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Richard B. Robins, Jr., Chairman | Lee G. Anderson, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: 5/31/2016

To: Council

From: Jason Didden

Subject: Industry-Funded Monitoring (IFM) Omnibus Amendment

The Council is scheduled to review and approve for public hearings an updated draft Environmental Assessment (EA) document. The Council has already selected preliminary preferred alternatives for several administrative alternatives, and may select preliminary preferred alternatives for mackerel coverage options prior to public hearings. The decision points for this meeting include:

- identify a preferred weighting scheme within the Council-led prioritization process
- clarify slippage consequence measures for IFM monitoring types
- clarify coverage target calculation
- select preliminary preferred mackerel coverage target alternatives with sub-options

The full draft Environmental Assessment and Appendices (500+ pages) have been posted to http://www.mafmc.org/briefing/june-2016. Related to the decision points above and areas where substantial edits have been made to the draft EA, several excerpts and supporting documents have been included below. A running underlined page number at the top of all pages in this tab is included to facilitate referencing.

MEMORANDUM

DATE: May 27, 2016

TO: New England Fishery Management Council
Mid-Atlantic Fishery Management Council

FROM: Industry-Funded Monitoring Plan Development Team/Fishery Management Action Team

SUBJECT: Industry-Funded Monitoring (IFM) Omnibus Amendment Development

1. The PDT/FMAT met by via teleconference on May 4, 2016, to consider the motions made at the Mid-Atlantic and New England Fishery Management Council meetings held in April 2016 and discuss revisions to the Draft Environmental Assessment (EA). PDT/FMAT participants included: Brant McAfee, Brett Alger, Carly Bari, Carrie Nordeen, Dan Luers (NMFS GARFO); Dr. Andrew Kitts, Amy Martins (NMFS NEFSC), Jason Didden (MAFMC); Dr. Jamie Cournane, Maria Jacob, Dr. Rachel Feeney (NEFMC).

2. The New England Fishery Management Council (NEFMC) recommended that the Draft EA include additional narrative descriptions for the box plots used in the economic impacts section to help the public interpret these figures. PDT/FMAT members had provided three sets of language to help better describe these figures. The group selected one alternative as the language to use as an illustrative example for the first figure and make highlight statements for the following figures in the EA.

3. A member of the Herring Advisory Panel requested that we investigate the economic impacts based on trip declaration as opposed to landings data. Drew was able to do some preliminary analysis to present to the group. The PDT/FMAT reviewed this analysis and discussed some of the improvements and modifications that could be made for inclusion in the Draft EA.

4. Andrew Kitts provided an explanation to the group on why it is not appropriate to use herring return-to-owner (RTO) in the economic analysis. In order to properly apportion RTO to a particular fishery in instances where a vessel participates in more than one, both revenues and costs (the two components of RTO) must be apportioned among the different fisheries. Revenues can be easily apportioned because the data on revenue is tracked by fishery. However, some types of costs cannot easily be allocated to a fishery due to the nature of these costs. For example, insurance costs don't correspond with the

amount or type of fishing being done and so methods for apportioning such costs (they could be apportioned based on the value gained from each fishery or by the weight or effort in each fishery) are arbitrary. Other types of costs (e.g., fuel costs), could be apportioned to each fishery if those costs were collected at the trip level. The survey used in the RTO analysis did not use trip level cost data, but instead used data at the annual level. In the previous attempt to calculate a herring RTO (vs. total RTO), revenue shares were used to apportion all costs to each fishery. In retrospect, this method should not have been used due to its arbitrary nature. And so it was decided that a separate herring RTO analysis should not be provided. Instead, the Draft EA will describe in detail the different sources of revenue for each of the vessel types examined.

5. Brant McAfee provided the group an update on the CV analysis he is working on for inclusion in the Draft EA. This analysis was done previously, but following motions made at the April Council meetings to adjust the at-sea monitoring (ASM) sampling design, this analysis has been updated (the draft analysis will be provided as a supplemental document to the Draft EA). Also, based on suggestions made by the NEFMC, the update will include CV analysis for the No Action alternative. Brant also notified the group of varying limitations on the analysis primarily due to lack of data.

6. GARFO staff clarified that the Draft EA will provide language that is more explicit on having 50% or 100% as options for the electronic monitoring (EM) and portside sampling alternatives.

7. In April both Council made motions that would extend slippage reporting requirements, restrictions (i.e., allowable slippage events include mechanical failure, excess catch of dogfish, or safety concerns), and consequence measures to all types of industry-funded monitoring. The PDT/FMAT discussed the ability of EM to determine and verify the cause of a slippage event which would be required to extend the slippage consequence measures. At this time, there is confidence that EM can detect whether or not a slippage event occurs, therefore making it reasonable to extend the slippage reporting requirements and restrictions to EM. However, it is unknown if EM can detect the cause of a slippage event, therefore making it difficult to extend the slippage consequence measures to EM. The Herring/Mackerel EM Project may provide more information on the capability of EM to determine the cause of a slippage event, but we will not know those results until 2017.

   There was additional discussion about alternative consequence measures that could potentially be considered for EM trips. One idea was that if EM can generally identify slippage events, then a uniform consequence that does not differentiate between causes may be feasible. Another idea included altering the video review rate, per vessel, based

on compliance with slippage restrictions. For example, if a vessel had been found to out of compliance with the slippage restriction, their video review rate would be increased. Alternatively, good behavior in regards to the slippage restrictions could be rewarded with a lowered video review rate. However, the overall sentiment was that it would be best to consider slippage consequence measures on EM trips after the conclusion of the EM pilot.

The PDT/FMAT recommends that the Council not apply consequence measures to EM at this time, but that applying the slippage consequence measures to different types of industry-funded monitoring be made frameworkable.

8. In April the NEFMC made a motion that would require at-sea monitors to collect length data, but not age data (i.e., scales or otoliths from fish) or biological samples (from marine mammals, sea birds, and sea turtles). Some PDT/FMAT members would like to investigate if there are data utility links between collecting age and length data together. GARFO staff will be reaching out to NEFSC staff in the Population Dynamics Branch to verify there are no data utility concerns for this change in sampling design.

9. The PDT/FMAT discussed the differences in sampling design between NEFOP-level observers and portside samplers. They are collecting baskets for sampling at different rates and applying them differently, either by the haul or by the trip. However, both sets of data are extrapolated for the entire trip, therefore the results won't necessarily be different despite using different sampling intensities.

10. In April the NEFMC made a motion that would require ASM through the IFM alternatives to obtain a high volume fisheries (HVF) training. The PDT/FMAT verified that are no technical concerns with this change and that the Fisheries Sampling Branch can develop HVF training tailored for ASM.

11. In April both Councils made motions to clarify that the coverage targets in the IFM alternatives should be calculated using a combined method to take into account SBRM observer coverage. It is understood that there are some technical challenges to calculating the coverage targets using this approach. The PDT/FMAT clarified that the methodology used to calculate the coverage targets in the herring and mackerel fisheries would need to be simplified from the methodology used in the groundfish fishery, to feasibility issues regarding timing difference in the herring and mackerel fishing year and workload.

    The PDT/FMAT recommends that the Council specify the combined coverage target be calculated using the previous year's SBRM coverage in the herring and mackerel

fisheries as a proxy for determining the amount of industry-funded monitoring needed to reach the desired coverage target. Therefore, this methodology would always operate on a one-year lag.

The PDT/FMAT discussed some of the timing challenges in obtaining the finalized SBRM coverage for the previous year and how that coordinates with the herring and mackerel fishing year. Additionally, it was suggested the additional coverage would be calculated by NMFS, based on the Councils target and the SBRM coverage on the previous year.

Industry-Funded Monitoring

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

May 2016

Executive Summary

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

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

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

Overview of Omnibus Alternatives

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

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

- No standard definition of cost responsibilities of industry and NMFS;
- No standardized framework adjustment process to implement future industry-funded monitoring programs in other FMPs;

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

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

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

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

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

Omnibus Alternative 2.6 – Monitoring Set-Aside
This alternative would provide a structure to develop future monitoring set-aside programs which could generally consist of reserving a portion of the annual catch limit for a fishery to assist in funding vessel/non-governmental costs for additional monitoring coverage beyond the SBRM requirements. No monitoring set-aside program would be directly established by this action.

Overview of Herring Coverage Target Alternatives

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

TABLE 1. RANGE OF INDUSTRY-FUNDED MONITORING HERRING COVERAGE TARGET ALTERNATIVES

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

Herring Alternative 2.6: Combination Coverage on MWT Fleet in Groundfish Closed Areas	SBRM	Coverage would match selected alternatives 2.1-2.4	SBRM
* Sub-Options do not apply to Herring Alternative 2.5.			

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

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

Overview of Mackerel Coverage Target Alternatives

The Mid-Atlantic Fishery Management Council is interested in increasing catch monitoring in the Atlantic mackerel fishery to address the following goals and objectives: (1) Accurate estimates of catch (retained and discarded), (2) accurate catch estimates for incidental species for which catch caps apply, and (3) affordable monitoring for the mackerel fishery. The Mackerel Alternatives provide a range of data collection and monitoring costs through various monitoring types including NEFOP-level observing, at-sea monitoring, electronic monitoring, and portside sampling. Existing industry reporting requirements and observer coverage to meet SBRM, ESA, and MMPA requirements under the No Action alternative

would continue. Any information collected under the mackerel coverage target action alternatives would be in addition to existing reporting and monitoring.

TABLE 2. RANGE OF INDUSTRY-FUNDED MONITORING MACKEREL COVERAGE TARGET ALTERNATIVES

Gear Type	MWT	SMBT	SMBT	SMBT
Permit 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: 1) Waiver Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold			
Mackerel Alternative 2.1: NEFOP-Level Coverage	100%	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.				

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

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

administration of the program). Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards.

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

List of Acronyms and Abbreviations

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

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

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

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

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

The prioritization process would have the following steps:

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

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

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

Timing for this process is discussed below.

Weighting Approach

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

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

Step 1

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

Step 2

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

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

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

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

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

2. The species has high commercial or recreational value.

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

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

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

4. The species has special importance to the ecosystem.

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

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

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

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

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

   First, NMFS must be able to identify trips *a priori* in order to deploy coverage effectively. The SBRM fleet definitions (gear, mesh size, area) are robust to this requirement. Some other definitions (e.g., by target species or permit category) have proven difficult to implement coverage for, leading to inefficient use of resources. One example is the design of the coverage requirements for the longfin squid fishery related to the butterfish cap. Vessels intending to land over 2,500 lb longfin squid must notify the observer program 48 hours prior to departure in order to facilitate observer placement. Many vessels fishing with small mesh gear wished to have the option to land large quantities of longfin squid, should they encounter it. However, in that case, requiring vessels to notify the observer program about intent to target squid could lead to coverage on trips that do not ultimately target squid.

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

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

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

7. Uncertainty surrounding catch estimates

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

8. Risk to management based on fishery performance

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

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

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

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

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

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

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

- After completing the comparisons, total each horizontal row.

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

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

TABLE 6. EXAMPLE IFM CRITERIA COMPARISON TABLE

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

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

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

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

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

Rate each industry-funded monitoring program:

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

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

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

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

TABLE 7. EXAMPLE FMP RANKING USING IFM EVALUATION CRITERIA

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

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

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

If Alternative 2.2 (Council-led Prioritization) is selected, the Councils have the option to use this weighting approach outlined above, or develop their own joint process for prioritization, provided that criteria used to evaluate industry-funded monitoring

programs, as well as the rationale for the recommended prioritization approach, are made available to the public in advance.

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

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

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

Timing for discretionary alternatives (Alternatives 2.1 and 2.2)

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

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

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

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

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

2.3 ATLANTIC MACKEREL MONITORING ALTERNATIVES

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

be allocated to the MSB FMP to support industry-funded monitoring and (2) an industry-funded monitoring coverage target to meet MSB FMP objectives.

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

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

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

In Amendment 14 to the MSB FMP, the Mid-Atlantic Council recommended 100% observer coverage on all limited access mackerel trips using midwater trawl, 100% coverage on Tier 1 mackerel vessels using small mesh bottom trawl, 50% coverage on Tier 2 vessels using small mesh bottom trawl, and 25% coverage on Tier 3 vessels using small mesh bottom trawl. The Mid-Atlantic Council believed that the provisions for observer coverage recommended in Amendment 14 could enhance estimates of river herring and shad catch in the mackerel fishery. Support for high levels of observer coverage on limited access mackerel vessels, especially vessels using midwater trawls, was driven by a majority of stakeholders. Those stakeholders, as well as some members of the mackerel industry, believed that 100% observer coverage was necessary for the most active vessels to either confirm or disprove the claims that have been made regarding incidental river herring and shad catch in the mackerel fishery.

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

for increased observer coverage in Amendment 14 were ultimately disapproved. The rationale for the disapproval is included in the Appendix.

Monitoring Interests in the Mackerel Fishery

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

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

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

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

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

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

analysis also indicated that the purse seine fleet is responsible for a negligible amount of river herring and shad catch (0.3%).

Current Monitoring of the Mackerel Fishery

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

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

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

Overview of Mackerel Industry-Funded Monitoring Alternatives

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

The industry-funded monitoring coverage target alternatives for the mackerel fishery provide a range of data collections and monitoring costs. This document evaluates how different coverage target alternative meet specific monitoring goals identified by the MAFMC while comparing the costs of the monitoring programs, particularly costs that would be borne by the fishing industry. The mackerel coverage target action alternatives

include Northeast Fisheries Observer Program-level (NEFOP-level) observer, ASM, electronic monitoring (EM), and portside sampling coverage.

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

TABLE 15. RANGE OF MACKEREL INDUSTRY-FUNDED MONITORING ALTERNATIVES

Gear Type	MWT	SMBT	SMBT	SMBT
Permit Categories	All Tiers	Tier 1	Tier 2	Tier 3
Mackerel Alternative 1: No Coverage Target for IFM Program (No Action)	SBRM	SBRM	SBRM	SBRM
Mackerel Alternative 2: Coverage Target for IFM Program	Includes Sub-Options: 1) Waiver Allowed, 2) Wing Vessel Exemption, 3) 2 Year Sunset, 4) 2 Year Re-evaluation, and 5) 25 mt Threshold			
Mackerel Alternative 2.1: NEFOP-Level Coverage	100% NEFOP-Level Observer	100% NEFOP-Level Observer	50% NEFOP-Level Observer	25% NEFOP-Level Observer
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 and SMBT indicates small mesh bottom trawl vessels.				
Mackerel Alternatives would only apply to trips that land greater than 20,000 lb of mackerel. Sub-Options could apply to any of the alternatives.				

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

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

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

TABLE 16. PROPOSED AND OBSERVED SEA DAYS FOR FLEETS THAT TARGET MACKEREL

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

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

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

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

Currently, NEFOP observers are required to possess a HVF certification in order to observe the mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. HVF certification allows observers to cover any of the fisheries that pump catch, typically the

mid-water 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.

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

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

Under Mackerel Alternative 2, the MAFMC would specify the details of an industry-funded monitoring program for the mackerel fishery. These details may include, but are not limited to: (1) Level and type of coverage target, (2) rationale for level and type of

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

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

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

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

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

Alternative 2 is not selected by the Councils, service provider requirements for industry-funded monitoring programs would be developed and implemented in individual FMPs.

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

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

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

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

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

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

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

Prior to any trip declared into the mackerel fishery, representatives for vessels with limited access mackerel permits using midwater trawl or small mesh bottom trawl would be required to provide notice to NMFS and request a NEFOP-level observer through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not NEFOP-level observer coverage must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that NEFOP-level observer coverage is necessary, they would then be required to contact an industry-funded monitoring service provider to

obtain and pay for a NEFOP-level observer to carry on the vessel's next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing in excess of the incidental mackerel trip limit (i.e., 20,000 lb) without carrying an NEFOP-level observer on its next trip. If NMFS informs the vessel representative that NEFOP-level coverage is not necessary on the next trip, NMFS would issue the vessel a NEFOP-level observer coverage waiver.

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

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

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

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

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

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

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

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

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

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

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

Prior to any trip declared into the mackerel fishery, representatives for vessels with limited access mackerel permits using midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that at-sea monitoring coverage is necessary, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on the

vessel's next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing any mackerel without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not necessary on the next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

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

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

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

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

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

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

midwater trawl gear and vessels with Tier 1 mackerel permits using small mesh bottom trawl gear.

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

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

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

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

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

Tier 1 Small Mesh Bottom Trawl Vessels

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

Prior to any trip declared into the mackerel fishery, representatives for vessels with Tier 1 mackerel permits using small mesh bottom trawl gear would be required to provide notice to NMFS and request an at-sea monitor through the pre-trip notification system. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether or not an at-sea monitor must be procured through an industry-funded monitoring service provider. If NMFS informs the vessel representative that they

needed at-sea monitoring coverage, they would then be required to contact an industry-funded monitoring service provider to obtain and pay for an at-sea monitor to carry on the vessel's next fishing trip. The vessel would be prohibited from fishing for, taking, possessing, or landing mackerel in excess of the incidental mackerel trip limit (20,000 lb) without carrying an at-sea monitor on its next trip. If NMFS informs the vessel representative that at-sea monitoring coverage is not needed on the next trip, NMFS would issue the vessel an at-sea monitoring coverage waiver.

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

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

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

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

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

Rationale: In contrast to NEFOP-level observers, at-sea monitors would not collect whole specimens, photos, or biological samples (other than length data) from catch or data on interactions with protected species. The MAFMC recommended that at-sea monitors collect only a limited data set compared to NEFOP-level observers to allow for any possible cost savings associated with reducing training time, gear requirements, and internal

support resources necessary to administer an at-sea monitoring program for the mackerel fishery. (*See Appendix 5 – Analysis of ASM Costs for additional details.)*

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

Midwater Trawl Fleet

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

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

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

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

Electronic Monitoring

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

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

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

Equipment

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

- Video cameras. Video cameras would need to be mounted to provide a clear, unobstructed, and well illuminated views of the area(s) where the midwater trawl gear is retrieved prior to being placed in the hold. There would need to be a sufficient number of cameras with sufficient resolution for NMFS, the US Coast Guard, and other authorized officers/designees to determine that all catch was brought aboard the vessel after haulback. The EM system must be capable of initiating video recording at the time gear retrieval starts, and record all periods of time when the gear is being retrieved and until catch is placed in the hold or discarded.
- Global Positioning System (GPS) receiver. A GPS receiver would be required to document coordinates, velocity, and heading data.
- Hydraulic and drum rotation sensors. Hydraulic sensors would be required to continuously monitor the hydraulic pressure. Drum rotation sensor would be required to continuously monitor drum rotations.

- EM control box. The system would need to include a control box that receives and stores the raw data provided by the sensors and cameras. The control box would need to contain removable hard drives and sufficient storage systems capability to record data for the full duration of a trip (i.e., the longest expected trip length for the vessel).
- EM systems monitor. A wheelhouse monitor would be necessary to provide a graphical user interface for the vessel operator to monitor: 1) The state and performance of the control box, 2) information on the current date and time synchronized via GPS, 3) GPS coordinates, 4) current hydraulic pressure reading, 5) presence of a data disk, 6) percentage used of the data disk, 7) and video recording status.

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

Data Transfer

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

Retention Requirements

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

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

Review of EM Video Footage

Video footage would be sampled at some Council-specified and predetermined percent of review (50% or 100%), and then compared to released catch affidavits, VMS reports

describing slippage events, and/or observer data on slippage. The sampling of video footage would evaluate whether or not catch was discarded. The rate of review may be adjusted by the MAFMC via a framework action, to use the optimum and most cost effective rate to achieve the management goal.

Compliance Measures

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

Vessel Monitoring Plans

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

Portside Sampling

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

Sampling Design

The sampling design for portside sampling alternatives would be based on existing portside sampling programs for the mackerel fishery, administered by the Massachusetts Division of Marine Fisheries and Maine Department of Marine Resources, and consistent with NEFOP sampling methodology. Midwater trawl vessels returning from a declared mackerel trip would be sampled portside during the offload. Initially, the level of sampling

for midwater trawl trips would be approximately 50% or 100%. However, the sampling rate may be adjusted by the MAFMC to use the optimum and most cost effective rate to achieve management goals. Such factors as where catch is landed, ability to access the offload, and infrastructure limitations at certain landing ports, may prevent the program from achieving 100% coverage, even if funding is not limiting.

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

Landing Ports

Midwater trawl vessels returning from declared mackerel trips would be required to land catch in specific ports. In past years, the midwater trawl fleet has landed catch in Maine (Portland, Rockland, Vinalhaven, Prospect Harbor, Jonesport), New Hampshire (Newington), Massachusetts (Boston, Gloucester, New Bedford), Rhode Island (Point Judith, North Kingston), and New Jersey (Cape May). The list of specific landing ports and the details of offloading requirements in those ports would be developed as part of this amendment. 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 contracting with a service provider to arrange a portside sampler to sample catch from declared mackerel trips.

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

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

participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

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

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

The implementation of EM in the mackerel fishery would be 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.

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

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

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

Mackerel Alternative 2.4, similar to Mackerel Alternative 2.3, would vessels with limited access mackerel permits using midwater trawl gear to carry an operating EM system on every trip declared into the mackerel fishery and portside sampling of their catch on every declared mackerel trip selected for coverage by NMFS. If an operative EM system or

portside sampler was not available to cover a specific mackerel trip (either due to logistics or a lack of funding), that vessel would be prohibited from fishing for, taking, possessing, or landing mackerel in excess of the incidental mackerel trip limit (20,000 lb) on that trip. Acknowledging that available Federal funding to cover NMFS cost responsibilities may be limited, this alternative would likely reduce the ability of the vessel to participate in the mackerel fishery, unless Sub-Option 1 was selected allowing coverage requirements to be waived.

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

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

Under Mackerel Alternative 2.4, all slippage restrictions, reporting requirements, and consequence measures would apply to all midwater trawl vessels with limited access mackerel permits.

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

The implementation of EM in the mackerel fishery would be 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.

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

2.3.3 Considered But Rejected Mackerel Alternatives

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

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

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

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

4.3.5 IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES ON HUMAN COMMUNITIES

Another major consideration when evaluating an industry-funded monitoring program is the cost of the monitoring program. The requirement to pay for monitoring coverage increases operating costs for fishing vessels, which in turn reduces net vessel revenues and overall profitability.

There are two primary approaches for minimizing the cost of monitoring paid by industry. The first approach is to select the most cost effective type of coverage to meet program goals. For example, it may be more cost effective to use electronic monitoring rather than at-sea observers to confirm retention of catch on mackerel vessels.

The second approach to limit costs to industry is to set coverage levels at the lowest level necessary to gather information to meet program goals. For example, it may be possible to sufficiently increase precision around catch estimates for a certain species by setting a coverage target of 50%, rather than a coverage target of 100%.

Table 98 shows the range of costs associated with the different types of monitoring being considered for the mackerel fishery. A detailed description of industry cost responsibilities associated with each of these types of monitoring can be found in Appendix 6 – Monitoring Cost Estimates.

TABLE 98. 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

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.
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.

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. This may reduce training time, gear requirements, and internal support resources necessary to administer an at-sea monitoring program for the mackerel fishery resulting in a lower sea day rate than the groundfish at-sea monitoring program rate. (*See Appendix 5 – Analysis of ASM Costs for additional information.*) In the absence of an estimate specific to the mackerel at-sea monitoring program, the PDT/FMAT determined that using the groundfish at-sea monitoring sea day rate was appropriate, but the actual cost of a mackerel at-sea monitor may be more or less.

TABLE 99. 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 100 and the ongoing costs associated with EM are summarized in Table 101. Additional details on monitoring costs are available in Appendix 6 – Monitoring Cost Estimates.

TABLE 100. 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 101.

TABLE 101. 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 Day[2]
Equipment, including annual equipment costs estimated here include spare parts to replace broken or aging equipment, as well as licenses	$11	$11

for the use of proprietary software		
Field Services, including labor, travel, and other costs associated with repairs, technical support, and retrieving hard drives from the vessels and shipping them to the service provider for analysis	$78	$47
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%.

Midwater trawl vessels returning from mackerel trips would be required to land catch in specific ports for sampling. The list of specific landing ports and the details of offloading

requirements in those ports would be developed as part of this amendment. 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 vessel may not be able to land in those ports on trips that are selected for portside sampling.

TABLE 102. SUMMARY OF ECONOMIC IMPACTS OF MACKEREL COVERAGE TARGET ALTERNATIVES

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

Mackerel Alternative 2.3: Combination Coverage	• Negative impact associated with potential 10.3%-1.4% reduction in RTO • Negative impact associated with potential 16.4%*-1.4% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty of catch estimates in the mackerel fishery
Mackerel Alternative 2.4: EM and Portside Sampling on Midwater Trawl Vessels	• Negative impact associated with potential 8.3%*-1.8% reduction in RTO • Negative impact associated with potential 7.0%*-1.6% reduction in RTO with 25 mt threshold • Negative impact if fishing effort is limited by monitoring availability and mackerel harvest is limited • Low positive impact associated with additional information to reduce uncertainty around catch estimates in the mackerel fishery
* Reflects RTO from Year 2 of Mackerel Alternative 2.4	

The previous analysis of economic impacts of mackerel coverage target alternatives on the mackerel industry was based on trip cost data collected by NEFOP and showed the economic impact of the alternatives on partial vessel net revenues (gross revenues less certain trip costs). Because NEFOP only collects a limited amount of cost data, industry participants expressed concern that an analysis of net revenues underestimated vessel costs. In response, Jason Didden, staff of the MAFMC, offered to coordinate a survey of herring and mackerel vessels to collect more detailed cost information.

The survey requested information from vessel owners on total trip costs in 2014. The cost survey collected information on variable costs; payments to crew; the cost of repairs, maintenance, upgrades; and fixed costs. These data were used to update the impact analyses. To profile vessels, data were averaged across vessel types, by vessel characteristics, and primary species caught. The cost profiles of vessels, as adjusted by the estimated industry cost responsibilities of each mackerel coverage target alternative, were used to describe the economic impact on mackerel vessels. Economic impacts are described at an annual level. Surveys were sent to approximately 18 vessel owners (representing about 26 vessels) in the herring and/or mackerel fisheries. Surveys were sent in May 2015 and information was submitted for 16 of the 26 vessels. A copy of the survey is included in Appendix 7.

Analysis of the economic impact of industry-funded monitoring mackerel coverage target alternatives on fishery-related businesses compared industry cost responsibilities to 2014 mackerel vessel returns-to owner (RTO). RTO is calculated by subtracting fixed and operational costs from gross revenue (Table 1) and was used rather than net revenues to more accurately reflect income from fishing trips. RTO is similar to net income from a financial income statement. Other financial statement approaches, such as a balance sheet or a cash flow statement, are not used. These approaches consider other financial aspects of a business, such as total assets and liabilities and the ability to cover expenses within a particular time frame. Principal payments on loans, which matter from a balance sheet and

cash flow perspective, are not typically used in the calculation of RTO/net income. Depreciation of capital assets is typically part of a RTO/net income calculation. In this analysis, depreciation of vessel improvements is included but the depreciation of the vessel is not included because that information was not collected in the survey.

TABLE 103. SUMMARY OF TOTAL TRIP COSTS FOR HERRING AND MACKEREL VESSELS IN 2014

Cost Category	Description	Average Percent of 2014 Gross Revenue for Herring and Mackerel Vessels	Average Percent of 2014 Gross Revenue for Squid Vessels
Variable Costs	Annual fuel, oil, food, water, ice, carrier vessel, communication, fishing supplies, crew supplies, and catch handling costs	25%	35%
Crew Share	Total annual payments to crew	28%	26%
Repair, Maintenance, Upgrades, Haulout (RMUH)	Annual cost of repairs to engines, deck equipment, machinery, hull, fishing gear, electronics, processing equipment, refrigeration, safety equipment, upgrades and haulout Because these costs vary considerably from year to year and are typically spread out over several years, only a portion of these costs were applied to 2014 revenue	13%	11%
Fixed Costs	Annual mooring, dockage, permits and licenses, insurance, quota and DAS lease, crew benefits, vessel monitoring, workshop and storage, office, vehicle, travel, association, professional, interest, taxes, and non-crew labor costs Note: depreciation expense of the vessel is not included in fixed costs.	19%	21%
Return to Owner	Gross revenue less variable, crew share, RMUH, and fixed costs	15%	7%

The MAFMC is considering four types of industry-funded monitoring for the mackerel fishery, including NEFOP-level observers, at-sea monitors, EM, and portside sampling coverage. NEFOP-level and at-sea monitoring coverage would function independently, but EM and portside are intended to be used together.

Prior to any trip declared into the mackerel fishery, vessel representatives would be required contact NMFS and request monitoring coverage. If an SBRM observer was not selected to cover that trip, NMFS would notify the vessel representative whether

monitoring coverage must be procured through an industry-funded monitoring service provider. For the purposes of this analysis, however, it is assumed that there would be no SBRM coverage of trips. Therefore, the economic impacts of industry-funded monitoring cost alternatives described in this section may be an overestimate of actual costs.

Summary of Economic Analyses

In general, the economic analyses evaluated two groups of vessels, one group was paired midwater trawl vessels and the second group included single midwater trawl vessels and small mesh bottom trawl vessels. The single midwater trawl vessels were combined with small mesh bottom trawl vessels to avoid data confidentiality violations.

Sea day costs are similar across Mackerel Alternatives 2.1, 2.2, and 2.3 for all vessel types. However, median at-sea monitoring costs as a percent of RTO are about twice as high for single midwater trawl and Tier 1 small mesh bottom trawl vessels (combined) as they are for paired midwater trawl vessels.

Median EM and portside monitoring costs as a percent of RTO in Year 2 under Mackerel Alternatives 2.3 and 2.4 for single midwater trawl vessels are about twice as high than for paired midwater trawl vessels at the 20,000 lb threshold and four times as high at the 25 mt threshold.

Mackerel revenue comprises a smaller portion of total revenue for vessels participating in the mackerel fishery than herring revenue does for vessels participating in the herring fishery. Therefore, revenue from other fisheries would contribute more significantly to covering industry-funded monitoring costs in the mackerel fishery than revenue from other fisheries would be covering industry-funded monitoring costs in the herring fishery. Meaning that if vessels wanted to continue to declare mackerel trips, they may need to use revenue from other fisheries to pay the industry-funded monitoring costs associated with the mackerel fishery. For all participants in the mackerel fishery, the average percentage of revenue that comes from the mackerel fishery never exceeded 75% in 2014. Additionally, average mackerel revenue from single midwater trawl vessels is about 20% lower than average mackerel revenue from paired midwater trawl vessels. For this reason, single midwater trawl vessel would likely rely more on revenue from other fisheries to cover industry-funded monitoring costs in the mackerel fishery than paired midwater trawl vessels.

Another method for accounting for these differential impacts on vessels using revenue from other fisheries to cover monitoring costs in the mackerel fishery would be to apportion the overall RTO to the different fisheries and then reduce the mackerel RTO by the monitoring cost. However, to properly apportion RTO to fisheries, much more detailed cost data is required. If data were available on a trip basis, costs that are specific to the fishery pursued on that trip could be assigned. Fuel is a good example of this type of cost. However, the trip related cost data used in the RTO analysis is at an annual level. Even with highly detailed cost information there are still costs that do not vary by trip, such as insurance costs. It is unclear in this instance what method should be used to apportion

these costs. For these reasons, mackerel as a percentage of revenue, rather than mackerel RTO, is shown in the following tables to evaluate impacts on vessels using revenue from other fisheries to cover monitoring costs in the mackerel fishery.

Exempting trips that land less than 25 mt of mackerel (Mackerel Alternative 2 Sub-Option 5) reduces monitoring costs more for Mackerel Alternatives 2.1 and 2.2 (about 30%) than for Mackerel Alternatives 2.3 and 2.4 (about 23%).

Monitoring costs associated with EM and portside sampling are similar to the costs associated with at-sea monitoring in Year 1 for paired midwater trawl vessels, but EM and portside sampling costs are 14% less than at-sea monitoring costs in Year 2 for paired midwater trawl vessels at EM of $325/day and portside of $5.12/mt. For EM at $187/day and 50% portside coverage at $3.84/mt the monitoring costs are 60% less. For single midwater trawl and small mesh bottom trawl vessels, the monitoring costs associated with EM and portside are about half of the at-sea monitoring costs in Year 1 and about a quarter of the at-sea monitoring costs in Year 2.

Initial industry cost assumptions for Mackerel Alternative 2.4 estimated $325 per sea day for electronic monitoring (cameras on every midwater trawl vessel, video collected for the duration of the trip, 100% vide review) and $5.12 per mt for portside sampling (administration and sampling cost) on close to 100% of trips. Revised industry cost assumptions for Mackerel Alternative 2.4 estimated $187 per sea day for electronic monitoring (cameras on every midwater trawl vessel, video collected around haulback, 50% video review) and $3.84 per mt for portside sampling (only sampling costs) on 50% of trips. Using the revised cost assumptions rather than the initial cost assumption for Mackerel Alternative 2.4 reduces total industry monitoring costs by 52% ($45,812 to $21,796) in Year 2, at the 20,000 lb threshold, for paired midwater trawl vessels and reduces costs by 55% ($34,421 to $15,364) in Year 2, at the 20,000 lb threshold, for single midwater trawl vessels.

Many of the vessels that would be impacted by industry-funded monitoring costs in the mackerel fishery would also be impacted by industry-funded monitoring costs in the herring fishery. For example, all the vessels impacted by Mackerel Alternative 2.1 would also be impacted by Herring Alternative 2.1 (100% NEFOP-level observer coverage on Herring Category A and B vessels).

The tables and box plot figures ("box plots") on the following pages provide summarized economic data for each of the mackerel coverage target alternatives. The economic impact on vessels associated with paying for monitoring coverage is described as a percentage of RTO for each mackerel coverage target alternative in the following figures. The tables provide the mean and median number of sea days per vessel that would result from each of the alternatives, as well as the mean and median RTO that would ultimately be reduced by the industry-funded monitoring costs. Additionally, fleet level effort, revenue, and monitoring cost information for each mackerel coverage target alternative are also provided. Additional economic analysis is available in Appendix 9.

4.3.5.1 Impacts of Mackerel Alternatives 1 and 2 on Fishery-Related Businesses

Mackerel Alternative 1 would not specify a coverage target for an industry-funded monitoring program in the MSB FMP. Monitoring for mackerel vessels would be allocated according to SBRM. If there was Federal funding available after SBRM coverage requirements were met, additional monitoring for the mackerel fishery would be evaluated on a case-by-case basis. Under Mackerel Alternative 1, additional costs to vessels participating in the mackerel fishery associated with monitoring coverage, if there were any, would be evaluated on a case-by-case basis.

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

Currently, it is unknown if the mackerel stock is overfished or if overfishing is occurring. There is concern about the mackerel fishery and indications of reduced productivity related to low catches in recent years (TRAC 2010). Possible explanations include: (1) mackerel have moved away from traditional fishing grounds (as has occurred in Europe), (2) environmental conditions have resulted in a less productive or less fishable stock, or (3) the stock is overfished. A combination of these factors could also be possible. In recent years, the fleet has not been able to harvest the ACL or ACTs. Selection of Mackerel Alternative 1 will not likely affect the setting of mackerel harvest specifications, but it may affect the ability of the mackerel fishery to harvest mackerel. If less monitoring (when compared to Mackerel Alternative 2) results in the catch cap for river herring and shad limiting effort in the mackerel fishery.

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

Mackerel Alternative 2 is intended to allow for increased monitoring in the mackerel fishery by specifying coverage targets, above and beyond SBRM (Mackerel Alternative 1), for industry-funded monitoring. The realized coverage level in a given year would be

determined by the target coverage level and the amount of funding available to cover NMFS cost responsibilities in that year and would fall somewhere between no additional coverage above SBRM (Mackerel Alternative 1) and the specified coverage target (Mackerel Alternatives 2.1-2.4).

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 of river herring and shad tracked against catch caps, mackerel vessels may benefit from increased stability in the fishery.

Direct negative impacts on mackerel vessels associated with Mackerel Alternative 2 would likely result from reduced RTO after paying for monitoring coverage. The magnitude of the economic impact associated with paying for monitoring coverage would vary by mackerel coverage target alternative (Mackerel Alternatives 2.1-2.4). 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. Reducing fishing effort to match available monitoring may lack sufficient justification and be inconsistent with National Standards. Sub-Option 2 would exempt a wing vessel pair trawling with another vessel from industry-funded monitoring requirements, provided the vessel does not carry any fish. Sub-Option 3 would require that industry-funded monitoring requirements expire two years after implementation. Sub-Option 4 would require the MAFMC to examine the results of any increased coverage in the mackerel fishery two years after implementation, and consider if adjustments to the coverage targets are warranted. Depending on the results and desired actions, subsequent action to adjust the coverage targets could be accomplished via specifications, a framework

adjustment, or an amendment to the MSB FMP, as appropriate. Lastly, Sub-Option 5 would exempt trips that land less than 25 mt of mackerel from industry-funded monitoring requirements.

If selection of the sub-options under Mackerel Alternative 2 minimizes the likelihood of positive or negative economic impacts on mackerel vessels, then the economic impacts associated with the sub-options may be reduced and/or similar to impacts under Mackerel Alternative 1. Additionally, under Mackerel Alternative 2, because the 25 mt threshold differs from the triggers used to determine which trips count against catch caps for river herring and shad (20,000 lb of mackerel), the data generated by selecting Sub-Option 5 may bias (either higher or lower) the catch tracked against catch caps when compared to not selecting Sub-Option 5.

Both Mackerel Alternative 1 and Mackerel Alternative 2 would require compliance with slippage restrictions, reporting requirements, and consequence measures. These measures are intended to improve catch monitoring by minimizing discarding. Because these measures apply to to both Mackerel Alternatives 1 and 2, the cost of complying with these requirements many be similar under Mackerel Alternatives 1 and 2, unless monitoring coverage is substantially higher under Mackerel Alternative 2. In that case, the cost of complying with these requirements may be higher under Mackerel Alternative 2.

Impacts under Mackerel Alternative 2 assume that the future behavior of fishery participants will be similar to that in past years, when in reality fishery participants are likely to engage in a range of mitigation behaviors to reduce the economic impact associated with industry-funded monitoring. For example, vessels that have historically participated in many fisheries may stop fishing for mackerel and only participate in fisheries that do not have industry-funded monitoring requirements. However, if a vessel does not have the ability to participate in other fisheries, it may not be able to mitigate the impacts of industry-funded monitoring in that way. At this time, it is not possible to predict what, if any, mitigation behaviors may be used by mackerel fishery participants.

Coverage Target Alternatives

Mackerel Alternative 2 would specify a level and type of industry-funded monitoring for the mackerel fishery. The types of industry-funded monitoring considered by the MAFMC for the mackerel fishery include: NEFOP-level observers, at-sea monitors, and electronic monitoring and portside sampling. Monitoring alternatives allocate coverage by fleet or permit category.

Under Mackerel Alternative 2, the amount, quality, and cost of information collected as part of an industry-funded monitoring would vary with the type of coverage target alternative specified for the mackerel fishery. Economic impacts on vessels participating in the mackerel fishery associated with specific coverage target alternatives (Mackerel Alternatives 2.1-2.4) are discussed in the following section.

Monitoring and Service Provider Requirements

Mackerel Alternative 2 would specify that requirements for industry-funded observers and at-sea monitors include a HVF certification for the mackerel fishery. The HVF certification was developed in order to more effectively train certified NEFOP observers in high volume catch sampling and documentation. HVF certification allows observers to cover any of the fisheries that pump catch, typically the mid-water 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 both observers and at-sea monitors would be required to possess a HVF certification under Mackerel Alternative 2. Mackerel vessels do not pay for observer training under Mackerel Alternative 1, but vessels would be responsible for additional observer and at-sea monitor training costs under Mackerel Alternative 2. Therefore, the economic impact on mackerel vessels of a HVF certification requirement under Mackerel Alternative 2 would be more negative than under Mackerel Alternative 1.

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

The direct economic impacts on mackerel vessels would be more negative under Mackerel Alternative 2 than under Mackerel Alternative 1 because vessels would be paying for additional monitoring coverage. To the extent that increased information on mackerel catch has indirect economic impacts on mackerel vessels under Mackerel Alternative 2, those indirect impacts may not be realized under Mackerel Alternative 1.

4.3.5.2 Impacts of Mackerel Coverage Target Alternatives 2.1- 2.4 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 as well as river herring and shad. These data are also used to track catch of other not-target species and catch of protected species.

The mackerel fishery is managed with a catch cap for river herring and shad. If the catch cap is harvested, effort in the mackerel fishery is restricted.

Mackerel Alternatives 2.1 would specify NEFOP-level observer coverage, Mackerel Alternatives 2.2 would specify at-sea monitor coverage, Mackerel 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 pay for monitoring coverage exceeds 10%. Additional background and summary information can be found in tables and box plots displayed starting on page 334.

TABLE 104. 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%

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.
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.

In general, the negative economic impact on mackerel vessels of paying for monitoring coverage (as measures by the potential reduction in the RTO) is greatest with Mackerel Alternatives 2.3 and 2.4 (Year 2), followed by Mackerel Alternatives 2.1and 2.2. These impacts are influenced by the type of information collected and amount of coverage specified.

Both NEFOP-level observer coverage and at-sea monitoring coverage would provide species composition data on retained and discarded catch, while portside sampling coverage would provide species composition data on retained catch. NEFOP-level observers and at-sea monitors can estimate amounts of discards. EM cannot estimate the amount of discards, but EM can verify retention of catch.

Because discarding in the mackerel fishery is minimal, Alternatives that increase the amount of information on retained and discarded catch (Mackerel Alternatives 2.1, 2.2, and 2.3) will likely have the same likelihood of affecting the data tracked against catch caps than alternatives that increase the amount of information on just retained catch (Mackerel Alternative 2.4). Increased monitoring of river herring and shad catch may help reduce variability in estimates of catch that is tracked against catch caps, when that variability may have otherwise led to effort restrictions in the mackerel fishery. Conversely, additional monitoring may illustrate higher than expected catch of river herring and shad, resulting in catch caps that are fully harvested earlier than expected and reduced opportunities to harvest mackerel. Increased information to help track catch against catch caps may help allow more opportunity to harvest mackerel or it may curtail the harvest of mackerel by the mackerel fishery.

Mackerel Alternatives 2.1, 2.2, 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 economic impact on mackerel vessels of paying for higher levels of monitoring coverage would be more negative than paying for lower levels of monitoring. Therefore, alternatives that specify higher coverage rates may have a more negative direct impact on mackerel vessels paying for monitoring coverage than alternatives with lower coverage rates.

While high levels of monitoring are not always necessary to address a monitoring goal, because the MAFMC is interested in increasing monitoring to improve the accuracy of catch estimates, in particular the ability to track catch against catch caps, more monitoring could be more effective than less monitoring. Additionally, because the catch of river herring and shad is highly variable, both spatially and temporally, increased monitoring for those

species 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, specifying a higher coverage target may have more indirect positive economic impacts on mackerel vessels than specifying a lower coverage target.

Mackerel Alternatives 2.1 – 2.4 primarily would allocate monitoring coverage by vessel permit category. The extent to which the allocation of industry-funded coverage is consistent SBRM fishing fleet will determine how the resulting data can be used. Unless vessel permit category is equivalent to fishing fleet, the resulting information from the mackerel alternatives may have limited utility. The additional information on catch and bycatch estimates in the mackerel fishery obtained via Mackerel Alternatives 2.1 – 2.4 could be used for tracking catch against ACLs and catch caps, but it is unlikely that those data could be used to estimate discards for stock assessments. Any indirect economic benefits for mackerel vessels related to data utility would be similar across alternatives.

The coverage targets for NEFOP-level observer and at-sea monitoring coverage would be calculated by combining SBRM and industry-funding monitoring coverage. One way to achieve this combined coverage target would be to use an estimate of the previous year's SBRM coverage for mackerel vessels (e.g., 15%) would be combined with industry-funded monitoring (e.g., 85%) to reach a 100% target coverage level. In contrast, the coverage targets for both EM and portside sampling would be calculated independent of and in addition SBRM coverage. For example, to reach a 50% coverage target in a given year, the rate of EM footage review and portside sampling would both equal 50%, regardless of the amount of SBRM coverage on midwater trawl vessels. Alternatives that specify NEFOP-level observer or at-sea monitoring coverage may have less of a direct negative economic impact on mackerel vessels than alternatives that specify EM or portside sampling coverage, even if the same coverage target is selected, because vessels would not be paying for the SBRM coverage.

The realized coverage level in a given year would be determined by the amount of funding available to cover NMFS cost responsibilities in that year. If coverage is not available (either due to logistics or a lack of funding) for a specific trip, Mackerel Alternatives 2.1-2.4 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.

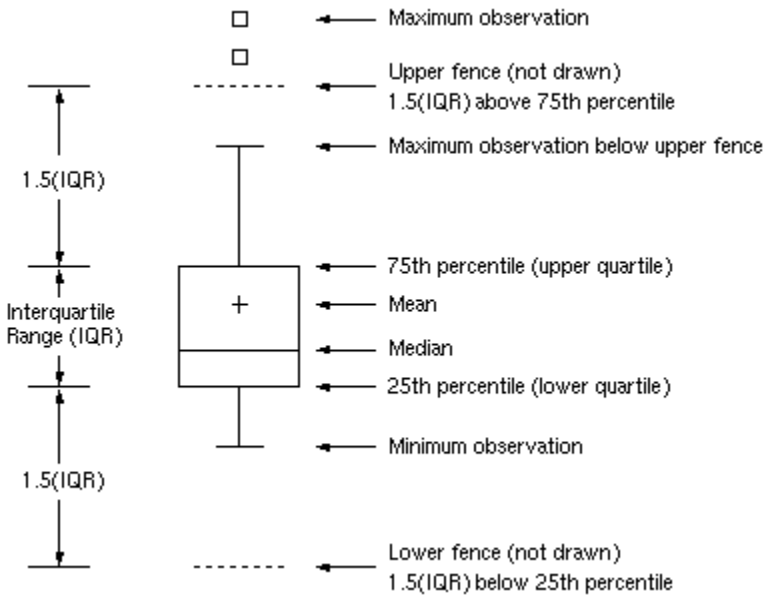
Indirect positive impacts on mackerel vessels associated with Mackerel Alternative 2 may result from increased monitoring helping to reduce variability around catch and bycatch estimates in the mackerel fishery leading to additional harvesting opportunities. If

increased monitoring reduces the variability in the catch of river herring and shad tracked against the catch cap, mackerel vessels may be less likely to be constrained by the catch cap.

Direct negative impacts on mackerel vessels associated with Mackerel Alternative 2 would likely result from reduced RTO after paying for monitoring coverage. The magnitude of the economic impact associated with paying for monitoring coverage would vary with mackerel coverage target alternative (Mackerel Alternatives 2.1-2.4). If increased monitoring results in the river herring and shad catch cap being harvested more often than expected, an indirect negative impact on mackerel vessels may be that the harvest of mackerel is constrained. While the full extent of positive and negative impacts to mackerel vessels may be difficult to quantify under Mackerel Alternative 2, the impacts may not be realized under Mackerel Alternative 1.

In summary, the direct economic impacts on mackerel vessels associated with Mackerel Alternatives 2.1-2.4 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. An indirect positive impact would result if increased monitoring deceased the uncertainty around river herring and shad catch such that it was less likely that mackerel harvest was constrained by catch caps. An indirect negative impact would result if increased monitoring showed higher than expected catch of river herring and shad such that it was more likely that mackerel harvest would be inappropriately constrained by catch caps.

The following box plots show of the distribution of monitoring costs and the distribution of monitoring costs as a percent of a vessel's RTO. Box plots are a useful tool to show how data are distributed. The following schematic shows what the various pieces of a box plot show regarding the distribution of data.



When examining the box plots, it is important to note the differences between mean and median values by gear type and by alternatives, as well as the differences in the variability of values by these criteria. For example, in the first figure (Mackerel Alternative 2.1) there is a wider range of costs for single midwater and small mesh bottom trawl vessels than for paired midwater trawl vessels, as represented by the length of the rectangle. Further, the difference between alternatives for both vessel categories shows that the mean and median values are lower under the 25 mt threshold (Sub-Option 5) but also that the likely range of NEFOP costs are much narrower.

TABLE 105. 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

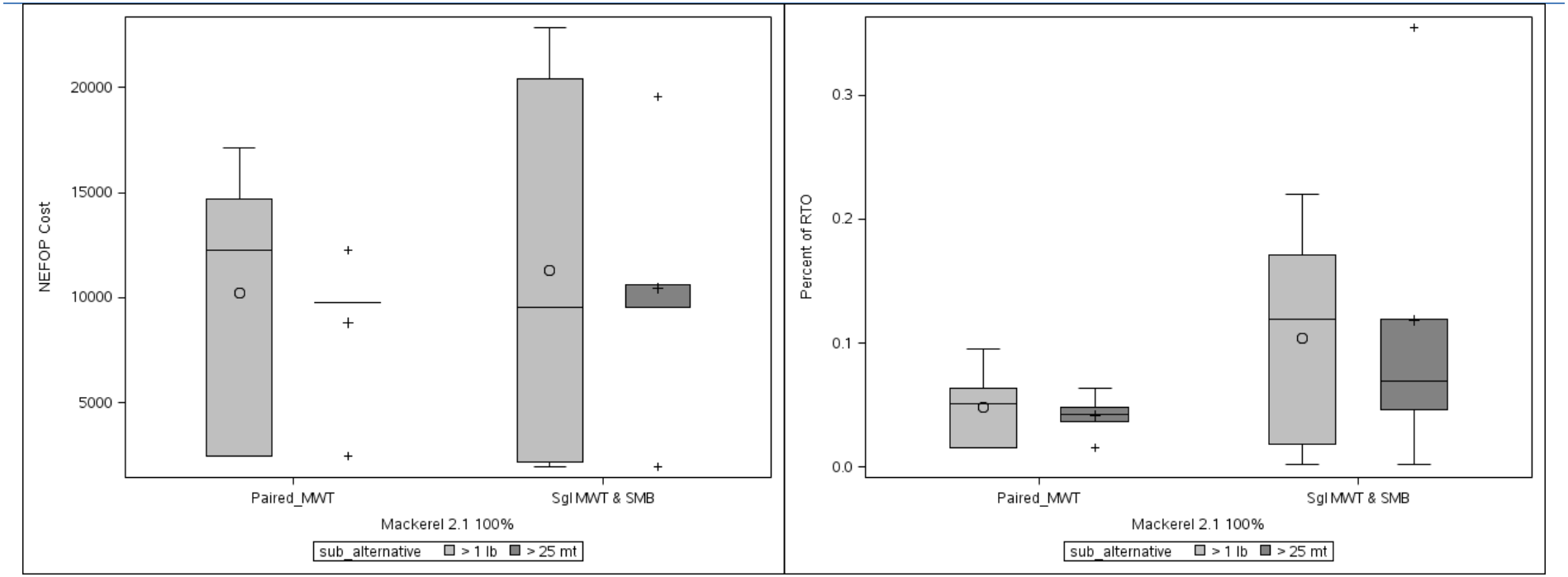


FIGURE 16. MACKEREL ALTERNATIVE 2.1 100% NEFOP COST AND PERCENT OF RTO

Figure 16 describes the approximate costs that applicable vessels with various gear types would incur annually from Alternative 2.1, which would require 100% coverage by NEFOP-level observers on vessels with limited access mackerel permits (includes vessels that use midwater trawl and small mesh bottom trawl gear). The MAFMC included thresholds of >20,000 lb (light grey) and > 25 mt (55,115 lb) (darker grey) for trips that would require monitoring – a 25 mt threshold would reduce the number of trips that had to be monitored and thus reduce costs.

Since this type of figure is used often in this document, additional detail on how to interpret the figure is provided to serve as a guide for interpreting other similar figures. All costs are based on the fleets operating as they did in 2014, and are derived from the number of days that they fished in 2014 on trips when they landed either 20,000 lb of mackerel or 25 mt of mackerel (the two thresholds being considered that would trigger monitoring). The line in the bar is the median (half of vessels would have higher or lower costs than the median cost) and the "o" or "+" within the bar shows the mean (average). Where the mean and median do not align there is some degree of skewedness to the data (generally if the mean is higher than the median there are a few unusually high values and if the median is higher than the mean there are a few unusually low values). When the median and mean are substantially different the median is more illustrative of the typical monitoring costs for vessels, so the median is the focus of this analysis.

The shaded bars show where 50% of the data are (the "interquartile range") and the whiskers show the range of values that lie within 1.5 times the interquartile percentile range. Together, the bars and whiskers illustrate whether the data are tightly grouped or highly variable (here highly variable would mean that some vessels would have high costs and some vessels would have low costs). An "o" or "+" outside the whiskers shows an extreme outlier. For example, there is a high outlier data point with the percent of RTO for single midwater trawl and small mesh bottom trawl vessels at a 25 mt threshold for monitoring.

For Mackerel Alternative 2.1 NEFOP costs, paired midwater trawl vessels are slightly more impacted than single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are comparable at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the NEFOP monitoring costs for vessels may be similar. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) are approximately $12,000 for paired midwater trawl vessels, and $10,000 for small mesh bottom trawl and single midwater trawl vessels. Recall the median is the point at which half of the vessels would pay more and half would pay less than that amount, and that wide bars and long whiskers indicate a wider range of costs/impacts across vessels. The lack of shaded bars and whiskers seen in portions of this plot stems from the small number of applicable trips represented in this analysis. For example, the plot representing NEFOP costs for paired midwater trawl vessels at the 25 mt threshold comprises only four trips, and thus lacks any bars or whiskers.

Costs are generally lower when a 25 mt threshold is used since not as many trips trigger a monitoring requirement. For the analysis of the 25 mt threshold, some vessels had no qualifying trips and drop out of the analysis, so even if the medians/averages stay similar the total fleet costs may still substantially decline). If a 25 mt threshold is used (darker grey bars), median costs are approximately $10,000 for paired midwater trawl vessels and $11,000 for small mesh bottom trawl and single midwater trawl vessels.

For Mackerel Alternative 2.1 costs as a percent of RTO, single midwater trawl and small mesh bottom trawl vessels are more impacted than paired midwater trawl vessels at both the 20,000 lb and 25 mt threshold. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 5.1%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 11.9%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 4.3%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 6.9%. The lack of small shaded bars and lack of whiskers seen in portions of this plot stems from the small number of applicable trips represented in this analysis. For example, the plot representing percent of RTO for paired midwater trawl vessels at the 25 mt threshold comprises only four trips, and thus has a very small bar with no lower whiskers.

In implementation, since vessels would have to declare their intent to fish for mackerel and the monitoring would be triggered based on that declaration of intent, costs may be higher if vessels want the option to fish for mackerel on more days than they actually caught mackerel in 2014.

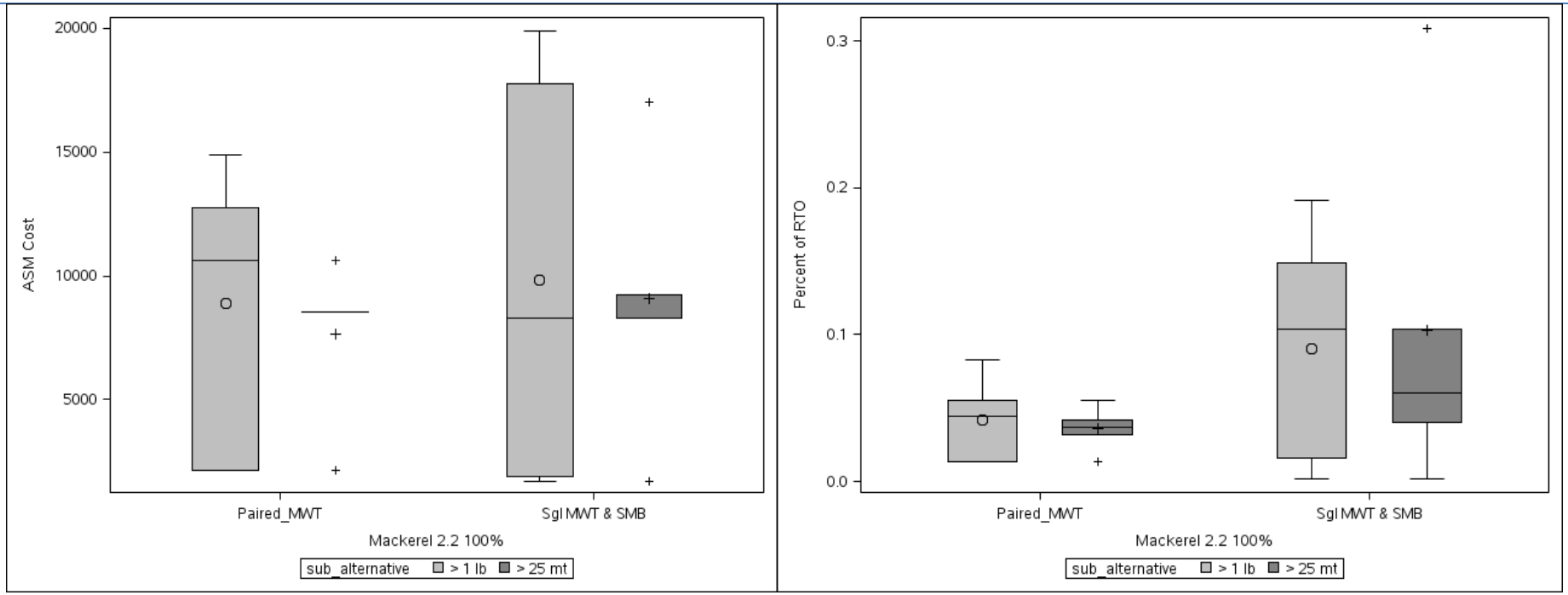


FIGURE 17. MACKEREL ALTERNATIVE 2.2 100% ASM COST AND PERCENT OF RTO

ASM costs for paired midwater trawl vessels are slightly more impacted than single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are comparable at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the ASM monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) are approximately $11,000 for paired midwater trawl vessels, and $8,000 for small mesh bottom trawl and single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $8,500 for paired midwater trawl vessels and $9,000 for small mesh bottom trawl and single midwater trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is higher for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 4.4%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 10.3%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 3.7%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 6.0%.

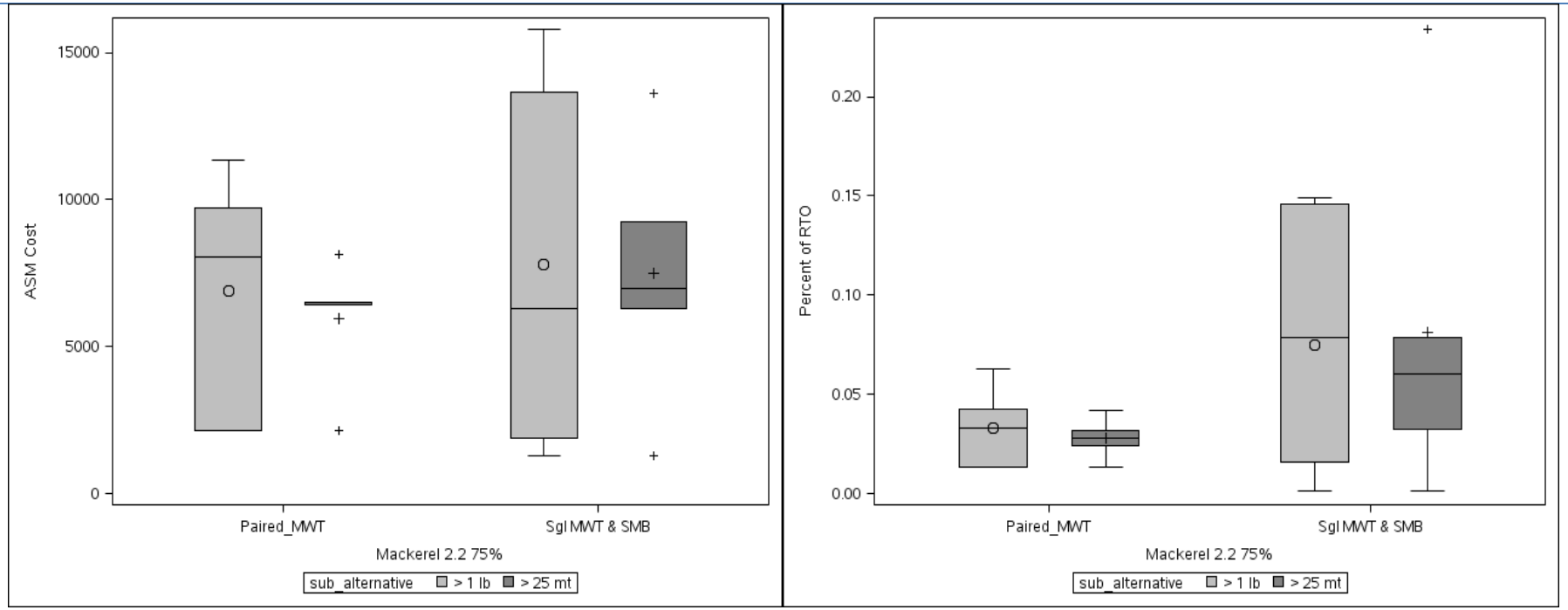


FIGURE 18. MACKEREL ALTERNATIVE 2.2 75% ASM COST AND PERCENT OF RTO

ASM costs (75%) for paired midwater trawl vessels are slightly higher than for single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are comparable at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the ASM monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb mackerel threshold (light grey bars) are approximately $8,000 for paired midwater trawl vessels, and $6,000 for small mesh bottom trawl and single midwater trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $6,000 for paired midwater trawl vessels, and $7,000 for small mesh bottom trawl and single midwater trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is higher for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 3.3%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 7.9%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 2.8%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 6.0%.

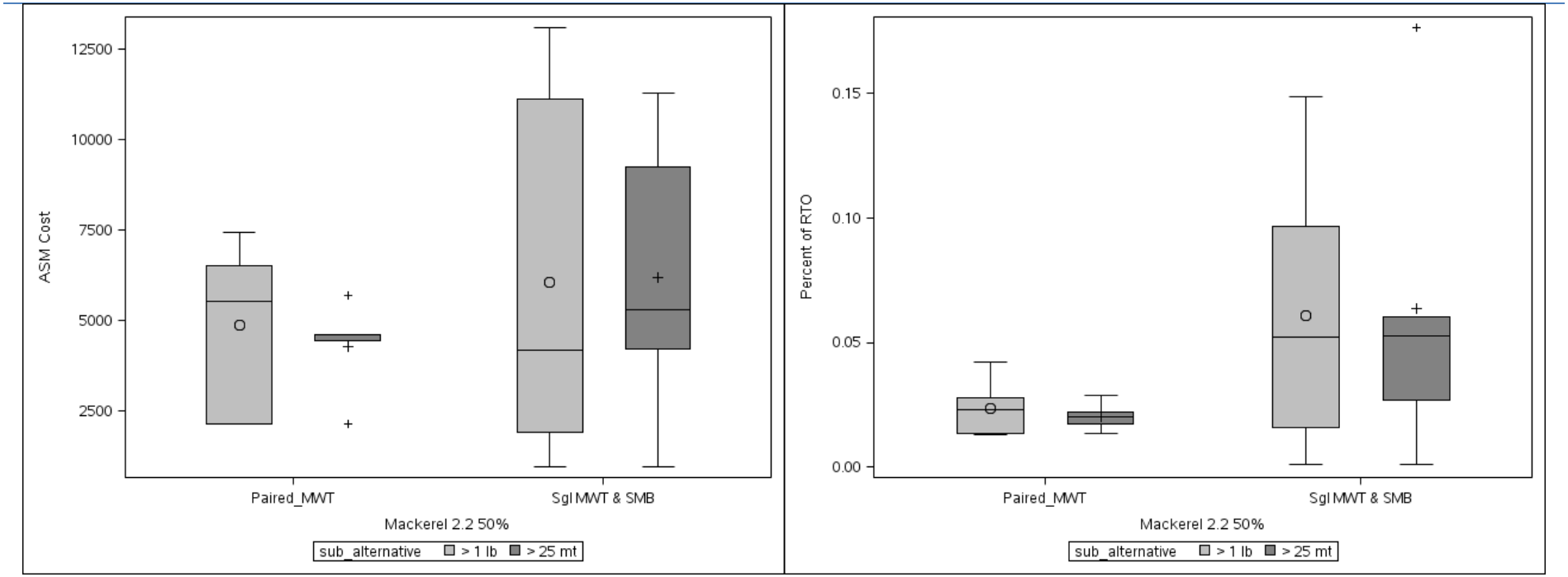


FIGURE 19. MACKEREL ALTERNATIVE 2.2 50% ASM COST AND PERCENT OF RTO

ASM costs (50%) for paired midwater trawl vessels are slightly higher than for single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are slightly lower at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the NEFOP monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb mackerel threshold (light grey bars) are approximately $6,000 for paired midwater trawl vessels, and $4,000 for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $5,000 for paired midwater trawl vessels, and $5,000 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is more impacted than paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 2.3%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 5.2%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 2.0%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 5.3%.

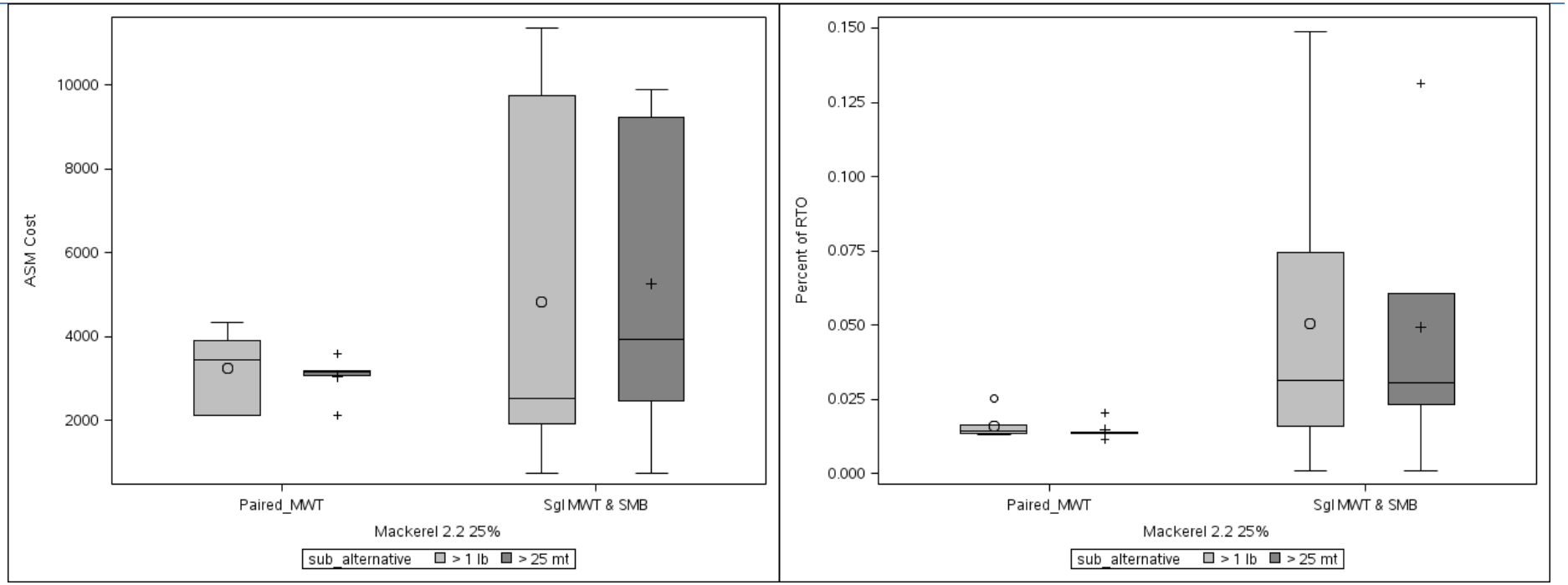


FIGURE 20. MACKEREL ALTERNATIVE 2.2 25% ASM COST AND PERCENT OF RTO

ASM costs (25%) for paired midwater trawl vessels are slightly higher than for single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are slightly lower at the 25 mt threshold. At the 20,000 lb threshold, there was skewedness in opposite directions for paired midwater trawl vessels (skewed low) and single midwater trawl and small mesh bottom trawl vessels (skewed high), indicating that the ASM monitoring costs for vessels may be more similar than indicated by the median. Median costs for the gear types at the 20,000 lb mackerel threshold (light grey bars) are approximately $3,500 for paired midwater trawl vessels, and $2,500 for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $3,000 for paired midwater trawl vessels, and $4,000 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is more impacted than paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 1.4%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 3.1%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 1.4%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 3.1%.

TABLE 106. MACKEREL ALTERNATIVE 2.1 AND 2.2 – ANNUAL FLEET LEVEL SUMMARY

Fleet Level	Paired MWT ≥ 20k LB	Paired MWT > 25 MT	Single MWT & SMBT ≥ 20k LB	Single MWT & SMBT > 25 MT
Number of Vessels	6	5	7	5
Days at Sea	75	54	97	64
Total NEFOP Cost at 100%	$61,200	$44,064	$78,926	$52,257
Total ASM Cost at 100%	$53,250	$38,340	$68,673	$45,468
Total Revenue	$1.5M	$1.3M	$2.4M	$2.0M
% Revenue Herring	18.8%	15.4%	28.9%	23.8%
% Revenue Mackerel	80.9%	84.4%	35.7%	41.4%
% Revenue Squid	-		3.9%	0.2%

Data shown by trips harvesting ≥ 20,000 lb of mackerel and > 25 mt of mackerel

TABLE 107. 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

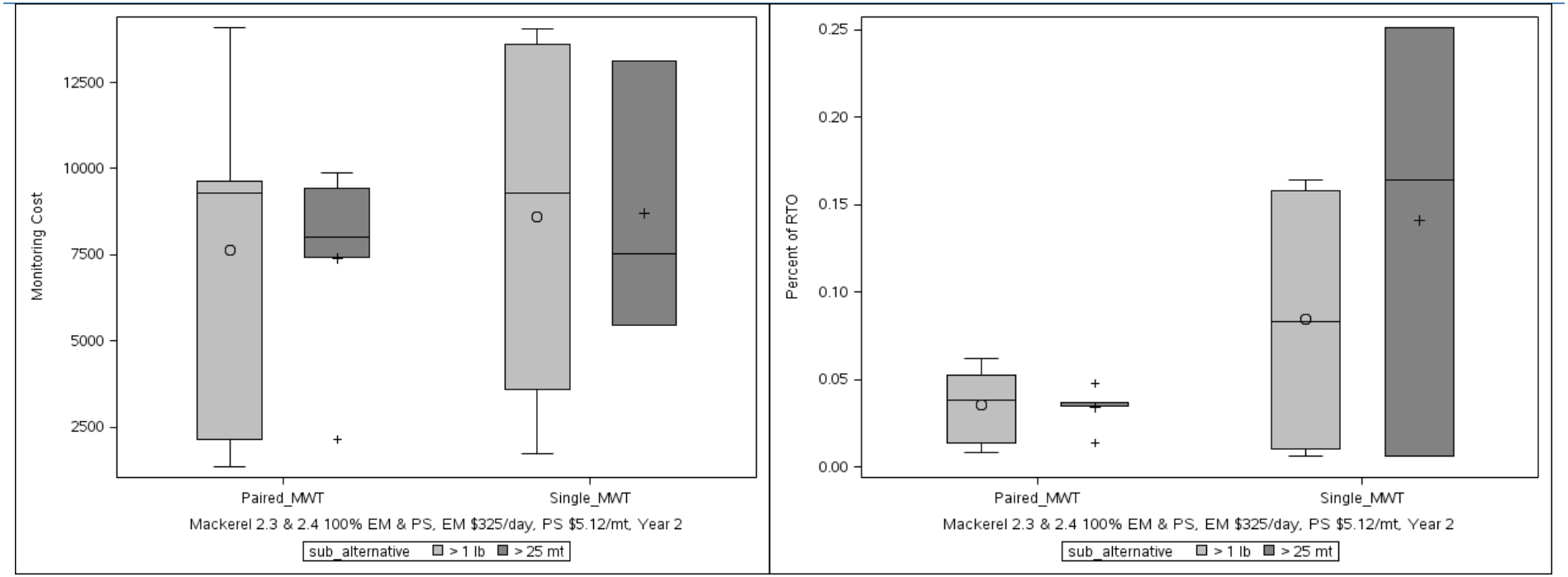


FIGURE 21. MACKEREL ALTERNATIVES 2.3 AND 2.4 100% EM AND PORTSIDE COST AND PERCENT OF RTO

100% EM and portside monitoring costs are approximately equal for paired midwater trawl vessels and single midwater trawl and small mesh bottom trawl vessels at both the 20,000 lb mackerel threshold and the 25 mt threshold. At the 20,000 lb threshold, all vessel types skewed lower, but distribution of costs within the interquartile range was more even about the median in single midwater trawl and small mesh bottom trawl vessels. This indicates that a substantial range exists for midwater trawl vessels in the highest quartile, while single midwater trawl and small mesh bottom trawl vessel costs are more evenly distributed about the median. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) was approximately $9,000 for paired midwater trawl vessels and for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $8,000 for paired midwater trawl vessels, and $7,500 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is substantially greater than for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 3.8%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 8.3%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 3.7%, while RTO for single midwater trawl and small mesh bottom trawl vessels was 16.4%.

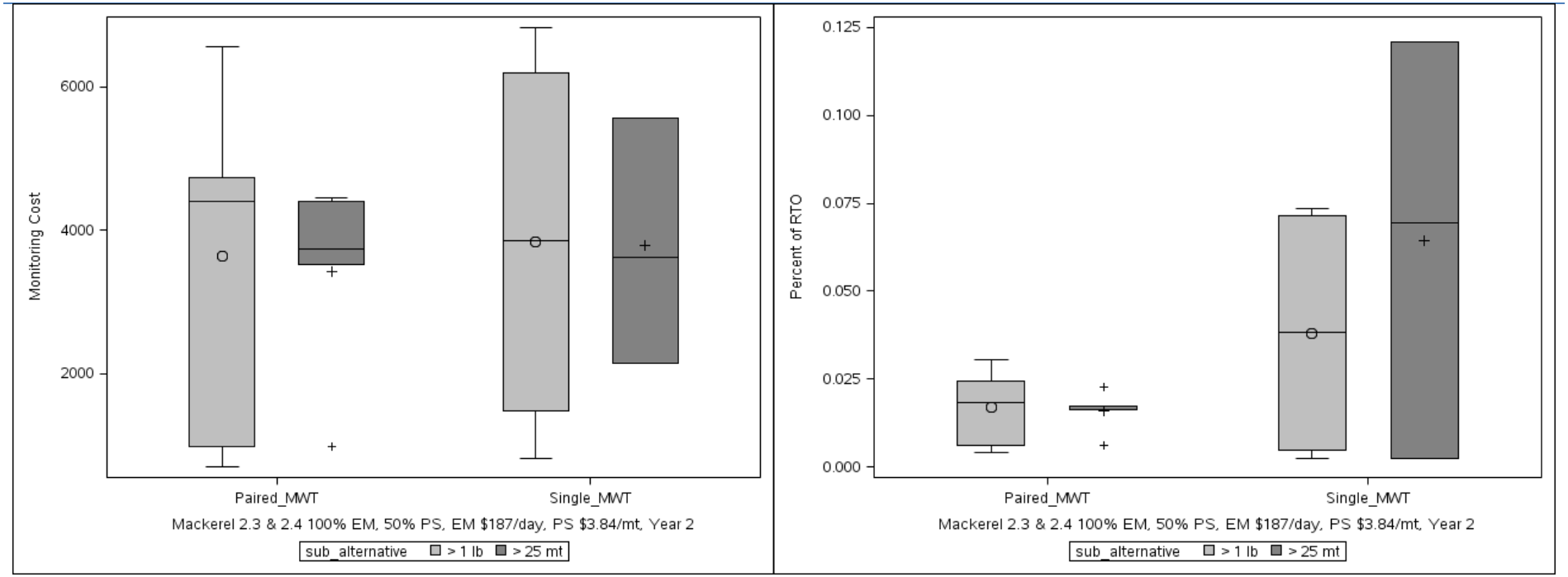


FIGURE 22. MACKEREL ALTERNATIVES 2.3 AND 2.4 50% EM AND PORTSIDE COST AND PERCENT OF RTO

50% EM and portside monitoring costs are slightly greater for paired midwater trawl vessels than single midwater trawl and small mesh bottom trawl vessels at the 20,000 lb mackerel threshold, and are approximately equal at the 25 mt threshold. At the 20,000 lb threshold, paired midwater trawl vessels skewed lower, indicating that most paired midwater trawl vessels have monitoring costs above the average, while single midwater trawl and small mesh bottom trawl vessel costs are more evenly distributed about the median. Median costs for the gear types at the 20,000 lb of mackerel threshold (light grey bars) were approximately $4,500 for paired midwater trawl vessels and $4,000 for single midwater trawl and small mesh bottom trawl vessels. If a 25 mt threshold is used (darker grey bars), median costs are approximately $4,000 for paired midwater trawl vessels and $3,500 for single midwater trawl and small mesh bottom trawl vessels.

Percent of RTO for single midwater trawl and small mesh bottom trawl vessels is substantially greater than for paired midwater trawl vessels at both the 20,000 lb and 25 mt thresholds. For the 20,000 lb threshold, RTO for paired midwater trawl vessels was approximately 1.8%, while RTO for single midwater trawl and small mesh bottom trawl vessels was around 3.8%. At the 25 mt threshold, RTO for paired midwater trawl vessels was approximately 1.6%, while RTO single midwater trawl and small mesh bottom trawl vessels was 7.0%.

TABLE 108. MACKEREL ALTERNATIVE 2.3 & 2.4 – ANNUAL FLEET LEVEL SUMMARY (MWT VESSELS ONLY)

Fleet Level	Paired MWT ≥ 20k LB	Paired MWT > 25 MT	Single MWT ≥ 20k LB	Single MWT > 25 MT
Number of Vessels	6		4	
Days at Sea	75		42	
Total Monitoring Cost (100% EM at $325/day, 100% PS at $5.12/mt, year 2)	$45,812	$36,898	$34,421	$26,122
Total Monitoring Cost (100% EM at $187/day, 50% PS at $3.84/mt, year 2)	$21,796	17,112	$15,364	$11,340
Total Revenue	$1.4M		$1.2M	
% Revenue Herring	18.8%		51.8%	
% Revenue Mackerel	81.0%		48.0%	
% Revenue Squid	-		-	
Data shown by trips harvesting ≥ 20k lb of herring and > 25 mt of herring				

4.3.6 ATLANTIC MACKEREL ALTERNATIVES

TABLE 109. SUMMARY OF OVERALL IMPACTS ASSOCIATED WITH MACKEREL COVERAGE TARGET ALTERNATIVES

Alternatives	Mackerel Resource	Non-Target Species	Protected Species	Physical Environment	Fishery-Related Businesses
Mackerel Alternative 1: No Coverage Target Specified For IFM Programs (No Action)	Low Positive	Low Positive	Low Positive	Negligible	Low Positive
Mackerel Alternative 2: Coverage Target Specified For IFM Programs	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.1: NEFOP-Level Coverage on Midwater Trawl Vessels and Tier 1-3 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.2: ASM Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.3: Combination Coverage on Midwater Trawl Vessels and Tier 1 SMBT Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative
Mackerel Alternative 2.4: EM and Portside Sampling Midwater Trawl Vessels	Low Positive	Low Positive	Low Positive	Negligible	Negative

Industry-Funded Monitoring Omnibus Amendment

Supplement to the Draft Environmental Assessment

Mid-Atlantic Fishery Management Council
May 2016

Prepared by NOAA's National Marine Fisheries Service

1.1 OBSERVER COVERAGE IN 2015

The table below describes Northeast Fisheries Observer Program (NEFOP) coverage by gear type. Revisions to the Standardized Bycatch Reporting Methodology (SBRM) in April 2015 affected how funding is used to allocate observer coverage. Therefore, the level of observer coverage during 2015 may be more indicative of future observer coverage levels than observer coverage levels from previous years.

2015 Midwater Trawl[1], Purse Seine[2], and Small Mesh Bottom Trawl[3] Observer Coverage Rates

Gear	Observer Coverage[4]
Midwater Trawl	4.7%
Purse Seine	2.5%
Small Mesh Bottom Trawl	9.1%

Source: DMIS and ODBS databases as of 2016-05-21

[1]Midwater Trawl: Includes both single and paired midwater trawl gears

[2]Purse Seine: Includes all purse seine gears (including tuna)

[3]Small Mesh Bottom Trawl: Includes bottom trawl gear w/codend mesh size less than 5.5" excluding bottom otter twin trawl, scallop and shrimp trawl trips

[4]Includes observer trips w/at least 1 observed haul divided by VTR trips reporting kept catch

1.2 MONITORING CATCH CAPS IN THE MACKEREL FISHERY

The proposed observer coverage levels in the Atlantic mackerel fishery described in Mackerel Alternative 1 of the Industry-Funded Monitoring (IFM) Omnibus Amendment was evaluated with regard to its impact on River Herring/Shad (RHS) Catch Cap catch estimate precision. Fishing years (FY) 2014-2015 were included in the analysis because they were the only years when the catch cap was effective. The FY2015 data for these catch caps are not finalized, and should be considered preliminary. Mackerel discards were not evaluated.

The Atlantic mackerel fishery currently has a single RHS catch cap that covers all trips landing greater than 20,000 pounds of mackerel regardless of gear or area. Atlantic Mackerel, Squid, and Butterfish Amendment 14 implemented the RHS Catch Cap and was effective on April 4, 2014, for all of fishing year 2014 (January-December).

Catch cap estimates in the Atlantic mackerel fishery are comprised of both incidental kept and discard components. Current quota monitoring methodology for the catch cap employs the cumulative method to extrapolate incidental catch (kept and discard) to the fleet based on a ratio estimator (incidental catch divided by total catch) derived from Northeast Fisheries Observer Program (NEFOP) data. Only observed trips are used to derive the ratio estimator. Fleet kept all (KALL) is obtained from vessel trip

reports (VTR) and dealer data, which provides effort information (gear and area) and landings information respectively. Actual observed incidental catch amounts are used in lieu of estimated incidental catch amounts whenever possible.

This analysis uses the same data sources as quota monitoring. However, this analysis focuses strictly on the precision of the incidental catch ratio estimator in the catch cap, and does not incorporate the replacement of actual observed values for estimated incidental catch based on the ratio estimator (described above). Furthermore, this analysis is constrained to trips that count towards the catch cap (e.g., trip must land >20,000 pounds of mackerel). Trips that would not be counted against the catch cap are not included in this analysis. The coefficient of variation (CV), defined for this analysis as the ratio of the standard error of total catch (incidental kept and discards), was used to quantify the precision of the estimated catch. The CV is sensitive to sample size. In a finite population the CV will converge to zero as the sample size approaches the population size. The total fishing trips within a stratum is considered finite, therefore as sampling coverage approaches 100%, the CV will converge to zero for that stratum. The CV analysis follows the guidelines detailed by the SBRM and uses the trip as the sampling unit. Only observed trips (trips with at least one observed haul) and trips reporting kept catch on their VTR were used in the CV analysis. This distinction is important to understand when interpreting observer coverage rates (referred to below as "realized" observer coverage) because in the paired midwater trawl fishery it is not uncommon for wing vessels to carry observers but not carry any catch. These trips would not be reflected in the observer coverage rates described in this analysis. Furthermore, trips that did not yield any observed hauls are excluded from this analysis.

The At-Sea Monitor (ASM) as defined by the IFM Amendment will collect both retained and discarded catch composition in a manner consistent with existing NEFOP protocols. Therefore it is assumed that there will be no difference in the catch composition data collected by NEFOP observers and ASMs under Mackerel Alternatives 2.1 and 2.2.

Due to the structure of Alternatives 2.1-2.4, along with the very limited amount of data available for the Mackerel RHS Catch Cap, it was infeasible to simulate the potential impacts of these alternatives. Instead a summary analysis of 2014 and 2015 was performed to describe the CVs observed in those fishing years as well as a general fleet profile of the vessels covered by the Mackerel RHS Catch Cap.

Table 1 and Figure 1 summarize the CV calculated according to SBRM methodology as well as the realized observer coverage for the catch cap during the years when the catch cap was in place. For each year, the CV and the realized observer coverage in italics are shown in Table 1. The Mackerel RHS Catch Cap exhibited variable CVs between 2014 and 2015 and showed a decline in both observer coverage and CV in 2015. Given the limited time-series it is difficult to infer a trend. However, it is important to note the very small number of trips that were observed in 2015. Table 1 and Figure 1 characterize the history of catch cap estimate precision produced from NEFOP coverage (Mackerel Alternative 1).

TABLE 1. MACKEREL RHS CATCH CAP CV AND OBSERVER COVERAGE, 2014-2015

	Fishing Year[1]: CV (Observer Coverage)	
Catch Cap	**2014**	**2015[3]**
RHS-Mackerel	48.9% *(37.8%)*	22.7% *(7.3%)[3]*

Source: GARFO Quota Monitoring Database as of 5/22/2016
[1]Catch cap fishing year: river herring/shad = calendar year; haddock = May-April
[3]Fishing Year 2015 data are PRELIMINARY

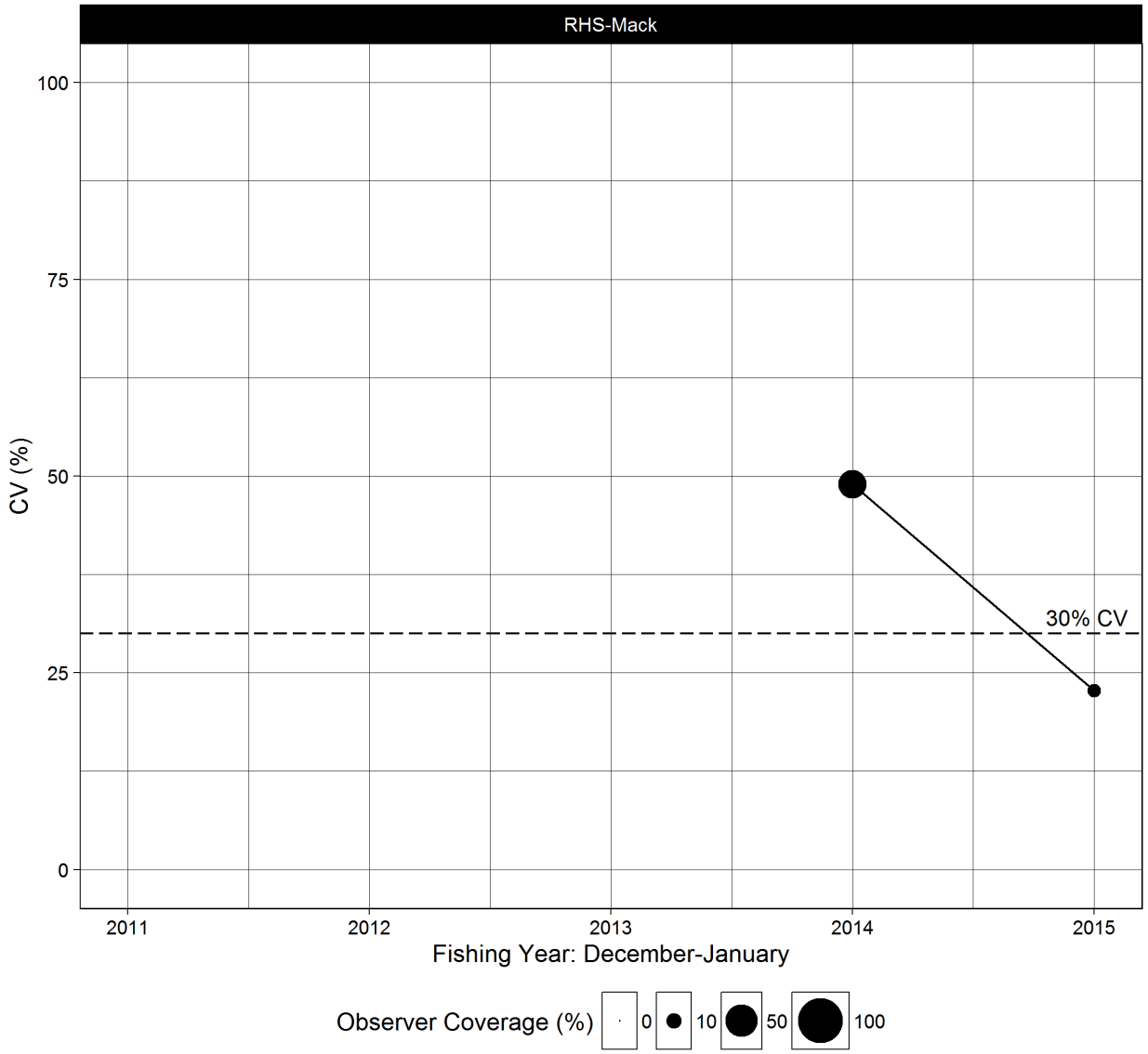


FIGURE 1. MACKEREL RHS CATCH CAP CV AND OBSERVER COVERAGE (DOT SIZE) IN RELATION TO A 30% CV.

Figure 2 details a CV curve calculated according to SBRM methodology across varying coverage levels in relation to a 30% CV. This curve is solely based on observer data within 2014 and 2015 and influenced

by how observer coverage was assigned for each particular year and does not describe the potential impacts of Mackerel Alternatives 2.1-2.4.

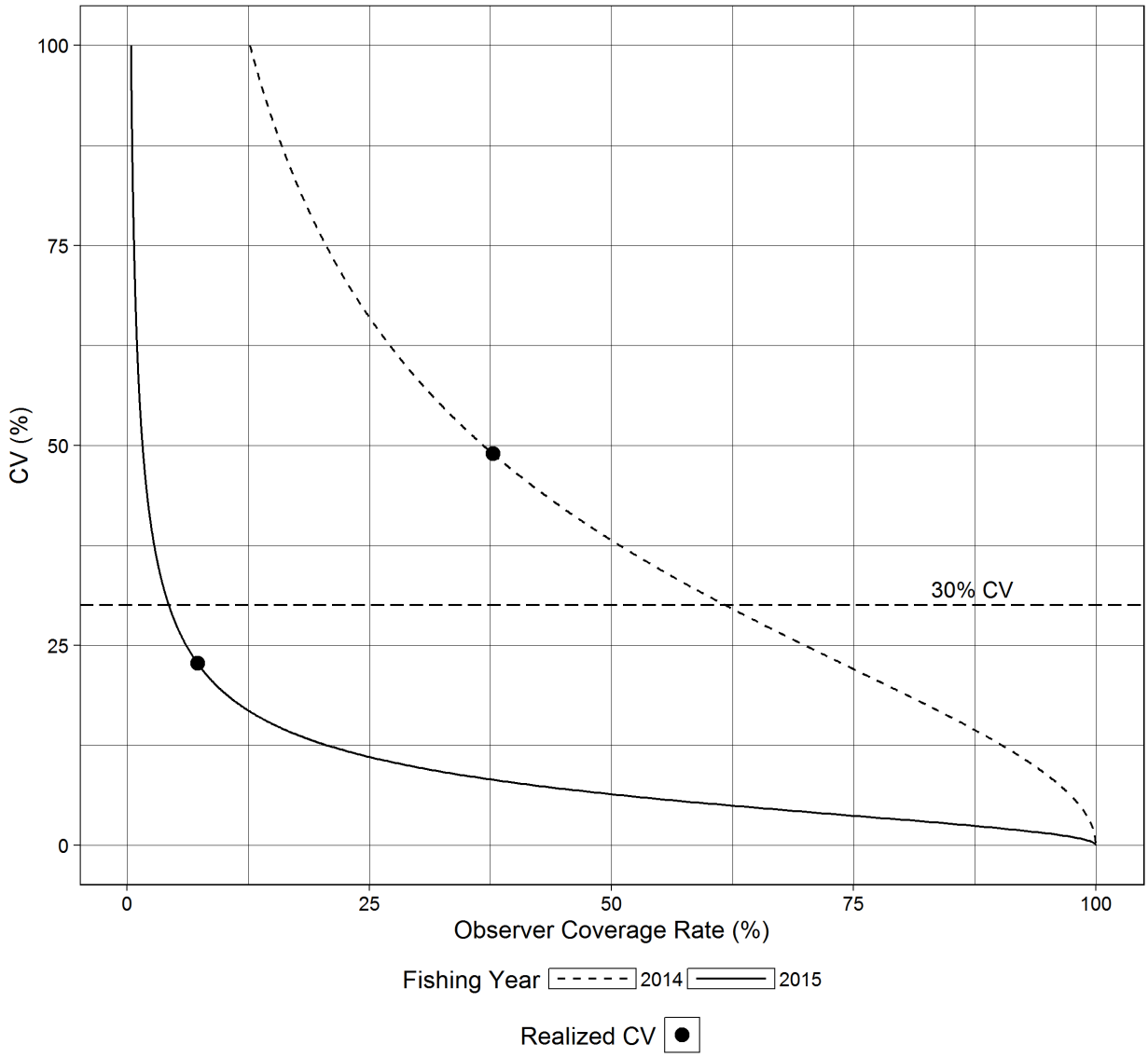


FIGURE 2. 2014-2015 DERIVED CV CURVE FOR MACKEREL RHS CATCH CAP BASED ON SBRM SAMPLE SIZE ANALYSIS METHODOLOGY, WITH REALIZED CV FOR THE CATCH CAP YEAR (BLACK DOT)

Mackerel RHS Catch Cap trips between 2014 and 2015 were comprised of both midwater and bottom trawl vessels. On average, 84% of Mackerel RHS Catch Cap trips between 2014 and 2015 were conducted by Tier 1 Midwater Trawl vessels. Out of those trips, 76% of them landed greater than 25 mt. Overall, the amount effort in the Mackerel RHS Catch Cap was low in 2014-2015, and therefore CV behavior could change if effort increases in the future.

1.3 MONITORING CATCH CAPS IN THE HERRING FISHERY

The proposed observer coverage levels in the Atlantic herring fishery described in Herring Alternatives 2.1 and 2.2 of the IFM Omnibus Amendment were evaluated with regard to their impact on Haddock and RHS Catch Cap catch estimate precision. Only fishing years (FY) when catch caps were implemented were included in the analysis. The Haddock Catch Cap analysis includes 2011-2015 fishing and the RHS Catch Cap analysis includes 2014-2015 fishing years. The FY2015 data for these catch caps are not finalized, and should be considered preliminary. Herring discards were not evaluated. Herring discards are generally a small component of the overall herring catch. Herring discards are estimated by extrapolating discards from observed hauls only. In recent years, herring discards have accounted for well less than 1% of the total herring catch.

The Atlantic herring fishery currently has six catch caps: (1) Haddock: Georges Bank (GB) Midwater Trawl, (2) Haddock: Gulf of Maine (GOM) Midwater Trawl, (3) RHS: Cape Cod (CC) Midwater Trawl, (4) RHS: GOM Midwater Trawl, (5) RHS: Southern New England (SNE) Bottom Trawl, and (6) SNE Midwater Trawl. The GB and GOM Haddock Catch Caps were implemented through Groundfish Framework 46 in 2011, which separated the previous existing Haddock Catch Cap into GB and GOM stock areas and adjusted the estimation methodology to the current extrapolation method. Herring Framework Adjustment 3 implemented RHS Catch Caps for 2014-2015 that were effective on December 4, 2014. The Haddock Catch Caps operate on a May-April Fishing Year, while the RHS Catch Caps operate on a January-December Fishing Year. For RHS Catch Caps, trips landing greater than 6,600 pounds of herring are counted against an individual catch cap, depending on the gear and area of the trip. For Haddock Catch Caps, all midwater trawl trips in GB and GOM are counted against the catch caps.

Catch cap estimates in the Atlantic herring fishery are comprised of both incidental kept and discard components. Current quota monitoring methodology for these catch caps employs the cumulative method to extrapolate incidental catch (kept and discard) to the fleet based on a ratio estimator (incidental catch divided by total catch) derived from NEFOP data. Only observed trips are used to derive the ratio estimator. Fleet kept all (KALL) is obtained from VTR and dealer data, which provides effort information (gear and area) and landings information respectively. Actual observed incidental catch amounts are used in lieu of estimated incidental catch amounts whenever possible.

This analysis uses the same data sources as quota monitoring. However, this analysis focuses strictly on the precision of the incidental catch ratio estimator in each catch cap, and does not incorporate the replacement of actual observed values for estimated incidental catch based on the ratio estimator (described above). Furthermore, this analysis is constrained to trips that count towards a specific catch cap (e.g., RHS cap trips must land >6,600 pounds of herring regardless of gear). Trips that would not count against a catch cap are not included in this analysis. The CV, defined for this analysis as the ratio of the standard error of total catch (incidental kept and discards), was used to quantify the precision of the estimated catch. The CV is sensitive to sample size. In a finite population, the CV will converge to zero as the sample size approaches the population size. The total fishing trips within a stratum is considered finite, therefore, as sampling coverage approaches 100%, the CV will converge to zero for

that stratum. The CV analysis follows the guidelines detailed by the SBRM and uses the trip as the sampling unit. Only observed trips (trips with at least one observed haul) and trips reporting kept catch on their VTR were used in the CV analysis. This distinction is important to understand when interpreting observer coverage rates (referred to below as "realized" observer coverage) because in the paired midwater trawl fishery it is not uncommon for wing vessels to carry observers but not carry any catch. These trips would not be reflected in the observer coverage rates described in this analysis. Furthermore, trips that did not yield any observed hauls are excluded from this analysis.

The At-Sea Monitor (ASM) as defined by the IFM Amendment will collect both retained and discarded catch composition in a manner consistent with existing NEFOP protocols. Therefore it is assumed that there will be no difference in the catch composition data collected by NEFOP observers and ASMs under Herring Alternatives 2.1 and 2.2. This analysis uses NEFOP data as a proxy for potential future ASM coverage estimate simulations. Also, observer and ASM coverage targets proposed in the IFM Amendment are additive, so simulated CV estimates based on proposed coverage targets assume both SBRM and IFM coverage will contribute to the target.

Table 2 and Figure 3 summarize the CV calculated according to SBRM methodology as well as the realized observer coverage for each catch cap during the years when catch caps were in place. For each year and catch cap, the CV and the realized observer coverage in italics are shown in Table 2. Although there is no defined CV target, a 30% CV was provided for context. The GB Haddock Catch Cap remained below a CV of 30% for all years except for 2015, while the GOM haddock had a CV of 0% for all years because no GOM haddock catch was observed. The RHS Catch Cap CVs are more variable, but it is difficult to infer a trend based on the limited data. Table 2 and Figure 3 characterize the history of catch cap estimate precision produced from NEFOP coverage (Herring Alternative 1). It must be noted that due to the implementation of RHS catch caps in late 2014, most of the 2014 effort was not subject to the RHS Catch Cap. Furthermore, the 2015 GB Haddock Catch Cap was closed in October, effectively truncating the May-April fishing year.

TABLE 2. HERRING CATCH CAP CV AND OBSERVER COVERAGE, 2011-2015

	Fishing Year[1]: CV (Observer Coverage)				
Catch Cap Fishery	**2011**	**2012**	**2013**	**2014**	**2015[3]**
Haddock: GB Midwater Trawl	17.6% *(41.7%)*	12.3% *(62.9%)*	21.3% (*35.6%)*	20.5% *(27.2%)*	61.4% *(4.9%)***
Haddock: GOM Midwater Trawl	0.0% *(30.4%)*	0.0% *(29.2%)*	0.0% (*34.8%*)	0.0% *(46.3%)*	0.0% *(8.6%)*
Herring-RHS: CC Midwater Trawl				36.2% *(48.0%)**	81.4% *(10.1%)*
Herring-RHS: GOM Midwater Trawl				37.3% *(50.0%)**	94.8% *(8.7%)*
Herring-RHS: SNE Bottom Trawl				28.4% *(17.4%)**	24.5% *(15.0%)*
Herring-RHS: SNE Midwater Trawl				70.2% *(3.4%)**	11.8% *(2.3%)*

Source: GARFO Quota Monitoring Database as of 5/22/2016

[1]Catch cap fishing year: river herring/shad = calendar year; haddock = May-April

[3]Fishing Year 2015 data are PRELIMINARY

*2014 Herring RHS fishing year partially covered by RHS Catch Caps which was implemented on December, 4 2014

**2015 GB Haddock fishing year truncated due to the closure of the GB Haddock AM Area on October 22, 2015

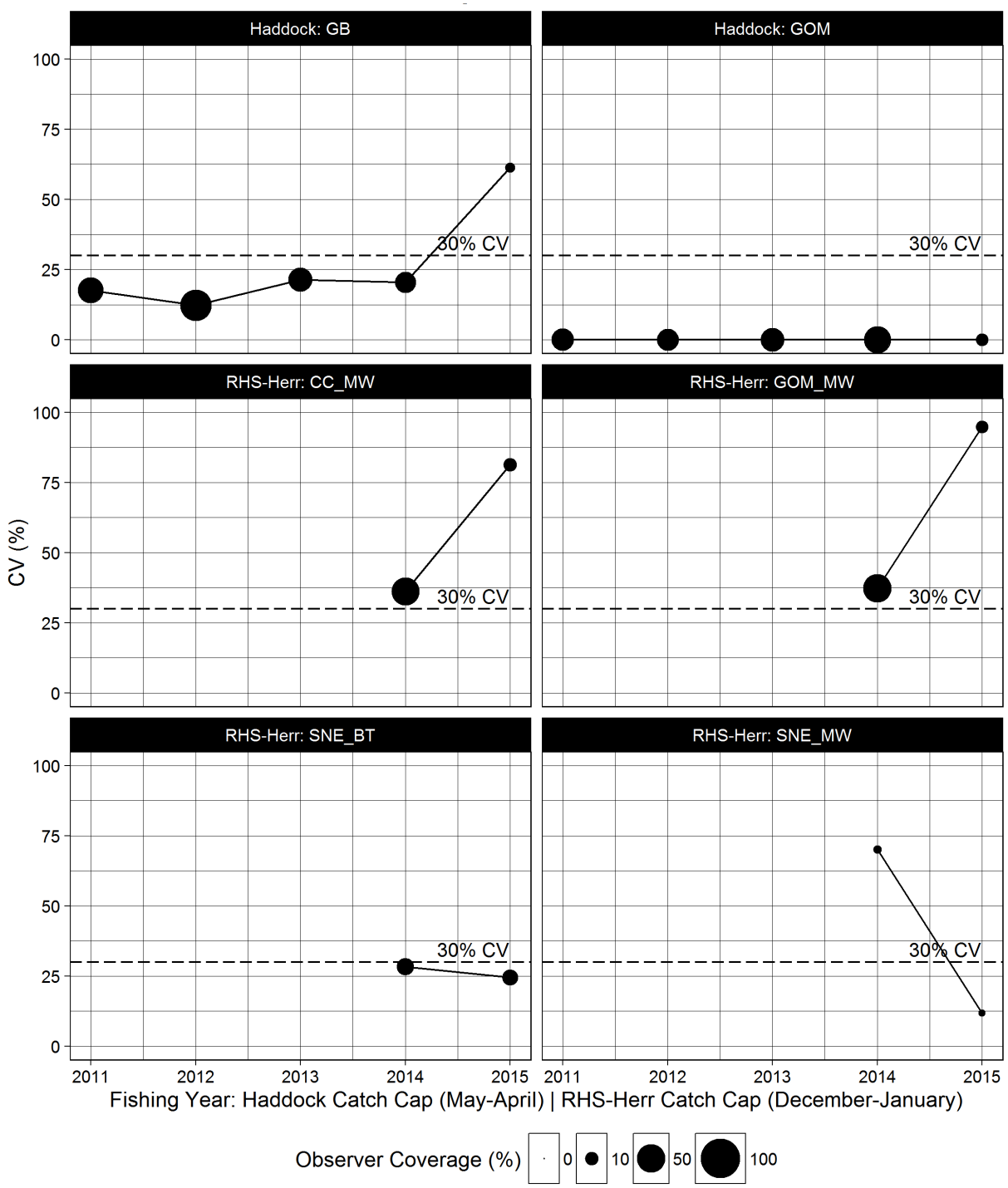


FIGURE 3. HERRING CATCH CAP CV AND OBSERVER COVERAGE (DOT SIZE) IN RELATION TO A 30% CV.

Figure 4 details CV curves calculated according to SBRM methodology across varying coverage levels in relation to a 30% CV. These curves are solely based on observer data within each catch cap and year

and are estimated on those data and how observer coverage was assigned for that particular year and does not describe the potential impacts of Alternative 2.1-2.2.

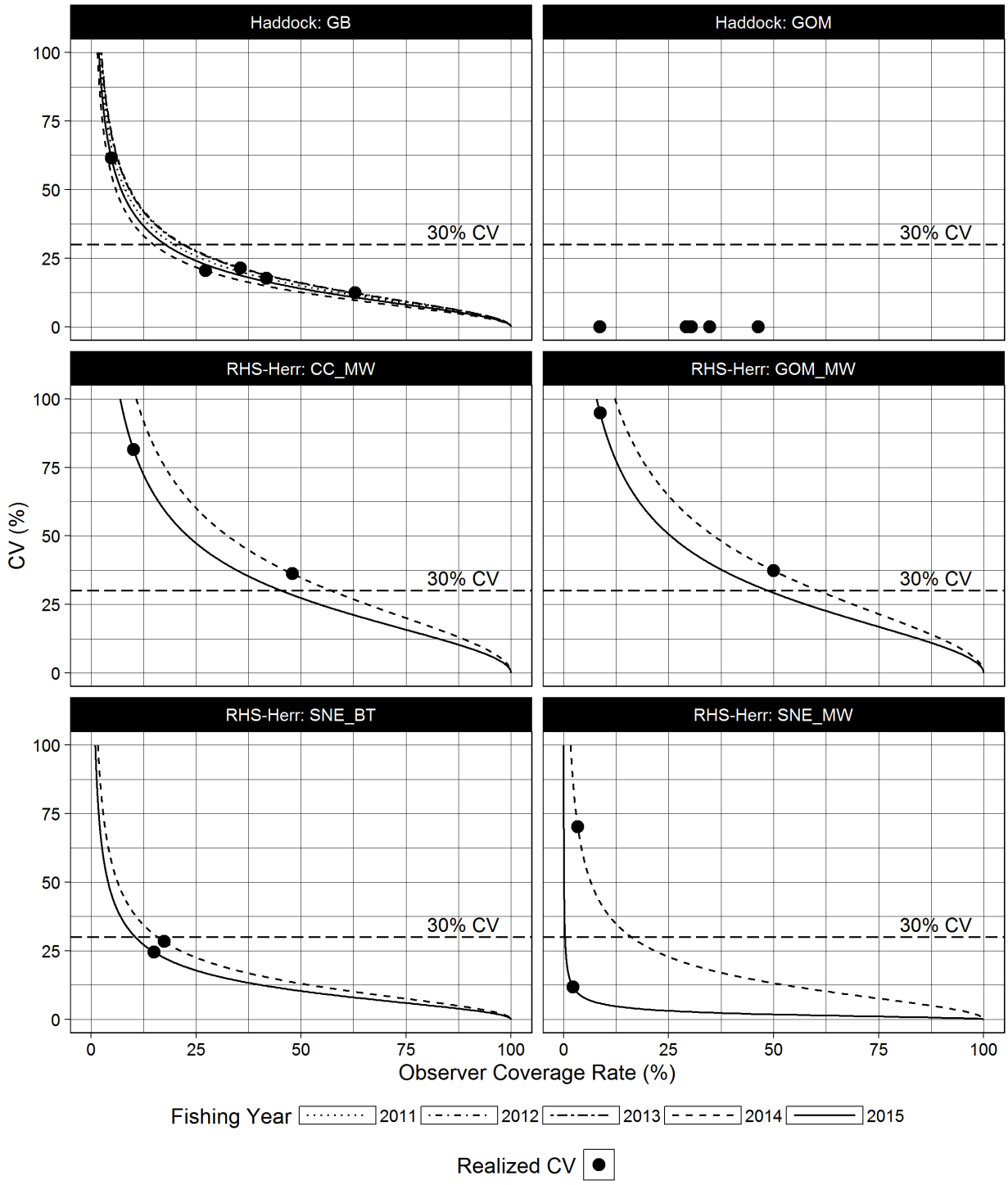


FIGURE 4. 2011-2015 DERIVED CV CURVE FOR EACH CATCH CAP BASED ON SBRM SAMPLE SIZE ANALYSIS METHODOLOGY, WITH REALIZED CV FOR EACH CATCH CAP YEAR (BLACK DOT)

Due to the structure of Herring Alternatives 2.1 and 2.2, and how coverage is being selectively assigned based on gear, permit, category, and a 25 mt landings threshold, estimated CVs based on proposed coverage levels could not be estimated formulaically according to SBRM, and instead required simulation based on resampling of observed trips. Simulations were performed for each catch cap and year and based on NEFOP observer data. Proposed coverage levels were simulated by resampling the required amount of observer trips to obtain the target coverage level based on the effort profile for a particular catch cap and year. Herring Alternatives 2.1 and 2.2 focus IFM coverage on Category A/B herring vessels. Due to this, simulated increasing coverage was confined to Category A/B vessel trips until 100% of those trips were simulated as observed. Observed non-category A/B herring vessel trips were assumed to be SBRM coverage and were fully resampled in each simulation without increasing coverage. Within each simulation, a CV was calculated for the catch cap based on the specified coverage level. This process was repeated 1,000 times for each proposed coverage level, which yielded a distribution of simulated CVs. Table 3 summarizes the mean CV from those distributions for each proposed coverage level, and Table 4 provides the simulated results if a 25 mt trip exemption existed. This process was repeated for each catch cap and year.

Due to the amount of observer data available within each catch cap different approaches were taken in order to obtain a minimum sampling pool. Haddock Catch Cap strata yielded higher numbers of observed trips within each year allowing for simulation of observed trips within each fishing year, observer data from multiple fishing years were not grouped. However, due to the GB Haddock AM closure in 2015 a small number (n<10) of observed trips were simulated. The RHS Catch Cap strata yielded smaller amounts of observed trips and needed to be combined across 2014 and 2015 into a single resampling group that was used to simulate 2014 and 2015 based on their respective effort profiles (total trips in strata for each year). Even after grouping 2014 and 2015, the RHS SNE Midwater Trawl Catch Cap had a small number (n<10) of trips to simulate. The RHS SNE Bottom Trawl Catch Cap also suffered from a small number of observed trips to simulate from when the 25 mt trip exemption was applied (this was not the case when the 25 mt trip exemption was removed).

For catch caps where all of the effort is comprised of Category A /B herring vessels, the CV should converge to zero in 100% coverage scenarios. This was the case for all catch caps confined to midwater trawl trips except for RHS SNE Midwater Trawl, which includes non-Category A/B vessels. The effect of mixed permit categories in RHS SNE Midwater Trawl Catch Cap is that proposed IFM coverage will not cover all trips in that catch cap at 100% coverage of Category A/B vessels and results in the CV not converging to zero. The effect is more pronounced in the RHS SNE Bottom Trawl Catch Cap where on average 38% of 2014-2015 trips were by non-Category A/B vessels.

The 25 mt trip exemption has a similar effect as the Category A/B permit IFM coverage criteria because it allows for a certain number of trips within each catch cap to go unobserved and therefore impacts the simulated CV. This effect is demonstrated in Table 4 and impacts all catch caps (GOM Haddock is not impacted because the CV is always zero due to no observed incidental haddock catch). The effect is much more pronounced in catch caps comprised of trips that yield smaller catches. The effect is very small in the GB Haddock Catch Cap where there trips tend to be consistently above 25 mt compared to the RHS Catch Caps where trip catches are either small or more variable.

Table 3. Alternative 2.2: Simulated mean CV at 25%, 50%, 75% and 100% ASM coverage

		Simulated Mean CV (%)			
Catch Cap	**Fishing Year[1]**	**25% Coverage**	**50% Coverage**	**75% Coverage**	**100% Coverage**
Haddock: GB Midwater Trawl	2011	25.8%	14.8%	8.6%	0.0%
	2012	24.2%	14.9%	8.8%	0.0%
	2013	26.4%	15.5%	9.1%	0.0%
	2014	21.7%	12.5%	7.2%	0.0%
	2015[3]**	22.7%	13.1%	7.5%	0.0%
Haddock: GOM Midwater Trawl	2011	0.0%	0.0%	0.0%	0.0%
	2012	0.0%	0.0%	0.0%	0.0%
	2013	0.0%	0.0%	0.0%	0.0%
	2014*	0.0%	0.0%	0.0%	0.0%
	2015[3]**	0.0%	0.0%	0.0%	0.0%
Herring-RHS: CC Midwater Trawl	2014*	63.2%	39.5%	22.7%	0.0%
	2015[3]	62.4%	41.8%	24.9%	0.0%
Herring-RHS: GOM Midwater Trawl	2014*	64.3%	39.1%	22.8%	0.0%
	2015[3]	61.1%	35.3%	20.8%	0.0%
Herring-RHS: SNE Bottom Trawl	2014*	24.1%	17.3%	13.2%	9.8%
	2015[3]	28.0%	18.6%	13.3%	9.2%
Herring-RHS: SNE Midwater Trawl	2014*	23.0%	13.6%	8.5%	3.9%
	2015[3]	22.7%	13.1%	7.5%	0.0%

Source: GARFO Quota Monitoring Database as of 5/22/2016

[1]Catch cap fishing year: river herring/shad = calendar year; haddock = May-April

[3]Fishing Year 2015 data are PRELIMINARY

*2014 Herring RHS fishing year partially covered by RHS Catch Caps which was implemented on December, 4 2014

**2015 GB Haddock fishing year truncated due to the closure of the GB Haddock AM Area on October 22, 2015

Table 4. Alternative 2.2: Simulated mean CV at 25%, 50%, 75% and 100% ASM coverage with 25 mt trip exemption

		Simulated Mean CV (%)			
Catch Cap	**Fishing Year[1]**	**25% Coverage**	**50% Coverage**	**75% Coverage**	**100% Coverage**
Haddock: GB Midwater Trawl	2011	25.4%	15.0%	8.9%	2.4%
	2012	24.8%	15.4%	9.7%	4.0%
	2013	26.1%	15.5%	9.3%	2.2%
	2014	22.2%	12.9%	7.6%	2.2%
	2015[3]**	23.1%	13.5%	8.1%	2.7%
Haddock: GOM Midwater Trawl	2011	0.0%	0.0%	0.0%	0.0%
	2012	0.0%	0.0%	0.0%	0.0%
	2013	0.0%	0.0%	0.0%	0.0%
	2014*	0.0%	0.0%	0.0%	0.0%
	2015[3]**	0.0%	0.0%	0.0%	0.0%
Herring-RHS: CC Midwater Trawl	2014*	61.9%	39.7%	23.4%	4.5%
	2015[3]	63.7%	42.0%	24.2%	5.0%
Herring-RHS: GOM Midwater Trawl	2014*	62.8%	41.8%	25.8%	11.5%
	2015[3]	63.6%	39.8%	25.0%	13.4%
Herring-RHS: SNE Bottom Trawl	2014*	24.2%	17.5%	14.1%	11.5%
	2015[3]	24.8%	19.3%	15.4%	12.6%
Herring-RHS: SNE Midwater Trawl	2014*	32.5%	21.7%	16.2%	12.4%
	2015[3]	34.3%	22.1%	15.9%	11.5%

Source: GARFO Quota Monitoring Database as of 5/22/2016

[1]Catch cap fishing year: river herring/shad = calendar year; haddock = May-April

[3]Fishing Year 2015 data are PRELIMINARY

*2014 Herring RHS fishing year partially covered by RHS Catch Caps which was implemented on December 4, 2014

**2015 GB Haddock fishing year truncated due to the closure of the GB Haddock AM Area on October 22, 2015

Figures 5 and 6 detail the simulation results by year and catch cap. The dotted line represents the mean simulated CV based on increasing Category A/B vessel coverage, while the solid line indicates the same simulation with the 25 mt trip exemption applied. The grey area around the solid and dashed lines represents the two standard error envelope around the mean simulated CV. It is important to understand that these are simulated CVs, therefore by their nature there is a range of resulting CVs for each coverage rate. The variability of the simulated CV (expressed by the standard error) is related to the variability of the underlying incidental catch data. The overlap (black dots on Figures 5 and 6) between the realized CV for these catch caps and the range of simulated CVs is a good indicator of that variability. All realized CVs fell within +/- 2 standard errors of the mean simulated CV, which implies the simulation is reasonable within that margin of error. For catch caps, the realized CV does not closely track the mean simulated CV. This effect is likely due to underlying variability in incidental catch data and/or small numbers of observed trips. The simulated GOM Haddock CV Catch Cap was not shown because no haddock catch was observed from 2011-2015.

Overall, the GB Haddock Catch Cap, RHS SNE Bottom Trawl, and RHS SNE Midwater Trawl catch caps yielded a mean simulated CV < 30% for all simulated years at or below a 25% coverage rate.

The performance was nearly identical under the 25 mt trip exemption option with the exception of RHS SNE Midwater Trawl Catch Cap, which shows the simulated mean CV slightly increase above 30%. RHS CC Midwater Trawl and RHS GOM Midwater Trawl Catch Caps were the only catch caps that clearly did not reduce below 30% at a 25% observer coverage rate. Given the broad range in the simulated CV for these caps (wide standard error envelope) it is difficult to draw strong conclusions from these results. Furthermore the relatively short (2 years) worth of data available from the RHS Catch Caps adds to this difficulty.

The simulated CV results must be interpreted as an estimate of what may happen in the future based on existing information. The simulations were based on past fishing behavior and observed incidental catch from within the catch caps. Therefore, they may not hold if either factor changes in the future.

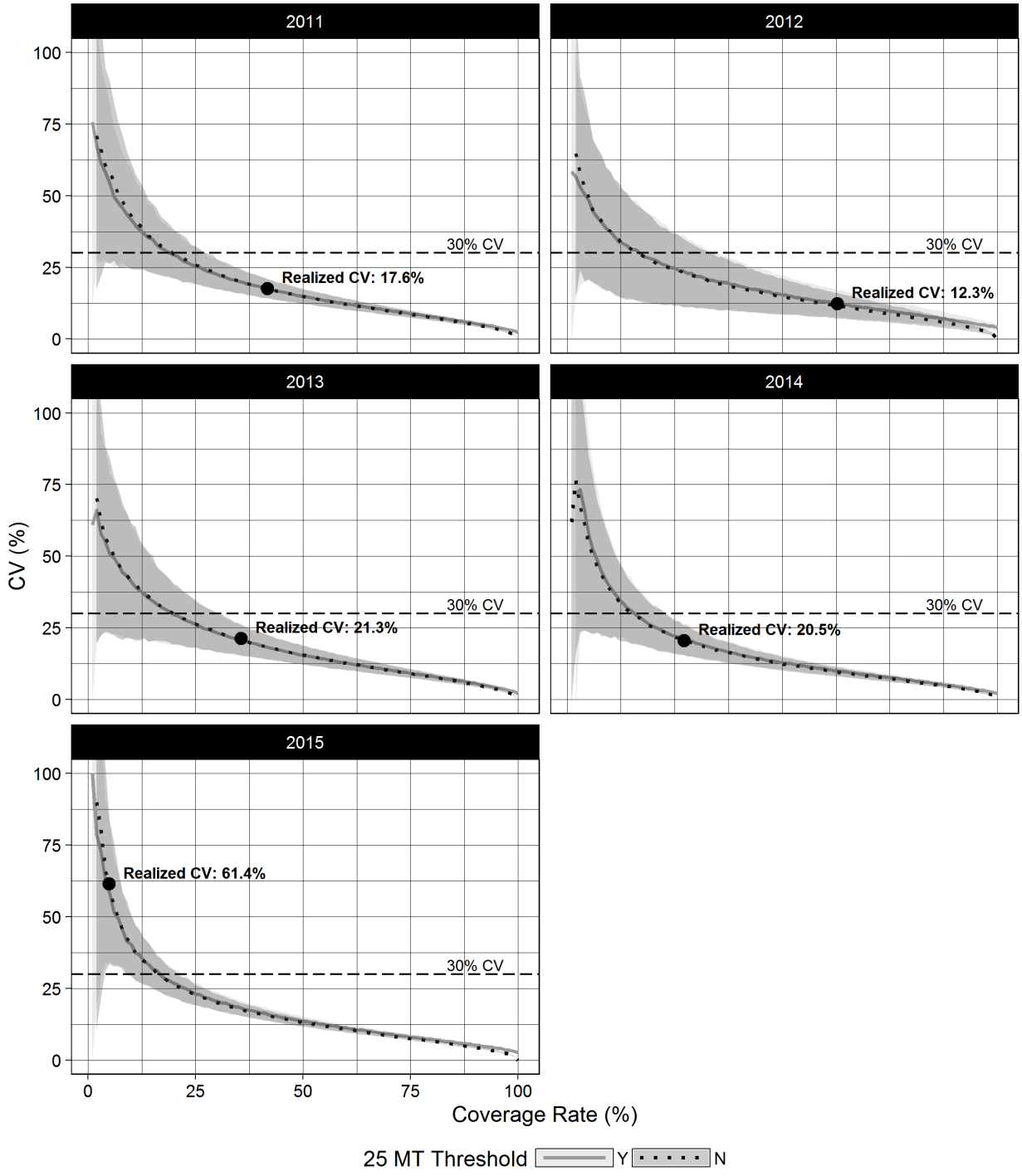


FIGURE 5. 2011-2015 SIMULATED GB HADDOCK CATCH CAP MEAN CV (+/- 2 STANDARD ERRORS) IN RESPONSE TO INCREASING OBSERVER COVERAGE ON CATEGORY A/B HERRING VESSELS, WITH REALIZED CV FOR EACH FISHING YEAR (BLACK DOT). INCLUDES 25 MT TRIP EXEMPTION OPTION.

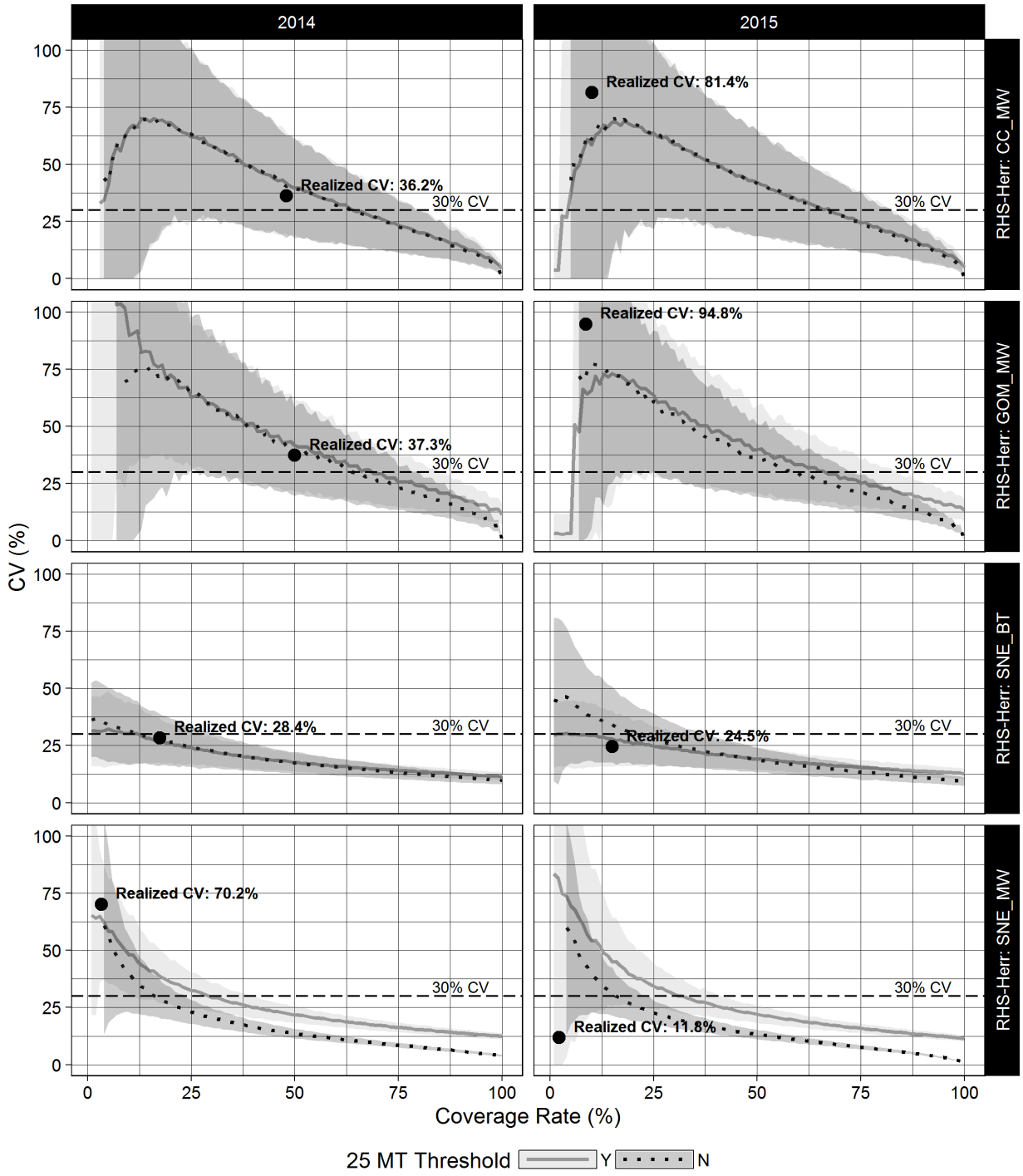


FIGURE 6. 2014-2015 SIMULATED RHS CATCH CAP MEAN CV (+/- 2 STANDARD ERRORS) IN RESPONSE TO INCREASING OBSERVER COVERAGE ON CATEGORY A/B HERRING VESSELS, WITH REALIZED CV FOR EACH FISHING YEAR (BLACK DOT). INCLUDES 25 MT TRIP EXEMPTION OPTION.