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7.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS

7.1 BIOLOGICAL IMPACTS

The biological impacts discussed in this section focus on expected changes resulting from selection of each of the proposed alternatives and were developed using qualitative and quantitative methods. In this section, biological impacts are discussed in relation to impacts on regulated multispecies (groundfish) – target and non-target – and non-groundfish species – incidental catch and bycatch of other species. Impacts on protected resources and essential fish habitat are discussed in separate sections.

Overall biological impacts of improved monitoring

The biological impacts from improvements in monitoring will depend on the amount of unknown mortality that is currently caused by missing catch. Improvements in monitoring should reduce the amount of unknown missing catch and this catch will then get accounted for through the output control management system which will also improve catch data streams feeding into stock assessments. Biological impacts are difficult to assess because we do not know the true amount of missing stock specific removals through time. If missing catch is a relatively important component of total mortality for a stock, then improvements in monitoring may yield substantial biological impacts. The true biological impacts also depend on the implications of missing historical catch on potential changes to the stock assessments. For example, shifts to empirical based assessments due to unknown removals from the past will likely lead to unknown biological impacts. However, if stock assessments are static with the present ABCs/ACLs then improvements in monitoring (higher total catch from improved monitoring of missing catch) in the short-term could limit fishing effort further depending on the amount of bias in the catch data. This will sequentially result in positive biological impacts. Regardless of the stock status, if fishing effort is reduced then this should result in a positive biological impact for the stock. The many unknowns associated with improvements in monitoring makes the quantitative determination of biological impacts difficult if not impossible to predict. We can only qualitatively rank alternatives relative to each other while also assuming improvement in monitoring will not fundamentally change how the assessments are done in the short-term. For example, increases in coverage rates that result in less bias through missing catch should result in less fishing effort and therefore produce a positive biological impact under the present catch limits.

In summary, the biological impacts are dependent on how improvements in monitoring will affect fishing effort regardless of what is known or unknown about the stock from the stock assessment. How exactly improvements in monitoring will affect fishing effort on each stock is unknown. Comprehensive improvements in monitoring will likely influence two different factors with regards to the biological impacts; 1) it could potentially have positive biological impacts by lowering fishing effort on stocks that are overfished due to higher total catch reporting from improved monitoring of missing catch and 2) improvements in monitoring should also improve stock assessments, stock status determination and the ability to quantify biological impacts in the future. However, improvements to the stock assessments though improvements in monitoring will likely be different in the short-term relative to the long-term.

Biological impacts are broken down by short and long-term impacts because stock assessments rely on historical data for the determination of stock status, management reference points, and catch advice. Therefore, if improvements in catch monitoring produce a perceived change in catch then improvements in the stock assessments in the short-term may be limited due to the assessments' reliance on historical catch data. We defined short-term as up to five years but this could be longer depending on the potential

bias and the ability to estimate such a bias in the historical time series. In the long-term, which we defined as greater than five years, a better estimate of removals should result in improvements in the stock assessments. However, the realized improvements to stock assessments may take much longer than five years. It is not clear, where a distinction should be made between short-term and long-term. This time frame may also differ among stocks depending on the assessment.

In conclusion, improvements in monitoring which reduce fishing mortality through better catch accounting should produce positive biological impacts in the short-term. In the longer-term analytical assessments should improve with better catch data which should lead to subsequent improvements in groundfish catch advice and management.

The following is an overview of *possible* short- and long-term impacts of 100% monitoring of all sector trips on regulated groundfish species.

- Short-term (upon implementation and up to five years)
    - Improved accuracy of catch attribution at the stock-level
    - Increased accuracy of the magnitude of catches for discard-only stocks
    - Reduce the likelihood of overfishing because in-season catch monitoring would improve – such that the "true" catch would be better known for the sector fishery
    - Reduce the likelihood that illegal discarding would occur because monitoring would have an ancillary benefit of increasing compliance. This should better control fishing mortality.
    - Create a level playing field where all participants are equally held accountable to available ACE
    - Increased accuracy and precision of commercial sector catch going into the assessments

- Long-term (greater than five years)
    - Improved estimation of fishing mortality and stock biomass
    - Increase the likelihood of rebuilding overfished stocks by constraining the true catch to be consistently lower than ACLs. Increased accuracy of catch data can also lead to reduced uncertainty in the stock assessments.
    - Improvements in model diagnostics if monitoring shows that missing catch was a significant issue in the past.
    - Allow for consideration of a wider-range of stock assessment approaches – for example shifting from low information content empirical approaches to the development of full analytical assessments.
    - Improvements in groundfish management through the more accurate catch advice from assessments.

7.1.1 Commercial Groundfish Monitoring Program Revisions (Sectors Only)

Amendment 16 to the Groundfish FMP implemented monitoring and enforcement provisions for sector fishing activity, which is primarily controlled by limits on how much the sector can catch – ACE. These are "hard" limits- sectors must stop fishing before they exceed these limits. There are two components to catch – landings and discards. In order to ensure that sector catches are actually limited to the ACE, both landings and discards must be accurately monitored. To increase confidence that sector catches are accurate Amendment 16 implemented the requirement that sectors land all legal-sized fish to discourage

sectors from discarding catches to avoid exceeding ACE. Amendment 16 reported that while admittedly difficult to monitor or enforce, this measure does encourage sectors to land all catch of legal-size. If adhered to, this measure may reduce discards of legal fish. Amendment 16 also required that sectors are able to prove they can attribute landings to a specific stock area, in order to reduce the likelihood sector catches will be applied to the wrong stock. If adhered to, this could lead to indirect biological benefits as improved attribution of catch to stock areas may lead to better management and assessment of the stocks.

The current groundfish monitoring program collects fishery-dependent data from multiple sources including the vessel monitoring system (VMS), the interactive voice response (IVR) system, vessel trip reports (VTR), dealer reports, industry-funded at-sea monitors (ASM), and Northeast Fishery Observer Program (NEFOP) observers (see Section 6.5.10.1 Affected Environment Groundfish Monitoring Data). The current monitoring system includes these uncertainties:

- Unreported and misreported catches (landings and discards) by species/stock
- Disagreement between data sources (vessel trip reports [VTR]/Dealer; VTRs/vessel monitoring system [VMS])
- The majority of analytical groundfish stock assessments contain a retrospective pattern, which may be caused in part by missing catch. Some analytical stock assessment models have been rejected, and missing catch may have contributed in part to the poor performance of those stock assessments.
- Lack of an independent verification of landings may lead to catch reporting conspiracy/collusion between a dealer and a vessel, and has occurred
- Fishermen behave differently when observers are on-board, and
- Incentives exist in any quota-based system for misreporting/non-reporting of catch (landings and discards).

Discrepancies in catch reporting

The measurement of fishing effort and estimation of catch are subject to a variety of errors that can compromise accuracy. Because fish are not equally distributed throughout the ocean, it is impossible to know exactly where they are caught during a fishing trip. Self-reported activity may provide a useful approximation to true activity but will be affected by competing objectives. Without incentives to report accurately or efforts to correct the record, some information may be particularly unreliable (e.g., discarded catch).

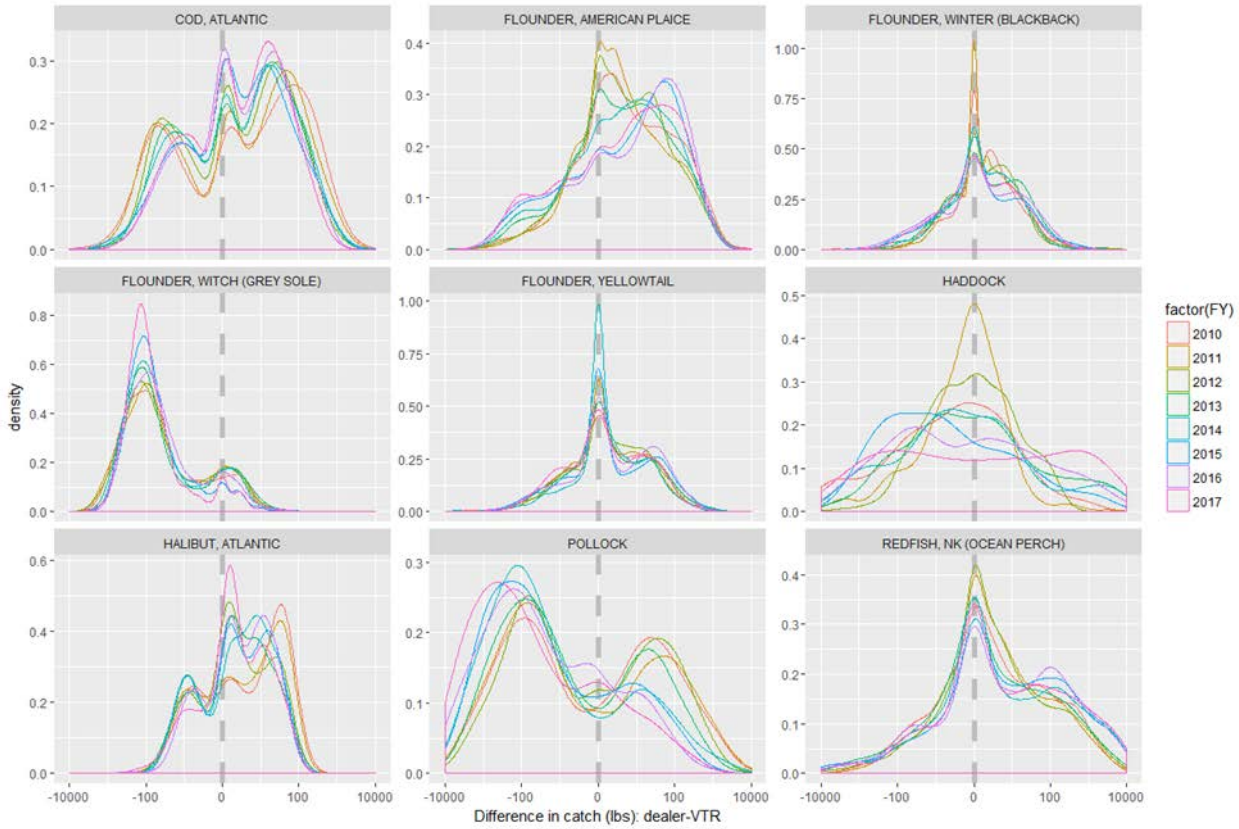
Statistical area fished - While the technology exists to record a spatial coordinate the moment gear is pulled onboard, we rely on self-reported location for apportioning catch to stock areas. Palmer (2017) identified discrepancies between stock-area apportioning of catch as reported on vessel trip reports (VTRs) with that as estimated by vessel monitoring system (VMS) data; the latter provided an approximation of the spatial distribution of fishing effort according to vessel speed. The differences were most pronounced starting in 2010 with implementation of the quota-based system for groundfish, after which incentives for misreporting of quota-limited stocks increased. Palmer (2017) suggested that while overall error was small and unlikely to substantially impact resource monitoring, the error could be particularly large in certain years for some individual stocks. Additionally, the error was disproportionately attributed to a small number of vessels, but these vessels tend to be the larger, higher volume trip vessels. Potential misreporting could be reduced with improved catch monitoring.

Kept catch - Even with reasonable diligence, self-reported catch is unlikely to exactly match the weight reported by a dealer using scales on land. Among many possibilities, accuracy could be affected by differences in how species are dressed and stored. Delayed recording of the catch could result in poor recollection of catch amounts. And visual estimation can have worse precision than other methods depending on the total amount of the catch. Further, the weight of fish changes based on the method of

storage (e.g., seawater slurry v. iced) and dealers often make deductions from measured weights to account for assumed weights of totes, ice, and slime.

Figure 1 illustrates density distributions of the differences (log10-transformed live pounds) in landings amount (dealer – VTR) across 9 allocated groundfish species from the 2010–2017 fishing years. Density that falls to the left of 0 indicates *over*-reported catch (VTR > dealer), while density on the right of 0 indicates *under*-reported catch (VTR < dealer), under the assumption that dealer amounts were accurate. Patterns differ across species, and for some species, across years.

Figure 1- Density distributions of the differences (log10-transformed live pounds) in landings amount (dealer – VTR) across 9 allocated groundfish species from the 2010–2017 fishing years,



<u>Analytical stock assessment models for New England groundfish often have retrospective patterns, which may be caused by missing catch (landings and discards).</u>

Retrospective patterns are systematic changes in estimates of population size or fishing mortality, which arise in analytical assessment models as more years of data are added to the model (Hurtado-Ferro et al., 2015; Miller and Legault, 2017). Retrospective error in the models occur when there is an underlying conflict among the trends in the input data (estimated removals and indices of abundance, along with size or age structure trends) in conjunction with the input biological information (life history) with the species/stock within the model. Retrospective patterns are a major concern for sustainable fisheries management. For example, when an assessment consistently overestimates stock biomass and underestimates F (the common trend for New England groundfish), catch advice (which is meant to be precautionary) may be set at levels that are too high, leading a subsequent assessment to estimate that overfishing has been occurring (e.g. GB cod). This is especially problematic for New England fisheries,

where assessments are typically not performed annually, and projection results are used to set catch levels for the next two to five years into the future and up to 10 years when considering rebuilding projections. At the GARM 3 benchmark assessments in 2008, it was determined that the models were not acceptable for catch advice without accounting for the retrospective issues. A rule of thumb was developed at GARM 3 to approximate the bias and adjust for it within the projections for catch advice (OFLs, ABCs). Retrospective adjustments (rho adjustments) are applied to terminal estimates of SSB and F in assessment models for New England groundfish for the recommended status determination, and the adjustments are made to the t+1 numbers at age within the projections when the retrospective bias falls outside of the 90% confident intervals of the model uncertainty estimates. These adjustments are intended to account for the magnitude of retrospective pattern, and to provide appropriate management advice.

During the 2017 Operational Assessments, 11 groundfish stocks were assessed using an age-structured analytical assessment model (e.g., VPA or ASAP). Major retrospective patterns (rho-adjusted values of F and SSB outside of 90% confidence regions for model estimates) were present in 8 of the 11 analytical assessments (See Table 9 of NEFSC 2017[1] for a full description). During the 2019 Operational Assessments, every analytical model exhibited a retrospective pattern. These major retrospective patterns required a retrospective ("rho") adjustment (at the discretion of the peer review panel). In all cases except for one, the retrospective adjustments lead to a more pessimistic perception of resource productivity (i.e., lower biomass and increased F), and in some cases resulted in changes to designations of stock status (e.g., from not overfished to overfished).

It should also be noted that some regional groundfish stocks which were formerly assessed using an analytical assessment model (e.g., GB cod, witch flounder, GB yellowtail flounder) are now assessed using an empirical approach. For these stocks, the analytical assessment models were rejected during prior peer reviews, in part due to the magnitude of retrospective error that were present in the models.

Analytical stock assessment models generally need to make a number of simplifying assumptions in order to reduce the number of parameters that are estimated in the model. For example, these models assume that important parameters such as natural mortality, catchability, and sometimes selectivity are constant over time. In addition the projections also assume that growth is constant into the future. However, if any of these parameters change over time in a consistent manner, it can lead to a retrospective pattern in the model. Retrospective patterns in analytical stock assessments can be caused by a number of factors including: changes in survey catchability (resource availability and/or gear efficiency), changes in natural mortality, or unreported catch (Hurtado-Ferro et al, 2015[2]; NEFSC, 2017). To a lesser extent, retrospective patterns can also arise to due to changes in fishery selectivity or growth, although nearly all analytical assessment models for groundfish attempt to account for these changes. Unfortunately, the true cause of the retrospective pattern is never known in practice (Miller and Legault, 2017[3]). In the case of New England groundfish, several factors may be acting in concert to contribute to the retrospective patterns, which confounds efforts to identify a single unifying cause. However, the persistence of

[1] Northeast Fisheries Science Center (NEFSC). 2017. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-17; 259 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications/

[2] Hurtado-Ferro, F., Szuwalski, C.S., Valero, J.L., et al. 2015. Looking in the rear-view mirror: bias and retrospective patterns in integrated, age-structured stock assessment models. ICES Journal of Marine Science, 72(1): 99-110.

[3] Miller, T.J., and Legault, C.M. 2017. Statistical behavior of retrospective patterns and their effects on estimation of stock and harvest status. Fisheries Research, 186: 109-120.

retrospective patterns across the majority of groundfish assessment suggests that there may be a common, regional-scale driver(s) that is responsible for the retrospective patterns.

Missing catch (landings and discards) has often been implicated as a potential cause of the retrospective pattern in groundfish assessments (see NEFSC, 2017), and some assessment scientists have attempted to quantify the magnitude of missing catch that is needed to "fix" the retrospective effort in the model. For example, during the 2016 witch flounder assessment (SAW 62), it was estimated that the magnitude of reported witch flounder catch would need to be increased by 300-500% to fix the retrospective problem in the assessment, but did not assert missing catch was the sole cause of the retrospective pattern. During the 2017 Operational Update assessments, it was estimated that the "recent catches" of Gulf of Maine cod would need to be roughly doubled in order to alleviate the retrospective pattern in the model. During the 2016 TRAC assessment, it was estimated that recent catches (or natural mortality) would need to be increased by 300 to 500% in order to remove the retrospective pattern in the VPA model that was formerly used to assess Georges Bank yellowtail flounder.

Trawl fisheries in New England are required to use large mesh codends, which are designed to reduce the capture and retention of sub-legal fish. Some proportion of fish which encounter a trawl net, but are not ultimately retained by the gear, may suffer acute or delayed mortality. This is referred to as "escapee mortality." Escapee mortality is a form of missing catch, and may contribute to the retrospective pattern in some assessments. However, neither the current monitoring system, nor any of the alternatives under consideration would enable the magnitude of escapee mortality to be quantified.

It is interesting to note that retrospective errors are present in assessment models for stocks that are considered to be constraining to the fishery (e.g., GB cod, plaice), where the incentive to misreport or underreport catches would be particularly strong. At the same time, retrospective errors are also present in assessments for stocks with low utilization rates and relatively large quotas (e.g., pollock, redfish, and GB haddock), where the incentive to misreport landings would presumably be much lower, or perhaps even non-existent.

Missing catch may be contributing to the retrospective patterns that are present in the New England groundfish assessments. However, there is not sufficient evidence at this time to understand whether missing catch is the primary contributing factor to the retrospective problem. Further work is needed to determine whether non-stationarity (e.g., variable M, changing catchability, etc.) may be contributing to the retrospective patterns that are present in the stock assessments.

Catch reporting collusion between a dealer and a vessel is possible, and has occurred – no independent verification of landings

Currently, landings data for the groundfish fishery comes from dealer reports and vessel trip reports (VTRs). VTRs require that the vessel captain reports all species caught during the trip and the weight of the catch, as well as statistical areas fished and gear used. Dealer reports include data about the date a catch was landed, the name of the vessel that brought it in, the grade, species, price and weight of the fish, and the number of the trip report that corresponds to the catch. There is no independent verification of landings.

There was a dockside monitoring (DSM) program in the groundfish fishery from 2010-2011, which was intended to verify landings of a vessel at the time it is weighed by a dealer and to certify the landing

weights are accurate as reported on the dealer report.[4] However, the DSM program was later discontinued in part because landings information is already provided through the dealer reporting system and by eliminating the program, sector operating costs would be reduced and redundant accounting would be avoided.[5] The Council's rationale was that as long as unreported landings do not occur, the dealer reports can be used to monitor sector landings and there is little advantage to having dockside monitors verify these reports. NMFS determined that dealer reporting combined with dockside intercepts by enforcement personnel were sufficient to monitor landings of sector catch at the time. However, after the removal of the DSM program there have been incidents of unreported and misreported landings, including collusion between vessels and dealers.

In addition to the potential for unreported and misreported landings, the lack of independent verification of landings in the groundfish fishery creates a situation in which catch reporting collusion between a dealer and a vessel is possible. The dealer reports and VTRs have intentional overlap, which allows NOAA to use the dealer reports as a check on the information vessels submit on trip reports, and vice versa. If the species and weight listed on the dealer report does not match the corresponding trip report, the discrepancy may be evidence of fraud in one or both reports. Therefore, to perpetrate an ongoing fraud regarding the species or weight of a given catch, the vessel operator and the dealer must collude. Additionally, there is that nothing prohibits a person from owning both the vessels and the wholesale dealer operation that buys fish from the vessels.

Such catch reporting collusion between a dealer and a vessel occurred in the case of United States vs. Carlos Rafael.[6] On March 30, 2017, Carlos Rafael, a.k.a. the Codfather, pleaded guilty to federal criminal charges involving falsely reporting catch information on dealer reports and vessel trip reports. He was initially arrested and charged in February 2016. Rafael, the owner of Carlos Seafood Inc., based in New Bedford, Mass., owned 32 fishing vessels through independent corporate shells and 44 permits, which amounted to one of the largest commercial fishing businesses in the United States.

In September 2017, Rafael was sentenced by U.S. District Court Judge William G. Young to 46 months in prison and three years of supervised release, during which time he is banned from working in the fishing industry.[7] The Court also ordered Rafael to pay a fine of $200,000 and restitution to the U.S. Treasury of $108,929. Four of his vessels were forfeited. A civil action against Rafael by NOAA was resolved in August 2019.[8] As a part of this settlement, NOAA is seeking a $3,010,633 civil money penalty, and has given Rafael until Dec. 31, 2020 to sell his fishing permits along with the many fishing vessels he owns or controls through transactions reviewed and approved by the agency. Rafael was also required to relinquish his seafood dealer permit by Sept. 1, 2019. Additionally, 17 captains who previously worked for Rafael and were part of the civil settlement received suspensions and probationary periods of varying lengths, the longest suspension being 200 days, along with 36 months of probation.

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[4] New England Fishery Management Council. Oct. 16, 2009. Amendment 16 to the Northeast Multispecies FMP. http://s3.amazonaws.com/nefmc.org/091016_Final_Amendment_16.pdf

[5] New England Fishery Management Council. (Feb. 26, 2013). Framework 48 and EA to the Northeast Multispecies FMP. http://s3.amazonaws.com/nefmc.org/130307_FW48_Figures_Repaired.pdf

[6] United States District Court, District of Massachusetts. Sept. 20, 2017. United States of America vs. Carlos Rafael Government's Sentencing Memorandum

[7] United States Attorney's Office, District of Massachusetts. Sept. 25, 2017 news release. https://www.justice.gov/usao-ma/pr/owner-one-nation-s-largest-commercial-fishing-businesses-sentenced-falsifying-records

[8] Details of the Settlement of the Government's Civil Case Against Carlos Rafael and his Fishing Captains. August 19, 2019. NOAA memorandum

During the probationary periods, the captains are subject to additional monitoring requirements (e.g. more frequent VMS polling, haul-by-haul reporting.

In this particular case, Rafael owned both the vessels and the dealer, Carlos Seafood, to which those vessels sold fish. As he freely admitted to the agents, this system of vertical integration is largely what enabled Rafael to commit long-term fraud without detection: he made sure that abundant, "high quota" fish like haddock was listed on trip reports instead of what his boats actually caught, i.e., "low quota," high value fish like cod. Rafael then made sure that Carlos Seafood, Inc.'s, receipts from "buying" the fish from his boats matched the fraudulent trip reports and, more importantly, that the dealer reports he submitted weekly to NOAA matched the fraudulent trip reports as well. It should be noted that collusion between a dealer and a vessel can still occur when these are not the same owner, and that a vertically integrated dealer/vessel business does not guarantee collusion or fraud will occur.

Observed trips are not representative of unobserved trips

Section 6.5.10.4, Summary of PDT Monitoring Analyses, provides an overview of Appendix V. Briefly, the PDT prepared four analyses to support the development of Amendment 23. Specifically, PDT members analyzed discard incentives, observer effects, and landings ratios; and developed models to predict groundfish catch on unobserved trips using observed trip information (see Appendix V for more information on each analysis). These four analyses were reviewed by a subgroup of the SSC in April 2019 (see SSC sub-panel report, in Appendix V) in order to determine the scientific rigor of each approach as well as the sufficiency of each analysis to inform the development of Amendment 23 and analysis of different alternatives (see Terms of Reference, SSC sub-panel report, page 21, in Appendix V).

The overall conclusion from the PDT was that observed trips are not representative of unobserved trips. The dimensions where observed trips differ from unobserved trips include: Gulf of Maine cod catch rates, groundfish landings to effort ratios, trip duration, pounds of kept groundfish, pounds of total kept catch, and trip revenue. Documented differences in the stock landing to effort relationships reflect differences in illegal discarding of legal sized fish on unobserved trips relative to observed trips. The discard incentive model describes one mechanism to explain differences between observed and unobserved trips: the sector system increases the incentive to illegally discard legal-sized fish on unobserved trips. Discard incentives have varied across time and stock and reflect changes in the relative size of quotas and availability of fish to the fleet. After full sector implementation, the accountability of discards and the application of sector/gear specific discard rates to unobserved trips, together with the potential catch of constraining stocks, increased the incentive to not comply with retention regulations. The SSC concluded the current precision standard is not an appropriate method to set at-sea monitoring coverage levels, without at least some change, because the assumption that observed trips are representative of unobserved trips is false. Further the SSC concluded that "…the analyses, taken comprehensively, create a weight of evidence that disproves the null hypothesis, namely that there is no effect from the presence of an observer on a fishing trip. In other words, the work taken collectively show that there is an observer effect, and therefore managers need to account for this when basing management off information derived from observed trips. The analyses suggest that estimates of discards on unobserved trips derived from discards rates on observe trips may not be accurate, and likely to be an underestimated reflection of actual discards." These analyses cannot quantify the differences between observed and unobserved trips in a way that allows for either a mathematical correction to the data or a survey design that resolves bias. Additional details are provided in Appendix V.

7.1.1.1 Sector Monitoring Standards (Target Coverage Levels)

Groundfish catch estimation under various levels of observer coverage and bias

These analyses examined how various levels of observer coverage (25– 100%) would influence the estimation of groundfish catch. In the absence of bias, an increase in sampling will result in a subsequent increase in precision and, assuming the stratification is appropriate with random sampling, an increase in accuracy. In the presence of bias, precision is a less useful measure of accuracy. When observed trips are not representative of all groundfish trips, bias is manifested by having estimates of discards that are different from the actual catch (inaccurate). Low variability around a discard estimate with non-representative sampling will only suggest that the discard estimate is precisely wrong.

We simulated how inferences regarding annual catch (landings + discards) for groundfish stocks would be affected under various levels of observer coverage, and what happens in the presence of observer bias. Here, we assumed that observer bias results in the true discard rate on unobserved trips being some inflated factor of the observed discard rate (e.g., truth = observed x10). As coverage increases to 100%, the effective bias of unobserved trips reduces to zero. Therefore, observer bias is expected to be most problematic at low levels of observer coverage.

Methods
We used the observed and estimated discards on all groundfish trips from 2010–2017 to serve as the population of actual discards during this period. Note, discards in this case refer to any discarded fish as recorded by the observer (e.g., sub-legal, legal-sized unmarketable fish [LUMF], illegal). While illegal discarding of legal-sized fish can and has been observed, its occurrence is relatively rare in the observer data. For this reason, the observer data cannot provide any context for the amount of illegal discarding that may occur on unobserved trips and how that affects total catch estimation.

For each combination of 5 levels of coverage (10%, 25%, 50%, 75%, 100%) and 4 levels of bias (1×, 2×, 5×, 10×), we re-sampled the trips 500 times using a non-parametric bootstrap to estimate total discards. The "sampled" trips were assigned their perceived discard quantity (whether originally observed or projected according to a rate) while the unsampled or unobserved trips were assigned a discard quantity that inflated their perceived quantity according to the bias level for the given simulation. For example, if a trip had an observed/projected discard quantity of 100 lbs for haddock, that quantity would be inflated to 100 lbs (1× = no bias), 200 lbs (2×), 500 lbs (5×), or 1000 lbs (10×). The bias levels we explored were for illustrative purposes.

This simulation exercise produced 2 quantities for each stock: total *estimated* discards and total *true* discards. The *estimated* discards were a summation of the sampled and projected (based on sampled rate) discards on observed and unobserved trips, respectively. The *true* discards were a summation of the sampled and inflated discards on observed and unobserved trips, respectively. In the absence of bias, the mean estimated discards – across all 500 simulations – are equivalent to true discards and uncertainty is dictated by coverage. In the presence of bias, estimated discards are no longer representative of the truth. Therefore, it is more useful to examine how true discards vary as the ratio of observed/unobserved trips changes with coverage rate.

Total catch (estimated and true) was then calculated as the summation of discards and landings. Due to differences in the relative magnitude of catch across stocks, and even within stocks across years, comparisons can be difficult to make depending on the scales being portrayed. We present the results in 2 phases:

1) effects of coverage rate (no bias) on the precision of estimated catch

2) effects of coverage rate & bias on the true catch

The variation in total catch (both estimated and true) across all 500 simulations is expected to be lowest for highly utilized stocks with total catch comprised mostly of landings (e.g., winter flounder, cod) and highest for those comprised mostly (or entirely) of discards (e.g., ocean pout, wolfish, windowpane flounder).

To allow for better illustration of relative differences, the results for estimated catch are displayed for only the past 3 years (2015–2017). True catch is displayed for all sector years (2010–2017) so that relative variation by coverage rate and bias level is displayed within the context of temporal differences.

Results
Figure 2 displays the variable uncertainty (95% confidence) in estimated catch across all 22 stocks (20 stocks plus 2 management units) as observer coverage is varied, in the scenario where there is no bias. Mean estimated catch is the same across coverage rates within a year, but means vary across years and uncertainty increases with decreasing coverage.

Figure 3 to Figure 24 display the simulated true catch (with 95% confidence intervals) separately for each stock from 2010–2017, with 4 panels for each level of bias and colored lines for each level of observer coverage. The lowest coverage levels are plotted last and will obscure higher levels when they match closely. Note that uncertainty intervals are often very small and appear absent.

It is clear that for highly utilized stocks where catch is comprised mostly of landings, the effects of observer coverage and bias are relatively low. For all stocks, with no bias present (bias = 1×) the mean estimated catch is not affected by level of observer coverage. Under high levels of bias (10×) and low levels of coverage (10–25%), simulated true catch for some stocks was significantly inflated over the true catch that occurs with no bias.

Figure 2- Total estimated catch (with 95% confidence intervals) under varying observer coverage.

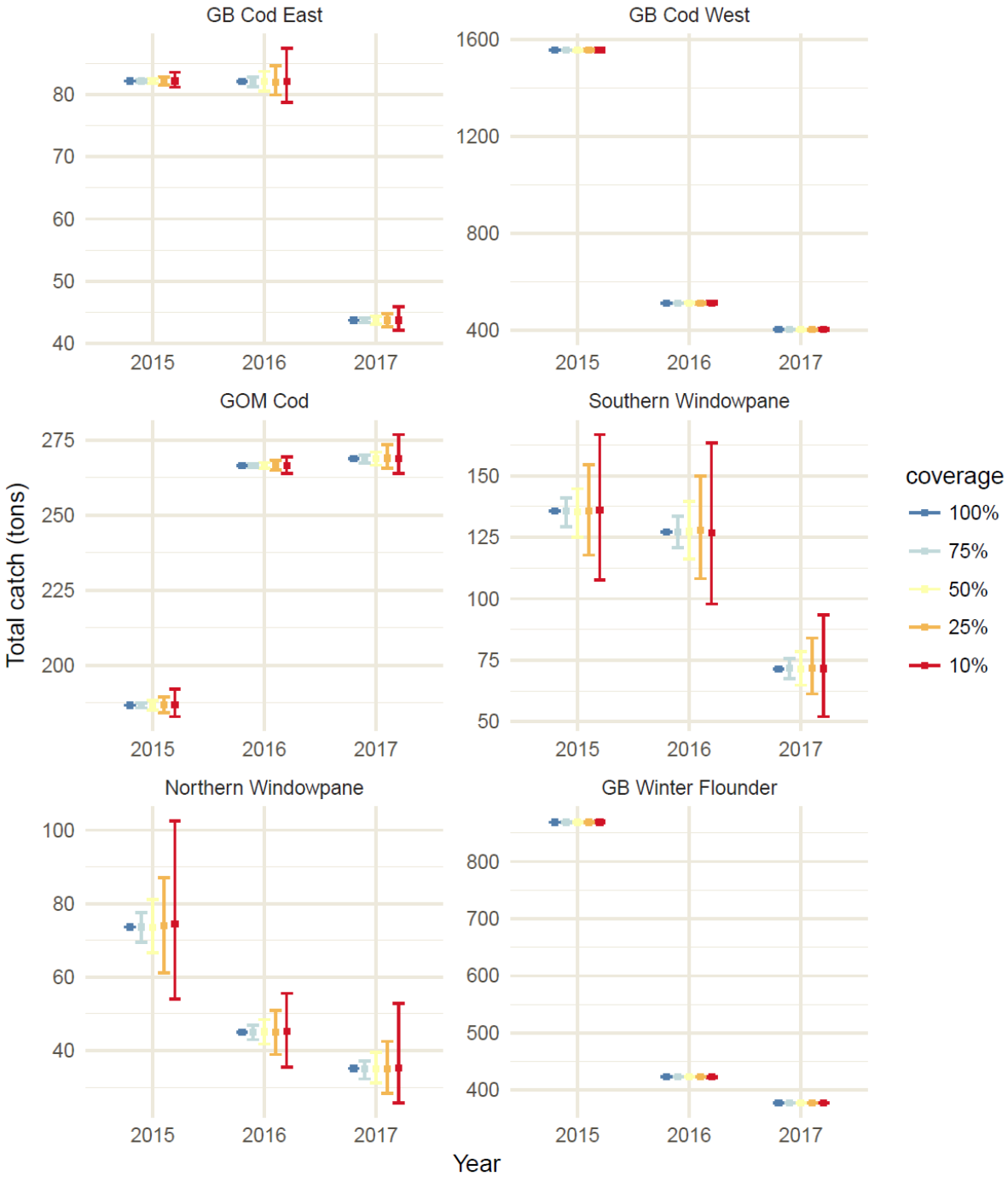

Figure 2 continued - Total estimated catch (with 95% confidence intervals) under varying observer coverage.

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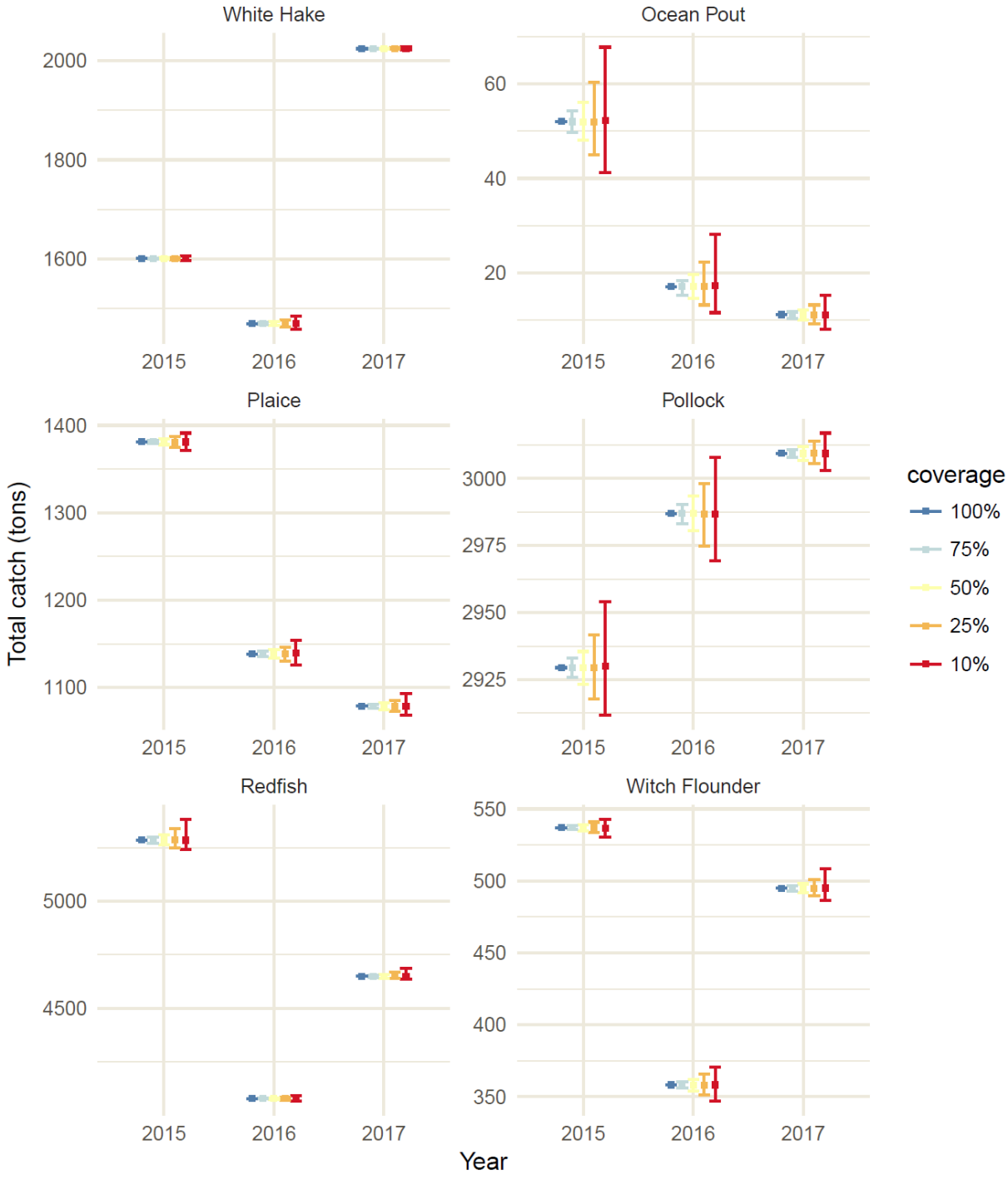


Figure 2 continued - Total estimated catch (with 95% confidence intervals) under varying observer coverage.

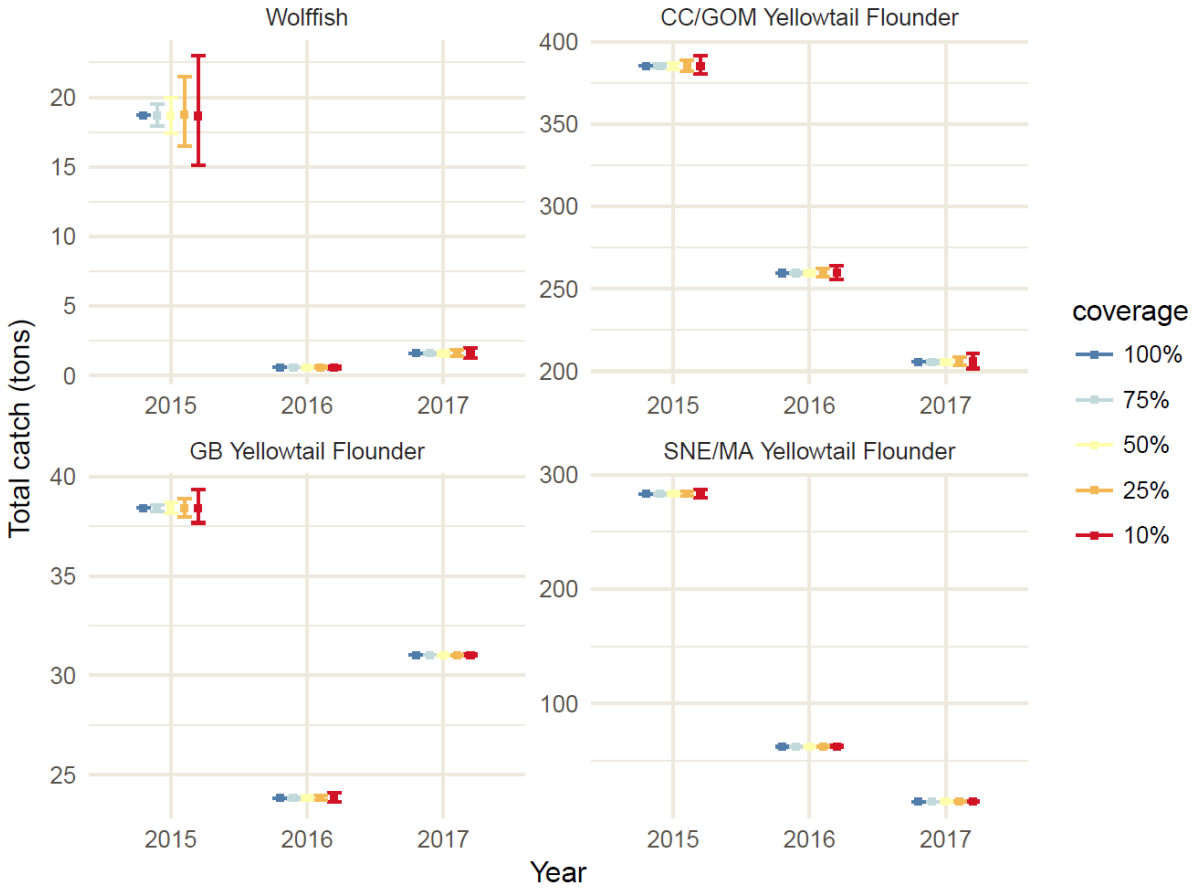


Figure 3- Eastern GB cod, total 'true' catch under varying observer coverage and bias.

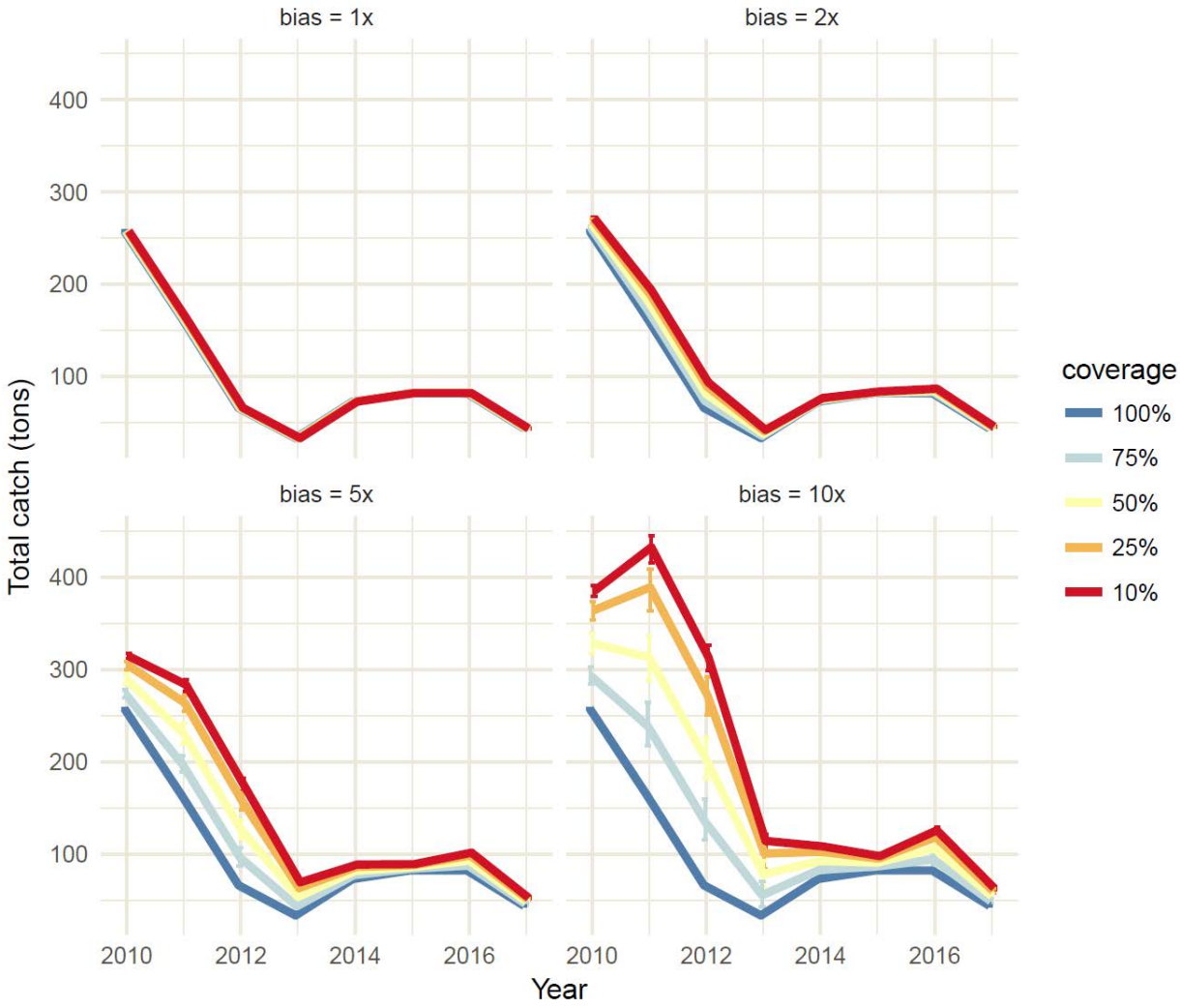


Figure 4- Western GB cod, total 'true' catch under varying observer coverage and bias.

Figure 5- GOM cod, total 'true' catch under varying observer coverage and bias.

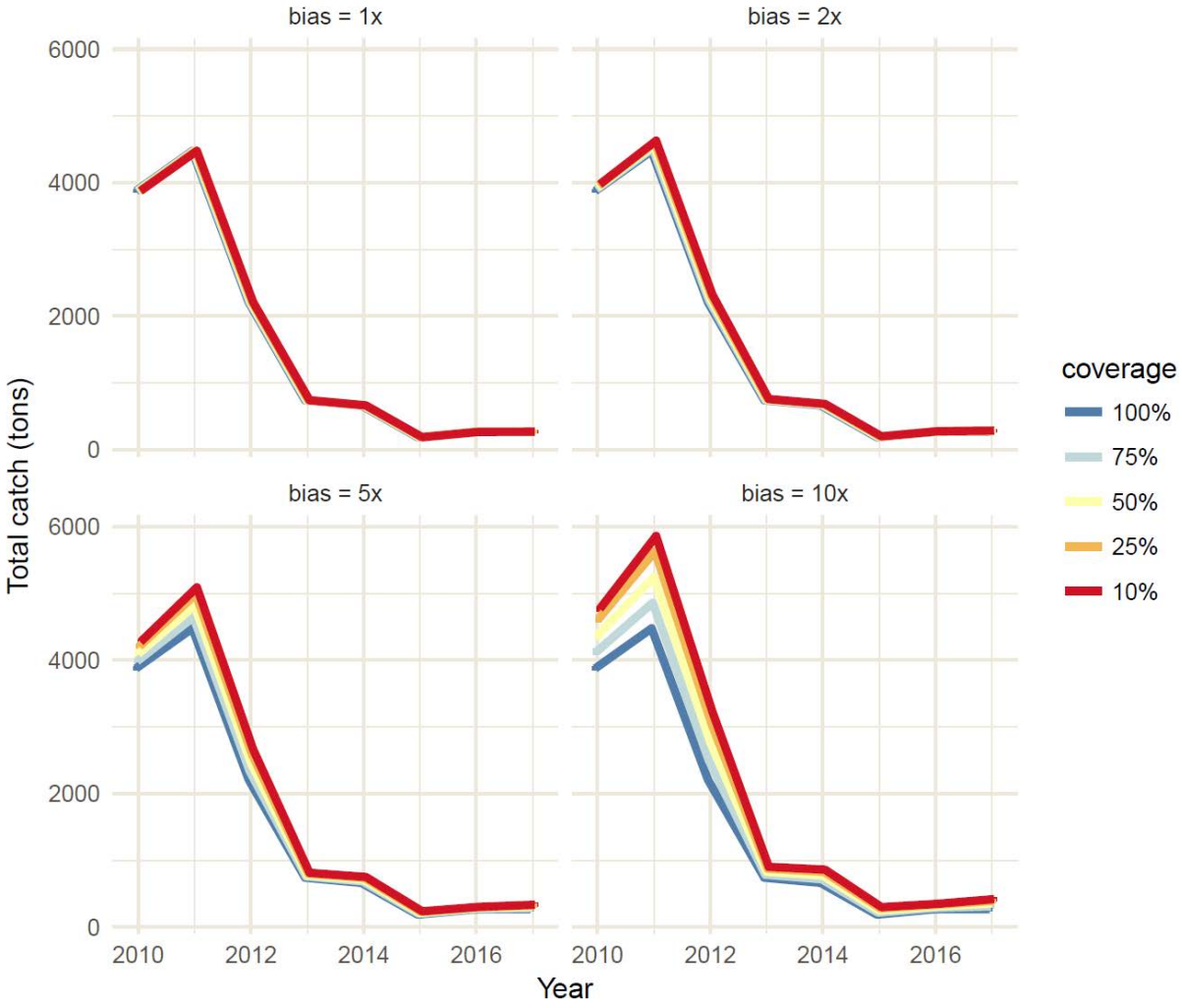


Figure 6- Southern windowpane flounder, total 'true' catch under varying observer coverage and bias.

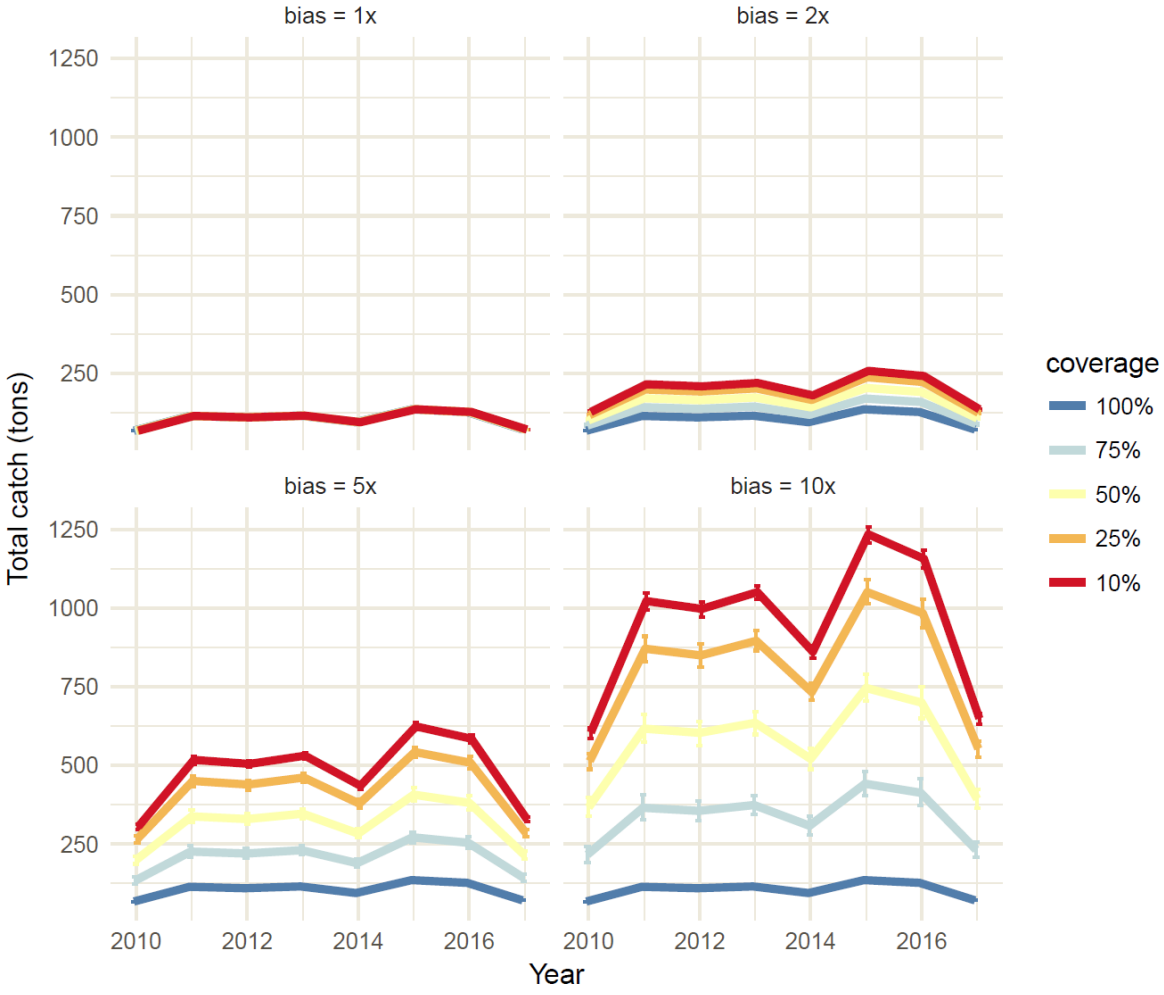


Figure 7- Northern windowpane flounder, total 'true' catch under varying observer coverage and bias.

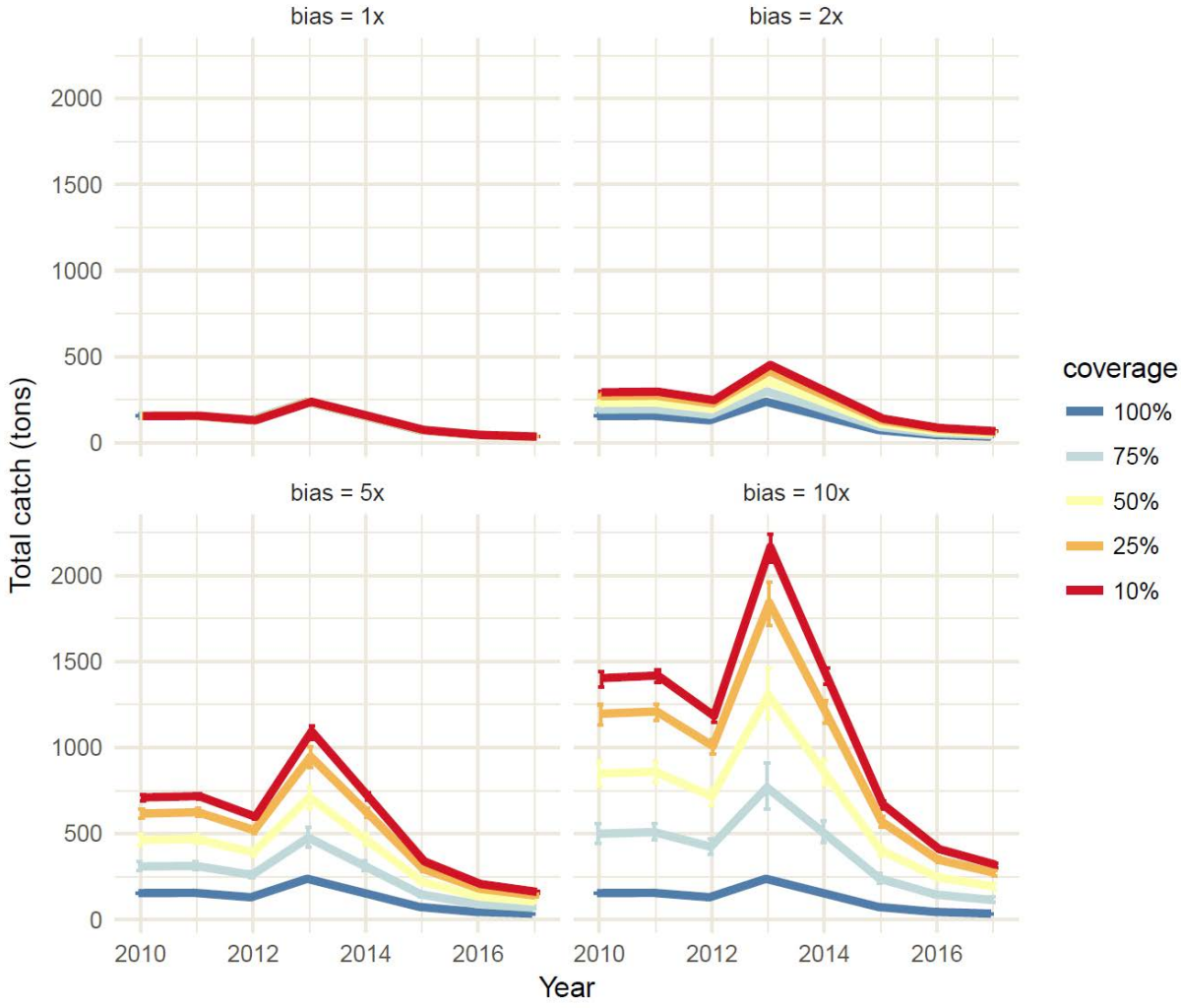


Figure 8- GB winter flounder, total 'true' catch under varying observer coverage and bias.

Figure 9- GOM winter flounder, total 'true' catch under varying observer coverage and bias.

Figure 10- SNE/MA winter flounder, total 'true' catch under varying observer coverage and bias.

Figure 11- Eastern GB haddock, total 'true' catch under varying observer coverage and bias.

Figure 12- Western GB haddock, total 'true' catch under varying observer coverage and bias.

Figure 13- GOM haddock, total 'true' catch under varying observer coverage and bias.

Figure 14- Atlantic halibut, total 'true' catch under varying observer coverage and bias.

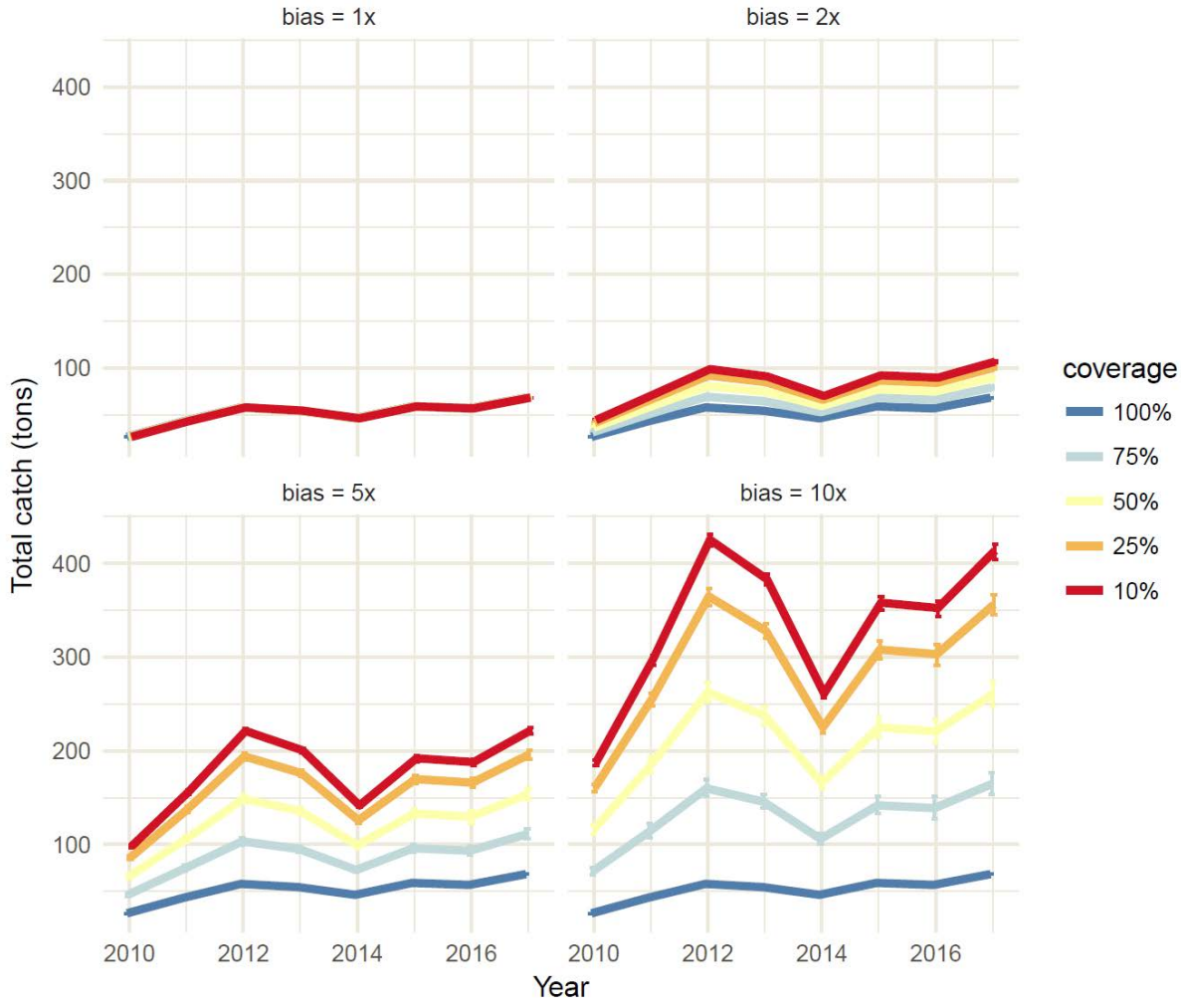


Figure 15- White hake, total 'true' catch under varying observer coverage and bias.

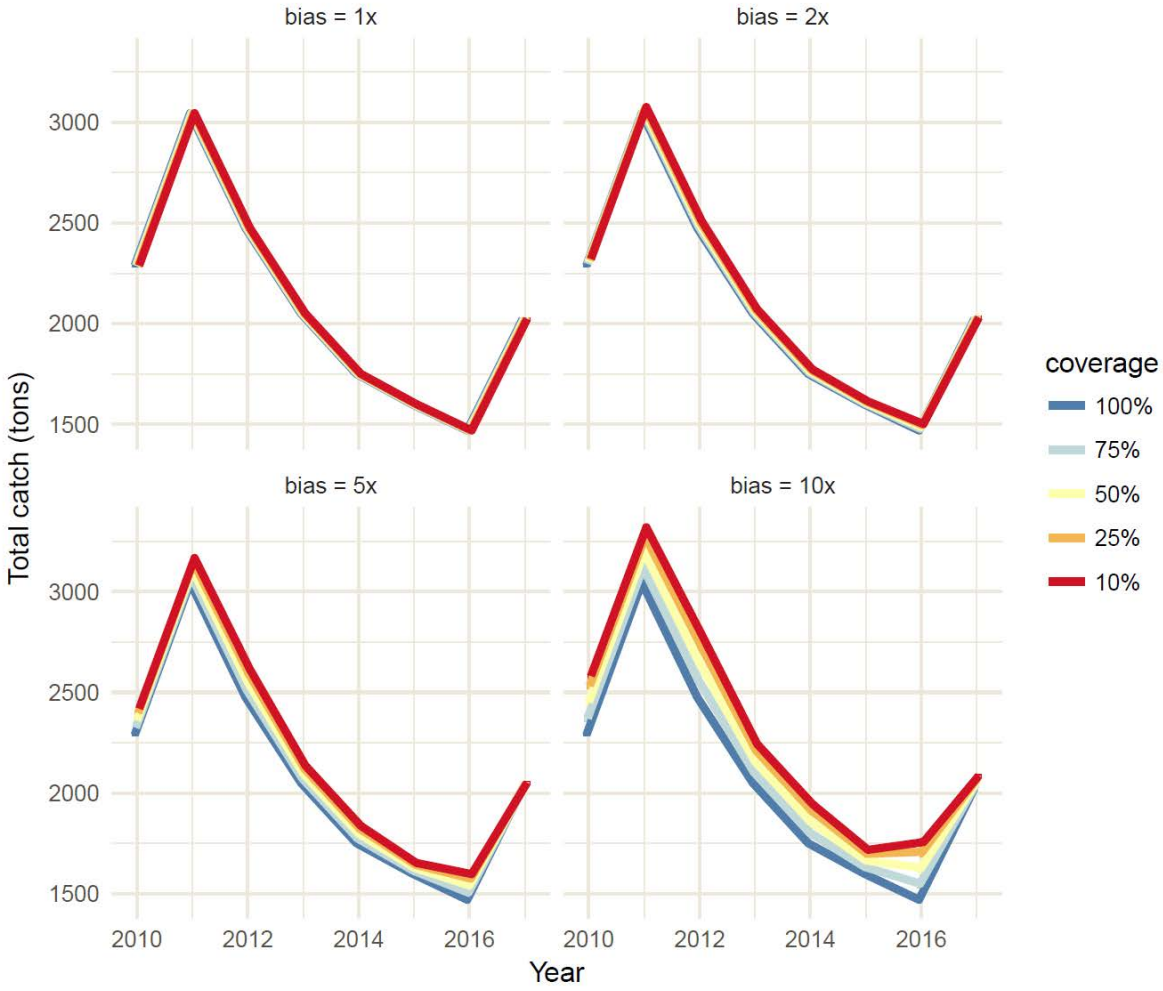


Figure 16- Ocean pout, total 'true' catch under varying observer coverage and bias.

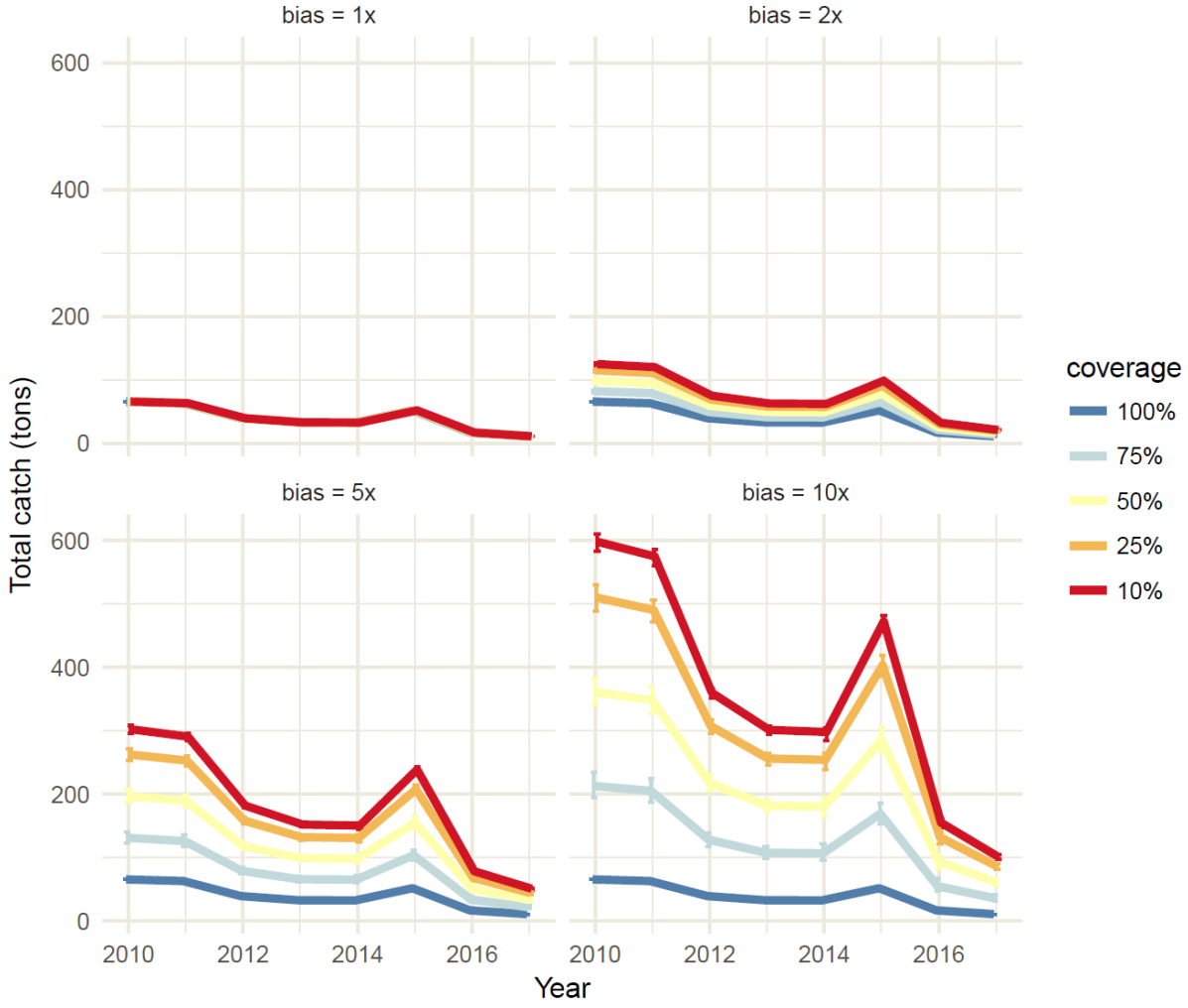


Figure 17- American plaice, total 'true' catch under varying observer coverage and bias.

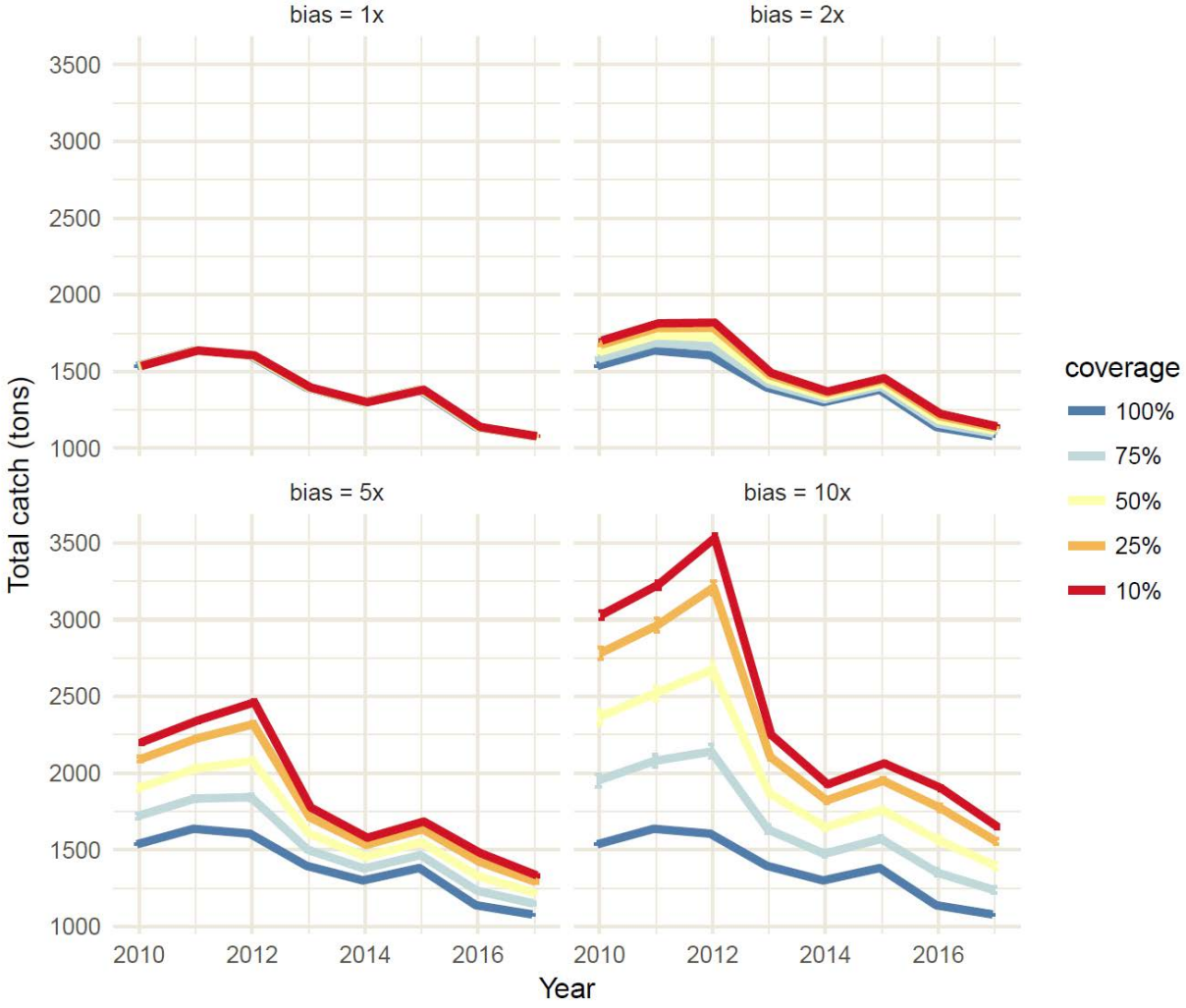


Figure 18- Pollock, total 'true' catch under varying observer coverage and bias.

Figure 19- Redfish, total 'true' catch under varying observer coverage and bias.

Figure 20- Witch flounder, total 'true' catch under varying observer coverage and bias.

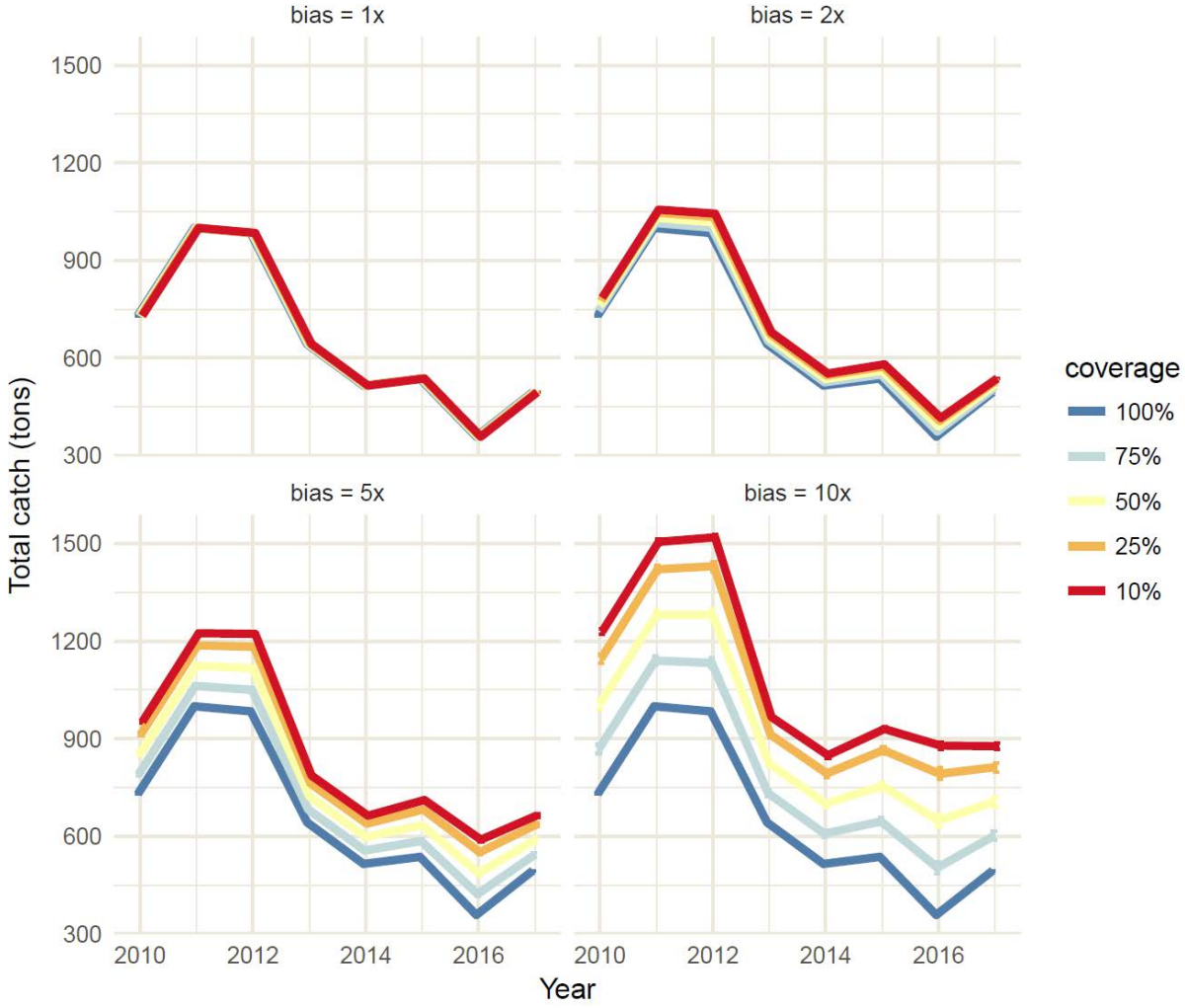


Figure 21- Wolffish, total 'true' catch under varying observer coverage and bias.

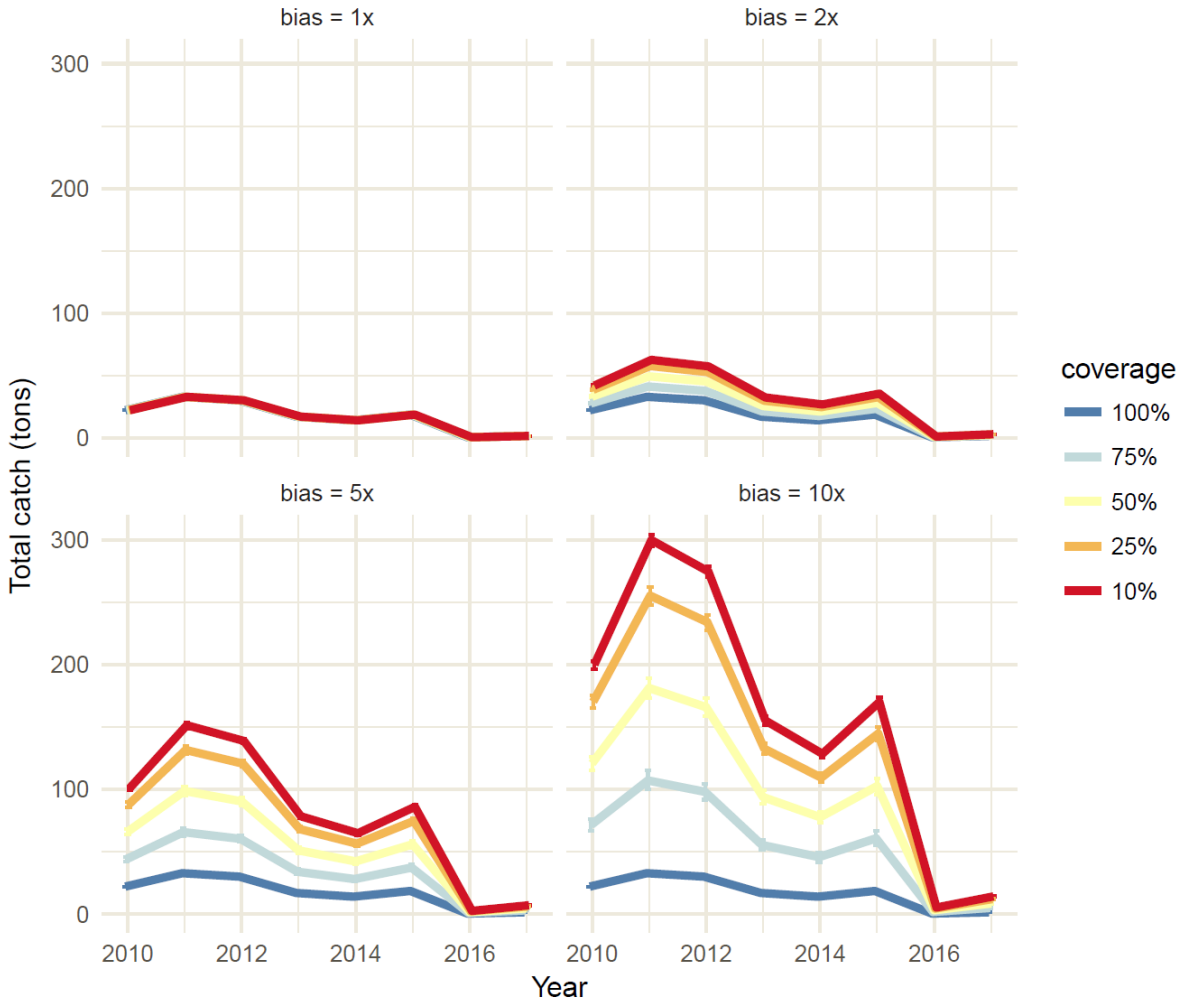


Figure 22- CC/GOM yellowtail flounder, total 'true' catch under varying observer coverage and bias.

Figure 23- GB yellowtail flounder, total 'true' catch under varying observer coverage and bias.

Figure 24- SNE/MA yellowtail flounder, total 'true' catch under varying observer coverage and bias.

Magnitude of potential 2018 missing Gulf of Maine cod discards

A sub-panel of the SSC reviewed PDT analyses showing evidence of an observer effect and concluded that observed trips are not representative of unobserved trips in the groundfish fishery (see Section 6.5.10.4 and Appendix V). However, the magnitude of the missing removals that results from illegal discards across the entire fishery was not quantified at the SSC review (the PDT does provide an estimate of potential magnitude of missing removals for GOM cod on gillnet trips; see Section 6.5.10.4 and Appendix V, "Predicting Gulf of Maine (GOM) cod catch on Northeast Multispecies (groundfish) sector trips: implications for observer bias and fishery catch accounting"). The reviewers did suggest that further investigation into quantifying the missing catch should be done. Using GOM cod as the focal stock, the PDT undertook analyses to investigate the potential magnitude for missing legal-sized discards in 2018.

The PDT acknowledges that there is considerable uncertainty surrounding a potential estimate of the magnitude of unreported legal-sized GOM cod discards. GOM cod was used as an example for two reasons. First, this stock was highly constraining from 2015 to 2018 which produces economic incentives for sector fishermen to discard legal-size fish (see Section 6.5.10.4 and Appendix V, "Modeling Discard Incentives for Northeast Multispecies (Groundfish) Stocks"). In 2012 the GOM cod ABC was 6700 mt and in 2013 was lowered to 1550 mt. The ABC became much more constraining after 2014 and was set at

703mt in 2018. Second, the GOM cod stock size estimate when the quota was less constraining in 2012 and 2013 was similar to the 2018 estimate when the quota should have been constraining. The relative change in stock size over this time period (2012-2018) can be seen in Table 1 below which shows the estimates of spawning stock biomass (SSB) from the 2019 GOM cod stock assessment.

Table 1 - Spawning stock biomass (SSB) estimates for GOM cod from the M=0.2 and M-ramp model from the 2019 operational groundfish stock assessment. The rho adjusted SSB estimates are also shown. The relative change in the SSB from 2012 and 2013 to the terminal year are shown on the right. An average of the estimated SSB changes is also given as an approximation for a stock size adjustment.

		SSB				SSB Relative Change				
year	ABC	m=0.2	rho adj	mramp	rho adj	m=0.2	rho adj	mramp	rho adj	Average
2011	9,012	6,723		8,009						
2012	6,700	3,524		4,221		1.06	0.70	0.91	0.71	0.84
2013	1,550	1,874		2,361		2.00	1.32	1.63	1.26	1.55
2014	1,550	1,263		1,809						
2015	386	1,439		2,164						
2016	500	2,258		3,023						
2017	500	3,051		3,593						
2018	703	3,752	2468	3,838	2976					

The PDT calculated the ratio of observed GOM cod landings to effort (days absent) in 2013, which was a fishing year where cod was less constraining to the total effort. This ratio was multiplied by the observed fishing effort in 2018 (∑days absent) to estimate the potential magnitude of discarding of legal-size GOM cod. This estimate only accounts for potential legal-size discards of GOM cod which should have been landed. Therefore, sublegal discards are not part of this calculation and the PDT is referring to this as a "potential landings estimate".

Potential Landings Estimate = ∑ 2013 GOM cod landings/∑ 2013 Days Absent (DA) * Total 2018 Days Absent

The potential landings estimate was also done using 2012 data for the ratio in the equation above. The magnitude of the missing landings through unreported discards of legal-size was summarized as a multiplier relative to the 2018 fishing year GOM cod commercial landings of 480mt (Landings estimate/2018 dealer landings of 480mt). The estimator was limited to GOM groundfish sector trawl trips. The multiplier gives an indication of the magnitude of the potential for missing landings relative to the total dealer landings that were recorded in 2018. This estimate does not include possible missing GOM cod landings through stock area misreporting or through potential missing GOM cod from unreported dealer landings. Any stock area misreporting or unreported dealer landings will also produce error for this estimate of the missing GOM cod discards.

The estimated multipliers calculated from 2012 or 2013 landings per days absent (CPUE) and applied to the total effort in 2018 (∑days absent) are shown in Table 2. The landings multipliers are relative to the total landings in 2018 (480mt).

As a sensitivity check, the PDT explored the effects of removing a proportion of the 2012 and 2013 trawl trips that had the greatest landings of GOM cod. Percentages signify the 2012 and 2013 trips used to estimate the multipliers. For example, 75% indicate that 25% of the highest cod landings trips were eliminated in estimation of the multiplier. The multiplier estimate is sensitive to the unknown targeting and avoidance behavior in the overall fishery.

Estimation of the multiplier by statistical area was also done since there was spatial shift in fishing effort (inshore to offshore) over this time period when cod became more constraining. This did result in the slight reduction in overall estimated multipliers. Most GOM trips (~90%) are made up of single statistical area trips. For trips that reported effort in multiple statistical areas, the catch and effort was apportioned equally between each area.

Table 2 - Estimated multipliers calculated for all trips and for trips by statistical area. Sensitivity of the estimate to elimination of the top 25% and 50% of GOM cod trips is also shown.

	Total			By Stat Area		
year	100%	75%	50%	100%	75%	50%
2012	3.84	2.99	2.15	3.03	2.42	1.82
2013	1.71	1.32	0.92	1.67	1.32	0.95

This estimate of an upper bound of the potential magnitude for missing legal sized discards of GOM cod is an approximation of the potential magnitude since there are several assumptions inherent in this approach. Due to these assumptions there is considerable unquantified uncertainty surrounding the estimate. However, this estimate is perhaps a more realistic bound on the potential missing catch for GOM cod relative to multipliers that are much higher since total fishing effort will limit the potential for missing discards. To estimate this bound the PDT first assume the stock size for years where the estimate of landings per unit of effort (e.g. 2012 and 2013) is similar to 2018 where the PDT applied that landings per unit effort estimator. The sensitivity to this assumption is discussed in the next paragraph. The second assumption is that the targeting behavior of the fishery was identical in 2012/2013 and 2018. The ability of the fishery to preferentially target certain stocks is a difficult factor to account for in estimating the bound of missing catch since the fleet's true ability to avoid constraining stocks on groundfish trips is not known, nor is it known what the true fishery avoidance behavior is for constraining stocks when a trip is unobserved because of the potential targeting of non-constraining stocks in areas of high catch per unit effort (CPUE) that may also overlap areas where cod are caught. To help bound this issue we used all of the trips (no targeting behavior change) in the estimator and also eliminated some of the highest cod landing trips (approximate a change in targeting behavior) from the estimate. Not surprisingly, the estimate of potential missing cod is sensitive to the elimination of the trips that caught the highest amount of cod.

For example, if we eliminate the top 50% of the total GOM cod landings trips from the estimator (landings per unit effort) in 2013 then the predicted landings were below the actual reported landings. This estimate is not realistic since one would not expect actual landings to be below the reported landings. Using all trips in the estimator may also not be realistic but this may give a sense of a bound for the missing catch given all of the other assumptions.

For further refinement the multipliers on missing GOM cod landings were adjusted by the relative average SSB change from the stock assessment (2012 SSB estimate/2018 SSB estimate = 0.84 and 2013 SSB estimate/2018 SSB estimate = 1.55). Adjusting for the change in SSB estimated by the assessment would bring the 2012 and 2013 estimates slightly closer together between years which can be seen in Table 3.

Table 3 - Estimated multipliers calculated for all trips and for trips by statistical area which were also adjusted for the relative average SSB change from the stock assessment (2012 = 0.84 and 2013 = 1.55).

	Total			By Stat Area						
year	100%	75%	50%	100%	75%	50%	Max	min	average	median
2012	3.24	2.53	1.82	2.56	2.04	1.54	3.24	1.54	2.31	2.29
2013	2.65	2.05		2.59	2.05					

In conclusion, both the average and median rough multiplier on an upper bound of potential missing GOM cod are about 2.3 which would equate to roughly 1,100mt (with a rough uncertainty range of 1.5 to 2.5, or about 700 to 1,200mt) given the many assumptions of this analysis, the assumed changes in stock size over this period and with some consideration for GOM cod avoidance behavior in the fishery.

7.1.1.1.1 Sector Monitoring Standard Option 1: No Action

Impacts on regulated groundfish

Option 1/No Action would maintain the current CV method for determining the annual total monitoring coverage. The average realized coverage rate for years FY2010-FY2017 was 22%. Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38%, and 14-32%, respectively, resulting in an average target and realized coverage level of 25% and 22%, respectively. As documented above in Section 7.1.1, there are a number of uncertainties within the current monitoring program related to low levels of monitoring coverage. In particular, PDT analysis (see Section 6.5.10.4 and Appendix V) has shown that observed trips are not representative of unobserved trips. Under the low levels of monitoring that have been realized under Option 1/No Action, the majority of groundfish trips would have estimates of discards that are not accurate. Therefore, Option 1/No Action is likely to continue to have negative biological impacts on regulated groundfish.

Additionally, compliance scores, which follow a qualitative analytical approach based on assessing the risk of noncompliance of alternatives (Section 7.4.2.6 in Economic Impacts Analysis), provide some idea of the risk of non-compliance with different fixed rates of at-sea monitoring coverage as a percentage of trips. As described in Section 7.4.2.6, the risk of non-compliance depends on the coverage rate selected, and because the compliance score depends on both the opportunity to be noncompliant and the economic incentive to be noncompliant, as discussed in PDT analyses (see Section 6.5.10.4 and Appendix V, "Modeling Discard Incentives for Northeast Multispecies (Groundfish) Stocks"), there is less compliance risk for violations at sea when the at-sea monitoring coverage rate is higher. The coverage levels under Option 1/No Action (average target and realized coverage level of 25% and 22%, respectively) have a score of 'low' compliance since there is high risk of non-compliance. This is due to the opportunity on the majority of trips for misreporting or illegal discarding of certain stocks that are constraining, which could mean the majority of groundfish trips would not have accurate estimates.

Compared to the four options for fixed coverage of trips under Option 2, Option 1/No Action would have similar/neutral biological impacts to 25% monitoring coverage, since the average realized coverage rate for years FY2010-FY2017 was 22%. Option 1/No Action would have negative biological impacts compared to the options for 50%, 75%, and 100% coverage of trips. Compared to the four options for fixed coverage of catch under Option 3, Option 1/No Action would have negative biological impacts compared to the options for 25%, 50%, 75%, and 100% coverage of catch, as a simulation analysis shows that overall coverage of trips will have to be set higher in order to achieve the target catch percentage for each allocated groundfish stock (see Section 7.1.1.1.3 for more details).

Impacts on other species

Under Option 1/No Action, the average realized coverage rate for years FY2010-FY2017 was 22%. Under the low levels of monitoring that have been realized under Option 1/No Action, there is less assurance that sector vessels do not exceed their ACE. As such, there is less opportunity for fishing effort to be reduced. Therefore, Option 1/No Action is likely to have negative biological impacts on other species.

Compared to the four options for fixed coverage of trips under Option 2, Option 1/No Action would have similar/neutral biological impacts to 25% monitoring coverage, since the average realized coverage rate for years FY2010-FY2017 was 22%. Option 1/No Action would have negative biological impacts compared to the options for 50%, 75%, and 100% coverage of trips. Compared to the four options for fixed coverage of catch under Option 3, Option 1/No Action would have negative biological impacts compared to the options for 50%, 75%, and 100% coverage of catch, as a simulation analysis shows that overall coverage of trips will have to be set higher in order to achieve the target catch percentage for each allocated groundfish stock (see Section 7.1.1.1.3 for more details).

7.1.1.1.2 Sector Monitoring Standard Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on Percentage of Trips

Impacts on regulated groundfish

As described above in Section 7.1, improvements in monitoring through higher levels of monitoring coverage have positive biological impacts on groundfish species, both in the short- and long-term. In the short-term, improvements in monitoring which reduce fishing mortality through better catch accounting should produce positive biological impacts. In the longer-term analytical assessments should improve with better catch data which should lead to subsequent improvements in groundfish catch advice and management. The four options for a fixed total monitoring coverage level based on a percentage of trips (25, 50, 75, and 100%) are analyzed and qualitatively ranked relative to each other. When possible, additional analyses are referred to that provide further comparative ranking of the four options for monitoring coverage. Compared to No Action, this option is expected to have neutral to positive biological impacts for regulated groundfish species.

Impacts on other species

Improvements in monitoring through higher levels of monitoring coverage have positive biological impacts on other species, in particular species that are caught incidentally as bycatch in the commercial groundfish fishery. Improved monitoring through higher monitoring coverage levels ensures that sector vessels do not exceed their ACE. As such, fishing effort may be reduced with higher levels of monitoring coverage which produces positive biological impacts for other species. The four options for a fixed total monitoring coverage level based on a percentage of trips (25, 50, 75, and 100%) are analyzed and qualitatively ranked relative to each other. Compared to No Action, this option is expected to have neutral to positive biological impacts for other species.

7.1.1.1.2.1 Sub-option 2A – 25 percent

Impacts on regulated groundfish

The 25% monitoring coverage option would not improve monitoring relative to the No Action since the average realized coverage rate for years FY2010-FY2017 was 22%. Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38%, and 14-32%, respectively, resulting in an average target and realized coverage level of 25% and 22%, respectively. Therefore a 25% fixed percentage coverage rate is expected to have neutral biological impacts relative to the No Action, and would continue to have negative impacts on regulated groundfish. Further, 75% of the groundfish trips would not have accurate estimates of discards since PDT analysis (see Section 6.6.10.3 and Appendix V) has shown that observed trips are not representative of unobserved trips.

Additionally, compliance scores, which follow a qualitative analytical approach based on assessing the risk of noncompliance of alternatives (Section 7.4.2.6 in Economic Impacts Analysis), provide some idea of the risk of non-compliance with different fixed rates of at-sea monitoring coverage as a percentage of trips. As described in Section 7.4.2.6, the risk of non-compliance depends on the coverage rate selected, and because the compliance score depends on both the opportunity to be noncompliant and the economic incentive to be noncompliant, as discussed in PDT analyses (see Section 6.5.10.4 and Appendix V, "Modeling Discard Incentives for Northeast Multispecies (Groundfish) Stocks"), there is less compliance risk for violations at sea when the at-sea monitoring coverage rate is higher. The 25% coverage option has a score of 'low' compliance since there is high risk of non-compliance. This is due to the opportunity on the majority of trips for misreporting or illegal discarding of certain stocks that are constraining, which could mean the majority of groundfish trips would not have accurate estimates.

Impacts on other species

The 25% monitoring coverage option would not improve monitoring relative to the No Action since the average realized coverage rate for years FY2010-FY2017 was 22%. Therefore, this option is expected to have neutral biological impacts for other species compared to the No Action. Since observer bias is still expected to be an issue under the 25% option, there are unknown impacts on discard estimation for other species since observed trips are not representative.

7.1.1.1.2.2 Sub-option 2B – 50 percent

Impacts on regulated groundfish

The 50% monitoring coverage option would establish slightly higher coverage rates relative to the No Action (average coverage rate for years FY2010-FY2017 of 22%). This option is expected to have low positive biological impacts relative to the No Action alternative. This option would provide accurate estimates of groundfish landings and discards for half of all the groundfish trips. However, half of the groundfish trips would not have accurate estimates of discards since PDT analysis (see Section 6.5.10.4 and Appendix V) has shown that observed trips are not representative of unobserved trips.

However, compliance scores (Section 7.4.2.6 in Economic Analysis) demonstrate that the risk for noncompliance at 50% monitoring coverage might be more similar to the risk of noncompliance at 25% coverage, and less similar to 75% coverage. This is due to economic incentives to misreport catch or discard illegally on the unobserved portion of trips, and since an observer is on board 50% of the trips there is less opportunity to discard illegally than at a lower coverage levels, while there is simultaneously a potential for the incentive to misreport catch or landings to increase substantially if it means catch of

certain stocks is more constraining some proportion of the time. Therefore, if an observer is not onboard, the incentive to illegally discard, may be higher and just as, if not more catch may be discarded at 50% coverage as at the 25% coverage rate, when the incentive effect isn't as strong (see Section 7.4.2.6). 50% coverage level is scored as 'low' compliance since there is a high risk of non-compliance. This strong incentive to misreport on the unobserved trips at 50% coverage could lead to increased illegal discards on the unobserved trips.

Impacts on other species

The 50% monitoring coverage option would have slightly higher coverage rates relative to the No Action (average coverage rate for years FY2010-FY2017 of 22%). This option is expected to have low positive biological impacts for other species relative to the No Action alternative. Since observer bias is still expected to be an issue under the 50% option, there are unknown impacts on discard estimation for other species since observed trips are not representative.

7.1.1.1.2.3 Sub-option 2C – 75 percent

Impacts on regulated groundfish

The 75% monitoring coverage option would have higher coverage rates relative to the No Action (average coverage rate for years FY2010-FY2017 of 22%). This option is expected to have positive biological impacts relative to the No Action alternative. Since 75% of all groundfish trips will have accurate estimates of discards this option has positive biological impacts relative to the 50% monitoring coverage option. With the 75% fixed coverage rate, 25% of the groundfish trips will likely have inaccurate estimates of discards due to the observed trips not being an accurate representation of unobserved trips (see Section 6.5.10.4 and Appendix V).

Referring to compliance scores (Section 7.4.2.6 in Economic Impacts Analysis), at 75% coverage, a potentially strong incentive effect to misreport or behave differently is counteracted by a lower opportunity. As described in Section 7.4.2.6, under such coverage levels misreporting or illegal discarding behavior can now occur only on a minority of trips, which limits the amount of potential illegal activity somewhat, but not entirely. While some alteration of pre-catch behavior depending on whether an observer is onboard or not is possible, it becomes much more difficult to maintain profitable business operations if it is dependent on illegal activity on a minority of trips. Therefore, risk of non-compliance is likely lower at 75% coverage compared to 50% or 25% coverage. The 75% coverage level option is scored as 'medium' since there is some risk of non-compliance. It should be noted that this is likely conservative, as there is expected to be a strong incentive to misreport on the unobserved portion of trips under 75% coverage, which could lead to inaccurate catch estimates from the 25% of groundfish trips that are unobserved.

Impacts on other species

The 75% monitoring coverage option would have higher coverage rates relative to the No Action (average coverage rate for years FY2010-FY2017 of 22%). This option is expected to have positive biological impacts for other species relative to the No Action alternative since the majority of trips will have accurate estimates of discards.

7.1.1.1.2.4 Sub-option 2D – 100 percent

Impacts on regulated groundfish

The 100% monitoring coverage option will provide an accurate estimate of groundfish discards on groundfish trips since an estimate for unobserved trips is not needed (with the exception of instances such as unobserved hauls or waivers issued). This will provide accurate estimates of discards on groundfish trips which will result in positive biological impacts since discard mortality will be fully accounted for in the groundfish fishery. Section 7.1 lists potential biological impacts from 100% monitoring of all sector trips on regulated groundfish, both in the short- and long-term. Compared to the No Action, the option for 100% monitoring coverage would have positive biological impacts. Similarly, 100% monitoring coverage would have positive biological impacts when compared to 25% and 50% coverage and would have low positive impacts compared to 75% coverage.

Impacts on other species

The 100% monitoring coverage option will provide comprehensive in-season monitoring on groundfish trips which ensures that sector vessels do not exceed their ACE. As such, fishing effort may be reduced with higher levels of monitoring coverage. Compared to the No Action, the option for 100% monitoring coverage would have positive biological impacts for other species. Similarly, 100% monitoring coverage would have positive biological impacts when compared to 25% and 50% coverage and would have low positive impacts compared to 75% coverage.

7.1.1.1.3 Sector Monitoring Standard Option 3: Fixed Total At-Sea Monitoring Coverage Level Based on Percentage of Catch

Impacts on regulated groundfish

As described above in Section 7.1, improvements in monitoring through higher levels of monitoring coverage have positive biological impacts on groundfish species, both in the short- and long-term. In the short-term, improvements in monitoring which reduces fishing mortality through better catch accounting should produce positive biological impacts. In the longer-term analytical assessments should improve with better catch data which should lead to subsequent improvements in groundfish catch advice and management. The four options for a fixed total monitoring coverage level based on a percentage of catch (25, 50, 75, and 100%) for each allocated groundfish stock are analyzed and qualitatively ranked relative to each other. Compared to No Action, this option is expected to have low positive to positive biological impacts for regulated groundfish species. Compared to Option 2, this option is expected to have low positive to positive biological impacts to regulated groundfish species, because achieving a target percent coverage of catch of each allocated groundfish stock will require a higher overall monitoring coverage level, due to the variation among stocks (see Section 7.4.3.1.3 in the Economic Impacts Analysis).

Impacts on other species

Improvements in monitoring through higher levels of monitoring coverage have positive biological impacts on other species. Improved monitoring through higher monitoring coverage levels ensures that sector vessels do not exceed their ACE. As such, fishing effort may be reduced with higher levels of monitoring coverage which produces positive biological impacts for other species. The four options for a fixed total monitoring coverage level based on a percentage of catch (25, 50, 75, and 100%) for each allocated groundfish stock are analyzed and qualitatively ranked relative to each other. Compared to No Action, this option is expected to have low positive to positive biological impacts for other species.

7.1.1.1.3.1 Sub-option 3A – 25 percent

Impacts on regulated groundfish

25% monitoring coverage as a percentage of catch for each allocated groundfish stock would likely result in some improvement to monitoring relative to Option 1/No Action. As demonstrated in a simulation exercise described in Section 7.4.3.1.3 in the Economic Impacts Analysis in order to investigate what overall coverage levels would be necessary to achieve a given coverage rate of total catch for any given allocated stock, a higher overall coverage level is needed in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. The simulations show that 50% randomized observer coverage across all FY2018 sector trips would result in a 90% probability that at least 25% of the total catch of every allocated stock (and halibut) was observed (Figure 42, Table 66 in Section 7.4.3.1.3 in the Economic Impacts Analysis). 25% monitoring coverage as a percentage of catch for each allocated groundfish stock would, therefore, result in improvements to monitoring when compared to Option 1/No Action, since the average realized coverage rate for years FY2010-FY2017 was 22%. Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38%, and 14-32%, respectively, resulting in an average target and realized coverage level of 25% and 22%, respectively. Therefore a 25% percentage coverage rate of total catch of each allocated groundfish stock is expected to have low positive biological impacts for regulated groundfish relative to the No Action. However, there are still concerns that the unobserved portion of groundfish trips would not have accurate estimates of discards since PDT analysis (see Section 6.5.10.4 in the Affected Environment and Appendix V) has shown that observed trips are not representative of unobserved trips.

Impacts on other species

25% monitoring coverage as a percentage of catch for each allocated groundfish stock would likely result in some improvement to monitoring relative to Option 1/No Action. As demonstrated in a simulation exercise described in Section 7.4.3.1.3 in the Economic Impacts Analysis in order to investigate what overall coverage levels would be necessary to achieve a given coverage rate of total catch for any given allocated stock, a higher overall coverage level is needed in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. The simulations show that 50% randomized observer coverage across all FY2018 sector trips would result in a 90% probability that at least 25% of the total catch of every allocated stock (and halibut) was observed (Figure 42, Table 66 in Section 7.4.3.1.3 in the Economic Impacts Analysis). 25% monitoring coverage as a percentage of catch for each allocated groundfish stock would, therefore, result in improvements to monitoring when compared to Option 1/No Action, since the average realized coverage rate for years FY2010-FY2017 was 22%. Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38%, and 14-32%, respectively, resulting in an average target and realized coverage level of 25% and 22%, respectively. Therefore a 25% percentage coverage rate of total catch of each allocated groundfish stock is expected to have low positive biological impacts for other species relative to the No Action. However, there are still concerns that the unobserved portion of groundfish trips would not have accurate estimates of discards since PDT analysis (see Section 6.5.10.4 in the Affected Environment and Appendix V) has shown that observed trips are not representative of unobserved trips.

7.1.1.1.3.2 Sub-option 3B – 50 percent

Impacts on regulated groundfish

50% monitoring coverage as a percentage of catch for each allocated groundfish stock would result in higher monitoring coverage relative to Option 1/No Action. As demonstrated in a simulation exercise described in Section 7.4.3.1.3 in the Economic Impacts Analysis in order to investigate what overall coverage levels would be necessary to achieve a given coverage rate of total catch for any given allocated stock, a higher overall coverage level is needed in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. The simulations show that increasing coverage rates to 70% of trips would confer roughly a 90% chance that 50% of total catch was observed for each allocated groundfish stock, with many stocks having a 100% chance of meeting that catch target if effort and stock availability remained identical to 2018. (Figure 43, Table 66 in Section 7.4.3.1.3 in the Economic Impacts Analysis). 50% monitoring coverage as a percentage of catch for each allocated groundfish stock would, therefore, result in improvements to monitoring when compared to the No Action (average coverage rate for years FY2010-FY2017 of 22%). Therefore a 50% percentage coverage rate of total catch of each allocated groundfish stock is expected to have positive? biological impacts relative to the No Action. However, there are still concerns that the unobserved portion of groundfish trips would not have accurate estimates of discards since PDT analysis (see Section 6.5.10.4 in the Affected Environment and Appendix V) has shown that observed trips are not representative of unobserved trips.

Impacts on other species

50% monitoring coverage as a percentage of catch for each allocated groundfish stock would result in higher monitoring coverage relative to the No Action. As demonstrated in a simulation exercise described in Section 7.4.3.1.3 in the Economic Impacts Analysis in order to investigate what overall coverage levels would be necessary to achieve a given coverage rate of total catch for any given allocated stock, a higher overall coverage level is needed in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. The simulations show that increasing coverage rates to 70% of trips would confer roughly a 90% chance that 50% of total catch was observed for each allocated groundfish stock, with many stocks having a 100% chance of meeting that catch target if effort and stock availability remained identical to 2018. (Figure 43, Table 66 in Section 7.4.3.1.3 in the Economic Impacts Analysis). 50% monitoring coverage as a percentage of catch for each allocated groundfish stock would, therefore, result in improvements to monitoring when compared to the No Action (average coverage rate for years FY2010-FY2017 of 22%). Therefore a 50% percentage coverage rate of total catch of each allocated groundfish stock is expected to have positive biological impacts for other species relative to the No Action.

7.1.1.1.3.3 Sub-option 3C – 75 percent

Impacts on regulated groundfish

75% monitoring coverage as a percentage of catch for each allocated groundfish stock would result in higher monitoring coverage relative to the No Action. As demonstrated in a simulation exercise described in Section 7.4.3.1.3 in the Economic Impacts Analysis in order to investigate what overall coverage levels would be necessary to achieve a given coverage rate of total catch for any given allocated stock, a higher overall coverage level is needed in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. The simulations show that increasing coverage rates to 90% of trips would confer roughly a 90% chance that 75% of total catch was observed for each stock (Figure 44, Table 66 in Section 7.4.3.1.3 in the Economic Impacts Analysis)). 75% monitoring coverage as a percentage of catch for each allocated groundfish stock would, therefore, result in improvements to monitoring when compared to the No Action (average coverage rate for years FY2010-FY2017 of 22%). Therefore a 75% percentage coverage rate of total catch of each allocated groundfish stock is expected to have positive biological impacts relative to the No Action. However, there are still concerns that the unobserved portion

of groundfish trips would not have accurate estimates of discards since PDT analysis (see Section 6.5.10.4 in the Affected Environment and Appendix V) has shown that observed trips are not representative of unobserved trips.

Impacts on other species

75% monitoring coverage as a percentage of catch for each allocated groundfish stock would result in higher monitoring coverage relative to the No Action. As demonstrated in a simulation exercise described in Section 7.4.3.1.3 in the Economic Impacts Analysis in order to investigate what overall coverage levels would be necessary to achieve a given coverage rate of total catch for any given allocated stock, a higher overall coverage level is needed in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. The simulations show that increasing coverage rates to 90% of trips would confer roughly a 90% chance that 75% of total catch was observed for each stock (Figure 44, Table 66 Section 7.4.3.1.3 in the Economic Impacts Analysis). 75% monitoring coverage as a percentage of catch for each allocated groundfish stock would, therefore, result in improvements to monitoring when compared to the No Action (average coverage rate for years FY2010-FY2017 of 22%). Therefore a 75% percentage coverage rate of total catch of each allocated groundfish stock is expected to have positive biological impacts for other species relative to the No Action.

7.1.1.1.3.4 Sub-option 3D – 100 percent

Impacts on regulated groundfish

100% monitoring coverage as a percentage of catch for each allocated groundfish stock will provide an accurate estimate of groundfish discards on groundfish trips since an estimate for unobserved trips is not needed. This will provide accurate estimates of discards on groundfish trips which will result in positive biological impacts since discard mortality will be fully accounted for in the groundfish fishery. Section 7.1 lists potential biological impacts from 100% monitoring of all sector trips on regulated groundfish, both in the short- and long-term. Compared to the No Action, the option for 100% monitoring coverage would have positive biological impacts. Similarly, 100% monitoring coverage would have positive biological impacts when compared to 25% and 50% coverage and would have low positive impacts compared to 75% coverage.

Impacts on other species

100% monitoring coverage as a percentage of catch for each allocated groundfish stock will provide comprehensive in-season on groundfish trips which ensures that sector vessels do not exceed their ACE. As such, fishing effort may be reduced with higher levels of monitoring coverage. Compared to the No Action, the option for 100% monitoring coverage would have positive biological impacts for other

species. Similarly, 100% monitoring coverage would have positive biological impacts when compared to 25% and 50% coverage and would have low positive impacts compared to 75% coverage.

7.1.1.2 Sector Monitoring Tools (Options for meeting monitoring standards)

7.1.1.2.1 Sector Monitoring Tools Option 1: Electronic Monitoring in place of Human At-Sea Monitors

Impacts on regulated groundfish

This option would not produce a change to the biological impacts on regulated groundfish relative to the No Action assuming the data collected from electronic monitoring is equivalent to a human at-sea-monitor. However, there are some instances where monitoring data collected by a human observer and a camera system may not be equivalent. For example, it is difficult to differentiate between some species, such as red and white hake, using electronic monitoring systems. In these instances, there is a potential negative biological impact for some stocks relative to an equivalent 100% coverage rates using human at-sea monitors. On the other hand, electronic monitoring systems can monitor every tow, which a human observer may not be able to achieve, especially on a multi-day trip. Further, electronic monitoring systems cannot be coerced into falsifying data, which may be a concern with human observers. In these respects, electronic monitoring data can provide information that is superior to a human observer.

Impacts on other species

This option would not produce a change to the biological impacts on other species relative to the No Action assuming the data collected from electronic monitoring is equivalent to a human at-sea-monitor. This assumption is likely not met for some stocks that are difficult to identify from the video such as red hake. There is a potential negative biological impact for some stocks relative to an equivalent 100% coverage rates using human at-sea monitors.

7.1.1.2.2 Sector Monitoring Tools Option 2: Audit Model Electronic Monitoring Option

Impacts on regulated groundfish

Positive biological impacts on regulated groundfish will occur under a fully developed audit model electronic monitoring option. If the audit model is correctly developed then this option should produce biological impacts that are similar to the impacts under 100% fixed rate for human at-sea coverage since discard estimates under this program should be unbiased and accurate. This option would have positive biological impacts on regulated groundfish species compared to the options for lower fixed rates (25-75%) for human at-sea coverage under Option 2. For some difficult to identify stocks from the video review like white hake there may be some negative biological impacts relative to an equivalent 100% coverage rates using human at-sea monitors. However, these identification issues can likely be alleviated through targeted subsampling, and thus this alternative would still offer an improvement over the No Action.

Impacts on other species

Positive biological impacts on other species will occur under a fully well-developed audit model electronic monitoring option. If the audit model is correctly developed then this option should produce biological impacts that are similar to the impacts under 100% fixed rate for human at-sea coverage since

this would provide comprehensive coverage of groundfish trips. Comprehensive monitoring coverage ensures that sector vessels do not exceed their ACE, and as such, fishing effort may be reduced with higher levels of monitoring coverage. This option would have positive biological impacts on other species compared to the options for lower fixed rates (25-75%) for human at-sea coverage under Option 2. For some difficult to identify stocks from the video review like red hake there may be some negative biological impacts relative to an equivalent 100% coverage rates using human at-sea monitors.

7.1.1.2.3 Sector Monitoring Tools Option 3: Maximized Retention Electronic Monitoring Option

Impacts on regulated groundfish

Positive biological impacts will occur under a well-developed maximized retention model electronic monitoring option. If the maximized retention model electronic option is correctly developed then this option should produce biological impacts that are similar to the biological impacts of 100% fixed rate for human at-sea coverage assuming the maximum retention model does not result in a shift in fishery selectivity to younger smaller fish. This option would have positive biological impacts on regulated groundfish species compared to the options for lower fixed rates (25-75%) for human at-sea coverage under Option 3. A shift in fishery to targeting to smaller younger fish will likely result in negative biological impacts since the contemporary catch limits are set assuming that the recent selectively will not change. A shift in selectively to smaller younger fish while holding all other factors constant will result in a decrease in the estimated overfishing mortality rate ($F_{40(MSYproxy)}$) (see FW48 for further analysis and discussion). This alternative is expected to have similar biological impacts to Option 2: EM audit model.

Impacts on other species

Positive biological impacts on other species will occur under a fully well-developed maximized retention model electronic monitoring option. If the maximized retention model is correctly developed then this option should produce biological impacts that are similar to the impacts under 100% fixed rate for human at-sea coverage since this would provide comprehensive coverage of groundfish trips. Comprehensive monitoring coverage ensures that sector vessels do not exceed their ACE, and as such, fishing effort may be reduced with higher levels of monitoring coverage. This option would have positive biological impacts on other species compared to the options for lower fixed rates (25-75%) for human at-sea coverage under Option 3. This assumes the maximum retention model does not result in a shift in fishery selectivity to younger smaller fish. A shift in fishery to targeting to smaller younger fish will likely result in negative biological impacts since the contemporary catch limits are set assuming that the recent selectively will not change. A shift in selectivity to smaller younger fish while holding all other factors constant will result in a decrease in the estimated overfishing mortality rate ($F_{40(MSYproxy)}$) (see FW48 for further analysis and discussion). This alternative is expected to have similar biological impacts to Option 2: EM audit model.

7.1.1.3 Total Monitoring Coverage Level Timing

7.1.1.3.1 Coverage Level Timing Option 1: No Action

Impacts on regulated groundfish
Option 1/No Action would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is administrative because it only affects the timing of information availability for business planning.

Impacts on other species
Option 1/No Action would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is administrative because it only affects the timing of information availability for business planning.

7.1.1.3.2 Coverage Level Timing Option 2: Knowing Total Monitoring Coverage Level at a Time Certain

Impacts on regulated groundfish
Option 2 would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is administrative because it only affects the timing of information availability for business planning.

Impacts on other species
Option 2 would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is administrative because it only affects the timing of information availability for business planning.

7.1.1.4 Review process for Sector Monitoring Coverage

7.1.1.4.1 Coverage Review Process Option 1: No Action

Impacts on regulated groundfish
Option 1/No Action would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Option 1/No Action would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

7.1.1.4.2 Coverage Review Process Option 2: Establish a Review Process for Monitoring Coverage Rates

Impacts on regulated groundfish
Option 2 would not be expected to have direct impacts on regulated groundfish species. While this measure is primarily administrative, by establishing a review process there could be indirect positive impacts on regulated groundfish from an evaluation of the efficacy of monitoring coverage rates to determine, for example, whether there is evidence of bias, and whether the monitoring standards are being met. Therefore, compared to No Action there could be indirect low positive impacts on regulated groundfish.

Impacts on other species
Option 2 would not be expected to have direct impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. While this measure is primarily administrative, by establishing a review process there could be indirect positive impacts on non-groundfish species from an evaluation of the efficacy of monitoring coverage rates to determine, for example, whether there is evidence of bias, and whether the monitoring standards are being met. Therefore, compared to No Action there could be indirect low positive impacts on other species.

7.1.1.5 Addition to List of Framework Items

Impacts on regulated groundfish
This option would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

This option would add new sector monitoring tools to the list of framework items. Impacts to regulated groundfish species would depend on the nature of new monitoring tools, which may include additional models of EM developed in the future.

This option would also add vessel coverage levels to the list of framework items. Initial discussion and analysis on possible impacts of vessel coverage levels can be found in "Memo from Groundfish PDT to Groundfish Committee re vessel specific coverage level option"[9], as well as in a letter from the NEFSC to the Council[10] in response to a request for information on observer deployment data at the vessel level for groundfish trips.

Impacts on other species
This option would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

7.1.2 Commercial Groundfish Monitoring Program Revisions (Sectors and Common Pool)

7.1.2.1 Dockside Monitoring Program (Sectors and Common Pool)

The following is an overview of *possible* short- and long-term impacts of 100% monitoring of all commercial (sector and common pool) groundfish landings.

- Short-term (upon implementation and up to five years)
  - Increased accuracy of commercial landings going into the assessments
  - Reduce the likelihood of overfishing because in-season monitoring of landings would improve – such that the "true" landings would be known by at least the species-level
- Long-term (greater than five years)
  - Improved estimation of fishing mortality and biomass
  - Allow for consideration of a wider-range of stock assessment approaches – for example, comprehensive monitoring may enable assessments to shift from low information content empirical approaches to the development of full analytical assessments. This transition is assessment methodology may be possible because comprehensive monitoring would provide accurate data on the magnitude and age structure of removals in the commercial fishery, which would be better aligned with the data requirements of the age-structured assessment models that are employed for groundfish in the region.

[9] "Memo from Groundfish PDT to Groundfish Committee re vessel specific coverage level option", dated November 19, 2019; https://s3.amazonaws.com/nefmc.org/4c_191119-GF-PDT-memo-to-GF-Committee-re-vessel-specific-coverage-level-option-with-attachments.pdf

[10] Letter from NEFSC to NEFMC, dated November 22, 2019; https://s3.amazonaws.com/nefmc.org/8.-Correspondence_191122_135920.pdf

Review of International Monitoring Programs in Catch Share Managed Fisheries

The Groundfish PDT reviewed twenty-one programs during development of this action across the U.S., Canada, Iceland, Argentina, New Zealand, and Australia[11]. The programs institute different monitoring requirements for different vessel size classes, gear types, and vessels that process at sea. Nearly all of the 16 U.S. catch share programs are included, excluding just the invertebrate Surfclam and Ocean Quahog ITQs. The majority of programs reviewed use trawl gear (bottom or mid-water), but fisheries using several other gear types including pots and traps, longline, vertical line, and gillnet were included as well.

Dockside monitoring
Excluding fleets that process at sea, of the 12 multispecies programs/fleets examined, only the Northeast Multispecies (groundfish) sector program did not have any form of dockside monitoring. Of the 11 programs or fleets with dockside monitoring, 5 implemented 100 percent dockside monitoring—this includes the West Coast shorebased IFQ fleet, the Alaskan Central Gulf of Alaska groundfish catcher vessel fleet, the B.C. integrated groundfish program, the Icelandic IFQ program, and Argentine IFQ programs. The remaining six programs or fleets, from the Gulf of Mexico grouper/tilefish IFQ, New Zealand, and Australia each monitor their fisheries dockside randomly, or through an annual audit. By contrast, only one of eight single species catch share programs had 100% dockside monitoring, the AFA pollock trawl catcher vessel fleet, while two programs had random inspections, and the remainder had no form of dockside monitoring, excluding inspections from law enforcement.

7.1.2.1.1 Dockside Monitoring Option 1: No Action

Impacts on regulated groundfish

If this option is selected, a dockside monitoring program would not be established for the groundfish fishery. When compared to other options under consideration, Option 1/No Action would result in lower certainty regarding the magnitude of groundfish catches at the species level, because the majority of groundfish catch is landed. An accurate estimate of groundfish catch is critical for stock assessments, as most assessment models assume there is little error surrounding the magnitude of the removals. In the absence of dockside monitoring, information on sector catches is expected to be less reliable, and it is possible that sectors could exceed their ACE, increasing the risk of overfishing. Under No Action, there is a much greater probability that landings could be misreported and/or underreported, which has occurred in the groundfish fishery in the recent past. As a result, this alternative is expected to have negative biological impacts relative to Options 2.

Impacts on other species

Under this alternative, there would continue to be no dockside monitoring for the groundfish fishery, and thus no independent verification of groundfish landings. As such, information on groundfish catches will be less reliable, and sectors could potentially exceed their ACE. Therefore, under this alternative it is less likely that fishing effort would be reduced in season. Compared to Options 2, this alternative is expected to have low negative biological impacts for other species.

[11] See "Memo from Groundfish PDT to Groundfish Committee re analyses for Amendment 23/Groundfish Monitoring", dated May 3, 2018; Attachment 5; https://s3.amazonaws.com/nefmc.org/7_190503-PDT-memo-to-GF-Committee-re-analyses-for-A23-with-attachments.pdf

7.1.2.1.2 Dockside Monitoring Option 2: Mandatory Dockside Monitoring Program for the Commercial Groundfish Fishery

Impacts on regulated groundfish

This alternative would establish a comprehensive dockside monitoring program for both the sector and common pool fishery. Currently in the groundfish fishery there is no independent verification of landings when catches are offloaded, and a very low percentage of groundfish trips are inspected by enforcement for compliance during offload (see Appendix III, "Groundfish PDT Dockside Monitoring Discussion Document"). This dockside monitoring program is intended to deter misreported landings, and provide independent verification of groundfish landings, and therefore should result in increased certainty in the magnitude of groundfish catches at the species level. Dockside monitoring will allow for more accurate in-season monitoring of landings, which will help ensure that sectors do not exceed the ACE, and that common pool vessel do not exceed daily catch limits. This independent verification of catch will reduce the risk of overfishing. Therefore, relative to No Action, this alternative is expected to have positive biological impacts for regulated groundfish species.

Impacts on other species

This alternative would provide comprehensive in-season monitoring of groundfish landings. As such, this alternative will ensure that sector vessels do not exceed their ACE. Therefore, fishing effort may be reduced under this alternative. Further, a dockside monitoring program would also provide independent verification of landings amounts for other species that are landed by groundfish vessels, which is expected to increase the accuracy of landings data for these other stocks. Relative to No Action, this alternative is expected to have low positive biological impacts for other species.

7.1.2.2 Dockside Monitoring Program Structure and Design

7.1.2.2.1 Dockside Monitoring Program Funding Responsibility

7.1.2.2.1.1 Dockside Monitoring Program Funding Responsibility Option A – Dealer Responsibility

Impacts on regulated groundfish
Option A would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Option A would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

7.1.2.2.1.2 Dockside Monitoring Program Funding Responsibility Option B – Vessel Responsibility

Impacts on regulated groundfish
Option B would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Option B would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

7.1.2.2.2 Dockside Monitoring Program Administration

7.1.2.2.2.1 Dockside Monitoring Program Administration Option A – Individual contracts with dockside monitor providers

Impacts on regulated groundfish

Option A would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Option A would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

7.1.2.2.2.2 Dockside Monitoring Program Administration Option B – NMFS-administered dockside monitoring program

Impacts on regulated groundfish
Option B would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Option B would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

7.1.2.2.3 Options for Lower Dockside Monitoring Coverage Levels (20 percent coverage)

7.1.2.2.3.1 Option A – Lower coverage levels for ports with low volumes of groundfish landings

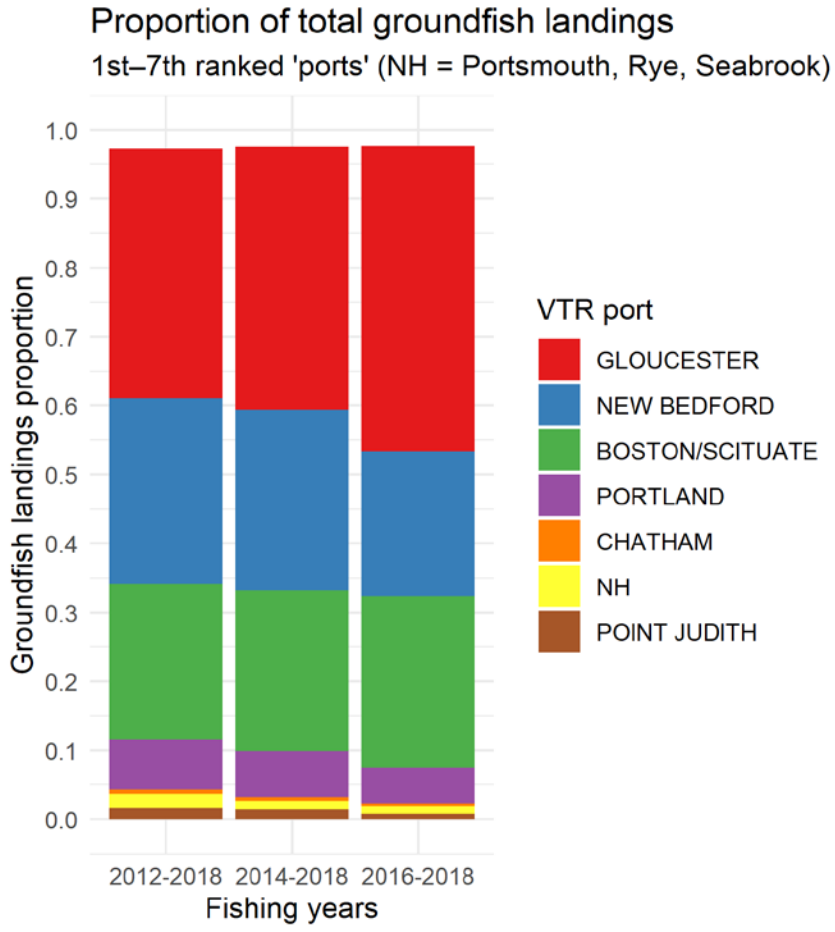
Background analysis of total annual groundfish landings by port to determine the landings threshold for lower coverage for low volume ports

Option A would allow for lower levels of dockside monitoring for low volume ports to act as a "spot check." To determine which ports would be considered low volume, an analysis of total annual groundfish landings by port was done. Ports that received ~97 percent of total annual groundfish landings for 2016-2018 would receive 100 percent dockside monitoring coverage. These "major" ports are those in the top nine – New Bedford, MA; Gloucester, MA; Boston, MA; Portland, ME; Chatham, MA; Point Judith, RI; Seabrook, NH; Rye, NH; and Portsmouth, NH (Figure 25). Dealers in these nine major ports, or vessels landing in these ports, would receive 100 percent dockside monitoring coverage. All other ports

would be considered "low volume" as characterized by lower landings volumes, and dealers in these ports, or vessels landing in these ports, would receive the lower coverage levels of 20 percent. This means that ports which land approximately 3 percent of total groundfish pounds would be exempted from 100 percent coverage and would receive 20 percent coverage instead, as a spot check.

Originally, when this alternative was first being developed the criteria used to determine the ports that would be considered low volume and would receive lower coverage were those ports with total annual groundfish landings volumes in the 5th percentile of total annual landings volume from 2016-2018. Under the 5th percentile criteria the major ports were: New Bedford, MA; Gloucester, MA; Boston, MA; Portland, ME. However, the list of major ports was expanded to the top nine in order to address concerns about landings of individual stocks, particularly stocks of concerns due to poor stock status. There are several stocks in relatively poor condition that are landed primarily in one or two ports that fall outside the list of major ports using the original criteria, such as Southern New England stocks landed in Point Judith, RI for example (Figure 26). Therefore, the criteria was expanded to shift several ports into the 100 percent dockside monitoring category to improve monitoring of landings for those stocks. This measure would include a periodic re-evaluation of what constitutes a "low volume port" based on landings volumes, to occur after two years of landings data is available and every three years after that.

Figure 25 - Proportion of total annual groundfish landings by port from FY2012-2018 for the top seven ports (Boston/Scituate combined for confidentiality; NH includes Portsmouth, Rye, and Seabrook). This option uses 2016-2018 as the qualifying period.



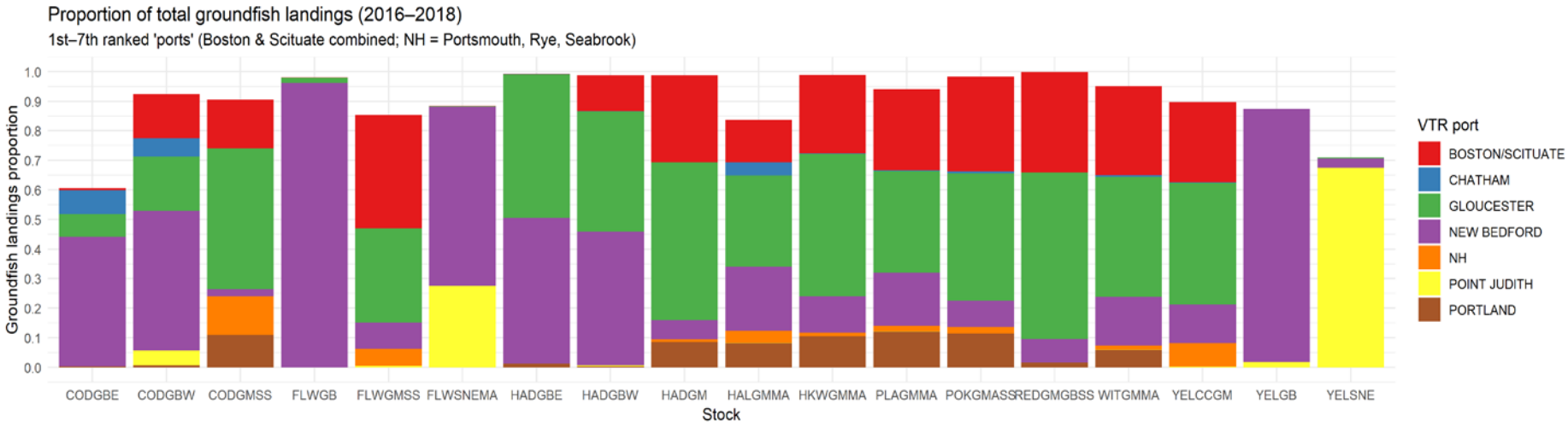


Figure 26 - Proportion of total stock landings by port area over the 2016-2018 period. Proportions do not sum to one since not all port areas are represented.

Impacts on regulated groundfish

Option A would allow for lower levels of dockside monitoring coverage for low volume ports. Relative to No Action (no required dockside monitoring program), this option would have positive impacts on regulated groundfish, since the dockside monitoring program is intended to deter misreported landings, and provide independent verification of groundfish landings, and therefore should result in increased certainty regarding the magnitude of groundfish landings at the species level. An accurate estimate of groundfish catch is critical for stock assessments, as many assessment models assume that the magnitude and age structure of removals is known without error. Additionally, in the absence of dockside monitoring, information on sector catches is expected to be less reliable, and it is possible that sectors could exceed their ACE, increasing the risk of overfishing.

Relative to Option 2, which would require 100 percent monitoring for the entire commercial groundfish fishery, this option would be expected to have low negative impacts on regulated groundfish since dockside monitoring coverage would be lower for certain ports under this option. However, landings from the low volume ports that would receive lower coverage make up ~2 percent of the total annual groundfish landings, and so the majority of groundfish landings would be monitored at 100 percent coverage (Figure 25). Table X in Section 7.4.3.2.3.1 Economic Impacts shows the amount of landed pounds of groundfish by sector vessels and common pool vessels landed in ports that would receive the lower dockside monitoring coverage under this option and the amount of landed groundfish pounds landed in ports that would receive 100 percent coverage for each year from FY2016 to FY2018. Between FY2016-2018, major ports accounted for 98.5% of all pounds landed of any allocated groundfish stock (Table X in Section 7.4.3.2.3.1 Economic Impacts).

Periodic evaluation of landings volumes at each port is intended to mitigate any potentially low negative impacts from the possible shifting of landings from the ports that receive 100 percent coverage to those that receive the lower coverage level.

Impacts on other species

Option A would allow for lower levels of dockside monitoring coverage for low volume ports. Relative to the No Action, this option would have positive impacts on non-groundfish, since dockside monitoring will ensure that sector vessels do not exceed their ACE. As such, fishing effort may be reduced under dockside monitoring coverage. Further, a dockside monitoring program would also provide independent verification of landings amounts for other species that are landed by groundfish vessels, which is expected to increase the accuracy of landings data for these other stocks.

Relative to Option 2, which would require 100 percent dockside monitoring for the entire commercial groundfish fishery, this option would be expected to have low negative impacts on non-groundfish since dockside monitoring coverage would be lower for certain ports under this option, and thus a lower proportion of non-groundfish landings would be subject to independent verification.. However, landings from the low volume ports that would receive lower coverage make up ~5 percent of the total annual groundfish landings, and so the majority of groundfish landings would be monitored at 100 percent coverage (Figure 25). Table X in Section 7.4.3.2.3.1 Economic Impacts shows the amount of landed pounds of non-groundfish by sector vessels and common pool vessels landed in ports that would receive the lower dockside monitoring coverage under this option and the amount of landed groundfish pounds landed in ports that would receive 100 percent coverage for each year from FY2016 to FY2018. Between FY2016-2018, major ports accounted for 89% of all non-groundfish pounds (Table X in Section 7.4.3.2.3.1 Economic Impacts).

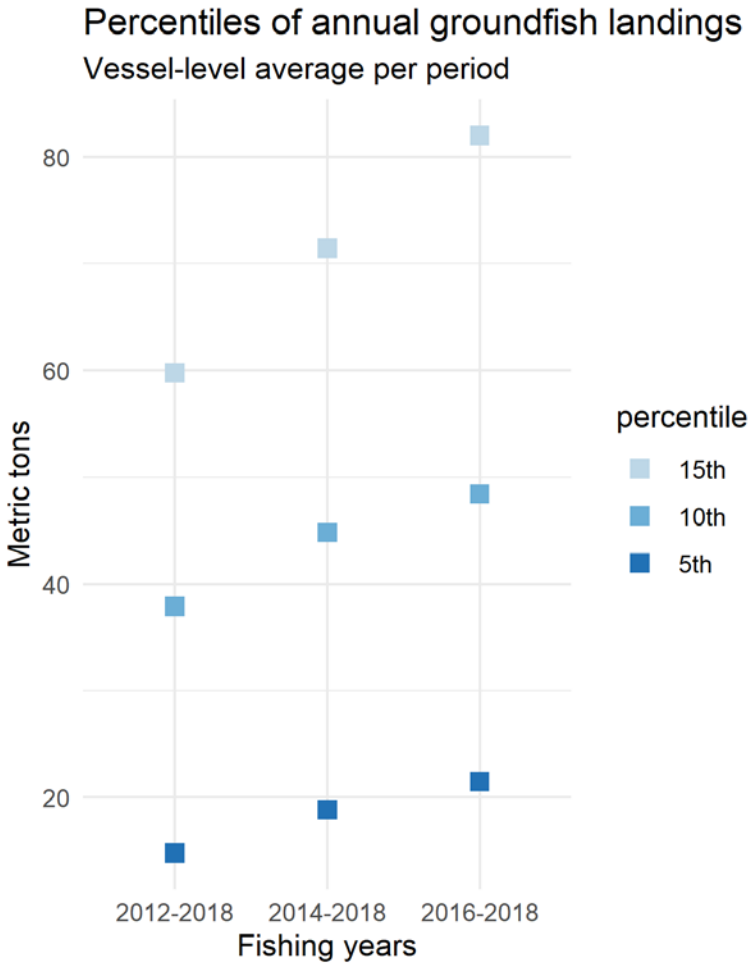
Periodic evaluation of landings volumes is intended to mitigate any potentially low negative impacts from the possible shifting of landings from the ports that receive 100 percent coverage to those that receive the lower coverage level.

7.1.2.2.3.2 Option B – Lower coverage levels for vessels with total groundfish landings volumes in the 5th percentile of total annual landings

Background analysis of total annual groundfish landings by vessel to determine the landings threshold for lower coverage for low volume vessels

Option B would allow for lower levels of dockside monitoring for low volume vessels to act as a "spot check." To determine which vessels would be considered "low volume", an analysis of total annual groundfish landings by volume was done. Vessels with total annual groundfish landings volumes in the 5th percentile of total annual landings volume for 2016-2018 were determined to be low volume and would receive lower "spot check" coverage under this option. This means that vessels which land approximately 5 to 10 percent of total groundfish pounds each year would be exempted from 100 percent dockside monitoring coverage and receive 20 percent coverage instead, as a spot check. Vessels that landed 90-95 percent of groundfish for 2012-2018 would receive 100 percent coverage. The vessels that cover ~95 percent of landings are those that landed 46,297lbs or more annually on average from 2016-2018 (Figure 26). Vessels landing 46,297lbs or more annually, or dealers receiving offloads from vessels with annual landings volumes of 46,297lbs or more, would receive 100 percent dockside monitoring coverage. Vessels with annual landings volumes of less than 46,297lbs, or dealers receiving offloads from vessels with annual landings volumes of less than 46,297lbs, would receive the lower coverage rate of 20 percent. This measure would include a periodic re-evaluation of what constitutes a "low volume vessel" based on landings volume, to occur after two years of landings data is available and every three years after that.

Figure 27 - Percentiles of total annual groundfish landings from FY2012--2018. This option uses 2016-2018 as the qualifying period.



Impacts on regulated groundfish

Option B would allow for lower levels of dockside monitoring coverage for low volume vessels. Relative to the No Action (no required dockside monitoring program), this option would have positive impacts on regulated groundfish, since dockside monitoring is intended to deter misreported landings, and provide independent verification of groundfish landings, and therefore should result in increased certainty regarding the magnitude of groundfish catches at the species level. An accurate estimate of groundfish catch is critical for stock assessments, as many assessment models assume that the magnitude and age structure of removals is known without error. Additionally, in the absence of dockside monitoring, information on sector catches is expected to be less reliable, and it is possible that sectors could exceed their ACE, increasing the risk of overfishing.

Relative to Option 2, which would require 100 percent dockside monitoring for the entire commercial groundfish fishery, this option would be expected to have low negative impacts on regulated groundfish since dockside monitoring coverage would be lower for certain vessels under this option. However, landings from the low volume vessels that would receive lower coverage make up ~5 percent of the total annual groundfish landings, and so the majority of groundfish landings would be monitored at 100 percent coverage (Figure 26). Table X in Section 7.4.3.2.3.2 Economic Impacts shows the amount of

landed pounds of groundfish landed by sector vessels and common pool vessels that would receive the lower dockside monitoring coverage under this option and the amount of landed groundfish pounds landed by vessels that would receive 100 percent coverage for each year from FY2016 to FY2018. Between FY2016-2018, low volume vessels accounted for only 2% of all landed groundfish pounds (Table X in Section 7.4.3.2.3.2 Economic Impacts).

Periodic evaluation of landings volumes is intended to mitigate any potentially low negative impacts from the potential that the 5th percentile of total annual groundfish landings changes over time and results in a different annual vessel landings volume threshold.

Impacts on other species

Option B would allow for lower levels of dockside monitoring coverage for small, low volume vessels. This option would have positive impacts on non-groundfish, since dockside monitoring will ensure that sector vessels do not exceed their ACE. As such, fishing effort may be reduced under dockside monitoring coverage. Further, a dockside monitoring program would also provide independent verification of landings amounts for other species that are landed by groundfish vessels, which is expected to increase the accuracy of landings data for these other stocks.

Relative to Option 2, which would require 100 percent monitoring for the entire commercial groundfish fishery, this option would be expected to have low negative impacts on non-groundfish since dockside monitoring coverage would be lower for certain vessels under this option. However, landings from the low volume vessels that would receive lower coverage make up ~5 percent of the total annual groundfish landings, and so the majority of groundfish landings would be monitored at 100 percent coverage (Figure 26). Table X in Section 7.4.3.2.3.2 Economic Impacts shows the amount of landed pounds of non-groundfish landed by sector vessels and common pool vessels that would receive the lower dockside monitoring coverage under this option and the amount of landed groundfish pounds landed by vessels that would receive 100 percent coverage for each year from FY2016 to FY2018. While low coverage vessels account for a minority of landed groundfish pounds, they account for the majority of landed non-groundfish pounds in any year. Between FY2016-2018, low volume vessels accounted for 65% of all non-groundfish pounds (Table X in Section 7.4.3.2.3.2 Economic Impacts).

Periodic evaluation of landings volumes is intended to mitigate any potentially low negative impacts from the potential that the 5th percentile of total annual groundfish landings changes over time and results in a different annual vessel landings volume threshold.

7.1.2.2.4 Safety and Liability Associated with Fish Hold Inspections

7.1.2.2.4.1 Fish Hold Inspection Option A – Dockside monitor fish hold inspections required

Impacts on regulated groundfish

Option A would require dockside monitor fish hold inspections at the conclusion of an offload. Fish hold inspections as part of a dockside monitoring program help to ensure that all landings are accounted for, which therefore should result in increased certainty in the magnitude of groundfish catches at the species level. This independent verification of catch will reduce the risk of overfishing. Therefore, this option is expected to have positive biological impacts for regulated groundfish species. Compared to Option B, this

option may have similar positive impacts, provided that alternative methods to dockside monitors directly inspecting the fish hold (cameras) can account for all catch. Compared to Option C, this option would likely have positive biological impacts, as it provides an independent verification of catch whereas Sub-Option 5C does not; Option C it is self-validation by the captain.

Impacts on other species

Option A would require dockside monitor fish hold inspections at the conclusion of an offload. Fish hold inspections as part of a dockside monitoring program help to ensure that all landings are accounted for, which will ensure that sector vessels do not exceed their ACE. As such, fishing effort may be reduced under this alternative. Therefore, this option is expected to have low positive biological impacts for other species. Compared to Option B, this option may have similar positive impacts, provided that alternative methods to dockside monitors directly inspecting the fish hold (cameras) can account for all catch. Compared to Option C, this option would likely have low positive biological impacts, as it provides an independent verification of catch whereas Option C does not.

7.1.2.2.4.2 Fish Hold Inspection Option B – Alternatives method for inspecting (cameras)

Impacts on regulated groundfish

Option B would allow for the use of cameras as an alternate method to dockside monitors directly inspecting fish holds at the conclusion of an offload. Fish hold inspections as part of a dockside monitoring program help to ensure that all landings are accounted for, which therefore should result in increased certainty in the magnitude of groundfish catches at the species level. This independent verification of catch will reduce the risk of overfishing. Therefore, this option is expected to have positive biological impacts for regulated groundfish species. Compared to Option A, this option may have similar positive impacts, provided that alternative methods to dockside monitors directly inspecting the fish hold (cameras) can account for all catch. Compared to Option C, this option would likely have low positive biological impacts, as it provides an independent verification of catch whereas Option C does not.

Impacts on other species

Option B would allow for the use of cameras as an alternate method to dockside monitors directly inspecting fish holds at the conclusion of an offload. Fish hold inspections as part of a dockside monitoring program help to ensure that all landings are accounted for, which will ensure that sector vessels do not exceed their ACE. As such, fishing effort may be reduced under this alternative. Therefore, this option is expected to have low positive biological impacts for other species. Compared to Option A, this option may have similar positive impacts, provided that alternative methods to dockside monitors directly inspecting the fish hold (cameras) can account for all catch. Compared to Option C, this option would likely have low positive biological impacts, as it provides an independent verification of catch whereas Option C does not.

7.1.2.2.4.3 Fish Hold Inspection Option C – No fish hold inspection required, captain signs affidavit

Impacts on regulated groundfish

Option C would not require fish hold inspections at the conclusion of an offload, and instead the captain would sign an affidavit verifying all catch has been offloaded, or an estimate of catch. Requiring a signed affidavit may help to ensure all catch has been offloaded and accounted for; however, there would be no independent verification of catch (aside from Office of Law Enforcement inspections, which occur infrequently, see PDT memo with information from OLE[12]). Therefore, this option is expected to have low positive biological impacts for regulated groundfish. Compared to Option A and Option B, this option may have low negative impacts, as there would be no independent verification of catch.

Impacts on other species

Option C would not require fish hold inspections at the conclusion of an offload, and instead the captain would sign an affidavit verifying all catch has been offloaded, or an estimate of catch. Requiring a signed affidavit may hep to ensure all catch has been offloaded and accounted for; however, there would be no independent verification of catch. Therefore, this option is expected to have low positive biological impacts for other species. Compared to Option A and Option B, this option may have low negative impacts, as there would be no independent verification of catch.

7.1.3 Sector Reporting

7.1.3.1 Sector reporting Option 1: No Action

Impacts on regulated groundfish
Option 1/No Action would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Option 1/No Action would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

[12] "190503 Groundfish PDT memo to Groundfish Committee re analyses for A23, Attachment 6": https://s3.amazonaws.com/nefmc.org/7_190503-PDT-memo-to-GF-Committee-re-analyses-for-A23-with-attachments.pdf

7.1.3.2 Sector reporting Option 2 – Grant Regional Administrator the Authority to Streamline Sector Reporting Requirements

Impacts on regulated groundfish
Option 2 would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative. Sectors would continue to monitor catch and reconcile with NMFS, but the format or process may be revised.

Impacts on other species
Option 2 would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative.

7.1.4 Funding/Operational Provisions of Groundfish Monitoring (Sectors and Common Pool)

7.1.4.1 Funding Provisions Option A: No Action

Impacts on regulated groundfish

Option 1/No Action would not be expected to have direct or indirect impacts on regulated groundfish species, as it is primarily administrative. However, relative to Sub-Option 2B, Option 1/No Action has the potential to result in lower fishing effort, should NMFS not have sufficient funding for its shoreside costs, which would require vessels to reduce fishing effort to match the available level of monitoring that could be covered by available funding for NMFS' shoreside costs. Option 1/No Action could potentially have low positive impacts on regulated groundfish species compared to Sub-Option 2B. Impacts to regulated groundfish species from Option 1/No Action, therefore, are somewhat unclear, as it is not known whether or not NMFS would have sufficient funding available for its shoreside costs for the specified level of monitoring. Impacts of Option 1/No Action would be neutral to low negative when compared to Sub-Option 2A, as Sub-Option 2A is not expected to change fishing effort, but it does have the potential for higher monitoring coverage levels.

Impacts on other species

Option 1/No Action would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops as it is primarily administrative. However, relative to Sub-Option 2B, Option 1/No Action has the potential to result in lower fishing effort, should NMFS not have sufficient funding for its shoreside costs, which would require vessels to reduce fishing effort to match the available level of monitoring that could be covered by available funding for NMFS' shoreside costs. Option 1/No Action could potentially have low positive impacts on non-groundfish species compared to Sub-Option 2B. Impacts to non-groundfish species from Option 1/No Action, therefore, are somewhat unclear, as it is not known whether or not NMFS would have sufficient funding available for its shoreside costs for the specified level of monitoring. Impacts of Option 1/No Action would be neutral to low negative when compared to Sub-Option 2A, as Sub-Option 2A is not expected to change fishing effort, but it does have the potential for higher monitoring coverage levels.

7.1.4.2 Funding Provisions Option 2 – Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.1.4.2.1 Funding Provisions Sub-Option 2A – Higher Monitoring Coverage Levels if NMFS Funds are Available (Sectors Only)

Sub-Option 2A would allow for at-sea monitoring at higher coverage levels than the target coverage required (see Section 4.1.1.1), up to 100 percent, provided that NMFS has determined funding is available to cover the additional administrative costs to NMFS and sampling costs to industry in a given year

Impacts on regulated groundfish

Sub-Option 2A would be expected to have indirect positive impacts on regulated groundfish species, as there is a potential for higher monitoring coverage levels under this option. If the Council selects less than 100 percent monitoring coverage, then it is expected that the increases in coverage that could potentially occur under Sub-Option 2A would likely have similar impacts as those described for the options for higher monitoring coverage, e.g., 75 percent (Section 7.1.1.1.2.3) and 100 percent (Section 7.1.1.1.2.4) as a percentage of trips, and 75 percent (Section 7.1.1.1.3.3) and 100 percent (Section 7.1.1.1.3.4) as a percentage of catch. Additionally, Section 7.1 lists potential biological impacts from 100% monitoring of all sector trips on regulated groundfish, both in the short- and long-term. Compared to Option 1/No Action, the impacts of Sub-Option 2A are somewhat unclear because it is unclear whether or not NMFS would have the funding available to cover additional administrative costs to NMFS and sampling costs to industry in a given year. The federal government may provide the funding to cover additional administrative costs to NMFS and sampling costs to industry, which would allow for at-sea monitoring at higher coverage levels than the target coverage required (see Section 4.1.1), up to 100 percent, in which case then Sub-Option 2A would have indirect positive impacts compared to Option 1/No Action. The level of additional monitoring coverage in a given year would be determined by the amount of funding available to cover additional administrative costs to NMFS and sampling costs to industry. The impacts to regulated groundfish species would depend on the level of additional monitoring coverage that NMFS has determined funding is available for in a given year. If the federal government did not have funding available for additional monitoring coverage, then impacts to regulated groundfish species would be similar to those under Option 1/No Action, and therefore, relative to Option 1, would result in neutral impacts to regulated groundfish species. Compared to Sub-Option 2B, Sub-Option 2A would have indirect low positive impacts, as there is a potential for lower monitoring coverage levels under Sub-Option 2B.

Impacts on other species

Sub-Option 2A would be expected to have indirect positive impacts on non-groundfish species, as there is a potential for higher monitoring coverage levels under this option. Compared to Option 1/No Action, the impacts of Sub-Option 2A are somewhat unclear because it is unclear whether or not NMFS would have the funding available to cover additional administrative costs to NMFS and sampling costs to industry in a given year. The federal government may provide the funding to cover additional administrative costs to NMFS and sampling costs to industry, which would allow for at-sea monitoring at higher coverage levels than the target coverage required (see Section 4.1.1), up to 100 percent, in which case then Sub-Option 2A would have indirect positive impacts compared to Option 1/No Action. The level of additional monitoring coverage in a given year would be determined by the amount of funding available to cover additional administrative costs to NMFS and sampling costs to industry. The impacts to non-groundfish species would depend on the level of additional monitoring coverage that NMFS has determined funding

is available for in a given year. If the federal government did not have funding available for additional monitoring coverage, then impacts to non-groundfish species would be similar to those under Option 1/No Action, and therefore, relative to Option 1, would result in neutral impacts to non-groundfish species. Compared to Sub-Option 2B, Sub-Option 2A would have indirect low positive impacts, as there is a potential for lower monitoring coverage levels under Sub-Option 2B.

7.1.4.2.2 Funding Provisions Sub-Option 2B – Waivers from Monitoring Requirements Allowed (Sectors and Common Pool)

Sub-Option 2B 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 insufficient funding for NMFS shoreside costs for the specified target coverage level.

Impacts on regulated groundfish

Sub-Option 2B would be expected to have indirect low negative impacts on regulated groundfish species, as there is a potential for lower monitoring coverage levels under this option. Depending on what potential coverage level could result from waivers being issued, then it is expected that the decreases in coverage that could potentially occur under Sub-Option 2B would likely have similar impacts as those described for the corresponding monitoring coverage level in Section 7.1.1.1.2 (coverage as a fixed percentage of sector trips or Section 7.1.1.1.3 (coverage as a fixed percentage of catch). Compared to Option 1/No Action, Sub-Option 2B would have indirect low negative impacts to regulated groundfish species, as there is a potential for lower monitoring coverage levels under Sub-Option 2B. Additionally, Sub-Option 2B could potentially have direct impacts on regulated groundfish species compared to Option 1/No Action, as there is the potential for lower effort under Option 1/No Action, should NMFS not have sufficient funding for its shoreside costs, which would require vessels to reduce fishing effort to match the available level of monitoring that could be covered by available funding for NMFS' shoreside costs. Sub-Option 2B could potentially have low negative impacts on regulated groundfish species compared to Option 1/No Action, as this measure does not have the potential to result in a reduction of fishing effort. Impacts to regulated groundfish species from Sub-Option 2B, therefore, are somewhat unclear, as it is not known whether or not NMFS would have funding available. Compared to Sub-Option 2A, Sub-Option 2B would have indirect low negative impacts, as there is a potential for higher monitoring coverage levels under Sub-Option 2A. However, it is unclear whether or not NMFS would have the funding available to cover additional administrative costs to NMFS and sampling costs to industry in a given year.

Impacts on other species

Sub-Option 2B would be expected to have indirect low negative impacts on non-groundfish species, as there is a potential for lower monitoring coverage levels under this option. Compared to Option 1/No Action, Sub-Option 2B would have indirect low negative impacts to non-groundfish species, as there is a potential for lower monitoring coverage levels under Sub-Option 2B. Additionally, Sub-Option 2B could potentially have direct impacts on non-groundfish species compared to Option 1/No Action, as there is the potential for lower effort under Option 1/No Action, should NMFS not have sufficient funding for its shoreside costs, which would require vessels to reduce fishing effort to match the available level of monitoring that could be covered by available funding for NMFS' shoreside costs. Sub-Option 2B could potentially have low negative impacts on non-groundfish species compared to Option 1/No Action, as this measure does not have the potential to result in a reduction of fishing effort. Impacts to non-groundfish species from Sub-Option 2B, therefore, are somewhat unclear, as it is not known whether or not NMFS would have funding available. Compared to Sub-Option 2A, Sub-Option 2B would have indirect low

negative impacts, as there is a potential for higher monitoring coverage levels under Sub-Option 2A. However, it is unclear whether or not NMFS would have the funding available to cover additional administrative costs to NMFS and sampling costs to industry in a given year.

7.1.5 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors)

Management uncertainty is the likelihood that management measures will result in a level of catch that is greater than the catch objective. It is related to the effectiveness of management measures (lower effectiveness of management measures results in greater management uncertainty, i.e., greater likelihood that measures will result in a catch that exceeds the catch level objective). An increase in the adjustment for management uncertainty may be warranted if there is a greater likelihood that management measures will result in a catch that exceeds the catch level objective. Adjustments to management uncertainty buffers should consider uncertainty in the ability of managers to constrain catch so the ACL is not exceeded, and uncertainty in quantifying the true catch amounts (i.e., estimation errors). The current default adjustment for management uncertainty for groundfish stocks is 5 percent of the ABC. Stocks without state waters catches have a lower management uncertainty buffer of 3 percent of the ABC; zero possession, discard-only stocks have a higher management uncertainty buffer of 7 percent of the ABC (see Table 1 in Section 4.5.1 for management uncertainty buffers for each stock).

7.1.5.1 Management Uncertainty Buffer Option 1: No Action

Impacts on regulated groundfish

Option 1/No Action would maintain the current process for setting management uncertainty buffers for groundfish stocks for the different sub-components of the commercial groundfish fishery. Option 1/No Action would likely have neutral to low positive biological impacts to regulated groundfish, as management uncertainty buffers are a part of the ACL-setting process, designed to constrain fishing effort to allowable levels. Maintaining current management uncertainty buffers would likely keep the groundfish fishery operating at current levels, and changes in effort would not be expected.

Compared to Option 2, Option 1/No Action may have neutral to low positive impacts to regulated groundfish. Option 2 would eliminate the management uncertainty buffers for the sector ACL for all allocated groundfish stocks, only if the option for 100% at-sea monitoring is selected, which may increase fishing effort since setting the buffer to zero would result in higher sector ACLs. However, 100% monitoring required to select Option 2 would provide an accurate estimate of groundfish discards on groundfish trips since an estimate for unobserved trips would not be needed. This will provide accurate estimates of discards on groundfish trips which will result in positive biological impacts for regulated groundfish since discard mortality will be fully accounted for in the groundfish fishery. Section 7.1 lists potential biological impacts from 100% monitoring of all sector trips on regulated groundfish, both in the short- and long-term. Further, it may be difficult to predict how changes to the management uncertainty buffers would influence fishing effort.

Impacts on other species

Option 1/No Action would likely have neutral to low positive biological impacts to other species, as management uncertainty buffers are a part of the ACL-setting process, designed to constrain fishing effort to allowable levels. Maintaining current management uncertainty buffers would likely keep the groundfish fishery operating at current levels, and changes in effort would not be expected.

7.1.5.2 Management Uncertainty Buffer Option 2 – Elimination of Management Uncertainty Buffer for Sector ACLs with 100 Percent Monitoring of All Sector Trips

Impacts on regulated groundfish

Option 2 would revise the management uncertainty buffer for the sector ACL for all allocated groundfish stocks to be zero, if the option for 100 percent at-sea monitoring, whether as a fixed percentage of sector trips (Section 4.1.1.1.2) or as a percentage of catch (Section 4.1.1.1.3) is selected. Thus, this option would increase the sector ACLs by 3 to 7 percent, depending upon the stock. It is difficult to predict whether the removing the buffers would result in substantial increases in fishing effort. This option has the potential to increase fishing effort and landings since setting the buffer to zero would result in higher sector ACLs. Therefore, relative to No Action, Option 2 has the potential to result in low negative impacts on regulated groundfish. However, 100% monitoring is required to select Option 2, and having comprehensive monitoring would essentially create a census of commercial catch, as an estimate of catch for unobserved trips would rarely be needed. This would provide positive impacts to regulated groundfish as there would be greater certainty in the magnitude and age structure of the commercial catch, and lower risks of the sector ACL being exceeded. Section 7.1 lists potential biological impacts from 100% monitoring of all sector trips on regulated groundfish, both in the short- and long-term. Based on the above information, impacts to regulated groundfish from Option 2 may range from low negative to low positive. It is important to note that Option 2 would not remove the scientific uncertainty buffer that is used to set ACLs (25%) which should provide a backstop to ensure that overall ACLs are not exceeded, even if sector catches increase slightly (3-7%) for some stocks under Option 2. Additionally, there are other elements evaluated in setting management uncertainty buffers besides monitoring adequacy (which includes timeliness, completeness, and accuracy of monitoring data), described in Section 4.5.1. These include enforceability of management measures, precision, latent effort, and other fishery catch. Changes in any of these elements have the potential to result in higher catches that could exceed ACLs which could warrant maintaining management uncertainty buffers.

Impacts on other species

Option 2 has the potential to increase fishing effort since setting the buffer to zero would result in higher sector ACLs that are 3-7% greater. Therefore, Option 2 has the potential to result in low negative to negative impacts on other species. However, 100% monitoring required to select Option 2 would provide comprehensive in-season monitoring on groundfish trips which ensures that sector vessels do not exceed their ACE. As such, fishing effort may be reduced, and therefore, Option 2 would provide positive impacts to other species. It is difficult to predict whether the removing the management uncertainty buffers would result in substantial increases in fishing effort. Based on the above information, impacts to other species from Option 2 may range from low negative to positive.

7.1.6 Remove Commercial Groundfish Monitoring Requirements for Certain Vessels Fishing Under Certain Circumstances

7.1.6.1 Removal of Monitoring Program Requirements Option 1: No Action (Sectors Only)

Analysis from FW55 – to be updated

Option 1/No Action would maintain the existing measures for removal of groundfish monitoring program requirements. These include the removal of ASM requirements for sector vessels fishing exclusively with extra-large mesh (ELM) gillnets of 10 inches (25.4 cm) or greater on a sector trip fishing exclusively in the SNE/MA and Inshore GB Broad Stock (see Figure 1 in Section 4.6.1). Additionally, sector vessels fishing on these non-ASM sector trips and fishing exclusively within the footprint and season of either the Nantucket Shoals Dogfish Exemption Area, the Eastern Area of the Cape Cod Spiny Dogfish Exemption Area, and SNE Dogfish Gillnet Fishery Exemption Area (see Figure 1 in Section 4.6.1) are removed from the requirement to only use 10+ inch mesh on these excluded trips in order to target dogfish with 6.5 inch mesh on the same trip, and are thus also excluded from the at-sea monitoring coverage requirement. However, these spiny dogfish exemptions are handled through sector operations plans.

On both types of trips, groundfish catches are low (Figure 28 and Figure 30). These measures for removal of monitoring requirements, singly or in combination, could help to maintain the amount of fishing on these types of trips at status quo levels, limiting any dampening effect ASM requirements have on these fisheries.

These measures for removal of monitoring requirements have the potential to introduce sampling bias if not applied across all broad stock areas (BSAs) in the same manner, which could limit the ability of using the information in stock assessments. Sampling bias could occur unless the exemption was broadly applied to the ELM gear. BSA 1 (GOM) and BSA 3 (GB) would still have the ASM requirement, but other areas would not. Another possible result could be incentivizing fishing outside of BSA 1 and BSA 3.

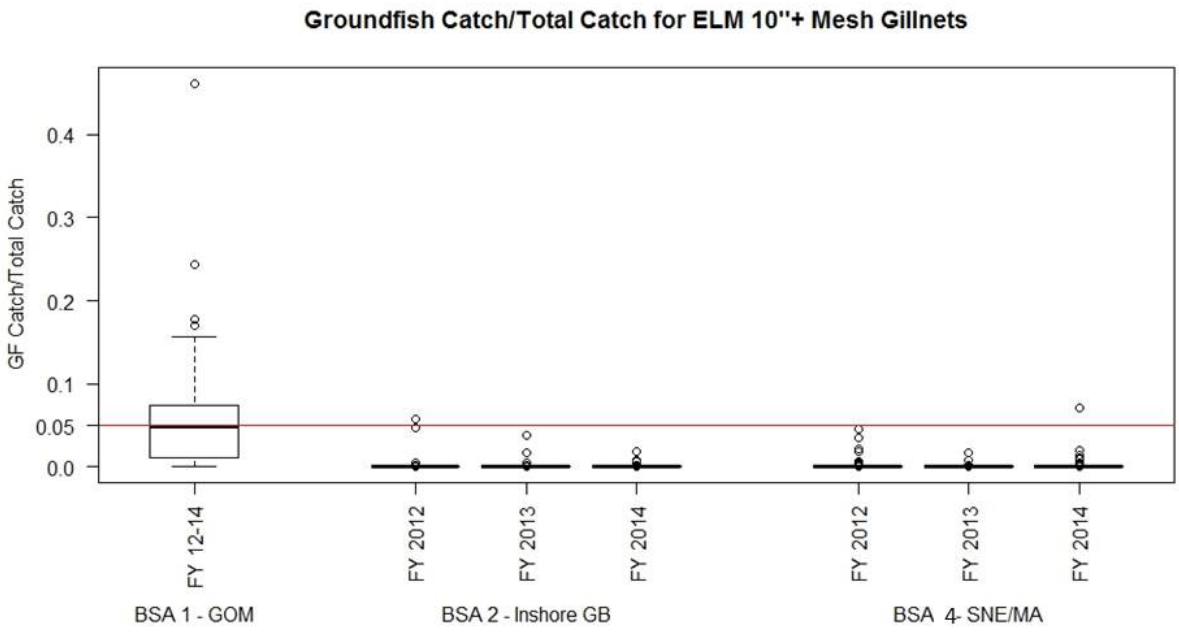


Figure 28 - Groundfish catch as a proportion of total catch on observed sector trips by fishing year and BSA.

Kept catch on sector gillnet trips fishing only mesh size of 8" or greater varies greatly by BSA fished (Table 4), with the majority of landings coming from BSA 2, inshore Georges Bank. Figure 28 depicts annual landings of ELM 8"+.

Table 4 - Commercial landings on sector groundfish gillnet trips fishing mesh size of 8" or greater.

Commercial Landings on Sector Groundfish GNS ELM Trips				
MULT_YEAR	BSA	KALL	VESSEL_COUNT	
2011	GOM	1,296,111	24	
2011	IGB	6,413,731	15	
2011	SNE	4,404,371	38	
2012	GOM	418,433	25	
2012	IGB	5,549,951	14	
2012	SNE	3,829,406	39	
2013	GOM	922,521	16	
2013	IGB	5,042,322	14	
2013	SNE	3,313,405	35	
2014	GOM	652,975	18	
2014	IGB	8,492,619	17	
2014	SNE	4,659,861	29	
Total	GB	22,864	5	
Total	GOM	3,290,040	38	
Total	IGB	25,498,623	20	
Total	SNE	16,207,043	45	
Note GB by year are confidential due to fewer than three vessel reports.				
Based on DMIS SSB tables as of 10/23/15				

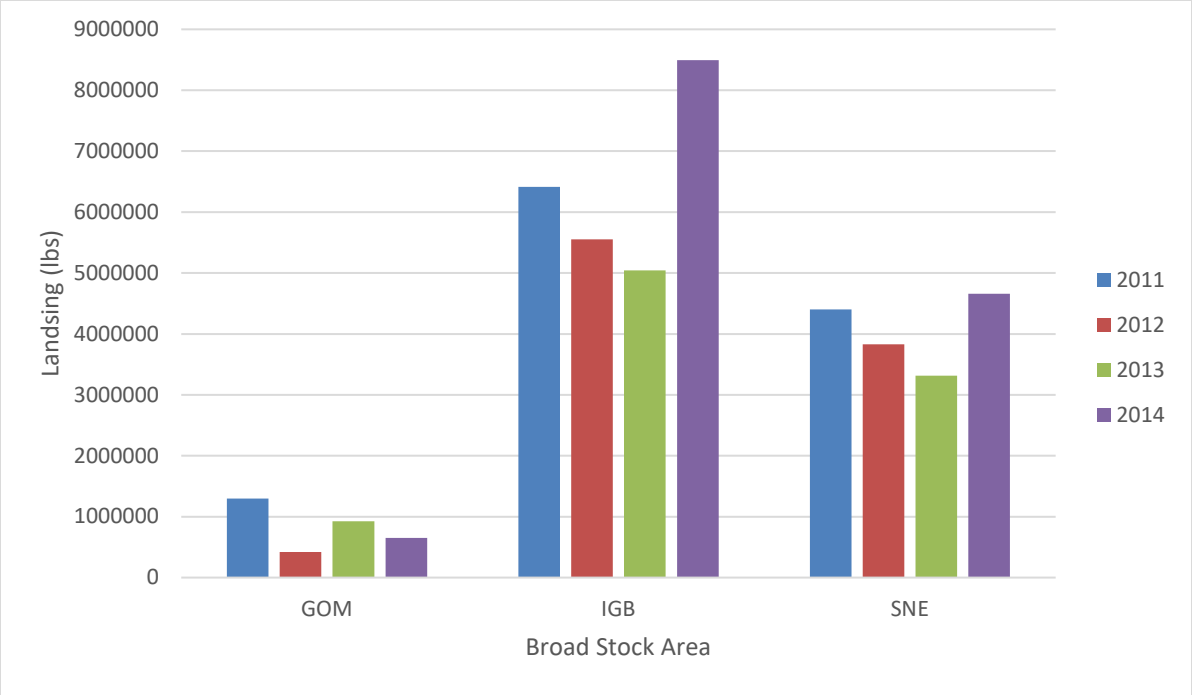


Figure 29 - Kept catch from sector trips fishing only ELM by BSA, FY 2011 - FY2014

Sector vessels fishing on a sector trip may fish multiple mesh sizes on the same trip. ASM coverage for sub-set of these trips fishing within the footprint of existing dogfish exempted fisheries which are within BSAs 2 and 4 is not required. The boxplot in Figure 29 indicates that groundfish catch represents less than 5% of total catch on the majority of trips fishing multiple mesh sizes in BSA 2 and 4. The number of observed trips fishing multiple mesh sizes in the GOM ranged from 74 – 132, from 97 – 143 in the Inshore GB, and 21 in trips in SNE.

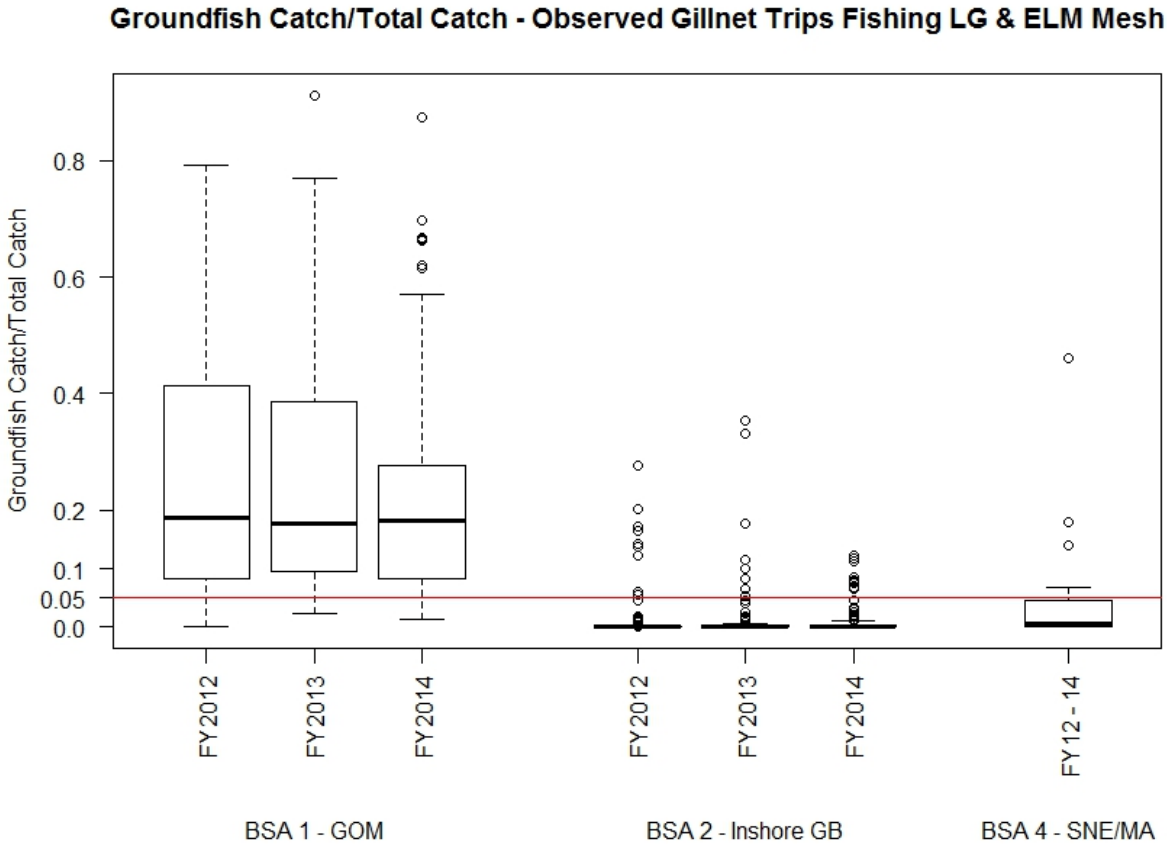


Figure 30 - Groundfish catch to total catch ratios for sector trips fishing both LG and ELM gillnets by fishing year and broad stock area (BSA). Due to a low sample size, SNE/MA trips were binned.

Impacts on regulated groundfish

Under Option 1/No Action, impacts on regulated groundfish are expected to be low negative, since the existing measures remove ASM requirements for a subset of sector trips. This is because reducing observer coverage also reduces the precision of discard estimates. Impacts relative to Option 2 are likely to be low positive since Option 2 would remove monitoring requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a trip from at-sea monitoring (Sub-option 2A) and/or dockside monitoring (if implemented) (Sub-option 2B), in addition to maintaining that ELM trips in BSAs 2 and 4 would not be subject to ASM coverage. Impacts relative to Option 3 are similar and likely to be low positive since Option 3 would remove monitoring requirements for vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a trip from at-sea monitoring (Sub-option 3A) and/or dockside monitoring (if implemented) (Sub-option 3B), in addition to maintaining that ELM trips in BSAs 2 and 4 would not be subject to ASM coverage.

Catches of regulated groundfish stocks on observed sector trips fishing exclusively ELM have been consistently low in BSAs 2 and 4 (Figure 27). Median groundfish catches within this universe of sector trips were zero for each individual fishing year in BSAs 2 and 4, with two trips in the time series with groundfish catches in excess of 5% of total catch (Figure 27).

Impacts on other species

Under Option 1/No Action, impacts on other species are expected to be low negative, since the existing measures remove ASM requirements for a subset of sector trips and the precision associated with non-groundfish discards would also decrease. The economic incentive to use ELM gillnets to target other species may increase effort – and subsequently – catch of these species. However, recent catch of skates, monkfish, and dogfish have been below total allowable catches for these species, such that additional catch would not be expected to result in catches exceeding ACTs for these species. Impacts on other species, such as skates, monkfish, and dogfish relative to Option 2 are likely to be low positive since Option 2 would remove monitoring requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a trip from at-sea monitoring (Sub-option 2A) and/or dockside monitoring (if implemented) (Sub-option 2B), in addition to maintaining that ELM sector trips would not be subject to ASM coverage and the precision associated with non-groundfish discards would also decrease. Impacts relative to Option 3 are similar and likely to be low positive since Option 3 would remove monitoring requirements for vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a trip from at-sea monitoring (sub-option 3A) and/or dockside monitoring (if implemented) (Sub-option 3B), in addition to maintaining that ELM trips in BSAs 2 and 4 would not be subject to ASM coverage. Impacts of Option 2 may be slightly less negative relative to Option 1/No Action then for Option 3, as the area for the exemptions is slightly larger under Option 3 than in Option 2.

7.1.6.2 Removal of Monitoring Program Requirements Option 2 – Remove Monitoring Requirements for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

Groundfish catch west of –72.5 degrees

The PDT examined groundfish catch west of –72.5 degrees longitude, an area at or beyond the western limits of most groundfish species (see Figure 2 of the draft Alternatives). This analysis presents data on landings and discards for groundfish trips taken during 2010-2017.

The catch summaries presented here represent the best available data from a combination of vessel trip reports (VTRs), dealer reports, and both NEFOP and ASM observer records. We only used trips with a VTR-reported longitude that matched the VTR-reported statistical area, given that longitude records are prone to reporting errors.

Groundfish catch west of –72.5 degrees. Table 5 and Table 6 present the total landings and observed discards, respectively, for each groundfish stock from 2010-2017 on trips where the reported longitude was west of –72.5 degrees. Landings came from all eligible groundfish trips while discards were restricted to observed trips (NEFOP or ASM). Table 7 presents the proportion of total groundfish catch (landings + discards) in the Greater Atlantic that was caught west of –72.5 degrees during the same period.

Total groundfish catch across longitudes. Figure 30 and Figure 31 present the trip-level landings and observed discards, respectively, for each groundfish stock from 2010-2017 for trips across all longitudes. A dashed line indicates –72.5 degrees and individual trips are colored by year (with later years plotting on top of earlier years). As with the data presented in the tables, low amounts of groundfish landings and discards are apparent west of –72.5 degrees, particularly in more recent years.

Table 5- Groundfish landings (tons) west of –72.5 degrees.

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	0.71	3.34	0.63	0.52	0.16	0.21	0.11	0.02
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	0.94	1.63	0.00	0.00	0.00	0.03	0.00	0.00
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	1.82	3.28	0.02	21.16	4.41	2.82	2.66	3.91
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00
White hake	0.35	0.23	0.03	0.20	0.00	0.00	0.04	0.08
Ocean pout	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American plaice	0.00	0.94	0.00	0.00	0.00	0.03	0.00	0.00
Pollock	0.11	0.86	0.26	0.09	0.00	0.00	0.45	0.03
Redfish	0.00	0.00	0.00	0.00	0.00	0.00	4.40	0.00
Witch fl	0.00	0.04	0.08	1.18	0.10	0.11	0.01	0.00
Wolffish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	4.87	6.94	9.83	5.94	7.39	0.95	0.02	0.03

Table 6- Groundfish discards (tons) west of –72.5 degrees.

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	2.33	1.63	0.37	0.41	0.12	0.07	0.03	0.01
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	3.27	23.14	3.75	7.24	7.58	2.22	1.51	0.24
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	0.47	5.93	0.61	0.86	0.23	0.07	0.08	0.02
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.07	0.08	0.08	0.29	1.72	1.06	0.76	0.01
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.48	0.16	0.33	0.20	0.07	0.31	0.01	0.00
White hake	0.25	0.19	0.19	0.11	0.10	0.04	0.02	0.00
Ocean pout	1.82	2.67	1.33	1.21	1.10	0.21	0.14	0.01
American plaice	1.03	0.18	0.16	0.12	0.26	0.12	0.04	0.01
Pollock	1.38	0.97	0.59	0.22	0.11	0.15	0.01	0.00
Redfish	0.09	0.07	0.10	0.53	0.75	0.05	0.00	0.02
Witch fl	0.39	0.11	0.08	0.24	0.27	0.10	0.04	0.02
Wolffish	0.40	0.30	0.04	0.02	0.03	0.02	0.00	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	1.58	0.27	0.85	0.32	0.23	0.10	0.04	0.00

Table 7- Proportion of groundfish catch west of –72.5 degrees.

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	0.06	0.22	0.03	0.06	0.08	0.02	0.01	0.00
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	0.05	0.09	0.01	0.03	0.01	0.00	0.01	0.01
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00
White hake	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ocean pout	0.03	0.04	0.03	0.04	0.03	0.00	0.01	0.00
American plaice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pollock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Redfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Witch fl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wolffish	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	0.04	0.02	0.02	0.02	0.02	0.00	0.00	0.00

Figure 31- Landings on all groundfish trips, 2010-2017.

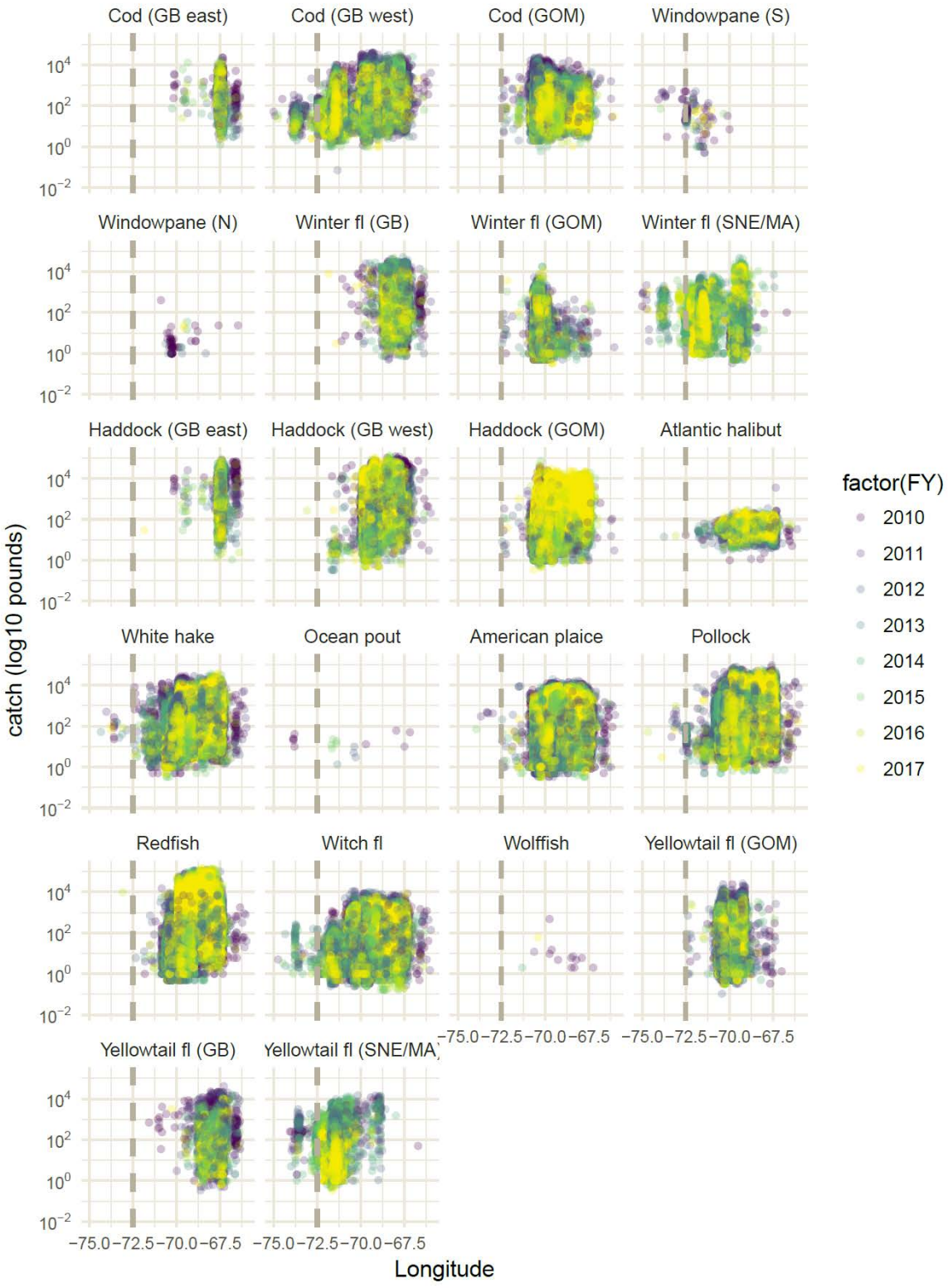
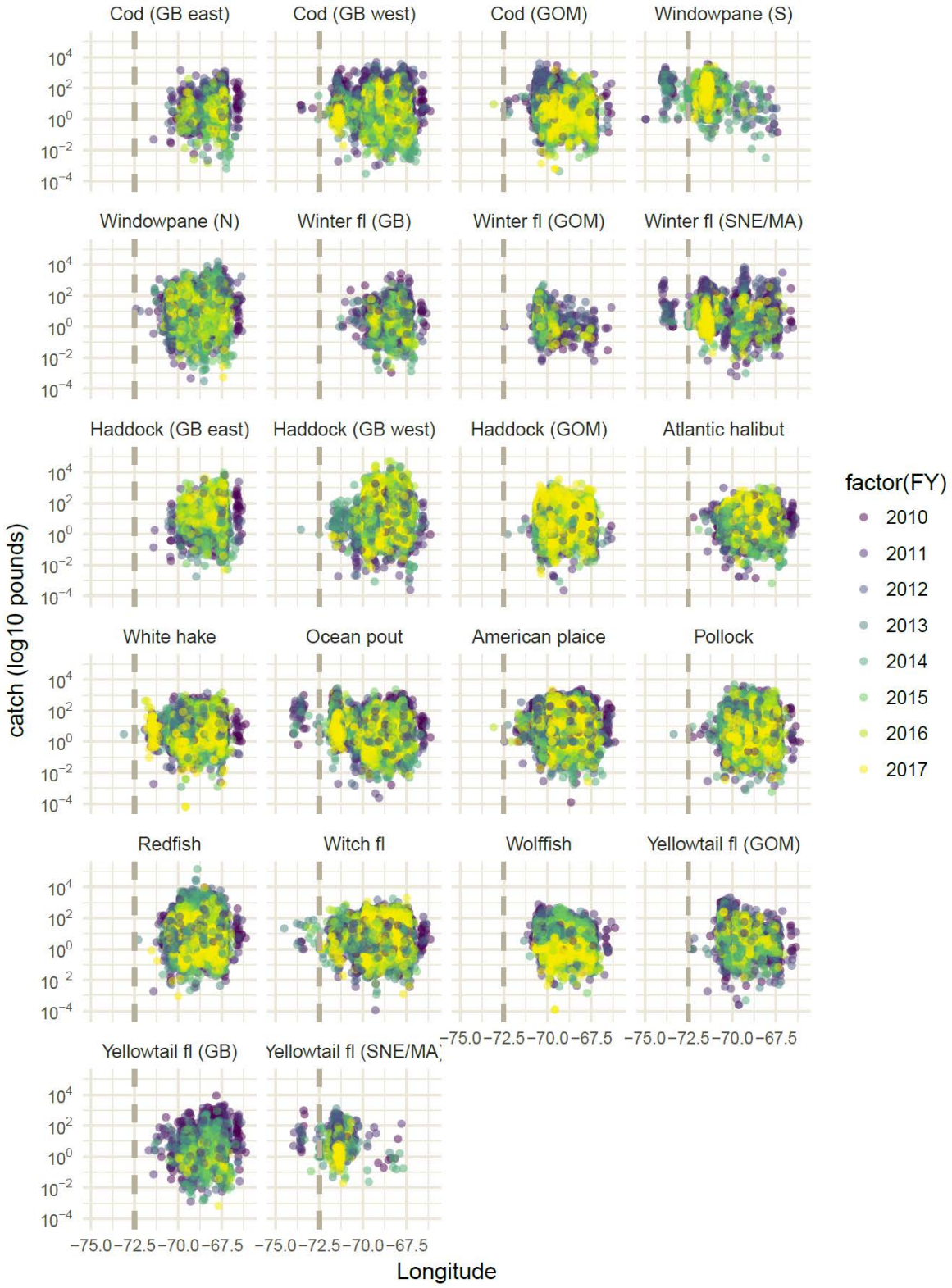


Figure 32- Discards on observed groundfish trips, 2010-2017.



7.1.6.2.1 Removal of Monitoring Program Requirements Sub-option 2A – Remove At-Sea Monitoring Coverage Requirement (Sectors Only)

Impacts on regulated groundfish

This option would remove the ASM requirement for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Since this would remove at-sea monitoring requirements for vessels fishing in this area, this option would result in negative biological impacts to regulated groundfish, as lower monitoring coverage would likely reduce the accuracy of catch estimates. However, catch composition for groundfish on trips fishing in this area is relatively low (Table 5-Table 7, Figure 30-Figure 31). The proportion of groundfish caught on trips west of 72 degrees 30 minutes west longitude from FY2010-2017 is less than 5% for most stocks in most years, with the exception of southern windowpane flounder in a few years (Table 7). Removing ASM requirements for vessels fishing in this area would result in some loss of information on groundfish catches, particularly for Southern New England stocks. However, groundfish discards on trips fishing in this area have been low, generally <2mt with the exception of southern windowpane flounder. Further, the groundfish fishery currently receives only 18% of the southern windowpane flounder ACL. Overall, while there would be expected to be some negative impacts from removing ASM requirements for vessels fishing west of 72 degrees 30 minutes west longitude, groundfish catches in this area comprise less than 5 percent of the total annual groundfish catches, and so the majority of groundfish catch would receive at-sea monitoring.

Relative to No Acton, Sub-Option 2A would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of ASM coverage requirements in other areas, in addition to the current measure for removal of ASM requirement for extra-large mesh gillnets (see section 7.1.6.1 for a description). In addition, this action is considering a review process for these exemptions (see Section 4.6.4.2). Therefore, if negative impacts are found from removing vessels from monitoring requirements in these areas, that can be adjusted in a future action. This option is expected to have neutral impacts to Sub-Option 2B, removal of dockside monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Compared to Sub-Option 3A, this option would be expected to have low positive biological impacts, as the exemption area under Sub-Option 3A is larger and groundfish catches have been larger there.

Impacts on other species

This option would be expected to have negative biological impacts to other species, since this would remove at-sea monitoring requirements for vessels fishing in this area. As such, information on groundfish catches will be less reliable, and sectors could potentially exceed their ACE. Therefore, under this alternative it is less likely that fishing effort would be reduced in season.

Relative to Option 1/No Acton, Sub-Option 2A would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of ASM coverage requirements in other areas, in addition to the current ASM exemption for extra-large mesh gillnets (see section 7.1.6.1 for a description). This option is expected to have neutral impacts to Sub-Option 2B, removal of dockside monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Compared to Sub-Option 3A, this option would be expected to have low positive biological impacts, as the exemption area under Sub-Option 3A is larger.

7.1.6.2.2 Removal of Monitoring Program Requirements Sub-option 2B – Remove Dockside Monitoring Coverage Requirement (Sectors and Common Pool)

Impacts on regulated groundfish

This option would remove dockside monitoring coverage requirements (if implemented for vessels fishing exclusively west of 72 degrees 30 minutes west longitude from). Exempting vessels fishing in this area from dockside monitoring would be expected to have negative impacts on regulated groundfish since there would be no independent verification of landings for vessels fishing in this area. However, groundfish landings from trips in this area have been low, generally less than 1mt with the exception of SNE/MA winter flounder and SNE/MA yellowtail flounder in a few years (Table 5). Therefore, the majority of total groundfish landings would receive dockside monitoring coverage (if implemented). Overall, while there would be expected to be some negative impacts of exempting vessels fishing west of 72 degrees 30 minutes west longitude from dockside monitoring, groundfish landings in this area comprise less than 5 percent of the total annual groundfish catches, and so the majority of groundfish landings would receive dockside monitoring (if implemented).

Relative to No Acton, Sub-Option 2B would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of dockside monitoring coverage requirements (if implemented) in other areas, in addition to the current ASM exemption for extra-large mesh gillnets (see section 7.1.6.1 for a description). In addition, this action is considering a review process for these exemptions (see Section 4.6.4.2). Therefore, if negative impacts are found from removing vessels from monitoring requirements in these areas, that can be adjusted in a future action. This option is expected to have neutral impacts to Sub-Option 2A, removal of at-sea monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Compared to Sub-Option 3B, this option would be expected to have low positive biological impacts, as the exemption area under Sub-Option 3B is larger and groundfish landings have been larger there.

Impacts on other species

This option would be expected to have negative biological impacts to other species, since this would remove dockside monitoring requirements (if implemented) for vessels fishing in this area. As such, information on groundfish catches will be less reliable, and sectors could potentially exceed their ACE. Therefore, under this alternative it is less likely that fishing effort would be reduced in season.

Relative to Option 1/No Acton, Sub-Option 2B would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of dockside monitoring coverage requirements (if implemented) in other areas, in addition to the current ASM exemption for extra-large mesh gillnets (see section 7.1.6.1 for a description). This option is expected to have neutral impacts to Sub-Option 2A, removal of at-sea monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Compared to Sub-Option 3B, this option would be expected to have low positive biological impacts, as the exemption area under Sub-Option 3B is larger.

7.1.6.3 Removal of Monitoring Program Requirements Option 3 – Remove Monitoring Requirements for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

Groundfish catch west of –71.5 degrees

The PDT examined groundfish catch west of –71.5 degrees longitude, an area at or beyond the western limits of most groundfish species (see Figure 2 of the draft Alternatives). This analysis presents data on landings and discards for groundfish trips taken during 2010-2017.

The catch summaries presented here represent the best available data from a combination of vessel trip reports (VTRs), dealer reports, and both NEFOP and ASM observer records. We only used trips with a VTR-reported longitude that matched the VTR-reported statistical area, given that longitude records are prone to reporting errors.

Groundfish catch west of –71.5 degrees. Table 8 and Table 9 present the total landings and observed discards, respectively, for each groundfish stock from 2010-2017 on trips where the reported longitude was west of –71.5 degrees. Landings came from all eligible groundfish trips while discards were restricted to observed trips (NEFOP or ASM). Table 10 presents the proportion of total groundfish catch (landings + discards) in the Greater Atlantic that was caught west of –71.5 degrees during the same period.

Total groundfish catch across longitudes. Figure 32 and Figure 33 present the trip-level landings and observed discards, respectively, for each groundfish stock from 2010-2017 for trips across all longitudes. A dashed line indicates –71.5 degrees and individual trips are colored by year (with later years plotting on top of earlier years). As with the data presented in the tables, low amounts of groundfish landings and discards are apparent west of –71.5 degrees, particularly in more recent years, though non-negligible catch of southern windowpane, SNE winter flounder, SNE yellowtail flounder, and ocean pout are apparent.

Table 8- Groundfish landings (tons) west of –71.5 degrees.

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	18.86	24.43	16.94	19.88	11.19	32.93	18.66	2.71
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	7.57	7.64	3.50	0.24	0.10	0.13	0.00	0.10
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	1.71	4.77	0.87	270.07	95.48	192.44	109.80	75.59
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	5.77	0.01	0.01	0.03	0.01	0.00	0.14	0.13
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.02	0.00	0.03	0.08	0.03	0.00	0.01	0.00
White hake	14.07	0.91	0.88	0.23	2.17	0.30	0.10	0.11
Ocean pout	0.44	0.00	0.08	0.00	0.00	0.02	0.00	0.00
American plaice	0.11	0.96	0.01	0.00	0.02	0.09	0.01	0.06
Pollock	0.31	1.20	0.42	0.47	0.64	0.01	0.48	1.67
Redfish	0.03	0.00	0.02	0.00	0.00	0.00	4.40	0.00
Witch fl	2.84	1.35	1.67	4.42	1.28	1.37	0.48	0.21
Wolffish	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	30.72	72.37	146.60	180.41	61.08	85.76	19.59	5.70

Table 9- Groundfish discards (tons) west of –71.5 degrees.

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	8.78	3.67	4.14	3.13	0.55	1.21	0.41	0.31
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	27.83	69.17	43.76	68.63	39.36	76.08	79.10	26.93
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	10.89	30.31	21.11	6.26	1.48	5.08	4.67	2.15
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.61	0.73	2.94	4.41	6.04	13.24	5.54	1.19
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.67	0.52	1.10	0.56	0.22	0.61	0.12	0.10
White hake	0.60	0.61	0.61	0.30	0.37	0.17	0.77	0.55
Ocean pout	8.08	14.61	9.98	8.66	7.84	12.91	2.49	1.09
American plaice	4.23	1.64	1.54	0.82	1.01	2.55	1.58	0.32
Pollock	1.92	1.39	1.12	0.49	0.35	0.23	0.15	0.01
Redfish	0.44	0.55	0.61	1.53	2.13	0.52	0.35	0.54
Witch fl	1.80	1.31	0.78	1.23	1.29	4.96	1.22	0.47
Wolffish	1.26	0.55	0.15	0.15	0.08	0.48	0.01	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	4.75	8.33	17.07	5.89	1.27	6.75	1.84	0.46

Table 10- Proportion of groundfish catch west of –71.5 degrees.

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.01
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	0.48	0.61	0.41	0.60	0.42	0.56	0.62	0.38
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	0.25	0.34	0.20	0.35	0.18	0.29	0.25	0.19
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.02	0.01	0.02	0.01	0.01	0.01	0.00	0.00
White hake	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ocean pout	0.13	0.23	0.25	0.26	0.24	0.25	0.15	0.10
American plaice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pollock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Redfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Witch fl	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Wolffish	0.06	0.02	0.00	0.01	0.01	0.03	0.02	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	0.21	0.21	0.35	0.50	0.16	0.33	0.34	0.43

Figure 33- Landings on all groundfish trips 2010-2017.

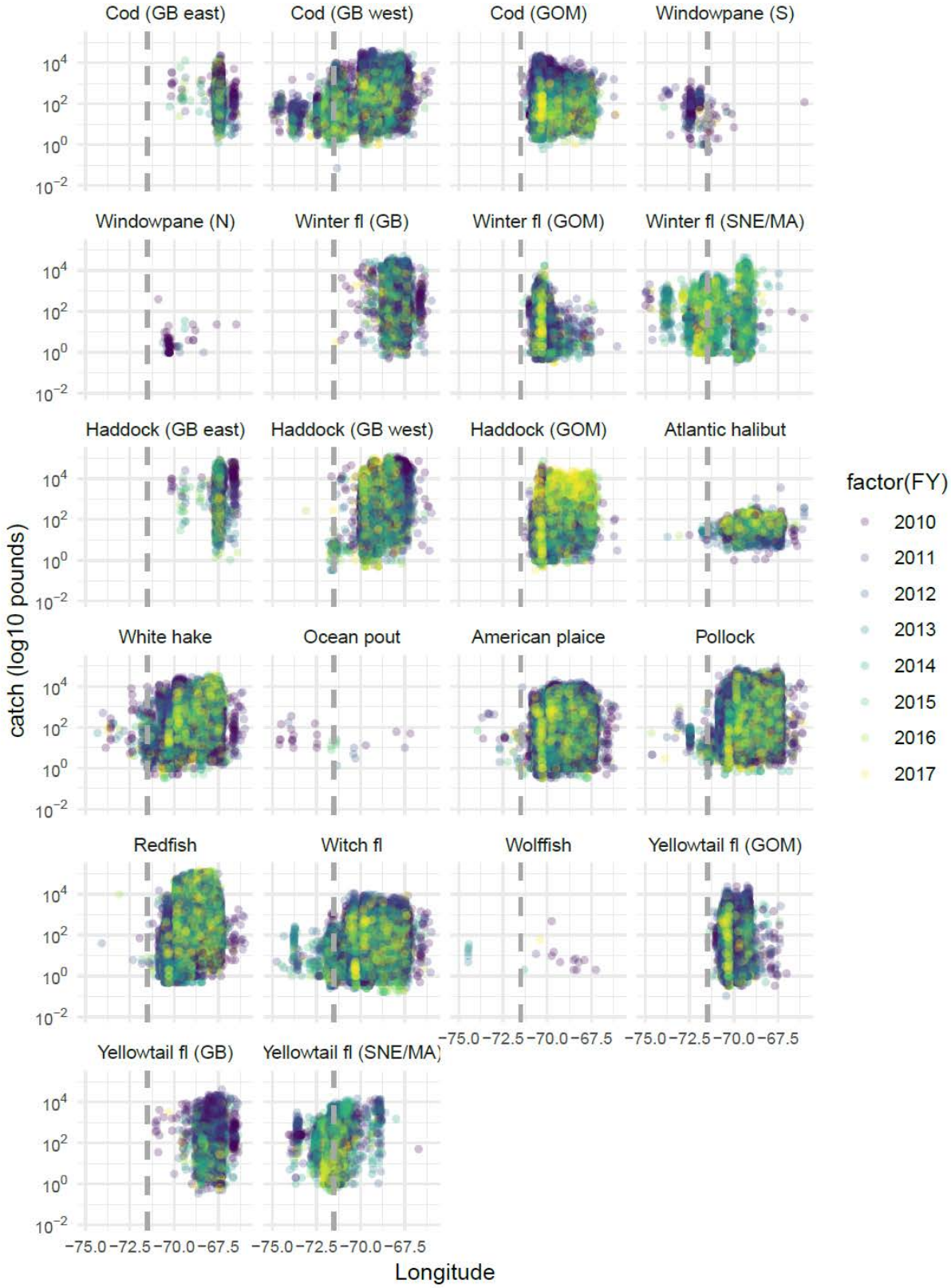
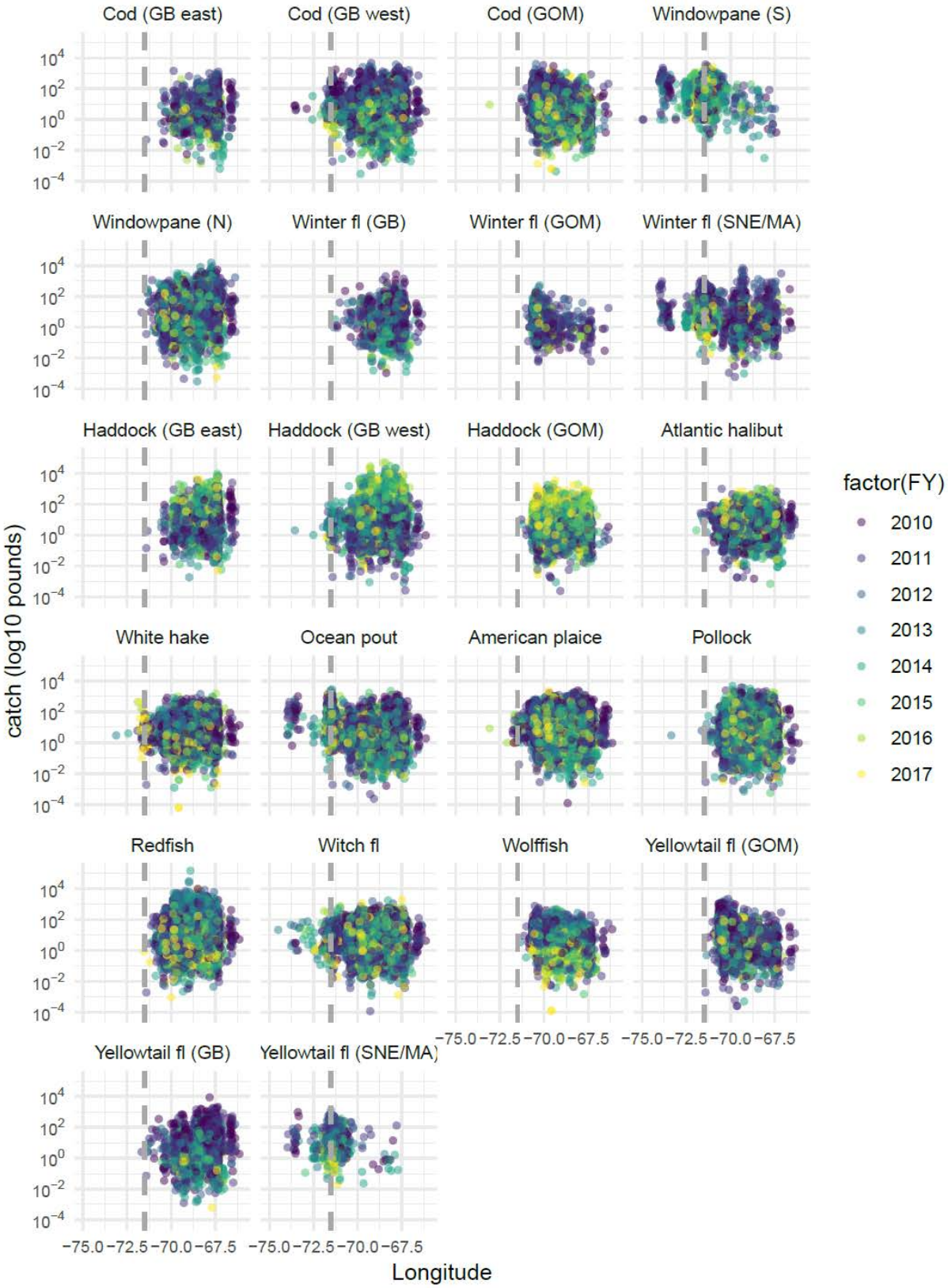


Figure 34- Discards on observed groundfish trips 2010-2017.



7.1.6.3.1 Removal of Monitoring Program Requirements Sub-option 3A – Remove At-Sea Monitoring Coverage Requirement (Sectors Only)

Impacts on regulated groundfish

This option would remove the ASM requirement for vessels fishing exclusively west of 71 degrees 30 minutes west longitude. Since this would remove at-sea monitoring requirements for vessels fishing in this area, this option would result in negative biological impacts to regulated groundfish, as lower monitoring coverage would likely reduce the accuracy of catch estimates. While groundfish catches from FY2010-2017 on trips fishing in this area for some stocks have been low, for other stocks there have been substantial catches (Table 8-Table 10 and Figure 32-Figure 33). The proportion of groundfish caught on trips west of 71 degrees 30 minutes west longitude from FY2010-2017 is less than 5% for many stocks in most years, however, for Southern New England stocks of southern windowpane flounder, SNE/MA winter flounder, and SNE/MA yellowtail flounder, as well as ocean pout the proportion of catch in this area has been relatively high, between 25-60% in most years (Table 10). Catches for these stocks in this area have, however, been lower in recent years.

Removing the ASM coverage requirement for vessels fishing in this area from at-sea monitoring would result in a loss of information on groundfish catches, particularly for Southern New England stocks. It should be noted that SNE/MA winter flounder and yellowtail flounder, as well as ocean pout are currently overfished and in a rebuilding plan. Groundfish discards on trips fishing in this area for many stocks have been low, generally <2mt, but for the Southern New England stocks of southern windowpane flounder, SNE/MA winter flounder, and SNE/MA yellowtail flounder, as well as ocean pout, discards have been substantial in some years (Table 9). For example, discards for southern windowpane flounder in this area have ranged from 25mt to 80mt from FY2010-2017 (Table 9). Overall, there would be expected to be negative impacts of exempting vessels fishing west of 71 degrees 30 minutes west longitude from at-sea monitoring, as groundfish catches in this area for some stocks comprise a fairly large proportion of the total annual groundfish catches. Therefore, while the majority of groundfish catch for most stocks would receive at-sea monitoring, based on information on groundfish catches from vessels fishing west of 71 degrees 30 minutes west longitude from FY2010-2017, Southern New England stocks would receive lower monitoring coverage.

Relative to No Acton, Sub-Option 3A would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of ASM coverage requirements in other areas, in addition to the current ASM exemption for extra-large mesh gillnets (see Section 7.1.6.1 for a description). In addition, this action is considering a review process for these exemptions (see Section 4.6.4.2). Therefore, if negative impacts are found from removing vessels from monitoring requirements in these areas, that can be adjusted in a future action. This option is expected to have neutral impacts to Sub-Option 3B, removal of dockside monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Compared to Sub-Option 2A, this option would be expected to have low negative biological impacts, as the exemption area under Sub-Option 2A is smaller and groundfish catches have been fewer there.

Impacts on other species

This option would be expected to have negative biological impacts to other species, since this would remove at-sea monitoring requirements for vessels fishing in this area. As such, information on groundfish catches will be less reliable, and sectors could potentially exceed their ACE. Therefore, under this alternative it is less likely that fishing effort would be reduced in season.

Relative to No Acton, Sub-Option 3A would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of ASM coverage requirements in other areas, in addition to the current ASM exemption for extra-large mesh gillnets (see section 7.1.6.1 for a description). This option is expected to have neutral impacts to Sub-Option 3B, removal of dockside monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Compared to Sub-Option 2A, this option would be expected to have low negative biological impacts, as the exemption area under Sub-Option 2A is smaller.

7.1.6.3.2 Removal of Monitoring Program Requirements Sub-option 3B – Remove Dockside Monitoring Coverage Requirement (Sectors and Common Pool)

Impacts on regulated groundfish

This option would exempt vessels fishing exclusively west of 71 degrees 30 minutes west longitude from dockside monitoring (if implemented). Exempting vessels fishing in this area from dockside monitoring would be expected to have negative impacts on regulated groundfish since there would be no independent verification of landings for vessels fishing in this area. While groundfish landings from trips in this area have been relatively low, generally less than 1mt, landings for SNE/MA winter flounder, SNE/MA yellowtail flounder, and GB cod (west) have been substantial (Table 8). Therefore, while the majority of total groundfish landings would receive dockside monitoring coverage, coverage could be lower for these Southern New England stocks. Overall, there would be expected to be negative impacts of exempting vessels fishing west of 71 degrees 30 minutes west longitude from dockside monitoring, as groundfish landings in this area for some stocks comprise a fairly large proportion of the total annual groundfish catches. Therefore, while the majority of groundfish landings for most stocks would receive dockside monitoring (if implemented), based on information on groundfish landings from vessels fishing west of 71 degrees 30 minutes west longitude from FY2010-2017, Southern New England stocks would receive lower dockside monitoring coverage.

Relative to No Acton, Sub-Option 3B would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of dockside monitoring coverage requirements (if implemented) in other areas, in addition to the current ASM exemption for extra-large mesh gillnets (see section 7.1.6.1 for a description). This option is expected to have neutral impacts to Sub-Option 3A, removal of at-sea monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude. Compared to Sub-Option 2B, this option would be expected to low have negative biological impacts, as the exemption area under Sub-Option 2B is smaller and groundfish landings have been fewer there.

Impacts on other species

This option would be expected to have negative biological impacts to other species, since this would remove dockside monitoring requirements (if implemented) for vessels fishing in this area. As such, information on groundfish catches will be less reliable, and sectors could potentially exceed their ACE. Therefore, under this alternative it is less likely that fishing effort would be reduced in season.

Relative to No Acton, Sub-Option 3B would be expected to have low negative biological impacts on regulated groundfish, as this would allow for removal of dockside monitoring coverage requirements (if implemented) in other areas, in addition to the current ASM exemption for extra-large mesh gillnets (see section 7.1.6.1 for a description). Compared to Sub-Option 2B, this option would be expected to have negative biological impacts, as the exemption area under Sub-Option 2B is smaller.

7.1.6.4 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements

7.1.6.4.1 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements Option 1: No Action

Impacts on regulated groundfish
Under No Action there is no formal review process to verify that catch composition from vessels fishing on trips that are exempt from monitoring requirements have little to no groundfish. This option would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
This option would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops, provided catch composition did not change for these bycatch species. This measure is primarily administrative.

7.1.6.4.2 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements Option 2 – Implement a Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements

Impacts on regulated groundfish
This option would not be expected to have direct impacts on regulated groundfish species. While this measure is primarily administrative, by requiring a periodic review there could be indirect positive impacts on regulated groundfish to confirm that measures for removal of monitoring requirements are not impacting estimates of groundfish catch. Therefore, compared to No Action there could be indirect low positive impacts on regulated groundfish.

Impacts on other species
This option would not be expected to have direct impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. While this measure is primarily administrative, by requiring a periodic review there could be indirect positive impacts on non-groundfish species to confirm that exemptions from monitoring requirements are not impacting estimates of non-target catch. Therefore, compared to No Action there could be indirect low positive impacts on other species.

7.2 ESSENTIAL FISH HABITAT IMPACTS

The alternatives under consideration in this amendment include various approaches to monitoring the sector and/or common pool segments of the groundfish fishery, with various options for coverage rates and monitoring approaches, which could be combined with one another in many ways. The effects on essential fish habitat (EFH) associated with these alternatives, if any, would be indirect, and related to whether a particular change to the monitoring system influences either the magnitude of effort in the fishery, the location of that effort, or both. The direction of change in the magnitude of effort is easier to predict than the amount of change or any spatial shifts in effort. While some management actions have the ability to affect the types of gears used in a fishery, which could have large influences on the magnitude of impacts to EFH because different gears have very different seabed impacts, the alternatives in Amendment 23 would apply regardless of gear type and seem unlikely to lead to gear switching. Thus, this analysis assumes that vessels that currently fish with trawls will continue to fish with trawls, gillnets with gillnets, etc.

The EFH impacts discussion below focuses on changes in the amount or location of fishing that might occur as a result of the implementation of the various alternatives. This approach to evaluating adverse effects to EFH is based on two principles: (1) seabed habitat vulnerability to fishing effects varies spatially, due to variations in seabed substrates, energy regimes, living and non-living seabed structural features, etc., between areas and (2) the magnitude of habitat impacts is based on the amount of time that fishing gear spends in contact with the seabed. This seabed area swept (seabed contact time) is grossly related to the amount of time spent fishing, although it will of course vary depending on catch efficiency, gear type used, and other factors.

In general, the effects of the groundfish fishery on EFH are more closely related to catch allocations than to monitoring approaches. Catch limits, which are not a part of this action, directly influence common pool trimester limits and sector annual catch entitlement values. These limits, combined with spatial and temporal patterns in fish availability, and other management measures such as year-round and seasonal fishery closures, largely determine patterns of effort in the groundfish fishery. In general, the monitoring approaches considered here are similarly burdensome or more burdensome than current (No Action) measures, so these alternatives, combined with catch limits, are likely to result in either similar levels of effort in the fishery as currently exist, or lower levels of effort, if costs associated with higher rates of monitoring create limits on overall effort. How exactly improvements in monitoring will affect fishing effort on each stock is unknown.

Biological impacts are broken down into short and long-term, and the same is done here for EFH impacts. An overview of possible short- and long-term impacts of 100% monitoring of all sector trips on regulated groundfish species are provided in the biological impacts section. Improvements in monitoring which reduce fishing mortality through better catch accounting should produce positive biological impacts in the short-term. In the longer-term, generally five years or more into the future, analytical assessments should improve with better catch data which should lead to subsequent improvements in groundfish catch advice and management.

Overall, the many unknowns associated with improvements in monitoring makes the determination of EFH impacts difficult, and we can only qualitatively rank alternatives relative to each other. Estimates of change in the fishery are complex and likely to vary by sector, since many of these approaches are sector-based. Spatial measures to minimize the impacts of the groundfish fishery and other fisheries on EFH were implemented via Omnibus Habitat Amendment 2. These spatial measures will not be altered by any of the alternatives under consideration here.

The area that is potentially affected by the proposed alternatives includes EFH for species managed under the following Fishery Management Plans: NE Multispecies; Atlantic Sea Scallop; Monkfish; Atlantic Herring; Summer Flounder, Scup and Black Sea Bass; Atlantic Mackerel, Squid, and Butterfish; Spiny Dogfish; Tilefish; Deep-Sea Red Crab; Atlantic Surfclam and Ocean Quahog; Atlantic Bluefish; Northeast Skates; and Atlantic Highly Migratory Species. Effects on EFH are considered in aggregate across these species; nearly all areas of the continental shelf are EFH for one or more managed species of fish or shellfish.

7.2.1 Commercial Groundfish Monitoring Program Revisions (Sectors Only)

These alternatives consider revisions to the groundfish monitoring program for sectors, including fixed at-sea monitoring coverage levels based on a percentage of trips or a percentage of catch, with percentages of 25, 50, 75, and 100%. This section also considers revisions to options for meeting monitoring standards, including electronic monitoring approaches. There are also administrative measures related to the timing of when monitoring coverages levels would be set relative to the fishing year, and the review process for establishing coverage rates.

7.2.1.1 Sector Monitoring Standards (Target Coverage Levels)

Under Option 1 (No Action) coverage levels for at-sea monitoring are set for each sector based on target coefficients of variation in estimated catch at the stock level. Option 2 would set a long-term, fixed coverage level based on a percentage of trips, with percentages ranging from 25-100%. Option 3 would set a long-term, fixed coverage based on a percentage of catch, with percentages ranging from 25-100%. Across all options, realized coverage rates may be lower than the target coverage rates due to availability of at-sea monitors. Regardless of option, higher coverage rates come at a higher cost for sectors and their members because sectors are responsible for funding any trips that are not covered by NOAA funds. If sectors deem that these costs are too high given the expected profits from the trips in question, trips would not be taken and fishing effort levels would decline. Such effort declines are more likely with progressively higher ASM coverage levels.

7.2.1.1.1 Sector Monitoring Standard Option 1: No Action

Under Option 1 (No Action), target coverage levels have averaged around 25%, varying by year, with somewhat lower (22%) realized ASM coverage rates, from FY2010-2017. As discussed in the introduction, impacts of the fishery on EFH are more dependent on annual catch limits and only somewhat related to at-sea monitoring coverage requirements, to the extent that these requirements impose a cost burden and reduce the likelihood of a trip occurring. As discussed in the biological impacts section, current coverage rates create limited opportunities for an ASM cost-related reduction in effort, so the direct effects of No Action ASM coverage rates on fishing effort levels, and therefore on the magnitude of the fishery's impact to EFH, are expected to be negligible. Given the recent target levels, No Action is expected to have similar impacts on the amount of fishing effort, and therefore on EFH, as compared to the 25% coverage levels, regardless of whether the 25% is based on a percentage of trips or a percentage of catch.

Over the longer term, the coverage rates under No Action appear to be introducing error into the catch data streams due to underreporting of discards during trips that are not monitored. There is an incentive for misreporting when the sector's annual catch entitlement for a stock is constraining, relative to the encounter rate of the stock during fishing (see analysis in Section 6.5.10.4 and Appendix V). Very generally, errors in the catch data create difficulty in fitting assessment models, leading to uncertainties in stock status, and the need to lower catch limits to account for these larger uncertainties. Lower catch

limits would result in lower levels of effort and therefore reduce any negative effects of the fishery on EFH.

7.2.1.1.2 Sector Monitoring Standard Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on Percentage of Trips

Selecting one of the sub-options in this section would set a long-term fixed ASM coverage level at 25, 50. 75, or 100% of trips.

7.2.1.1.2.1 Sub-option 2A – 25 percent

ASM coverage of 25% is similar to recent coverage targets under the No Action/CV-based system. Thus, sub-option 2A is expected to have similar impacts to Option 1/No Action, negligible effects on EFH in the short term, towards potential positive effects in the long term if continued lower levels of monitoring influence catch advice in such a way that ACE values are lower as an outgrowth of these coverage rates.

7.2.1.1.2.2 Sub-option 2B – 50 percent

ASM coverage rates of 50% represent an increase over current targets under the CV-based system. This increase in coverage rates could have multiple effects on the fishery and fishery data. Costs associated with ASM could make it difficult for operators to afford to go fishing, such that effort could decline, but EFH impacts would also decline (i.e. sub-option 2B could have a positive impact on EFH). This decline in effort due to increased per trip costs might or might not occur, and the magnitude of such a decline is unknown. An increase in ASM coverage will also influence data streams associated with the fishery. For the fraction of trips that are monitored, catch data, in particular data on discards, would improve. Over the long term it is assumed that such improvements in data would benefit assessments, decreasing uncertainty and potentially leading to higher catch limits for sectors (and other groundfish and non-groundfish vessels subject to groundfish ACLs). For other trips, data quality could remain the same, or could decrease. Decreases in data quality, i.e. an increase in misreporting of discards, might be incentivized under higher coverage rates as described in the biological impacts analysis. If this occurs, the net positive benefits on assessments and quotas might be reduced. If changes in coverage rates contribute to higher catch limits, effort could increase, causing negative impacts on EFH, but if they lead to lower catch limits, or no changes in catch limits, this ASM coverage rate could have positive impacts on EFH. The magnitude of these effects is uncertain.

7.2.1.1.2.3 Sub-option 2C – 75 percent

Sub-option 2C represents a substantial increase in ASM coverage rates as compared to current targets. The increase from 50% to 75% would increase the likelihood that sectors would find difficulty in paying ASM costs, and therefore increase the likelihood of effort reductions. Such effort reductions could lead to positive impacts on EFH. Over the longer term, however, a 75% coverage rate would mean that catch and discards are well accounted for on the majority of sector trips, which in turn account for the majority of groundfish catch. Thus 75% ASM coverage would have a positive influence on the accuracy of catch data, and the proportion of trips where misreporting of discards might occur would be smaller. This should hopefully improve the fit of assessment models and reduce their uncertainty, allowing for higher catch limits, and therefore greater fishing effort, associated with negative impacts on EFH. The balance between these different factors in determining net effects over the short and long term is impossible to estimate.

7.2.1.1.2.4 Sub-option 2D – 100 percent

Sub-option 2D would set a target of 100% ASM coverage for sectors. This level of coverage has an even greater likelihood of reducing effort due to per-trip costs that the sectors cannot accommodate, but also

has a greater likelihood of improving catch data, which will in turn contribute to greater certainty in assessment results, and have a positive effect on catch advice. This would lead to greater effort, and larger negative effects on EFH. Again, the balance between these different factors in determining net effects over the short and long term is impossible to estimate.

7.2.1.1.3 Sector Monitoring Standard Option 3: Fixed Total At-Sea Monitoring Coverage Level Based on Percentage of Catch

While the range of target percentages is the same for Option 3 and Option 2, the resulting overall coverage rates under Option 3 will be greater than Option 2 because the percentage of catch targets are to be achieved for all allocated stocks. Simulation analysis (see Section 7.4.3.1.3 in Economic Impacts Analysis) indicates that the impacts of the 25% catch-based option are similar to the sub-option covering 50% of trips, 50% catch based similar to 75% of trips, and 75% catch based similar to 100% of trips. Sub-option D, based on 100% of catch would result in the same target coverage as Option 2, Sub-option D, 100% of trips.

7.2.1.1.3.1 Sub-option 3A – 25 percent

Impacts of this sub-option are expected to be similar to the 50% of trips sub-option described in section 7.2.1.1.2.2, i.e., ranging from positive to negative. The direction and magnitude of effects will depend on whether and how much effort is reduced due to monitoring-associated costs in the short and long run, and the potential for catch limits to increase over the long run in response to higher quality data.

7.2.1.1.3.2 Sub-option 3B – 50 percent

Impacts of this sub-option are expected to be similar to the 75% of trips sub-option described in section 7.2.1.1.2.3, i.e., ranging from positive to negative. The direction and magnitude of effects will depend on whether and how much effort is reduced due to monitoring-associated costs in the short and long run, and the potential for catch limits to increase over the long run in response to higher quality data.

7.2.1.1.3.3 Sub-option 3C – 75 percent

Impacts of this sub-option are expected to be similar to the 100% of trips sub-option described in section 7.2.1.1.2.4, i.e., ranging from positive to negative. The direction and magnitude of effects will depend on whether and how much effort is reduced due to monitoring-associated costs in the short and long run, and the potential for catch limits to increase over the long run in response to higher quality data.

7.2.1.1.3.4 Sub-option 3D – 100 percent

Impacts of this sub-option are also expected to be similar to the 100% of trips sub-option described in section 7.2.1.1.2.4, i.e., ranging from positive to negative. The direction and magnitude of effects will depend on whether and how much effort is reduced due to monitoring-associated costs in the short and long run, and the potential for catch limits to increase over the long run in response to higher quality data.

7.2.1.2 Sector Monitoring Tools (Options for meeting monitoring standards)

One way to provide sectors operational flexibility as well as potential cost savings associated with ASM requirements is to allow them to substitute electronic monitoring for human monitors. While there are still per-trip costs associated with electronic monitoring approaches, aside from the amortization of the initial equipment costs, electronic monitoring is expected to be less expensive than using a human monitor. If approved, these three options could be combined, with sectors choosing approaches that are least

burdensome in terms of administration and costs. These options may mitigate some of the cost-related barriers to fishing associated with higher monitoring target rates, allowing vessels to complete more trips. The extent to which the substitution of electronic ASM mitigates cost-related decreases in effort is difficult to estimate, but greater mitigation is likely for progressively higher ASM target rates (see Section 7.4.3.2 in Economic Impacts). In general the benefits of electronic monitoring in the context of assessment and specifications setting for the groundfish resource are expected to be similar to those associated with data collected by human monitors, although there may be differences for a few species (see Section 7.1.1.2). Thus over the longer term, and depending on target coverage rate, the use of electronic monitoring (or not) should not change the expected impacts of the various rate sub-options on EFH.

7.2.1.2.1 Sector Monitoring Tools Option 1: Electronic Monitoring in place of Human At-Sea Monitors

Allowing sectors to substitute electronic monitoring for human monitoring may have slight negative impacts to EFH in the short term if the substitution facilitates greater fishing effort. Over the longer term, substitution of electronic monitoring for human monitoring should provide similar positive benefits in terms of assessment and management of the resource, leading to increased effort and increased impacts of the fishery on EFH.

7.2.1.2.2 Sector Monitoring Tools Option 2: Audit Model Electronic Monitoring Option

Impacts will be similar to Option 1 above, i.e. potentially low negative impacts to EFH. Audit model EM may further reduce costs to sectors as review of the camera footage will be done for only a subset of trips.

7.2.1.2.3 Sector Monitoring Tools Option 3: Maximized Retention Electronic Monitoring Option

Impacts will be similar to Option 1 above, i.e. potentially low negative impacts to EFH. Maximized retention approaches that combine electronic ASM with dockside review of catch may be more practical for certain vessels, for example for operators where the at-sea protocols associated with the audit method are more challenging due to higher volumes of catch.

7.2.1.3 Total Monitoring Coverage Level Timing

The timing of when coverage targets are announced is generally an administrative measure that will not affect impacts to EFH, but is important to sectors for planning and administrative reasons.

7.2.1.3.1 Coverage Level Timing Option 1: No Action

Under Option 1, the total annual monitoring coverage level is announced upon completion of necessary analyses, and not by a fixed date. This measure is primarily administrative. Therefore, Option 1/No Action would not be expected to have direct or indirect impacts on essential fish habitat.

7.2.1.3.2 Coverage Level Timing Option 2: Knowing Total Monitoring Coverage Level at a Time Certain

Under Option 2, the total annual monitoring coverage level would be announced three weeks prior to the annual sector enrollment deadline. This measure is primarily administrative, however setting a specific deadline could influence the data available for determination of the coverage level, and therefore the coverage level itself. This would not be the case if a fixed percentage was selected (Sector Monitoring

Standards and Monitoring Tools, Option 2), but could occur under Option 1/No Action (CV-based coverage rate) or Option 3 (rate based on percent of catch).

If a fixed monitoring percentage (Option 2) is selected in the Sector Monitoring Standards and Monitoring Tools section, Option 2 for a time certain would not be expected to have direct or indirect impacts on essential fish habitat, because the rate would be set at the same fixed value regardless of the timing of the announcement (and in fact, would be generally known as the ongoing rate, until it was revised by the Council). If Option 1 or Option 3 is selected under the Sector Monitoring Standards and Monitoring Tools section, Option 2 for a time certain could affect the monitoring rate. If this monitoring rate was higher than it otherwise would be without the time certain provision, this could lead to lower effort and reduced negative impacts to EFH. Lower effort would not necessarily be the case and would depend on sector's abilities to fund monitoring coverage, combined with NMFS ability to fund shoreside aspects of said coverage. Lower effort and therefore lower impacts would be most likely associated with higher coverage rates.

7.2.1.4 Review process for Sector Monitoring Coverage

7.2.1.4.1 Coverage Review Process Option 1: No Action

Under Option 1, the efficacy of sector monitoring coverage rates would not be reviewed on a prescribed basis but would be reviewed on occasion using a schedule and method determined by the Council and related to the goals of the program. Efficacy refers to increase in accuracy, maximized value, and minimized costs. This measure is primarily administrative. Therefore, Option 1/No Action would not be expected to have direct or indirect impacts on essential fish habitat.

7.2.1.4.2 Coverage Review Process Option 2: Establish a Review Process for Monitoring Coverage Rates

Under Option 2, the efficacy of sector monitoring coverage rates would be reviewed on a prescribed basis, after two full years of fishing data are available under the revised monitoring program. As above, efficacy refers to increase in accuracy, maximized value, and minimized costs. This measure is primarily administrative. Therefore, Option 2 would not be expected to have direct or indirect impacts on essential fish habitat.

7.2.1.5 Addition to List of Framework Items

This alternative would allow as yet undeveloped monitoring technologies to be considered for adoption through the framework adjustment vs. amendment process. Vessel coverage levels would also be adjustable via framework. Regardless of the management vehicle used, analysis of impacts under NEPA and MSA would occur in that future action. Therefore, this alternative is not expected to have direct or indirect impacts on essential fish habitat.

7.2.2 Commercial Groundfish Monitoring Program Revisions (Sectors and Common Pool)

These measures relate to dockside monitoring of landings in both the sector and common pool segments of the fishery.

7.2.2.1 Dockside Monitoring Program (Sectors and Common Pool)

These options consider whether to require dockside monitoring in the fishery. Dockside monitoring data, if utilized effectively, could contribute to better assessment and management of groundfish resources. It also imposes costs on groundfish vessels at the trip level.

7.2.2.1.1 Dockside Monitoring Option 1: No Action

Under Option 1 (No Action), dockside monitoring is not required. This Option is expected to have neutral effects on EFH in the short term, as there would be no required dockside monitoring costs for sector and common pool vessels to accommodate that could in turn influence the magnitude of effort in the fishery and thus the magnitude of impacts to EFH. In the long term, Option 1 might have slight positive impacts to EFH, assuming that the absence of these landings verification data would have a negative effect overall, thus reducing catch limits and reducing effort and impacts to EFH. If dockside monitoring data do not influence overall management and setting of catch limits, these reductions in impacts would not occur.

7.2.2.1.2 Dockside Monitoring Option 2: Mandatory Dockside Monitoring Program for the Commercial Groundfish Fishery

Mandatory dockside monitoring of all trips under Option 2 would impose costs of the fishery, which could serve to limit effort and thus reduce the fishery's impacts on EFH. In the longer term, if this monitoring leads to better data streams that improve management of the resource, higher catch limits could allow for increased effort and increased impacts to EFH.

7.2.2.2 Dockside Monitoring Program Structure and Design

The options below relate to the design and administration of the dockside monitoring program, if it is adopted under Option 2 above.

7.2.2.2.1 Dockside Monitoring Program Funding Responsibility

As discussed under Option 2, above, the imposition of a dockside monitoring program costs could decrease effort and therefore on the fishery's impacts to EFH in the short term. This would be the case regardless of who is responsible for paying for the monitoring, but if dockside monitoring is the responsibility of the vessel/sector, this could lead to larger decreases in effort.

7.2.2.2.1.1 Dockside Monitoring Program Funding Responsibility Option A – Dealer Responsibility

If dockside monitoring costs are a dealer responsibility, slight declines in effort and therefore slight decrease in short term impacts to EFH could be expected. This is expected due to financial interrelationships between vessels and dealers.

7.2.2.2.1.2 Dockside Monitoring Program Funding Responsibility Option B – Vessel Responsibility

If dockside monitoring costs are a vessel or sector responsibility, slight declines in effort and therefore slight decrease in short term impacts to EFH could be expected. Effects could be greater than under Option A, because vessels or sectors would be directly responsible for costs.

7.2.2.2.2 Dockside Monitoring Program Administration

7.2.2.2.2.1 Dockside Monitoring Program Administration Option A – Individual contracts with dockside monitor providers

Option A would allow sectors to develop individual contracts with DSM providers. This measure could have administrative and other practical benefits for sectors but would not be expected to directly affect the amount of fishing effort or the magnitude of effects on EFH.

7.2.2.2.2.2 Dockside Monitoring Program Administration Option B – NMFS-administered dockside monitoring program

Option B would allow NMFS to administer the DSM program. This measure could have administrative and other practical benefits for NMFS but would not be expected to directly affect the amount of fishing effort or the magnitude of effects on EFH.

7.2.2.2.3 Options for Lower Dockside Monitoring Coverage Levels (20 percent coverage)

These options would allow vessels landing in small, remote ports or with lower amounts of landings to have only 20% dockside monitoring rates. This would reduce costs for these vessels.

In addition to possible options for lower coverage levels in small, remote ports and for smaller vessels with low landings considered in this section, this action also considers options to fully remove dockside monitoring requirements (if implemented) for some vessels based on fishing location (Section 4.6.2 and 4.6.3), that likely include some of the same vessels. Impacts of those options based on fishing location are described below (Section 7.1.6.2 and 7.1.6.3).

7.2.2.2.3.1 Option A – Lower coverage levels for ports with low volume of groundfish landings

The vast majority of groundfish landing come through nine ports: New Bedford, Gloucester, Boston, Portland, Chatham, Point Judith, Seabrook, Rye, and Portsmouth. Based on recent landing ports, all other ports would qualify as small and remote. While this lower coverage options encompasses a number of locations, effects on effort are expected to be minor across the fishery because only a small amount of groundfish landings (~5%) are represented at these other ports. Nonetheless, an option for lower DSM coverage in small/remote ports could reduce the cost burden associated with dockside monitoring on vessels landing in these ports, thus reducing the downward pressure on effort associated with monitoring costs. Overall effects of Option A on EFH are expected to be negligible, given the small amount of effort represented.

7.2.2.2.3.2 Option B – Lower coverage levels for vessels with total groundfish landings volumes in the 5th percentile of total annual landings

Option B is expected to have similar impacts to EFH as compared to Option A. Overall a small amount of effort in the fishery could be influenced by this option for lower DSM coverage for vessels, so impacts are not expected to be more than negligible.

7.2.2.2.4 Safety and Liability Associated with Fish Hold Inspections

These options relate to inspection of the fish hold of the vessel by dockside monitors. These options are primarily administrative.

7.2.2.2.4.1 Fish Hold Inspection Option A – Dockside monitor fish hold inspections required

Option A would require monitors to inspect the fish hold as part of their data collection procedures for each trip. This option is not expected to influence the amount or location of fishing effort and therefore would not have any direct or indirect impacts on essential fish habitat.

7.2.2.2.4.2 Fish Hold Inspection Option B – Alternatives method for inspecting (cameras)

Option B would authorize monitors to use alternative (e.g. video) methods to inspect the fish hold as part of their data collection procedures for each trip. This option is not expected to influence the amount or location of fishing effort and therefore would not have any direct or indirect impacts on essential fish habitat.

7.2.2.2.4.3 Fish Hold Inspection Option C – No fish hold inspection required, captains sign affidavit

Option C would allow the captain to sign an affidavit certifying that the fish hold was emptied when the trip was offloaded. This affidavit would then accompany dockside monitoring data for the trip. This option is not expected to influence the amount or location of fishing effort and therefore would not have any direct or indirect impacts on essential fish habitat.

7.2.3 Sector Reporting

These options pertain to the frequency of sector reporting and are primarily administrative.

7.2.3.1 Sector reporting Option 1: No Action

Option 1 would continue to require weekly or daily sector reporting, and submission of annual year-end reports. This alternative is primarily administrative and no direct or indirect impacts on essential fish habitat are expected.

7.2.3.2 Sector reporting Option 2 – Grant Regional Administrator the Authority to Streamline Sector Reporting Requirements

Option 2 would authorize the Regional Administrator the authority to streamline sector reporting requirements. This alternative is primarily administrative and no direct or indirect impacts on essential fish habitat are expected.

7.2.4 Funding/Operational Provisions of Groundfish Monitoring (Sectors and Common Pool)

These options are related to changes in monitoring targets depending on the availability of NMFS funding.

7.2.4.1 Funding Provisions Option A: No Action

Under No Action, would continue the requirement that the industry funds ASM costs, even if these costs cannot be covered in full by NMFS. This condition is assumed in the sections related to ASM coverage rates, such that impacts to EFH would be as described in sections 7.1.1.1.1, 7.1.1.1.2, and 7.1.1.1.3, depending on the target coverage rate selected by the Council.

7.2.4.2 Funding Provisions Option 2 – Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.2.4.2.1 Funding Provisions Sub-Option 2A – Higher Monitoring Coverage Levels if NMFS Funds are Available (Sectors Only)

Under Sub-option 2A, if additional funding is available, it would be used to increase the monitoring rate beyond the target set by the Council, up to 100%. Because the costs of this additional monitoring would not be borne by sectors/sector vessels, effects on fishing effort and therefore on the magnitude of impacts to EFH are not expected.

7.2.4.2.2 Funding Provisions Sub-Option 2B – Waivers from Monitoring Requirements Allowed (Sectors and Common Pool)

Sub-option 2B would allow for maintenance of effort in the fishery under a waiver if for some reason NMFS has insufficient funds to administer the shoreside aspects of the ASM and dockside monitoring programs. Here, ASM refers to both human and electronic monitoring. Under this sub-option, impacts to EFH would be as described in sections 7.1.1.1.1, 7.1.1.1.2, and 7.1.1.1.3, depending on the target coverage rate selected by the Council.

7.2.5 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors)

These options relate to the management uncertainty buffers used when setting annual catch limits for sectors. If the target is set at 100% (Option B), removing or reducing these buffers would allow for higher catch limits as a proportion of the ABC.

7.2.5.1 Management Uncertainty Buffer Option 1: No Action

Under Option 1 (No Action), the process for setting management uncertainty buffers for the different sub-components of the commercial groundfish fishery would remain. Buffers are either 3, 5, or 7% of the ABC, depending on the stock (see Table 1 in Section 4.5.1 for management uncertainty buffers for each stock). Under this option, impacts to EFH would be as described in sections 7.1.1.1.1, 7.1.1.1.2, and 7.1.1.1.3, depending on the target coverage rate selected by the Council.

7.2.5.2 Management Uncertainty Buffer Option 2 – Elimination of Management Uncertainty Buffer for Sector ACLs with 100 Percent Monitoring of All Sector Trips

Under Option 2, the management uncertainty buffers would be eliminated when setting sector ACLs provided that 100% monitoring is adopted by the Council. This would allow for larger ACLs as a proportion of the ABC for each stock, and could potentially increase effort in the fishery, subject to other constraints (e.g. monitoring costs, choke stocks, etc.). If effort increased under this option, impacts to EFH would also increase relative to those described in the sections related to 100% ASM coverage (7.2.1.1.2.4 and 7.2.1.1.3.4).

7.2.6 Remove Commercial Groundfish Monitoring Requirements for Certain Vessels Fishing Under Certain Circumstances

These options would eliminate monitoring requirements (at-sea monitoring and/or dockside monitoring (if implemented)) for certain vessels based on geographic location of fishing, based on information that groundfish catches in these locations are small.

7.2.6.1 Removal of Monitoring Program Requirements Option 1: No Action (Sectors Only)

Under Option 1 (No Action), there would be no new geographic exemptions from monitoring requirements (some programs already exist). Under this option, impacts to EFH would be as described in sections 7.2.1.1.1, 7.2.1.1.2, and 7.2.1.1.3, depending on the target coverage rate selected by the Council.

7.2.6.2 Removal of Monitoring Program Requirements Option 2 – Remove Monitoring Requirements for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

7.2.6.2.1 Removal of Monitoring Program Requirements Sub-option 2A – Remove At-Sea Monitoring Coverage Requirement (Sectors Only)

This option would remove at-sea monitoring requirements for vessels fishing west of the specified longitude. This option could be selected in combination with the option in Section 7.2.6.2.2. The proportion of total groundfish catch is very small west of this longitude, not exceeding 2% at the stock level since 2015 (Table 7 in Section 7.1.6.2). This suggests that groundfish vessels that would be subject to monitoring are doing very limited fishing west of 72° 30’ W. Thus, sub-option 2A (removal of ASM requirements) is expected to have negligible effects on effort in the fishery overall, and therefore negligible impacts on EFH.

7.2.6.2.2 Removal of Monitoring Program Requirements Sub-option 2B – Remove Dockside Monitoring Coverage Requirement (Sectors and Common Pool)

This option would remove dockside monitoring requirements (if implemented) for vessels fishing west of the specified longitude. This option could be selected in combination with the option in Section 7.2.6.2.1.

The proportion of total groundfish catch is very small west of this longitude, not exceeding 2% at the stock level since 2015 (Table 7 in Section 7.1.6.2). This suggests that groundfish vessels that would be subject to monitoring are doing very limited fishing west of 72° 30' W. Thus, sub-option 2B (removal of dockside monitoring requirements, if implemented) is expected to have negligible effects on effort in the fishery overall, and therefore negligible impacts on EFH.

7.2.6.3 Removal of Monitoring Program Requirements Option 3 – Remove Monitoring Requirements for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

7.2.6.3.1 Removal of Monitoring Program Requirements Sub-option 3A – Remove At-Sea Monitoring Coverage Requirement (Sectors Only)

This option would remove at-sea monitoring requirements for vessels fishing west of the specified longitude. This option could be selected in combination with the option in Section 7.2.6.3.2. The proportion of total groundfish catch is greater than under Option 2, with a few stocks in particular having relatively large proportions of their catch west of 71° 30' W, including southern windowpane, SNE/MA winter flounder, SNE/MA yellowtail flounder, and ocean pout (Table 10 in Section 7.1.6.3). This suggests that some groundfish vessels that would be subject to monitoring are fishing west of 72° 30' W, such that a removal of monitoring requirements would facilitate their effort by reducing their monitoring costs. Thus, sub-option 3A (removal of ASM requirements) is expected to have slight positive effects on effort in the fishery overall, and therefore slight negative impacts on EFH.

7.2.6.3.2 Removal of Monitoring Program Requirements Sub-option 3B – Remove Dockside Monitoring Coverage Requirement (Sectors and Common Pool)

This option would remove dockside monitoring requirements (if implemented) for vessels fishing west of the specified longitude. This option could be selected in combination with the option in Section 7.2.6.3.1. The proportion of total groundfish catch is greater than under Option 2, with a few stocks in particular having relatively large proportions of their catch west of 71° 30' W, including southern windowpane, SNE/MA winter flounder, SNE/MA yellowtail flounder, and ocean pout (Table 10 in Section 7.1.6.3). This suggests that some groundfish vessels that would be subject to monitoring are fishing west of 72° 30' W, such that a removal of monitoring requirements would facilitate their effort by reducing their monitoring costs. Thus, sub-option 3B (removal of dockside monitoring requirements, if implemented) is expected to have slight positive effects on effort in the fishery overall, and therefore slight negative impacts on EFH.

7.2.6.4 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements

7.2.6.4.1 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements Option 1: No Action

This option relates to the development of a review process for the various measures that remove monitoring requirements that are based on geographic location (sections 4.6.1, 4.6.2, and 4.2.3). Under

Option 1 (No Action) there would continue to be no formal process for reviewing catches associated with vessels exempted from monitoring. No direct or indirect effects on EFH are expected to result from No Action.

7.2.6.4.2 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements Option 2 – Implement a Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements

This option relates to the development of a review process for the various measures that remove monitoring requirements that are based on geographic location (sections 4.6.1, 4.6.2, and 4.2.3). Establishment of a formal review process under Option 2 could improve administration of the monitoring program, but no direct or indirect impacts on EFH are expected.

7.3 IMPACTS ON ENDANGERED AND OTHER PROTECTED SPECIES

The A23 alternatives are evaluated for their impacts on species protected under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972. Section 6.4 of the Affected Environment Section contains a complete list of protected species (i.e., ESA listed and MMPA protected species) that inhabit the areas of operation for the Northeast multispecies fishery. This impact analysis considers how the fishery may overlap with protected species in time and space, as well as records of protected species interaction with particular gear types (e.g. gillnet, bottom otter trawl).

7.3.1 Commercial Groundfish Monitoring Program Revisions (Sectors Only)

7.3.1.1 Sector Monitoring Standards (Target Coverage Levels)

7.3.1.1.1 Sector Monitoring Standard Option 1: No Action

As provided in Section 4.1.1.1, Option 1/No Action, if adopted, would maintain the monitoring coverage requirements adopted by Amendment 16 and subsequent actions. The monitoring provisions in those actions were specifically adopted for monitoring groundfish catches, albeit additional information on encounters between fishing activity and protected species (i.e., ESA listed and MMPA protected species) is provided via sector monitoring. In fact, since its inception in 2010, the sector monitoring program and the associated coverage levels have provided a wealth of information about protected species interactions in commercial fishing gear, thereby improving the precision of protected species bycatch analyses and resultant bycatch estimates *(*Table 1). Indirectly, this affords positive impacts to protected species, as reducing uncertainty of the bycatch estimates improves assessments of anthropogenic removals from the population, as well as mitigation efforts in forums such as take reduction teams (NEFSC PSB, pers. comm.). Generally, higher levels of coverage may improve the precision of bycatch estimates and capture variability in the bycatch rates. With increased coverage bycatch estimates would be expected to be more representative and may exhibit more stability if the fishery and other factors remain similar from year to year (NEFSC PSB, pers. comm.)[13]. However, given the limited variables on protected species interactions collected by the ASM program, ancillary analysis can be hindered because of lack of data on, for example, pinger use details (NEFSC PSB, pers. comm.). Based on this information, Option 1/No Action, which will maintain monitoring coverage requirements as adopted by Amendment 16 and modified in subsequent actions, is expected to have indirect low positive impacts to protected species.

Relative to Option 1, the range of coverage levels (as a percentage of sector trips) under consideration for Option 2 (25, 50, 75, and 100 percent) are similar to, or higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are within the lower range of coverage levels considered under Option 2 (i.e., 25 percent) and therefore, Option 1/No Action may have similar indirect impacts to protected species as the option for 25

[13] The following tool has been developed to explore how projected CV changes with varying levels of observer effort: https://kacurtis.shinyapps.io/obscov/ (NEFSC PSB, pers. comm.).

percent coverage under Option 2. However, under Option 2, there are also a range of higher coverage levels (50, 75, and 100 percent) that have never been assigned to the groundfish fishery since FY2010. As described above, higher coverage levels for groundfish sector monitoring result in greater additional information on protected species interactions with fishing activity, which improves the precision of bycatch estimates. Taking into consideration the above information, relative to Option 2, Option 1 /No Action is likely to have negligible to indirect low negative to negative impacts to protected species.

Relative to Option 1, the range of coverage levels (as a percentage of catch) under consideration for Option 3 (25, 50, 75, and 100 percent) are similar to, or higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent respectively. These coverage levels are within the lower range of coverage levels considered under Option 3 (i.e., 25 percent) and therefore, Option 1/No Action may have similar indirect impacts to protected species as the option for 25 percent coverage under Option 3. However, under Option 3, there are also a range of higher coverage levels (50, 75, and 100 percent) that have never been assigned to the groundfish fishery. Additionally, since this option applies the target coverage level of catch to each allocated groundfish stock, the resulting overall coverage level will be higher in order to achieve the target coverage level for each stock. As described above, higher coverage levels for groundfish sector monitoring result in greater additional information on protected species interactions with fishing activity, which improves the precision of bycatch estimates. Taking into consideration the above information, relative to Option 3, Option 1 /No Action is likely to have negligible to indirect low negative to negative impacts to protected species.

Under Option 1/No Action, at-sea monitors would be used to achieve at-sea monitoring coverage levels. Options in Section 4.1.2 (Sector Monitoring Tools) would allow sectors to use various models of EM in place of at-sea monitors under both Option 2 and Option 3. Currently little to no information is collected on protected species through EM, and therefore, use of this technology may result in a loss of data on protected species interactions with fishing gear (NEFSC PSB, pers. comm.). Given this, Option 1/No Action, compared to the options in Section 4.1.2 (Sector Monitoring Tools), may have indirect low positive impacts to protected species; rationale supporting this determination is found in section 7.3.1.2. However, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would likely be mitigated, and would not be expected to have a significant adverse impact; rationale supporting this determination is found in section 7.3.1.2.

7.3.1.1.2 Sector Monitoring Standard Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on Percentage of Trips

Option 2 would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of sector trips - one of a range of four options under consideration (25, 50, 75, and 100 percent). As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Option 2 would have indirect low positive impacts to protected species for each of the coverage levels under consideration.

Relative to Option 1/No Action, the range of coverage levels (as a percentage of sector trips) under consideration for Option 2 (25, 50, 75, and 100 percent) are similar to, or higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent,

respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are within the lower range of coverage levels considered under Option 2 (i.e., 25 percent) and therefore, the option for 25 percent coverage under Option 2 may have similar indirect impacts to protected species as Option 1/No Action. However, under Option 2, there are also a range of higher coverage levels (50, 75, and 100 percent) that have never been assigned to the groundfish fishery since FY2010. As described above, higher coverage levels for groundfish sector monitoring result in greater additional information on protected species interactions with fishing activity, which improves the precision of bycatch estimates. With increased coverage bycatch estimates would be expected to be more representative and may exhibit more stability if the fishery and other factors remain similar from year to year (NEFSC PSB, pers. comm.). Taking into consideration the above information, relative to Option 1/No Action, Option 2 is likely to have negligible to indirect low positive to positive impacts to protected species.

Relative to Option 3, Option 2 is expected to have similar indirect positive impacts to protected species for each of the coverage levels options under consideration. As described above, since Option 3 applies the target coverage level of catch to each allocated groundfish stock, the resulting overall coverage level will be higher in order to achieve the target coverage level for each stock. As a result, Option 2 may afford slightly less indirect positive impacts to protected species relative to Option 3.

Under Option 2, at-sea monitors would be used to achieve at-sea monitoring coverage levels. Options in Section 4.1.2 (Sector Monitoring Tools) would allow sectors to use various models of EM in place of at-sea monitors under both Option 2 and Option 3. Currently little to no information is collected on protected species through EM, and therefore, use of this technology may result in a loss of data on protected species interactions with fishing gear (NEFSC PSB, pers. comm.). Given this, compared to the options in Section 4.1.2 (Sector Monitoring Tools), there may be tradeoffs between higher coverage levels under consideration for some sub-options in Section 4.1.1.2 relative to coverage level options in Option 2 and 3, and the potential for a loss of data on protected species interactions with fishing gear (NEFSC PSB, pers. comm.). Given this, Option 2, compared to the options in Section 4.1.2, may have indirect low positive impacts to protected species; rationale supporting this determination is found in section 7.3.1.2. However, as noted above, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would not be expected to have a significant adverse impact; rationale supporting this determination is found in section 7.3.1.2.

7.3.1.1.2.1 Sub-option 2A – 25 percent

Sub-option 2A would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of sector trips of 25 percent. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 2A would have indirect low positive impacts to protected species. The impact of a 25 percent coverage rate would likely vary by time and area depending on the realized observed effort. Depending on the times and areas this may represent an increase in coverage, which may result in increased precision of bycatch estimates, or it may represent a decrease in coverage, which may result in decreased precision (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 2A, 25 percent, is similar to the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are within the range of 25 percent and therefore, Sub-

option 2A may have similar indirect impacts to protected species as Option 1/No Action. Relative to the coverage levels considered under Sub-options 2B, 2C, and 2D which are all higher than 25 percent, Sub-option 2A would be expected to have indirect low negative impacts to protected species.

7.3.1.1.2.2 Sub-option 2B – 50 percent

Sub-option 2B would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of sector trips of 50 percent. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 2B would have indirect low positive impacts to protected species. A coverage level of 50 percent may increase precision of bycatch estimates. This would vary by distribution of fishing effort and by species given the rarity of the bycatch (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 2B, 50 percent, is higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are lower than 50 percent and therefore, Sub-option 2B may have indirect low positive impacts to protected species compared to Option 1/No Action. Relative to the coverage level considered under Sub-option 2A, which is lower than 50 percent, Sub-option 2B would be expected to have indirect low positive impacts to protected species. Relative to the coverage levels considered under Sub-options 2C and 2D, which are higher than 50 percent, Sub-option 2B would be expected to have indirect low negative impacts to protected species.

7.3.1.1.2.3 Sub-option 2C – 75 percent

Sub-option 2C would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of sector trips of 75 percent. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 2C would have indirect low positive impacts to protected species. A coverage level of 75 percent may increase precision of bycatch estimates. This would vary by distribution of fishing effort and by species given the rarity of the bycatch (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 2C, 75 percent, is higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are all lower than 75 percent and therefore, Sub-option 2C may have indirect low positive impacts to protected species compared to Option 1/No Action. Relative to the coverage levels considered under Sub-options 2A and 2B, which is lower than 75 percent, Sub-option 2C would be expected to have indirect low positive impacts to protected species. Relative to the coverage level considered under Sub-option 2D, which are higher than 75 percent, Sub-option 2C would be expected to have indirect low negative impacts to protected species.

7.3.1.1.2.4 Sub-option 2D – 100 percent

Sub-option 2D would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of sector trips of 100 percent. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 2D would have indirect positive impacts to protected species. 100 percent coverage would result in a CV of zero for bycatch estimates (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 2D, 100 percent, is higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are all lower than 100 percent and therefore, Sub-option 2D may have indirect low positive (positive?) impacts to protected species compared to Option 1/No Action. Relative to the coverage levels considered under Sub-options 2A, 2B and 2C, which are all lower than 100 percent, Sub-option 2D would be expected to have indirect positive impacts to protected species.

7.3.1.1.3 Sector Monitoring Standard Option 3: Fixed Total At-Sea Monitoring Coverage Level Based on Percentage of Catch

Option 3 would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of catch - one of a range of four options under consideration (25, 50, 75, and 100 percent). As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords low positive impacts to protected species.

Relative to Option 1, the range of coverage levels under consideration for Option 3 (25, 50, 75, and 100 percent) are similar to, or higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are within the lower range of coverage levels considered under Option 3 (i.e., 25 percent) and therefore, the option for 25 percent coverage under Option 3 may have similar indirect impacts to protected species as Option 1/No Action. However, under Option 3, there are also a range of higher coverage levels (50, 75, and 100 percent) that have never been assigned to the groundfish fishery since FY2010. Further, since Option 3 applies the target coverage level of catch to each allocated groundfish stock, the resulting overall coverage level will be higher in order to achieve the target coverage level for each stock (see section 7.4.3.1.3 in Economic Impacts).As described above, higher coverage levels for groundfish sector monitoring result in greater additional information on protected species interactions with fishing activity, which improves the precision of bycatch estimates. With increased coverage bycatch estimates would be expected to be more representative and may exhibit more stability if the fishery and other factors remain similar from year to year (NEFSC PSB, pers. comm.). Taking into consideration the above information, relative to Option 1 /No Action, Option 3 is likely to have negligible to indirect low positive to positive impacts to protected species.

Relative to Option 2, Option 3 is expected to have similar indirect positive impacts to protected species for each of the coverage levels options under consideration. As described above, since Option 3 applies

the target coverage level of catch to each allocated groundfish stock, the resulting overall coverage level will be higher in order to achieve the target coverage level for each stock (see section 7.4.3.1.3 in Economic Impacts). As a result, Option 3 may afford slightly greater indirect positive impacts to protected species relative to Option 2.

Under Option 3, at-sea monitors would be used to achieve at-sea monitoring coverage levels. Options in Section 4.1.2 (Sector Monitoring Tools) would allow sectors to use various models of EM in place of at-sea monitors under both Option 2 and Option 3. Currently little to no information is collected on protected species through EM, and therefore, use of this technology may result in a loss of data on protected species interactions with fishing gear (NEFSC PSB, pers. comm.). Given this, compared to the options in Section 4.1.2 (Sector Monitoring Tools), there may be tradeoffs between higher coverage levels under consideration for some sub-options in Section 4.1.1.3 relative to coverage level options in Option 2 and 3, and the potential for a loss of data on protected species interactions with fishing gear(NEFSC PSB, pers. comm.). Given this, Option 2, compared to the options in Section 4.1.2, may have indirect low positive impacts to protected species; rationale supporting this determination is found in section 7.3.1.2. However, as noted above, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would not be expected to have a significant adverse impact; rationale supporting this determination is found in section 7.3.1.2.

7.3.1.1.3.1 Sub-option 3A – 25 percent

Sub-option 3A would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of catch of each allocated groundfish stock of 25 percent. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 3A would have indirect low positive impacts to protected species. The impact of a 25 percent coverage rate would likely vary by time and area depending on the realized observed effort. Depending on the times and areas this may represent an increase in coverage, which may result in increased precision of bycatch estimates, or it may represent a decrease in coverage, which may result in decreased precision (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 3A, 25 percent, is similar to the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are within the range of 25 percent and therefore, Sub-option 2A may have similar indirect impacts to protected species as Option 1/No Action. However, since Option 3 applies the target coverage level of catch to each allocated groundfish stock, the resulting overall coverage level will be higher in order to achieve the target coverage level for each stock (see section 7.4.3.1.3 in Economic Impacts). Simulation analysis (see Section 7.4.3.1.3 in Economic Impacts Analysis) indicates that the 25% catch-based option will require an overall coverage rate of 50% of trips in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock, As a result, Sub-option 3A may afford greater indirect positive impacts to protected species relative to Option 1/No Action. Relative to the coverage levels considered under Sub-options 3B, 3C, and 3D which are all higher than 25 percent, Sub-option 3A would be expected to have indirect low negative impacts to protected species.

7.3.1.1.3.2 Sub-option 3B – 50 percent

Sub-option 3B would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of a percentage of catch of each allocated groundfish stock of 50 percent. As described

above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 3B would have indirect low positive impacts to protected species. A coverage level of 50 percent may increase precision of bycatch estimates. This would vary by distribution of fishing effort and by species given the rarity of the bycatch (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 3B, 50 percent, is higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are lower than 50 percent and therefore, Sub-option 3B may have indirect low positive impacts to protected species compared to Option 1/No Action. Since Option 3 applies the target coverage level of catch to each allocated groundfish stock, the resulting overall coverage level will be higher in order to achieve the target coverage level for each stock (see section 7.4.3.1.3 in Economic Impacts). Simulation analysis (see Section 7.4.3.1.3 in Economic Impacts Analysis) indicates that the 50% catch-based option will require an overall coverage rate of 70% of trips in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. Relative to the coverage level considered under Sub-option 3A, which is lower than 50 percent, Sub-option 3B would be expected to have indirect low positive impacts to protected species. Relative to the coverage levels considered under Sub-options 3C and 3D, which are higher than 50 percent, Sub-option 3B would be expected to have indirect low negative impacts to protected species.

7.3.1.1.3.3 Sub-option 3C – 75 percent

Sub-option 3C would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of catch of each allocated groundfish stock of 75 percent. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 3C would have indirect low positive impacts to protected species. A coverage level of 75 percent may increase precision of bycatch estimates. This would vary by distribution of fishing effort and by species given the rarity of the bycatch (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 3C, 75 percent, is higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are all lower than 75 percent and therefore, Sub-option 3C may have indirect low positive impacts to protected species compared to Option 1/No Action. Since Option 3 applies the target coverage level of catch to each allocated groundfish stock, the resulting overall coverage level will be higher in order to achieve the target coverage level for each stock (see section 7.4.3.1.3 in Economic Impacts). Simulation analysis (see Section 7.4.3.1.3 in Economic Impacts Analysis) indicates that the 75% catch-based option will require an overall coverage rate of 90% of trips in order to reliably achieve the target percent coverage of total catch for each allocated groundfish stock. Relative to the coverage levels considered under Sub-options 3A and 3B, which is lower than 75 percent, Sub-option 3C would be expected to have indirect low positive impacts to protected species. Relative to the coverage level considered under Sub-option 3D, which are higher than 75 percent, Sub-option 3C would be expected to have indirect low negative impacts to protected species.

7.3.1.1.3.4 Sub-option 3D – 100 percent

Sub-option 3D would revise the total monitoring coverage level to be a fixed annual target coverage level as a percentage of catch of each allocated groundfish stock of 100 percent. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Similar to Option 1/No Action, Sub-option 3D would have indirect positive impacts to protected species. 100 percent coverage would result in a CV of zero for bycatch estimates (NEFSC PSB, pers. comm.).

Relative to Option 1/No Action, the coverage level considered under Sub-option 3D, 100 percent, is higher than the target and realized coverage levels documented since the groundfish sector monitoring program was established (FY2010-2017; see Table 63 in Section 6.5.10.2 in the Affected Environment). Specifically, target and realized coverage levels from FY2010-FY2017 have ranged from 14-38 percent, and 14-32 percent, respectively, resulting in an average target and realized coverage level of 25 percent and 22 percent, respectively. These coverage levels are all lower than 100 percent and therefore, Sub-option 2D may have indirect positive impacts to protected species compared to Option 1/No Action. Relative to the coverage levels considered under Sub-options 3A, 3B and 3C, which are all lower than 100 percent, Sub-option 3D would be expected to have indirect positive impacts to protected species.

7.3.1.2 Sector Monitoring Tools (Options for meeting monitoring standards)

Analytical Approach:

For the following options being considered as options for sector monitoring tools that meet monitoring standards, a comparison of Option 1/No Action (Section 7.3.1.1.1) to all of the options in Section 4.1.2 (Sector Monitoring Tools) (Options 1, 2, and 3) is provided below. Each option is then compared to Option 2 (Section 7.3.1.1.2) and Option 3 (Section 7.3.1.1.3), in which at-sea monitors would be used to achieve the target coverage level, and to the other options in Section 4.1.2.

Analyzing Sub-Options relative to No Action (Option 1) in Section 4.1.1:

In Section 4.2.1, Option 1 would require EM coverage levels to be designated based upon specified coverage rates identified under Option 2 (25, 50, 75, and 100 percent) or Option 3 (25, 50, 75, and 100 percent), while Options 2 and 3 require that EM cameras are on 100 percent of trips.

Given the above, there may be tradeoffs between the higher coverage levels under consideration for Options 1, 2,and 3 relative to Option 1/No Action in Section 4.1.1: Sector Monitoring Standards, and the potential for a loss of data on protected species interactions with fishing gear, since currently little to no information is collected on protected species through EM (NEFSC PSB, pers. comm). EM may be able to capture some of the interactions between protected species and fishing gear, depending on the configuration of the cameras, but would likely miss many events because the animals are not brought on the vessel and into camera view. Camera placement is expected to have a large impact on detection of protected species bycatch events. For example, marine mammals and sea turtles are known to sometimes fall out of a gillnet during the haulback, so positioning a camera to view the net as it is coming out of the water is crucial to getting a representative bycatch estimate. Otherwise incidental takes like these would be unobserved if cameras were primarily aimed at fish processing on deck. Incidental takes could also be disentangled by the crew before the net comes over the side, so a camera positioned to observe this would ensure bycatch estimates are not biased low (NEFSC PSB, pers. comm.).

Video reviewers would collect counts of discards of protected species where possible. However, if the data fields for EM are not descriptive enough to identify the species of marine mammal, sea turtle, or fish, or the gear associated with the interaction, estimating bycatch rates will be impossible from this data, and there may be a loss of data on protected species interactions compared to the information collected from at-sea monitors, even at higher coverage levels for EM. In addition, EM would likely miss opportunistic data collection of protected species encounters where an at-sea monitor would record seeing an animal around the vessel or in the general area. Sub-sampling of the video footage also limits the usefulness of the data. If, for example, only 20% of the video footage is reviewed for quality assurance, then 80% of the hauls are effectively not sampled for protected species. One possible way to address this could be through use of an algorithm that identifies bycatch of interest in the non-reviewed portions (NEFSC PSB, pers. comm.).

In addition to the above, the lack of biological samples returned would be another key primary data piece lost if at-sea monitors were not on board. These biological samples play a key role in ancillary assessments such as diet analysis, health assessments, and population assessments (age/size/sex composition of animals removed from the population) (NEFSC PSB, pers. comm.). Currently at-sea monitors are not required to bring back biological samples of protected species, but in the past have provided useful samples for studies of protected species diet. Some key gear information would also be lost, such as pinger functionality on gillnets after an incidental marine mammal take (NEFSC PSB, pers. comm.). Additional gear information may also be lost, however, given the current experimental nature of EM, there has not been a full review of the capabilities of EM with regards to protected species (NEFSC PSB, pers. comm.).

How the differences in the information collected through EM would affect bycatch estimates and marine mammal stock assessments is highly dependent on camera location, the degree to which all footage (or all footage with protected species bycatch) is effectively reviewed, what information is recorded about the bycatch event, how extensive the implementation of EM is across fisheries, and how accessible the data is to bycatch analysts (NEFSC PSB, pers. comm.). For example, with 100 percent coverage, accurate species ID, proper camera placement, 100 percent data review for protected species, and sharing of all relevant data, then EM could be very insightful and significantly improve bycatch estimates and stock assessments. With poor camera placement, limited video review, no species identification, and no access to the actual footage, EM could not be used to inform bycatch estimates and stock assessments (NEFSC PSB, pers. comm.). EM could also potentially hinder the ability to accurately classify fisheries in the MMPA List of Fisheries (i.e., removing or placing species in Cat I, II, or III fisheries), because there would not be accurate information on the magnitude of protected species bycatch (NEFSC PSB, pers. comm.).

Based on this information, Options 1, 2, and 3 may have indirect low negative impacts to protected species, when compared to the impacts of section 4.1.1's No Action (Option 1) (see Section 7.3.1.1.1 for impacts). However, additional camera angles or a different camera configuration could help to capture more of the protected species encounters that a human at-sea monitor would record. EM could potentially document more protected species interactions with a properly designed protocol including specific camera angles and data recording standards. In addition, the elements of the EM program were designed for the purpose of monitoring and accounting for groundfish species to achieve the requirements of the sector monitoring program. Further, the use of EM, if approved as a sector monitoring tool, would be a choice for individual vessels to make and not a requirement. Currently, only a small percentage of the groundfish fishery (~10 percent) participate in the EM projects through Exempted Fishing Permits (EFPs). Therefore, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would likely be mitigated, and would not be expected to have a significant adverse impact. EM has the potential to be beneficial for some aspects of protected species

data collection, and the opportunity to more fully evaluate the impact of EM data on bycatch estimates would be useful in the development of EM options (NEFSC PSB, pers. comm.).

7.3.1.2.1 Sector Monitoring Tools Option 1: Electronic Monitoring in place of Human At-Sea Monitors

Option 1 would allow sectors to use EM in place of at-sea monitors at the selected coverage rate. This option is expected to have similar indirect low negative impacts to protected species as provided in Section 7.3.1.2.

When compared to Sector Monitoring Standards Option 2 and Option 3 in Section 4.1.1 (Sector Monitoring Standards) in which at-sea monitors would be used to achieve monitoring standards, Option 1 may have indirect low negative to negative impacts on protected species because of the potential loss of data on protected species interactions compared to the information collected from at-sea monitors. However, as noted above, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would not be expected to have a significant adverse impact.

Compared to Sector Monitoring Tools Options 2 and 3, Option 1 would be expected to have negligible impacts on protected species as either of these Options may result in the loss of data on protected species interactions and therefore, result in similar levels of impacts to protected species (i.e., indirect low negative).

7.3.1.2.2 Sector Monitoring Tools Option 2: Audit Model Electronic Monitoring Option

Option 2 would allow sectors to use the audit model EM in place of at-sea monitors, in which cameras are run on 100 percent of trips. This would potentially allow for more opportunity to see protected species interactions relative to the lower potential coverage rates (25, 50, and 75 percent) under consideration in Sector Monitoring Standards Option 2 and Option 3. At the same time, however, as described above in Section 7.3.1.2, if the data fields for EM are not descriptive enough to identify the species of marine mammal, sea turtle, or fish, or the gear associated with the interaction, estimating bycatch rates will be impossible from this data, and so there may be tradeoffs in terms of data that could still be lost even at 100 percent coverage of trips. Option 2, therefore, may have indirect low negative impacts to protected species. However, as noted above, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would not be expected to have a significant adverse impact.

When compared to Sector Monitoring Standards Option 2 and Option 3 in Section 4.1.1 (Sector Monitoring Standards) in which at-sea monitors would be used to achieve monitoring standards, Option 2 may have indirect low negative to negative impacts on protected species because of the potential loss of data on protected species interactions compared to the information collected from at-sea monitors. However, as noted above, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would not be expected to have a significant adverse impact.

Compared to Option 1 and Option 3, Option 2 would be expected to have negligible impacts on protected species as either of these Options may result in the loss of data on protected species interactions and therefore, result in similar levels of impacts to protected species (i.e., indirect low negative).

7.3.1.2.3 Sector Monitoring Tools Option 3: Maximized Retention Electronic Monitoring Option

Option 3 would allow sectors to use the maximized retention model EM in place of at-sea monitors, in which cameras are run on 100 percent of trips. This would potentially allow for more opportunity to see protected species interactions relative to the lower potential coverage rates (25, 50, and 75 percent) under consideration in Sector Monitoring Standards Option 2 and Option 3. At the same time, however, as described in Section 7.3.1.2, if the data fields for EM are not descriptive enough to identify the species of marine mammal, sea turtle, or fish, or the gear associated with the interaction, estimating bycatch rates will be impossible from this data, and so there may be tradeoffs in terms of data that could still be lost even at 100 percent coverage of trips. Option 3, therefore, may have indirect low negative impacts to protected species. However, as noted above, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would not be expected to have a significant adverse impact.

When compared to Sector Monitoring Standards Option 2 and Option 3 in Section 4.1.1 (Sector Monitoring Standards) in which at-sea monitors would be used to achieve monitoring standards, Option 3 may have indirect low negative to negative impacts on protected species because of the potential loss of data on protected species interactions compared to the information collected from at-sea monitors. However, as noted above, any indirect negative impacts to protected species from any potential loss of data on protected species interactions through the use of EM would not be expected to have a significant adverse impact.

Compared to Option 1 and Option 2, Option 3 would be expected to have negligible impacts on protected species as either of these Sub-Options may result in the loss of data on protected species interactions and therefore, result in similar levels of impacts to protected species (i.e., indirect low negative).

7.3.1.3 Total Monitoring Coverage Level Timing

7.3.1.3.1 Coverage Level Timing Option 1: No Action

Option 1/No Action would maintain the current process in which the total monitoring coverage level is available from NMFS once the necessary analysis is complete. Option 1/No Action would not be expected to have direct or indirect impacts on protected species, as this is an administrative measure and so it does not, in and of itself, change fishing effort or fishing behavior.

7.3.1.3.2 Coverage Level Timing Option 2: Knowing Total Monitoring Coverage Level at a Time Certain

Similar to Option 1/No Action, Option 2 is not expected to impact protected species. Establishing a requirement for knowing the total monitoring coverage level at a time certain is an administrative measure, and would not have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior.

7.3.1.4 Review process for Sector Monitoring Coverage

7.3.1.4.1 Coverage Review Process Option 1: No Action

Option 1/No Action would not establish a review process to evaluate the efficacy of sector monitoring coverage rates, and would maintain the current process in which the groundfish monitoring program is to

be periodically reviewed as part of the goals and objectives of the groundfish sector monitoring program. Option 1/No Action would not be expected to have direct or indirect impacts on protected species, as this is an administrative measure and so it does not, in and of itself, change fishing effort or fishing behavior.

7.3.1.4.2 Coverage Review Process Option 2: Establish a Review Process for Monitoring Coverage Rates

Similar to Option 1/No Action, Option 2 is not expected to impact protected species. Establishing a review process to evaluate the efficacy of sector monitoring coverage rates is an administrative measure, and would not have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior.

7.3.1.5 Addition to List of Framework Items

This option is an administrative measure, and is not expected to have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior.

This option would add new sector monitoring tools to the list of framework items. Impacts to protected species would depend on the nature of new monitoring tools and the extent to which ancillary information on protected species interactions in commercial fishing gear is provided by these additional monitoring tools; such impacts would likely be indirect (see Section 7.3.1.1.1 for more information on the impacts of monitoring coverage and Section 7.3.1.2 for more information on the impacts of monitoring tools such as EM).

This option would also add vessel coverage levels to the list of framework items. Impacts to protected species would be similar to impacts of monitoring coverage, as discussed in Section 7.3.1.1.1.

7.3.2 Commercial Groundfish Monitoring Program Revisions (Sectors and Common Pool)

7.3.2.1 Dockside Monitoring Program (Sectors and Common Pool)

7.3.2.1.1 Dockside Monitoring Option 1: No Action

Option 1/No Action would continue to maintain no requirement for dockside monitoring for the commercial groundfish fishery. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.2.1.2 Dockside Monitoring Option 2: Mandatory Dockside Monitoring Program for the Commercial Groundfish Fishery

Option 2 would establish the requirement of a dockside monitoring program for the entire commercial groundfish fishery. Although the accuracy of landing information may improve as a result of this option, it would not improve information on protected species, as protected species are illegal to bring to the dock and therefore would not be monitored better. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.2.2 Dockside Monitoring Program Structure and Design

7.3.2.2.1 Dockside Monitoring Program Funding Responsibility

7.3.2.2.1.1 Dockside Monitoring Program Funding Responsibility Option A – Dealer Responsibility

This option would determine the funding responsibility for dockside monitoring. This is an administrative measure and would not have any direct or indirect impacts on protected species. Additionally, dockside monitoring does not affect protected species.

7.3.2.2.1.2 Dockside Monitoring Program Funding Responsibility Option B – Vessel Responsibility

This option would determine the funding responsibility for dockside monitoring. This is an administrative measure and would not have any direct or indirect impacts on protected species. Additionally, dockside monitoring does not affect protected species.

7.3.2.2.2 Dockside Monitoring Program Administration

7.3.2.2.2.1 Dockside Monitoring Program Administration Option A – Individual contracts with dockside monitor providers

This option would determine the program administration for dockside monitoring. This is an administrative measure and would not have any direct or indirect impacts on protected species. Additionally, dockside monitoring does not affect protected species.

7.3.2.2.2.2 Dockside Monitoring Program Administration Option B – NMFS-administered dockside monitoring program

This option would determine the program administration for dockside monitoring. This is an administrative measure and would not have any direct or indirect impacts on protected species. Additionally, dockside monitoring does not affect protected species.

7.3.2.2.3 Options for Lower Dockside Monitoring Coverage Levels (20 percent coverage)

7.3.2.2.3.1 Option A – Lower coverage levels for ports with low volumes of groundfish landings

This option would require lower coverage for vessels or dealers in small, remote ports. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.2.2.3.2 Option B – Lower coverage levels for vessels with total groundfish landings volumes in the 5th percentile of total annual landings

This option would require lower coverage for low volume vessels or dealers that receive landings from low volume vessels. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.2.2.4 Safety and Liability Associated with Fish Hold Inspections

7.3.2.2.4.1 Fish Hold Inspection Option A – Dockside monitor fish hold inspections required

This option would require dockside monitor fish hold inspections. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.2.2.4.2 Fish Hold Inspection Option B – Alternatives method for inspecting (cameras)

This option would allow for the use of cameras as an alternative to dockside monitors directly inspecting fish holds. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.2.2.4.3 Fish Hold Inspection Option C – No fish hold inspection required, captain signs affidavit

This option would not require dockside monitor fish hold inspections and instead would require captains to sign an affidavit verifying all catch has been offloaded. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.3 Sector Reporting

7.3.3.1 Sector reporting Option 1: No Action

Option 1/No Action would maintain the current sector reporting requirements. Option 1/No Action would not be expected to have direct or indirect impacts on protected species, as this is an administrative measure and so it does not, in and of itself, change fishing effort or fishing behavior.

7.3.3.2 Sector reporting Option 2 – Grant Regional Administrator the Authority to Streamline Sector Reporting Requirements

Similar to Option 1/No Action, Option 2 is not expected to impact protected species. Granting the Regional Administrator the authority to streamline sector reporting requirements is an administrative measure, and would not have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior.

7.3.4 Funding/Operational Provisions of Groundfish Monitoring (Sectors and Common Pool)

7.3.4.1 Funding Provisions Option A: No Action

Option 1/No Action would maintain the industry-funded monitoring requirement. The funding requirement is an administrative measure that would not be expected to have direct impacts on protected

species. However, indirectly, this measure could have impacts on protected species, as this could influence monitoring coverage rates. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords low positive impacts to protected species. Additionally, this measure could have direct impacts on protected species, as there is the potential for lower fishing effort should NMFS not have sufficient funding for its shoreside costs, which would require vessels to reduce fishing effort to match available funding. As interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, any decrease in either of these factors will reduce the potential for protected species interactions with gear. Therefore, Option 1/No Action has the potential to reduce interaction risks for protected species, which could provide some benefit to protected species. However, as interactions can still occur, even under a reduced effort scenario, direct impacts to protected species are expected to be low negative. Given the above, Option 1/No Action is expected to result in direct low negative impacts and indirect low positive impacts to protected species.

Compared to Sub-Option 2A, this measure would likely have neutral to indirect low negative impacts, as there is a potential for higher monitoring coverage levels under Sub-Option 2A, but a change in fishing effort under Sub-Option 2A is not expected. Compared to Sub-Option 2B, Option 1/No Action would likely have indirect low positive impacts to protected species, as there a potential for lower monitoring coverage levels under Sub-Option 2B. Additionally, Option1/No Action could potentially have direct positive impacts on protected species when compared to Sub-Option 2B, as there is the potential for lower effort under Option 1/No Action, should NMFS not have sufficient funding for its shoreside costs, which would require vessels to reduce fishing effort to match available funding. As interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, any decrease in either of these factors will reduce the potential for protected species interactions with gear. Therefore, Option 1/No Action has the potential to reduce interaction risks for protected species. Option 1/No Action could potentially have low positive impacts on protected species compared to Sub-Option 2B. Impacts to protected species from Option 1/No Action, therefore, are somewhat unclear, as it is not known whether or not NMFS would have funding available for its shoreside costs.

7.3.4.2 Funding Provisions Option 2 – Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.3.4.2.1 Funding Provisions Sub-Option 2A – Higher Monitoring Coverage Levels if NMFS Funds are Available (Sectors Only)

Sub-Option 2A would allow for at-sea monitoring at higher coverage levels than the target coverage required (see Section 4.1.1.1), up to 100 percent, provided that NMFS has determined funding is available to cover the additional administrative costs to NMFS and sampling costs to industry in a given year. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Sub-Option 2A could potentially result in higher monitoring levels, which would be expected to have indirect low positive impacts on protected species. Sub-Option 2A will also not result in any potential change in effort relative to current operating conditions, and therefore, new or elevated interaction risks to protected species are not expected. Specifically, interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, with any increase in either of these factors

increasing the potential for protected species interactions with gear. As Sub-Option 2A will not change any of these factors, while interactions are possible, they are not expected to increase or decrease under this sub-option and therefore, direct impacts to protected species are likely to be low negative. Given the above, indirectly, Sub-Option 2A may have low positive impacts to protected species, while directly, impacts to protected species are expected to be low negative.

Compared to Option 1/No Action, the impacts of Sub-Option 2A are somewhat unclear because it is unclear whether or not NMFS would have the funding available to cover additional administrative costs to NMFS and sampling costs to industry in a given year. The federal government may provide the funding to cover additional administrative costs to NMFS and sampling costs to industry, which would allow for at-sea monitoring at higher coverage levels than the target coverage required (see Section 4.1.1.1), up to 100 percent, in which case then Sub-Option 2A would have indirect positive impacts compared to Option 1/No Action. If the federal government did not have funding available for additional monitoring coverage, then impacts to protected species would be similar to those under Option 1/No Action, and therefore, relative to Option 1, would result in negligible impacts to protected species. Additionally, unlike Option 1/No Action, Sub-Option 2A does not allow for a potential decrease in effort (see Option 1 for more details). As there is the potential for lower effort under Option 1/No Action relative to Sub-Option 2A, relative to Option 1/No Action, Sub-Option 2A could potentially have direct low negative impacts on protected species, as this measure does not have the potential to result in a reduction of fishing effort. Compared to Sub-Option 2B, Sub-Option 2A would have indirect low positive impacts, as there is a potential for lower monitoring coverage levels under Sub-Option 2B.

7.3.4.2.2 Funding Provisions Sub-Option 2B – Waivers from Monitoring Requirements Allowed (Sectors and Common Pool)

Sub-Option 2B 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 insufficient funding for NMFS shoreside costs for the specified target coverage level. As described above, the additional information on encounters between fishing activity and protected species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species. Sub-Option 2B could potentially result in lower monitoring levels, which would be expected to have indirect low negative impacts on protected species. Sub-Option 2B will also not result in any potential change in effort relative to current operating conditions, and therefore, new or elevated interaction risks to protected species are not expected. Specifically, interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, with any increase in either of these factors increasing the potential for protected species interactions with gear. As Sub-Option 2B will not change any of these factors, while interactions are possible, they are not expected to increase or decrease under this sub-option and therefore, direct impacts to protected species are likely to be low negative. Given the above, the impacts of Sub-Option 2B on protected species are expected to be (directly and indirectly) low negative.

Compared to Option 1/No Action, Sub-Option 2B would have indirect low negative impacts to protected species, as there is a potential for lower monitoring coverage levels under Sub-Option 2B. Additionally, unlike Option 1/No Action, Sub-Option 2B does not allow for a potential decrease in effort (see Option 1 for more details). As there is the potential for lower effort under Option 1/No Action relative to Sub-Option 2B, relative to Option 1/No Action, Sub-Option 2B could potentially have direct low negative impacts on protected species, as this measure does not have the potential to result in a reduction of fishing effort. Impacts to protected species from Sub-Option 2B, therefore, are somewhat unclear, as it is not known whether or not NMFS would have funding available for its shoreside costs. Compared to Sub-

Option 2A, Sub-Option 2B would have indirect low negative impacts, as there is a potential for higher monitoring coverage levels under Sub-Option 2A.

7.3.5 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors)

7.3.5.1 Management Uncertainty Buffer Option 1: No Action

Option 1/No Action would maintain the current process in place for setting management uncertainty buffers for groundfish stocks for the different sub-components of the commercial groundfish fishery. Option 1/No Action would likely have neutral to low negative impacts to protected species, as management uncertainty buffers are a part of the ACL-setting process, designed to constrain fishing effort to allowable levels. Maintaining current management uncertainty buffers would likely keep the groundfish fishery operating at current levels, and changes in effort would not be expected. As interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, any decrease in either of these factors will reduce the potential for protected species interactions with gear. With fishing effort remaining the same, interactions with protected species are still possible, however, elevated interactions would not be expected. Therefore, impacts to protected species would be low negative.

Compared to Option 2, Option 1/No Action may have neutral to low positive impacts to protected species, as there is the potential for an increase in effort under Option 2. However, with 100 percent monitoring required should Option 2 be selected, Option 2 would provide indirect positive impacts to protected species as there would be additional information on protected species interactions with commercial fishing gear, which in turn, could be used to inform future protected species management measure to minimize such gear interactions. As described above, the additional information on encounters between fishing activity and protected species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so Option 2, indirectly, affords positive impacts to protected species. Therefore, relative to Option 2, Option 1/ No Action may result in indirect negative impacts to protected species since there is no potential for an increase monitoring coverage as there is under Option 2. Further, it may be difficult to predict how changes to the management uncertainty buffers would influence fishing effort.

7.3.5.2 Management Uncertainty Buffer Option 2 – Elimination of Management Uncertainty Buffer for Sector ACLs with 100 Percent Monitoring of All Sector Trips

Option 2 would revise the management uncertainty buffer for the sector ACL for all allocated groundfish stocks to be zero, if the option for 100 percent at-sea monitoring, whether as a fixed percentage of sector trips (Section 4.1.1.1.2) or as a percentage of catch (Section 4.1.1.1.3) is selected. It is difficult to predict whether the removing the management uncertainty buffers would result in substantial increases in fishing effort. This has the potential to increase fishing effort since setting the buffer to zero would result in higher sector ACLs. As interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, any decrease in either of these factors will reduce the potential for protected species interactions with gear. Therefore, Option 2 has the potential to increase interaction risks for protected species and therefore, is likely to result in low negative to negative impacts on protected

species. However, with 100 percent monitoring required should Option 2 be selected, Option 2 would provide indirect positive impacts to protected species as there would be additional information on protected species interactions with commercial fishing gear, which in turn, could be used to inform future protected species management measure to minimize such gear interactions. Based on the above information, impacts to protected species from Option 2 may range from direct low negative to negative impacts, to indirect low positive impacts.

Compared to Option 1/No Action, Option 2 is expected to have neutral to negative impacts, as there is the potential for an increase in fishing effort under Option 2. However relative to Option 1/ No Action, Option 2 may also result in indirect positive impacts to protected species through the increase in additional information on protected species interactions with commercial fishing gear provided through higher levels of monitoring, as 100 percent monitoring is required for this option to be selected. As described above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates, and so indirectly affords positive impacts to protected species.

7.3.6 Remove Commercial Groundfish Monitoring Requirements for Certain Vessels Fishing Under Certain Circumstances

7.3.6.1 Removal of Monitoring Program Requirements Option 1: No Action (Sectors Only)

Option 1/No Action would maintain the existing measures for removal of groundfish monitoring program coverage requirements. These include the removal of at-sea monitoring coverage requirement for sector vessels fishing exclusively with extra-large mesh (ELM) gillnets of 10 inches (25.4 cm) or greater on a sector trip fishing exclusively in the SNE/MA and Inshore GB Broad Stock. Additionally, sector vessels fishing on these non-ASM sector trips and fishing exclusively within the footprint and season of either the Nantucket Shoals Dogfish Exemption Area, the Eastern Area of the Cape Cod Spiny Dogfish Exemption Area, and SNE Dogfish Gillnet Fishery Exemption Area are removed from the requirement to only use 10+ inch mesh on these excluded trips in order to target dogfish with 6.5 inch mesh on the same trip, and are thus also excluded from the at-sea monitoring coverage requirement. However, these spiny dogfish exemptions are handled through sector operations plans. As has previously been discussed in past actions (FW 55), sector ELM trips overlap in time and space with observed takes of marine mammals throughout the northeast, particularly in the GOM (BSA 1), Inshore GB (BSA 2), and SNE (BSA 4) (Figure 35). The exempted dogfish fisheries overlap in time and space with observed takes marine mammals to the east of Cape Cod and in southern New England.

The removal of the ASM requirement for a sub-set of sector trips had the potential to create an economic incentive to target non-groundfish stocks like skates, monkfish, and dogfish using 10"+ mesh. Although this had the potential to increase fishing effort, effort is still constrained by quota allocations for these non-groundfish stocks. As a result, there is the potential that although effort could increase, the increase in effort will result in quotas being attained faster. ASM was paid for by NMFS from on May 1st, 2010 through December 31st, 2015. Over this time, sector vessels targeted non-groundfish stocks while on sector trips with very low catch of groundfish. As a portion of the fishery was already exhibiting this behavior when there was not an economic incentive, fishing effort present in these dogfish exemption areas is likely to be consistent with previous fishing years.

Based on the above information, Option 1/No Action has the potential to result in direct and indirect impacts to protected species. Direct impacts to protected species are likely to be seen via changes in

fishing behavior resulting from the economic incentive created from existing measures for removal of groundfish monitoring program coverage requirements. As noted above, this could equate to increased effort and therefore, the potential for increased interactions with protected species; however, as also noted above, under this same scenario, quota constraints are likely to limit any significant increase in effort. In fact, redirecting effort to these stocks may result in quotas being caught faster. If quota is reached faster, this equates to gear being present for less time in the water. As interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, any decrease in either of these factors will reduce the potential for protected species interactions with gear. As a result, direct impacts to protected species are expected to be low negative.

Indirectly, the existing measures for removal of groundfish monitoring program coverage requirements under Option 1/No Action may also result in low negative impacts to protected species. As noted previously, since its inception in 2010, at-sea monitoring (ASM) data have provided a wealth of information about protected species interactions in commercial fishing gear, particularly in the extra-large mesh (>=8") sink gillnet fisheries (NEFSC PSB pers. comm); however, as evidenced by measures implemented in FW55, removal of any level of at-sea monitoring can result in a decrease in protected species bycatch information that previously would have been used to improve bycatch estimates and precision, as well as inform potential protected species management decisions. For instance, from 2010-2014, the number of hauls observed by ASM in the extra-large-mesh (ELM) fishery exceeded the number of hauls observed by traditional Northeast Fisheries Observer Program (NEFOP) observers, constituting 60% of all observed ELM hauls; moreover, ASM documented 63% of all protected species interactions in the ELM fisheries (NEFSC PSB pers. comm). Larger mesh sizes are correlated with higher bycatch rates of both loggerhead sea turtles (Murray 2013) and harbor porpoises (Hatch and Orphanides, 2015; Orphanides 2009), and possibly other species as well (e.g., Atlantic sturgeon; Stein et al. 2004; ASMFC 2007; Miller and Shepard 2011).

While ASM data have supplemented NEFOP data in the Gulf of Maine and southern New England regions (Figure 35a,b), they have also provided information about ELM fishing practices and bycatch where NEFOP coverage did not (Figure 35c,d). The amount of information ASM data provide to protected species bycatch analyses improves the precision of bycatch estimates. For example, the addition of ASM information to an analysis of gray seal bycatch rates from May 2010-April 2011 reduced the coefficient of variation (CV) around the bycatch rates in almost all strata (Table 11, Graham *et al.* in review). Reducing uncertainty of bycatch estimates improves assessments of anthropogenic removals from the population, as well as mitigation efforts in forums such as take reduction teams (NEFSC PSB, pers. comm). As the existing measures for removal of monitoring requirements under Option 1/No Action remove ASM coverage requirements for particular sector trips (see description above), the full informational benefits provided by current ASM coverage levels in assessing protecting species bycatch has likely been reduced (see above), thereby affecting the precision of protected species bycatch estimates and reducing available information for protected species management decisions. Specifically, as provided in Table 12, the ASM data collected on ELM trips in the two broad stock areas (BSAs 2 and 4) before FW55 was implemented contributed information to marine mammal bycatch assessments. However, after FW55, there were few observed marine mammal takes on ELM trips in these areas from 2016-2018 due to the measure removing ASM coverage. Any observations made in these areas over this time frame are suspected to have come from NEFOP coverage based on patterns in the observational data.

Based on the above information, impacts to protected species from Option 1/No Action are expected to be (directly and indirectly) low negative. Relative to Option 2 and Option 3, Option 1/No Action would be expected to have low positive impacts to protected species, as both Option 2 and Option 3 would allow for the removal of ASM requirements in other areas, in addition to the existing measures for removal of groundfish monitoring program coverage requirements under Option 1/No Action.

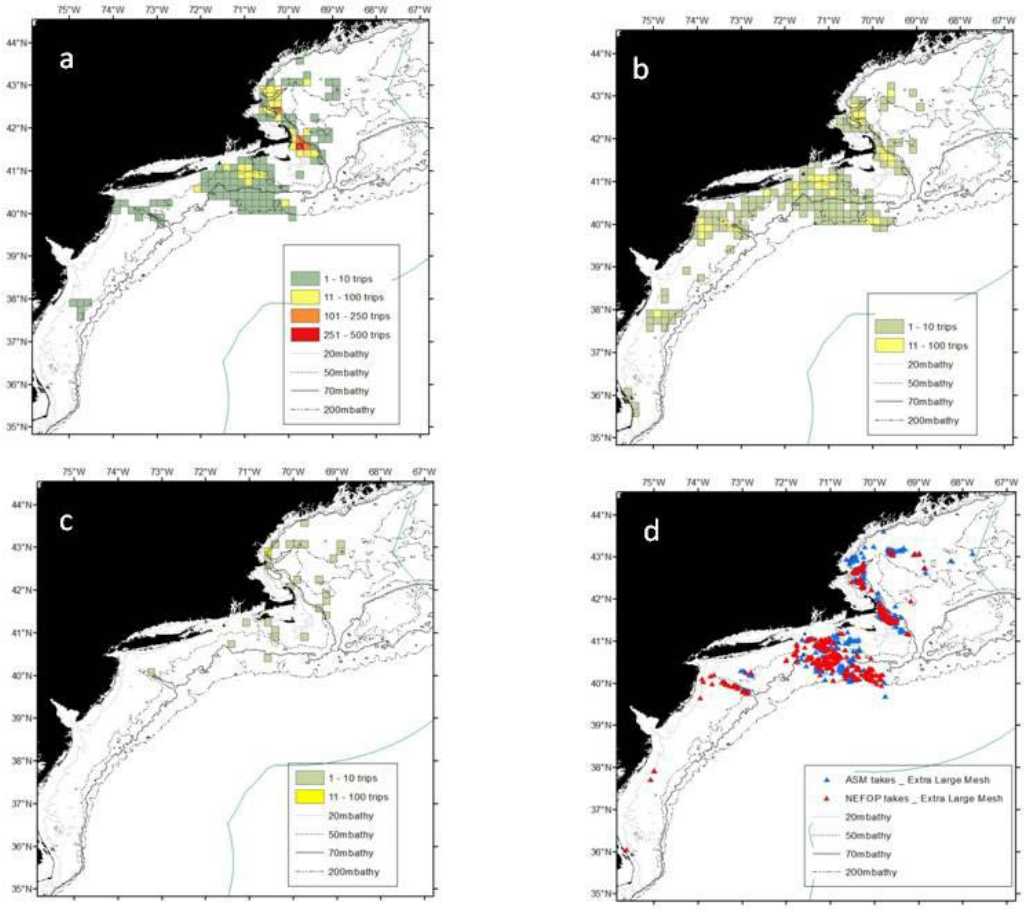


Figure 35 - a) Number of ASM trips in extra-large (>=8") mesh gillnet gear, 2010-2014; b) Number of NEFOP trips in extra-large (>=8") mesh gillnet gear, 2010-2014; c) ASM extra-large mesh trips in 10' squares where there was no NEFOP coverage; d) Observed interactions between extra-large mesh gillnet gear and protected species (birds, cetaceans, seals, turtles). Provided by NEFSC, Protected Species Branch.

Table 11 - Comparison of estimated bycatch rates, coefficient of variation (CV) and 95% confidence intervals (CI) from a log-normal distribution after pooling NEFOP observer data with ASM data for gray seals in gillnet gear. Provided by NEFSC, Protected Species Branch.

NEFOP					GILLNET	ASM+NEFOP				
Number of Hauls	Gray Seal Takes	Bycatch Rate	CV	95% CI	Strata	Num of Hauls	Gray Seal Takes	Bycatch Rate	CV	95% CI
1,796	33	0.0184	0.18	0.013-0.026	All	7,850	161	0.0205	0.08	0.017-0.024
1,060	2	0.0019	0.50	0.001-0.005	Inshore GOM	4,621	15	0.0032	0.21	0.002-0.005
357	3	0.0084	0.46	0.004-0.020	Offshore GOM	1,393	5	0.0036	0.37	0.002-0.007
379	28	0.0739	0.20	0.050-0.109	SNE	1,836	141	0.0768	0.09	0.065-0.091
90	1	0.0111	0.72	0.003-0.039	Dogfish	714	1	0.0014	0.72	0.000-0.005
199	11	0.0553	0.29	0.031-0.097	Monkfish	919	71	0.0773	0.12	0.061-0.097
1,287	3	0.0023	0.48	0.001-0.006	Multispecies	5,028	11	0.0022	0.24	0.001-0.003
220	18	0.0818	0.23	0.052-0.128	Skate	1,189	78	0.0656	0.10	0.054-0.080
657	18	0.0274	0.22	0.018-0.042	Jan-Apr 2011	1,728	86	0.0498	0.11	0.040-0.061
630	13	0.0206	0.33	0.011-0.039	May-Aug 2010	3,484	59	0.0169	0.13	0.013-0.022
509	2	0.0039	0.60	0.001-0.012	Sept-Dec 2010	2,638	16	0.0061	0.19	0.004-0.009

Table 12 - Summary of ASM & NEFOP 2010-2018 (calendar year) observed hauls in broad stock areas 2 and 4. Hauls missing latitude or longitude are excluded.

Broad Stock Area	Source	Mesh Category	Year Category	Hauls	Seabirds	Turtles	Marine Mammals	Total Protected Species
Inshore GB Stock Area 2	ASM	ELM	2010-2015	2397	187	4	220	411
			2016-2018	54	2	0	10	12
		non-ELM	2010-2015	2313	724	0	22	746
			2016-2018	50	58	0	0	58
	NEFOP	ELM	2010-2015	701	41	1	90	132
			2016-2018	510	104	0	61	165
		non-ELM	2010-2015	865	329	0	4	333
			2016-2018	289	925	0	1	926
SNE/MA Stock Area 4	ASM	ELM	2010-2015	2392	13	15	256	284
			2016-2018	5	0	0	2	2
		non-ELM	2010-2015	135	5	2	1	8
			2016-2018	5	1	0	1	2
	NEFOP	ELM	2010-2015	3967	18	22	386	426
			2016-2018	3934	10	5	187	202
		non-ELM	2010-2015	8050	49	5	12	66
			2016-2018	10446	92	5	9	106

***Note, no protected fish species were included in this summary. Provided by NEFSC, Protected Species Branch.**

7.3.6.2 Removal of Monitoring Program Requirements Option 2 – Remove Monitoring Requirements for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

7.3.6.2.1 Removal of Monitoring Program Requirements Sub-option 2A – Remove At-Sea Monitoring Coverage Requirement (Sectors Only)

Sub-Option 2A would remove the at-sea monitoring (ASM) coverage requirement for vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a sector trip.

Since ASM is an industry-funded program, removing this requirement for a sub-set of sector trips may create an economic incentive to fish in the area west of 72 degrees 30 minutes west longitude. The removal of the ASM requirement for a sub-set of sector trips has the potential to create an economic incentive to target non-groundfish stocks like skates, monkfish, dogfish, and fluke in the area west of 72 degrees 30 minutes west longitude. Although this has the potential to increase fishing effort, effort would still be constrained by quota allocations for these non-groundfish stocks. As a result, there is the potential that although effort will increase, the increase in effort will result in quotas being attained faster.

Based on the above information, Sub-Option 2A has the potential to result in direct and indirect impacts to protected species. Direct impacts to protected species are likely to be seen via changes in fishing behavior resulting from the economic incentive created this exemption. As noted above, this could equate to increased effort and therefore, the potential for increased interactions with protected species; however, as also noted above, under this same scenario, quota constraints are likely to limit any significant increase in effort. In fact, redirecting effort to these stocks may result in quotas being caught faster. If quota is reached faster, this equates to gear being present for less time in the water. As interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, any decrease in either of these factors will reduce the potential for protected species interactions with gear. As a result, direct impacts to protected species are expected to be low negative.

Indirectly, the existing measures for removal of groundfish monitoring program coverage requirements under Option 1/No Action may result in low negative impacts to protected species. As noted previously, since its inception in 2010, ASM data have provided a wealth of information about protected species interactions in commercial fishing gear (NEFSC PSB pers. comm). As noted above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates. As the measures for removal of groundfish monitoring program coverage requirements under Sub-Option 2A would remove ASM coverage requirements for a particular sector trips (see description above), along with existing measures for removal of groundfish monitoring program coverage requirements (see Option 1/No Action), the full informational benefits provided by current ASM coverage levels in assessing protecting species bycatch would likely be reduced. This in turn will affect the precision of protected species bycatch estimates and reduce available information for protected species management decisions. Given this, indirectly, Sub-Option 2A results in low negative impacts to protected species.

Based on the above information, impacts to protected species from Sub-Option 2A are expected to be (directly and indirectly) low negative. Relative to Option 1/No Action, Sub-Option 2A would be expected to have low negative to negative impacts to protected species, as this sub-option has the potential to increase effort, and would allow for removal of ASM coverage requirements in other areas, in addition to

the removal of ASM coverage requirements under Option 1/No Action. Compared to Sub-Option 3A, impacts to protected species would be similar, as these sub-options are close in area. Sub-Option 3A would cover a larger area for removal of ASM coverage requirements than Sub-Option 2A, so impacts to protected species may be slightly less negative for Sub-Option 2A relative to Sub-Option 3A. Relative to both Sub-Options 2B and 3B, Sub-Option 2A would have negative impacts, as Sub-Options 2B and 3B would remove dockside monitoring requirements, and dockside monitoring does not affect protected species.

7.3.6.2.2 Removal of Monitoring Program Requirements Sub-option 2B – Remove Dockside Monitoring Coverage Requirement (Sectors and Common Pool)

Sub-Option 2B would remove the requirement for dockside monitoring coverage (if implemented) for vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a sector trip. Dockside monitoring does not affect protected species, and so removal of dockside monitoring coverage requirement (if implemented) would have no direct or indirect impacts on protected species. Therefore, Sub-option 2B would have no direct or indirect impacts on protected species. This option is expected to have, indirectly, low positive impacts compared to Sub-Option 2A, removal of at-sea monitoring coverage requirements for vessels fishing exclusively west of 72 degrees 30 minutes west longitude, since dockside monitoring does not affect protected species.

7.3.6.3 Removal of Monitoring Program Requirements Option 3 – Remove Monitoring Requirements for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

7.3.6.3.1 Removal of Monitoring Program Requirements Sub-option 3A – Remove At-Sea Monitoring Coverage Requirement (Sectors Only)

Sub-Option 3A would remove the at-sea monitoring (ASM) coverage requirement for vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a sector trip.

Since ASM is an industry-funded program, removing this requirement for a sub-set of sector trips may create an economic incentive to fish in the area west of 71 degrees 30 minutes west longitude. The removal of the ASM requirement for a sub-set of sector trips has the potential to create an economic incentive to target non-groundfish stocks like skates, monkfish, dogfish, and fluke in the area west of 71 degrees 30 minutes west longitude. Although this has the potential to increase fishing effort, effort would still be constrained by quota allocations for these non-groundfish stocks. As a result, there is the potential that although effort will increase, the increase in effort will result in quotas being attained faster.

Based on the above information, Sub-Option 3A has the potential to result in direct and indirect impacts to protected species. Direct impacts to protected species are likely to be seen via changes in fishing behavior resulting from the economic incentive created this exemption. As noted above, this could equate to increased effort and therefore, the potential for increased interactions with protected species; however, as also noted above, under this same scenario, quota constraints are likely to limit any significant increase in effort. In fact, redirecting effort to these stocks may result in quotas being caught faster. If quota is reached faster, this equates to gear being present for less time in the water. As interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species, any decrease in either of these factors will reduce the potential for protected species interactions with gear. As a result, direct impacts to protected species are expected to be low negative.

Indirectly, the existing measures for removal of groundfish monitoring program coverage requirements under Option 1/No Action may result in low negative impacts to protected species. As noted previously, since its inception in 2010, at-sea monitoring (ASM) data have provided a wealth of information about protected species interactions in commercial fishing gear (NEFSC PSB pers. comm). As noted above, the additional information on encounters between fishing activity and protected and endangered species provided via sector monitoring improves the precision of protected species bycatch analyses and resultant bycatch estimates. As the measures for removal of groundfish monitoring program coverage requirements under Sub-Option 3A would remove ASM coverage requirements for particular sector trips (see description above), along with existing measures for removal of groundfish monitoring program coverage requirements (see Option 1/No Action), the full informational benefits provided by current ASM coverage levels in assessing protecting species bycatch would likely be reduced. This in turn will affect the precision of protected species bycatch estimates and reducing available information for protected species management decisions. Given this, indirectly, Sub-Option 3A results in low negative impacts to protected species.

Based on the above information, impacts to protected species from Sub-Option 3A are expected to be (directly and indirectly) low negative. Relative to Option 1/No Action, Sub-Option 3A would be expected to have low negative to negative impacts to protected species, as this sub-option has the potential to increase effort, and would allow for removal of ASM coverage requirements in other areas, in addition to the removal of ASM coverage requirements under Option 1/No Action. Compared to Sub-Option 3A, impacts to protected species would be similar, as these sub-options are close in area. Sub-Option 3A would cover a larger area for removal of ASM coverage requirements than Sub-Option 2A, so impacts to protected species may be slightly less negative for Sub-Option 2A relative to Sub-Option 3A. Relative to both Sub-Options 2B and 3B, Sub-Option 2A would have negative impacts, as Sub-Options 2B and 3B would remove dockside monitoring requirements, and dockside monitoring does not affect protected species.

7.3.6.3.2 Removal of Monitoring Program Requirements Sub-option 3B – Remove Dockside Monitoring Coverage Requirement (Sectors and Common Pool)

Sub-Option 3B would remove the requirement for dockside monitoring coverage (if implemented) for vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a sector trip. Dockside monitoring does not affect protected species, and so the removal of dockside monitoring coverage requirement (if implemented) would have no direct or indirect impacts on protected species. Therefore, Sub-option 3B would have no direct or indirect impacts on protected species. This option is expected to have, indirectly, low positive impacts compared to Sub-Option 3A, removal of at-sea monitoring coverage requirements for vessels fishing exclusively west of 71 degrees 30 minutes west longitude, since dockside monitoring does not affect protected species.

7.3.6.4 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements

7.3.6.4.1 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements Option 1: No Action

This option would not establish a review process for any measures that remove groundfish monitoring program requirements for certain vessels based on catch composition (Removal of Monitoring Program Requirements Option 1, Option 2, and Option 3). This measure is administrative in nature, and is not expected to have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior

7.3.6.4.2 Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements Option 2 – Implement a Review Process for Vessels Removed from Commercial Groundfish Monitoring Program Requirements

This option would establish a review process for any measures that remove groundfish monitoring program requirements for certain vessels based on catch composition (Removal of Monitoring Program Requirements Option 1, Option 2, and Option 3). This measure is administrative in nature, and is not expected to have a direct or indirect impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior