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MEMORANDUM

DATE: March 30, 2016

TO: Council

FROM: Jason Didden *JTD*

SUBJECT: Industry-Funded Monitoring (IFM) Amendment

The IFM Amendment provides a way to implement industry-funded monitoring of the Atlantic mackerel fishery at levels above what the Standardized Bycatch Reporting Methodology is likely to produce. The Amendment addresses the disapproved portions of Amendment 14 that attempted to implement additional monitoring of the mackerel fishery. The following document describes the mackerel coverage options in the IFM Amendment. Recall that the Council dealt with a variety of administrative provisions for the Amendment at the February Council Meeting.

The intent had been to consider selecting preliminary preferred alternatives at this meeting for public hearings in May and final action in June. The New England Herring Committee recommended moving forward with public hearings without preferred alternatives but also identified a variety of concerns which may delay public hearings. The technical staff group for this Amendment is meeting on 3/31 to discuss the concerns raised by the Herring Committee and possible ways to address those concerns. A memo from that meeting will be available before the Council meets. The Herring Committee's concerns are summarized in the following "Consensus Statement":

The [Herring] Committee agreed by consensus that the IFM document should be revised as follows:

Clarifications:

- Refine the [At-Sea Monitoring] (ASM) sampling design and training requirements to better meet the goals identified for the herring coverage target alternatives to improve catch estimation that would inform the catch caps.
- Include analysis of haddock bycatch outside the groundfish closed areas, for bycatch rate comparison inside the groundfish closed areas.
- Improve biological impact analysis to include other quantitative and qualitative analysis (e.g., how past monitoring has affected the CV, coverage levels).
- Describe which ports may not be sampled portside, and analyze the impacts of potentially precluding landings.

- Tables (on page 65 of discussion document) regarding return to owner information needs some context to allow the public and Committee members to understand the impacts, particularly the differential impacts for those vessels considered outliers in the data.
- Clarify in the document whether the RTO information considers amortization (i.e., depreciating value of vessels)

Substantive changes:

- Any ASM option should include monitoring of catch that is retained.
- The coverage target percentages currently do not include SBRM coverage, and are described as additive. The Committee supports including SBRM coverage to meet coverage target.
- Modify language on portside sampling to state that the rationale for any deviation to the Council-selected target level for portside sampling and EM review rates should be brought before the Council for consideration.

There are a variety of decision points identified in the document and also in the above Consensus Statement. NMFS/GARFO staff will present the various options and decision points at the April Council Meeting. There are also five Appendices that generally focus on costs and economic analyses, and these are available at the Council Meeting web site:

<http://www.mafmc.org/briefing/april-2016>:

Appendix 1: Monitoring and Service Provider Requirements

Appendix 2: Monitoring Cost Estimates

Appendix 3: Cost Survey

Appendix 4: Economic Impact Analysis Details

Appendix 5: Analysis of Sea Day Monitoring Costs

**Industry-Funded
Monitoring
Omnibus Amendment
Discussion Document**

Mackerel Alternatives

**Mid-Atlantic Fishery Management Council
April 12-14, 2016**

**Prepared by NOAA's National Marine Fisheries Service
in cooperation with the Mid-Atlantic and New England
Fishery Management Councils**

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1.1 INTRODUCTION

The Mid-Atlantic Fishery Management Council (MAFMC) is interested in increasing catch monitoring in the Atlantic mackerel fishery. This increased monitoring would be above and beyond coverage required through the Standardized Bycatch Reporting Methodology (SBRM), the Endangered Species Act (ESA), or Marine Mammal Protection Act (MMPA). Limited Federal funding and legal constraints on the sharing of costs between NOAA's National Marine Fisheries Service (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) Fishery Management Plan (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 Council objectives for the mackerel fishery.

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.

The omnibus alternatives in this amendment would apply to both MAFMC and New England Fishery Management Council (NEFMC) FMPs and consider a standardized process to develop new industry-funded monitoring programs to achieve target coverage levels above SBRM requirements and prioritize available Federal funding across new industry-funded monitoring programs if funding falls short of NMFS cost responsibilities for administering new industry-funded monitoring programs.

The omnibus alternatives are generally administrative in nature, and 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 available Federal funding for industry-funded monitoring across FMPs, and (5) a process for monitoring set-aside programs to be implemented via a future framework adjustment action. Both Councils reviewed and selected preliminary preferred omnibus alternatives in early 2016.

The coverage target alternatives in this amendment would apply to the both the mackerel and herring fisheries and consider coverage targets to increase monitoring in these FMPs, but this document only discusses the mackerel coverage target alternatives. The MAFMC would vote on the mackerel coverage target alternatives and the NEFMC would vote on the herring coverage target alternatives (both Councils would vote on the omnibus alternatives). The MAFMC recommended increased monitoring in the mackerel 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) effective and affordable and monitoring for the mackerel fishery.

In 2016, NMFS was awarded NMFS National Observer Program/Fishery Information System money to test electronic monitoring aboard midwater trawl vessels and build an interface to receive state portside sampling data. NMFS will be evaluating how to use electronic monitoring to verify catch retention aboard midwater trawl vessels and how to use portside sampling data to monitor catch in the mackerel fishery.

1.2 PURPOSE AND NEED

The purpose of this action is to consider measures that would allow the MAFMC and NEFMC to develop new industry-funded monitoring programs using a standardized approach. These programs 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 action is needed

to allow the Councils to recommend increased monitoring above SBRM coverage levels in specific fisheries and prioritize Federal funding across new industry-funded monitoring programs when funding falls short of Federal cost responsibilities for administering new industry-funded monitoring programs.

1.3 UPDATE ON OMNIBUS ALTERNATIVES

Industry-funded monitoring programs for the mackerel and herring fisheries would both aim 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.

Both the MAFMC and the NEFMC have identified a Council-led prioritization process (Omnibus Alternative 2.2) as their preliminary preferred alternative to prioritize Federal funding across new industry-funded monitoring programs when funding falls short of Federal cost responsibilities for 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 funding 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 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, and an equal weighting approach specified in this action would ensure that the management objectives of both Councils are initially given equal weight.

1.4 DESCRIPTION OF MACKEREL COVERAGE TARGET ALTERNATIVES

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 alternatives 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.

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 1. RANGE OF INDUSTRY-FUNDED MONITORING MACKEREL COVERAGE TARGET ALTERNATIVES

Gear Type	MWT	SMBT	SMBT	SMBT
Permit Category	All Tiers	Tier 1	Tier 2	Tier 3
Mackerel Alternative 1: No Coverage Target for IFM Program (No Action)	SBRM	SBRM	SBRM	SBRM
Mackerel Alternative 2: Coverage Target for IFM Program	Includes Sub-Options: Waiver Allowed, Wing Vessel Exemption, 2 Year Sunset, 2 Year Re-evaluation, and 25 mt Threshold			
Mackerel Alternative 2.1: NEFOP-Level Coverage	100%	100%	50%	25%
Mackerel Alternative 2.2: ASM Coverage	[25,50,75,100%] ASM	[25,50,75,100%] ASM	SBRM (No Action)	SBRM (No Action)
Mackerel Alternative 2.3: Combination Coverage	[50,100%] EM/Portside	[25,50,75,100%] ASM	SBRM (No Action)	SBRM (No Action)
Mackerel Alternative 2.4: EM and Portside Coverage	[50,100%] EM/Portside	SBRM (No Action)	SBRM (No Action)	SBRM (No Action)
MWT indicates midwater trawl vessels 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.				

1.4.1 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 Northeast Fisheries Observer Program (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 2 describes the sea days allocated for April 2015 through March 2016. 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.¹

TABLE 2. PROPOSED AND OBSERVED SEA DAYS FOR FLEETS THAT TARGET MACKEREL

Fleet	Region	Sea Days allocated for April 2015 to March 2016	Observed sea days, July 2013 to June 2014	VTR sea days, July 2013 to June 2014	Observed trips, July 2013 to June 2014	VTR trips, July 2013 to June 2014
Small Mesh Bottom Trawl	MA	1,340	993	8,824	357	3,839
Small Mesh Bottom Trawl	NE	1,312	735	9,318	279	3,588
Purse seine	MA	6	0	231	0	229
Purse seine	NE	31	73	618	34	296
Midwater Trawl (Pair and Single)	MA	0	9	51	2	13
Midwater Trawl (Pair and Single)	NE	39	455	1,426	105	439

Sources: 2015 SBRM Annual Discard Report with Observer Sea day Allocation; Wigley et al., 2015.

¹ Midwater trawl coverage has been reduced in recent years due to lawsuits and resulting loss of flexibility in allocating sea days through SBRM.

Under SBRM, NEFOP observers collect the following information on declared 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 seabirds; 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 mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. HVF certification allows observers to cover any of the fisheries that pump catch, typically the midwater trawl and purse seine fleets. 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 day 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.

1.4.2 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 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 other IFM programs and/or modifying the industry-funded monitoring program for the mackerel fishery.

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 (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 for the program).

- 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.

Omnibus Alternative 2 (identified as preferred by the Councils) 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 1 – 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 industry-funded observer requirements include a HVF certification for the mackerel fishery.

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.

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

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 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 vessels using small mesh bottom trawl gear.

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, and 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.

Detailed Description: NEFOP-level observers would be required to possess a NEFOP 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 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 (these vessels are currently required to provide notice of trips). If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not industry-funded NEFOP-level observer coverage must be procured through an industry-

funded monitoring service provider. If NMFS informs the vessel representative that industry-funded 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 for the relevant fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing in excess of the incidental mackerel trip limit (20,000 lb) without carrying an NEFOP-level observer on its next trip. If 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, 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 seabirds; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

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, which provides for NMFS to issue waivers if there are funding/logistical issues.

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

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. NMFS would select a trip for at-sea monitor coverage based on a coverage target (25%, 50%, 75%, or 100%) specified in this action by the Council. These at-sea monitor coverage requirements only apply to trips landing more than 20,000 lb of mackerel.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would only collect species composition on discarded catch, or catch that is not retained on board the vessel for any reason, including slippage events, operational discards, and catch that is sorted on board the vessel and then discarded. The Councils recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for maximum cost saving 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.*) The NEFMC is considering whether to modify this alternative so that all catch is sampled (not just collecting information on discarded catch), which would increase the information obtained but also reduce the opportunity for cost savings.

Detailed Description: 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 (these vessels are currently required to provide notice of trips). If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not industry-funded at-sea monitor coverage must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative industry-funded 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 for the relevant 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 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 and dredges, 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 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;
- Biological samples (i.e., scales, otoliths, and/or vertebrae from fish, invertebrates, and incidental takes) on discarded catch; and
- Vessel trip costs (i.e., operational costs for trip including food, fuel, oil, and ice).

Currently, there are slippage restrictions and reporting requirements when an observer is aboard vessels with limited access mackerel permits. The Councils need to decide if slippage restrictions and reporting requirements should be extended to vessels with at-sea monitors aboard.

The realized 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 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, which provides for NMFS to issue waivers if there are funding/logistical issues.

1.4.2.3 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

Mackerel Alternative 2.3 would require vessels with Tier 1 mackerel permits 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.

Rationale: In contrast to NEFOP-level observers, at-sea monitors would only collect species composition on discarded catch, or catch that is not retained on board the vessel for any reason, including slippage events, operational discards, and catch that is sorted on board the vessel and then discarded. The MAFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost saving 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.*) The NEFMC is considering whether to modify this alternative so that all catch is sampled (not just collecting information on discarded catch), which would increase the information obtained but also reduce the opportunity for cost savings.

Detailed Description: 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 (these vessels are currently required to provide notice of trips). If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not industry-funded at-sea monitor coverage must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that they needed industry-funded 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 for the relevant 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 at-sea monitoring coverage is not needed on the next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

Currently, there are slippage restrictions and reporting requirements when an observer is aboard vessels with limited access mackerel permits. The Councils need to decide if slippage restrictions and reporting requirements should be extended to vessels with at-sea monitors aboard.

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, which provides for NMFS to issue waivers if there are funding/logistical issues.

Midwater Trawl Fleet

Mackerel Alternative 2.3 would require vessels with limited access mackerel permits using midwater trawl gear to carry an operating electronic monitoring (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 some percentage of all declared mackerel trips by midwater trawl vessels would be 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 an issue.

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 based on the ongoing EM 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 based on the existing portside sampling program for the midwater trawl fleet operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

Detailed Description: 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.

Electronic Monitoring

Under Mackerel Alternative 2.3, owners or operators of vessels issued a mackerel 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 during declared mackerel trips using midwater trawl gear.

Video footage would be used to confirm retention 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 deployment to some set amount of time after the time gear sensors sense the end of deployment, in order to ensure that all catch has been transferred into the hold. In addition, one wide angle camera may remain on for the duration of the trip to monitor for discard compliance.

While video footage would initially only be used to verify retention of catch for portside sampling, EM would also be evaluated for its ability to verify compliance with slippage restrictions and reporting requirements, as well as slippage consequence measures (i.e., requirements to move 15 nautical miles or terminate a fishing trip following a slippage event). Footage would not initially be used to identify species, nor estimate the amount of catch released if a haul were slipped. The Councils or NMFS may expand the uses of video footage to include species identification or quantification of released catch in the future if video footage proves useful for these purposes. Such an expansion would be done via a framework adjustment or amendment, as appropriate.

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 a clear, unobstructed, and well illuminated views of the area(s) where the midwater trawl gear is retrieved prior to catch 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 would 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 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, 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. 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 EM on trips that are selected for portside sampling. There are also some statutory measures under the ESA and MMPA that may dictate retention of protected species.

Review of EM Video Footage

Video footage would be subsampled at a 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. Relatively high rates of review may be required to confirm discarding is not happening because discard events are relatively rare. The rate of review may be adjusted by NMFS during implementation, in cooperation with Council staff, to use the optimum and most cost effective rate to achieve management goals. Substantial changes would require Council-approval.

Compliance Measures

Rates of video collection and/or subsampling could be increased if there is evidence of non-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 vessel could be subject to increased rates of video collection and/or review for all subsequent fishing trips at the vessel owner's expense for the remainder of the season and the next season, or until NMFS has determined that review levels can return to the original specified level.

Vessel Monitoring Plans (VMPs)

Individual Vessel Monitoring Plans (VMPs) would serve as a clear plan for discard documentation, installation and maintenance, protocols for data storage and transfer, and other important information regarding a vessel's 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 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. NMFS is developing a plan to help track catch against catch caps for river herring and shad using the portside data. Portside samplers would also collect biological information (i.e., age and length data).

Sampling Design

The sampling design for portside sampling alternatives would be based on the existing portside sampling programs for the mackerel fishery, administered by the states of 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% (Council must identify a sampling rate at the time of final action). However, the sampling rate may be adjusted by NMFS during implementation, in cooperation with Council staff, to use the optimum and most cost effective rate to achieve management goals. Substantial changes would have to be approved by the Council. Such 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.

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 haul weight to represent estimated retained catch for

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, Milbridge), New Hampshire (Newington), Massachusetts (Boston, Gloucester, New Bedford), Rhode Island (Point Judith, North Kingstown), and New Jersey (Cape May). The list of specific landing ports and the details of offloading requirements in those ports would be developed as part of this amendment, prior to final action. Alternatives that include portside sampling are not intended to restrict the landing and offloading behavior of midwater trawl vessels. 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. If portside sampling is selected as a preliminary preferred alternative for the mackerel fishery, then NMFS would further evaluate how to enable portside sampling in midwater trawl landing ports.

Vessel Responsibilities

Midwater trawl vessels would be responsible for offloading catch consistent with offloading requirements and contacting 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, which provides for NMFS to issue waivers if there are funding/logistical issues.

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.

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

Mackerel Alternative 2.4 would require vessels 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 some percentage of all declared mackerel trips by midwater trawl vessels would be 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 an issue.

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 based on the ongoing EM 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 based on the existing portside sampling program for the midwater trawl fleet operated by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources.

Detailed Description: 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.

The realized observer coverage level for Mackerel Alternative 2.4 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 limited access mackerel permits using midwater trawl gear.

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, which provides for NMFS to issue waivers if there are funding/logistical issues.

As recommended 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 sampling equipment, notification, sampling, and reporting requirements.

1.4.3 Considered But Rejected Mackerel Coverage Target Alternatives

The alternative specifying NEFOP-level observer coverage on the midwater trawl fleet to obtain a 30% coefficient of variation (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 catches the majority of river herring and shad (57%). 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 Council's preferred Alternatives for MSB Amendment 14.

1.5 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES

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 2.1-2.4.

1.5.1 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON BIOLOGICAL RESOURCES

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.

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 Northeast Fisheries Science Center 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 3. 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-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 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

Type of Information Collected

Different types of monitoring can provide different kinds of information with varying levels of verification (Table 4.)

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 mackerel coverage target alternatives, NEFOP-level observers and/or at-sea monitors could provide information on fishing effort. NEFOP-level observers and portside samplers would be collecting species composition and biological information on retained catch, while at-sea monitors would be collecting species and biological information on discarded catch. The NEFMC is considering whether to modify alternatives with at-sea monitoring coverage so that all catch is sampled (not just collecting information on discarded catch), which would increase the information obtained but also reduce the opportunity for cost savings. If this change is confirmed by the Councils, the biological impacts will need to be revised from what is presented in this document. EM would be used to confirm retention of catch.

TABLE 4. 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
		Ability to meet data interest: <input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> N/A				
		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 on MWT vessels
Retained Catch	<ul style="list-style-type: none"> 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 Confirm retention	ASM - Information on effort, area, gear, economics; confirms retention EM/Portside - Confirms retention; species composition data	Confirms retention Species composition data
Discarded Catch	<ul style="list-style-type: none"> 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 on discarded catch EM - Flags discarding	Flags discarding
River herring and Shad Catch Cap Monitoring	<ul style="list-style-type: none"> 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	EM/Portside - Confirms retention; species composition data on retained catch Confirms retention	EM/Portside - Confirms retention; species composition data on retained catch Confirms retention
Stock Assessments	<ul style="list-style-type: none"> Vessel trip reports 	Age and length data on catch	Age and length data on catch	Age and length data on discarded catch	ASM - Age and length data on discarded catch EM/Portside - Age and length data on retained catch	Age and length data on retained catch

MWT indicates midwater trawl vessels and SMBT indicates small mesh bottom trawl vessels. Mackerel alternatives would only apply to trips that land greater than 20,000 lb of mackerel.

Tracking Catch Against Mackerel Fishery Catch Caps

Mackerel Alternatives 2.1-2.4 were evaluated with regard to their impact on monitoring the river herring and shad catch cap in the mackerel fishery. The intent of this analysis is to provide a general characterization of how different alternatives would affect the precision of catch estimates tracked against catch caps.

Many of the mackerel coverage target alternatives do not provide increased monitoring coverage by fleet, but rather by permit category. Currently, NEFOP observer coverage is allocated by fleet (based on gear, mesh, and area). Analyses of 2010-2013 observer data suggests that for midwater trawl gear in New England and the Mid-Atlantic, approximately 26%-54% coverage is needed to obtain a 30% CV for river herring and shad catch (K. Curti). Assuming a normal distribution, a 30% CV means that you are about 95% sure that the real answer is within $\pm 60\%$ of the estimate. Similar analyses of small mesh bottom trawl observer data (all fisheries) suggest that approximately 5%-22% coverage is needed to obtain a 30% CV for river herring and shad catch in that gear type. Mackerel Alternatives 2.1, 2.3, and 2.4 would cover the entire midwater trawl fleet; therefore 26%-54% coverage rates are applicable to these alternatives for midwater trawl gear. Given that all the mackerel alternatives would only cover a portion of total small mesh bottom trawl activity, because the alternatives allocate increased coverage by permit category rather than fleet, the 5%-22% coverage rate range may not be indicative of what coverage rates in the small mesh bottom trawl portion of the mackerel fishery may be appropriate (relative to the river herring and shad cap).

TABLE 5. SUMMARY OF BIOLOGICAL IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES

Alternatives	Impacts on Mackerel Resource, Non-Target Species, and Protected Species
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 reproductive potential of mackerel, non-target species, and protected species is increased • Negative impact associated with Sub-Option 5 if it biases data used to track catch against the catch cap
Mackerel Alternative 2.1: NEFOP-Level Coverage on Limited Access Vessels	<ul style="list-style-type: none"> • Positive impact associated with additional information to reduce uncertainty around catch estimates and to track catch against the catch cap for midwater trawl vessels • Low positive impact associated with additional information to reduce uncertainty of catch estimates and to track catch against the catch cap for limited access small mesh bottom trawl vessels • Positive impact if fishing effort is limited and reproductive potential of mackerel, non-target, and protected species is increased
Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	<ul style="list-style-type: none"> • Negligible impact associated with additional information to reduce uncertainty of discard estimates and to track discards against the catch cap for midwater trawl and Tier 1 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and reproductive potential of mackerel, non-target, and protected species is increased
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	<ul style="list-style-type: none"> • Positive impact associated with additional information to reduce uncertainty around catch estimates and to track catch against the catch cap for midwater trawl vessels • Negligible impact associated with additional information to reduce uncertainty of discard estimates and to track discards against the catch cap for Tier 1 small mesh bottom trawl vessels • Positive impact if fishing effort is limited and reproductive potential of mackerel, non-target, and protected species is increased
Mackerel Alternative 2.4: EM and Portside Sampling on Midwater Trawl Vessels	<ul style="list-style-type: none"> • Positive impact associated with additional information to reduce uncertainty around catch estimates to track catch against the catch cap for midwater trawl vessels • Positive impact if fishing effort is limited and reproductive potential of mackerel, non-target, and protected species is increased

1.5.1.1 Impacts of Mackerel Alternatives 1 and 2 on Biological Resources

For the purposes of this discussion, biological resources include the mackerel resource, non-target species, and protected species. The non-target species of interest that are harvested by the mackerel fishery are river herring, shad, and herring. Protected species include fish, turtles, and marine mammals listed under the ESA and marine mammals protected under the MMPA.

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 MAFMC. Current observer coverage allocated to the mackerel fishery through SBRM is described in Table 2.

The mackerel fishery is managed through an annual catch limit (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 effort in the mackerel fishery in relation to harvesting ACLs. Less monitoring (when compared to Mackerel Alternative 2) could result in the catch cap for river herring and shad to be reached sooner or later in the fishing year, therefore affecting effort in the mackerel fishery.

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 precision of tracking catch against the river herring and shad catch cap.

Mackerel Alternative 2 would specify the details of an industry-funded monitoring program for the MSB FMP and facilitate additional monitoring in the mackerel fishery by specifying coverage targets, above SBRM (Mackerel Alternative 1/the status quo), for industry-funded monitoring.

Under Mackerel Alternative 2, long-term benefits to the biological resources would vary with the type and amount of monitoring coverage target specified for the mackerel fishery. Benefits 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 biological resources 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 2.1-2.4). Imprecise estimates would tend to cause the fishery to be closed early in some years and later in other years. However, overall one would expect that more precise catch estimates would facilitate better management over time and thus produce positive impacts for the mackerel and incidentally-caught species such as river herring and shad.

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 ($\geq 20,000$ 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. Therefore, the selection of Sub-Option 5 may further reduce any benefits associated with Mackerel Alternative 2.

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 2.1-2.4) are discussed in the following section.

Monitoring and Service Provider Requirements

Mackerel Alternative 2 would specify that industry-funded observer requirements 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. HVF certification allows observer to cover any of the fisheries that pump catch, typically the midwater trawl and purse seine fleets. 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 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 biological resources under Mackerel Alternative 2, those benefits may not be realized under Mackerel Alternative 1.

1.5.1.2 Impacts of Mackerel Coverage Target Alternatives 2.1- 2.4 on the Biological Resources

Mackerel Alternatives 2.1-2.4 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 Alternatives 2.1-2.4 may have a positive impact on the biological resources by increasing monitoring in the mackerel fishery. Increases in monitoring should increase catch estimate precision, which in the long run should lead to more effective management of biological resources. While the benefits to the biological resources may be difficult to quantify under Mackerel Alternatives 2.1-2.4, they may not be realized under Mackerel Alternative 1.

The magnitude of positive impacts to the biological resources 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 2.1-2.4).

Mackerel Alternatives 2.1-2.4 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 as well as river herring and shad cap catch. These data are used to track catch of other non-target species and catch of protected species. Biological samples taken portside or on SBRM observed trips are also used in assessments and research projects relevant to management.

For certain components of the mackerel fishery specific to each alternative and detailed above, Mackerel Alternative 2.1 would specify NEFOP-level observer coverage, Mackerel Alternative 2.2 would specify at-sea monitor coverage, Mackerel Alternative 2.3 would specify at-sea monitor coverage as well as EM and portside sampling coverage, and Mackerel Alternative 2.4 would specify EM and portside sampling coverage. Because alternatives with NEFOP-level observer coverage and EM and portside sampling coverage have the potential to collect information on a greater percentage of catch than at-sea monitoring coverage, Mackerel Alternatives 2.1, 2.3, and 2.4 have the potential to benefit the biological resources more than Mackerel Alternative 2.2.

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 level of coverage should have greater benefits for biological resources related to improving management through better data.

Mackerel Alternatives 2.1 and 2.2 primarily would allocate monitoring coverage by vessel permit category, while Mackerel Alternative 2.4 would allocate monitoring coverage by fishing fleet (i.e., midwater trawl fleet), and Mackerel Alternative 2.3 would allocate monitoring coverage by both permit category and fishing fleet for parts of the fishery. The extent to which coverage is allocated consistent with 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 Mackerel Alternatives 2.1 and 2.2 will have limited utility when compared to Mackerel Alternatives 2.3 and 2.4. The additional information on catch estimates in the mackerel fishery obtained via Mackerel Alternatives 2.1, 2.2, and 2.3 (at-sea monitoring data) can be used for tracking catch against ACLs and catch caps but it is unlikely that those data will be used for stock assessments and estimating total removals. Additional data on catch and bycatch estimates in mackerel fishery obtained via Mackerel Alternatives 2.3 (EM and portside sampling data) and 2.4 could be used for catch monitoring as well as stock assessments and estimating total removals.

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 2.1-2.4 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 biological resources associated with Mackerel Alternatives 2.1-2.4. 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 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 biological resources under Mackerel Alternatives 2.1-2.4 may not be realized under Mackerel Alternative 2 – Sub-Option 1.

Alternatives that increase the amount of information on retained catch (Mackerel Alternatives 2.1, 2.3, and 2.4) may have an increased likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just discarded catch (Mackerel Alternative 2.2). Increased monitoring of the 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. Increased information to help track catch against catch caps may help allow the mackerel fishery to fully harvest the ACL or it may curtail the harvest of mackerel by the mackerel fishery, depending on the direction of error in any given year, which one would expect to be random across years.

In general, the benefits of these mackerel alternatives to the biological resources 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 the ACL and generate more information to estimate total removals and for stock assessments. 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. Indirect benefits to protected species are possible if increased monitoring of the mackerel fishery generates additional information on protected species to estimate total removals and for stock assessments. However, these alternatives may lead to direct positive impacts on the biological resources if fishing effort is limited, either through monitoring availability or the river herring and shad catch cap, leading to increased reproductive potential of the biological resources. Alternatively, if more precise data leads to additional effort then there could be negative impacts for biological resources. The impacts of these mackerel alternatives on the mackerel resource or non-target species are not significant because they would not cause the mackerel resource or non-target species to become overfished and would not result in overfishing. The impacts of these mackerel alternatives on protected species are not significant because they would not cause a change in population status.

1.5.2 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON THE PHYSICAL ENVIRONMENT

TABLE 6. SUMMARY OF PHYSICAL ENVIRONMENT IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES

Alternatives	Impacts on Physical Environment
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	<ul style="list-style-type: none"> Negligible impact associated with minimal and temporary effects on the environment from mackerel fishery
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	<ul style="list-style-type: none"> 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 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.

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 2.1-2.4 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.

1.5.3 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.

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 data precision around discard estimates for a certain species by setting a coverage target of 50%, rather than a coverage target of 100%.

Table 7 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 2 – Monitoring Cost Estimates.

TABLE 7. 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	Year 1: \$36,000 startup plus \$97 per sea day Year 2: \$97 per sea day	Year 1: \$15,000 startup plus \$325 ¹ or \$187 ² per sea day Year 2: \$325 ¹ or \$187 ² per sea day
Portside Sampling	\$479-\$530 per sea day	\$5.12 ¹ or \$3.84 ² per mt
<p>1 – Initial cost assumptions: EM on every vessel, video collected throughout the duration of a trip, 100% video review, and targeting 100% of all trip sampled portside. Additionally, this portside cost estimate includes portside administration costs.</p> <p>2 – Revised cost assumptions: EM on every vessel, video collected only around haulback, 50% video review, and targeting 50% of all trips sampled portside. Additionally, this portside cost estimate no longer includes portside administration costs.</p>		

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.

NEFOP-Level Observer Cost Estimate

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.² 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 less.

² See discussion in alternative description section above about possible modifications such that at-sea monitors could collect retained catch information in addition to discard catch.

TABLE 8. 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 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	\$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 9 and the ongoing costs associated with EM are summarized in Table 10. Additional details on monitoring costs are available in Appendix 2 – Monitoring Cost Estimates.

TABLE 9. 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. In October 2015, the MAFMC requested the PDT/FMAT revise the \$325 per sea day industry cost estimate associated with electronic monitoring. The \$325 cost estimate was likely high because it assumed video was collected for the duration of a trip and 100% of the video was reviewed. The revised cost estimate of \$187 per sea day assumes video collected around haulback only and 50% video review. This revised estimate may be closer to the actual industry cost responsibilities associated with electronic monitoring of midwater trawl trips. The breakdown of these costs is shown in Table 10.

TABLE 10. INDUSTRY COST RESPONSIBILITIES FOR ONGOING ELECTRONIC MONITORING COSTS

Industry Cost Responsibilities	Initial Ongoing Electronic Monitoring Costs Per Vessel Per Sea Day ¹	Revised Ongoing Electronic Monitoring Costs Per Vessel Per Sea Day²
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
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
Data Services, including the costs associated with review and analysis of the video, reporting to NMFS, and archiving of the data	\$160	\$52
Program Management, including costs of the day-to-day operations of the service provider for running the EM program	\$77	\$77
Total	\$325	\$187
1 - Initial cost assumptions based on video collected for the duration of a trip and 100% video review.		
2 - Revised cost assumptions based on video collected only around haulback and 50% video review.		

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.

Using cost estimates from the Massachusetts Division of Marine Fisheries portside sampling program for the mackerel fishery, the industry cost responsibility associated with portside sampling may be as much as \$5.12 per mt. This cost estimate is likely high as it includes program administration costs as well as sampling costs and was intended to apply to all midwater trawl trips for a target sampling rate of 100%.

In October 2015, the MAFMC requested the PDT/FMAT revise the estimate of the industry cost responsibility associated with portside sampling. The revised cost estimate eliminates portside administration costs and is estimated at \$3.84 per mt. This cost estimate may be closer to the actual industry cost responsibilities associated with portside sampling and is intended to apply to 50% of all midwater trawl trips for target sampling rate of 50%.

TABLE 11. 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)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 • Negligible impact associated with additional information to reduce uncertainty of discard estimates in the mackerel fishery
Mackerel Alternative 2.3: Combination Coverage	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
* Reflects RTO from Year 2 of Mackerel Alternative 2.4	

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 and was used rather than net revenues to more accurately reflect income from fishing trips. Interest on business loans, but not principal payments, is included.

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 mackerel and herring 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 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 mackerel 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 3.

TABLE 12. 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: principal payments on business loans are 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 to 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 as it is for paired midwater trawl vessels at the 20,000 lb threshold. At the 25 mt threshold the percent RTO is about four times as high.

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. 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.

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 costs of \$325/day and portside costs 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% video 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 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 4.

1.5.3.1 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.

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 catch caps for river herring and shad limiting effort in the mackerel fishery.

Mackerel Alternative 2 would specify the details of an industry-funded monitoring program for the MSB FMP and facilitate additional monitoring in the mackerel fishery by specifying coverage targets, above SBRM (Mackerel Alternative 1/the status quo), 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 2.1-2.4).

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 river herring and shad tracked against catch caps, mackerel vessels may benefit from increased stability in the fishery. On a year-to-year basis more precise estimates could close the fishery sooner or later, but it would close at the intended time rather than early or late due to imprecise information.

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 2.1-2.4). 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. 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.

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 and how that may affect the impact from the alternative under consideration.

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 2.1-2.4) are discussed in the following section.

Monitoring and Service Provider Requirements

Mackerel Alternative 2 would specify that industry-funded observer requirements 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. HVF certification allows observers to cover any of the fisheries that pump catch, typically the midwater trawl and purse seine fleets. 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 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 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.

1.5.3.2 Impacts of Mackerel Coverage Target Alternatives 2.1- 2.4 on Fishery-Related Businesses

Mackerel Alternatives 2.1-2.4 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 2.1-2.4, 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 2.1-2.4).

Mackerel Alternatives 2.1-2.4 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 catch as well as river herring and shad cap catch. Additionally, vessel and SBRM observer data are used for stock assessments and to estimate total removals.

The mackerel fishery is also subject to closure from a catch cap for river herring and shad. If the catch cap is harvested, effort in the fishery is restricted.

Mackerel Alternatives 2.1 would specify NEFOP-level observer coverage, Mackerel Alternatives 2.2 would specify at-sea monitor coverage, Mackerel Alternative 2.3 would specify at-sea monitor coverage as well as 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 (\$187-\$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 paying for monitoring coverage exceeds 10%. Additional background and summary information can be found in the tables and box plots displayed starting on page 57.

TABLE 13. 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	EM/Portside Year 1 ¹	10.7%	10.1%	22.6%	35.1%
	EM/Portside Year 2 ¹	3.8%	3.7%	8.3%	16.4%
	EM/Portside Year 1 ²	9.1%	8.2%	18.3%	25.7%
	EM/Portside Year 2 ²	1.8%	1.6%	3.8%	7.0%
<p>1 – Initial cost assumptions based on video collected for the duration of a trip, 100% video review, and including portside administration costs. This cost would apply to 100% of trips.</p> <p>2 – Revised cost assumptions based on video collected only around haulback, 50% video review, and not including portside administration costs. This cost would apply to 50% of trips.</p>					

In general, the negative economic impact on mackerel vessels of paying for monitoring coverage (as measured by the potential reduction in the RTO) is greatest with Mackerel Alternatives 2.3 and 2.4 (Year 2), followed by Mackerel Alternatives 2.1 and 2.2. These impacts are influenced by the type of information collected and amount of coverage specified. If vessel activity patterns change compared to 2014, relative impacts may change as well.

NEFOP-level observer coverage provides species composition data on both retained and discarded catch, while at-sea monitor coverage provides species composition data on discarded catch and portside sampling coverage provides species composition information 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.

Alternatives with NEFOP-level observer coverage and EM and portside sampling coverage have an increased likelihood to collect information on the catch of river herring and shad than alternatives with only at-sea monitoring coverage. Mackerel Alternatives 2.1, 2.3, and 2.4 have a greater potential to reduce the variability in river herring and shad catch and may reduce the likelihood that catch caps inappropriately limit mackerel harvest than Mackerel Alternative 2.2.

Mackerel Alternative 2.1 specifies monitoring coverage at 100% while Mackerel Alternatives 2.2-2.4 allow monitoring coverage to range between 25% 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.

Mackerel Alternative 2.4 specifies monitoring coverage at 100% or 50% while Mackerel Alternatives 2.1, 2.2, and 2.3 allow monitoring coverage to range between 100% and 25%. 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, mackerel alternatives with overall higher levels of monitoring coverage may have a more negative direct impact on mackerel vessels paying for monitoring coverage than mackerel alternatives that have overall lower levels of monitoring coverage.

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 would 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, Mackerel Alternatives 2.1, 2.3, and 2.4 may have more indirect positive economic impacts on mackerel vessels than Mackerel Alternative 2.2.

Mackerel Alternatives 2.1 and 2.2 would primarily allocate monitoring coverage by vessel permit category (i.e., Category A and B mackerel permits), Mackerel Alternative 2.4 would allocate monitoring coverage by fishing fleet (i.e., midwater trawl fleet), and Mackerel Alternative 2.3 would allocate monitoring coverage by permit category and fishing fleet. The extent to which coverage is allocated consistent with 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 Mackerel Alternatives 2.1 and 2.2 will have limited utility, when compared to Mackerel Alternatives 2.3 and 2.4. The additional information on catch and discard estimates in the mackerel fishery obtained via Mackerel Alternatives 2.1, 2.2, and 2.3 (at-sea monitoring data) can be used for tracking catch against catch caps but it is unlikely that those data will be used for stock assessments and estimating total removals. Additional data on catch and bycatch estimates in mackerel fishery obtained via Mackerel Alternatives 2.3 (EM

and portside sampling data) and 2.4 could be used for catch cap monitoring as well as stock assessments and estimating total removals. Any indirect economic benefits for mackerel vessels related to data utility would be more likely to be realized under Mackerel Alternatives 2.3 and 2.4 than under Mackerel Alternatives 2.1 and 2.2.

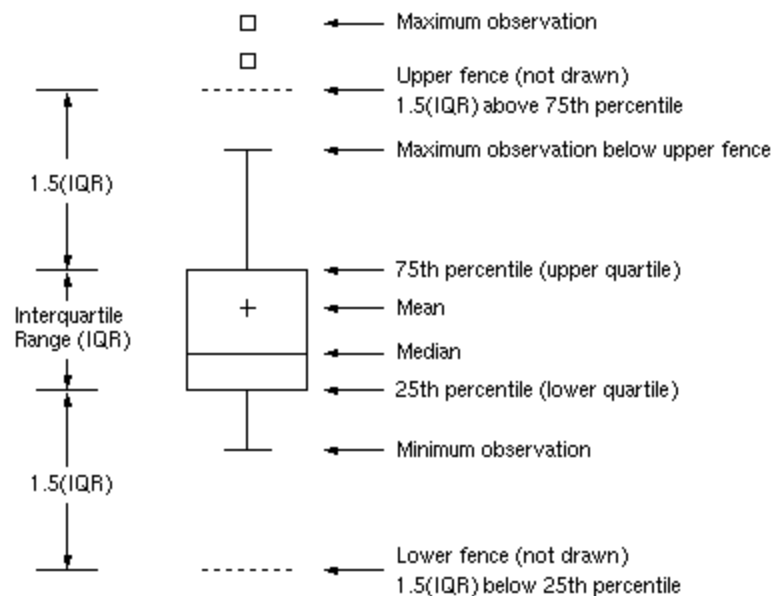
All the mackerel alternatives would allocate monitoring coverage by limited access permit category. The extent to which coverage is allocated consistent with SBRM fishing fleet will determine how the resulting data can be used. Unless vessel permit category is equivalent to fishing fleet, the resulting information from alternatives that allocated coverage by permit category will have limited utility when compared alternatives that allocate coverage by fishing fleet. Because most vessels using a midwater trawl gear have a mackerel limited access permit, the fleet with limited access mackerel permits using midwater trawl gear may be consistent with the SBRM midwater trawl fleet. Catch data collected by permit category can be used catch and catch cap monitoring, but it is unlikely that those data will be used for stock assessments and estimating total removals. Catch data collected from the midwater trawl vessels may be used for catch and catch cap monitoring, as well as stock assessments and estimating total removals. Any indirect economic benefits for mackerel vessels related to data utility would be more likely to be realized when catch data are collected consistent with SBRM, and only the midwater trawl options do this.

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 2.1-2.4 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.

In general, the direct economic impacts on mackerel vessels associated with Mackerel Alternatives 2.1-2.4 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. Indirect positive economic impacts on mackerel vessels result from the increased likelihood that additionally monitoring would make

it less likely that mackerel harvest would be inappropriately constrained by catch caps due to imprecise data. However, imprecise data could also allow the fishery to stay open longer than would occur with precise data.

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 trawl 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 14. 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

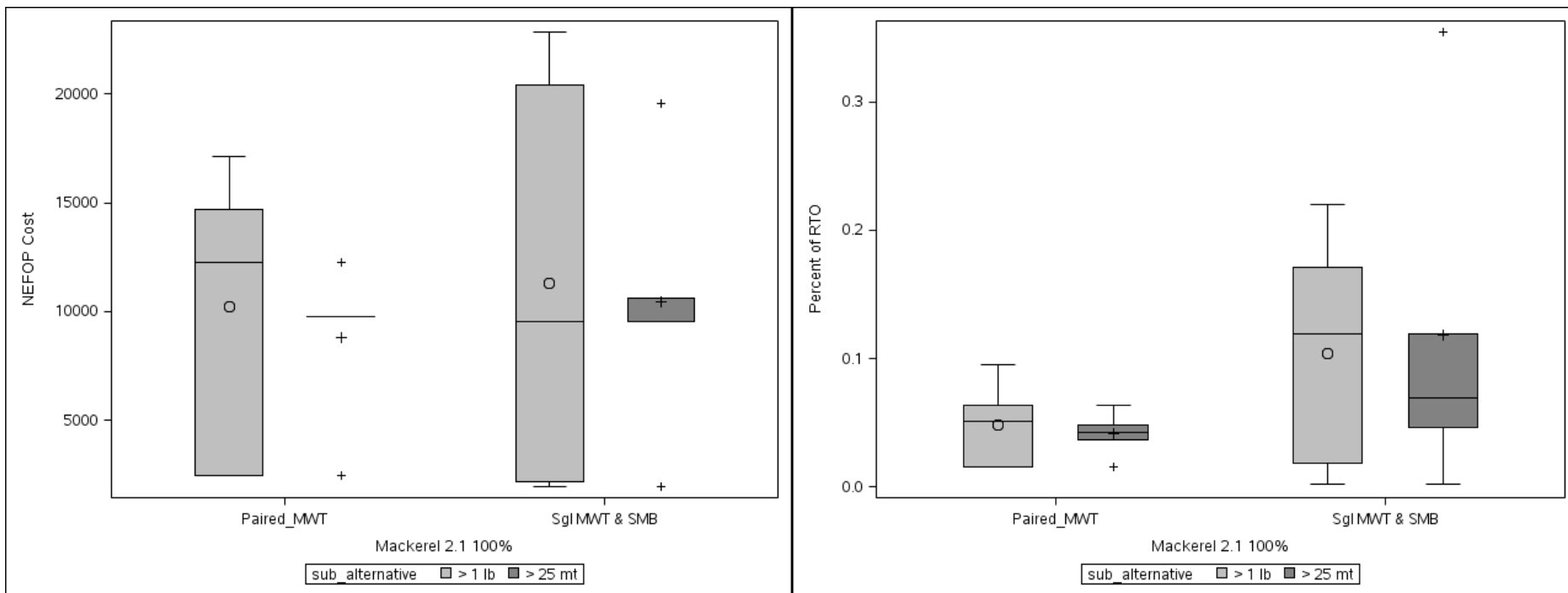


FIGURE 1. MACKEREL ALTERNATIVE 2.1 100% NEFOP COST AND PERCENT OF RTO

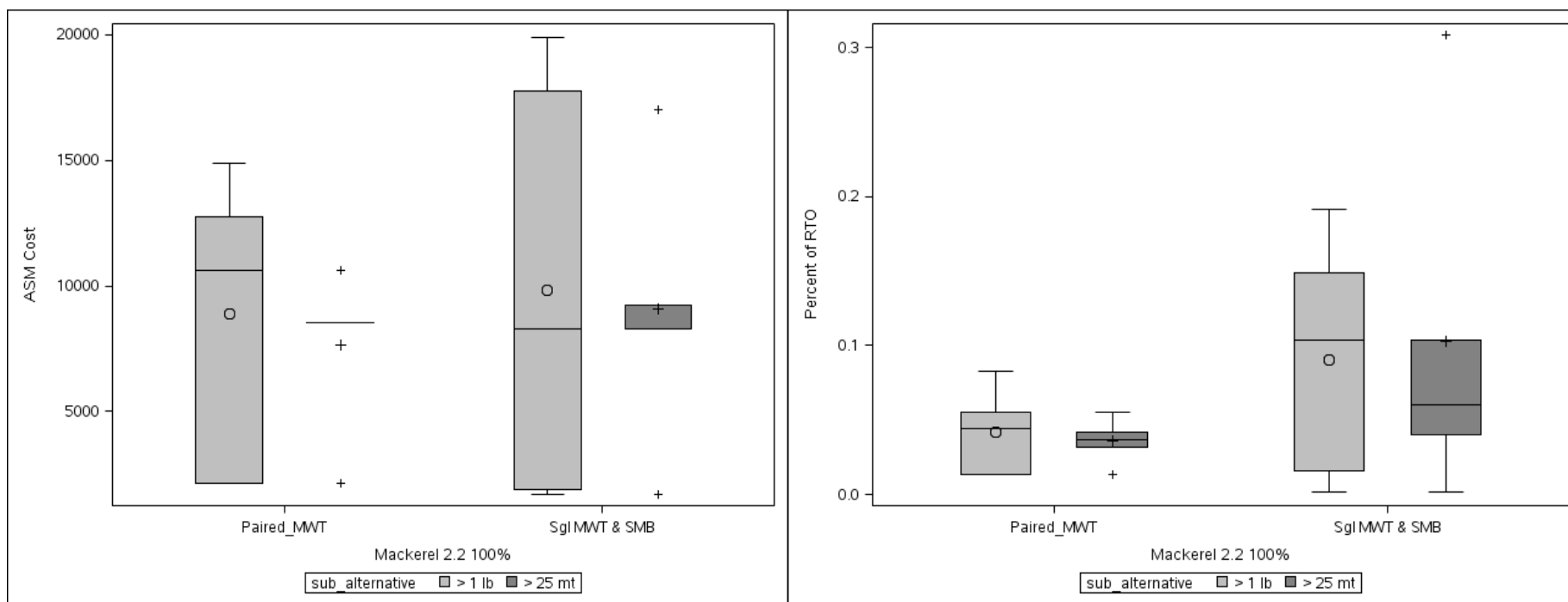


FIGURE 2. MACKEREL ALTERNATIVE 2.2 100% ASM COST AND PERCENT OF RTO

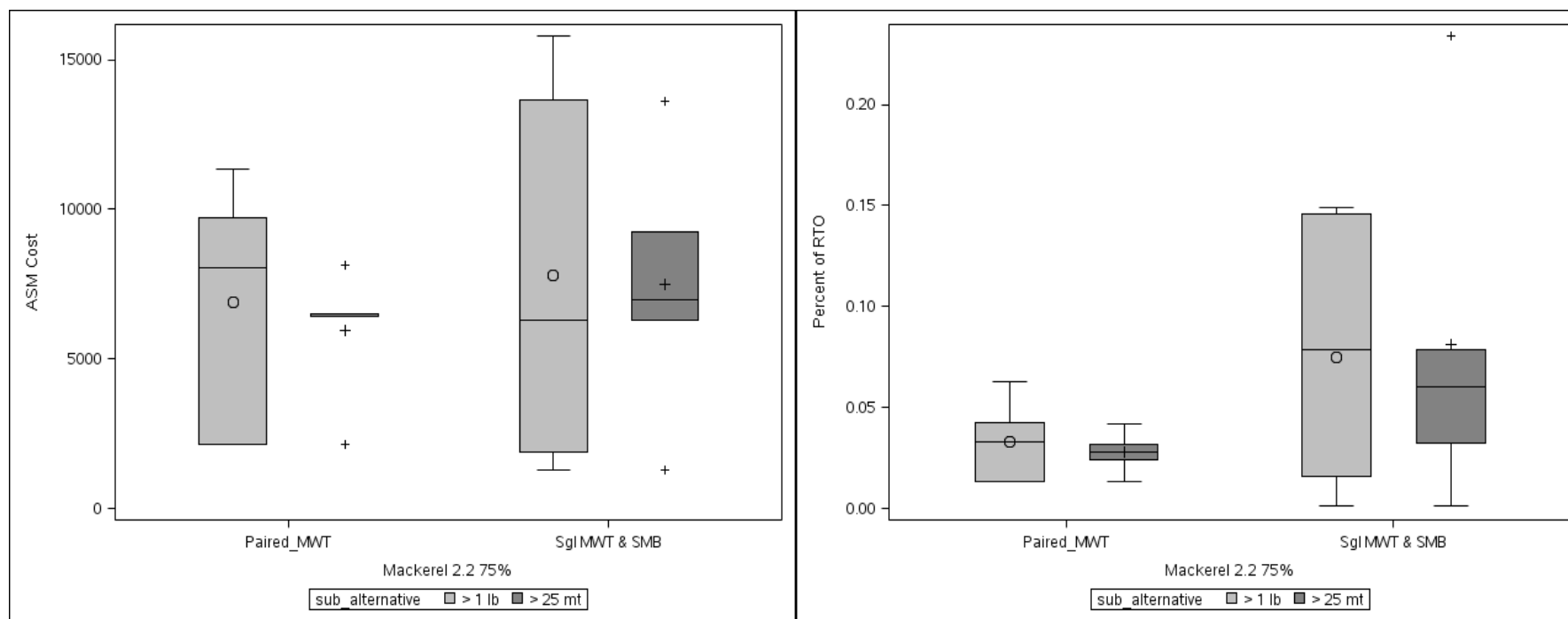


FIGURE 3. MACKEREL ALTERNATIVE 2.2 75% ASM COST AND PERCENT OF RTO

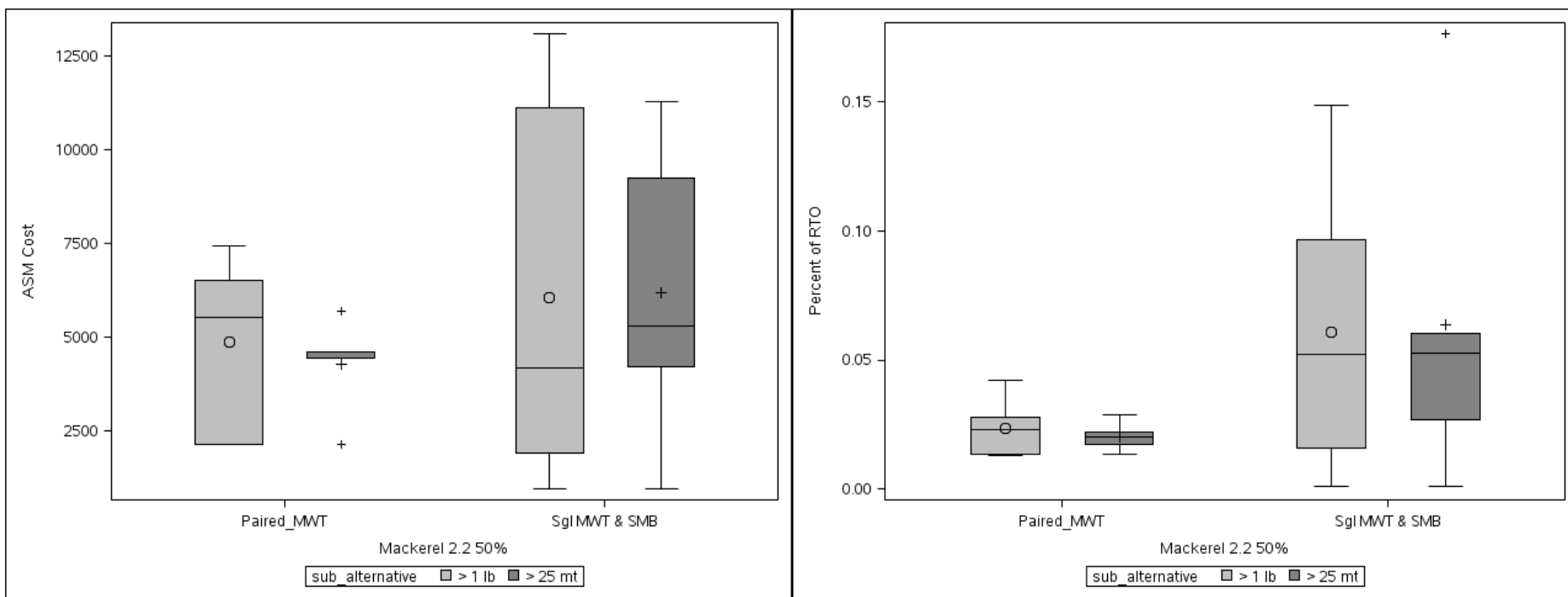


FIGURE 4. MACKEREL ALTERNATIVE 2.2 50% ASM COST AND PERCENT OF RTO

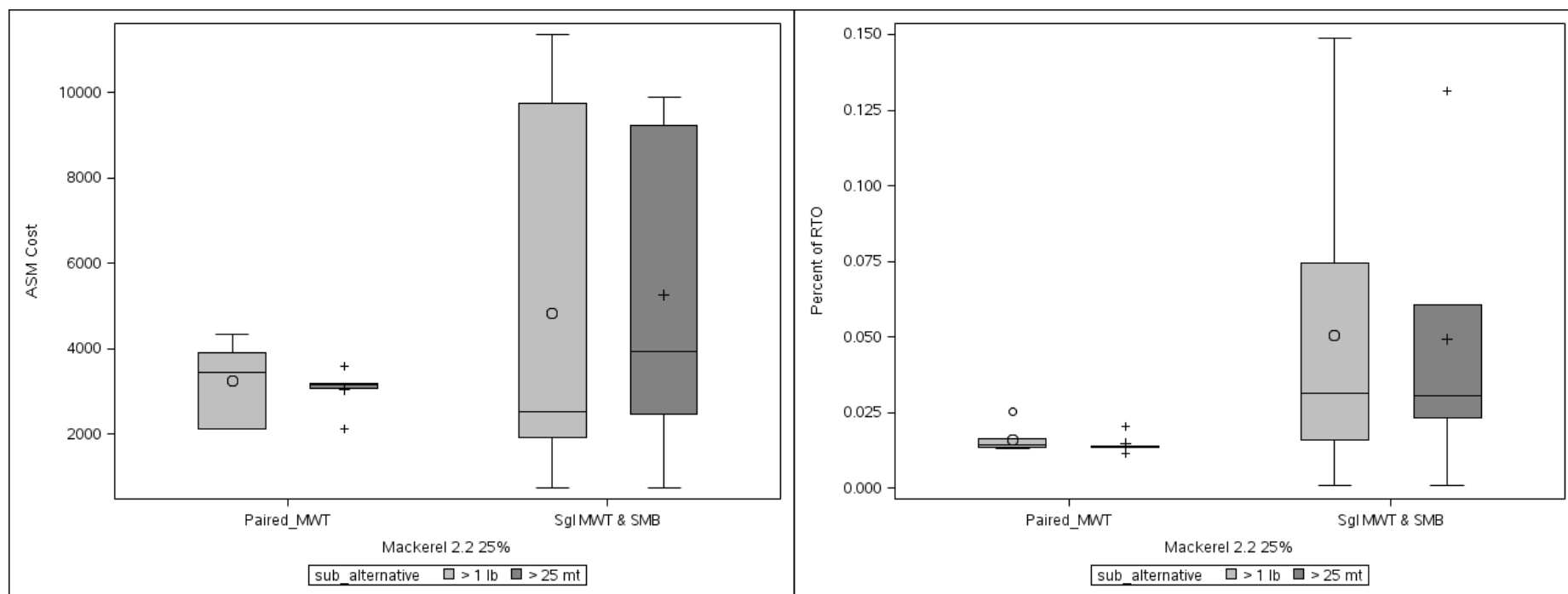


FIGURE 5. MACKEREL ALTERNATIVE 2.2 25% ASM COST AND PERCENT OF RTO

TABLE 15. 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%
<i>Data shown by trips harvesting ≥ 20,000 lb of mackerel and > 25 mt of mackerel</i>				

TABLE 16. 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

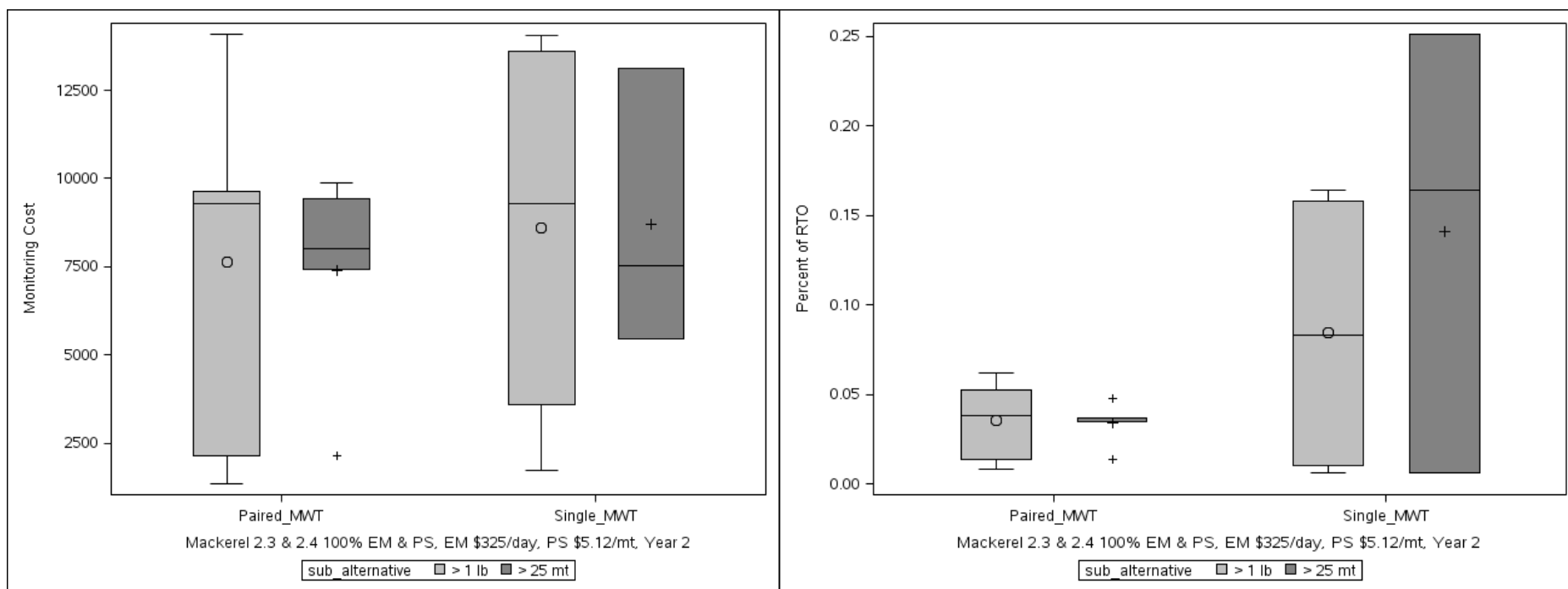


FIGURE 6. MACKEREL ALTERNATIVES 2.3 AND 2.4 100% EM AND PORTSIDE COST AND PERCENT OF RTO

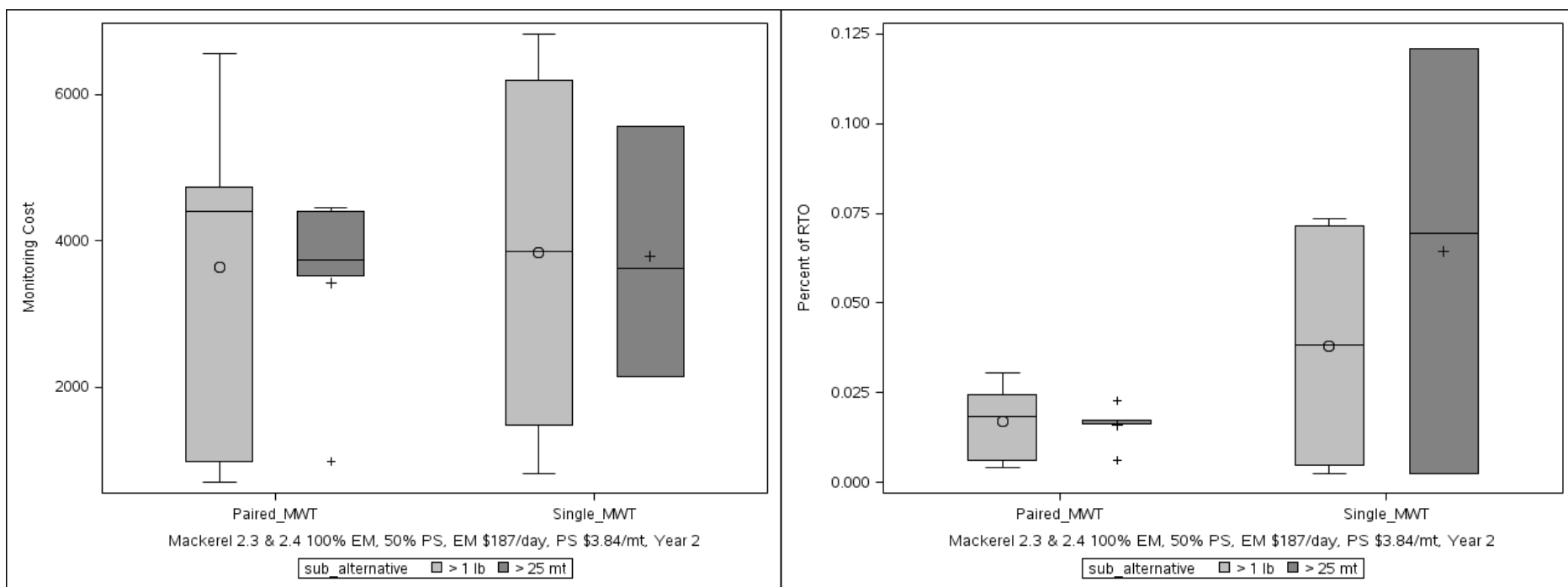


FIGURE 7. MACKEREL ALTERNATIVES 2.3 AND 2.4 50% EM AND PORTSIDE COST AND PERCENT OF RTO

TABLE 17. 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	-		-	
<i>Data shown by trips harvesting ≥ 20k lb of mackerel and > 25 mt of mackerel</i>				