer coverage options (HER OBS) and the herring at-sea monitoring options (HER ASM). As previously noted, the HER ASM service provider requirements are based on the current requirements for the groundfish ASM program. The major elements of the options as well as the differences between the herring OBS options and herring ASM options are discussed below.

Under the Herring OBS Options:

- Service provider requirements for industry-funded observer coverage would be consistent with those recently implemented through the SBRM amendment (CFR 648.11(h), Table 8, see details in Appendix I).
- Certified observers would be required to qualify/receive and additional NEFOP high-volume certification to work on herring OBS trips. MRAG Americas is currently the only service provider with high-volume certified observers because this is the company that has the existing (five-year) contract with NMFS for observer coverage under the SBRM amendment. Under the herring OBS options, additional service provider companies would need to apply and be approved by NMFS for observer coverage and train/certify their observers through NEFOP for observer coverage in high-volume fisheries.

Under the Herring ASM Options:

- Service provider requirements for industry-funded herring at-sea monitoring would be consistent with those for the multispecies (groundfish) sector at-sea monitoring program, implemented in Amendment 16 to the Northeast Multispecies FMP (CFR 648.47(b)(4) and (b)(5), Table 8, see details in Appendix I).
- Existing service providers approved for observer coverage and the groundfish ASM program would be “grandfathered in,” i.e., automatically approved for the herring ASM program, when the omnibus IFM amendment becomes effective. This increases negotiating opportunities for participants in the

fishery by providing competition between companies at the onset of the industry-funded monitoring program (versus having only one service provider available at the program onset).

- Observers working for HER ASM-approved service providers would be required to obtain a Herring ASM certification before being deployed for at-sea monitoring trips on herring vessels. Re-approval of the herring ASM service providers after Year 1 would be consistent with the process for re-approving groundfish ASM service providers.
- Cross-certification for existing providers/observers across multiple monitoring programs would be allowed and encouraged to minimize additional training for a HER ASM certification. Observers employed by the service provider companies that are approved for NEFOP observer coverage and/or groundfish ASM could apply their training for these certifications to a herring ASM certification during the same year. An abbreviated herring ASM training program would be developed to certify new (HER ASM only) observers who are not already certified/certifying for observer coverage or groundfish ASM. This is discussed more in Section 3.3 of this document.
- Provisions for re-certification of herring ASM observers would be consistent with those for Groundfish ASM, but the time needed for re-certification would likely be shorter (see Section 3.3).

The primary differences between the service provider requirements proposed under the HER OBS options and the HER ASM options is that there is no requirement for observers to have a college degree for HER ASM, and there is no prohibition on deploying observers on back-to-back multi-day trips or multiple multi-day trips on the same vessel in the same month (Table 8). Eliminating the college degree requirement and prohibition on multiple trips should reduce sea day costs by increasing the potential pool of observers for-hire and reducing logistics and travel expenses associated with deploying observers on multiple fishing trips. However, concerns about observer retention and data quality have been expressed regarding the elimination of the college degree requirement; these concerns should be considered carefully under the HER ASM options.

Another difference between the options is that the regulations regarding service provider approval and responsibilities under the herring ASM options do not include requirements for service providers to meet SCA/FLSA and Department of Labor (DOL) wage/overtime standards. While it is expected that service provider companies will continue to adhere to DOL and other applicable Federal labor laws, the proposed regulations for the HER ASM options would not further address these requirements, which is also consistent with the current service provider requirements for the Groundfish ASM program. As previously discussed (see Sections 2.1 and 2.2), there is likely to be a sea day cost savings by eliminating these requirements.

TABLE 8 HERRING IFM OPTIONS: SERVICE PROVIDER REQUIREMENTS

	Industry-Funded Observer Coverage Options (HER OBS)	***NE GROUNDFISH ASM PROGRAM***	**Industry-Funded Herring ASM Options (HER ASM)**
Service Provider Requirements	***Implemented through SBRM Amendment***	***Implemented through Am 16 Multispecies FMP***	***Same as Groundfish ASM Program***
	CFR 648.11(h) Observer Service Provider Approval/Responsibilities	CFR 648.47(b)(4) and (b)(5)	*No requirement for providers to meet SCA/FLSA/DOL wage/overtime standards*
	Bachelor's Degree required	High School Diploma or equivalency	*High School Diploma or equivalency*
		No prohibition on observer deployment on back-to-back trips or multiple multi-day trips	*No prohibition on observer deployment on back-to-back trips or multiple multi-day trips*
Current NMFS-Approved Providers	MRAG Americas	MRAG Americas East West Technical Services AIS, Inc. ACD USA Ltd.* Fathom Research, LLC*	MRAG Americas East West Technical Services AIS, Inc. ACD USA Ltd.* Fathom Research, LLC*

**Service provider companies with an asterisk by their names have been approved for Groundfish ASM but are not currently providing sea day coverage.*

The elements of the Groundfish ASM program are provided in the table above for comparison purposes.

3.3 Observer Training, Certification, and Sampling Equipment

General provisions related to observer training, certification, and sampling equipment under the herring OBS and ASM options are summarized in Table 9 and Table 10. Training and certification of industry-funded observers under the HER OBS and HER ASM options would be administered/managed through NEFOP, consistent with training and certification for the groundfish ASM program (GF ASM). Approved service providers for would be responsible for covering the costs associated with providing their employees with a daily stipend, meals, hotel/lodging, and covering other related expenses associated with attending training/certification courses at NEFOP (Falmouth, MA). This can include lodging, meals, and a daily stipend over weekends if training courses more than one week.

Cross-certification of observers and carryover of overlapping training/equipment from NEFOP and GF ASM programs would be allowed to certify observers under the herring ASM options. Any training courses that are completed for a NEFOP observer coverage certification and/or GF ASM certification could be applied to a herring ASM certification during the same year. Training, certification, debriefing, and re-certification would be streamlined (ex., provided remotely) and combined with the NEFOP and GF ASM programs to the extent possible. Because the herring ASM program focuses only on the collection of discard data on Category A/B herring vessels, training requirements and equipment needs for a HER ASM only certification (observers not certified for other programs) would be less than those for the industry-funded observer coverage (OBS options) or the GF ASM program. Therefore, the costs paid by service providers to certify observers for the HER ASM program are expected to be less than those for observer coverage (OBS options) and the GF ASM program, which is likely to reduce the sea day costs for the HER ASM options. Any newly-approved service providers that do not have observers currently certified for either NEFOP observer coverage or GF ASM would incur the largest training/certification/equipment costs under the HER ASM options.

Under the Herring OBS Options:

- Observers (employed by approved service providers) would need to attend 15 training days to obtain a NEFOP certification for observer coverage (Table 9). Newly certified observers would be required to work four training trips, including one trip with a veteran observer. Additional experience (sea days) is necessary prior to qualifying for a high-volume certification, which would then require one additional training day.
- Current GF ASM-certified observers could obtain a NEFOP certification for observer coverage under the Herring OBS options with additional training days and a high-volume certification.

Under the Herring ASM Options:

- Any training that is completed for a NEFOP observer coverage and/or GF ASM certification by observers working for approved service providers could be applied to a HER ASM certification during the same year. Observers already certified for NEFOP and/or GF ASM would not require training trips with a veteran observer to certify for HER ASM. This should significantly reduce costs for existing service providers that may want to “dual certify” their observers for multiple monitoring programs, including herring ASM. Many costs associated with training/certifying observers under the herring ASM options would be incurred only by service provider companies that are certifying their observers for HER ASM only.
- Current NEFOP-certified observers with high-volume certification would not require additional training days to certify for HER ASM, but would likely require some overview/instruction regarding the protocols for HER ASM trips (possibly conducted remotely/online).
- Current groundfish ASM-certified observer would likely require 1-2 additional training days to learn more about herring fishing operations (midwater trawl, purse seine, and small mesh bottom trawl gear) and sampling protocols in high-volume fisheries. Based on cost information provided by service provider companies (*see below), the cost of certifying GF ASM observers for HER ASM would be about $320-$640 (1-2 training days), or about 10-20% of the cost of certifying observers for the GF ASM program (11 training days).
- New observers certifying for HER ASM-only (employed by approved service providers) would likely require 4-5 training days, which includes two days of safety training plus 2-3 days or training for the HER ASM program (herring fishing operations, sampling protocols, data entry, species identification). To obtain a HER ASM certification, new observers would be required to work four training trips, including one trip with a veteran observer. Based on the cost information provided by service provider companies (*see below), the cost of certifying new observers for HER ASM only would be about $1,500-$2,000 per observer (4-5 training days), or about 50% of the cost of certifying observers for the GF ASM program (11 training days).
- Annual recertification would be required for the HER ASM program, but the recertification process could likely be reduced to one day. The GF ASM program recertification currently lasts three days. The costs to service providers for recertifying observers under the herring ASM options, therefore, is expected to be 1/3 of the cost for recertifying observers for Groundfish ASM. To the extent possible, the recertification courses for these programs would be combined and/or provided remotely.

**The cost for training/certifying one observer for the Groundfish ASM program is estimated by service providers to be $3,000-$4,000 (personal communication). This includes travel, meals, lodging, and a daily stipend for 11 training days at the NEFOP training center in Falmouth, MA. This results in an average estimate of about $320 per training day per observer.*

Under the herring ASM options, expenses for sampling equipment would be shared between the Federal government and the service providers in a manner that is similar to the current groundfish ASM program. Because of the focus on bycatch/discards only, less sampling equipment would likely be needed for the herring ASM options versus the herring OBS options (Table 10). Personal safety equipment (immersion suit, inflatable vest, etc.) would continue to be paid for by the service providers; existing observers certified observer coverage and the GF ASM program already possess personal safety equipment and would not need to purchase it again to certify for HER ASM. Other personal issue and off-the-shelf gear such as small scales, gloves, bags, measuring tapes, knives, clipboards, etc. would be covered by the service provider. Additional costs for this equipment would be incurred primarily by newly-approved service providers that do not have observers currently certified for either NEFOP observer coverage or GF ASM. Special prints, special electronics, and not-off-the-shelf gear would continue to be funded by the Federal government, although the availability of future funding is unknown. This includes manuals, field guides, tablets, logs, laptops, and other electronics. The costs of any sampling equipment not provided by the Federal government must be covered by the service providers and is therefore transferred to the industry in the sea day cost.

Overall, because of the need for less sampling equipment and the ability for current NEFOP and GF ASM observers to utilize existing equipment for a herring ASM program, the equipment costs associated with the herring ASM options are expected to be less than those for the herring OBS options. The equipment costs for the herring ASM options will also be lower for service providers with observers who are already certified for groundfish ASM.*

**Information provided by NMFS indicates that the estimated sea day cost incurred by the service provider for equipment in the Groundfish ASM program is $17.50 per observer (based on the observer working 150 sea days in a year).*

TABLE 9 HERRING IFM OPTIONS: OBSERVER TRAINING AND CERTIFICATION

	Industry-Funded Observer Coverage Options (OBS)	*NE GROUNDFISH ASM PROGRAM*	Industry-Funded Herring ASM Options (Herring ASM)
Training and Certification			
Training Courses	15 days (3 working weeks) comprehensive training, plus high-volume certification for qualified observers (one extra day); **Current Groundfish ASM-certified Observers** - can certify for OBS with additional training days and high-volume certificaiton	11 days (covers multiple gear types - gillnet, longline, otter trawl, handline - catch estimation procedures, protected species)	**NEFOP-Certified Observers with Current High-Volume Certification** - no extra training days, but possibly some instruction on protocols for ASM trips; **GF ASM-Certified Observers** - 1-2 training days for herring/high-volume; **New HER ASM Observers** - 4-5 training days for HER ASM only certification (2 days safety, plus herring/high-volume training); *Providers pay for travel/lodging, and daily pay to observers for attending training; Est. provider cost for Gfish ASM training (11 days) - $3000-$4000 per observer ($325/day)*
Certification/Shadow Trips	Yes, 4 trips incl. 1 with trainer	Yes, 4 trips incl. 1 with trainer	Not required for existing NEFOP and GF ASM-certified observers (already certified); New HER ASM only observers - one shadow trip with trainer; first four trips would be training trips
Re-certification	No	Yes, Annual	Yes, annual - one day (Gfish ASM - 3 days; cost reduced by 2/3)
Safety Refresher (two days)	Yes, every 18 months	Yes, every 18 months	Yes; cross-certify; additional cost only for HER ASM-only observers
CPR/First Aid Certification	Annual	Annual	Annual; cross-certify; additional cost only for HER ASM-only observers

TABLE 10 HERRING IFM OPTIONS: OBSERVER EQUIPMENT

	Industry-Funded Observer Coverage Options (Herring OBS)	***NE GROUNDFISH ASM PROGRAM***	**Industry-Funded Herring ASM Options (Herring ASM)**
Equipment	Comprehensive - 83 items	Limited - 44 items	Limited - Similar to Groundfish ASM; any equipment necessary for discard sampling/documentation
Personal Safety Equipment- Immersion suit, PLB, Inflattable Vest	Yes	Yes, covered by provider	Yes, covered by provider; Equipment for NEFOP and GFASM can be used; Additional cost only for HER ASM-only observers
Personal Issue and Off-the-Shelf Gear	*(baskets, small scales, gloves, bags, measuring tapes, disposable cameras, knives, clipboards)*	Yes, covered by provider	Yes, covered by provider; Est. total cost for new observer ($2,600 amortized for life of equipment); Est. sea day cost (service provider) per observer (150 days) - $17.50
Special Prints, Electronics, Not Off-the-Shelf Gear	*(manuals, guides, Marel scales, tablets, logs, electronics)*	Yes, covered by NMFS	Yes, covered by NMFS; *future funding unknown*

The elements of the Groundfish ASM program are provided in the tables above for comparison purposes.

3.4 Pre-Trip Notification, Debriefing, and Data Management

Provisions related to vessel selection (through pre-trip call-in/notification), debriefing, and data management for the herring OBS and ASM options are summarized in Table 11. Under all of the herring OBS and ASM options, vessel selection/notification for industry-funded coverage would occur through the existing pre-trip call-in system for Atlantic herring vessels (Amendment 5). The Atlantic herring notification process differs from the Groundfish Pre-Trip Notification System.

The existing notification system for observer deployment on Atlantic herring vessels requires 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 Atlantic herring carrier vessels to notify NMFS/NEFOP at least 48 or 72 hours (depending on permit category) prior to the beginning of any trip where the vessel may harvest, possess, or land Atlantic herring. Vessels/representatives 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, closed area, etc., consistent with regulatory requirements), as well as target species (target species is helpful to identify directed herring versus directed mackerel trips). Notification is through a telephone number. Vessels can provide pre-trip notification for multiple trips at one time. 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 observer selection notices for observer coverage are issued to the vessel by VMS so as to have on-board verification of the waiver or selection.

The existing pre-trip notification system (PTNS) for observer deployment on groundfish and longfin vessels requires all vessels fishing on PTNS-eligible groundfish trips or PTNS-eligible longfin trips to notify NMFS/NEFOP at least 48 hours prior to the beginning of any trip. Groundfish sector vessels with category A, C, D, E, F, and HA multispecies permits must notify for all multispecies trips. Common pool vessels with categories A, D, E, and F permits, as well as those fishing monkfish or multispecies using A DAS must notify for their groundfish trips. Vessels with a longfin/butterfish moratorium (SMB 1) permit must notify for all trips on which they plan on landing greater than 2500 pounds of longfin squid. Vessels/representatives must provide information including the vessel name, permit number, contact person name and contact phone number, date sail, time sail, port of departure, estimated length of trip, gear type, and area intending to fish. There are several methods available for the pre-trip notification: internet, email, and telephone. Vessels can provide pre-trip notification for multiple trips at one time and may enter their own trips directly into the PTNS without contacting FSB staff. Trips are entered into the PTNS and go through a programmed algorithm to determine which trips get selected for observer coverage. Trips are cancelled by FSB staff based on automated sail reports. All waivers or observer selection notices for observer coverage are issued to the vessel via VMS so as to have on-board verification of the waiver or selection. The PTNS system in all its complexity requires a full time contractor to oversee the system on a daily basis. The NEFOP also contracts with an afterhours phone service to provide access 24 hours a day, 7 days a week to allow for notifications or troubleshooting.

Under the Herring OBS and ASM Options, vessels would be notified via VMS if they are selected for industry-funded coverage. The 100% coverage target options simplify vessel selection, as all vessels that are not selected for observer coverage under the SBRM provisions would be required to obtain an industry-funded observer employed by one of the service providers approved for the monitoring program.

Debriefing is an important component of any monitoring program, as it helps to resolve data issues expeditiously and ultimately enhances data quality. It also provides an opportunity to review observer performance and address any problems with data collection and data entry. Provisions for debriefing under the Herring ASM options would be consistent with those for the Groundfish ASM program. To the extent possible, debriefing will be streamlined (for example, conducted remotely) to reduce travel and other related costs. The most successful debriefings are conducted soon after the vessel lands and after the preliminary data are uploaded to the NEFOP program. Preliminary data can be reviewed by staff and follow-up questions answered in a timely manner. Information is then edited near real-time and is therefore more accurate. Sampling in the high volume fisheries can be challenging and direct communication with observers after trips land is key to understanding the data, especially slippage information.

Responsibilities and provisions for **data management** under the Herring ASM options would be the same as those for observer data and data collected for Groundfish ASM. The NEFOP would manage the data. A summary of preliminary data would be uploaded electronically, by observers and reviewed by the NEFOP staff. Once verified the data are available for use by GARFO and other end users. Data are stored in master tables in the Observer database, and fully audited data are available 90 days after date landed.

TABLE 11 HERRING IFM OPTIONS: LOGISTICS (NOTIFICATION), DEBRIEFING, AND DATA MANAGEMENT

	Industry-Funded Observer Coverage Options (HER OBS)	***NE GROUNDFISH ASM PROGRAM***	**Industry-Funded Herring ASM Options (HER ASM)**
Logistics and Related Provisions	PTNS	Gfish PTNS	Build into existing pre-trip notification system for Herring A/B vessels (different from GFish) *No need to develop strategy for vessel selection under 100% coverage options (or possibly 50%)*
Debriefing	Yes	Yes	Yes; Pre-trip and post-trip briefing important for discard logs; *Streamline/combine debriefing to the extent possible*
Data Management	NEFSC/NEFOP	NEFSC/NEFOP	Data submitted to NEFOP for use by all users (NEFSC, GARFO, NEFMC) under a separate program code
	Upload OB PRELIM record 48 hours from landing	Upload OB PRELIM record 48 hours from landing	OBPRELIM upload - a) Delivery of paper log data shall be received within 5 calendar days (120 hours) of the vessel landing (b) Delivery of electronic data shall be received within 2 calendar days (48 hours) of the vessel landing
	Paper logs due 5-7 business days	Paper logs due 5-7 business days	Paper logs due 5-7 business days

**The elements of the Groundfish ASM program are provided in the table above for comparison purposes.*

3.5 Summary: Comparison of Herring OBS and ASM Options

Table 12 provides a qualitative comparison of some of the pros/cons associated with the options under consideration in the IFM amendment to establish industry-funded monitoring in the Atlantic herring fishery.

TABLE 12 QUALITATIVE COMPARISON OF OPTIONS FOR INDUSTRY-FUNDED MONITORING IN THE ATLANTIC HERRING FISHERY (HERRING OBS OPTIONS VS. HERRING ASM OPTIONS)

	Pros	Cons
Observer Coverage Options (HER OBS)	Comprehensive catch sampling (kept and discarded)	Higher sea day cost
	Biological samples collected	Limited ability to reduce industry/sea day costs
	More applications/uses for data (stock assessment, catch monitoring, etc.)	Industry-funded observer data not collected consistently with SBRM strata (gear type, area) not utilized for bycatch estimation and stock assessment
		Limited to only one service provider at onset of industry-fund program; higher costs for other providers to certify observers
At-Sea Monitoring Options (HER ASM)	**Pros**	**Cons**
	Reduces sea day costs for industry	Discard data only; more limited applications of data
	Builds on existing discard data collected by observers (provides basis for comparison to observer data)	Loss of opportunity to collect other important data while paying for an observer
	Focuses on at-sea component of comprehensive long-term catch monitoring program that will likely include portside sampling and EM	
	Multiple service providers available at onset of industry-funded program; increases flexibility and negotiating ability for industry; competition reduces costs	
	Discard data collected by at-sea monitors can help to inform decisions about maximized retention provisions for the portside sampling/EM components of the IFM program	

4.0 Estimated Sea Day Costs for the Herring ASM Options

For the purposes of the omnibus IFM Amendment, an estimate of the sea day cost that may be expected under the Herring ASM options will be developed by the IFM FMAT based on estimates of sea day costs for NEFOP observer coverage (currently estimated at $806 in the Draft IFM Amendment) and the Groundfish ASM program. This sea day cost can be used in the economic analysis for a comparison of the impacts of the Herring ASM options to the Herring OBS options.

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Omnibus Industry-Funded Monitoring (IFM) Amendment

Amendment 7 to the Atlantic Herring FMP

DRAFT APPENDIX I:

SERVICE PROVIDER REQUIREMENTS

Proposed Regulations for Herring Industry-Funded Observer Coverage (OBS) and Herring Industry-Funded At-Sea Monitoring (ASM)

Regulations for Service Provider Approval

	Industry-Funded Observer Coverage (OBS) Options Service Provider Requirements *Consistent with SBRM Amendment*	**Proposed Atlantic Herring At-Sea Monitoring (ASM) Service Provider Requirements** *Consistent with NE Groundfish ASM Requirements*
At-Sea Sampler/Observer Coverage (CFR 648.11) **CFR 648.11(h) Observer Service Provider Approval/Responsibilities**		**Independent Third-Party Monitoring Provider Standards** **CFR 648.47(b)(4) and (b)(5)**
3. Contents of Application	*Corporate structure, contact information, confict-of-interest and other statements*	*Same requirements (b)(4)*
	Summary of prior experience, monitoring services provided	*Same requirements (b)(4)*
	Proof of Insurance - Workers Compensation and Maritime Employer's Liability Insurance $5M min)	*Addressed in i(G) Evidence of adequate insurance to cover in jury, liability, and accidental death*
	Proof that salaries meet/exceed DOL Guidelines, compensation for FLSA non-exempt employees, information about benefits and personnel services provided	*Addressed in (b)(4)(i)(H) Proof of benefits and personnel services, but no reference to DOL Guidelines or FLSA requirements*
	Names of NMFS-certified observers and trainees	*Addressed in (b)(4)(i)(I) Proof that monitors have passed adequate training course to the extent not funded by NMFS, consistent with NEFOP*
	Emergency Action Plan	*(b)(4)(i)(J) Same*
		(b)(4)(i)(K) Evidence that the company is in good financial standing

Regulations for Service Provider Responsibilities

	Industry-Funded Observer Coverage (OBS) Options **Service Provider Requirements** *Consistent with SBRM Amendment*	**Proposed Atlantic Herring At-Sea Monitoring (ASM)** **Service Provider Requirements** *Consistent with NE Groundfish ASM Requirements*
At-Sea Sampler/Observer Coverage (CFR 648.11) **CFR 648.11(h) Observer Service Provider Approval/Responsibilities**		**Independent Third-Party Monitoring Provider Standards** **CFR 648.47(b)(4) and (b)(5)**
5. Responsibilities of Observer Service Providers	*Provide observers with transportation to initial location of deployment, subsequent vessel assignments, and debriefing locations*	*(b)(4)(ii)(A) Must establish and carry out a comprehensive plan to deploy NMFS-certified at-sea monitors, or other at-sea monitoring mechanism (ex., NMFS-approved EM equipment) to meet specified coverage levels;* *(b)(4)(ii)(A)(1)-(A)(6) include specific requirements for groundfish sector monitoring*
	Lodging, per diem, and any other services for observers to attend training classes	
	Required observer equipment prior to training or deployment	*Addressed in (b)(4)(ii)(J); and (b)(5)(i) - providers are responsible for cost of gear to the extent not funded by NMFS*
	Individually-assigned communication equipment (cell phones, other devices)	
iii. Logistics	*Must be able to deploy observers based on comprehensive plan (24/7) with phone system to secure coverage, must access all ports, report deployments to NMFS, fair/equitable assignment of observers*	*Addressed in (b)(4)(ii)(A)*
iv. Limitations	*Review/edit/approve data from first four deployments by candidate observer before certifying*	
	Observers cannot be deployed on the same vessel for more than two consecutive multi-day trips; observers cannot be deployed on the same vessel more than twice in any given month for multi-day deployments	*Not addressed in Groundfish ASM Provider Requirements*
v. Communications with Observers	*Must have employee on call 24/7 to handle issues*	
vi. Observer Training Requirements	*Must submit information about trainees at least 7 days prior to training*	
vii. Reports	*Observer deployment reports w/in 24 hours; reports back in OBSCON data w/in 24 hours of landing; raw data w/in four days of landing*	
	Safety refusals within 24 hours; Return biological samples within 7 days; Debriefing availability for up to 2 weeks following trip; Observer availbaility report to NMFS by 5 p.m.; other reports (harassment, discrimination, injury, etc.) within 24 hours of event	*(b)(4)(ii)(B) Monitors must remain available to NMFS for debriefing at least two weeks following trip; (b)(4)(ii)(C) similar requirements for other reports in this section*
	Requirements for observer status reports, vessel contracts, observer contracts and additional information that may be distributed to vessels	*(b)(4)(ii)(D) contracts and (b)(4)(ii)(E) other paperwork distributed to vessels*
viii. Refusal to Deploy Observer	*If provider does not have observer available within 48 hours of request; if the vessel is determined unsafe; other reasons including failure to pay for previous deployments (if authorized in writing by NMFS)*	*(b)(4)(ii)(F); also includes refusal for inadequate notice for departure or landing*
6. Limitations on Conflict of Interest	*No direct/indirect interest in fishery/vessels/dealers/research/advocacy; must assign observers without preference; must not soliciy or accept gifts, favors, loans, etc.*	*Addressed in (b)(4)(ii)(G)*
7. Removal of Service Provider	*Process for removal if provider does not meet requirements/conditions of service, conflict of interest, criminal convictions, embezzlement, theft, etc., crimes of dishonesty, unsatisfactory performance ratings on Federal contracts, evidence of de-certification*	*(b)(4)(ii)(I) A means to protect the confidentiality and privacy of data submitted by vessels, as required under the MSA*

Regulations for Observer Certification

	Industry-Funded Observer Coverage (OBS) Options Service Provider Requirements *Consistent with SBRM Amendment*	Proposed Atlantic Herring At-Sea Monitoring (ASM) Service Provider Requirements *Consistent with NE Groundfish ASM Requirements*
648.11(i) Observer Certification		**Independent Third-Party Monitoring Provider Standards**
(1) Eligibility Standards	*Observers must meet NMFS National Minimum Eligibility Standards (National Observer Program), Provided Below*	**CFR 648.47(b)(4) and (b)(5)**
Education/Experience	*Unless waived by the RA, must possess Bachelor's Degree with a major in one of the sciences; must have had at least one undergad course on math/stats; must have experience with data entry on computers; these requirements can be waived by RA or NEFSC Directors if skills have been acquired through alternative training program (observing fishing activities, research cruises, marine mammal data recording, collecting biological samples, entering data, completing NMFS biological training program*	*(b)(4)(iii)(A) High school diploma or legal equivalent*
Training Requirement	*Must pass tests 80% or greater for program; must complete acknowledgement of risk*	*(b)(4)(iii)(B) Successful completion of NMFS-required training and briefings before deployment*
Conflict of Interest	*No direct financial interest, ownership, etc. in catching, taking, harvesting, processing fish; may not solicit or accept gifts; may not observe on vessels previously employed in another capacity; must not work for other vessels/processors while hired as observer*	*Addressed in (b)(4)(ii)(G)*
Physical/Mental Confition	*Documentation of physician certification within 12 months of completing training*	*Addressed in (b)(4)(iii)(C)*
Communication Skills	*Must be able to communicate verbally and written in English*	
Citizenship/Ability to Work Legally in US	*Must be a U.S. citizen, non-citizen with green card, TN authorization, H1 visa, or valid work visa, and social security card*	
(2) Observer Training	*Must pass NMFS/NEFOP course(s); one training trip with another observer; data from first four trips reviewed/approved for certification*	*Addresssed in (b)(4)(iii)(B)*
(3) Observer Requirements	*Must be NMFS/NEFOP certified; completed all required training and briefings for observers*	
	Physically and mentally capable fo carrying out responsibilities	
	Red Cross/CPR certification	*Addressed in (b)(4)(iii)(D)*
	Must accurately record sampling data, write complete reports, report observations accurately	
(4) and (5) Probation/Decertification	*Process for NMFS to review certifications and written issuance of de-certification*	
	Automatic background check when observers are issued a "CAC" card	*(b)(4)(iii)(E) Absence of fisheries-related convictions, based upon a thorough background check*
		(b)(4)(iii)(F) Independence from fishing-related parties
		(b)(5)(ii) includes requirements for groundfish vessel selection protocols

Appendix 6 – Monitoring Cost Estimates for the Industry-Funded Monitoring Omnibus Amendment

NMFS Costs for NEFOP-level observers, at-sea monitors and dockside monitors. Based on fiscal year 2013 expenses, Table 1 shows the level of costs required to support the deployment of all Northeast Region at-sea monitoring programs, including NEFOP observers, and groundfish at-sea monitors, and the scallop industry-funded monitoring program. These are presented as annual costs because while some components can be scaled up proportional to an increase in the total number of sea days, many cannot be scaled proportionally. For example, an increase in observer days would increase the number of hours needed to process data and that need could be met by hiring additional data processing personnel (proportional to the increased need). However, the facilities (particularly office space) needed to accommodate the additional data processing personnel is not proportionally scalable. The approximately $5 million of NMFS costs, detailed below, supported 10,666 sea days in FY 2013, but could support about a maximum of 15,000 sea days per year. The currently leased facilities could accommodate additional personnel to support an additional 2,000 sea days. However, beyond that, new facilities cost would have to be incurred. Facility costs cannot be obtained in small increments, so if sea days beyond 17,000 are considered, new facilities would have to be obtained so that there is sufficient capacity to cover the upper end of any anticipated increase. NMFS costs for dockside monitoring programs are likely similar to the costs described in this annual estimate.

The operational costs are presented as a single figure and are not broken out by each of the three components because there is some overlap, particularly when allocating employees' time over these activities.

Table 1. NMFS Cost Responsibilities for monitoring

NMFS Cost Responsibilities		Annual Cost (FY2013) for all Programs (NEFOP, ASM, and industry funded scallops)
Training and Data Processing Costs	The labor and facilities costs associated with training and debriefing of monitors	$805,700
	Data processing	$2,057,100
Operational Costs	Certification of monitoring providers and individual monitors; performance monitoring to maintain certifications	$2,244,700
	Developing and executing vessel selection	
	Costs associated with liaison activities between service providers, NMFS, Councils, sectors and other partners	
Total		$5,107,500

The groundfish electronic monitoring cost comparison report estimates NMFS costs for the groundfish at-sea monitoring program for fiscal year 2014 costs. In fiscal year 2014, NMFS spent an estimated

$531,953 on training, $626,043 on data processing, and $719,548 on program management for the groundfish at-sea monitoring program for a total cost of $1,877,544 (Table 2). This total cost is divided by the number of at-sea monitor sea days accomplished in 2014 (3,541 days) to get a per sea day administrative costs of $530 (Table 2).

TABLE 13: ANNUAL AT-SEA MONITORING COSTS FOR NOAA FISHERIES

	Estimated Cost	
Program Component	**Total**	**Per Sea Day**
Training	$531,953	$150
Data Processing	$626,043	$177
Program Management	$719,548	$203
Total	$1,877,544	$530

NMFS cost responsibilities for electronic monitoring. In this section, we estimate NMFS costs for administering the example EM programs for groundfish sectors (audit approach) and the midwater trawl fleet (optimized/full retention approach) based on the roles and responsibilities described above. The reader should note that generalized descriptions for industry costs for electronic monitoring programs presented in this section were derived separately and differently than the NMFS costs presented here.

Many of the costs to NMFS for administering the example EM program would be driven by the scale of the program and the level of participation, although these costs do not necessarily increase linearly with the amount of sea days. Thus, we present a range of potential NMFS costs from overseeing an audit approach EM program for a single hypothetical sector (20 vessels) to a program for the entire active groundfish fleet (400 vessels), and for an optimized/full retention approach EM program for an example midwater trawl fleet (9 vessels). We based NMFS costs for the EM program on costs the Northeast Fishery Observer Program incurred for administering programs with similar roles and responsibilities and from the New England EM Project (Archipelago, 2014). These are rough estimates of NMFS potential costs and, unlike the NEFOP-level observer/at-sea monitoring program costs presented in the section above, may not reflect efficiencies or economies of scale that are possible in a mature program. NMFS would also have other incremental costs for enforcement and use of the data for management, which were not estimated here in order to be consistent with the estimates of the NEFOP-level observer/at-sea monitoring program.

In Table 3, training costs include labor and costs of licenses for any proprietary EM review software. The number of annual trainings that would need to be held and, hence, the number of trainers, would depend on the number of EM reviewers employed by the service providers, which would depend on the number and activity levels of vessels using EM in the fishery. For the audit model, training costs do not increase linearly. Although the number of participants increases by a factor of 20 when scaling up from

20 vessels to a fleet-wide program, the training costs increase by a factor of 8. This type of relationship makes it difficult to estimate costs at a unit that is easily multiplied (e.g., sea day cost). For the optimized/full retention model, although the example fleet includes only 9 midwater trawlers, there is a large amount of video footage to be reviewed, due to a high number of assumed trips (500) and the assumed rate of video review (100 percent) used in the analysis. This much video footage may require a larger cadre of EM reviewers than the number of vessels might indicate, also increasing demand for training and certifications and NMFS's training costs.

NMFS may also have some costs for reviewing and approving individual Vessel Monitoring Plans (VMPs), which are each vessels individualized plans for equipment specifications, installation, and catch handling, and inspecting equipment installation on the vessel. Annual labor and travel associated with this activity is estimated at $15,500 for 9 vessels, $31,000 for 20 vessels and $232,500-$310,000 for 400 vessels.

For the audit model, NMFS costs for auditing the service provider's review of logbooks were estimated to be $46,795 for 20 vessels and $432,405-$525,905 for 400 vessels (Table 3), assuming NOAA Fisheries audits 5 percent of trips. These costs include staff time and licenses for proprietary EM review software. Use of open source software would negate the cost of software licenses in this category. For the optimized full retention model, the staff time and equipment costs to conduct periodic video reviews to audit the service providers are estimated at $26,295, assuming 5 percent of trips are audited.

Program management cost is labor for a program manager, which is necessary to administer the new program, liaise with the service providers, vessel, and enforcement, and coordinate staff. Program management cost is estimated at $86,000 annually, irrespective of the number of vessels participating in the program.

Not included in these cost estimates is the cost of storing any EM data submitted by the service providers or sectors. NMFS data storage costs would be driven by record-keeping and security requirements for EM data, which NMFS is still working to determine. Alternately, NMFS may be able to get remote access to EM data and video stored by the provider, and reduce or eliminate its data storage costs (Van Oyen, pers. comm., 2014).

TABLE 3: NMFS COST RESPONSIBILITIES FOR ELECTRONIC MONITORING PROGRAMS

	Estimated NMFS Cost Responsibilities for Audit and Optimized/Full Retention EM program models	
	Audit Model	**Optimized/Full Retention Model**

Program Component	20 vessels	400 vessels	9 vessels
EM Reviewer Training	$25,000	$187,500 - $250,000	$12,500
VMP Approval, Inspections	$31,000	$232,500 - $310,000	$15,500
EM Review Audit	$46,795	$423,405 - $525,905	$26,295
Program Management	$86,000	$86,000	$86,000
Total	$188,795	$929,405 - $1,171,905	$140,295

Industry Costs for NEFOP-level observers and FMP-specific at-sea monitors. The industry cost responsibilities are presented as costs per sea day because these costs are, for the most part, proportionally scalable to the number of sea days. These per day costs by cost component are shown in the tables below. This per day cost estimate does not include "Other costs of the provider to meet performance standards laid out by a fishery management plan" because those costs will not be known until the details are made explicit in subsequent management plans. These costs are based on the period from October 2012 through May 2014 and are averaged across the three service providers.

TABLE 4. INDUSTRY COST RESPONSIBILITIES FOR NEFOP AND AT-SEA MONITORING

Industry Cost Responsibilities	NEFOP-level observer cost per observed sea day (FY2013)	Fishery Specific At-sea monitoring cost per sea day
Costs to the provider for deployments and sampling (e.g., travel and salary for observer deployments and debriefing)	Sea day charges paid to providers: $640/day Travel: $71/day Meals: $22/day Other non-sea day charges: $12/day	Sea day charge paid to providers: $561/day Travel: $67/day Meals: $18/day Other non-sea day charges: $14/day
Equipment, as specified by NMFS, to the extent not provided by NMFS	$11/day	
Costs to the provider for observer time and travel to a scheduled deployment that doesn't sail and was not canceled by the vessel prior to the sail time.	$1/day	
Provider overhead and project management costs not included in sea day charges above (e.g., per diem costs for trainees)	Training: $61/day	Training: $50/day

Other costs of the provider to meet performance standards laid out by a fishery management plan	TBD – won't know these costs until an industry funded observer coverage program is implemented in a fishery	TBD – won't know these costs until an industry funded observer coverage program is implemented in a fishery
Total (not including other costs)	$818/day	$710/day

Additional estimates for industry contributions for NEFOP-level observer coverage and the groundfish at-sea monitoring program were provided in the Fisheries Monitoring Roadmap (Lowman et al., 2013). This report based the estimated costs on the 2011 fiscal year. For 2011, the industry cost for NEFOP-level coverage was estimated at $917 per sea day, and the industry cost groundfish at-sea monitoring was estimated at $847 per sea day. These additional estimates are provided to highlight the inter-annual variability in the sea day estimate for NMFS and industry costs, as outlined in the introduction (Section 1.0).

Industry cost responsibilities for dockside monitoring. The industry costs of a dockside monitoring program are generally broken into several components: Program management and overhead costs of the provider company; travel costs for the monitor to travel from home or office to offload port, for non-principle ports; and hourly salary for the monitor, including, in some instances, waiting time at the dock.

A number of example industry costs for dockside monitoring are presented below. Dockside monitoring costs can be represented in three ways: 1) as a cost per sea day; 2) as a cost per landing event; and 3) as a cost per pound landed. The paragraphs below will discuss the different available estimates of dockside monitoring costs using each of these representations, and the pros and cons of each representation.

- Cost per sea day – This document uses a cost estimate of $106 per sea day based on publicized estimates for other dockside monitoring programs. In particular, the estimate is influenced by the industry costs for the NE Multispecies dockside monitoring program. The Fisheries Monitoring Roadmap (Lowman et al., 2013) provides per sea day rates of $51 and $82 for dockside monitoring for the British Columbia Hook and Line Groundfish fishery and the Pacific Groundfish (non-whiting) IFQ fishery, respectively. The "cost per sea day" representation makes the cost of dockside monitoring easy to compare against industry costs for at-sea and electronic monitoring. However, this representation of dockside monitoring costs implies that costs scale linearly with trip length, which does not accurately represent dockside monitoring costs. For example, if we assume the cost for monitoring is $106 per sea day, then a 3 day trip would cost $318 and 10 day trip would cost $1,060 to monitor. However, a 10-day trip could come back with its hold only half full with fish, or a 3-day trip could come back with a full hold. In this example, the 3-day trip with the full hold would actually cost more to monitor than the 10-day trip.

- Cost per landing event - The average cost per landing event for the NE Multispecies groundfish dockside monitoring program ranged from $36.87-$212.32 for all sectors. Though this range is a more accurate representation of costs than the cost per sea day representations, it is not easy to compare against industry costs for at-sea and electronic monitoring.
- Cost per pound of fish landed – The analysis assumes the cost per pound landed for each specific FMP is the most accurate way to represent the potential industry costs for monitoring. The average cost per pound of groundfish landed for the NE Multispecies groundfish dockside monitoring program range ranged from $0.006-$0.12 per pound for all sectors. The average cost per pound landed and per trip is inversely related to the average pounds landed – that is, larger trips are less expensive to monitor, by pound, than smaller trips. This was due to several factors, including that larger trips typically landed in a principle port (no roving monitor required and, depending on the location, no travel costs) and much of the cost of providing a monitor is fixed, due to the logistics of having monitors present while vessels land their catch (e.g., insurance, administrative costs). The analysis uses estimated a cost of $0.002 per pound of herring landed, based on state dockside monitoring programs for herring, to analyze the economic impacts of Herring Alternative 2.3 and 2.4 and Mackerel Alternative 2.3 and 2.4.

Industry cost responsibilities for electronic monitoring. Portions of the discussion that follows were originally included in the March 2015 version of the Environmental Assessment for the Omnibus Standardized Bycatch Reporting Methodology Amendment. The description of costs and costs responsibilities below is generalized to encompass a range of potential program designs.

The economic impacts associated with the alternative to implement an electronic video monitoring program for one or more fisheries in the Greater Atlantic Region are derived directly from the expected costs to purchase, install, and maintain the electronic monitoring systems. Industry would be required to purchase, install, and maintain the electronic monitoring equipment aboard their vessels.

Based on cost estimates as of May 2006, it is likely that the cost to purchase a complete electronic video monitoring system would be approximately $7,200 per vessel (Archipelago Marine Research, Ltd. 2006).[20, 21] Installation costs are highly variable and depend upon the size of the vessel, the number of cameras to be installed, and other complicating factors such as the need to retrofit the vessel to support

[20] Archipelago Marine Research, Ltd. (2006), identifies the costs to purchase, install, and maintain a complete electronic monitoring system. While this fee schedule is focused on the British Columbia groundfish longline fisheries, the costs identified are presumed to be transferable to other fisheries. Published costs in Canadian dollars were converted to U.S. dollars based on the published exchange rate for September 7, 2006.

[21] Kinsolving (2006) also provides estimates of the cost to purchase a complete electronic monitoring system, ranging from $4,250, if off-the-shelf components are used, to $8,000 if a package system is purchased from an approved contractor. For the purposes of this analysis, the costs published by Archipelago Marine Research, Ltd. (2006), were used to simplify the analysis and to clearly identify the source of the costs used.

the installation of the equipment. Kinsolving (2006) estimates installation costs as ranging from $650 to $4,225 per vessel, based on a service rate of $65 per hour and the installation time ranging from 10 hours to as many as 65 hours per vessel, depending on the aforementioned complexity. In addition to the cost to purchase and install a system, it is expected that an annual registration fee would be required by the contractor providing the equipment and this is estimated to be approximately $600 per year. Maintenance costs would be expected to vary, but for the purposes of analysis, Kinsolving's (2006) estimate of $975 per year is used. The total first year costs would be approximately $10,200 per vessel, with continuing costs of approximately $1,600 per vessel per year for the second year and beyond .

TABLE 5. ESTIMATED COSTS PER FISHING VESSEL TO PURCHASE, INSTALL, AND MAINTAIN AN ELECTRONIC VIDEO MONITORING SYSTEM (ARCHIPELAGO MARINE RESEARCH, LTD. 2006; KINSOLVING 2006).

	Year 1 (per vessel)	**Year 2+ (per vessel)**
Equipment purchase	$7,194	N/A
Installation costs (average)	$2,438	N/A
Annual program registration fee	$608	$608
Annual maintenance	N/A	$975
Total	**$10,240**	**$1,583**

The information presented above and in **Error! Reference source not found.** provide an estimate of the per vessel costs of implementing an industry-funded electronic monitoring requirement. The next step is to estimate the number of affected vessels within the fisheries for which this alternative would be considered.

The costs discussed above address only the purchase, installation, and annual maintenance of the electronic video monitoring systems, but do not address the costs associated with extracting the data from the video recording systems, or storing, maintaining, editing, and reviewing the data.

Agency or contractor personnel would be required to obtain the video data from fishing vessels (either through dockside extraction or a mail-in hard drive exchange program), to review the video footage in order to document discard events, to oversee and perform quality control on the extracted data, and to archive and maintain the data. Video reviewing and data archiving equipment would also be required. Kinsolving (2006) estimates that data storage systems would be required to support approximately 20 terabytes of data per year, but this was an estimate solely for the Pacific rockfish pilot program, which has a fleet of approximately 25 vessels (consolidating to 18 active vessels) that make an average of seven fishing trips per year, with trips averaging 3 days each. Therefore, extrapolating to determine the data storage needs were this program implemented in the Greater Atlantic Region would most likely be orders of magnitude greater.

Potential Industry Cost Saving with Electronic Monitoring and Portside Monitoring. For both electronic monitoring and portside monitoring it is difficult to predict whether and/or how costs may change if industry is contracting directly with providers (versus the federal government contracting with providers). General program overhead/management is a substantial part of the costs and it is difficult to know whether these costs will be reduced when industry is contracting with providers, and if so how much. Based on the amount of coverage/monitoring several potential cost savings have been identified however, as described below. It is also important to remember that all of these cost figures (including the original values) are estimates, and may be higher or lower than actual costs once implemented.

Electronic Monitoring

Based on "A Cost Comparison of At-Sea Observers and Electronic Monitoring fora Hypothetical Midwater Trawl Herring/Mackerel Fishery."
https://www.greateratlantic.fisheries.noaa.gov/stories/2015/september/em_cost_assessment_for_gar_herring_150904_v6.pdf

100% recording, 100% Review: ***$325***

Haulback Recording Only, 100% Review: $***248*** - Reduction: $78 of the $160 data services cost (49%). [(325 – (.49*160)) = (325 – 78) = $248]. $82 of data services costs remaining.

Haulback Recording Only, 50% Review: ***$218*** - $61 is the cost for haulback review, so if only half of the trips are reviewed, this would save about another $30. [(248 – (61/2)) = (248 – 30.5) = $218]

Field Services are $78/day, and "Field services costs are largely driven by the frequency of hard drive retrievals from the vessel, and the associated travel and labor costs." "Repair and technical support needs also drive field services costs." However, the document also states that repair and technical support costs were low because it was believed that minor problems could be addressed during data retrieval. If 25% of costs were repair and technical support but this amount doubled due to additional single purpose technical support trips, an overall 40% savings from mailing hard drives appears reasonable. 40% of $78 = $31. Saving $31 would reduce the overall cost to around ***$187*** per seaday. [(218 – 31) = $187]

Portside Monitoring

The Portside Monitoring cost estimate is $5.12/mt, but this includes administration costs that have been borne by the State of Massachusetts, and could be paid for by NMFS (subject to funds being available to run such a program). For NEFOP observers, the administrative cost for NMFS is approximately 37% ($479 NMFS cost $818 at-sea industry cost - http://s3.amazonaws.com/nefmc.org/150929-NEFMC-Meeting-Presentation-without-notes.pdf, slide 32). If one assumes that 25% or 33% of these costs would not be directed at vessels (conservatively less than 37%), the cost for vessels per mt would be $3.84/mt and $3.41/mt respectively.

If only 50% of trips were sampled, while any particular trip might still have to pay $3.84/mt or $3.41/mt, over the course of a year it should reduce average costs to $1.92/mt or $1.71/mt. The table below describes the total costs for trips landing different amounts of fish, and daily costs assuming a 3-day trip.

	25% Admin		33% Admin	
Full Cost	$5.12	Per day cost with 3/day trip	$5.12	Per day cost with 3/day trip
Cost less Admin	$3.84		$3.41	
50% Coverage	$1.92		$1.71	
100 mt trip cost	$192	$64	$171	$57
200 mt trip cost	$384	$128	$341	$114
300 mt trip cost	$576	$192	$512	$171
400 mt trip cost	$768	$256	$683	$228

Table 6 summarizes the ways that sea day costs can be minimized reduced in an industry-funded monitoring program. The discussion provided in Table 6 was generated from information provided by NEFOP personnel, observers, and representatives from service providers in the northeast and west coast. To the extent that the issues identified in Table 6 can be addressed through the management measures that establish/implement the IFM program, sea day costs borne by the fishing industry can be reduced.

Table 6 Summary Discussion – How to Reduce Sea Day Costs

How to Reduce Sea Day Costs	Discussion/Rationale
uild from existing observer mpling protocols; do not require ew/different data to be collected	• Collecting data in a new/different way will require modifications to existing observer sampling protocols and training procedures, new/revised manuals/logs, possibly new/additional sampling equipment, and database design or restructure; this could increase administrative and training costs
iminate SCA and related gulatory requirements for Federal ntracts	• Federal requirements for wage structure/overtime/paid holidays/vacation are not necessary for contracts between vessels/providers; without specifically implementing these requirements as part of the IFM regulations, wage structure and benefits for employees would be determined by individual service provider companies; MRAG report (June 2012) estimates that eliminating these requirements may reduce costs by $50-$100 per sea day; • FLSA and other Federal labor laws would still apply to service provider companies; however, eliminating the SCA requirements from IFM regulations is likely to result in some reduction in sea day cost; • Not likely to result in $100 per sea day cost savings in this region due to existing pay structure/benefits for observers required by Federal contracts
Grandfather in" current service oviders approved for NEFOP oserver coverage and GF ASM ograms – approve these providers nmediately for any new, fishery-pecific ASM program	• Reduces expense of applying/re-approving service provider companies already approved for other programs in the region; observers/monitors for approved service providers would still need to be certified for existing monitoring programs to participate as fishery-specific at-sea monitors; • Allows vessels to select from multiple service providers when program is established; increases negotiating opportunities for vessels at onset of program by creating competition between companies; • Provides opportunity for existing service providers to offer more work days to their observers (could reduce staff/overhead expenses for both programs)
low cross-certification of NEFOP nd GF ASM observers for new, shery-specific ASM programs; ombine/overlap training and certification whenever possible	• Cross-training and applying training courses to multiple certifications reduces training costs (travel, hotel, per diem for service providers); • Reduces equipment costs for service providers – no need to purchase duplicative equipment • As previously noted, this may reduce overhead costs for service providers by providing their observers with a greater number of days to work (improving ability for service providers to retain full-time employees)

Table 6 continued. Summary Discussion – How to Reduce Sea Day Costs

How to Reduce Sea Day Costs	Discussion/Rationale
rovide detailed information about shing patterns for vessels articipating in the industry-funded onitoring program	• Allows providers to more accurately estimate manpower/resources needed, logistics, overhead, and travel costs - reduces need for providers to over-estimate these costs to cover expenses that cannot be predicted prior to the start of the year; • Increases predictability of fishery for observer/monitor deployment; • Increases efficiency for service providers
inimize observer deployment gistics	• Simplifying the selection process for vessels/trips that require industry-funded observers/monitors reduces costs for service providers because vessel selection/notification would not require additional staff or resources
low industry to negotiate less gnificant costs with providers	• Structure the provisions in the industry-funded monitoring program to allow the industry to negotiate as many minor costs as possible with service providers, to better meet their individual vessel needs circumstances; • These may include costs for trip cancellations and no-shows, meal reimbursements, partial day/hourly billing (see below), land-hour rates (if necessary), or other costs
ncourage service roviders/industry to negotiate lling by partial days (versus 24 our days)	• Sea scallop regulations 648.11(g)(5)(i)(A)(2) state that "For the purposes of determining a daily rate…a service provider may charge a vessel owner for not more than the time an observer boards a vessel until the vessel disembarks (dock to dock), where a day is defined as a 24-hour period, and portions of other days would be pro-rated at an hourly charge." • Industry participants should be aware that this can be negotiated in contracts with providers; may be an opportunity to reduce sea day costs for some vessels depending on fishing operations; • Consideration should be given to the possibility of land hour time for observers/monitors, which may be necessary if days are billed partially or by the hour
low observers to be deployed on e same vessel for more than two onsecutive multi-day trips, and ore than twice in any given month	• Prohibited in current regulations for industry-funded observer coverage, implemented in SBRM amendment • Increases flexibility and reduces travel costs for service providers; appears to

r multi-day deployments	be consistent with regulations for Groundfish ASM

Table 6 continued. Summary Discussion – How to Reduce Sea Day Costs

How to Reduce Sea Day Costs	Discussion/Rationale
ncourage vessels in close roximity to negotiate contracts gether so that they can utilize the me observers and minimize travel xpenses	• Industry can reduce costs by collaborating with vessels that fish from same ports and/or during same seasons to reduce travel and related costs for observers/monitors
reamline debriefing and re-ertification requirements	• Reduces costs to service providers (travel/per diem)
surance	• There may be ways to reduce/streamline insurance requirements to reduce costs for providers. To the extent that duplicative or redundant insurance requirements can be eliminated, costs can be reduced. This issue requires further investigation.
ombine the IFM programs for ultiple fisheries, when ppropriate	• Would reduce complexity (PTNS, deployment, travel) and increase efficiency for service providers; increases number of sea days for amortizing travel/training expenses over the year; • Could increase the total number of work days available for ASM-certified observers/monitors and may reduce staff/overhead costs for service providers

Cost drivers for electronic monitoring. There are a number of variables in the design of an electronic monitoring program. The text below briefly summarizes some of the program specifications related to data submission, video review, video audit, and data storage that can reduce the industry contribution for electronic monitoring programs.

Data Submission

- Allow the hard drives that store EM footage to be submitted by mail, rather than requiring them to be retrieved by a technician.
- For fisheries that have dockside monitoring programs in addition to EM, consider having dockside monitor retrieve/transmit hard drives.

Video Review

- Design a random sampling program to select trips or portions of trips (i.e., around haulback on herring and mackerel trips) from which video would be reviewed.

- For audit approaches, specify an assumed discard rate in lieu of additional video review in the instances where the EM validation fails.
- Documentation of discards at the species level, including identifying and counting the fish and measuring the length of the fish, for only a few species of interest (e.g., only species in the NE multispecies complex on groundfish trips).
- Software solutions may be able to automate review of portions of video footage.

Data storage

- Allow video data to be stored in the "cloud" (as permitted within security and data confidentiality regulations).
- Determine the lowest possible frame rate and image resolution necessary to document the activity of interest for the EM program. Slow activities such as identifying large objects in a pile of fish being sorted, requires more frames per second. The higher the frame rate, the more likely it is that the camera will capture detailed information. Similarly, identifying fish to species requires higher resolution than verifying when fishing gear is deployed. Higher frame rate and resolution results in larger video files and requires additional storage requirements.

APPENDIX 8 -- ATLANTIC HERRING ALTERNATIVE ECONOMIC IMPACTS ON HERRING FISHING BUSINESSES

Impact Analysis Methods

Four types of industry-funded monitoring for the herring fishery are being considered: Northeast Fisheries Observer Program (NEFOP) level observer, at-sea monitor (ASM), Electronic Monitoring (EM), and portside sampling (PS) coverage. NEFOP-level and at-sea monitoring coverage would function independently, but EM and portside are intended to be used together.

MONITORING COSTS TO INDUSTRY

Types of Monitoring	NEFOP-Level Observer	At-Sea Monitor	Electronic Monitoring	Portside Sampling
Industry Cost Responsibility	$818 per seaday	$710 per seaday	Year 1: $15,000 one-time set up cost then $325 (also $187) per seaday Year 2: $325 (also $187) per	$0.0023 per lb ($5.12 per mt) and at $0.00174 per lb ($3.84 per mt)

			seaday	

Trips that occurred in 2014 were used to estimate the likely future impacts of the herring alternatives. This is the most recent year for which data is available and 2014 activity should represent what is likely to occur in future years in terms of the vessels participating in the fishery, the condition of the stock, the regulatory environment, and fishing methods. Each alternative has different criteria for defining which types of trips would be monitored (based on permit type, gear used, etc.). Trips from 2014 that met these criteria were evaluated in terms of how the monitoring costs impacted annual returns to owner (see below for description of how return-to-owner (RTO) was calculated). If an alternative specified 100% coverage, then the monitoring costs that would have been paid for all trips occurring in 2014 were calculated and assessed in terms of impacts to RTO. For alternatives that have options with less than 100% coverage, trips from the pool of 2014 trips were randomly selected until the coverage target was met. This was repeated 1,000 times for each trip selection simulation. Mean annual ASM/NEFOP costs per vessel are then calculated from the simulated trip selections.

Vessels were assigned a major gear type based on the gear that earned the greatest revenue (from all species landed) among the trips selected for evaluation (according to the criteria in the alternative). It is not necessarily the major gear for the year for a particular vessel.

In the tables, any information that pertains to amounts of revenue from various species and numbers of days at sea and trips are for the trips that met the criteria under each of the alternatives only, not for the year.

Return-to-Owner

A previous analysis of economic impacts of herring and mackerel coverage target alternatives was based on trip cost data collected by the NEFOP and showed the economic impact of the alternatives on vessel net revenues (gross revenues less trip costs). Because NEFOP only collects a limited amount of cost data, industry participants expressed concern that net revenue estimates used in the previous economic analysis underestimated vessel costs. In response, Jason Didden, staff of the Mid-Atlantic Council, offered to survey herring and mackerel vessels to collect more detailed cost information.

The survey requested information from vessel owners on total trip costs in 2014. The cost survey collected information on variable trip costs, the cost of repairs/maintenance/upgrades/haulout, fixed costs, and payments to crew. These data were used to update the impact analyses. If the vessel owner completed a survey then that vessel's actual costs were used in the analysis. Otherwise, respondent data were used to project costs on other vessels that did not provide a survey response. To do this, responses from the surveys were categorized by the annual primary species caught based on value. Two categories were used: herring/mackerel vessels and squid vessels. For each of these vessel types, costs were assigned into one of four categories: variable costs, crew share, repair/maint/upgrades/haulout, and fixed costs. Average percentages of annual gross revenue by cost category and vessel type were used to estimate costs for vessels that did not have survey data. See table below for cost category descriptions and average percentages of gross revenue.

Surveys were sent to approximately 18 vessel owners (representing about 26 vessels) in the herring and/or mackerel fisheries. Surveys were sent in May 2015 and information was submitted for 16 of the 26 vessels.

Cost category	Description	Average percent of gross revenue	
		Herring/ mackerel vessels	Squid vessels
Variable costs	Annual fuel, oil, food, water, ice, carrier vessel, communication, fishing supplies, crew supplies, and catch handling costs	25%	35%
Crew share	Total annual payments to crew	28%	26%
Repair/ maintenance/ upgrades/ haulout (RMUH)	Annual cost of repairs to engines, deck equipment, machinery, hull, fishing gear, electronics, processing equipment, refrigeration, and safety equipment. Includes haulout costs. Because these costs vary considerably from year to year and upgrade costs were combined with repair/maintenance costs, half of these costs were amortized over 7 years.	13%	11%
Fixed costs	Annual mooring/dockage, permits/licenses, insurance, quota/DAS lease, crew benefits, vessel monitoring, workshop/storage, office, vehicle, travel, association, professional, interest, taxes, and non-crew labor costs. Note: principal payments on business loans are not included in fixed costs.	19%	21%
Return to Owner (RTO)	Gross revenue less variable, crew share, RMUH, and fixed costs	15%	7%

<u>Major Findings</u>

Across the vessel types examined, the paired MWT vessels have the highest monitoring costs as a percentage of RTO. This is due to the fact that these vessels have, on average, more sea days that would have monitoring costs than the other vessel types.

There are differences among vessel types in terms of the sources of revenue that would be used to pay for monitoring costs. For example, for SMBT vessels, half of their revenue comes from herring and the other half from other species. What this means is that for monitoring that is required for the herring fishery, other non-herring sources of revenue must be used to cover the herring related costs. A metric for evaluating these differences is monitoring cost as a percent of herring revenue. For SMBT monitoring costs as a percent of herring revenue are higher than for other vessel types.

Exempting trips less than 25 mt of herring (Herring Alternative 2 Sub-Option 5) from industry-funded monitoring costs reduces the monitoring cost substantially in many cases. The degree of saving varies by gear type. Using Alternative 2.1 as an example, aggregate NEFOP costs decline by 48% for purse seine vessels ($320k to $166k). For paired midwater trawl vessels, the percentage difference (20%; $673k to $541k) is not as great.

For midwater trawl vessels, selecting Herring Alternatives 2.3 or 2.4 rather than Herring Alternative 2.2 results in about a 60% cost saving for paired midwater vessels in Year 2 and beyond and about a 45% cost saving for single midwater trawl vessels.

Selecting Herring Alternative 2.5 rather than Herring Alternative 2.1 reduces total industry monitoring costs from $811k to $75k – a 91% reduction.

Reducing EM costs from $325 to $187 per day and only monitoring half of the portside sampling trips at a rate of $3.84 per mt, as opposed to all trips at $5.12 per mt, reduces total monitoring costs by 51% for paired MWT vessels ($457,595 to $222,958) in year 2. For single MWT vessels, costs are reduced by 54% ($134,165 to $61,067).

Herring Alternative 2.1

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$1,364,372	$920,296	$1,026,390	$1,179,521	$1,875,233	$1,505,034
Annual Variable Costs	$318,252	$167,769	$330,865	$233,767	$284,996	$267,061	$594,112	$412,374
Annual Crew Share	$410,406	$213,633	$358,167	$270,086	$292,093	$332,733	$519,728	$451,846
Annual Repair/Maint/Upgrade/Haulout	$177,888	$98,231	$182,172	$119,312	$120,240	$101,172	$149,714	$94,073
Annual Fixed Costs	$268,728	$172,799	$251,988	$177,397	$187,892	$200,926	$467,553	$476,899
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$144,125	$113,903
Annual Cost of NEFOP	$84,150	$37,945	$45,700	$28,075	$23,077	$13,108	$17,380	$14,134
NEFOP as pct of RTO (median)	44.7%		13.9%		24.4%		11.5%	
post-NEFOP RTO	$78,930	$77,928	$195,480	$159,212	$118,091	$352,542	$126,745	$110,764
Percent of Revenue from Herring	91.2%	9.5%	100.0%	0.0%	81.9%	17.0%	52.4%	42.0%
Percent of Revenue from Mackerel	13.9%	8.2%			19.4%	17.0%	2.6%	4.1%
Percent of Revenue from Squids							44.3%	39.7%
Percent of Revenue from Other Species	0.1%	0.1%			7.7%	17.0%	21.5%	17.9%
Average Number of Days at Sea	103	47	56	34	28	16	21	17
Average Number of Trips	34	16	64	37	22	20	11	16

Herring Alternative 2.1

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	9
Total Days at Sea	825	392	170	192
Total Number of Trips	275	451	129	103
Total Herring Revenue	$9,409,389	$11,042,232	$3,842,873	$1,483,242
Total Mackerel Revenue	$1,155,588	$225	$570,246	$97,806
Total Squid Revenue				$529,723
Total Other Species Revenue	$5,906		$50,399	$485,180
Total Revenue	$10,570,883	$11,042,457	$4,463,518	$2,595,951
Total NEFOP Cost	$673,200	$319,902	$138,463	$156,420
NEFOP as pct of Total Revenue	6.4%	2.9%	3.1%	6.0%
NEFOP as pct of Herring Revenue	7.2%	2.9%	3.6%	10.5%

Herring Alternative 2.1 – Sub Option 5

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$1,364,372	$920,296	$1,026,390	$1,179,521	$2,057,720	$1,835,879
Annual Variable Costs	$318,252	$167,769	$330,865	$233,767	$284,996	$267,061	$626,872	$501,818
Annual Crew Share	$410,406	$213,633	$358,167	$270,086	$292,093	$332,733	$583,258	$550,531
Annual Repair/Maint/Upgrade/Haulout	$177,888	$98,231	$182,172	$119,312	$120,240	$101,172	$141,508	$110,893
Annual Fixed Costs	$268,728	$172,799	$251,988	$177,397	$187,892	$200,926	$542,753	$581,061
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$163,329	$137,021
Annual Cost of NEFOP	$67,626	$36,730	$23,759	$13,141	$15,756	$13,934	$15,975	$12,682
NEFOP as pct of RTO (median)	42.2%		10.4%		5.8%		14.2%	
post-NEFOP RTO	$95,454	$72,095	$217,421	$153,564	$125,412	$351,076	$147,354	$135,976
Percent of Revenue from Herring	94.9%	6.3%	100.0%	0.0%	88.0%	15.0%	88.5%	17.9%
Percent of Revenue from Mackerel	8.1%	6.1%			19.5%	17.1%	2.1%	1.3%
Percent of Revenue from Squids							12.2%	8.5%
Percent of Revenue from Other Species	0.0%	0.1%			0.4%	0.5%	20.3%	12.5%
Average Number of Days at Sea	83	45	29	16	19	17	20	16
Average Number of Trips	28	15	46	29	12	15	10	12

Herring Alternative 2.1 – Sub Option 5

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	6
Total Days at Sea	663	204	116	117
Total Number of Trips	221	320	73	59
Total Herring Revenue	$9,152,836	$10,263,855	$3,606,269	$1,352,045

Total Mackerel Revenue	$657,345	$225	$570,246	$28,633
Total Squid Revenue				$171,323
Total Other Species Revenue	$4,109		$2,721	$237,472
Total Revenue	$9,814,290	$10,264,080	$4,179,236	$1,789,473
Total NEFOP Cost	$541,008	$166,313	$94,538	$95,852
NEFOP as pct of Total Revenue	5.5%	1.6%	2.3%	5.4%
NEFOP as pct of Herring Revenue	5.9%	1.6%	2.6%	7.1%

Herring Alternative 2.2 & 2.3 (100%) – ASM Coverage Only

Per Vessel	**Paired MWT**		**Purse Seine**		**Single MWT**		**SMBT**	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$1,364,372	$920,296	$1,026,390	$1,179,521	$1,875,233	$1,505,034
Annual Variable Costs	$318,252	$167,769	$330,865	$233,767	$284,996	$267,061	$594,112	$412,374
Annual Crew Share	$410,406	$213,633	$358,167	$270,086	$292,093	$332,733	$519,728	$451,846
Annual Repair/Maint/Upgrade/Haulout	$177,888	$98,231	$182,172	$119,312	$120,240	$101,172	$149,714	$94,073
Annual Fixed Costs	$268,728	$172,799	$251,988	$177,397	$187,892	$200,926	$467,553	$476,899
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$144,125	$113,903
Annual Cost of ASM	$73,219	$33,016	$39,764	$24,428	$20,079	$11,405	$15,122	$12,298
ASM as pct of RTO (median)	38.9%		12.1%		21.3%		10.0%	
post-ASM RTO	$89,862	$78,545	$201,417	$159,318	$121,089	$353,817	$129,003	$111,075
Percent of Revenue from Herring	91.2%	9.5%	100.0%	0.0%	81.9%	17.0%	52.4%	42.0%
Percent of Revenue from Mackerel	13.9%	8.2%	0.0%		19.4%	17.0%	2.6%	4.1%
Percent of Revenue from Squids							44.3%	39.7%
Percent of Revenue from Other Species	0.1%	0.1%			7.7%	17.0%	21.5%	17.9%
Average Number of Days at Sea	103	47	56	34	28	16	21	17

Average Number of Trips	34	16	64	37	22	20	11	16

Herring Alternative 2.2 & 2.3 (100%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	9
Total Days at Sea	825	392	170	192
Total Number of Trips	275	451	129	103
Total Herring Revenue	$9,409,389	$11,042,232	$3,842,873	$1,483,242
Total Mackerel Revenue	$1,155,588	$225	$570,246	$97,806
Total Squid Revenue				$529,723
Total Other Species Revenue	$5,906		$50,399	$485,180
Total Revenue	$10,570,883	$11,042,457	$4,463,518	$2,595,951
Total ASM Cost	$585,750	$278,346	$120,477	$136,100
ASM as pct of Total Revenue	5.5%	2.5%	2.7%	5.2%
ASM as pct of Herring Revenue	6.2%	2.5%	3.1%	9.2%

Herring Alternative 2.2 & 2.3 – Sub Option 5 (100%) – ASM Coverage Only

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$1,364,372	$920,296	$1,026,390	$1,179,521	$2,057,720	$1,835,879
Annual Variable Costs	$318,252	$167,769	$330,865	$233,767	$284,996	$267,061	$626,872	$501,818
Annual Crew Share	$410,406	$213,633	$358,167	$270,086	$292,093	$332,733	$583,258	$550,531
Annual Repair/Maint/Upgrade/Haulout	$177,888	$98,231	$182,172	$119,312	$120,240	$101,172	$141,508	$110,893
Annual Fixed Costs	$268,728	$172,799	$251,988	$177,397	$187,892	$200,926	$542,753	$581,061
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$163,329	$137,021
Annual Cost of ASM	$58,841	$31,959	$20,673	$11,434	$13,710	$12,124	$13,900	$11,034
ASM as pct of RTO (median)	36.7%		9.1%		5.1%		12.3%	
post-ASM RTO	$104,239	$73,608	$220,508	$154,643	$127,459	$352,543	$149,429	$136,046
Percent of Revenue from Herring	94.9%	6.3%	100.0%	0.0%	88.0%	15.0%	88.5%	17.9%
Percent of Revenue from Mackerel	8.1%	6.1%	0.0%		19.5%	17.1%	2.1%	1.3%
Percent of Revenue from Squids							12.2%	8.5%
Percent of Revenue from Other Species	0.0%	0.1%			0.4%	0.5%	20.3%	12.5%
Average Number of Days at Sea	83	45	29	16	19	17	20	16
Average Number of Trips	28	15	46	29	12	15	10	12

Herring Alternative 2.2 & 2.3 – Sub Option 5 (100%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	6
Total Days at Sea	663	204	116	117
Total Number of Trips	221	320	73	59
Total Herring Revenue	$9,152,836	$10,263,855	$3,606,269	$1,352,045

Total Mackerel Revenue	$657,345	$225	$570,246	$28,633
Total Squid Revenue				$171,323
Total Other Species Revenue	$4,109		$2,721	$237,472
Total Revenue	$9,814,290	$10,264,080	$4,179,236	$1,789,473
Total ASM Cost	$470,730	$144,709	$82,257	$83,400
ASM as pct of Total Revenue	4.8%	1.4%	2.0%	4.7%
ASM as pct of Herring Revenue	5.1%	1.4%	2.3%	6.2%

Herring Alternative 2.2 & 2.3 (75%) – ASM Coverage Only

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$144,125	$113,903
Annual Cost of ASM	$54,936	$24,736	$29,898	$18,339	$15,021	$8,472	$11,709	$9,100
ASM as pct of RTO (median)	29.7%		9.1%		15.9%		7.5%	
post-ASM RTO	$108,144	$80,253	$211,282	$159,725	$126,148	$356,073	$132,416	$111,831
Percent of Revenue from Herring	91.3%	9.4%	100.0%	0.0%	82.5%	16.2%	52.7%	42.0%
Percent of Revenue from Mackerel	13.8%	8.0%	0.0%		19.3%	16.7%	2.6%	4.0%
Percent of Revenue from Squids							44.3%	39.8%
Percent of Revenue from Other Species	0.1%	0.1%			7.5%	16.5%	22.6%	19.1%
Average Number of Days at Sea	77	35	42	26	21	12	16	13

Herring Alternative 2.2 & 2.3 (75%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	9
Total Days at Sea	619	295	127	148
Total Herring Revenue	$7,069,090	$8,301,401	$2,870,099	$1,106,513
Total Mackerel Revenue	$865,766	$225	$436,137	$73,907
Total Squid Revenue				$440,897
Total Other Species Revenue	$4,749		$39,714	$385,635
Total Revenue	$7,939,606	$8,301,626	$3,345,950	$2,006,952
Total ASM Cost	$439,489	$209,288	$90,126	$105,382
ASM as pct of Total Revenue	5.5%	2.5%	2.7%	5.3%
ASM as pct of Herring Revenue	6.2%	2.5%	3.1%	9.5%

Herring Alternative 2.2 & 2.3 – Sub Option 5 (75%) – ASM Coverage Only

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$163,329	$137,021
Annual Cost of ASM	$44,198	$23,997	$15,571	$8,472	$10,298	$9,099	$10,474	$8,230
ASM as pct of RTO (median)	28.2%		6.8%		3.8%		9.4%	
post-ASM RTO	$118,882	$76,712	$225,610	$156,562	$130,870	$354,992	$152,855	$136,065
Percent of Revenue from Herring	94.9%	6.2%	100.0%	0.0%	88.1%	14.8%	89.2%	16.8%
Percent of Revenue from Mackerel	8.7%	6.0%	0.0%		19.4%	17.0%	2.2%	1.1%
Percent of Revenue from Squids							11.8%	8.4%
Percent of Revenue from Other Species	0.0%	0.1%			0.5%	0.8%	19.6%	11.3%
Average Number of Days at Sea	62	34	22	12	15	13	15	12

Herring Alternative 2.2 & 2.3 – Sub Option 5 (75%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	6
Total Days at Sea	498	154	87	89
Total Herring Revenue	$6,874,690	$7,702,188	$2,712,401	$1,024,121
Total Mackerel Revenue	$526,863	$225	$433,487	$21,556
Total Squid Revenue				$130,869
Total Other Species Revenue	$3,148		$2,345	$190,706
Total Revenue	$7,404,700	$7,702,413	$3,148,233	$1,367,252
Total ASM Cost	$353,586	$108,996	$61,791	$62,845
ASM as pct of Total Revenue	4.8%	1.4%	2.0%	4.6%
ASM as pct of Herring Revenue	5.1%	1.4%	2.3%	6.1%

Herring Alternative 2.2 & 2.3 (50%) – ASM Coverage Only

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$163,080	$241,180	$241,180	$141,169	$141,169	$144,125	$144,125
Annual Cost of ASM	$36,875	$16,417	$19,846	$12,053	$10,145	$5,662	$8,483	$6,375
ASM as pct of RTO (median)	20.4%		6.0%		10.5%		5.4%	
post-ASM RTO	$126,205	$82,980	$221,334	$160,394	$131,024	$358,152	$135,643	$112,417
Percent of Revenue from Herring	91.4%	9.3%	100.0%	0.0%	83.3%	15.4%	53.6%	42.2%
Percent of Revenue from Mackerel	14.1%	8.0%	0.0%		19.1%	16.2%	2.9%	4.4%
Percent of Revenue from Squids							44.5%	39.8%
Percent of Revenue from Other Species	0.1%	0.2%			8.2%	17.9%	24.7%	21.7%
Average Number of Days at Sea	52	23	28	17	14	8	12	9

Herring Alternative 2.2 & 2.3 (50%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	9
Total Days at Sea	415	196	86	108
Total Herring Revenue	4,732,456	5,510,474	1,943,001	748,019
Total Mackerel Revenue	591,520	225	310,908	56,804
Total Squid Revenue				369,787
Total Other Species Revenue	3,503		33,722	312,508
Total Revenue	5,327,480	5,510,699	2,287,630	1,487,117
Total ASM Cost	$294,999	$138,922	$60,867	$76,346
ASM as pct of Total Revenue	5.5%	2.5%	2.7%	5.1%

ASM as pct of Herring Revenue	6.2%	2.5%	3.1%	10.2%

Herring Alternative 2.2 & 2.3 – Sub Option 5 (50%) – ASM Coverage Only

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$163,329	$137,021
Annual Cost of ASM	$29,489	$15,844	$10,464	$5,525	$6,999	$6,001	$7,247	$5,562
ASM as pct of RTO (median)	18.9%		4.5%		2.5%		6.4%	
post-ASM RTO	$133,591	$80,718	$230,716	$158,500	$134,170	$357,624	$156,082	$136,133
Percent of Revenue from Herring	95.0%	6.2%	100.0%	0.0%	88.5%	14.0%	90.2%	15.2%
Percent of Revenue from Mackerel	10.3%	6.6%	0.0%		19.3%	16.4%	2.7%	0.6%
Percent of Revenue from Squids							11.2%	7.8%
Percent of Revenue from Other Species	0.0%	0.1%			0.8%	1.3%	20.1%	9.6%
Average Number of Days at Sea	42	22	15	8	10	8	10	8

Herring Alternative 2.2 & 2.3 – Sub Option 5 (50%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	6
Total Days at Sea	332	103	59	61
Total Herring Revenue	$4,580,747	$5,158,742	$1,820,329	$708,574
Total Mackerel Revenue	$417,898	$225	$310,536	$15,657
Total Squid Revenue				$95,931
Total Other Species Revenue	$2,109		$2,117	$159,514
Total Revenue	$5,000,754	$5,158,967	$2,132,982	$979,676
Total ASM Cost	$235,915	$73,250	$41,994	$43,482
ASM as pct of Total Revenue	4.7%	1.4%	2.0%	4.4%
ASM as pct of Herring Revenue	5.2%	1.4%	2.3%	6.1%

Herring Alternative 2.2 & 2.3 (25%) – ASM Coverage Only

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$144,125	$113,903
Annual Cost of ASM	$18,578	$7,854	$10,041	$5,914	$5,498	$2,600	$5,642	$4,539
ASM as pct of RTO (median)	10.1%		3.0%		5.6%		3.5%	
post-ASM RTO	$144,503	$86,107	$231,139	$161,277	$135,671	$360,600	$138,483	$112,951
Percent of Revenue from Herring	91.8%	9.0%	100.0%	0.0%	85.0%	13.7%	55.0%	42.1%
Percent of Revenue from Mackerel	16.3%	8.9%	0.1%		20.0%	15.2%	3.1%	4.4%
Percent of Revenue from Squids							44.6%	39.8%
Percent of Revenue from Other Species	0.2%	0.4%			9.0%	19.4%	27.6%	26.7%
Average Number of Days at Sea	26	11	14	8	8	4	8	6

Herring Alternative 2.2 & 2.3 (25%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	9
Total Days at Sea	209	99	46	72
Total Herring Revenue	$2,394,688	$2,774,156	$981,948	$448,402
Total Mackerel Revenue	$357,710	$225	$213,945	$39,547
Total Squid Revenue				$305,034
Total Other Species Revenue	$2,470		$28,154	$249,797
Total Revenue	$2,754,868	$2,774,381	$1,224,046	$1,042,780
Total ASM Cost	$148,622	$70,288	$32,987	$50,782
ASM as pct of Total Revenue	5.4%	2.5%	2.7%	4.9%
ASM as pct of Herring Revenue	6.2%	2.5%	3.4%	11.3%

Herring Alternative 2.2 & 2.3 – Sub Option 5 (25%) – ASM Coverage Only

Per Vessel	Paired MWT		Purse Seine		Single MWT		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$241,180	$162,152	$141,169	$362,448	$163,329	$137,021
Annual Cost of ASM	$14,949	$7,649	$5,370	$2,578	$3,994	$2,978	$4,560	$3,380
ASM as pct of RTO (median)	9.6%		2.2%		1.4%		3.8%	
post-ASM RTO	$148,131	$85,224	$235,811	$160,535	$137,175	$360,395	$158,769	$136,042
Percent of Revenue from Herring	95.4%	5.8%	100.0%	0.0%	89.3%	12.8%	90.9%	14.1%
Percent of Revenue from Mackerel	15.5%	9.9%	0.1%		20.1%	15.6%	3.1%	0.1%
Percent of Revenue from Squids							11.0%	7.2%
Percent of Revenue from Other Species	0.0%	0.1%			1.3%	2.0%	21.7%	8.6%
Average Number of Days at Sea	21	11	8	4	6	4	6	5

Herring Alternative 2.2 & 2.3 – Sub Option 5 (25%) – ASM Coverage Only

Fleet Level	Paired MWT	Purse Seine	Single MWT	SMBT
Number of Vessels	8	7	6	6
Total Days at Sea	168	53	34	39
Total Herring Revenue	$2,317,299	$2,591,280	$940,773	$452,532
Total Mackerel Revenue	$336,069	$225	$205,825	$10,562
Total Squid Revenue				$68,202
Total Other Species Revenue	$1,128		$1,920	$135,106
Total Revenue	$2,654,496	$2,591,505	$1,148,518	$666,402
Total ASM Cost	$119,591	$37,587	$23,964	$27,358
ASM as pct of Total Revenue	4.5%	1.5%	2.1%	4.1%
ASM as pct of Herring Revenue	5.2%	1.5%	2.5%	6.0%

Herring Alternative 2.3 and 2.4 (100% EM at $325 per day, 100% PS at $5.12 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$912,105	$1,024,851
Annual Variable Costs	$318,252	$167,769	$264,620	$232,352
Annual Crew Share	$410,406	$213,633	$239,242	$297,854
Annual Repair/Maint/Haulout	$177,888	$98,231	$110,742	$90,131
Annual Fixed Costs	$268,728	$172,799	$163,296	$175,943
Annual Return-to-owner	$163,080	$89,827	$134,205	$310,157
Annual Cost of EM - year 1	$48,516	$15,113	$22,300	$5,316
Annual Cost of EM - year 2	$33,516	$15,113	$7,300	$5,316
Annual Cost of PS	$23,684	$15,503	$9,471	$16,229
Total Monitoring Costs as pct of RTO - year 1 (median)	42.2%		37.3%	
Total Monitoring Costs as pct of RTO - year 2 (median)	29.1%		12.8%	
Post-monitoring RTO -- year 1	$90,881	$74,211	$102,434	$292,275
Post-monitoring RTO -- year 2	$105,881	$74,211	$117,434	$292,275
Percent of Revenue from Herring	91.2%	9.5%	86.0%	16.3%
Percent of Revenue from Mackerel	13.9%	8.2%	15.5%	17.1%
Percent of Revenue from Squids			2.9%	
Percent of Revenue from Other Species	0.1%	0.1%	6.4%	15.5%
Average Number of Days at Sea	103	47	23	17
Average Number of Trips	34	16	18	18

Herring Alternative 2.3 and 2.4 (100% EM at $187 per day, 50% PS at $3.84 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$134,205	$310,157
Annual Cost of EM - year 1	$34,284	$8,696	$19,200	$3,059
Annual Cost of EM - year 2	$19,284	$8,696	$4,200	$3,059
Annual Cost of PS	$8,585	$5,620	$3,433	$5,883
Total Monitoring Costs as pct of RTO - year 1 (median)	25.1%		26.7%	
Total Monitoring Costs as pct of RTO - year 2 (median)	14.4%		6.9%	
Post-monitoring RTO -- year 1	$120,211	$82,109	$111,572	$302,913
Post-monitoring RTO -- year 2	$135,211	$82,109	$126,572	$302,913

Herring Alternative 2.3 and 2.4(100% EM at $325 per day, 100% PS at $5.12 per mt)

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	8
Total Days at Sea	825	180
Total Number of Trips	275	140
Total Herring Revenue	$9,409,389	$3,873,778
Total Mackerel Revenue	$1,155,588	$570,248
Total Squid Revenue		$441
Total Other Species Revenue	$5,906	$50,421
Total Revenue	$10,570,883	$4,494,888
Total EM Cost - year 1	$388,125	$178,398
Total EM Cost - year 2	$268,125	$58,398
Total PS Cost	$189,470	$75,767
Total Monitoring Costs - year 1	$577,595	$254,165

Total Monitoring Costs - year 2	$457,595	$134,165
Monitoring Costs as pct of Total Revenue -- year 1	5.5%	5.7%
Monitoring Costs as pct of Total Revenue -- year 2	4.3%	3.0%
Monitoring Costs as pct of Herring Revenue -- year 1	6.1%	6.6%
Monitoring Costs as pct of Herring Revenue -- year 2	4.9%	3.5%

Herring Alternative 2.3 and 2.4 (100% EM at $187 per day, 50% PS at $3.84 per mt)

Fleet Level	**Paired MWT**	**Single MWT**
Number of Vessels	8	8
Total Days at Sea	825	180
Total Number of Trips	275	140
Total Herring Revenue	$9,409,389	$3,873,778
Total Mackerel Revenue	$1,155,588	$570,248
Total Squid Revenue		$441
Total Other Species Revenue	$5,906	$50,421
Total Revenue	$10,570,883	$4,494,888
Total EM Cost - year 1	$274,275	$153,601
Total EM Cost - year 2	$154,275	$33,601
Total PS Cost	$68,683	$27,465
Total Monitoring Costs - year 1	$342,958	$181,067
Total Monitoring Costs - year 2	$222,958	$61,067
Monitoring Costs as pct of Total Revenue -- year 1	3.2%	4.0%
Monitoring Costs as pct of Total Revenue -- year 2	2.1%	1.4%
Monitoring Costs as pct of Herring Revenue -- year 1	3.6%	4.7%
Monitoring Costs as pct of Herring Revenue -- year 2	2.4%	1.6%

Herring Alternative 2.3 and 2.4 – Sub Option 5 (100% EM at $325 per day, 100% PS at $5.12 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,338,354	$704,254	$990,082	$1,081,027
Annual Variable Costs	$318,252	$167,769	$284,110	$243,803
Annual Crew Share	$410,406	$213,633	$259,816	$315,519
Annual Repair/Maint/Haulout	$177,888	$98,231	$120,806	$92,369
Annual Fixed Costs	$268,728	$172,799	$175,636	$186,264
Annual Return-to-owner	$163,080	$89,827	$149,714	$331,640
Annual Cost of EM - year 1	$41,934	$14,629	$20,425	$5,543
Annual Cost of EM - year 2	$26,934	$14,629	$5,425	$5,543
Annual Cost of PS	$22,205	$15,461	$9,943	$17,483
Total Monitoring Costs as pct of RTO - year 1 (median)	40.1%		19.5%	
Total Monitoring Costs as pct of RTO - year 2 (median)	27.5%		4.9%	
Post-monitoring RTO -- year 1	$98,941	$73,425	$119,346	$312,177
Post-monitoring RTO -- year 2	$113,941	$73,425	$134,346	$312,177
Percent of Revenue from Herring	94.9%	6.3%	89.7%	14.4%
Percent of Revenue from Mackerel	8.1%	6.1%	19.5%	17.1%
Percent of Revenue from Squids				
Percent of Revenue from Other Species	0.0%	0.1%	0.4%	0.5%
Average Number of Days at Sea	83	45	17	17
Average Number of Trips	28	15	11	15

Herring Alternative 2.3 and 2.4 – Sub Option 5 (100% EM at $187 per day, 50% PS at $3.84 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$149,714	$331,640
Annual Cost of EM - year 1	$30,498	$8,417	$18,122	$3,189
Annual Cost of EM - year 2	$15,498	$8,417	$3,122	$3,189
Annual Cost of PS	$8,049	$5,605	$3,604	$6,338
Total Monitoring Costs as pct of RTO - year 1 (median)	24.2%		16.9%	
Total Monitoring Costs as pct of RTO - year 2 (median)	13.3%		2.4%	
Post-monitoring RTO -- year 1	$124,533	$81,356	$127,988	$323,695
Post-monitoring RTO -- year 2	$139,533	$81,356	$142,988	$323,695

Herring Alternative 2.3 and 2.4 – Sub Option 5 (100% EM at $325 per day, 100% PS at $5.12 per mt)

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	7
Total Days at Sea	663	117
Total Number of Trips	221	75
Total Herring Revenue	$9,152,836	$3,618,705
Total Mackerel Revenue	$657,345	$570,246
Total Squid Revenue		
Total Other Species Revenue	$4,109	$2,721
Total Revenue	$9,814,290	$4,191,672
Total EM Cost - year 1	$335,475	$142,978
Total EM Cost - year 2	$215,475	$37,978
Total PS Cost	$177,642	$69,602
Total Monitoring Costs - year 1	$513,117	$212,580

Total Monitoring Costs - year 2	$393,117	$107,580
Monitoring Costs as pct of Total Revenue -- year 1	5.2%	5.1%
Monitoring Costs as pct of Total Revenue -- year 2	4.0%	2.6%
Monitoring Costs as pct of Herring Revenue -- year 1	5.6%	5.9%
Monitoring Costs as pct of Herring Revenue -- year 2	4.3%	3.0%

Herring Alternative 2.3 and 2.4 – Sub Option 5 (100% EM at $187 per day, 50% PS at $3.84 per mt)

Fleet Level	Paired MWT	Single MWT
Number of Vessels	8	7
Total Days at Sea	663	117
Total Number of Trips	221	75
Total Herring Revenue	$9,152,836	$3,618,705
Total Mackerel Revenue	$657,345	$570,246
Total Squid Revenue		
Total Other Species Revenue	$4,109	$2,721
Total Revenue	$9,814,290	$4,191,672
Total EM Cost - year 1	$243,981	$126,852
Total EM Cost - year 2	$123,981	$21,852
Total PS Cost	$64,395	$25,231
Total Monitoring Costs - year 1	$308,376	$152,083
Total Monitoring Costs - year 2	$188,376	$47,083
Monitoring Costs as pct of Total Revenue -- year 1	3.1%	3.6%
Monitoring Costs as pct of Total Revenue -- year 2	1.9%	1.1%
Monitoring Costs as pct of Herring Revenue -- year 1	3.4%	4.2%
Monitoring Costs as pct of Herring Revenue -- year 2	2.1%	1.3%

Herring Alternative 2.5

Per Vessel	Average	Stnd Dev
Annual Gross Revenue	$1,752,994	$822,480
Annual Variable Costs	$409,945	$181,028
Annual Crew Share	$527,920	$227,404
Annual Repair/Maint/Upgrade/Haulout	$208,650	$73,627
Annual Fixed Costs	$340,386	$171,281
Annual Return-to-owner	$266,094	$239,382
Annual Cost of NEFOP	$9,353	$7,604
NEFOP as pct of RTO (median)	4.0%	
post-NEFOP RTO	$256,740	$244,116
Percent of Revenue from Herring	99.9%	0.4%
Percent of Revenue from Mackerel		
Percent of Revenue from Squids		
Percent of Revenue from Other Species	0.2%	0.4%
Average Number of Days at Sea	11	9
Average Number of Trips	4	3

Fleet Level	
Number of Vessels	8
Total Days at Sea	92
Total Number of Trips	33
Total Herring Revenue	$1,437,094
Total Mackerel Revenue	
Total Squid Revenue	
Total Other Species Revenue	$1,170
Total Revenue	$1,438,264
Total NEFOP Cost	$74,827
NEFOP as pct of Total Revenue	5.2%
NEFOP as pct of Herring Revenue	5.2%

Herring Alternative 2.5 – Sub Option 5

Per Vessel	Average	Stnd Dev
Annual Gross Revenue	$1,752,994	$822,480
Annual Variable Costs	$409,945	$181,028
Annual Crew Share	$527,920	$227,404
Annual Repair/Maint/Upgrade/Haulout	$208,650	$73,627
Annual Fixed Costs	$340,386	$171,281
Annual Return-to-owner	$266,094	$239,382
Annual Cost of NEFOP	$6,293	$3,131
NEFOP as pct of RTO (median)	3.7%	
post-NEFOP RTO	$259,800	$241,604
Percent of Revenue from Herring	100.0%	0.0%
Percent of Revenue from Mackerel		
Percent of Revenue from Squids		
Percent of Revenue from Other Species	0.0%	0.0%
Average Number of Days at Sea	8	4
Average Number of Trips	3	1

Fleet Level	
Number of Vessels	8
Total Days at Sea	62
Total Number of Trips	23
Total Herring Revenue	$1,379,191
Total Mackerel Revenue	
Total Squid Revenue	
Total Other Species Revenue	
Total Revenue	$1,379,191
Total NEFOP Cost	$50,347
NEFOP as pct of Total Revenue	3.7%
NEFOP as pct of Herring Revenue	3.7%

Herring Alternative 2.6

Analyses are not yet complete for this alternative. Alternative 2.6 applies the same criteria as found in Alternatives 2.2, 2.3, and 2.4 but only for vessels that fish in groundfish closed areas. However, in order to provide a means for obtaining a reasonably reliable estimate of the impacts of Alternative 2.6, the following two tables are provided. The first table shows the major differences between Alternatives 2.1 and 2.5 at 100% coverage for trips with > 1 lb of herring landed (the second table shows the differences for trips > 25 mt – Sub-Option 5). These two alternatives are identical except that Alternative 2.5 applies only to vessels that fish in groundfish closed areas and applies to MWT vessels with category A through E herring permits whereas Alternative 2.1 applies to vessel with category A and B permits only. Therefore, these differences can be used to estimate the impacts of Alternative 2.6.

Trips with Herring Landings > 1 lb (includes all gear types)

	Herring Alternative 2.1	Herring Alternative 2.5	Herring Alternative 2.5 as a Percent of Alternative 2.1	
Number of Vessels	30	8	26.7%	
Total Days at Sea	1,579	92	5.8%	
Number of Trips	958	33	3.4%	
Total Revenue	$28,672,809	$1,438,264	5.0%	Use this for estimating portside sampling costs for Alternative 2.6
Total NEFOP Cost	$1,287,985	$74,827	5.8%	Use this for estimating EM and ASM costs for Alternative 2.6

Trips with Herring Landings > 25 mt (Sub-Option 5) (includes all gear types)

	Herring Alternative 2.1	Herring Alternative 2.5	Herring Alternative 2.5 as a Percent of Alternative 2.1	
Number of Vessels	27	8	29.6%	
Total Days at Sea	1,100	62	5.6%	
Number of Trips	673	23	3.4%	
Total Revenue	$246,047,079	$1,379,191	5.6%	Use this for estimating portside sampling costs for Alternative 2.6
Total NEFOP Cost	$897,711	$50,347	5.6%	Use this for estimating EM and ASM costs for Alternative 2.6

Herring Alternative 2.7. 100% EM and PS. EM at $325/day. PS at $5.12/mt

Vessel Level	Paired MWT		Single MWT		PurseSeine		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$144,125	$113,903
Annual Cost of EM - year 1	$48,516	$15,113	$24,191	$5,221	$33,202	$11,182	$21,922	$5,629
Annual Cost of EM - year 2	$33,516	$15,113	$9,191	$5,221	$18,202	$11,182	$6,922	$5,629
Annual Cost of PS	$22,914	$14,999	$12,097	$17,447	$23,633	$15,699	$2,844	$3,000
Total Monitoring Costs as pct of RTO - year 1	43.8%	Median: 42.3%	25.7%	Median: 38.1%	23.6%	Median: 19.4%	17.2%	Median: 21.0%
Total Monitoring Costs as pct of RTO - year 2	34.6%	Median: 29.2%	15.1%	Median: 17.3%	17.3%	Median: 15.3%	6.8%	Median: 6.3%
Post-monitoring RTO -- year 1	$91,651	$74,471	$104,881	$341,867	$184,345	$144,814	$119,359	$111,844

Post-monitoring RTO -- year 2	$106,651	$74,471	$119,881	$341,867	$199,345	$144,814	$134,359	$111,844

Fleet Level	Paired MWT	Single MWT	PurseSeine	SMBT
Number of Vessels	8	6	7	9
Total Days at Sea	825	170	392	192
Total Number of Trips	275	129	451	103
Total Herring Revenue	$9,409,389	$3,842,873	$11,042,232	$1,483,242
Total Mackerel Revenue	$1,155,588	$570,246	$225	$97,806
Total Squid Revenue				$529,723
Total Other Species Revenue	$5,906	$50,399		$485,180
Total Revenue	$10,570,883	$4,463,518	$11,042,457	$2,595,951
Total EM Cost - year 1	$388,125	$145,148	$232,412	$197,300
Total EM Cost - year 2	$268,125	$55,148	$127,412	$62,300
Total PS Cost	$183,313	$72,580	$165,433	$25,597
Total Monitoring Costs - year 1	$571,438	$217,728	$397,845	$222,897
Total Monitoring Costs - year 2	$451,438	$127,728	$292,845	$87,897
Monitoring Costs as pct of Total Revenue -- year 1	5.4%	4.9%	3.6%	8.6%
Monitoring Costs as pct of Total Revenue -- year 2	4.3%	2.9%	2.7%	3.4%
Monitoring Costs as pct of Herring Revenue -- year 1	6.1%	5.7%	3.6%	15.0%
Monitoring Costs as pct of Herring Revenue -- year 2	4.8%	3.3%	2.7%	5.9%

Herring Alternative 2.7 – sub option 5. 100% EM and PS. EM at $325/day. PS at $5.12/mt

Vessel Level	**Paired MWT**		**Single MWT**		**PurseSeine**		**SMBT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$163,329	$137,021
Annual Cost of EM - year 1	$41,934	$14,629	$21,276	$5,550	$24,463	$5,234	$21,363	$5,051
Annual Cost of EM - year 2	$26,934	$14,629	$6,276	$5,550	$9,463	$5,234	$6,363	$5,051

Annual Cost of PS	$21,484	$14,958	$11,173	$17,974	$22,027	$15,705	$3,410	$2,535
Total Monitoring Costs as pct of RTO - year 1	38.9%	Median: 39.7%	23.0%	Median: 29.2%	19.3%	Median: 18.3%	15.2%	Median: 19.9%
Total Monitoring Costs as pct of RTO - year 2	29.7%	Median: 27.1%	12.4%	Median: 6.2%	13.1%	Median: 14.1%	6.0%	Median: 8.8%
Post-monitoring RTO -- year 1	$99,662	$73,641	$108,720	$341,047	$194,691	$143,060	$138,556	$136,267
Post-monitoring RTO -- year 2	$114,662	$73,641	$123,720	$341,047	$209,691	$143,060	$153,556	$136,267

Fleet Level	**Paired MWT**	**Single MWT**	**PurseSeine**	**SMBT**
Number of Vessels	8	6	7	6
Total Days at Sea	663	116	204	117
Total Number of Trips	221	73	320	59
Total Herring Revenue	$9,152,836	$3,606,269	$10,263,855	$1,352,045
Total Mackerel Revenue	$657,345	$570,246	$225	$28,633
Total Squid Revenue				$171,323
Total Other Species Revenue	$4,109	$2,721		$237,472
Total Revenue	$9,814,290	$4,179,236	$10,264,080	$1,789,473
Total EM Cost - year 1	$335,475	$127,653	$171,240	$128,176
Total EM Cost - year 2	$215,475	$37,653	$66,240	$38,176
Total PS Cost	$171,869	$67,038	$154,189	$20,461
Total Monitoring Costs - year 1	$507,344	$194,691	$325,429	$148,637
Total Monitoring Costs - year 2	$387,344	$104,691	$220,429	$58,637
Monitoring Costs as pct of Total Revenue -- year 1	5.2%	4.7%	3.2%	8.3%
Monitoring Costs as pct of Total Revenue -- year 2	3.9%	2.5%	2.1%	3.3%
Monitoring Costs as pct of Herring Revenue -- year 1	5.5%	5.4%	3.2%	11.0%
Monitoring Costs as pct of Herring Revenue -- year 2	4.2%	2.9%	2.1%	4.3%

<u>Herring Alternative 2.7. 75% EM and PS. EM at $202/day. PS at $3.84/mt</u>

Vessel Level	Paired MWT		Single MWT		PurseSeine		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$144,125	$113,903
Annual Cost of EM - year 1	$30,623	$7,045	$19,285	$2,434	$23,485	$5,212	$18,227	$2,624
Annual Cost of EM - year 2	$15,623	$7,045	$4,285	$2,434	$8,485	$5,212	$3,227	$2,624
Annual Cost of PS	$12,878	$8,430	$6,798	$9,805	$13,282	$8,823	$1,598	$1,686
Total Monitoring Costs as pct of RTO - year 1	26.7%	Median: 25.6%	18.5%	Median: 27.6%	15.2%	Median: 13.0%	13.8%	Median: 16.8%
Total Monitoring Costs as pct of RTO - year 2	17.5%	Median: 14.8%	7.9%	Median: 8.5%	9.0%	Median: 8.1%	3.3%	Median: 3.0%
Post-monitoring RTO -- year 1	$119,579	$81,021	$115,086	$351,250	$204,413	$152,458	$124,300	$112,806
Post-monitoring RTO -- year 2	$134,579	$81,021	$130,086	$351,250	$219,413	$152,458	$139,300	$112,806

Fleet Level	Paired MWT	Single MWT	PurseSeine	SMBT
Number of Vessels	8	6	7	9
Total Days at Sea	825	170	392	192
Total Number of Trips	275	129	451	103
Total Herring Revenue	$9,409,389	$3,842,873	$11,042,232	$1,483,242
Total Mackerel Revenue	$1,155,588	$570,246	$225	$97,806
Total Squid Revenue				$529,723
Total Other Species Revenue	$5,906	$50,399		$485,180
Total Revenue	$10,570,883	$4,463,518	$11,042,457	$2,595,951
Total EM Cost - year 1	$244,988	$115,707	$164,394	$164,041
Total EM Cost - year 2	$124,988	$25,707	$59,394	$29,041
Total PS Cost	$103,025	$40,791	$92,976	$14,386
Total Monitoring Costs - year 1	$348,012	$156,498	$257,369	$178,427
Total Monitoring Costs - year 2	$228,012	$66,498	$152,369	$43,427

Monitoring Costs as pct of Total Revenue -- year 1	3.3%	3.5%	2.3%	6.9%
Monitoring Costs as pct of Total Revenue -- year 2	2.2%	1.5%	1.4%	1.7%
Monitoring Costs as pct of Herring Revenue -- year 1	3.7%	4.1%	2.3%	12.0%
Monitoring Costs as pct of Herring Revenue -- year 2	2.4%	1.7%	1.4%	2.9%

Herring Alternative 2.7 – sub option 5. 75% EM and PS. EM at $202/day. PS at $3.84/mt

Vessel Level	**Paired MWT**		**Single MWT**		**PurseSeine**		**SMBT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$163,329	$137,021
Annual Cost of EM - year 1	$27,556	$6,819	$17,925	$2,587	$19,411	$2,440	$17,966	$2,355
Annual Cost of EM - year 2	$12,556	$6,819	$2,925	$2,587	$4,411	$2,440	$2,966	$2,355
Annual Cost of PS	$12,074	$8,407	$6,279	$10,102	$12,380	$8,826	$1,917	$1,425
Total Monitoring Costs as pct of RTO - year 1	24.3%	Median: 24.8%	17.1%	Median: 23.5%	13.2%	Median: 12.6%	12.2%	Median: 15.4%
Total Monitoring Costs as pct of RTO - year 2	15.1%	Median: 13.7%	6.5%	Median: 3.3%	7.0%	Median: 7.6%	3.0%	Median: 4.3%
Post-monitoring RTO -- year 1	$123,451	$80,634	$116,964	$350,826	$209,390	$151,744	$143,446	$136,600
Post-monitoring RTO -- year 2	$138,451	$80,634	$131,964	$350,826	$224,390	$151,744	$158,446	$136,600

Fleet Level	**Paired MWT**	**Single MWT**	**PurseSeine**	**SMBT**
Number of Vessels	8	6	7	6
Total Days at Sea	663	116	204	117
Total Number of Trips	221	73	320	59
Total Herring Revenue	$9,152,836	$3,606,269	$10,263,855	$1,352,045
Total Mackerel Revenue	$657,345	$570,246	$225	$28,633
Total Squid Revenue				$171,323
Total Other Species Revenue	$4,109	$2,721		$237,472

Total Revenue	$9,814,290	$4,179,236	$10,264,080	$1,789,473
Total EM Cost - year 1	$220,445	$107,552	$135,878	$107,796
Total EM Cost - year 2	$100,445	$17,552	$30,878	$17,796
Total PS Cost	$96,593	$37,676	$86,657	$11,499
Total Monitoring Costs - year 1	$317,037	$145,228	$222,535	$119,295
Total Monitoring Costs - year 2	$197,037	$55,228	$117,535	$29,295
Monitoring Costs as pct of Total Revenue -- year 1	3.2%	3.5%	2.2%	6.7%
Monitoring Costs as pct of Total Revenue -- year 2	2.0%	1.3%	1.1%	1.6%
Monitoring Costs as pct of Herring Revenue -- year 1	3.5%	4.0%	2.2%	8.8%
Monitoring Costs as pct of Herring Revenue -- year 2	2.2%	1.5%	1.1%	2.2%

Herring Alternative 2.7. 50% EM and PS. EM at $187/day. PS at $3.84/mt

Vessel Level	**Paired MWT**		**Single MWT**		**PurseSeine**		**SMBT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$144,125	$113,903
Annual Cost of EM - year 1	$24,642	$4,348	$17,644	$1,502	$20,236	$3,217	$16,991	$1,619
Annual Cost of EM - year 2	$9,642	$4,348	$2,644	$1,502	$5,236	$3,217	$1,991	$1,619
Annual Cost of PS	$8,585	$5,620	$4,532	$6,537	$8,855	$5,882	$1,066	$1,124
Total Monitoring Costs as pct of RTO - year 1	20.4%	Median: 19.8%	15.7%	Median: 23.7%	12.1%	Median: 10.5%	12.5%	Median: 14.3%
Total Monitoring Costs as pct of RTO - year 2	11.2%	Median: 9.5%	5.1%	Median: 5.4%	5.8%	Median: 5.3%	2.1%	Median: 18.4%
Post-monitoring RTO -- year 1	$129,853	$83,958	$118,992	$355,072	$212,089	$155,712	$126,068	$113,189
Post-monitoring RTO -- year 2	$144,853	$83,958	$133,992	$355,072	$227,089	$155,712	$141,068	$113,189

Fleet Level	**Paired MWT**	**Single MWT**	**PurseSeine**	**SMBT**
Number of Vessels	8	6	7	9

Total Days at Sea	825	170	392	192
Total Number of Trips	275	129	451	103
Total Herring Revenue	$9,409,389	$3,842,873	$11,042,232	$1,483,242
Total Mackerel Revenue	$1,155,588	$570,246	$225	$97,806
Total Squid Revenue				$529,723
Total Other Species Revenue	$5,906	$50,399		$485,180
Total Revenue	$10,570,883	$4,463,518	$11,042,457	$2,595,951
Total EM Cost - year 1	$197,138	$105,866	$141,655	$152,923
Total EM Cost - year 2	$77,138	$15,866	$36,655	$17,923
Total PS Cost	$68,683	$27,194	$61,984	$9,591
Total Monitoring Costs - year 1	$265,821	$133,060	$203,639	$162,514
Total Monitoring Costs - year 2	$145,821	$43,060	$98,639	$27,514
Monitoring Costs as pct of Total Revenue -- year 1	2.5%	3.0%	1.8%	6.3%
Monitoring Costs as pct of Total Revenue -- year 2	1.4%	1.0%	0.9%	1.1%
Monitoring Costs as pct of Herring Revenue -- year 1	2.8%	3.5%	1.8%	11.0%
Monitoring Costs as pct of Herring Revenue -- year 2	1.5%	1.1%	0.9%	1.9%

Herring Alternative 2.7 – sub option 5. 50% EM and PS. EM at $187/day. PS at $3.84/mt

Vessel Level	**Paired MWT**		**Single MWT**		**PurseSeine**		**SMBT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$163,329	$137,021
Annual Cost of EM - year 1	$22,749	$4,209	$16,805	$1,597	$17,722	$1,506	$16,831	$1,453
Annual Cost of EM - year 2	$7,749	$4,209	$1,805	$1,597	$2,722	$1,506	$1,831	$1,453
Annual Cost of PS	$8,049	$5,605	$4,186	$6,735	$8,253	$5,884	$1,278	$950
Total Monitoring Costs as pct of RTO - year 1	18.9%	Median: 19.3%	14.9%	Median: 21.1%	10.8%	Median: 10.3%	11.1%	Median: 13.8%
Total Monitoring Costs as pct of RTO - year 2	9.7%	Median: 8.8%	4.2%	Median: 2.1%	4.6%	Median: 4.9%	1.9%	Median: 2.7%

Post-monitoring RTO -- year 1	$132,282	$83,719	$120,177	$354,798	$215,205	$155,292	$145,221	$136,744
Post-monitoring RTO -- year 2	$147,282	$83,719	$135,177	$354,798	$230,205	$155,292	$160,221	$136,744

Fleet Level	**Paired MWT**	**Single MWT**	**PurseSeine**	**SMBT**
Number of Vessels	8	6	7	6
Total Days at Sea	663	116	204	117
Total Number of Trips	221	73	320	59
Total Herring Revenue	$9,152,836	$3,606,269	$10,263,855	$1,352,045
Total Mackerel Revenue	$657,345	$570,246	$225	$28,633
Total Squid Revenue				$171,323
Total Other Species Revenue	$4,109	$2,721		$237,472
Total Revenue	$9,814,290	$4,179,236	$10,264,080	$1,789,473
Total EM Cost - year 1	$181,991	$100,832	$124,057	$100,983
Total EM Cost - year 2	$61,991	$10,832	$19,057	$10,983
Total PS Cost	$64,395	$25,118	$57,771	$7,666
Total Monitoring Costs - year 1	$246,386	$125,950	$181,828	$108,649
Total Monitoring Costs - year 2	$126,386	$35,950	$76,828	$18,649
Monitoring Costs as pct of Total Revenue -- year 1	2.5%	3.0%	1.8%	6.1%
Monitoring Costs as pct of Total Revenue -- year 2	1.3%	0.9%	0.7%	1.0%
Monitoring Costs as pct of Herring Revenue -- year 1	2.7%	3.5%	1.8%	8.0%
Monitoring Costs as pct of Herring Revenue -- year 2	1.4%	1.0%	0.7%	1.4%

Herring Alternative 2.7. 25% EM and PS. EM at $172/day. PS at $3.84/mt

Vessel Level	**Paired MWT**		**Single MWT**		**PurseSeine**		**SMBT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$144,125	$113,903
Annual Cost of EM - year 1	$19,434	$2,000	$16,216	$691	$17,408	$1,479	$15,916	$745

Annual Cost of EM - year 2	$4,434	$2,000	$1,216	$691	$2,408	$1,479	$916	$745
Annual Cost of PS	$4,293	$2,810	$2,266	$3,268	$4,427	$2,941	$533	$562
Total Monitoring Costs as pct of RTO - year 1	14.5%	14.4%	13.1%	20.0%	9.1%	8.2%	11.4%	13.3%
Total Monitoring Costs as pct of RTO - year 2	5.4%	4.5%	2.5%	2.5%	2.8%	2.6%	1.0%	0.8%
Post-monitoring RTO -- year 1	$139,353	$86,909	$122,686	$358,805	$219,345	$158,946	$127,677	$113,557
Post-monitoring RTO -- year 2	$154,353	$86,909	$137,686	$358,805	$234,345	$158,946	$142,677	$113,557

Fleet Level	**Paired MWT**	**Single MWT**	**PurseSeine**	**SMBT**
Number of Vessels	8	6	7	9
Total Days at Sea	825	170	392	192
Total Number of Trips	275	129	451	103
Total Herring Revenue	$9,409,389	$3,842,873	$11,042,232	$1,483,242
Total Mackerel Revenue	$1,155,588	$570,246	$225	$97,806
Total Squid Revenue				$529,723
Total Other Species Revenue	$5,906	$50,399		$485,180
Total Revenue	$10,570,883	$4,463,518	$11,042,457	$2,595,951
Total EM Cost - year 1	$155,475	$97,296	$121,858	$143,243
Total EM Cost - year 2	$35,475	$7,296	$16,858	$8,243
Total PS Cost	$34,342	$13,597	$30,992	$4,795
Total Monitoring Costs - year 1	$189,817	$110,893	$152,850	$148,038
Total Monitoring Costs - year 2	$69,817	$20,893	$47,850	$13,038
Monitoring Costs as pct of Total Revenue -- year 1	1.8%	2.5%	1.4%	5.7%
Monitoring Costs as pct of Total Revenue -- year 2	0.7%	0.5%	0.4%	0.5%
Monitoring Costs as pct of Herring Revenue -- year 1	2.0%	2.9%	1.4%	10.0%
Monitoring Costs as pct of Herring Revenue -- year 2	0.7%	0.5%	0.4%	0.9%

<u>Herring Alternative 2.7 – sub option 5. 25% EM and PS. EM at $172/day. PS at $3.84/mt</u>

Vessel Level	Paired MWT		Single MWT		PurseSeine		SMBT	
	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$163,080	$89,827	$141,169	$362,448	$241,180	$162,152	$163,329	$137,021
Annual Cost of EM - year 1	$18,564	$1,936	$15,830	$734	$16,252	$692	$15,842	$668
Annual Cost of EM - year 2	$3,564	$1,936	$830	$734	$1,252	$692	$842	$668
Annual Cost of PS	$4,025	$2,802	$2,093	$3,367	$4,127	$2,942	$639	$475
Total Monitoring Costs as pct of RTO - year 1	13.9%	Median: 14.2%	12.7%	Median: 18.8%	8.4%	Median: 8.4%	10.1%	Median: 12.4%
Total Monitoring Costs as pct of RTO - year 2	4.7%	Median: 4.2%	2.1%	Median: 1.0%	2.2%	Median: 2.4%	0.9%	Median: 1.3%
Post-monitoring RTO -- year 1	$140,492	$86,801	$123,245	$358,672	$220,802	$158,762	$146,848	$136,885
Post-monitoring RTO -- year 2	$155,492	$86,801	$138,245	$358,672	$235,802	$158,762	$161,848	$136,885

Fleet Level	Paired MWT	Single MWT	PurseSeine	SMBT
Number of Vessels	8	6	7	6
Total Days at Sea	663	116	204	117
Total Number of Trips	221	73	320	59
Total Herring Revenue	$9,152,836	$3,606,269	$10,263,855	$1,352,045
Total Mackerel Revenue	$657,345	$570,246	$225	$28,633
Total Squid Revenue				$171,323
Total Other Species Revenue	$4,109	$2,721		$237,472
Total Revenue	$9,814,290	$4,179,236	$10,264,080	$1,789,473
Total EM Cost - year 1	$148,509	$94,982	$113,764	$95,051
Total EM Cost - year 2	$28,509	$4,982	$8,764	$5,051
Total PS Cost	$32,198	$12,559	$28,886	$3,833
Total Monitoring Costs - year 1	$180,707	$107,541	$142,650	$98,884
Total Monitoring Costs - year 2	$60,707	$17,541	$37,650	$8,884
Monitoring Costs as pct of Total Revenue -- year 1	1.8%	2.6%	1.4%	5.5%
Monitoring Costs as pct of Total Revenue -- year 2	0.6%	0.4%	0.4%	0.5%

Monitoring Costs as pct of Herring Revenue -- year 1	2.0%	3.0%	1.4%	7.3%
Monitoring Costs as pct of Herring Revenue -- year 2	0.7%	0.5%	0.4%	0.7%

Appendix 9 - ATLANTIC MACKEREL ALTERNATIVE ECONOMIC

IMPACTS ON MACKEREL FISHING BUSINESSES

Impact Analysis Methods

Four types of industry-funded monitoring for the mackerel fishery are being considered: Northeast Fisheries Observer Program (NEFOP) level observer, at-sea monitor (ASM), Electronic Monitoring (EM), and portside sampling (PS) coverage. NEFOP-level and at-sea monitoring coverage would function independently, but EM and portside are intended to be used together.

MONITORING COSTS TO INDUSTRY

Types of Monitoring	NEFOP-Level Observer	At-Sea Monitor	Electronic Monitoring	Portside Sampling
Industry Cost Responsibility	$818 per seaday	$710 per seaday	Year 1: $15,000 one-time set up cost then $325 (and $187) per seaday Year 2: $325 (and $187) per seaday	$0.0023 per lb ($5.12 per mt) and at $0.00174 per lb ($3.84 per mt)

Trips that occurred in 2014 were used to estimate the likely future impacts of the mackerel alternatives. This is the most recent year for which data is available and 2014 activity should represent what is likely to occur in future years in terms of the vessels participating in the fishery, the condition of the stock, the regulatory environment, and fishing methods. Each alternative has different criteria for defining which types of trips would be monitored (based on permit type, gear used, etc.). Trips from 2014 that met these criteria were evaluated in terms of how the monitoring costs impacted annual returns to owner (see below for description of how return-to-owner (RTO) was calculated). If an alternative specified 100% coverage, then the monitoring costs that would have been paid for all trips occurring in 2014 were calculated and assessed in terms of impacts to RTO. For alternatives that have options with less than 100% coverage, trips from the pool of 2014 trips were randomly selected until the coverage target was met. This was repeated 1,000 times for each trip selection simulation. Mean annual ASM/NEFOP costs per vessel are then calculated from the simulated trip selections.

Vessels were assigned a major gear type based on the gear that earned the greatest revenue (from all species landed) among the trips selected for evaluation (according to the criteria in the alternative). It is not necessarily the major gear for the year for a particular vessel.

In the tables, any information that pertains to amounts of revenue from various species and numbers of days at sea and trips are for the trips that met the criteria under each of the alternatives only, not for the year.

Return-to-Owner

A previous analysis of economic impacts of herring and mackerel coverage target alternatives was based on trip cost data collected by the NEFOP and showed the economic impact of the alternatives on vessel net revenues (gross revenues less trip costs). Because NEFOP only collects a limited amount of cost data, industry participants expressed concern that net revenue estimates used in the previous economic analysis underestimated vessel costs. In response, Jason Didden, staff of the Mid-Atlantic Council, offered to survey herring and mackerel vessels to collect more detailed cost information.

The survey requested information from vessel owners on total trip costs in 2014. The cost survey collected information on variable trip costs, the cost of repairs/maintenance/upgrades/haulout, fixed costs, and payments to crew. These data were used to update the impact analyses. If the vessel owner completed a survey then that vessel's actual costs were used in the analysis. Otherwise, respondent data were used to project costs on other vessels that did not provide a survey response. To do this, responses from the surveys were categorized by the annual primary species caught based on value. Two categories were used: herring/mackerel vessels and squid vessels. For each of these vessel types, costs were assigned into one of four categories: variable costs, crew share, repair/maint/upgrades/haulout, and fixed costs. Average percentages of annual gross revenue by cost category and vessel type were used to estimate costs for vessels that did not have survey data. See table below for cost category descriptions and average percentages of gross revenue.

Surveys were sent to approximately 18 vessel owners (representing about 26 vessels) in the herring and/or mackerel fisheries. Surveys were sent in May 2015 and information was submitted for 16 of the 26 vessels.

Cost category	Description	Average percent of gross revenue	
		Herring/ mackerel vessels	Squid vessels
Variable costs	Annual fuel, oil, food, water, ice, carrier vessel, communication, fishing supplies, crew supplies, and catch handling costs	25%	35%
Crew share	Total annual payments to crew	28%	26%
Repair/ maintenance/ upgrades/ haulout (RMUH)	Annual cost of repairs to engines, deck equipment, machinery, hull, fishing gear, electronics, processing equipment, refrigeration, and safety equipment. Includes haulout costs. Because these costs vary considerably from year to year and upgrade costs were combined with repair/maintenance costs, half of these costs were amortized over 7 years.	13%	11%
Fixed costs	Annual mooring/dockage, permits/licenses, insurance, quota/DAS lease, crew benefits, vessel monitoring, workshop/storage, office, vehicle, travel, association, professional, interest, taxes, and non-crew labor costs. Note: principal payments on business loans are not included in fixed costs.	19%	21%
Return to Owner (RTO)	Gross revenue less variable, crew share, RMUH, and fixed costs	15%	7%

<u>Major Findings</u>

There were two vessel types examined for economic impacts from the mackerel alternatives: paired MWT vessels and a second category that combines single MWT & SMBT vessels (these vessel types are combined for data confidentially reasons). Among the two vessels types evaluated, average per vessel monitoring costs as a percentage of RTO are similar across all scenarios within alternatives 2.1 and 2.2. The average number of monitored seadays per vessel are also similar.

For alternative 2.3 average per vessel monitoring costs as a percent of RTO for single MWT vessels and paired MWT vessels are similar (around 3% to 4%). For these vessel types, only EM and PS monitoring costs apply. SMBT would not have EM/PS costs but would have ASM costs. The impact of these ASM costs on RTO cannot be reported for data confidentiality reasons. For MWT vessels, alternative 2.4 has identical impacts to alternative 2.3.

For the vessels impacted by the mackerel alternatives, mackerel revenue comprises a smaller portion of total revenue than does herring as a percent of total revenue under the herring alternatives. That is, revenue from species that are not the focus of the alternative (non-mackerel species in this case) contributes more significantly to covering mackerel-based monitoring costs than do non-herring species under the herring alternatives. Across all mackerel alternatives, the average percent mackerel revenue never exceeds 75%.

The average percent revenue from mackerel for single MWT vessels are about 20 percentage points lower than paired MWT vessels indicating that single MWT vessels must rely more heavily on non-mackerel revenue in order to cover mackerel-based monitoring requirements.

Exempting trips less than 25 mt from monitoring requirements reduces the cost by about 30% in alternatives 2.1 and 2.2 and by about 23% in alternatives 2.3 and 2.4.

Using EM and PS monitoring in place of ASM on MWT vessels results in no change in monitoring costs in year 1 for paired MWT vessels but a 14% cost saving in year 2. For single MWT and SMBT vessels combined, costs increase by 13% in year 1 and 7% in year 2.

There is significant crossover of vessels impacted by both the herring alternatives and the mackerel alternatives. For example, all of the vessels impacted by mackerel alternative 2.1 are also impacted by herring alternative 2.1.

Reducing EM costs from $325 to $187 per day and only monitoring half of the portside sampling trips at a rate of $3.84 per mt, as opposed to all trips at $5.12 per mt, reduces total monitoring costs by 52% for paired MWT vessels ($45,812 to $21,796) in year 2. For single MWT vessels, costs are reduced by 55% ($34,421 to $15,364).

Mackerel Alternative 2.1 (100%)

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,698,295	$243,698	$2,179,669	$1,819,008
Annual Variable Costs	$402,791	$65,429	$625,479	$482,473
Annual Crew Share	$523,079	$43,947	$613,595	$544,347
Annual Repair/Maint/Haulout	$225,981	$46,751	$156,964	$110,071
Annual Fixed Costs	$341,930	$124,936	$537,927	$540,915
Annual Return-to-owner	$204,514	$52,550	$245,704	$291,036
Annual Cost of NEFOP	$10,200	$6,273	$11,275	$9,460
NEFOP as pct of RTO (median)	5.1%		11.9%	
post-NEFOP RTO	$194,314	$48,697	$234,429	$292,923
Percent of Revenue from Herring	35.7%	36.4%	45.7%	34.2%
Percent of Revenue from Mackerel	64.1%	36.4%	34.9%	21.1%
Percent of Revenue from Squids			9.9%	13.1%
Percent of Revenue from Other Species	0.2%	0.2%	38.2%	44.6%
Average Number of Days at Sea	13	8	14	12
Average Number of Trips	4	3	3	2

Mackerel Alternative 2.1 (100%)

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	6	7
Total Days at Sea	75	97
Total Number of Trips	25	21
Total Herring Revenue	$275,720	$688,416
Total Mackerel Revenue	$1,184,211	$850,276
Total Squid Revenue		$93,069
Total Other Species Revenue	$2,895	$749,911

Total Revenue	$1,462,826	$2,381,672
Total NEFOP Cost	$61,200	$78,926
NEFOP as pct of Total Revenue	4.2%	3.3%
NEFOP as pct of Mackerel Revenue	5.2%	9.3%

Mackerel Alternative 2.1—Sub Option 6 (100%)

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,706,040	$271,636	$2,574,720	$2,082,561
Annual Variable Costs	$402,170	$73,132	$684,427	$578,997
Annual Crew Share	$524,828	$48,900	$743,633	$611,125
Annual Repair/Maint/Upgrade/Haulout	$220,871	$50,362	$180,777	$128,395
Annual Fixed Costs	$345,165	$139,401	$661,531	$612,688
Annual Return-to-owner	$213,005	$53,954	$304,352	$333,578
Annual Cost of NEFOP	$8,813	$3,713	$10,451	$6,260
NEFOP as pct of RTO (median)	4.3%		6.9%	
post-NEFOP RTO	$204,193	$51,645	$293,901	$336,095
Percent of Revenue from Herring	25.7%	33.5%	34.5%	29.9%
Percent of Revenue from Mackerel	74.2%	33.5%	45.9%	20.0%
Percent of Revenue from Squids			0.5%	0.2%
Percent of Revenue from Other Species	0.2%	0.3%	46.4%	53.7%
Average Number of Days at Sea	11	5	13	8
Average Number of Trips	4	2	3	2

Mackerel Alternative 2.1—Sub Option 6 (100%)

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	5	5
Total Days at Sea	54	64
Total Number of Trips	18	15
Total Herring Revenue	$206,648	$463,726
Total Mackerel Revenue	$1,132,514	$808,274
Total Squid Revenue		$4,216
Total Other Species Revenue	$2,268	$674,817

Total Revenue	$1,341,430	$1,951,033
Total NEFOP Cost	$44,064	$52,257
NEFOP as pct of Total Revenue	3.3%	2.7%
NEFOP as pct of Mackerel Revenue	3.9%	6.5%

Mackerel Alternative 2.1 SMBT Tier 2 (50%)

No landings of mackerel > 20,000 lbs by SMBT with tier 2 permits.

Mackerel Alternative 2.1 SMBT Tier 3 (25%)

No landings of mackerel > 20,000 lbs by SMBT with tier 3 permits.

Mackerel Alternative 2.2 & 2.3 (100%) – Observer Coverage Only

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,698,295	$243,698	$2,179,669	$1,819,008
Annual Variable Costs	$402,791	$65,429	$625,479	$482,473
Annual Crew Share	$523,079	$43,947	$613,595	$544,347
Annual Repair/Maint/Haulout	$225,981	$46,751	$156,964	$110,071
Annual Fixed Costs	$341,930	$124,936	$537,927	$540,915
Annual Return-to-owner	$204,514	$52,550	$245,704	$291,036
Annual Cost of ASM	$8,875	$5,458	$9,810	$8,231
ASM as pct of RTO (median)	4.4%		10.3%	
post-ASM RTO	$195,639	$49,169	$235,894	$292,661
Percent of Revenue from Herring	35.7%	36.4%	45.7%	34.2%
Percent of Revenue from Mackerel	64.1%	36.4%	34.9%	21.1%
Percent of Revenue from Squids			9.9%	13.1%
Percent of Revenue from Other Species	0.2%	0.2%	38.2%	44.6%
Average Number of Days at Sea	13	8	14	12
Average Number of Trips	4	3	3	2

Mackerel Alternative 2.2 & 2.3 (100%) – Observer Coverage Only

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	6	7
Total Days at Sea	75	97
Total Number of Trips	25	21
Total Herring Revenue	$275,720	$688,416
Total Mackerel Revenue	$1,184,211	$850,276
Total Squid Revenue		$93,069
Total Other Species Revenue	$2,895	$749,911

Total Revenue	$1,462,826	$2,381,672
Total ASM Cost	$53,250	$68,673
ASM as pct of Total Revenue	3.6%	2.9%
ASM as pct of Mackerel Revenue	4.5%	8.1%

Mackerel Alternative 2.2 & 2.3 – Sub Option 6 (100%) – Observer Coverage Only

Per Vessel	**Paired MWT**		**Single MWT & SMBT**	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,706,040	$271,636	$2,574,720	$2,082,561
Annual Variable Costs	$402,170	$73,132	$684,427	$578,997
Annual Crew Share	$524,828	$48,900	$743,633	$611,125
Annual Repair/Maint/Upgrade/Haulout	$220,871	$50,362	$180,777	$128,395
Annual Fixed Costs	$345,165	$139,401	$661,531	$612,688
Annual Return-to-owner	$213,005	$53,954	$304,352	$333,578
Annual Cost of ASM	$7,668	$3,230	$9,094	$5,447
ASM as pct of RTO (median)	3.7%		6.0%	
post-ASM RTO	$205,337	$51,935	$295,258	$335,762
Percent of Revenue from Herring	25.7%	33.5%	34.5%	29.9%
Percent of Revenue from Mackerel	74.2%	33.5%	45.9%	20.0%
Percent of Revenue from Squids			0.5%	0.2%
Percent of Revenue from Other Species	0.2%	0.3%	46.4%	53.7%
Average Number of Days at Sea	11	5	13	8
Average Number of Trips	4	2	3	2

Mackerel Alternative 2.2 & 2.3 – Sub Option 6 (100%) – Observer Coverage Only

Fleet Level	**Paired MWT**	**Single MWT & SMBT**
Number of Vessels	5	5

Total Days at Sea	54	64
Total Number of Trips	18	15
Total Herring Revenue	$206,648	$463,726
Total Mackerel Revenue	$1,132,514	$808,274
Total Squid Revenue		$4,216
Total Other Species Revenue	$2,268	$674,817
Total Revenue	$1,341,430	$1,951,033
Total ASM Cost	$38,340	$45,468
ASM as pct of Total Revenue	2.9%	2.3%
ASM as pct of Mackerel Revenue	3.4%	5.6%

Mackerel Alternative 2.2 & 2.3 (75%) – Observer Coverage Only

Per Vessel	**Paired MWT**		**Single MWT & SMBT**	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$204,514	$52,550	$245,704	$291,036
Annual Cost of ASM	$6,948	$3,895	$7,820	$6,393
ASM as pct of RTO (median)	3.3%		7.9%	
post-ASM RTO	$197,566	$50,098	$235,667	$293,747
Percent of Revenue from Herring	35.6%	36.5%	46.4%	33.5%
Percent of Revenue from Mackerel	64.3%	36.4%	34.7%	20.3%
Percent of Revenue from Squids			9.8%	12.8%
Percent of Revenue from Other Species	0.2%	0.2%	38.5%	44.8%
Average Number of Days at Sea	10	5	11	9

Mackerel Alternative 2.2 & 2.3 (75%) – Observer Coverage Only

Fleet Level	**Paired MWT**	**Single MWT & SMBT**
Number of Vessels	6	7

Total Days at Sea	59	77
Total Herring Revenue	$226,568	$551,463
Total Mackerel Revenue	$908,886	$665,280
Total Squid Revenue		$73,534
Total Other Species Revenue	$2,207	$608,770
Total Revenue	$1,137,660	$1,899,047
Total ASM Cost	$41,688	$54,743
ASM as pct of Total Revenue	3.7%	2.9%
ASM as pct of Mackerel Revenue	4.6%	8.2%

Mackerel Alternative 2.2 & 2.3 – Sub Option 6 (75%) – Observer Coverage Only

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$213,005	$53,954	$304,352	$333,578
Annual Cost of ASM	$5,883	$2,198	$7,549	$4,555
ASM as pct of RTO (median)	2.8%		6.0%	
post-ASM RTO	$207,122	$52,560	$296,804	$335,418
Percent of Revenue from Herring	25.5%	33.5%	35.2%	29.8%
Percent of Revenue from Mackerel	74.4%	33.5%	45.4%	19.3%
Percent of Revenue from Squids			0.5%	0.2%
Percent of Revenue from Other Species	0.2%	0.3%	46.4%	53.6%
Average Number of Days at Sea	8	3	11	6

Mackerel Alternative 2.2 & 2.3 – Sub Option 6 (75%) – Observer Coverage Only

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	5	5
Total Days at Sea	41	53
Total Herring Revenue	$170,203	$355,677
Total Mackerel Revenue	$856,097	$646,053
Total Squid Revenue		$3,571
Total Other Species Revenue	$1,715	$592,459
Total Revenue	$1,028,016	$1,597,761
Total ASM Cost	$29,417	$37,743
ASM as pct of Total Revenue	2.9%	2.4%
ASM as pct of Mackerel Revenue	3.4%	5.8%

Mackerel Alternative 2.2 & 2.3 (50%) – Observer Coverage Only

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$204,514	$52,550	$245,704	$291,036
Annual Cost of ASM	$4,887	$2,259	$6,085	$4,983
ASM as pct of RTO (median)	2.3%		5.2%	
post-ASM RTO	$199,626	$51,095	$235,205	$294,885
Percent of Revenue from Herring	35.5%	36.5%	47.2%	32.8%
Percent of Revenue from Mackerel	64.5%	36.5%	34.3%	19.9%
Percent of Revenue from Squids			10.5%	13.9%
Percent of Revenue from Other Species	0.3%	0.2%	38.0%	44.2%
Average Number of Days at Sea	7	3	9	7

Mackerel Alternative 2.2 & 2.3 (50%) – Observer Coverage Only

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	6	7
Total Days at Sea	41	60
Total Herring Revenue	$178,570	$414,792
Total Mackerel Revenue	$615,357	$496,422
Total Squid Revenue		$63,321
Total Other Species Revenue	$1,619	$493,004
Total Revenue	$795,546	$1,467,538
Total ASM Cost	$29,324	$42,593
ASM as pct of Total Revenue	3.7%	2.9%
ASM as pct of Mackerel Revenue	4.8%	8.6%

Mackerel Alternative 2.2 & 2.3 – Sub Option 6 (50%) – Observer Coverage Only

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$213,005	$53,954	$304,352	$333,578
Annual Cost of ASM	$4,306	$1,290	$6,243	$4,059
ASM as pct of RTO (median)	2.0%		5.3%	
post-ASM RTO	$208,699	$53,155	$298,109	$335,109
Percent of Revenue from Herring	25.3%	33.5%	35.8%	29.6%
Percent of Revenue from Mackerel	74.6%	33.5%	44.9%	18.4%
Percent of Revenue from Squids			0.5%	0.2%
Percent of Revenue from Other Species	0.2%	0.3%	46.5%	53.5%
Average Number of Days at Sea	6	2	9	6

Mackerel Alternative 2.2 & 2.3 – Sub Option 6 (50%) – Observer Coverage Only

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	5	5
Total Days at Sea	30	44
Total Herring Revenue	$137,598	$251,128
Total Mackerel Revenue	$611,182	$503,343
Total Squid Revenue		$3,049
Total Other Species Revenue	$1,308	$526,287
Total Revenue	$750,088	$1,283,807
Total ASM Cost	$21,532	$31,214
ASM as pct of Total Revenue	2.9%	2.4%
ASM as pct of Mackerel Revenue	3.5%	6.2%

Mackerel Alternative 2.2 & 2.3 (25%) – Observer Coverage Only

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$204,514	$52,550	$245,704	$291,036
Annual Cost of ASM	$3,254	$919	$4,784	$4,175
ASM as pct of RTO (median)	1.4%		3.1%	
post-ASM RTO	$201,259	$51,951	$234,577	$295,890
Percent of Revenue from Herring	35.6%	36.4%	47.8%	32.1%
Percent of Revenue from Mackerel	64.7%	36.6%	33.9%	19.5%
Percent of Revenue from Squids			11.4%	15.1%
Percent of Revenue from Other Species	0.4%	0.4%	37.4%	43.4%
Average Number of Days at Sea	5	1	7	6

Mackerel Alternative 2.2 & 2.3 (25%) – Observer Coverage Only

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	6	7
Total Days at Sea	28	47
Total Herring Revenue	$139,888	$303,922
Total Mackerel Revenue	$379,697	$373,750
Total Squid Revenue		$58,335
Total Other Species Revenue	$1,204	$417,124
Total Revenue	$520,789	$1,153,130
Total ASM Cost	$19,526	$33,485
ASM as pct of Total Revenue	3.7%	2.9%
ASM as pct of Mackerel Revenue	5.1%	9.0%

Mackerel Alternative 2.2 & 2.3 (25%) – Sub Option 6 – Observer Coverage Only

Per Vessel	Paired MWT		Single MWT & SMBT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$213,005	$53,954	$304,352	$333,578
Annual Cost of ASM	$3,025	$539	$5,250	$4,103
ASM as pct of RTO (median)	1.4%		3.1%	
post-ASM RTO	$209,980	$53,618	$299,102	$334,697
Percent of Revenue from Herring	25.4%	33.3%	35.9%	28.8%
Percent of Revenue from Mackerel	74.5%	33.3%	44.7%	17.4%
Percent of Revenue from Squids			0.5%	0.2%
Percent of Revenue from Other Species	0.2%	0.3%	46.6%	53.2%
Average Number of Days at Sea	4	1	7	6

Mackerel Alternative 2.2 & 2.3 (25%) – Sub Option 6 – Observer Coverage Only

Fleet Level	Paired MWT	Single MWT & SMBT
Number of Vessels	5	5
Total Days at Sea	21	37
Total Herring Revenue	$113,686	$159,358
Total Mackerel Revenue	$415,938	$395,969
Total Squid Revenue		$2,788
Total Other Species Revenue	$966	$491,517
Total Revenue	$530,590	$1,049,632
Total ASM Cost	$15,125	$26,249
ASM as pct of Total Revenue	2.9%	2.5%
ASM as pct of Mackerel Revenue	3.6%	6.6%

Mackerel Alternative 2.3 and 2.4 (100% EM at $325 per day, 100% PS at $5.12 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,698,295	$243,698	$1,485,691	$1,330,496
Annual Variable Costs	$402,791	$65,429	$412,835	$315,928
Annual Crew Share	$523,079	$43,947	$404,789	$380,374
Annual Repair/Maint/Haulout	$225,981	$46,751	$121,326	$90,037
Annual Fixed Costs	$341,930	$124,936	$264,343	$225,873
Annual Return-to-owner	$204,514	$52,550	$282,398	$369,292
Annual Cost of EM - year 1	$19,063	$2,498	$18,390	$3,453
Annual Cost of EM - year 2	$4,063	$2,498	$3,390	$3,453
Annual Cost of PS	$3,573	$2,502	$5,215	$3,503
Total Monitoring Costs as pct of RTO - year 1 (median)	10.7%		22.6%	
Total Monitoring Costs as pct of RTO - year 2 (median)	3.8%		8.3%	
Post-monitoring RTO -- year 1	$181,879	$48,953	$258,793	$371,663
Post-monitoring RTO -- year 2	$196,879	$48,953	$273,793	$371,663
Percent of Revenue from Herring	35.7%	36.4%	59.5%	27.7%
Percent of Revenue from Mackerel	64.1%	36.4%	40.4%	27.7%
Percent of Revenue from Squids				
Percent of Revenue from Other Species	0.2%	0.2%	0.2%	0.3%
Average Number of Days at Sea	13	8	10	11
Average Number of Trips	4	3	4	2

Mackerel Alternative 2.3 and 2.4 (100% EM at $187 per day, 50% PS at $3.84 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$204,514	$52,550	$282,398	$369,292
Annual Cost of EM - year 1	$17,338	$1,438	$16,951	$1,987
Annual Cost of EM - year 2	$2,338	$1,438	$1,951	$1,987
Annual Cost of PS	$1,295	$907	$1,891	$1,270
Total Monitoring Costs as pct of RTO - year 1 (median)	9.1%		18.3%	
Total Monitoring Costs as pct of RTO - year 2 (median)	1.8%		3.8%	
Post-monitoring RTO -- year 1	$185,881	$50,885	$263,557	$370,534
Post-monitoring RTO -- year 2	$200,881	$50,885	$278,557	$370,534

Mackerel Alternative 2.3 and 2.4 (100% EM at $325 per day, 100% PS at $5.12 per mt)

Fleet Level	Paired MWT	Single MWT
Number of Vessels	6	4
Total Days at Sea	75	42
Total Number of Trips	25	16
Total Herring Revenue	$275,720	$624,837
Total Mackerel Revenue	$1,184,211	$579,021
Total Squid Revenue		
Total Other Species Revenue	$2,895	$1,908
Total Revenue	$1,462,826	$1,205,766
Total EM Cost - year 1	$114,375	$73,560
Total EM Cost - year 2	$24,375	$13,560
Total PS Cost	$21,437	$20,861
Total Monitoring Costs - year 1	$135,812	$94,421
Total Monitoring Costs - year 2	$45,812	$34,421
Monitoring Costs as pct of Total Revenue -- year 1	9.3%	7.8%

Monitoring Costs as pct of Total Revenue -- year 2	3.1%	2.9%
Monitoring Costs as pct of Herring Revenue -- year 1	49.3%	15.1%
Monitoring Costs as pct of Herring Revenue -- year 2	16.6%	5.5%

Mackerel Alternative 2.3 and 2.4 (100% ASM, 100% EM at $187 per day, 50% PS at $3.84 per mt)

Fleet Level	Paired MWT	Single MWT
Number of Vessels	6	4
Total Days at Sea	75	42
Total Number of Trips	25	16
Total Herring Revenue	$275,720	$624,837
Total Mackerel Revenue	$1,184,211	$579,021
Total Squid Revenue		
Total Other Species Revenue	$2,895	$1,908
Total Revenue	$1,462,826	$1,205,766
Total EM Cost - year 1	$104,025	$67,802
Total EM Cost - year 2	$14,025	$7,802
Total PS Cost	$7,771	$7,562
Total Monitoring Costs - year 1	$111,796	$75,364
Total Monitoring Costs - year 2	$21,796	$15,364
Monitoring Costs as pct of Total Revenue -- year 1	7.6%	6.3%
Monitoring Costs as pct of Total Revenue -- year 2	1.5%	1.3%
Monitoring Costs as pct of Herring Revenue -- year 1	40.5%	12.1%
Monitoring Costs as pct of Herring Revenue -- year 2	7.9%	2.5%

Mackerel Alternative 2.3 and 2.4 – Sub Option 6 (100% EM at $325 per day, 100% PS at $5.12 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Gross Revenue	$1,706,040	$271,636	$1,376,004	$1,756,198
Annual Variable Costs	$402,170	$73,132	$312,090	$384,064
Annual Crew Share	$524,828	$48,900	$389,054	$498,240
Annual Repair/Maint/Haulout	$220,871	$50,362	$117,170	$122,329
Annual Fixed Costs	$345,165	$139,401	$242,444	$300,940
Annual Return-to-owner	$213,005	$53,954	$315,247	$451,458
Annual Cost of EM - year 1	$18,510	$1,479	$17,929	$1,880
Annual Cost of EM - year 2	$3,510	$1,479	$2,929	$1,880
Annual Cost of PS	$3,870	$1,757	$5,778	$3,172
Total Monitoring Costs as pct of RTO - year 1 (median)	10.1%		35.1%	
Total Monitoring Costs as pct of RTO - year 2 (median)	3.7%		16.4%	
Post-monitoring RTO -- year 1	$190,626	$51,550	$291,539	$454,111
Post-monitoring RTO -- year 2	$205,626	$51,550	$306,539	$454,111
Percent of Revenue from Herring	25.7%	33.5%	45.9%	23.5%
Percent of Revenue from Mackerel	74.2%	33.5%	53.9%	23.7%
Percent of Revenue from Squids				
Percent of Revenue from Other Species	0.2%	0.3%	0.2%	0.2%
Average Number of Days at Sea	11	5	9	6
Average Number of Trips	4	2	4	2

Mackerel Alternative 2.3 and 2.4 – Sub Option 6 (100% EM at $187 per day, 50% PS at $3.84 per mt)

Per Vessel	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$213,005	$53,954	$315,247	$451,458
Annual Cost of EM - year 1	$17,020	$851	$16,685	$1,082
Annual Cost of EM - year 2	$2,020	$851	$1,685	$1,082
Annual Cost of PS	$1,403	$637	$2,095	$1,150
Total Monitoring Costs as pct of RTO - year 1 (median)	8.2%		25.7%	
Total Monitoring Costs as pct of RTO - year 2 (median)	1.6%		7.0%	
Post-monitoring RTO -- year 1	$194,583	$52,875	$296,467	$452,817
Post-monitoring RTO -- year 2	$209,583	$52,875	$311,467	$452,817

Mackerel Alternative 2.3 – Sub Option 6 (100% ASM, 100% EM at $325 per day, 100% PS at $5.12 per mt)

Fleet Level	Paired MWT	Single MWT
Number of Vessels	5	3
Total Days at Sea	54	27
Total Number of Trips	18	12
Total Herring Revenue	$206,648	$462,831
Total Mackerel Revenue	$1,132,514	$556,663
Total Squid Revenue		
Total Other Species Revenue	$2,268	$1,908
Total Revenue	$1,341,430	$1,021,402
Total EM Cost - year 1	$92,550	$53,788
Total EM Cost - year 2	$17,550	$8,788
Total PS Cost	$19,348	$17,334
Total Monitoring Costs - year 1	$111,898	$71,122
Total Monitoring Costs - year 2	$36,898	$26,122
Monitoring Costs as pct of Total Revenue -- year 1	8.3%	7.0%

Monitoring Costs as pct of Total Revenue -- year 2	2.8%	2.6%
Monitoring Costs as pct of Herring Revenue -- year 1	54.1%	15.4%
Monitoring Costs as pct of Herring Revenue -- year 2	17.9%	5.6%

Mackerel Alternative 2.3 and 2.4 – Sub Option 6 (100% EM at $187 per day, 50% PS at $3.84 per mt)

Fleet Level	Paired MWT	Single MWT
Number of Vessels	5	3
Total Days at Sea	54	27
Total Number of Trips	18	12
Total Herring Revenue	$206,648	$462,831
Total Mackerel Revenue	$1,132,514	$556,663
Total Squid Revenue		
Total Other Species Revenue	$2,268	$1,908
Total Revenue	$1,341,430	$1,021,402
Total EM Cost - year 1	$85,098	$50,056
Total EM Cost - year 2	$10,098	$5,056
Total PS Cost	$7,014	$6,284
Total Monitoring Costs - year 1	$92,112	$56,340
Total Monitoring Costs - year 2	$17,112	$11,340
Monitoring Costs as pct of Total Revenue -- year 1	6.9%	5.5%
Monitoring Costs as pct of Total Revenue -- year 2	1.3%	1.1%
Monitoring Costs as pct of Herring Revenue -- year 1	44.6%	12.2%
Monitoring Costs as pct of Herring Revenue -- year 2	8.3%	2.5%

Mackerel Alternative 2.5. 100% EM and PS. EM at $325/day. PS at $5.12/mt

Vessel Level	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$204,514	$52,550	$282,398	$369,292
Annual Cost of EM - year 1	$19,063	$2,498	$18,390	$3,453
Annual Cost of EM - year 2	$4,063	$2,498	$3,390	$3,453
Annual Cost of PS	$3,457	$2,421	$5,046	$3,389
Total Monitoring Costs as pct of RTO - year 1	11.0%	Median: 10.6%	8.3%	Median: 22.5%
Total Monitoring Costs as pct of RTO - year 2	3.7%	Median: 3.8%	3.0%	Median: 8.2%
Post-monitoring RTO -- year 1	$181,995	$49,018	$258,962	$371,645
Post-monitoring RTO -- year 2	$196,995	$49,018	$273,962	$371,645

Fleet Level	Paired MWT	Single MWT
Number of Vessels	6	4
Total Days at Sea	75	42
Total Number of Trips	25	16
Total Herring Revenue	$275,720	$624,837
Total Mackerel Revenue	$1,184,211	$579,021
Total Squid Revenue		

Total Other Species Revenue	$2,895	$1,908
Total Revenue	$1,462,826	$1,205,766
Total EM Cost - year 1	$114,375	$73,560
Total EM Cost - year 2	$24,375	$13,560
Total PS Cost	$20,740	$20,183
Total Monitoring Costs - year 1	$135,115	$93,743
Total Monitoring Costs - year 2	$45,115	$33,743
Monitoring Costs as pct of Total Revenue -- year 1	9.2%	7.8%
Monitoring Costs as pct of Total Revenue -- year 2	3.1%	2.8%
Monitoring Costs as pct of Mackerel Revenue -- year 1	11.4%	16.2%
Monitoring Costs as pct of Mackerel Revenue -- year 2	3.8%	5.8%

Mackerel Alternative 2.5 – sub option 5. 100% EM and PS. EM at $325/day. PS at $5.12/mt

Vessel Level	**Paired MWT**		**Single MWT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$213,005	$53,954	$315,247	$451,458
Annual Cost of EM - year 1	$18,510	$1,479	$17,929	$1,880
Annual Cost of EM - year 2	$3,510	$1,479	$2,929	$1,880
Annual Cost of PS	$3,744	$1,700	$5,590	$3,069
Total Monitoring Costs as pct of RTO - year 1	10.4%	Median: 10.0%	7.5%	Median: 34.8%
Total Monitoring Costs as pct of RTO - year 2	3.4%	Median: 3.6%	2.7%	Median: 16.0%
Post-monitoring RTO -- year 1	$190,752	$51,597	$291,727	$454,085
Post-monitoring RTO -- year 2	$205,752	$51,597	$306,727	$454,085

Fleet Level	Paired MWT	Single MWT
Number of Vessels	5	3
Total Days at Sea	54	27
Total Number of Trips	18	12
Total Herring Revenue	$206,648	$462,831
Total Mackerel Revenue	$1,132,514	$556,663
Total Squid Revenue		
Total Other Species Revenue	$2,268	$1,908
Total Revenue	$1,341,430	$1,021,402
Total EM Cost - year 1	$92,550	$53,788
Total EM Cost - year 2	$17,550	$8,788
Total PS Cost	$18,719	$16,771
Total Monitoring Costs - year 1	$111,269	$70,559
Total Monitoring Costs - year 2	$36,269	$25,559
Monitoring Costs as pct of Total Revenue -- year 1	8.3%	6.9%
Monitoring Costs as pct of Total Revenue -- year 2	2.7%	2.5%
Monitoring Costs as pct of Mackerel Revenue -- year 1	9.8%	12.7%
Monitoring Costs as pct of Mackerel Revenue -- year 2	3.2%	4.6%

Mackerel Alternative 2.5. 75% EM and PS. EM at $202/day. PS at $3.84/mt

Vessel Level	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$204,514	$52,550	$282,398	$369,292
Annual Cost of EM - year 1	$16,894	$1,165	$16,580	$1,610
Annual Cost of EM - year 2	$1,894	$1,165	$1,580	$1,610
Annual Cost of PS	$1,943	$1,361	$2,836	$1,905
Total Monitoring Costs as pct of RTO - year 1	9.2%	Median:	6.9%	Median:

		9.1%		18.4%
Total Monitoring Costs as pct of RTO - year 2	1.9%	Median: 1.9%	1.6%	Median: 4.1%
Post-monitoring RTO -- year 1	$185,677	$50,688	$262,982	$370,428
Post-monitoring RTO -- year 2	$200,677	$50,688	$277,982	$370,428

Fleet Level	**Paired MWT**	**Single MWT**
Number of Vessels	6	4
Total Days at Sea	75	42
Total Number of Trips	25	16
Total Herring Revenue	$275,720	$624,837
Total Mackerel Revenue	$1,184,211	$579,021
Total Squid Revenue		
Total Other Species Revenue	$2,895	$1,908
Total Revenue	$1,462,826	$1,205,766
Total EM Cost - year 1	$101,363	$66,321
Total EM Cost - year 2	$11,363	$6,321
Total PS Cost	$11,656	$11,343
Total Monitoring Costs - year 1	$113,019	$77,664
Total Monitoring Costs - year 2	$23,019	$17,664
Monitoring Costs as pct of Total Revenue -- year 1	7.7%	6.4%
Monitoring Costs as pct of Total Revenue -- year 2	1.6%	1.5%
Monitoring Costs as pct of Mackerel Revenue -- year 1	9.5%	13.4%
Monitoring Costs as pct of Mackerel Revenue -- year 2	1.9%	3.1%

<u>Mackerel Alternative 2.5 – sub option 5. 75% EM and PS. EM at $202/day. PS at $3.84/mt</u>

Vessel Level	Paired MWT		Single MWT	
	Average	Stnd Dev	Average	Stnd Dev
Annual Return-to-owner	$213,005	$53,954	$315,247	$451,458
Annual Cost of EM - year 1	$16,636	$689	$16,366	$876
Annual Cost of EM - year 2	$1,636	$689	$1,366	$876
Annual Cost of PS	$2,104	$955	$3,142	$1,725
Total Monitoring Costs as pct of RTO - year 1	8.8%	Median: 8.3%	6.2%	Median: 27.3%
Total Monitoring Costs as pct of RTO - year 2	1.8%	Median: 1.9%	1.4%	Median: 8.6%
Post-monitoring RTO -- year 1	$194,265	$52,710	$295,739	$452,752
Post-monitoring RTO -- year 2	$209,265	$52,710	$310,739	$452,752

Fleet Level	Paired MWT	Single MWT
Number of Vessels	5	3
Total Days at Sea	54	27
Total Number of Trips	18	12
Total Herring Revenue	$206,648	$462,831
Total Mackerel Revenue	$1,132,514	$556,663
Total Squid Revenue		
Total Other Species Revenue	$2,268	$1,908
Total Revenue	$1,341,430	$1,021,402
Total EM Cost - year 1	$83,181	$49,097
Total EM Cost - year 2	$8,181	$4,097
Total PS Cost	$10,520	$9,426
Total Monitoring Costs - year 1	$93,701	$58,522
Total Monitoring Costs - year 2	$18,701	$13,522
Monitoring Costs as pct of Total Revenue -- year 1	7.0%	5.7%
Monitoring Costs as pct of Total Revenue -- year 2	1.4%	1.3%
Monitoring Costs as pct of Mackerel Revenue -- year 1	8.3%	10.5%

Monitoring Costs as pct of Mackerel Revenue -- year 2	1.7%	2.4%

Mackerel Alternative 2.5. 50% EM and PS. EM at $187/day. PS at $3.84/mt

Vessel Level	**Paired MWT**		**Single MWT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$204,514	$52,550	$282,398	$369,292
Annual Cost of EM - year 1	$16,169	$719	$15,975	$993
Annual Cost of EM - year 2	$1,169	$719	$975	$993
Annual Cost of PS	$1,295	$907	$1,891	$1,270
Total Monitoring Costs as pct of RTO - year 1	8.5%	Median: 8.7%	6.3%	Median: 16.9%
Total Monitoring Costs as pct of RTO - year 2	1.2%	Median: 1.2%	1.0%	Median: 2.7%
Post-monitoring RTO -- year 1	$187,050	$51,339	$264,532	$370,005
Post-monitoring RTO -- year 2	$202,050	$51,339	$279,532	$370,005

Fleet Level	**Paired MWT**	**Single MWT**
Number of Vessels	6	4
Total Days at Sea	75	42
Total Number of Trips	25	16
Total Herring Revenue	$275,720	$624,837
Total Mackerel Revenue	$1,184,211	$579,021
Total Squid Revenue		
Total Other Species Revenue	$2,895	$1,908
Total Revenue	$1,462,826	$1,205,766
Total EM Cost - year 1	$97,013	$63,901
Total EM Cost - year 2	$7,013	$3,901
Total PS Cost	$7,771	$7,562

Total Monitoring Costs - year 1	$104,783	$71,463
Total Monitoring Costs - year 2	$14,783	$11,463
Monitoring Costs as pct of Total Revenue -- year 1	7.2%	5.9%
Monitoring Costs as pct of Total Revenue -- year 2	1.0%	1.0%
Monitoring Costs as pct of Mackerel Revenue -- year 1	8.8%	12.3%
Monitoring Costs as pct of Mackerel Revenue -- year 2	1.2%	2.0%

<u>Mackerel Alternative 2.5 – sub option 5. 50% EM and PS. EM at $187/day. PS at $3.84/mt</u>

Vessel Level	**Paired MWT**		**Single MWT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$213,005	$53,954	$315,247	$451,458
Annual Cost of EM - year 1	$16,010	$425	$15,843	$541
Annual Cost of EM - year 2	$1,010	$425	$843	$541
Annual Cost of PS	$1,403	$637	$2,095	$1,150
Total Monitoring Costs as pct of RTO - year 1	8.2%	Median: 7.7%	5.7%	Median: 24.3%
Total Monitoring Costs as pct of RTO - year 2	1.1%	Median: 1.2%	0.9%	Median: 5.6%
Post-monitoring RTO -- year 1	$195,593	$53,144	$297,310	$452,277
Post-monitoring RTO -- year 2	$210,593	$53,144	$312,310	$452,277

Fleet Level	**Paired MWT**	**Single MWT**
Number of Vessels	5	3
Total Days at Sea	54	27
Total Number of Trips	18	12
Total Herring Revenue	$206,648	$462,831
Total Mackerel Revenue	$1,132,514	$556,663

Total Squid Revenue		
Total Other Species Revenue	$2,268	$1,908
Total Revenue	$1,341,430	$1,021,402
Total EM Cost - year 1	$80,049	$47,528
Total EM Cost - year 2	$5,049	$2,528
Total PS Cost	$7,014	$6,284
Total Monitoring Costs - year 1	$87,063	$53,812
Total Monitoring Costs - year 2	$12,063	$8,812
Monitoring Costs as pct of Total Revenue -- year 1	6.5%	5.3%
Monitoring Costs as pct of Total Revenue -- year 2	0.9%	0.9%
Monitoring Costs as pct of Mackerel Revenue -- year 1	7.7%	9.7%
Monitoring Costs as pct of Mackerel Revenue -- year 2	1.1%	1.6%

Mackerel Alternative 2.5. 25% EM and PS. EM at $172/day. PS at $3.84/mt

Vessel Level	**Paired MWT**		**Single MWT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$204,514	$52,550	$282,398	$369,292
Annual Cost of EM - year 1	$15,538	$331	$15,449	$457
Annual Cost of EM - year 2	$538	$331	$449	$457
Annual Cost of PS	$648	$454	$945	$635
Total Monitoring Costs as pct of RTO - year 1	7.9%	Median: 8.3%	5.8%	Median: 15.6%
Total Monitoring Costs as pct of RTO - year 2	0.6%	Median: 0.6%	0.5%	Median: 1.3%
Post-monitoring RTO -- year 1	$188,329	$51,960	$266,004	$369,626
Post-monitoring RTO -- year 2	$203,329	$51,960	$281,004	$369,626

Fleet Level	**Paired**	**Single**

	MWT	MWT
Number of Vessels	6	4
Total Days at Sea	75	42
Total Number of Trips	25	16
Total Herring Revenue	$275,720	$624,837
Total Mackerel Revenue	$1,184,211	$579,021
Total Squid Revenue		
Total Other Species Revenue	$2,895	$1,908
Total Revenue	$1,462,826	$1,205,766
Total EM Cost - year 1	$93,225	$61,794
Total EM Cost - year 2	$3,225	$1,794
Total PS Cost	$3,885	$3,781
Total Monitoring Costs - year 1	$97,110	$65,575
Total Monitoring Costs - year 2	$7,110	$5,575
Monitoring Costs as pct of Total Revenue -- year 1	6.6%	5.4%
Monitoring Costs as pct of Total Revenue -- year 2	0.5%	0.5%
Monitoring Costs as pct of Mackerel Revenue -- year 1	8.2%	11.3%
Monitoring Costs as pct of Mackerel Revenue -- year 2	0.6%	1.0%

Mackerel Alternative 2.5 – sub option 5. 25% EM and PS. EM at $172/day. PS at $3.84/mt

Vessel Level	**Paired MWT**		**Single MWT**	
	Average	**Stnd Dev**	**Average**	**Stnd Dev**
Annual Return-to-owner	$213,005	$53,954	$315,247	$451,458
Annual Cost of EM - year 1	$15,464	$196	$15,388	$249
Annual Cost of EM - year 2	$464	$196	$388	$249
Annual Cost of PS	$701	$318	$1,047	$575
Total Monitoring Costs as pct of RTO - year 1	7.6%	Median: 7.1%	5.2%	Median: 21.5%

Total Monitoring Costs as pct of RTO - year 2	0.5%	Median: 0.6%	0.5%	Median: 2.7%
Post-monitoring RTO -- year 1	$196,840	$53,559	$298,812	$451,845
Post-monitoring RTO -- year 2	$211,840	$53,559	$313,812	$451,845

Fleet Level	**Paired MWT**	**Single MWT**
Number of Vessels	5	3
Total Days at Sea	54	27
Total Number of Trips	18	12
Total Herring Revenue	$206,648	$462,831
Total Mackerel Revenue	$1,132,514	$556,663
Total Squid Revenue		
Total Other Species Revenue	$2,268	$1,908
Total Revenue	$1,341,430	$1,021,402
Total EM Cost - year 1	$77,322	$46,163
Total EM Cost - year 2	$2,322	$1,163
Total PS Cost	$3,507	$3,142
Total Monitoring Costs - year 1	$80,829	$49,305
Total Monitoring Costs - year 2	$5,829	$4,305
Monitoring Costs as pct of Total Revenue -- year 1	6.0%	4.8%
Monitoring Costs as pct of Total Revenue -- year 2	0.4%	0.4%
Monitoring Costs as pct of Mackerel Revenue -- year 1	7.1%	8.9%
Monitoring Costs as pct of Mackerel Revenue -- year 2	0.5%	0.8%