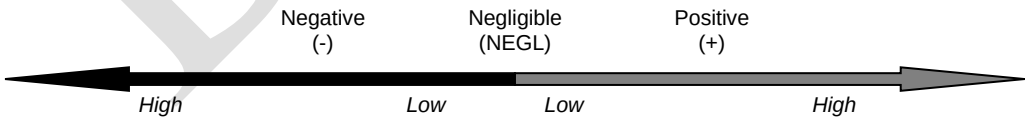
7.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS

Evaluation Criteria

This EA evaluates the potential impacts using the criteria outlined in Table 56. Impacts for all alternatives are judged relative to the baseline conditions, as described in Section 6.0, and compared to each other.

Table 56 - Impact designations in this document are defined generally as positive, negligible/neutral, and negative.

	Direction		
VEC	**Positive (+)**	**Negative (-)**	**Negligible/Neutral**
Allocated target species, other landed species, and protected resources	Actions that increase stock/population size for stocks in rebuilding. For stocks that are rebuilt, actions that maintain stock population sizes at rebuilt levels. For protected resources, actions that increase the population size, or decrease gear interactions.	Actions that decrease stock/population sizes for overfished stocks. Actions that would cause a rebuilt stock to become overfished. For protected resources, actions that decrease the population size, or increase or maintain gear interactions.	Actions that have little or no positive or negative impacts to stocks/populations
Physical Environment/ Habitat/EFH	Actions that improve the quality or reduce disturbance of habitat	Actions that degrade the quality or increase disturbance of habitat	Actions that have no positive or negative impact on habitat quality
Human Communities	Actions that increase revenue and social well-being of fishermen and/or associated businesses	Actions that decrease revenue and social well-being of fishermen and/or associated businesses	Actions that have no positive or negative impact on revenue and social well-being of fishermen and/or associated businesses
	Impact Qualifiers:		
All VECs: Mixed	**both positive and negative**		
Low (L, as in low positive or low negative)	To a lesser degree		
High (H; as in high positive or high negative)	To a substantial degree (not significant)		
Likely	Some degree of uncertainty associated with the impact		



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.

7.1.1 Groundfish Monitoring

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/unreporting of catch (landings and discards).

Discrepancies in catch reporting

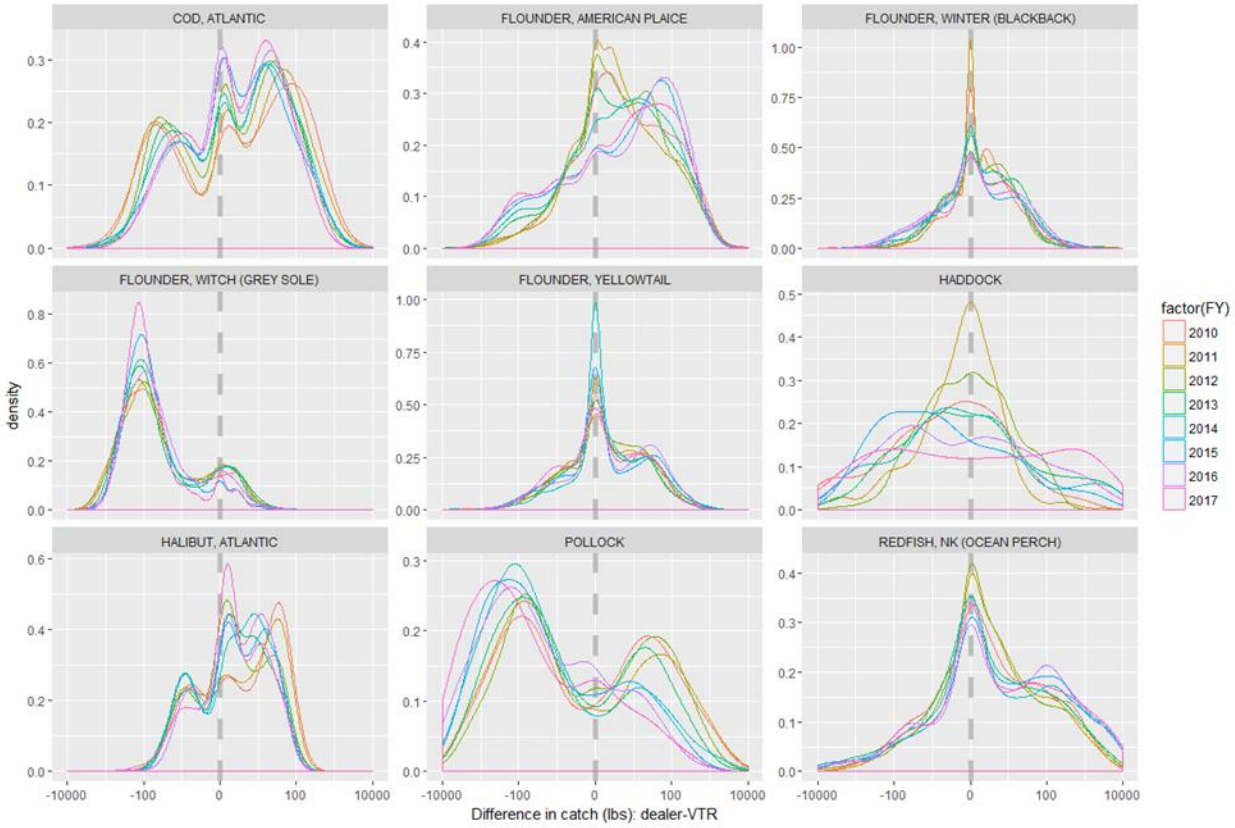
The measurement of fishing effort and estimation of catch are subject to a variety of errors that can compromise accuracy. Self-reported activity may provide a useful approximation to true activity but will be affected by competing objectives. Without incentives to report accurately or efforts to correct 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 and 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. 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.

Figure 7 illustrates density distributions of the differences (log10-transformed live pounds) in catch 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 7- Density distributions of the differences (log10-transformed live pounds) in catch amount (dealer – VTR) across 9 allocated groundfish species from the 2010–2017 fishing years.



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

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. 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 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[29] for a full description). These major retrospective patterns required a retrospective ("rho") adjustment (at the discretion of the peer review panel). 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., not overfished -> 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[30]; 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[31]). 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 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 catch would need to be increased by 300-500% to fix the retrospective problem in the assessment. During

[29] 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/

[30] 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.

[31] 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.

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.[32] 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.[33] 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

[32] 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
[33] 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

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.

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 by now familiar case of United States vs. Carlos Rafael.[34] 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.

The charges arose out of an undercover investigation in which federal agents posed as organized crime figures interested in buying Carlos Seafood. From 2012 to January 2016, Rafael routinely lied to NOAA about the quantity and species of fish his vessels caught in order to evade federal quotas. During that period, Rafael misreported to NOAA approximately 782,812 pounds of fish, telling NOAA that the fish was haddock, or some other abundant species subject to high quotas, when in fact the fish was cod, sole, or other species subject to strict quotas. After submitting false records to federal regulators, Rafael sold much of the fish to a wholesale business in New York City in exchange for duffle bags of cash. During meetings with the undercover agents, Rafael said that in his most recent dealings with the New York buyer he received $668,000 in cash. Rafael smuggled at least some of that cash out of the United States to his native Portugal, hiding it there to evade federal taxation on that revenue.

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.[35] 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. There is also ongoing civil action pending against Rafael by NOAA.

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

[34] United States District Court, District of Massachusetts. Sept. 20, 2017. United States of America vs. Carlos Rafael Government's Sentencing Memorandum
[35] 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

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 6.6.10.2, Summary of PDT Monitoring Analyses, provides an overview of Appendix IV. Briefly, the PDT prepared four analyses to support the development of Amendment 23. Specifically, PDT members analyzed discard incentives, observer effects, catch ratios, and developed models to predict groundfish catch on unobserved trips using observed trip information (see Appendix IV 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 IV) 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 IV).

The overall conclusions from the PDT were observed trips are not representative of unobserved trips. The dimensions where observed trips differ from unobserved trips including: 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 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 area. 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. Given these conclusions, the current precision standard is not an appropriate method to set at-sea monitoring coverage levels because the assumption that observed trips are representative of unobserved trips is false. 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 IV.

Biological impacts of improved monitoring

The biological impacts from improvements in monitoring will depend on the amount of unknown mortality from the 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 the stock assessments. Biological impacts are difficult to assess because the true amount of missing stock specific removals are not known through time. 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 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 determination of biological impacts difficult if not impossible to predict. We can likely 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 difference factors with regards to the biological impacts; 1) it could potentially have positive biological impacts through lower fishing effort 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 relatively 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 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 5 years. It is not clear, where a short-term verse longer-term break should be made. This time frame may also differ among stocks depending on the assessment.

In conclusion, improvements in monitoring which reduces 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.

7.1.1.1 Groundfish Sector Monitoring Program Revisions

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)
    - Increased accuracy and precision of commercial sector catch going into the assessments
    - 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.
- Long-term (greater than five years)
    - Improved estimation of fishing mortality and biomass
    - 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
    - Increase the likelihood of rebuilding overfished stocks if accurate catch leads to reduced uncertainty in the stock assessments.
    - Improvements in groundfish management through the more accurate catch advice from assessments.

7.1.1.1.1 Sector Monitoring Standards and Monitoring Tools

Groundfish catch estimation under various levels of observer coverage and bias

We 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, with a random sampling scheme, 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 truth (inaccurate).
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 comprising mostly of landings (e.g., winter flounder, cod) and highest for those comprising mostly (or entirely) of discards (e.g., halibut, windowpane).

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 8 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 9 to Figure 30 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 8 - Total estimated catch (with 95% confidence intervals) under varying observer coverage.

Figure 8 continued.

Figure 8 continued.

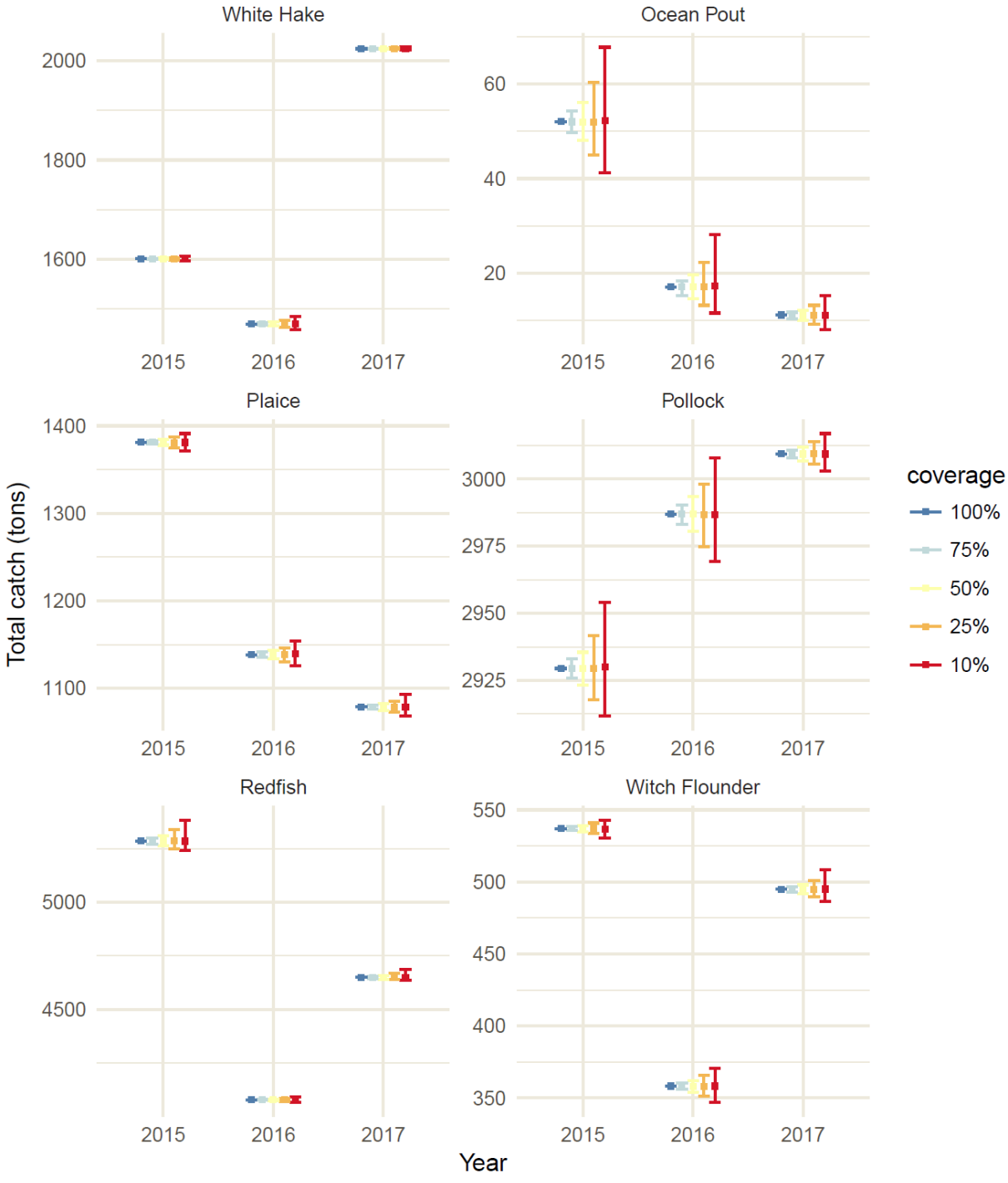


Figure 8 continued.

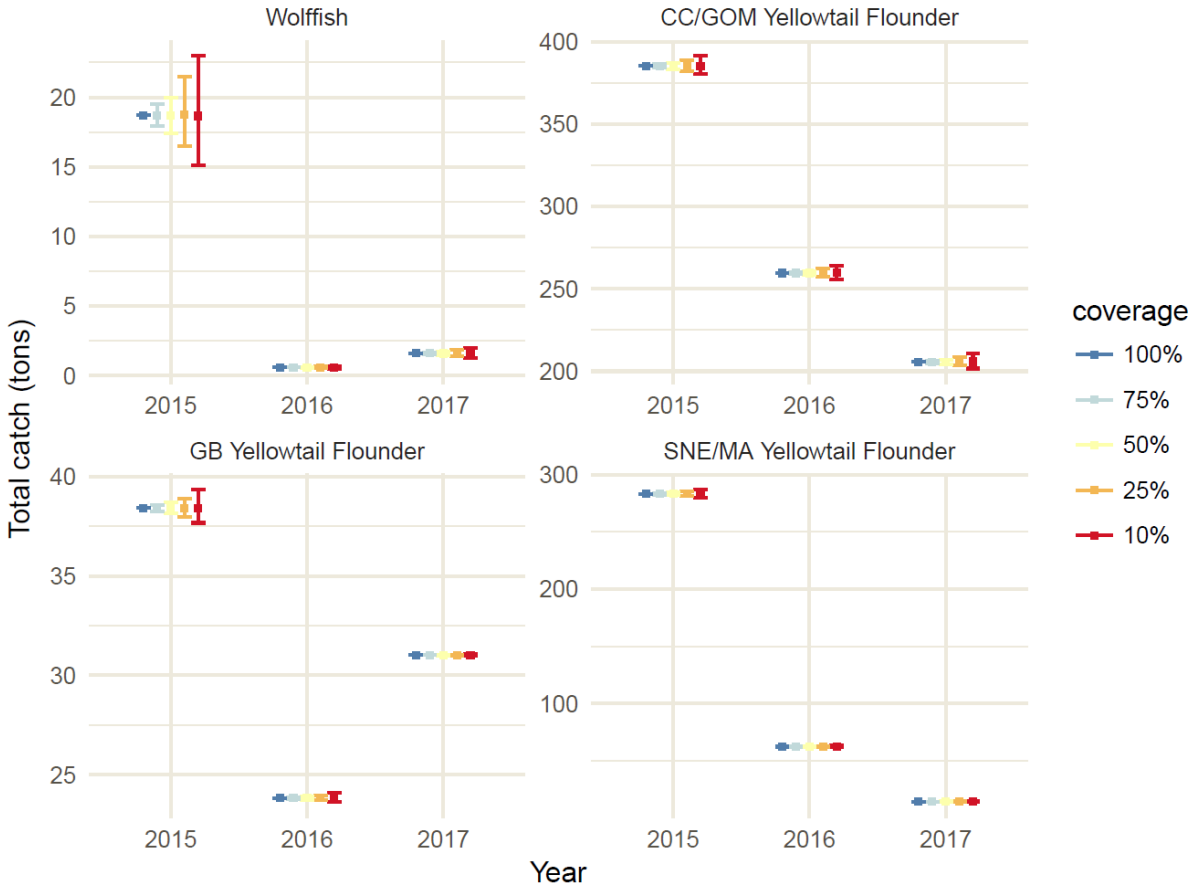


Figure 9 - Eastern GB cod, total 'true' catch under varying observer coverage and bias.

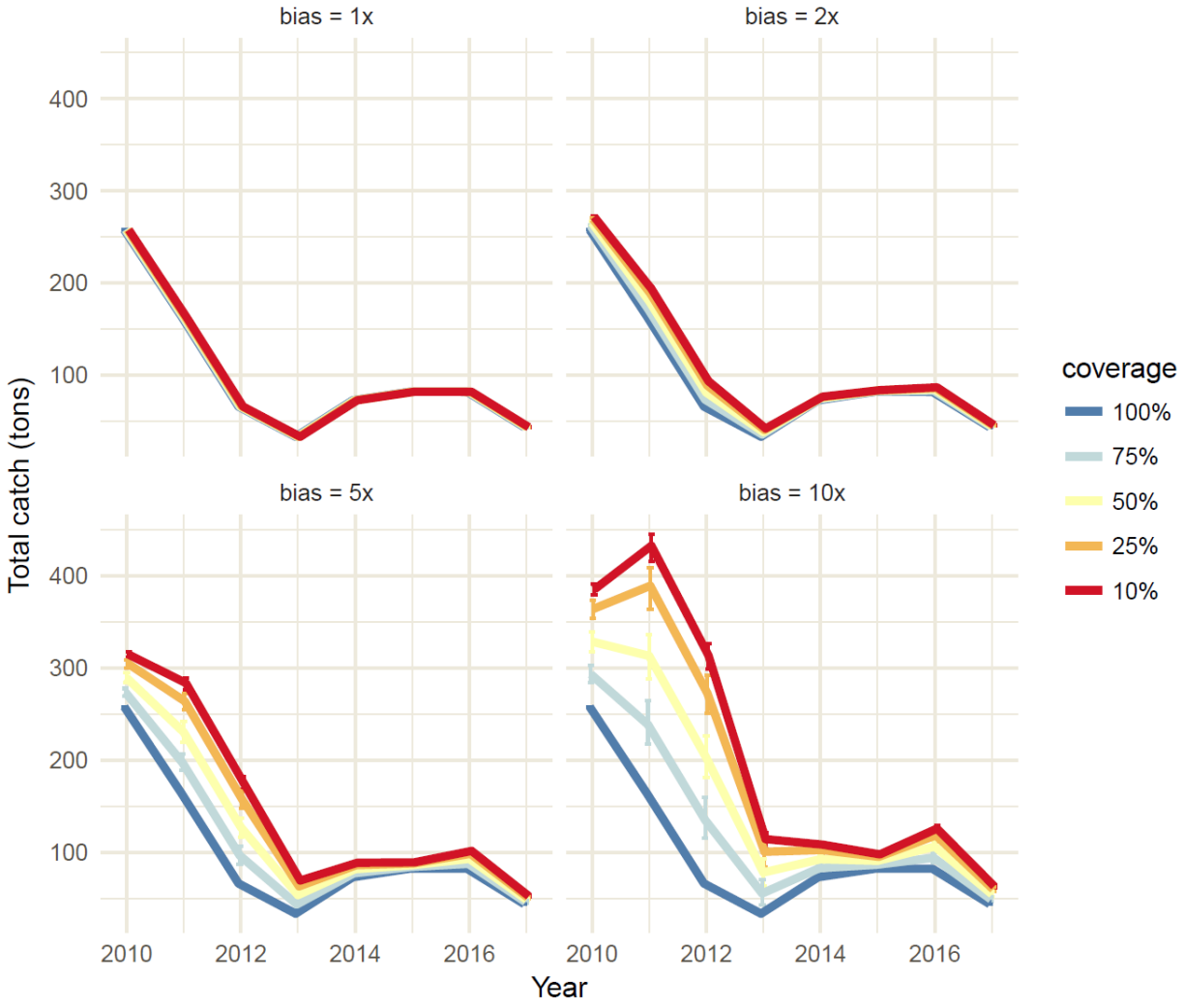


Figure 10 - Western GB cod, total 'true' catch under varying observer coverage and bias.

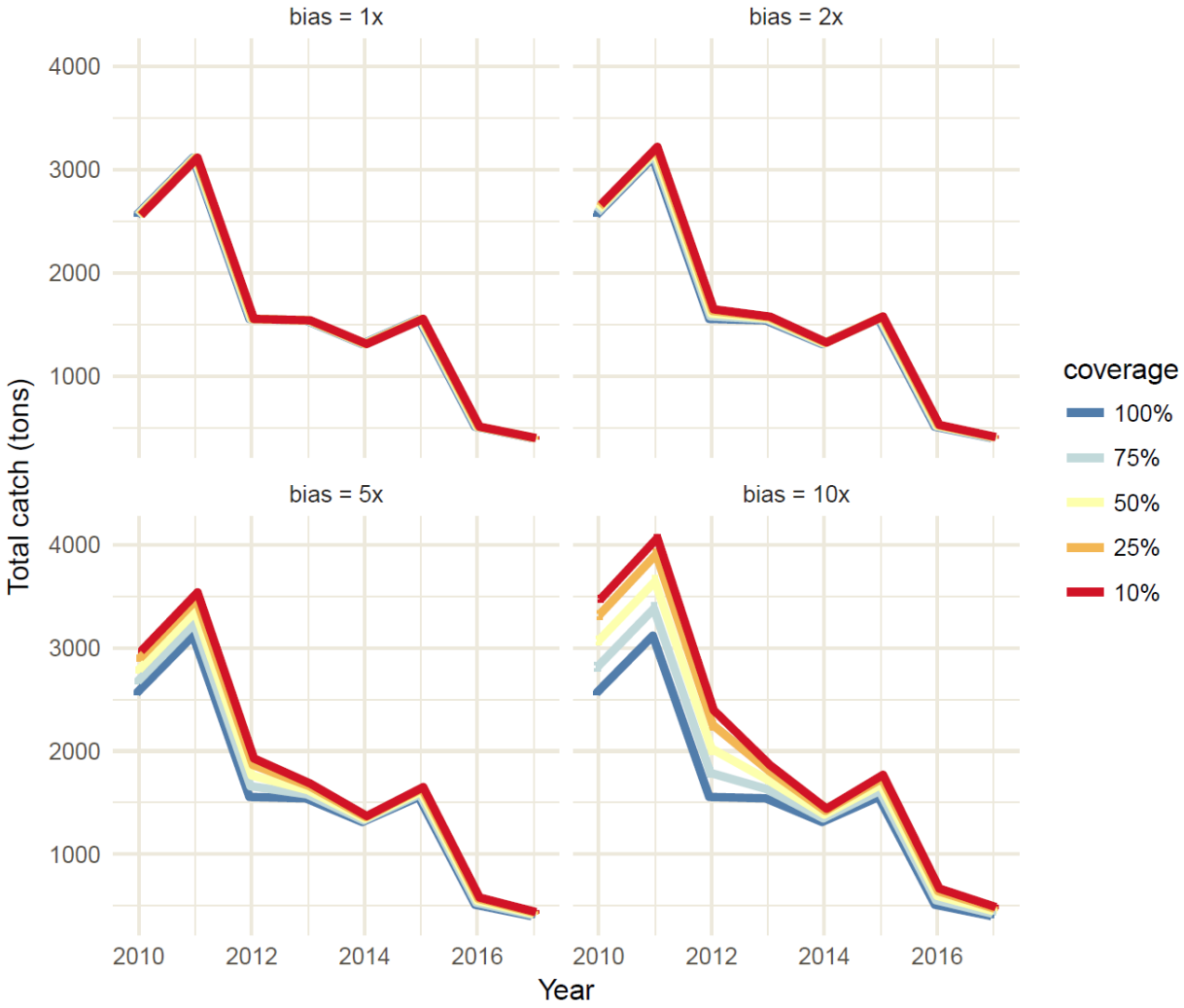


Figure 11 - GOM cod, total 'true' catch under varying observer coverage and bias.

Figure 12 - Southern windowpane flounder, total 'true' catch under varying observer coverage and bias.

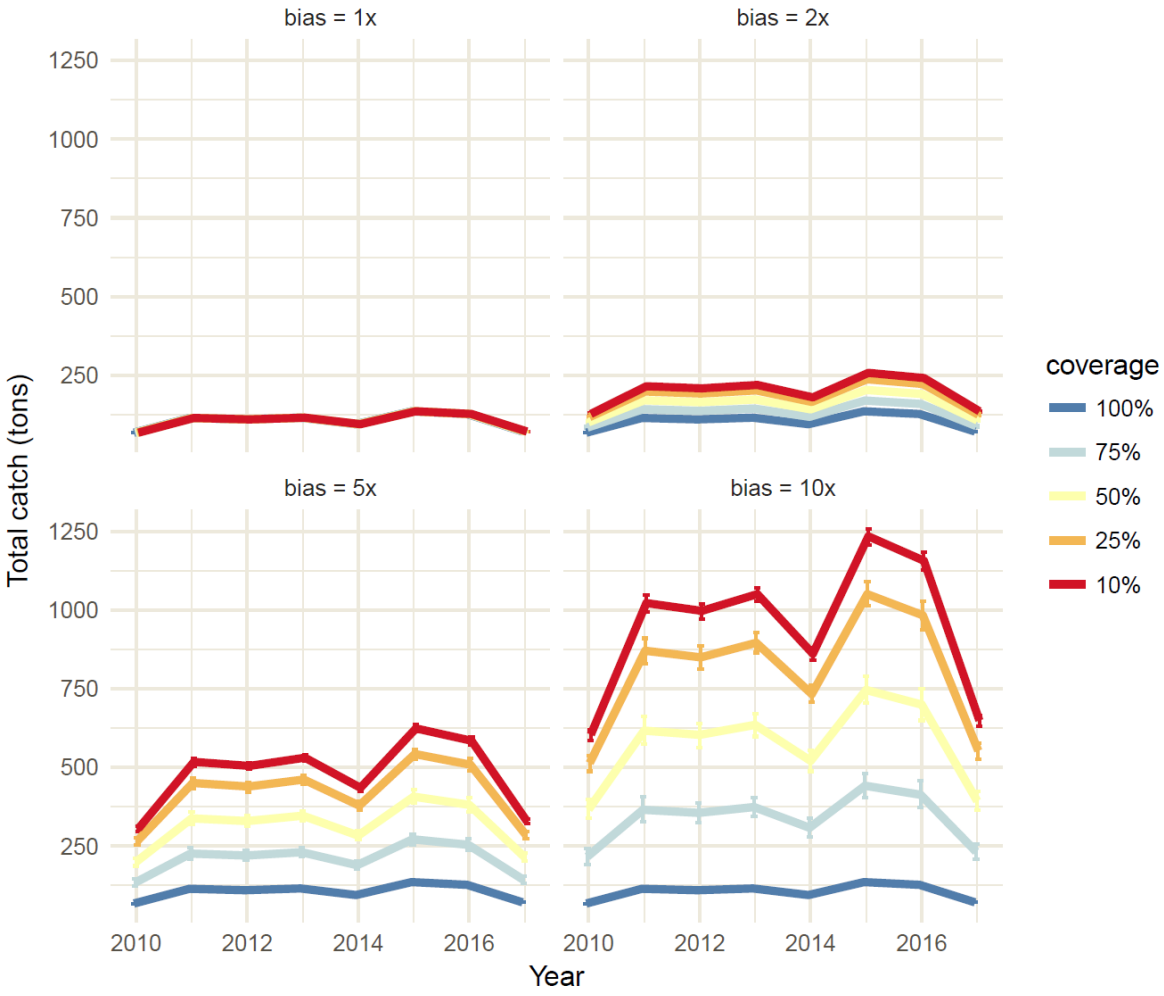


Figure 13 - Northern windowpane flounder, total 'true' catch under varying observer coverage and bias.

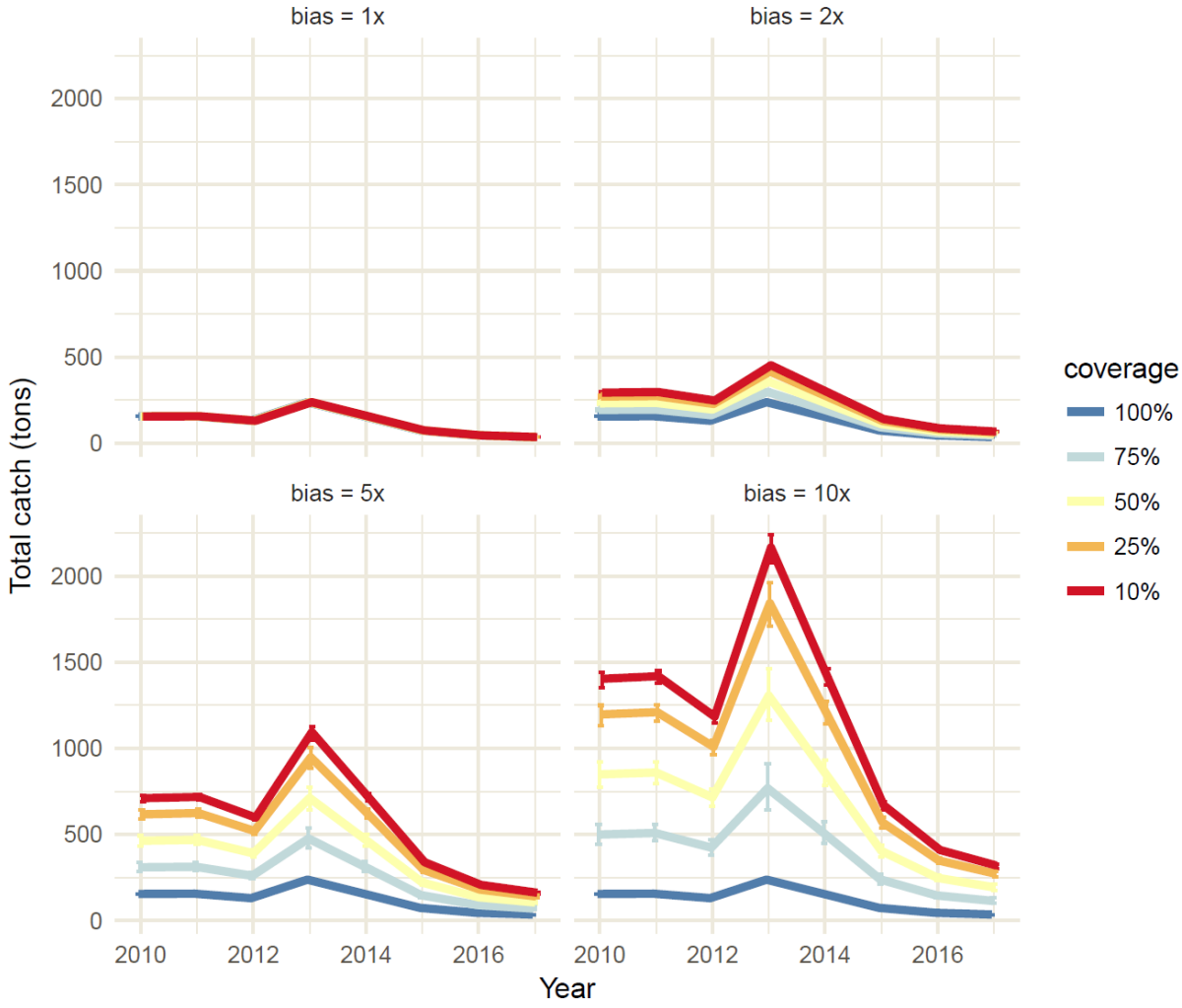


Figure 14 - GB winter flounder, total 'true' catch under varying observer coverage and bias.

Figure 15 - GOM winter flounder, total 'true' catch under varying observer coverage and bias.

Figure 16 - SNE/MA winter flounder, total 'true' catch under varying observer coverage and bias.

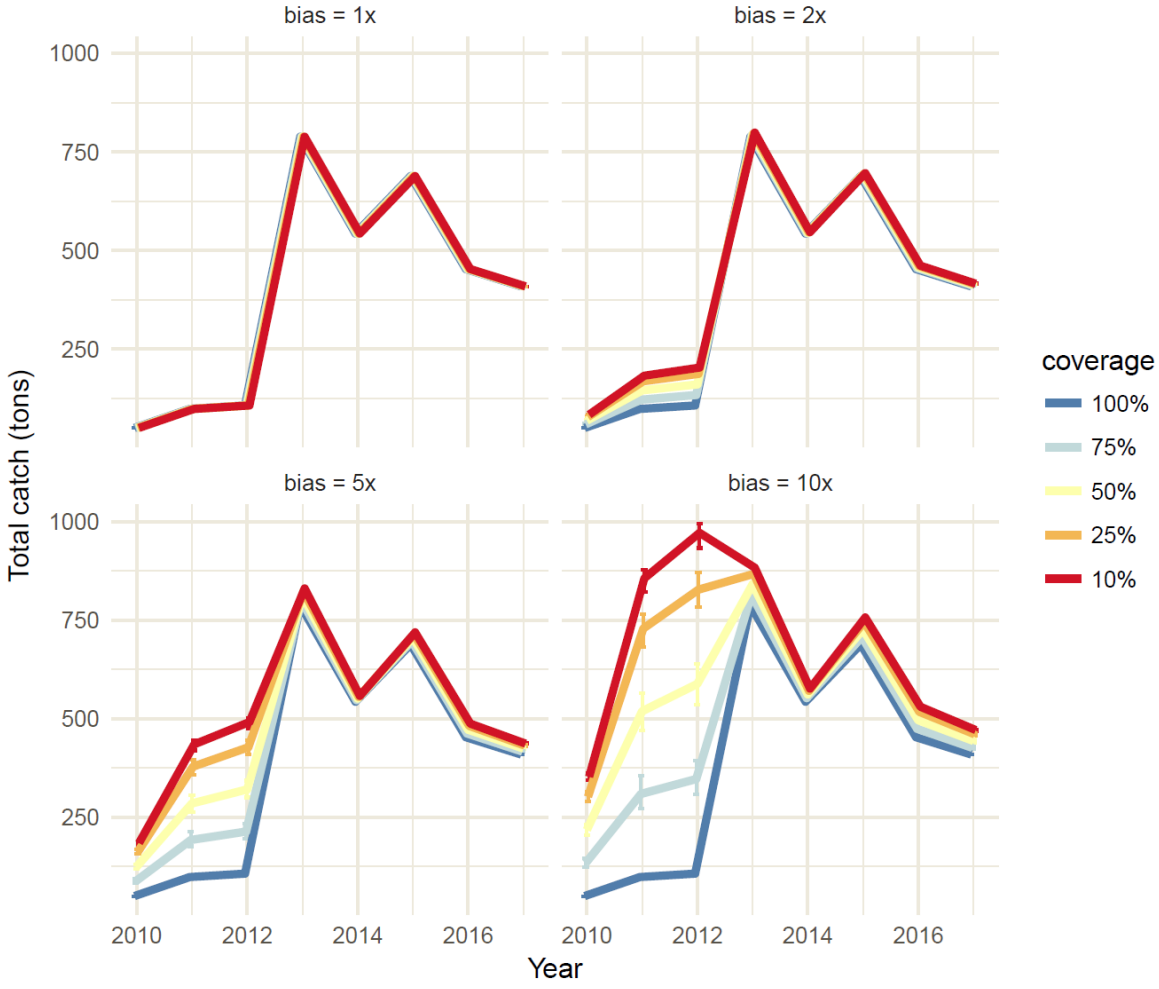


Figure 17 - Eastern GB haddock, total 'true' catch under varying observer coverage and bias.

Figure 18 - Western GB haddock, total 'true' catch under varying observer coverage and bias.

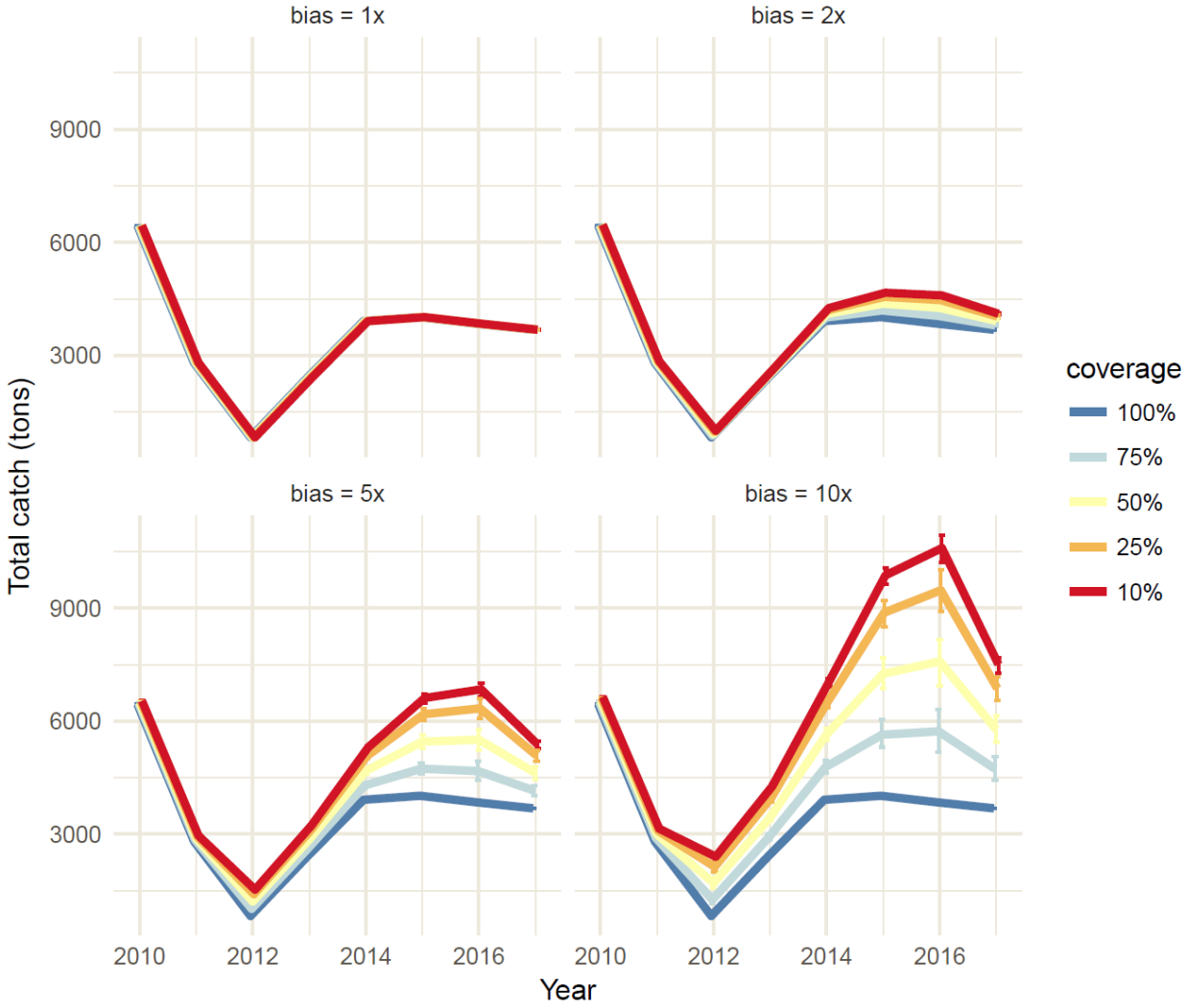


Figure 19 - GOM haddock, total 'true' catch under varying observer coverage and bias.

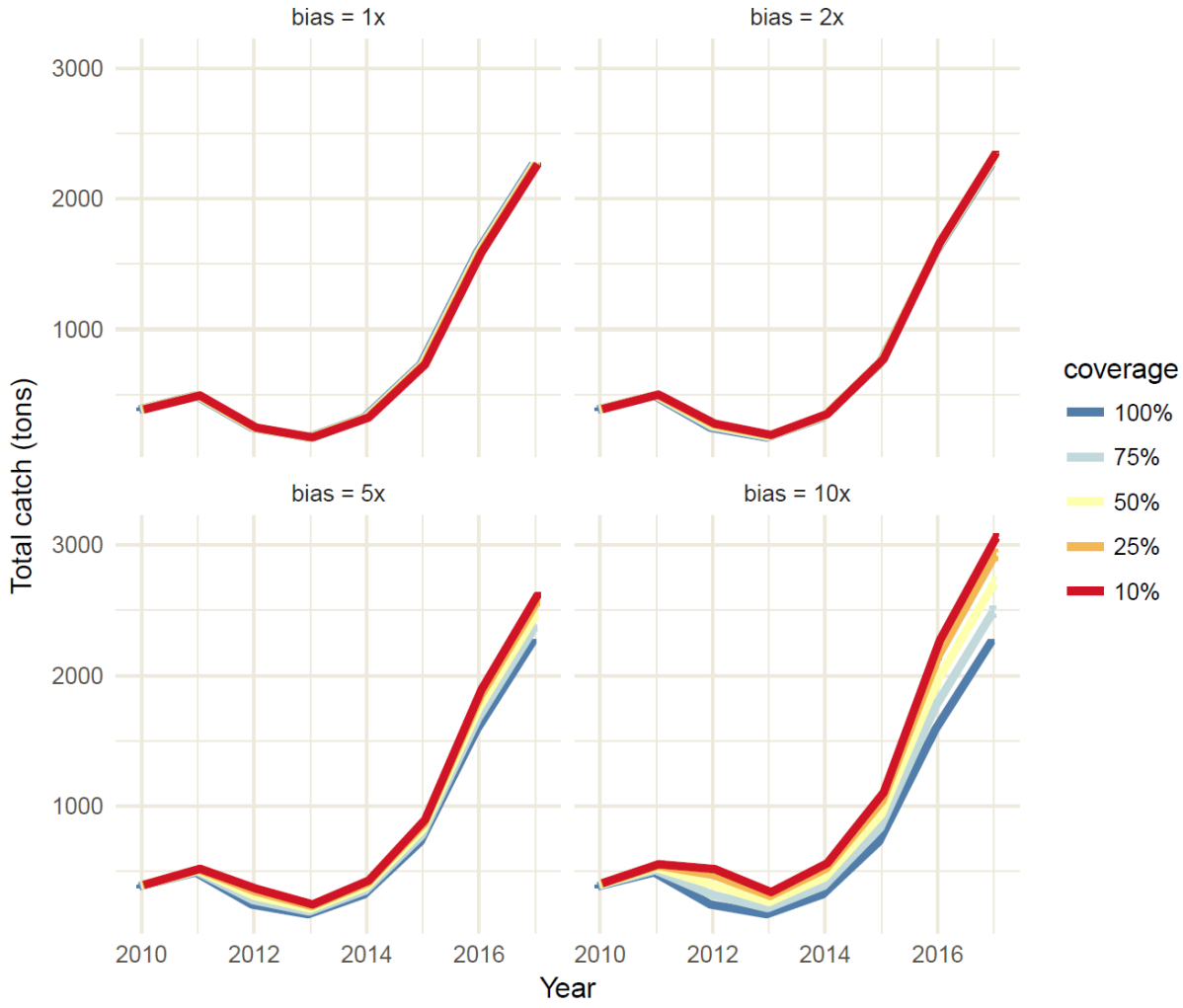


Figure 20 - Atlantic halibut, total 'true' catch under varying observer coverage and bias.

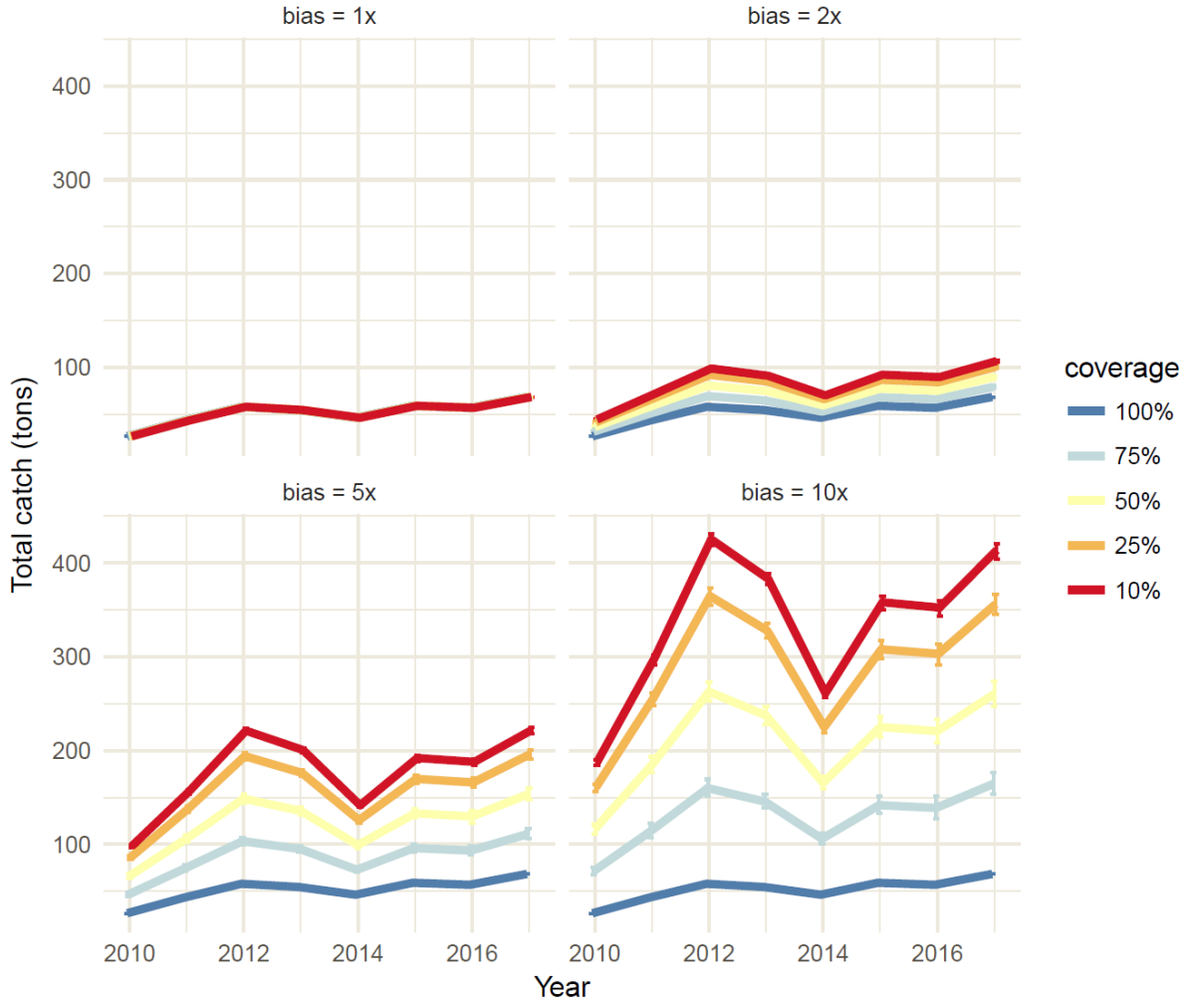


Figure 21 - White hake, total 'true' catch under varying observer coverage and bias.

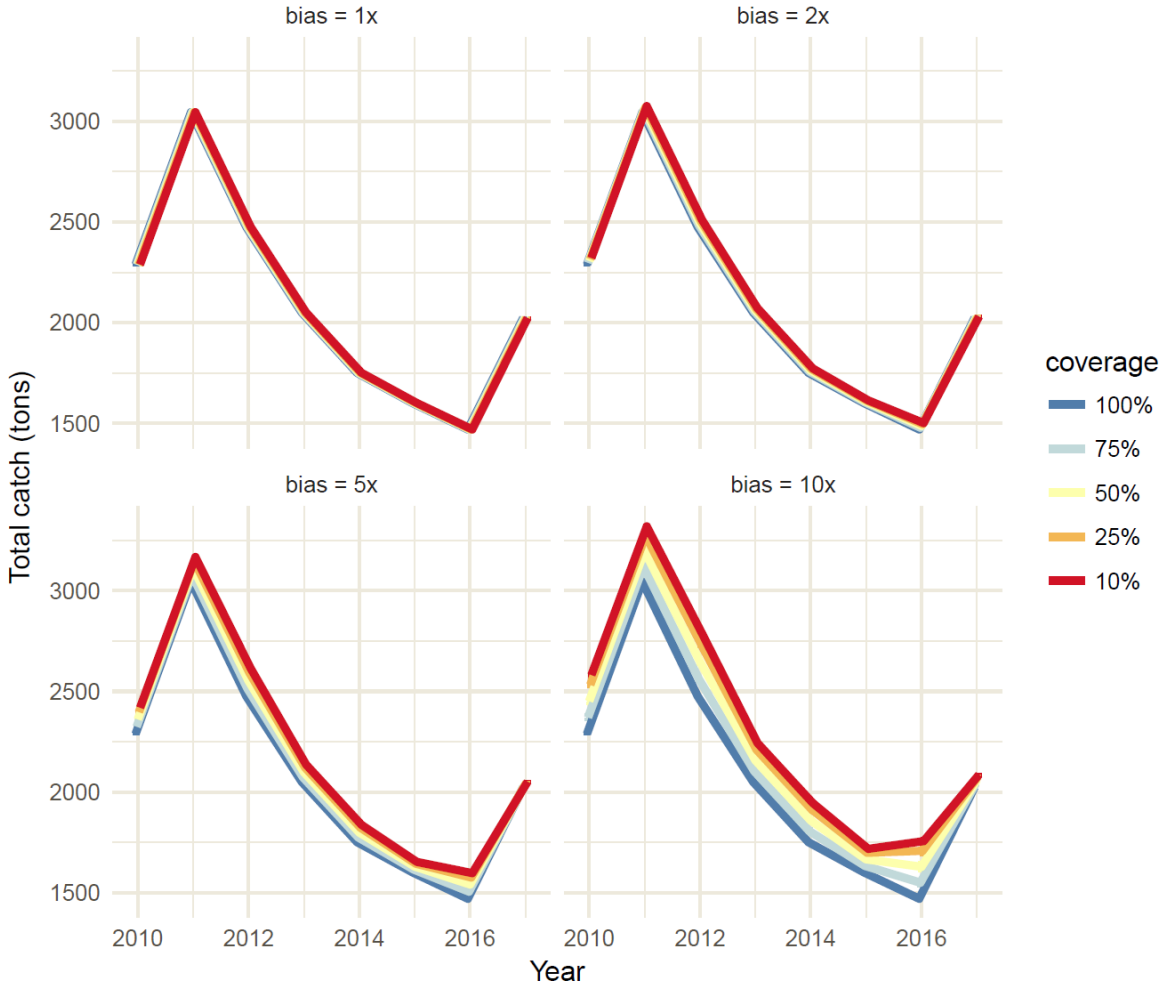


Figure 22 - Ocean pout, total 'true' catch under varying observer coverage and bias.

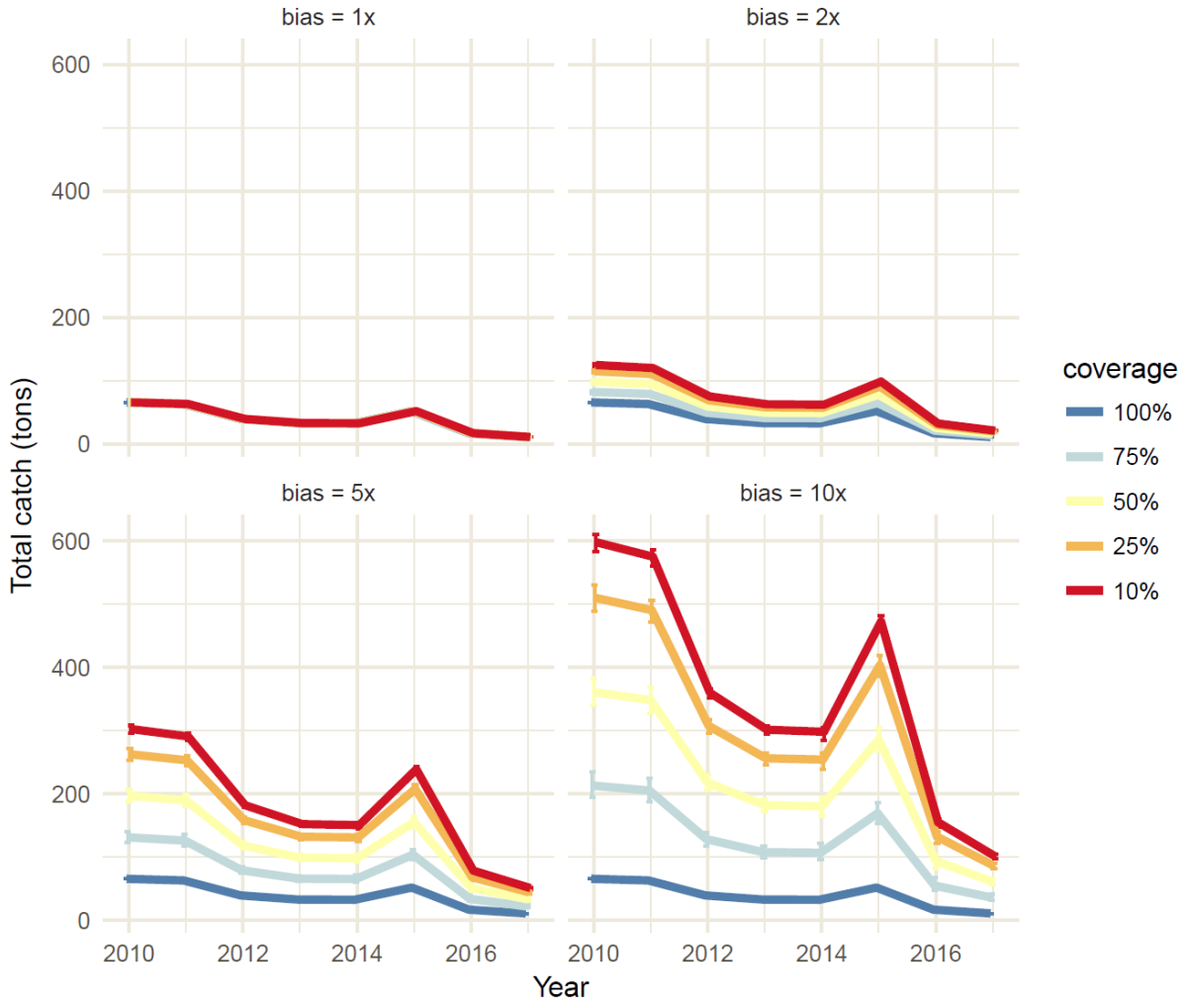


Figure 23 - American plaice, total 'true' catch under varying observer coverage and bias.

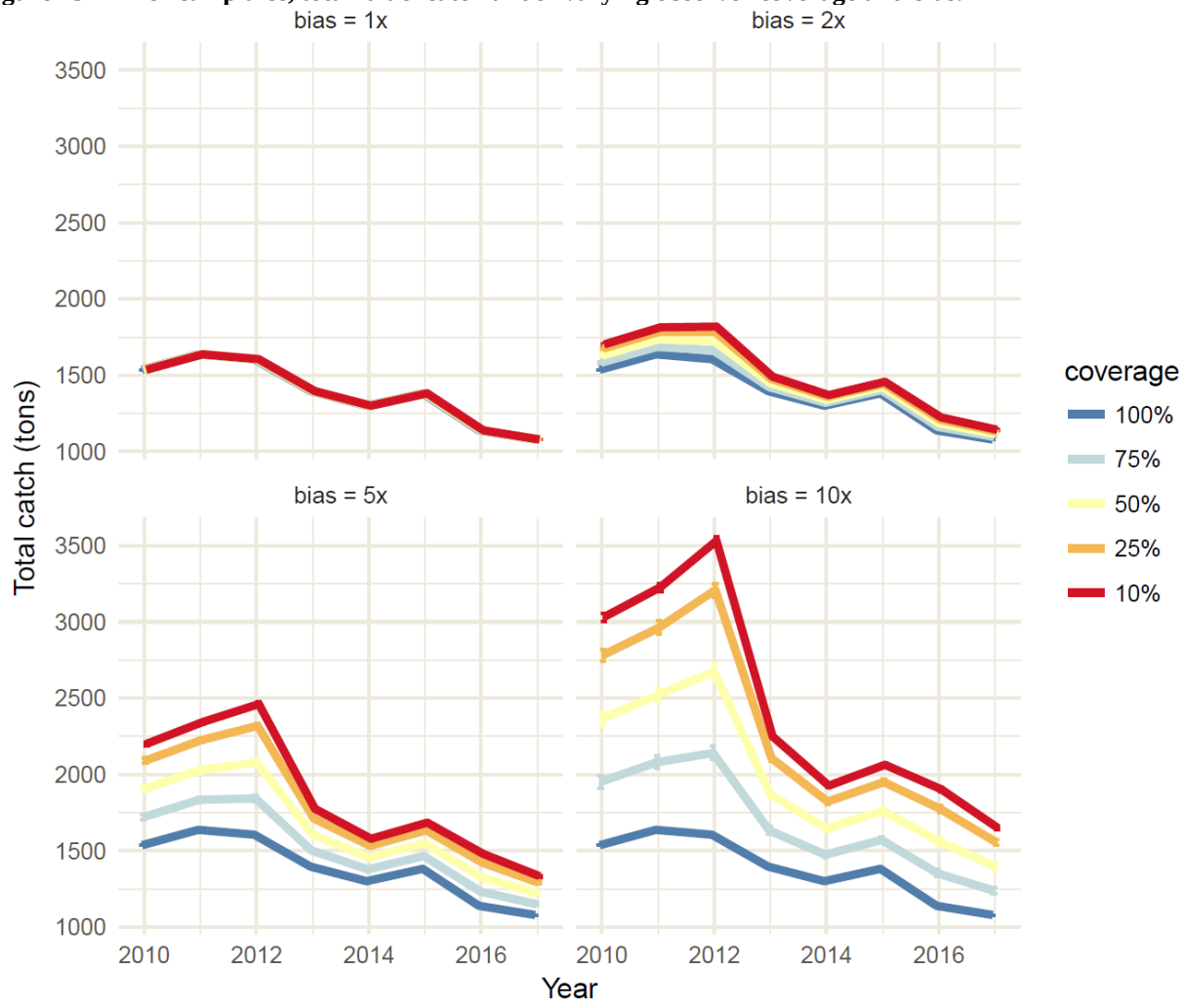


Figure 24 - Pollock, total 'true' catch under varying observer coverage and bias.

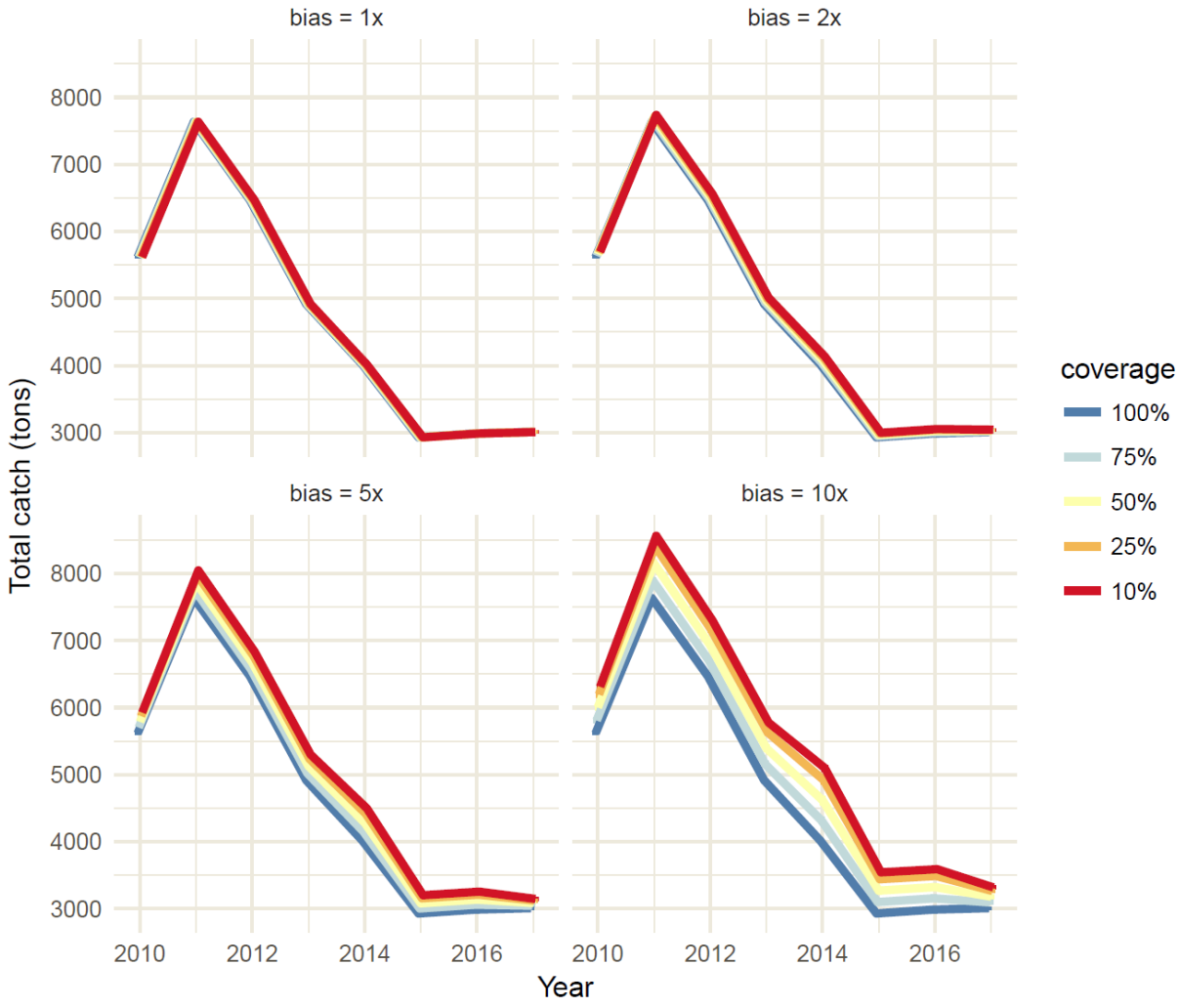


Figure 25 - Redfish, total 'true' catch under varying observer coverage and bias.

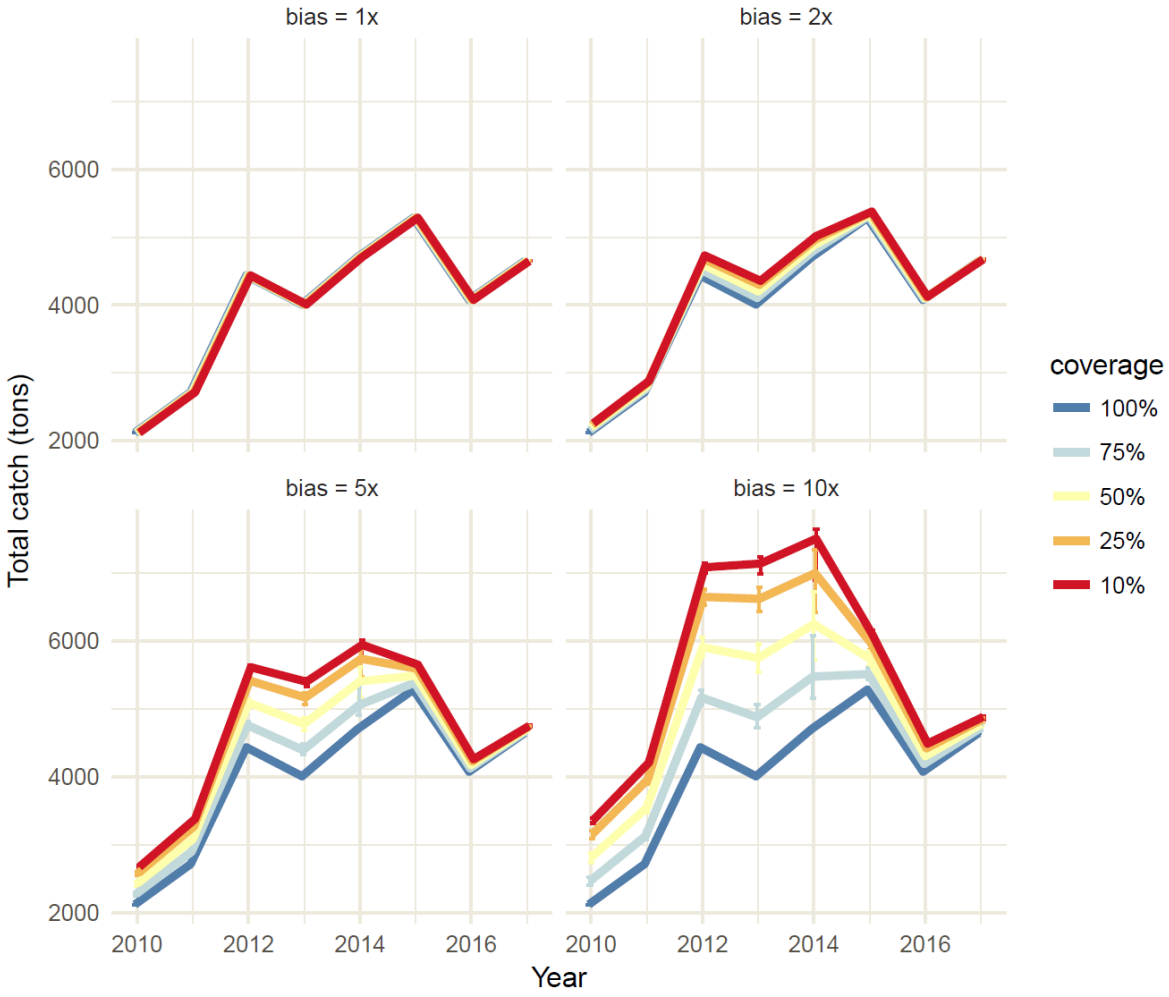


Figure 26 - Witch flounder, total 'true' catch under varying observer coverage and bias.

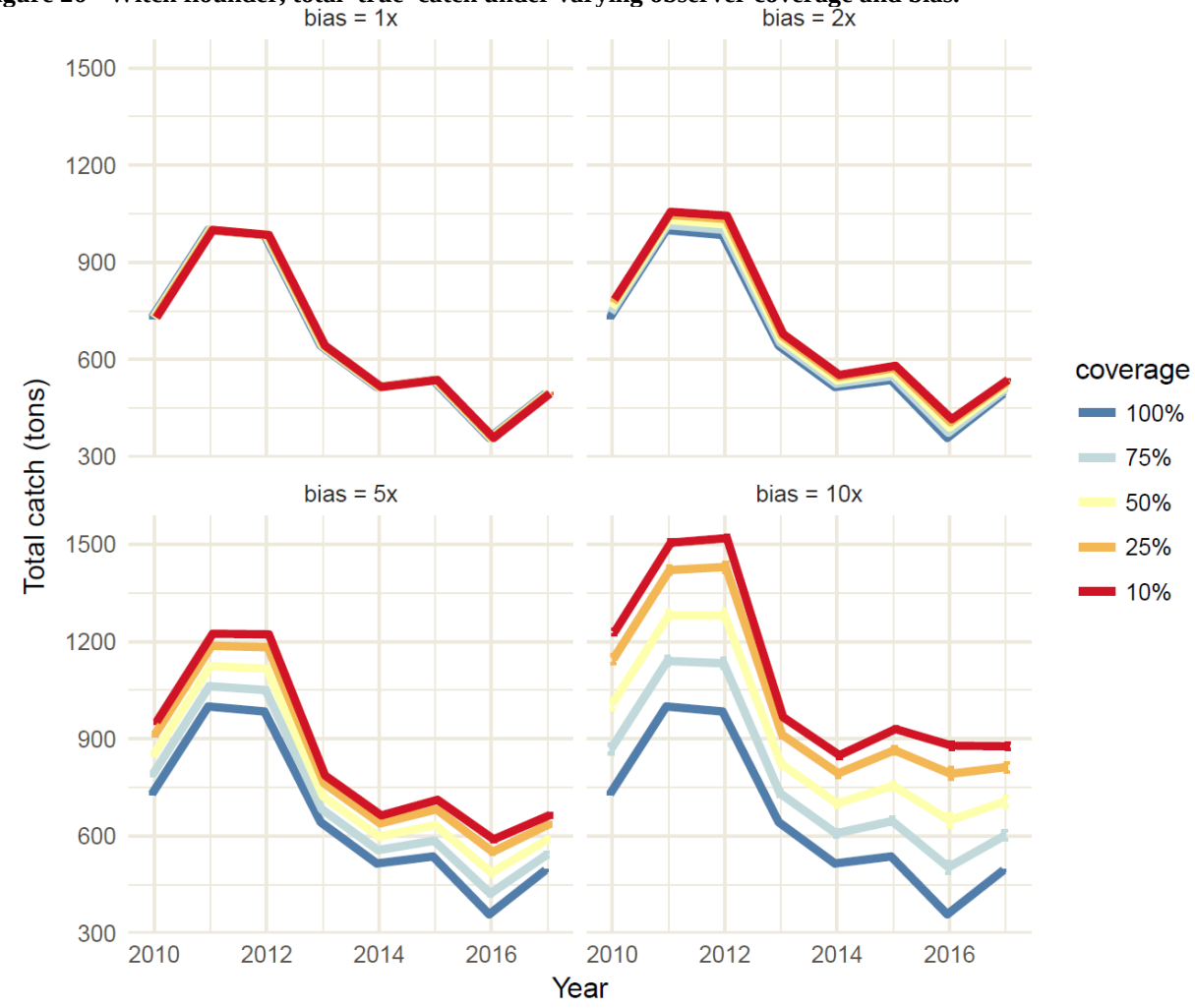


Figure 27 - Wolffish, total 'true' catch under varying observer coverage and bias.

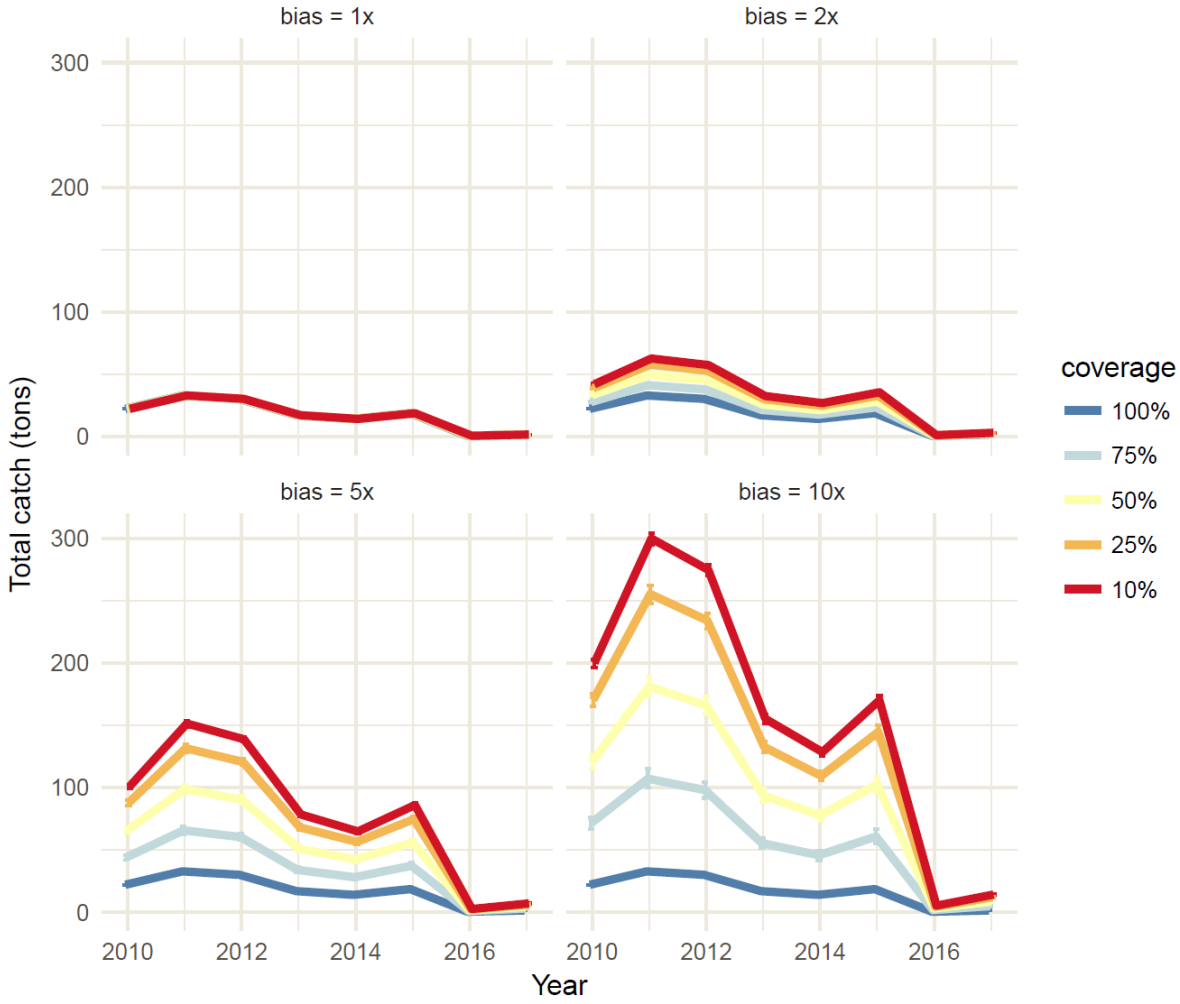


Figure 28 - CC/GOM yellowtail flounder, total 'true' catch under varying observer coverage and bias.

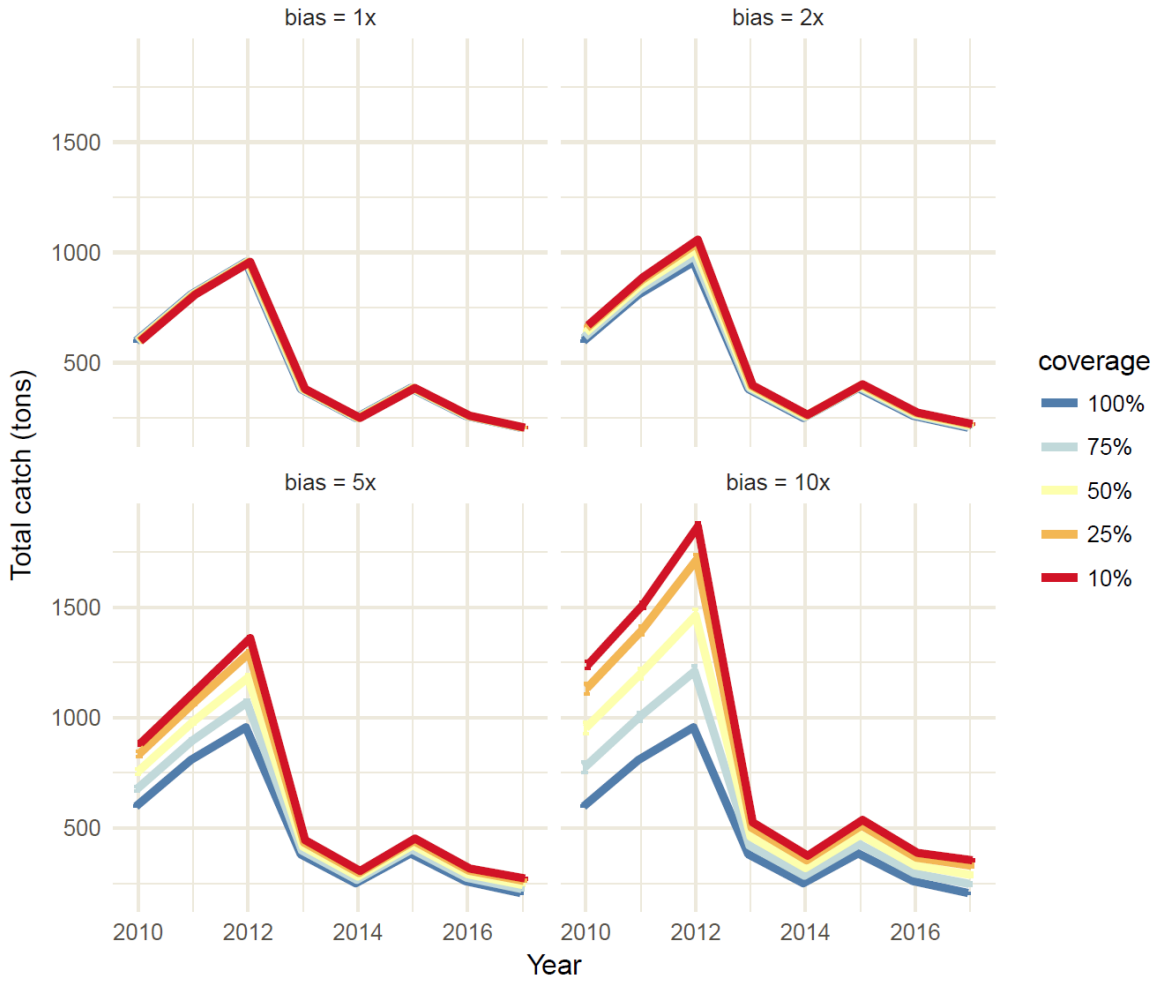


Figure 29 - GB yellowtail flounder, total 'true' catch under varying observer coverage and bias.

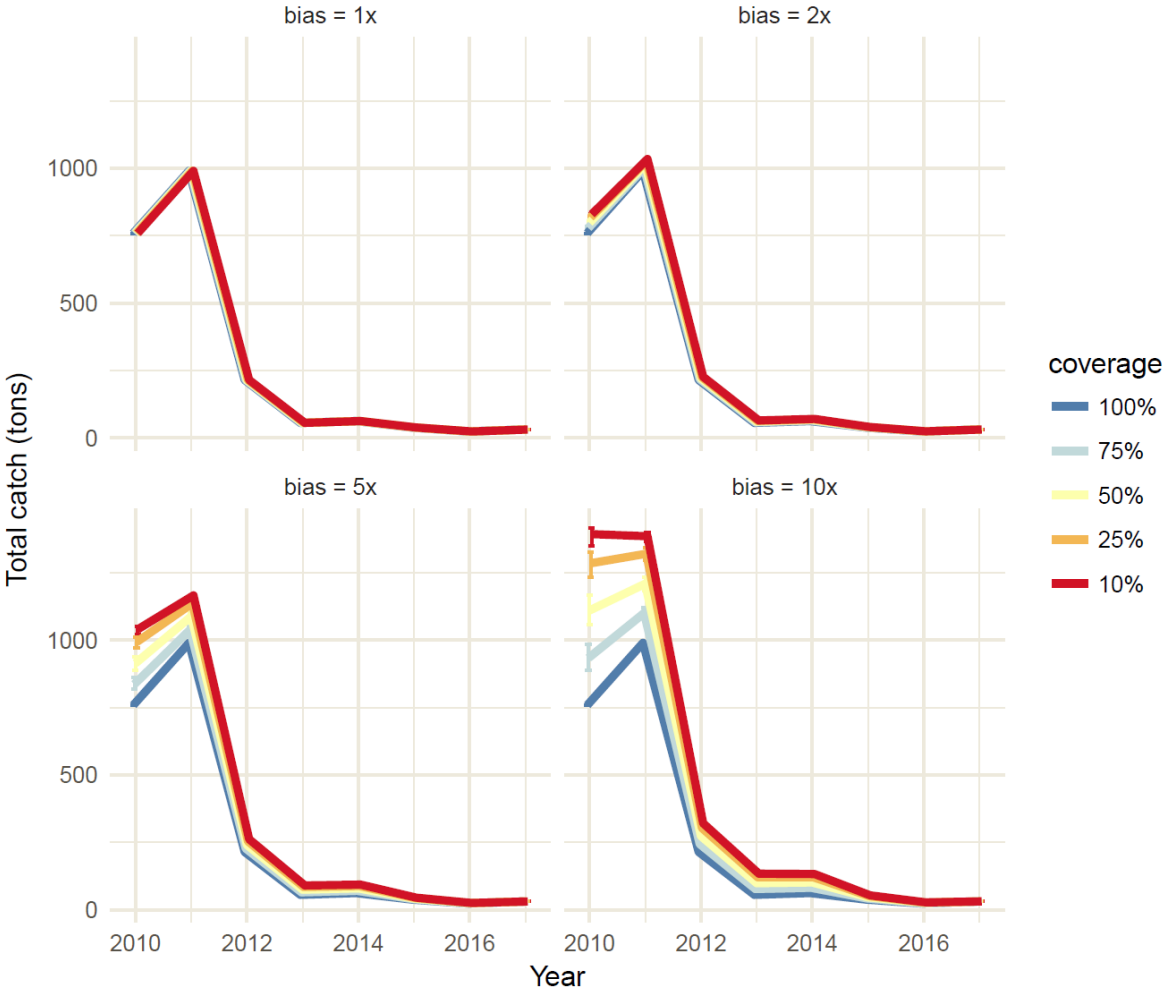


Figure 30 - SNE/MA yellowtail flounder, total 'true' catch under varying observer coverage and bias.

7.1.1.1.1.1 Option 1: No Action

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.1.1.1.2 Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on a Percentage of Trips

Impacts on regulated groundfish

25% coverage would not improve monitoring relative to the no action since the average realized coverage rate for years FY2010-2017 was 22%. Therefore a 25% fix percentage coverage rate is expected to have negative biological impacts relative to the no action alternative.

50% coverage would have slightly higher coverage rates relative to the no action (average coverage rate 22%) alternative. This option is expected to have low positive biological impacts relative to the no action alternative. This option would provide accurate groundfish stock discard estimates for half of all the groundfish trips. However, half of the groundfish trips would not have accurate estimates of discards since PDT analysis (see Appendix IV) has shown that observed trips are not representative of unobserved trips.

75% coverage of all groundfish trips will have accurate estimates of discards so this option has positive biological impacts relative to the 50% 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.

100% coverage 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.

Impacts on other species

To be provided.

7.1.1.1.1.2.1 Substitute Options for Sector Monitoring Tools

7.1.1.1.1.2.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Impacts on regulated groundfish

This option would not produce a change to the biological impacts relative to the no action option 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 white hake. There is a potential negative biological impact for some stocks relative to an equivalent 100% coverage rates using human At-Sea monitors.

Impacts on other species

To be provided.

7.1.1.1.1.2.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Impacts on regulated groundfish

Positive biological impacts 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 discard estimates under this program should be unbiased and accurate. 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.

Impacts on other species

To be provided.

7.1.1.1.1.2.1.3 Sub-Option C: 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. 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_{MSY}) where will lowered the minimum sizes).

Impacts on other species

To be provided.

7.1.1.1.1.3 Option 3: Fixed Total Monitoring Coverage Level Based on a Percentage of Catch

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.1.1.1.3.1 Substitute Options for Sector Monitoring Tools

7.1.1.1.1.3.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.1.1.1.3.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.1.1.1.3.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.1.1.2 Knowing the Total Monitoring Coverage Level at a Time Certain

7.1.1.1.2.1 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.

7.1.1.1.2.2 Option 2: Administrative Measure for 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 primarily administrative.

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.

7.1.1.1.3 Review Process for Sector Monitoring Coverage

7.1.1.1.3.1 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.

7.1.1.1.3.2 Option 2: Administrative Measure to Establish a Review Process for Monitoring Coverage Rates

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.

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.

7.1.1.1.4 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.

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.

7.1.1.2 Groundfish Sector and Common Pool Monitoring Program Revisions

7.1.1.2.1 Dockside Monitoring Program

The following is an overview of possible short and long-term impacts of 100% monitoring 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 shifting from low information content empirical approaches to the development of full analytical assessments

Review of International Monitoring Programs in Catch Share Managed Fisheries

21 programs were reviewed across the U.S., Canada, Iceland, Argentina, New Zealand, and Australia. Programs that institute different monitoring requirements for different vessel size classes, gear types, or catch and process at sea. Nearly all of the 16 U.S. catch share programs are included, excluding just the invertebrate Surfclam and Ocean Quahog ITQs. Majority of programs reviewed utilize trawl gear (bottom

or mid-water), but fisheries utilizing 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 and Argentine IFQ programs. The remaining 6 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 1 of 8 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.

7.1.1.2.1.1 Option 1: No Action

Impacts on regulated groundfish

If this option is selected, a dockside monitoring 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. An accurate estimate of groundfish catch is critical for stock assessments, as many assessment models assume that the magnitude and age structure if removals is known without error. 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 and 3.

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 and 3, this alternative is expected to have negative biological impacts for other species.

7.1.1.2.1.2 Option 2: Dockside Monitoring Program for the Entire Commercial Groundfish Fishery (Sectors and Common Pool)

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 for compliance during offload (see Appendix II). 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. As such, fishing effort may be reduced under this alternative. Relative to No Action, this alternative is expected to have low positive biological impacts for other species.

7.1.1.2.1.3 Option 3: Dockside Monitoring Program as an Optional Program for Sectors

Impacts on regulated groundfish

This option would establish a voluntary dockside monitoring program that sectors could use as a supplemental tool to monitor their groundfish landings. As such, this measure could lead to greater certainty in the magnitude of groundfish landings. The biological impacts of this alternative are uncertain, because it is not known how many sectors will choose to voluntarily implement a dockside monitoring program. The biological benefits are expected to be directly proportional to the number of sectors that choose to establish this monitoring program. If no sectors choose to establish a voluntary dockside monitoring program, then the biological impact of this option is negligible in relation the No Action. However, if sectors choose to exercise this option, then the biological benefits would be positive, relative to No Action.

Impacts on other species

This alternative would provide an optional program that sectors can establish to provide an independent verification of their groundfish landings. As such, this alternative will ensure that sector vessels do not exceed their ACE. However, the biological impacts of this alternative will depend upon the proportion of sectors that choose to establish this voluntary program. If some proportion of sectors chose to implement this program, there is a potential that fishing effort may be reduced under this alternative, which would result in low positive biological impacts for other species, relative to No Action. However, if sectors do not choose to establish a voluntary dockside monitoring program, the biological impacts are expected to be negligible relative to No Action.

7.1.1.2.1.4 Dockside Monitoring Program Structure and Design

7.1.1.2.1.4.1 Sub-Option 1: Dockside Monitoring Program Funding Responsibility

Sub-Option 1A: Dockside Monitoring as a Dealer Responsibility

Impacts on regulated groundfish
Sub-Option 1A would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Sub-Option 1A 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.

Sub-Option 1B: Dockside Monitoring as a Vessel Responsibility

Impacts on regulated groundfish
Sub-Option 1B would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Sub-Option 1B 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.

7.1.1.2.1.4.2 Sub-Option 2: Dockside Monitorng Program Administration

Sub-Option 2A: Individual contracts with dockside monitor providers

Impacts on regulated groundfish
Sub-Option 2A would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Sub-Option 2A 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.

Sub-Option 2B: NMFS-administered dockside monitoring program

Impacts on regulated groundfish
Sub-Option 2B would not be expected to have direct or indirect impacts on regulated groundfish species. This measure is primarily administrative.

Impacts on other species
Sub-Option 2B 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.

7.1.1.2.1.4.3 Sub-Option 3: Options for Reconciling Discrepancies between Dealer Reports and Dockside Monitor Reports

Sub-Option 3A: Whichever record is higher is the official record

Impacts on regulated groundfish
Sub-Option 3A would not be expected to have direct or indirect impacts on regulated groundfish species, unless the highest record lead to an inaccurate catch estimate and this outcome is uncertain. This measure is primarily administrative.

Impacts on other species
Sub-Option 3A 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.

Sub-Option 3B: Dealer reports remain the official record, with comparison to dockside monitor reports

Impacts on regulated groundfish
Sub-Option 3B would not be expected to have direct or indirect impacts on regulated groundfish species unless the Dealer's record leads to an inaccurate catch estimate and this outcome is uncertain. This measure is primarily administrative.

Impacts on other species
Sub-Option 3B 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.

7.1.1.2.1.4.4 Sub-Option 4: Options for Lower Coverage Levels in Small, Remote Ports and for Small Vessels with Low Landings

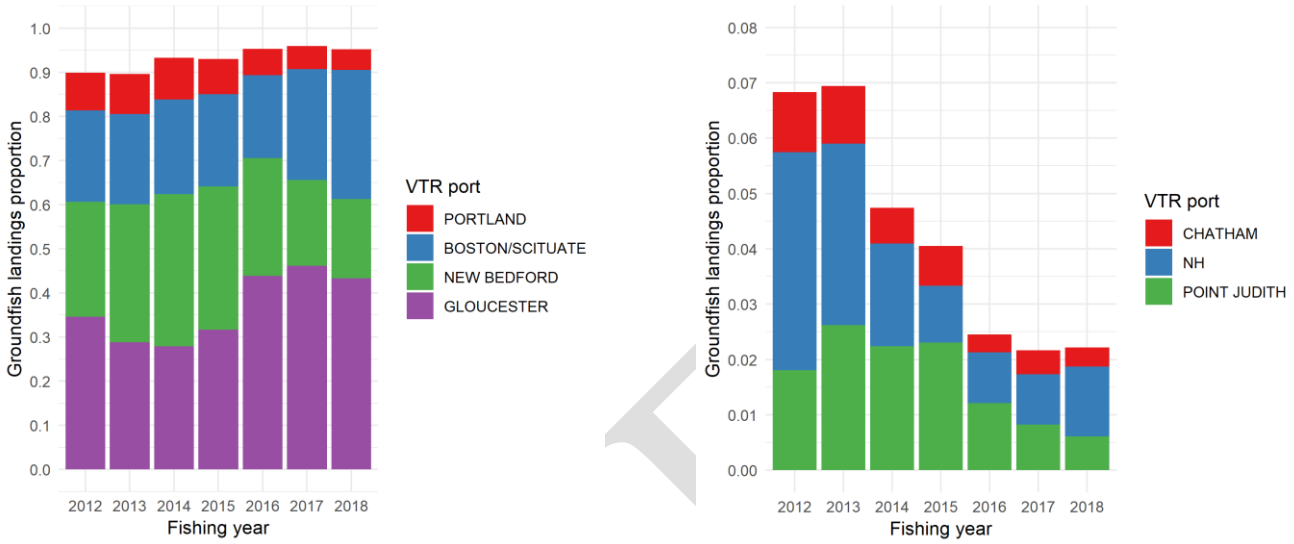
Sub-Option 4A: Lower coverage levels for small, remote ports

Analysis of total annual groundfish landings by port to determine the landings threshold for lower coverage for small, remote ports

This option would allow for lower levels of dockside monitoring for small, remote ports to act as a "spot check." To determine which ports would be consider "small and remote", an analysis of total annual groundfish landings by port was done. Ports with total annual groundfish landings volumes in the 5th percentile of total annual landings volume were determined to be small and remote and would receive lower "spot check" coverage. This means that ports which land approximately 5 to 10 percent of total groundfish pounds each year would be exempted from 100 percent coverage and would receive 20 percent coverage instead, as a spot check. Ports that land 90-95 percent of groundfish for 2012-2018 would receive 100 percent coverage. The ports that cover ~95 percent of landings are those in the top five – New Bedford, Gloucester, Boston, Scituate, and Portland (Figure 31a). Dealers in these ports, or vessels landing in these ports, would receive 100 percent coverage. All other ports would be considered "small and/or remote" 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. The 5th through 7th ranked ports by proportion of total annual groundfish landings are also shown for comparison (Figure 31b). This measure would include a periodic re-evaluation of what constitutes a "small port" based on landings volumes, to

occur after two years of landings data is available and every three years after that.

Figure 31 - Proportion of total annual groundfish landings by port from FY2012-2018; a) for the top four ports (Boston/Scituate combined); b) for the 5th-7th ranked ports (NH includes Portsmouth, Rye, and Seabrook).



Impacts on regulated groundfish

This option would allow for lower levels of dockside monitoring coverage for small, remote ports. 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 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 monitoring for the entire commercial groundfish fishery, this option would be expected to have negative impacts on regulated groundfish since dockside monitoring coverage would be lower for certain ports under this option. However, landings from the small 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 31a). Impacts relative to Option 3 are somewhat unclear, as it is not known how many sectors will choose to voluntarily implement a dockside monitoring program. The biological benefits are expected to be directly proportional to the number of sectors that choose to establish this monitoring program. If no sectors choose to establish a voluntary dockside monitoring program, then the biological impact of this option is positive relative to Option 3. However, if sectors choose to exercise this option, then the biological benefits may be negligible, relative to Option 3.

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

Impacts on other species

This option would allow for lower levels of dockside monitoring coverage for small, remote ports. 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.

Relative to Option 2, which would require 100 percent monitoring for the entire commercial groundfish fishery, this option would be expected to have negative impacts on non-groundfish since dockside monitoring coverage would be lower for certain ports under this option. However, landings from the small 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 31a). Impacts relative to Option 3 are somewhat unclear, as it is not known how many sectors will choose to voluntarily implement a dockside monitoring program. The biological benefits are expected to be directly proportional to the number of sectors that choose to establish this monitoring program. If no sectors choose to establish a voluntary dockside monitoring program, then the biological impact of this option is positive relative to Option 3. However, if sectors choose to exercise this option, then the biological benefits may be negligible, relative to Option 3.

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

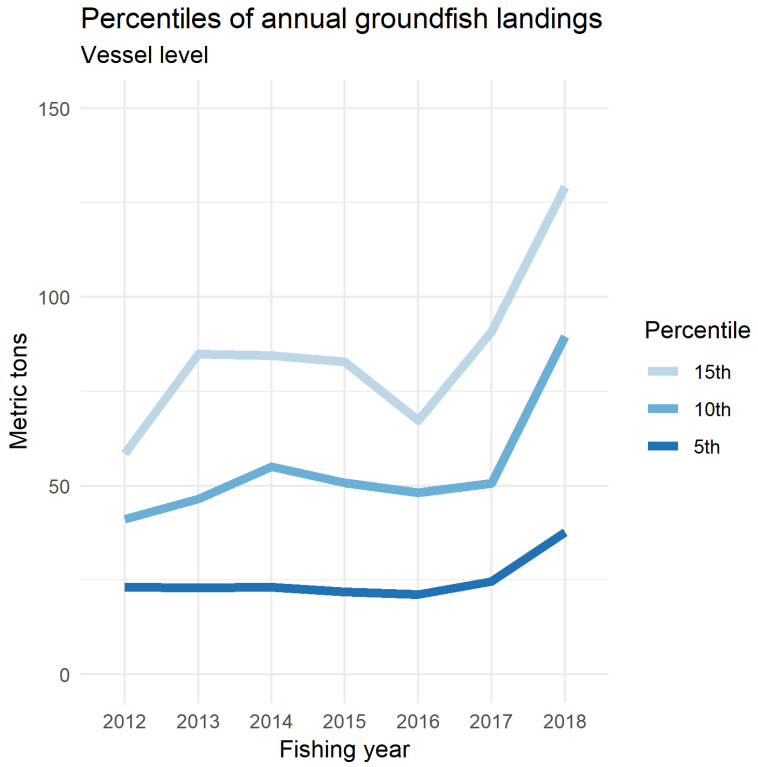
Sub-Option 4B: Lower coverage for low volume vessels

Analysis of total annual groundfish landings by vessel to determine the landings threshold for lower coverage for small, low volume vessels

This option would allow for lower levels of dockside monitoring for smaller, low volume vessels to act as a "spot check." To determine which vessels would be consider "small and 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 were determined to be low volume and would receive lower "spot check" coverage. This means that vessels which land approximately 5 to 10 percent of total groundfish pounds each year would be exempted from 100 percent coverage and receive 20 percent coverage instead, as a spot check. Vessels that land 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 55,000lbs or more annually on average from 2012-2018 (Figure 32). Vessels landings 55,000lbs or more annually, or dealers receiving offloads from vessels with annual landings volumes of 55,000lbs or more, would receive 100 percent coverage. Vessels with annual landings volumes of less than 55,000lbs, or dealers receiving offloads from vessels with annual landings volumes of less than 55,000lbs, 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 32 - Percentiles of total annual groundfish landings from FY2012-2018.



Impacts on regulated groundfish

This option would allow for lower levels of dockside monitoring coverage for small, low volume vessels. 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 if 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 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 (**Error! Reference source not found.**). Impacts relative to Option 3 are somewhat unclear, as it is not known how many sectors will choose to voluntarily implement a dockside monitoring program. The biological benefits are expected to be directly proportional to the number of sectors that choose to establish this monitoring program. If no sectors choose to establish a voluntary dockside monitoring program, then the biological impact of this option is positive relative to Option 3. However, if sectors choose to exercise this option, then the biological benefits may be negligible, relative to Option 3.

Periodic evaluation of landings volumes is intended to mitigate any 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

This option 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.
Relative to Option 2, which would require 100 percent monitoring for the entire commercial groundfish fishery, this option would be expected to have 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 (**Error! Reference source not found.**a). Impacts relative to Option 3 are somewhat unclear, as it is not known how many sectors will choose to voluntarily implement a dockside monitoring program. The biological benefits are expected to be directly proportional to the number of sectors that choose to establish this monitoring program. If no sectors choose to establish a voluntary dockside monitoring program, then the biological impact of this option is positive relative to Option 3. However, if sectors choose to exercise this option, then the biological benefits may be negligible, relative to Option 3.

Periodic evaluation of landings volumes is intended to mitigate any 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.

7.1.1.2.1.4.5 Sub-Option 5: Options for Dockside Monitor Safety and Liability Associated with Fish Hold Inspections

Sub-Option 5A: Dockside monitor fish hold inspections required

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

Sub-Option 5B: Alternative methods for inspecting fish holds

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

Sub-Option 5C: No fish hold inspection required, captain signs affidavit

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.2 Sector Reporting

7.1.2.1 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.

7.1.2.2 Option 2: Grant Regional Administrator the Authority to Streamline Sector Reporting

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.

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.

7.1.3 Funding/Operational Provisions of Groundfish Monitoring

7.1.3.1 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, 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.

7.1.3.2 Option 2: Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.1.3.2.1 Sub-Option 2A: Additional NMFS Funding for Increased Monitoring if Funds Available

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. 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. 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 4.1.1.1), 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.

7.1.3.2.2 Sub-Option 2B: Waivers from Monitoring Requirements Allowed

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. 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.

7.1.4 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors and Common Pool)

Add PDT memo on uncertainty buffers – *to be provided.*

7.1.4.1 Option 1: No Action

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.4.2 Option 2: Revised Management Uncertainty Buffers for Allocated Groundfish Stocks

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.4.3 Option 3: Elimination of Management Uncertainty Buffer for Sector ACL with 100 Pecent Monitoring of All Sector Trips

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.5 Exemptions from Groundfish Sector and Common Pool Monitoring Requirements

7.1.5.1 Option 1: No Action

Analysis from FW55 – to be updated

Option 1/No Action would maintain the existing exemptions from groundfish monitoring program requirements. These include the exemption from 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. 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 exempt 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 33 and Figure 35). These exemptions, 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 exemptions have the potential to introduce sampling bias if not applied across all 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.

Impacts on regulated groundfish

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

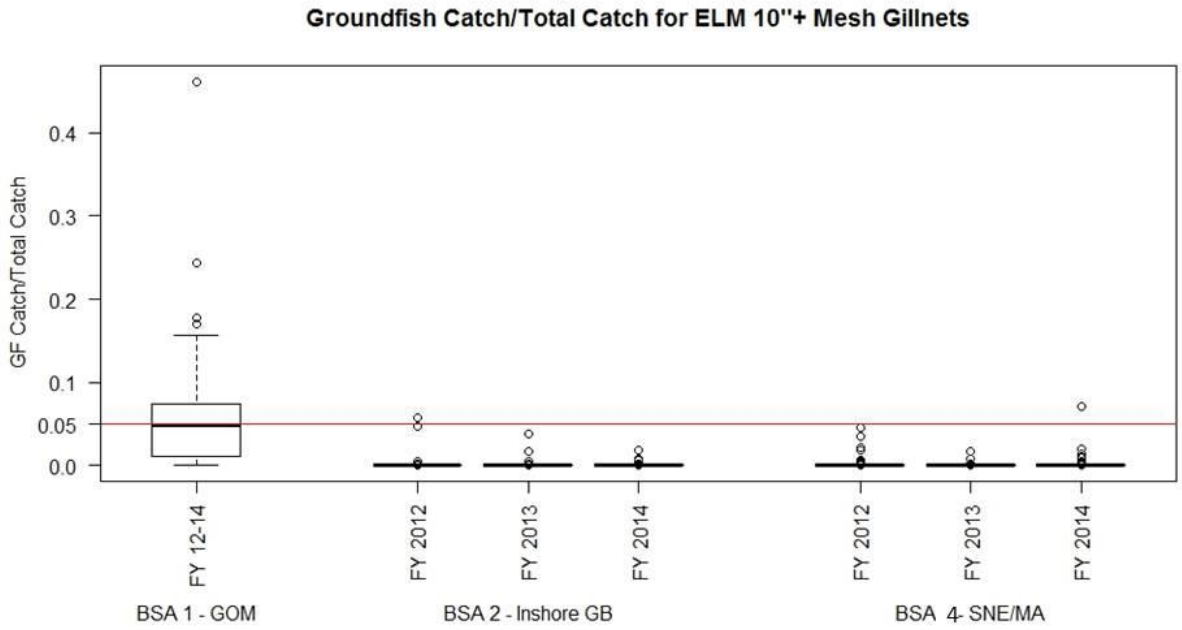
Catches of regulated groundfish stocks on observed sector trips fishing exclusively ELM have been consistently low in BSAs 2 and 4 (Figure 33). Median groundfish catches within this universe of sector trips were zero for each individual fishing year in BSAs 2 and 4, with two trips in the time series with groundfish catches in excess of 5% of total catch (Figure 25).

Impacts on other species

Under Option 1/No Action, impacts on other species are expected to be low negative, since the existing exemptions remove ASM requirements for a subset of sector trips. Impacts on other species, such as skates, monkfish, and dogfish relative to Sub-Option 2A are likely to be low positive since Sub-Option 2A would exempt vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a trip from at-sea monitoring and/or dockside monitoring (if implemented), 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 Sub-Option 2B are similar and likely to be low positive since Sub-Option 2B would exempt vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a trip from at-sea monitoring and/or dockside monitoring (if implemented), in addition to maintaining that ELM trips in BSAs 2 and 4 would not be subject to ASM coverage. Impacts of Sub-

Option 2A may be slightly less negative relative to Option 1/No Action then for Sub-Option 2B, as the area for the exemptions is slightly larger under Sub-Option 2B than in Sub-Option 2A. 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.

Figure 33 - Groundfish catch as a proportion of total catch on observed sector trips by fishing year and BSA.



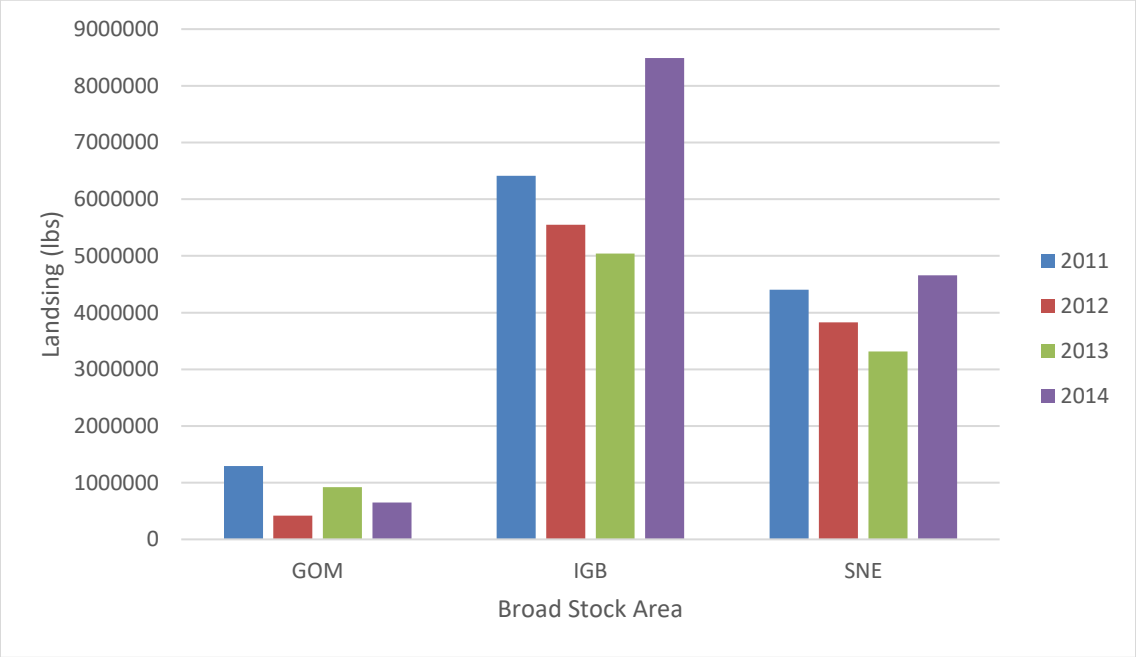
Kept catch on sector gillnet trips fishing only mesh size of 8” or greater varies greatly by BSA fished (Table 57), with the majority of landings coming from BSA 2, inshore Georges Bank. **Error! Reference source not found.** depicts annual landings of ELM 8”+.

Table 57 - 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	

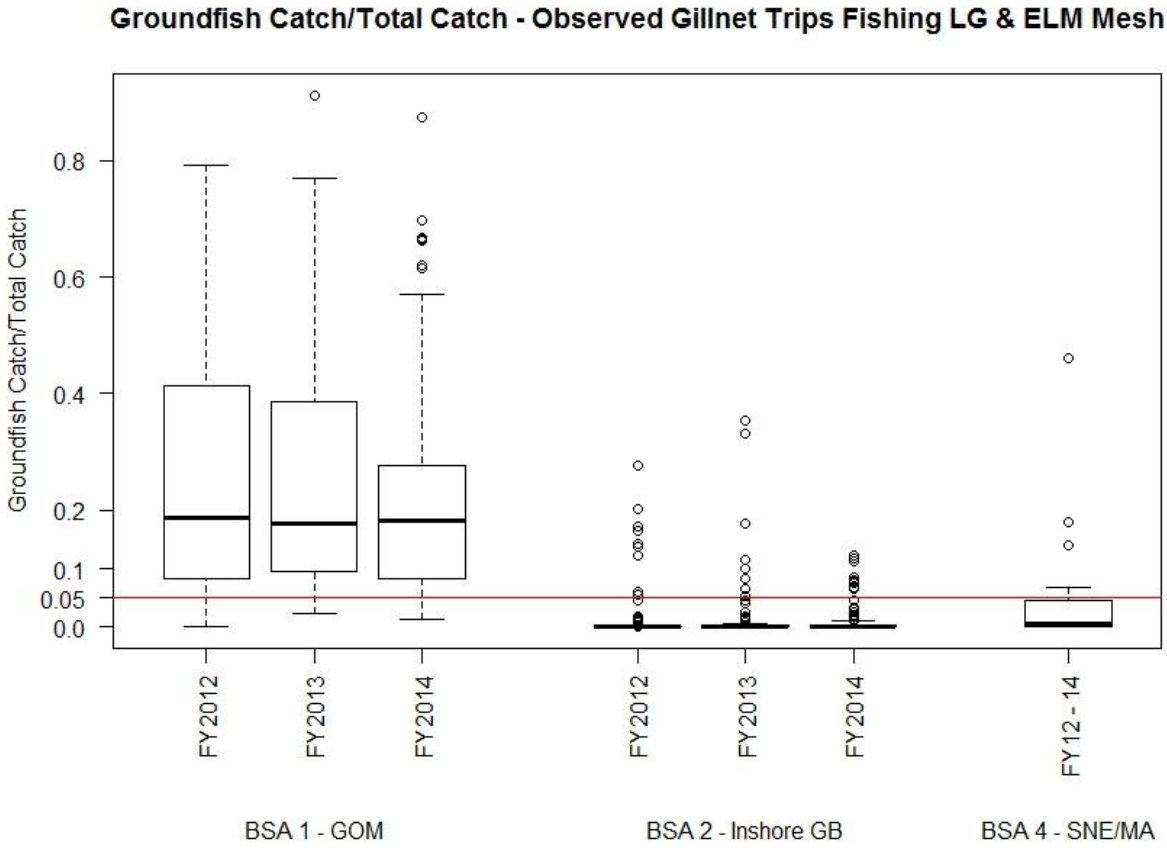
2012	SNE	3,829,406	39	
2013	GOM	922,521	16	
2013	IGB	5,042,322	14	
2013	SNE	3,313,405	35	
2014	GOM	652,975	18	
2014	IGB	8,492,619	17	
2014	SNE	4,659,861	29	
Total	GB	22,864	5	
Total	GOM	3,290,040	38	
Total	IGB	25,498,623	20	
Total	SNE	16,207,043	45	
Note GB by year are confidential due to fewer than three vessel reports.				
Based on DMIS SSB tables as of 10/23/15				

Figure 34 - 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 35 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 35 - 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.



7.1.5.2 Option 2: Exemption for Certain Vessels Based on Fishing Location

Groundfish catch west of –72.5 degrees

We 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 58 and Table 59 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 60 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 36 and Figure 37 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 58 - 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 59 - 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 60 - 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 36 - Landings on all groundfish trips, 2010-2017.

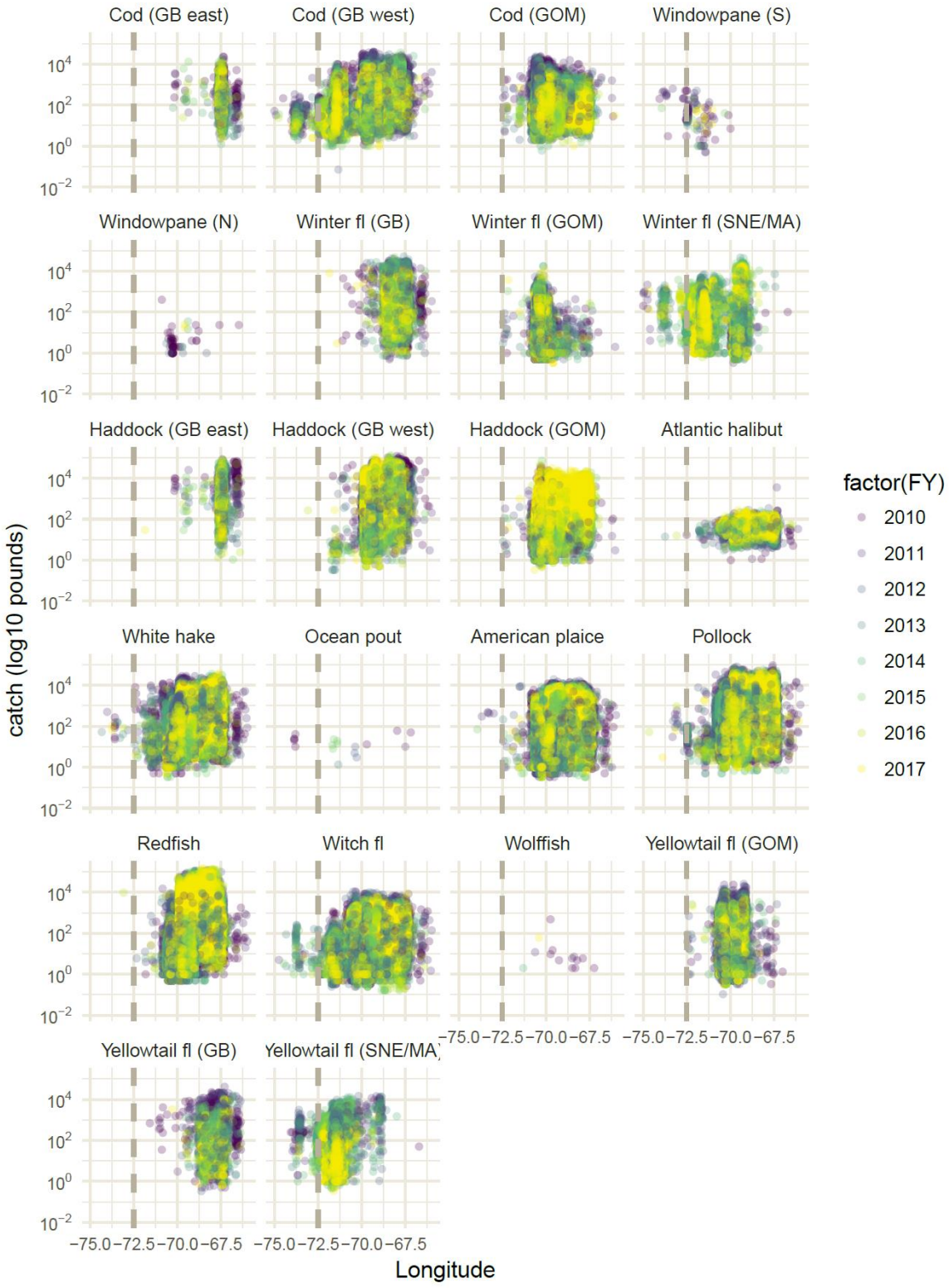
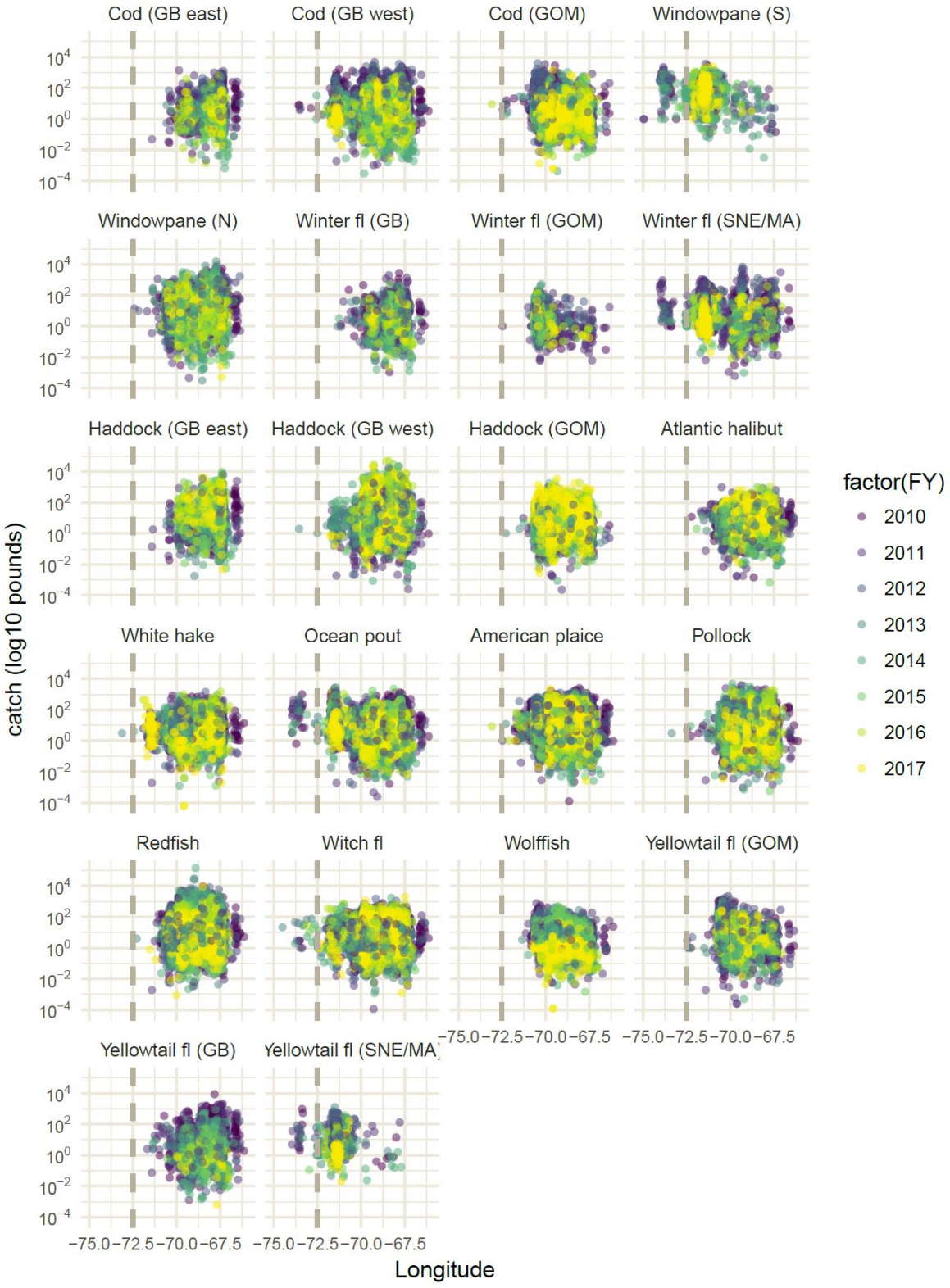


Figure 37 - Discards on observed groundfish trips, 2010-2017.



Groundfish catch west of –71.5 degrees

We 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 61 and Table 62 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 63 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 38 and Figure 39 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 61 - 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 62 - 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 63 - 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 38 - Landings on all groundfish trips 2010-2017.

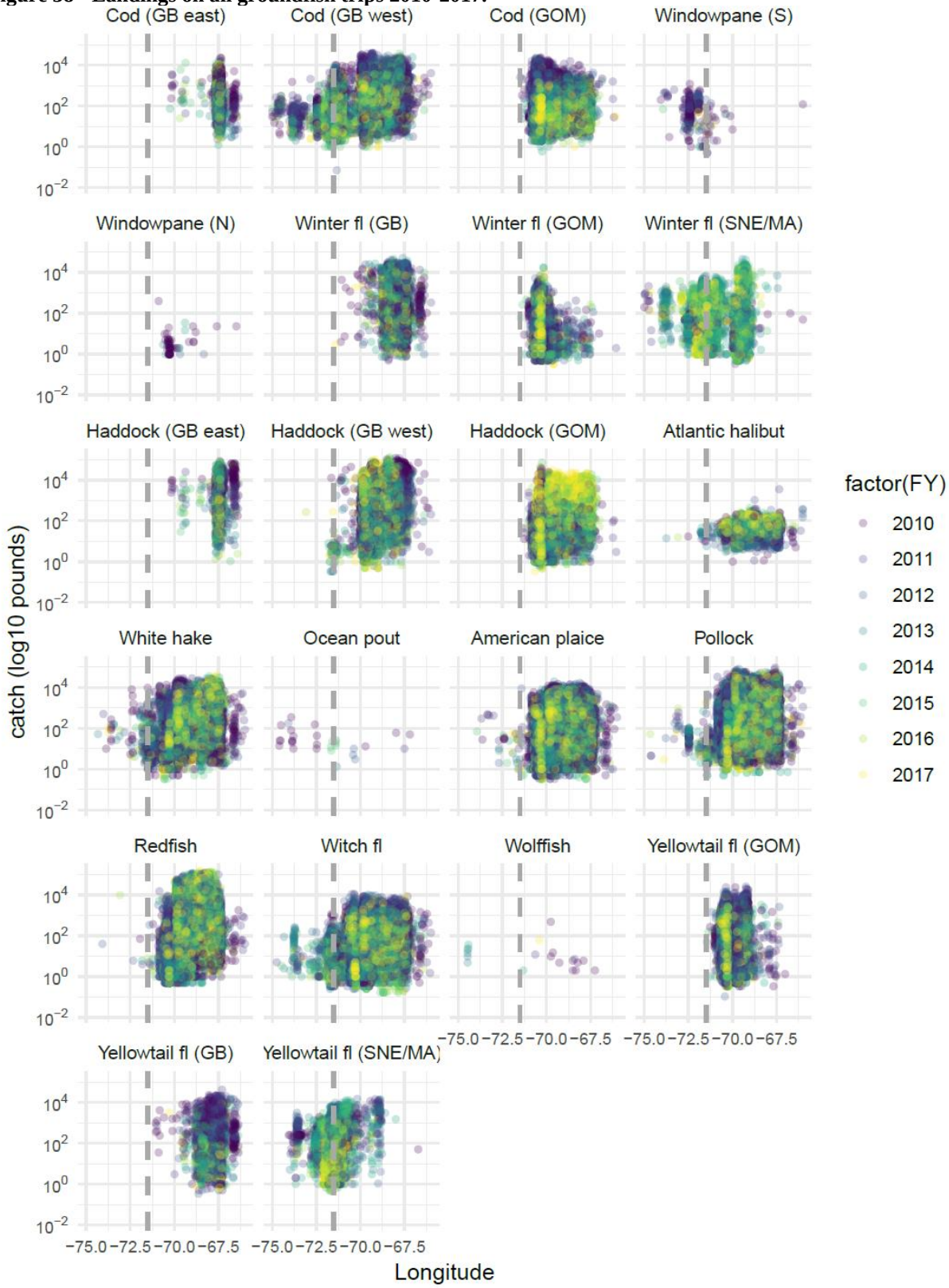
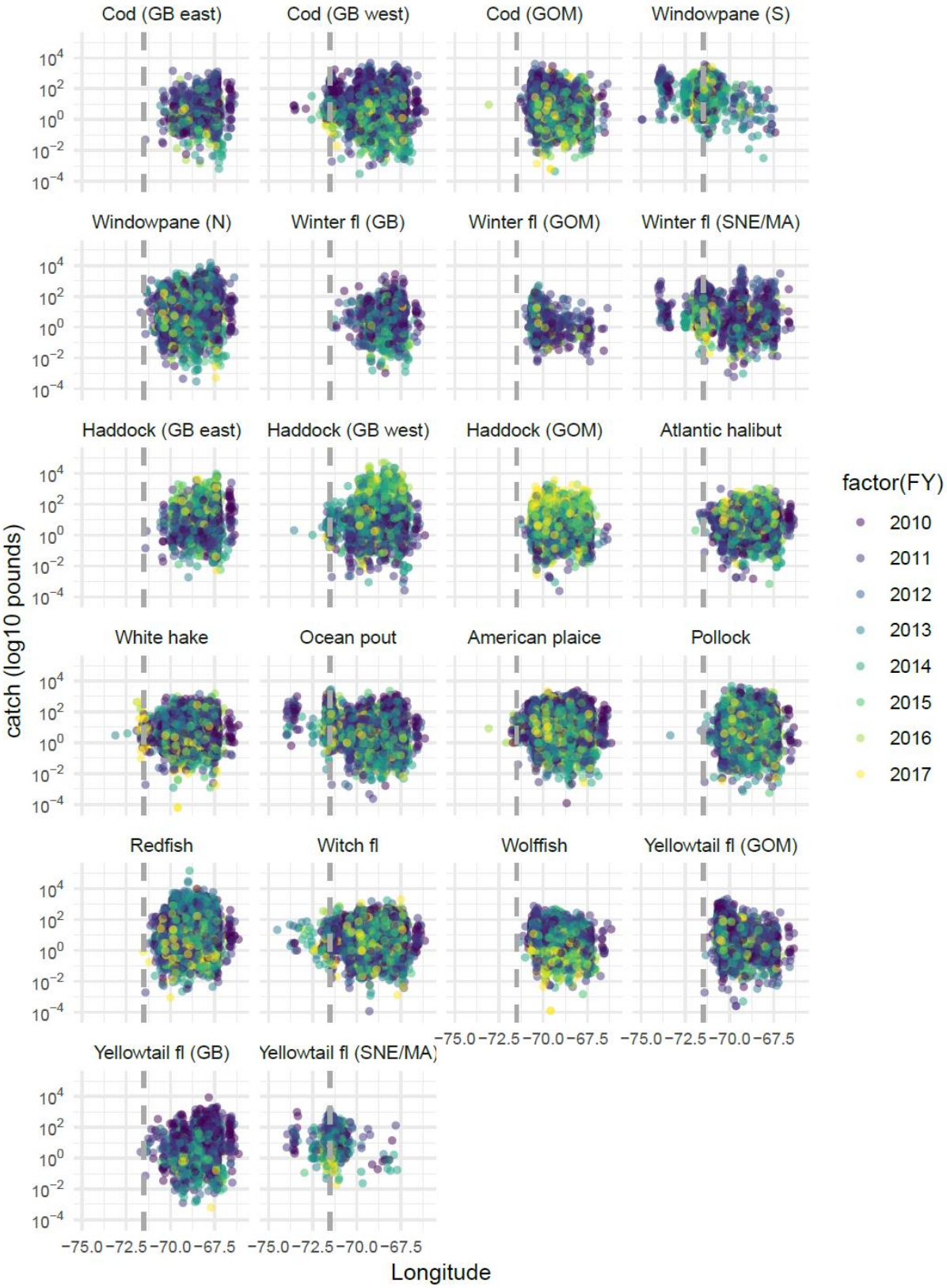


Figure 39 - Discards on observed groundfish trips 2010-2017.



7.1.5.2.1 Sub-Option 2A: Exemption for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.5.2.2 Sub-Option 2B: Exemption for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

Impacts on regulated groundfish

To be provided.

Impacts on other species

To be provided.

7.1.5.3 Review of Exemptions Based on Catch Composition

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.

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.

7.2 Essential Fish Habitat Impacts

The Essential Fish Habitat (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.

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 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.

Overall 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. 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 in Amendment 23.

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.

7.2.1 Groundfish Monitoring

7.2.1.1 Groundfish Sector Monitoring Program Revisions

7.2.1.1.1 Sector Monitoring Standards and Monitoring Tools

7.2.1.1.1.1 Option 1: No Action

To be provided.

7.2.1.1.1.2 Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on a Percentage of Trips

To be provided.

7.2.1.1.1.2.1 Substitute Options for Sector Monitoring Tools

7.2.1.1.1.2.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

To be provided.

7.2.1.1.1.2.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

To be provided.

7.2.1.1.1.2.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

To be provided.

7.2.1.1.1.3 Option 3: Fixed Total Monitoring Coverage Level Based on a Percentage of Catch

To be provided.

7.2.1.1.1.3.1 Substitute Options for Sector Monitoring Tools

7.2.1.1.1.3.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

To be provided.

7.2.1.1.1.3.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

To be provided.

7.2.1.1.1.3.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

To be provided.

7.2.1.1.2 Knowing the Total Monitoring Coverage Level at a Time Certain

7.2.1.1.2.1 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.

7.2.1.1.2.2 Option 2: Administrative Measure for 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.

7.2.1.1.3 Review Process for Sector Monitoring Coverage

7.2.1.1.3.1 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.

7.2.1.1.3.2 Option 2: Administrative Measure to 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.

7.2.1.1.4 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. 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.

7.2.1.2 Groundfish Sector and Common Pool Monitoring Program Revisions

7.2.1.2.1 Dockside Monitoring Program

7.2.1.2.1.1 Option 1: No Action

To be provided.

7.2.1.2.1.2 Option 2: Dockside Monitoring Program for the Entire Commercial Groundfish Fishery (Sectors and Common Pool)

To be provided.

7.2.1.2.1.3 Option 3: Dockside Monitoring Program as an Optional Program for Sectors

To be provided.

7.2.1.2.1.4 Dockside Monitoring Program Structure and Design

7.2.1.2.1.4.1 Sub-Option 1: Dockside Monitoring Program Funding Responsibility

Sub-Option 1A: Dockside Monitoring as a Dealer Responsibility

To be provided.

Sub-Option 1B: Dockside Monitoring as a Vessel Responsibility

To be provided.

7.2.1.2.1.4.2 Sub-Option 2: Dockside Monitorng Program Administration

Sub-Option 2A: Individual contracts with dockside monitor providers

Sub-Option 2A would allow sectors to develop individual contracts with DM 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.

Sub-Option 2B: NMFS-administered dockside monitoring program

Sub-Option 2B would allow NMFS to administer the DM 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.

7.2.1.2.1.4.3 Sub-Option 3: Options for Reconciling Discrepancies between Dealer Reports and Dockside Monitor Reports

Sub-Option 3A: Whichever record is higher is the official record

To be provided.

Sub-Option 3B: Dealer reports remain the official record, with comparison to dockside monitor reports

To be provided.

7.2.1.2.1.4.4 Sub-Option 4: Options for Lower Coverage Levels in Small, Remote Ports and for Small Vessels with Low Landings

Sub-Option 4A: Lower coverage levels for small, remote ports

To be provided.

Sub-Option 4B: Lower coverage for low volume vessels

To be provided.

7.2.1.2.1.4.5 Sub-Option 5: Options for Dockside Monitor Safety and Liability Associated with Fish Hold Inspections

Sub-Option 5A: Dockside monitor fish hold inspections required

Sub-Option 5A would require monitors to inspect the fish hold as part of their data collection procedures for each trip. This alternative 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.

Sub-Option 5B: Alternative methods for inspecting fish holds

Sub-Option 5B 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 alternative 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

Sub-Option 5C: No fish hold inspection required, captain signs affidavit

Sub-Option 5C 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 alternative 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 Sector Reporting

7.2.2.1 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.

7.2.2.2 Option 2: Grant Regional Administrator the Authority to Streamline Sector Reporting

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.

7.2.3 Funding/Operational Provisions of Groundfish Monitoring

7.2.3.1 Option 1: No Action

To be provided.

7.2.3.2 Option 2: Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.2.3.2.1 Sub-Option 2A: Additional NMFS Funding for Increased Monitoring if Funds Available

To be provided.

7.2.3.2.2 Sub-Option 2B: Waivers from Monitoring Requirements Allowed

To be provided.

7.2.4 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors and Common Pool)

7.2.4.1 Option 1: No Action

To be provided.

7.2.4.2 Option 2: Revised Management Uncertainty Buffers for Allocated Groundfish Stocks

To be provided.

7.2.4.3 Option 3: Elimination of Management Uncertainty Buffer for Sector ACL with 100 Pecent Monitoring of All Sector Trips

To be provided.

7.2.5 Exemptions from Groundfish Sector and Common Pool Monitoring Requirements

7.2.5.1 Option 1: No Action

To be provided.

7.2.5.2 Option 2: Exemption for Certain Vessels Based on Fishing Location

These options would create exemptions from monitoring requirements for vessels fishing west of the specified longitude

7.2.5.2.1 Sub-Option 2A: Exemption for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

To be provided.

7.2.5.2.2 Sub-Option 2B: Exemption for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

To be provided.

7.2.5.3 Review of Exemptions Based on Catch Composition

This alternative would establish a review process for these spatial exemptions, if one is adopted, where review will occur after two years of monitoring data are available under the new program. This alternative is primarily administrative, and no direct or indirect effects on essential fish habitat 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 6.5 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 Groundfish Monitoring

7.3.1.1 Groundfish Sector Monitoring Program Revisions

7.3.1.1.1 Sector Monitoring Standards and Monitoring Tools

7.3.1.1.1.1 Option 1: No Action

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 and endangered 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 64- *will update table from FW55*). 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). Based on this information, Option1/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 55 in the Affected Environment) for monitoring coverage levels in 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 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 55 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, there is the potential to need a higher overall coverage level 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. Compared to the sub-options under both Option 2 and Option 3 that would allow sectors to use various models of EM in place of at-sea monitors, there may be tradeoffs between the higher coverage levels under consideration in Option 2 and Option 3 relative to Option 1/No Action, and the potential for a loss of data on protected species interactions with fishing gear, since 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. 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. Based on this information, Option 1/No Action may have indirect low positive impacts to protected species when compared to the sub-options under Option 2 and Option 3 that would allow sectors to use EM in place of at-sea monitors. 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.

7.3.1.1.1.2 Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on a 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 55 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. 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, there is the potential to need a higher overall coverage level 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; however, these differences would likely be negligible.

Under Option 2, at-sea monitors would be used to achieve at-sea monitoring coverage levels. Compared to the sub-options under Option 2 that would allow sectors to use various models of EM in place of at-sea monitors, there may be tradeoffs between the higher coverage levels under consideration for some of the sub-options relative to the range of coverage level options in Option 2, and the potential for a loss of data on protected species interactions with fishing gear, since little to no information is collected on protected species through EM (NEFSC PSB, pers. comm). 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.

7.3.1.1.1.2.1 Substitute Options for Sector Monitoring Tools

Analytical Approach:

For the following sub-options being considered as substitute options for sector monitoring tools, a comparison of Option 1/No Action (Section 7.3.1.1.1.1) to all of the sub-options (Sub-Options A, B, and C) is provided below. Each sub-option is then compared to Option 2 (Section 7.3.1.1.1.2), in which at-sea monitors would be used to achieve the target coverage level, and to the other sub-options.

Analyzing Sub-Options relative to Option 1/No Action:

Sub-Option A would require EM coverage levels to be designated based upon specified coverage rates identified under Option 2 (25, 50, 75, and 100 percent), while Sub-Options B and C require that EM cameras are on 100 percent of trips. As described above, there may be tradeoffs between the higher coverage levels under consideration for Sub-Options A, B, and C relative to Option 1/No Action, and the

potential for a loss of data on protected species interactions with fishing gear, since 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. 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. Based on this information, Sub-Options A, B, and C may have indirect low negative impacts to protected species, and when compared to Option 1/No Action impacts may be indirectly low negative to negative. 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.

7.3.1.1.1.2.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Sub-Option A 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 7.3.1.1.1.2.1.

When compared to Option 2, Sub-Option A 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 Sub-Options B and C, Sub-Option A 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).

7.3.1.1.1.2.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Sub-Option B 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 Option 2. At the same time, however, as described above in Section 7.3.1.1.1.2.1, 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. Sub-Option B, 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 Option 2, Sub-Option B 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 Sub-Options A and C, Sub-Option B 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).

7.3.1.1.1.2.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

Sub-Option C 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 Option 2. At the same time, however, as described in Section 7.3.1.1.1.2.1, 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. Sub-Option C, 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 Option 2, Sub-Option C 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 Sub-Options A and B, Sub-Option C 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).

7.3.1.1.1.3 Option 3: Fixed Total Monitoring Coverage Level Based on a 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 55 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. 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 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, there is the potential to need a higher overall coverage level in order to achieve the target coverage level for each stock. As a result, Option 3 may afford slightly greater indirect positive impacts to protected species relative to Option 2; however, these differences would likely be negligible.

Under Option 3, at-sea monitors would be used to achieve at-sea monitoring coverage levels. Compared to the sub-options under Option 3 that would allow sectors to use various models of EM in place of at-sea monitors, there may be tradeoffs between the higher coverage levels under consideration for some of the sub-options relative to the range of coverage level options in Option 3, and the potential for a loss of data on protected species interactions with fishing gear, since little to no information is collected on protected species through EM (NEFSC PSB, pers. comm). 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.

7.3.1.1.1.3.1 Substitute Options for Sector Monitoring Tools

Analytical Approach:

For the following sub-options being considered as substitute options for sector monitoring tools, a comparison of Option 1/No Action (Section 7.3.1.1.1.1) to all of the sub-options (Sub-Options A, B, and C) is provided below. Each sub-option is then compared to Option 3 (Section 7.3.1.1.1.3), in which at-sea monitors would be used to achieve the target coverage level, and to the other sub-options.

Analyzing Sub-Options relative to Option 1/No Action:

Sub-Option A would require EM coverage levels to be designated based upon specified coverage rates identified under Option 3 (25, 50, 75, and 100 percent), while Sub-Options B and C require that EM cameras are on 100 percent of trips. As described above, there may be tradeoffs between the higher coverage levels under consideration for Sub-Options A, B, and C relative to Option 1/No Action, and the potential for a loss of data on protected species interactions with fishing gear, since 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. 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. Based on this information, Sub-Options A, B, and C may have indirect low negative impacts to protected species, and when compared to Option 1/No Action impacts may be indirectly low negative to negative. 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.

7.3.1.1.1.3.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Sub-Option A 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 7.3.1.1.1.3.1.

When compared to Option 3, Sub-Option A 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 Sub-Options B and C, Sub-Option A 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).

7.3.1.1.1.3.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Sub-Option B 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 Option 2. At the same time, however, as described above in Section 7.3.1.1.1.3.1, 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.

Sub-Option B, 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 Option 3, Sub-Option B 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 Sub-Options A and C, Sub-Option B 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).

7.3.1.1.1.3.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

Sub-Option C 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 Option 2. At the same time, however, as described in Section 7.3.1.1.1.3.1, 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. Sub-Option C, 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 Option 3, Sub-Option C 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 Sub-Options A and B, Sub-Option C 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).

7.3.1.1.2 Knowing the Total Monitoring Coverage Level at a Time Certain

7.3.1.1.2.1 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.

7.3.1.1.2.2 Option 2: Administrative Measure for 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.

7.3.1.1.3 Review Process for Sector Monitoring Coverage

7.3.1.1.3.1 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.

7.3.1.1.3.2 Option 2: Administrative Measure to 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.

7.3.1.1.4 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.

7.3.1.2 Groundfish Sector and Common Pool Monitoring Program Revisions

7.3.1.2.1 Dockside Monitoring Program

7.3.1.2.1.1 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.

7.3.1.2.1.2 Option 2: Dockside Monitoring Program for the Entire Commercial Groundfish Fishery (Sectors and Common Pool)

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.

7.3.1.2.1.3 Option 3: Dockside Monitoring Program as an Optional Program for Sectors

Option 3 would establish an optional dockside monitoring program for sectors. Dockside monitoring does not affect protected species; this option is therefore not expected to have direct or indirect impacts on protected species.

7.3.1.2.1.4 Dockside Monitoring Program Structure and Design

7.3.1.2.1.4.1 Sub-Option 1: Dockside Monitoring Program Funding Responsibility

Sub-Option 1A: Dockside Monitoring as 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.

Sub-Option 1B: Dockside Monitoring as a 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.

7.3.1.2.1.4.2 Sub-Option 2: Dockside Monitorng Program Administration

Sub-Option 2A: 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.

Sub-Option 2B: 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.

7.3.1.2.1.4.3 Sub-Option 3: Options for Reconciling Discrepancies between Dealer Reports and Dockside Monitor Reports

Sub-Option 3A: Whichever record is higher is the official record

This option would determine the official landings record to be whichever record is highest. This is primarily an administrative measure and would not have any direct or indirect impacts on protected species. Additionally, dockside monitoring does not affect protected species.

Sub-Option 3B: Dealer reports remain the official record, with comparison to dockside monitor reports

This option would determine the official landings record. This is primarily an administrative measure and would not have any direct or indirect impacts on protected species. Additionally, dockside monitoring does not affect protected species.

7.3.1.2.1.4.4 Sub-Option 4: Options for Lower Coverage Levels in Small, Remote Ports and for Small Vessels with Low Landings

Sub-Option 4A: Lower coverage levels for small, remote ports

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.

Sub-Option 4B: Lower coverage for low volume vessels

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.

7.3.1.2.1.4.5 Sub-Option 5: Options for Dockside Monitor Safety and Liability Associated with Fish Hold Inspections

Sub-Option 5A: 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.

Sub-Option 5B: Alternative methods for inspecting fish holds

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.

Sub-Option 5C: 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.

7.3.2 Sector Reporting

7.3.2.1 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.

7.3.2.2 Option 2: Grant Regional Administrator the Authority to Streamline Sector Reporting

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.

7.3.3 Funding/Operational Provisions of Groundfish Monitoring

7.3.3.1 Option 1: 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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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.

7.3.3.2 Option 2: Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.3.3.2.1 Sub-Option 2A: Additional NMFS Funding for Increased Monitoring if Funds Available

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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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, the impacts of Sub-Option 2A on protected species are expected to be (directly and indirectly) 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.

7.3.3.2.2 Sub-Option 2B: Waivers from Monitoring Requirements Allowed

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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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.

7.3.4 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors and Common Pool)

7.3.4.1 Option 1: No Action

Option 1/No Action would maintain the management uncertainty buffers currently in place for groundfish stocks for the sector and common pool components of the 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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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 would be expected to have negative impacts, as there is the potential for fishing effort to be further constrained in Option 2. Compared to Option 3, Option 1/No Action may have neutral to positive impacts to protected species. Option 3 would eliminate the management uncertainty buffers for the sector ACL for all allocated groundfish stocks, only if the option for 100 percent at-sea monitoring is selected, which may increase fishing effort since setting the buffer to zero would result in higher sector ACLs. However, 100 percent monitoring required to select Option 3 would provide indirect positive impacts to protected species as there would be additional information on protected species interactions with commercial fishing gear. 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 3 indirectly affords positive impacts to protected species. Further, it may be difficult to predict how changes to the management uncertainty buffers would influence fishing effort.

7.3.4.2 Option 2: Revised Management Uncertainty Buffers for Allocated Groundfish Stocks

Option 2 would revise the management uncertainty buffers for all allocated groundfish stocks. The result would be an increase in the management uncertainty buffer for these stocks, one of three potential options (a multiplier of 2x, 5x, or 10 x the current uncertainty buffer of each stock), designed to further constrain fishing effort to allowable levels. This would have the potential to result in a decrease in fishing activity as the fishery is constrained to lower ACLs, which may result in less overall fishing effort. As interaction risks with protected species are influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, any decrease in either of these factors will reduce the potential for protected species interactions with gear. Therefore, Option 2 has the potential to reduce interaction risks for protected species, and therefore provide some benefit to protected species. However, as interactions can still occur, even under a reduced effort scenario, Option 2 would likely have low negative impacts on protected species.

Compared to Option 1/No Action, Option 2 would be expected to have positive impacts, as there is the potential for a decrease in fishing effort under Option 2. Compared to Option 3, Option 2 may have neutral to positive impacts. Option 3 would revise the management uncertainty buffer for the sector ACL for all allocated groundfish stocks to be zero, only if the option for 100 percent at-sea monitoring is selected, which increase fishing effort since setting the buffer to zero would result in higher sector ACLs. However, 100 percent monitoring required to select Option 3 would provide indirect positive impacts to protected species as there would be additional information on protected species interactions with commercial fishing gear. 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 3 indirectly affords positive impacts to protected species. Further, it may be difficult to predict how changes to the management uncertainty buffers would influence fishing effort.

7.3.4.3 Option 3: Elimination of Management Uncertainty Buffer for Sector ACL with 100 Pecent Monitoring of All Sector Trips

Option 3 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. 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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, any decrease in either of these factors will reduce the potential for protected species interactions with gear. Therefore, Option 3 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, 100 percent monitoring required to select Option 3 would provide indirect positive impacts to protected species as there would be additional information on protected species interactions with commercial fishing gear. Based on the above information, impacts to protected species from Option 3 may range from low negative to indirect low positive.

Compared to Option 1/No Action, Option 3 is expected to have neutral to negative impacts, as there is the potential for an increase in fishing effort under Option 3. However, Option 3 also affords 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. Compared to Option 2, Option 3 may have neutral to negative impacts. Option 3 has the potential to increase fishing effort, but 100 percent monitoring required to select Option 3 would provide indirect positive impacts to protected species as there would be additional information on protected species interactions with commercial fishing gear. Further, it may be difficult to predict how changes to the management uncertainty buffers would influence fishing effort.

7.3.5 Exemptions from Groundfish Sector and Common Pool Monitoring Requirements

7.3.5.1 Option 1: No Action

Option 1/No Action would maintain the existing exemptions from groundfish monitoring program requirements. These include the exemption from 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. 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 exempt 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 40- to be updated). 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 exemptions. 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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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 below negative.

Indirectly, the existing exemptions 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).

From FW55 (will be updated): 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 1a,b), they have also provided information about ELM fishing practices and bycatch where NEFOP coverage did not (Figure 40c,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 64, 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 exemptions 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. As a result, indirectly, Option 1/No Action results in low negative impacts to protected species.

Figure 40 - 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 (*to be updated*).

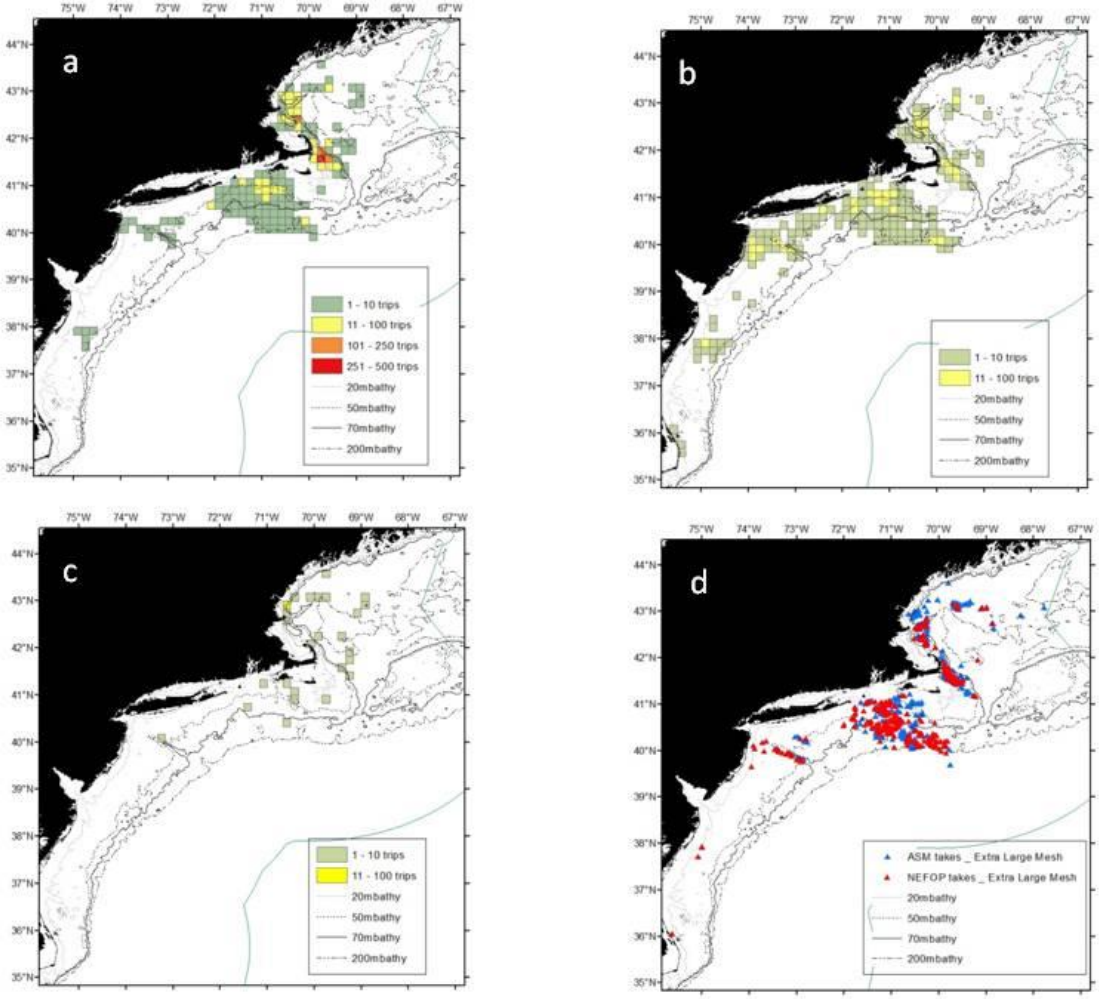

a
1 - 10 trips
11 - 100 trips
101 - 250 trips
251 - 500 trips
20mbathy
50mbathy
70mbathy
200mbathy
b
1 - 10 trips
11 - 100 trips
20mbathy
50mbathy
70mbathy
200mbathy
c
1 - 10 trips
11 - 100 trips
20mbathy
50mbathy
70mbathy
200mbathy
d
ASM takes _ Extra Large Mesh
NEFOP takes _ Extra Large Mesh
20mbathy
50mbathy
70mbathy
200mbathy

Table 64 - 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. (*to be updated*)

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

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 Sub-Option 2A and 2B, Option 1/No Action would be expected to have low positive impacts to protected species, as both Sub-Options would allow for exemptions from ASM requirements in other areas, in addition to the exemptions under Option 1/No Action. Relative to Option 3 which would establish a review process for exemptions based on catch composition, which is administrative in nature, Option 1/No Action would likely have neutral impacts to protected species.

7.3.5.2 Option 2: Exemption for Certain Vessels Based on Fishing Location

7.3.5.2.1 Sub-Option 2A: Exemption for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

Sub-Option 2A would exempt vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a trip from at-sea monitoring and/or dockside monitoring (if implemented).

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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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 exemptions 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 exemptions under Sub-Option 2A would remove ASM coverage requirements for particular sector trips (see description above), along with existing exemptions, the full informational benefits provided by current ASM coverage levels in assessing protecting species bycatch would likely be reduced (see Option 1/No Action), thereby affecting the precision of protected species bycatch estimates and reducing available information for protected species management decisions. As a result, 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 to negative. Relative to Option 1/No Action, Sub-Option 2A would be expected to have low negative impacts to protected species, as this sub-option would allow for exemptions from ASM requirements in other areas, in addition to the exemptions under Option 1/No Action. Compared to Sub-Option 2B, impacts to protected species would be similar, as these sub-options are close in area. Sub-Option 2B would cover a larger area for exemptions than Sub-Option 2A, so impacts to protected species may be slightly less negative for Sub-Option 2A relative to Sub-Option 2B. Relative to Option 3 which would establish a review process for exemptions based on catch composition, which is administrative in nature, Sub-Option 2A would likely have neutral impacts to protected species.

For Sub-Option 2A, impacts to protected species would be due to exemptions from at-sea monitoring requirements. Dockside monitoring does not affect protected species, and so exemptions from dockside monitoring (if implemented) would have no direct or indirect impacts on protected species.

7.3.5.2.2 Sub-Option 2B: Exemption for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

Sub-Option 2B exempt vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a trip from at-sea monitoring and/or dockside monitoring (if implemented).

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 quota's being attained faster.

Based on the above information, Sub-Option 2B 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 influenced by the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, 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 exemptions 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 exemptions under Sub-Option 2B would remove ASM coverage requirements for particular sector trips (see description above), along with existing exemptions, the full informational benefits provided by current ASM coverage levels in assessing protecting species bycatch would likely be reduced (see Option 1/No Action), thereby affecting the precision of protected species bycatch estimates and reducing available information for protected species management decisions. As a result, indirectly, Sub-Option 2B results in low negative impacts to protected species.

Based on the above information, impacts to protected species from Sub-Option 2B are expected to be (directly and indirectly) low negative. Relative to Option 1/No Action, Sub-Option 2B would be expected to have low negative to negative impacts to protected species, as this sub-option would allow for exemptions from ASM requirements in other areas, in addition to the exemptions under Option 1/No Action. Compared to Sub-Option 2A, impacts to protected species would be similar, as these sub-options are close in area. Sub-Option 2B would cover a larger area for exemptions than Sub-Option 2A, so impacts to protected species may be slightly more negative for Sub-Option 2B relative to Sub-Option 2B. Relative to Option 3 which would establish a review process for exemptions based on catch composition, which is administrative in nature, Sub-Option 2B would likely have neutral impacts to protected species.

For Sub-Option 2B, impacts to protected species would be due to exemptions from at-sea monitoring requirements. Dockside monitoring does not affect protected species, and so exemptions from dockside monitoring (if implemented) would have no direct or indirect impacts on protected species.

7.3.5.3 Review of Exemptions Based on Catch Composition

This option would establish a review process for exemptions based on catch composition. 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

7.4 Economic Impacts

Consideration of the economic impacts of the changes made in this amendment is required pursuant to the National Environmental Policy Act (NEPA) of 1969 and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976. NEPA requires that before any federal agency may take "actions significantly affecting the quality of the human environment," that agency must prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) that includes the integrated use of the social sciences (NEPA Section 102(2) (C)). The MSA stipulates that the social and economic impacts to all fishery stakeholders should be analyzed for each proposed fishery management measure to provide advice to the Council when making regulatory decisions (Magnuson-Stevens Section 1010627, 109-47).

The National Marine Fisheries Service (NMFS) provides guidelines to use when performing economic reviews of regulatory actions. The key dimensions for this analysis are expected changes in net benefits to fishery stakeholders, the distribution of benefits and costs within the industry, and changes in income and employment (NMFS 2007). Where possible, cumulative effects of regulations are identified and discussed. Non-economic social concerns are discussed in Section 7.5. The economic impacts presented here consist of both qualitative and quantitative analyses dependent on available data, resources, and the measurability of predicted outcomes. It is assumed throughout this analysis that changes in revenues would have downstream impacts on income levels and employment; however, these are only mentioned if directly quantifiable.

NOTE: The following section is incomplete. Full economic impact analysis requires cost information with respect to many of the alternatives considered in this action. This information will be incorporated when available. Qualitative costs and benefits are discussed when relevant but may be adjusted as cost information becomes available.

7.4.1 Groundfish Monitoring

7.4.1.1 Groundfish Sector Monitoring Program Revisions

7.4.1.1.1 Sector Monitoring Standards and Monitoring Tools

Throughout this section, we refer to compliance and enforceability scores, which follow a qualitative analytical approach based on assessing the risk of noncompliance and enforceability of alternatives. Not all alternatives are expected to directly affect the risk of non-compliance and enforceability and thus are not assigned scores, but relevant insights may be described. Definitions and theoretical basis for scoring are as follows:

COMPLIANCE: Here, compliance is defined as the extent to which participants activities are in accordance with all rules and regulations. Relevant rules and regulations for this action may include retention and reporting requirements both at-sea and dockside. Examples of non-compliance include illegal discarding of legal sized stocks, stock area or stock misreporting (species substitution), or non-reporting (black fish). Each alternative is scored based on the risk of non-compliance ranging between "High", "Medium", and "Low". The risk of non-compliance is represented by first, the opportunity for non-compliant behavior, such as, the proportion of time, catch, or other metric of effort, that illegal behavior is not readily detected, as outlined by the Discard Incentive Model (Appendix IV, #1a), and second, the potential economic benefit of noncompliance, or cost of compliance, as represented by possible impacts on ACE lease prices (more constraining to less constraining), costs of landing, or other model parameters. Actual compliance may vary substantially from the risk for non-compliance. True

compliance in the fishery is unknown, and depends on a variety of socio-economic factors, including societal norms, which are not represented here.

ENFORCEABILITY: Enforceability is defined here as the ability for enforcement officials (NOAA OLE or US Coast Guard) to detect and prosecute violations. Each alternative was scored depending on the degree of enforceability that is expected under each between "Low" to "High, where low is little to no ability for enforcement to detect and act on violations, and high is a great capability to detect and act on violations. This score directly depends on the proportion of time that independent records are created that can be compared with self-reported information to detect violations. Secondary factors that may be discussed in conjunction with scoring includes the quality of information collected and its utility for enforcement. Observers and dockside monitors are not enforcement agents but their independent records, which include observations of potential illegal activities, can be used by enforcement to identify and prosecute violations.

Table 65 - Compliance and enforceability scores for Amendment 23 alternatives. Note not all alternatives are included for administrative measures or alternatives that do not have direct impacts on compliance and enforceability, as defined above. *impacts depend on the number of trips and proportion of landings subject to exemption.

Alternative		Compliance (at-sea or dockside, as relevant)	Enforceability
Human At-Sea Monitors- Fixed rate	status quo-22%	Low	Low
	25%	Low	Low
	50%	Low	Medium
	75%	Medium	Medium-High
	100%	High	High
Human At-Sea Monitors- Percentage of catch	0-25%	Low	Low
	25-50%	Low	Low to medium
	50-75%	Low to Medium	Medium to medium high
	75-100%	Medium to High	Medium-high to High
EM	Audit	High	High
	Max Retention	High	High
	In place of humans	Depends on ASM Coverage Low-High	Depends on ASM coverage Low-High
DSM	Status quo (0%)	Low to Medium	Low
	100% individual-based	High	High
	100% NMFS based	High	High
	Sector-funded	High	High

	Dealer-funded	High	High
	Exemptions for small vessels	Medium to High*	Medium to High*
	Exemptions for small ports	Medium to High*	Medium to High*

7.4.1.1.1.1 Option 1: No Action

Here, compliance is defined as the extent to which participants activities are in accordance with all rules and regulations. Relevant rules and regulations for this action may include retention and reporting requirements both at-sea and dockside. Examples of non-compliance include illegal discarding of legal sized stocks, stock area or stock misreporting (species substitution), or non-reporting (black fish). The risk of non-compliance is represented by first, the opportunity for non-compliant behavior, such as, the proportion of time, catch, or other metric of effort, that illegal behavior is not readily detected, as outlined by the Discard Incentive Model (Appendix IV, #1a), and second, the potential economic benefit of noncompliance, or cost of compliance, such as represented by possible impacts on ACE lease prices (in qualitative terms). In other words, how likely is it for someone to be noncompliant when given the opportunity? The discard incentive model discusses how at current levels of at-sea monitoring, fishermen can derive considerable economic benefit, with few probable costs, by discarding illegally on unobserved trips. Therefore, this level of at-sea coverage represents a high risk of non-compliance for the fishery since there is both greater opportunity and economic incentive for noncompliance on unobserved trips. Resultantly, the compliance score for this alternative is '**low**'. Actual compliance may vary substantially from the risk for non-compliance. True non-compliance in the fishery is unknown, and depends on a variety of socio-economic factors, including societal norms, which are not represented here.

Enforceability is defined here as the ability for enforcement officials (NOAA OLE or US Coast Guard) to detect and prosecute violations. Some violations are difficult, if not impossible, to enforce under the status quo. For example, retention requirements mandate all legal-sized allocated groundfish to be landed, however, without an observer onboard, enforcement agents have noted that it is nearly impossible to detect if illegal discarding has occurred (see Attachment 1 of Appendix IV, #1a). Observers are not enforcement agents but their records, which include observations of potential illegal activities, can be used by enforcement to identify and prosecute violations. At current levels of monitoring coverage, there is no information confirming catch and discards on the majority of trips at sea, and almost no information confirming landings dockside, therefore the enforceability score for this option is '**low**'.

7.4.1.1.1.2 Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on a Percentage of Trips

The risk of non-compliance with ASM based on a fixed percentage of trips depends on the coverage rate selected. Because the compliance score depends on both the opportunity to be noncompliant and the economic incentive to be noncompliant, there is less compliance risk for violations at sea when the coverage rate is higher. However, the risk for noncompliance at 50% observer coverage might be more similar to the risk of noncompliance at 25% observer coverage because of the incentive effect. That is, the incentive to misreport catch or landings may increase substantially if it means catch of certain stocks is more constraining some proportion of the time. For example, if 50% of the time catch limits are more binding since an observer is onboard, fishermen may fish differently, or pay higher prices to lease stocks that they may encounter, since they cannot as readily illegally discard. Therefore, if an observer is not onboard, the incentive to illegally discard, which includes the cost of quota, may be higher and just as, if

not more catch may be discarded at this coverage rate as at the 25% coverage rate, when the incentive effect isn't as strong. At a 75% coverage level, a potentially strong incentive effect is counteracted by a lower opportunity. Now, only on a minority of trips can quota costs be evaded, which limits the amount of potential illegal activity somewhat, but not entirely. Fishermen can strategically alter their pre-catch behavior depending on whether they have an observer onboard, to the extent that it is feasible, fishermen may choose to take longer trips or have more profitable trips when an observer is not onboard, however, it becomes much more difficult to maintain profitable business operations if it is dependent on illegal activity on a minority of trips. **For these reasons, the compliance score at 25% coverage is similar to the status quo alternative, at 'low', as is the compliance score at 50% ASM coverage. The compliance score at 75% is 'medium', which is conservative based on the assumption that illegal activity will be highly incentivized on the remainder of trips. Only 100% coverage rate obtains a 'high' compliance score, since opportunity for illegal activity at sea is low.**

Relative to No Action, the impact of moving to 25% fixed rate coverage depends on the target CV coverage rate in any given year. Between FY 2010 and FY 2018, the ASM target coverage rate was between 8% and 30%, with the most recent five-year average being 13.2%. If future coverage rates are similar, slight to moderate increases in the percentage of at-sea monitoring coverage is expected to have a neutral effect on compliance, since the No Action, 25%, and 50% coverage levels all receive a 'low' compliance score. Major increases in at-sea coverage are expected to have positive impacts on compliance, as the risk for noncompliance decreases at 75% and is very low at 100% coverage, reflected in the compliance scores at these levels of coverage.

Enforceability is expected to scale mostly linearly at different levels of at-sea observer coverage. More information available to enforcement officials will support their ability to detect and prosecute violations. In addition, other types of information may also support their operations, for example, at more equal proportions of observer coverage differences in pre-catch behavior may be more readily identified, so that enforcement may better target their efforts on likely offenders. Enforceability at 25% is therefore **'low'**, **'medium'** at 50%, **'medium-high'** at 75%, and **'high'** at 100% ASM coverage.

Relative to No Action, the impact on enforceability of moving to 25% fixed rate coverage depends on the target CV coverage rate in any given year. Between FY 2010 and FY 2018, the ASM target coverage rate was between 8% and 30%, with the most recent five-year average being 13.2%. If future coverage rates are similar, slight increases in the percentage of at-sea monitoring coverage is expected to have a neutral effect on enforceability, since the No Action and 25% coverage levels receive a 'low' compliance score. Increases in at-sea monitoring coverage are expected to have positive impacts on enforceability, as enforceability increases as the more monitoring reports and independently verified information is generated. At 50% coverage, there is expected to be a positive impact on enforceability, medium-positive impact at 75%, and strongly positive impact at 100% coverage, reflected in the compliance scores at these levels of coverage.

7.4.1.1.1.2.1 Substitute Options for Sector Monitoring Tools

7.4.1.1.1.2.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Compliance: Compliance scores for this alternative **are similar** to the scores given for the at-sea monitoring alternatives depending on the coverage rate. At status quo levels of monitoring, risk of non-compliance may still be high if cameras are only turned on 20-30% of the time. When cameras are on, fishermen are expected to be incentivized to follow rules and regulations similar to when an observer is onboard. Compliance may be somewhat higher than with human monitors to the extent that the coverage

of onboard activities (sorting, discarding) is higher than with human observers (no missed hauls) and if a video record is believed to be stronger evidence of noncompliance than a human-based record, and therefore perceived to increase the likelihood of sanction. Relative to No Action, this alternative is expected to have a neutral effect on compliance if the at-sea target coverage level is not increased to at least 50% under Option 2, as that is the point when the risk for noncompliance decreases. At a 50% target coverage level, the risk for noncompliance decreases so there is a low positive increase on the risk for noncompliance. At 75% and 100% coverage levels there is a positive and strongly positive impact on the risk for noncompliance, respectively.

Enforceability: Enforceability scores of this sub-option **are similar** to the enforceability scores for equivalent levels of ASM coverage, so at low levels of observer coverage, 0-25%, enforceability is **'low'**. NOAA OLE supports EM implementation as means to improve compliance (Compliance Improvement Recommendations, Enforcement Committee Meeting July 2019). As mentioned for compliance, video records may potentially be more useful to enforcement than observer statements if video footage can reliably identify illegal practices. Relative to No Action, this alternative is expected to have a neutral impact on enforceability if the at-sea target coverage level is not increased beyond 25% under Option 2, a low positive impact if the coverage level is increased to 50%, and positive to strongly positive impact on enforceability if the coverage rate is increased to 75% or 100%, respectively.

7.4.1.1.1.2.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Compliance: Because this sub-option would require video cameras to be on 100% of the time, with a subset of video footage reviewed, it is expected that risk of non-compliance is very low. This primarily stems from the fact that unlike when an observer is onboard, vessel operators do not know what portions of a trip will be reviewed, so deterrence is constant across trips. For these reasons, this sub-option has a **'high'** compliance score. However, it should be noted that non-compliance is still possible, particularly if the review rate is low enough and operators perceive the probability of detection as low, as well as if video systems are focused on estimating discards, rather than landings, without dockside monitoring or another form of independent verification of landings, noncompliance dockside is still possible, and may have higher incentives for illegal activity under high levels ASM or under EM.
Relative to No Action, this alternative would have a strongly positive impact on compliance if low to medium levels of coverage (25%-50%) are selected under Option 2, and a low positive impact if 75% is selected. If 100% coverage is selected under Option 1 or Option 2, this alternative would have a neutral impact on compliance, since even at fairly low review rates (10-15%), there is a constant deterrence since cameras are on 100% of the time, which results in a similar probability of detection as when an observer is onboard.

Enforceability: If cameras are situated and high resolution as to provide full coverage of operations, video footage collected through the audit model could provide a great deal of information useful for enforcement about the frequency and quantity of illegal activity since more footage could be reviewed as a result of a report of suspected illegal behavior. NOAA OLE supports EM implementation as means to improve compliance (Compliance Improvement Recommendations, Enforcement Committee Meeting July 2019). For these reasons, this sub-option receives a **'high'** enforceability score. Relative to No Action, this sub-option would have a strongly positive impact on enforceability if low levels of coverage are selected under either Option 1 or Option 2, since it would greatly increase the quantity of information available for inquiry and investigation over status quo. If 100% ASM is selected under Option 1, then enforceability impacts may be relatively neutral, with some positive impacts if EM footage is stored longer, or generally is more useful for enforcement, than human-based observations.
Relative to No Action, this alternative would have a strongly positive impact on enforceability if low levels of monitoring coverage are selected under Option 2 (25%), positive impact if medium levels of

coverage are selected (50%), low positive impacts if medium-high levels of coverage are selected (75%), and neutral impacts if 100% coverage is selected.

7.4.1.1.1.2.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

Compliance: Compliance scores for the maximized retention sub-option **are similar** to the compliance scores for the audit-model sub-option. Specifically, the risk of non-compliance when cameras are on 100% of the time is expected to be low as long as cameras are positioned correctly and collect reliable information, this includes all fishing activities and verification of retained, sub-legal discards, dockside after the trip has concluded. Therefore, the compliance score for this alternative is **'high'**. Relative to No Action, this alternative would have a strongly positive impact on compliance if low to medium levels of coverage (25%-50%) are selected under Option 2, and a low positive impact if 75% is selected. If 100% coverage is selected under Option 2, this alternative would have a neutral impact on compliance, since even at fairly low review rates (10-15%), there is a constant deterrence since cameras are on 100% of the time, which results in a similar probability of detection as when an observer is onboard.

Enforceability: If cameras are situated and high resolution as to provide full coverage of operations, video footage collected through the maximized retention model could provide a great deal of information useful for enforcement about the frequency and quantity of illegal activity since more footage could be reviewed as a result of a report of suspected illegal behavior. NOAA OLE supports EM implementation as means to improve compliance (Compliance Improvement Recommendations, Enforcement Committee Meeting July 2019). For these reasons, this sub-option receives a '**high'** enforceability score. Relative to No Action, this alternative would have a strongly positive impact on enforceability if low levels of monitoring coverage are selected under Option 2 (25%), positive impact if medium levels of coverage are selected (50%), low positive impacts if medium-high levels of coverage are selected (75%), and neutral impacts if 100% coverage is selected.

7.4.1.1.1.3 Option 3: Fixed Total Monitoring Coverage Level Based on a Percentage of Catch

Approach for Analysis:

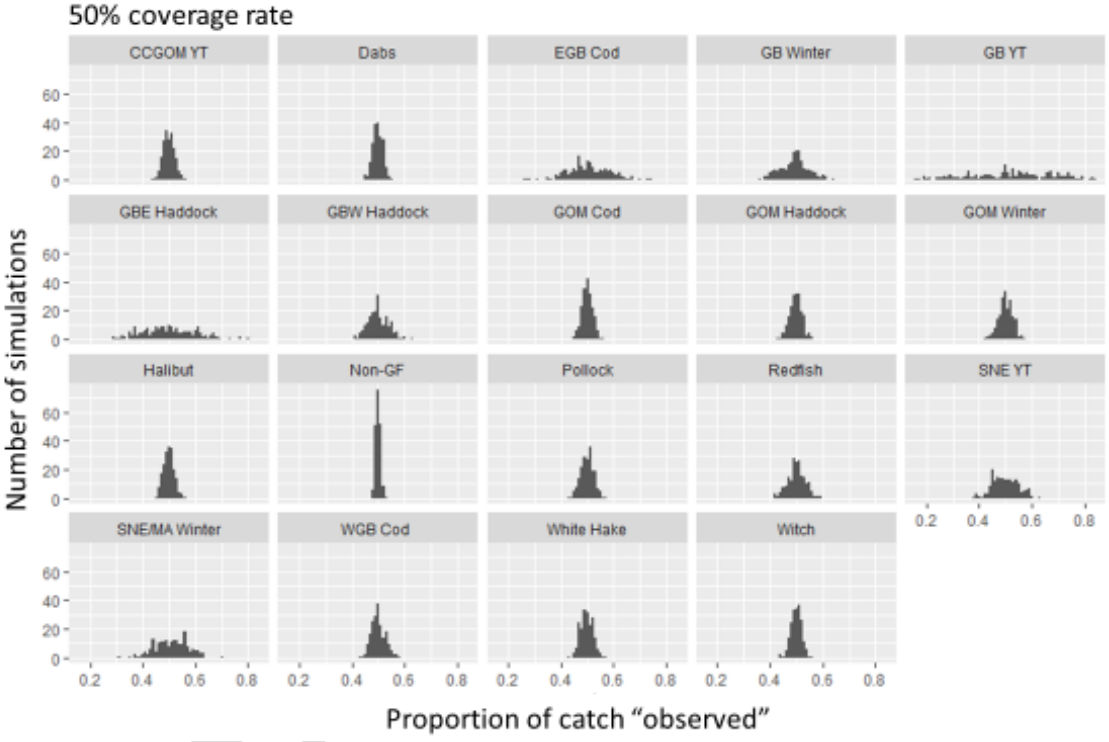
This option considers an alternative methodology to using the CV standard (precision standard) for determining coverage levels for human observers or at-sea monitors. Specifically, the Council would select an annual coverage level of total catch to be independently verified in all future fishing years. For whichever coverage level is chosen, sectors collectively would be required to meet the coverage level of total catch to be independently verified for each allocated groundfish stock, targeted at the total sector sub-ACL level. Independent verification could be achieved through a suite of monitoring tools. Sectors would describe in their monitoring plans how the selected target coverage level would be achieved for each allocated groundfish stock.

Simulations were performed 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. Each simulation was run to randomly assign all sector groundfish trips in FY2018[36] (GARFO DMIS database) as "observed" or

[36] Where a groundfish trip is defined as a trip where the vessel owner or operator declared, either through the vessel monitoring system (VMS) or through the interactive voice response system, that the vessel was making a groundfish trip. This includes trips on which groundfish DAS were used, including monkfish (Lophius americanus) trips that used groundfish DAS (Murphy et al 2018).

"unobserved", from which, the total simulated "observed" catch was calculated as a proportion of total reported landings (GARFO dealer data) in that year. For example, assume the monitoring target was 50% of total catch, 200 simulations were run to estimate a distribution of potential "observed" ratios for every allocated stock, assuming trips are randomly selected. The simulations suggest that the proportion of trips that need to be monitored to observe 50% of the total catch varies considerably between stocks (Figure 41). Non-groundfish ("other") has very little variance so a 50% coverage rate would be very likely to observe 50% of the total catch. This is also fairly true for American plaice, GOM cod, and a few other stocks. However, for stocks with greater variability, a higher proportion of trips would need to be monitored to have a high probability of observing 50% of the total catch. In FY18 catches were low and sporadic for Georges Bank yellowtail flounder, and Eastern Georges Bank haddock, so achieving a high probability of ensuring at least 50% of the total catch of each stock was observed would require a higher observer coverage rate. Specifically, moving the coverage rate to 70% of trips results in at least a 90% chance that 50 % of the total catch of every stock will be observed, with many stocks having a 100% chance of meeting that catch target if effort and stock availability remained identical to 2018.

Figure 41 - Distribution of 200 random simulations estimating the total percentage of catch observed at a 50% coverage rate in FY2018.



The simulations show that 50% randomized observer coverage across all FY 2018 sector trips would result in a 90% probability that at least 25% percent of the total catch of every allocated stock (and halibut) was observed. Increasing coverage rates to 70% of trips would confer roughly a 90% chance that 50% of total catch was observed for each stock (Figure 42, Table 66). Finally, increasing observer coverage to 90% would achieve the 75% of total catch per stock threshold with a similar level of confidence (Figure 43). Similar results were obtained for FY 2017, with slightly higher probabilities of achieving target catch coverage rates (between 93-95%). In every simulation GB yellowtail was the stock that drives the recommended coverage rate to meet each catch target (Table 66), including simulations run in FY 2017. Should fishery characteristics or changes in ACLs occur for this stock, catch rates and therefore the level of observer coverage needed to capture a given proportion of landings for this stock, or

any stock in the northeast multispecies complex, are likely to change. In future years, the stock with the lowest and most variable catch rate will drive the coverage rate needed to meet the catch proportion target while other stocks will likely far exceed that target, resulting in a total proportion of catch observed that is significantly higher than the target.

It is important to recognize that this analysis assumes that under random deployment there will be no observer effects (observed trips do not materially change from unobserved trips), and that on unobserved trips landings and calculated discards are representative of true catch (no illegal discarding), both which have been shown to be false assumptions under low levels of observer coverage in this fishery (Appendix IV, Attachments #1a and #1b). Observer effects or possible illegal discarding may further reduce the confidence in which a catch target may be achieved using randomized deployment in any given year, especially at low to medium levels of observer coverage rates.

Figure 42 - Distribution of 200 random simulations estimating the total percentage of catch observed at a 70% coverage rate in FY2018.

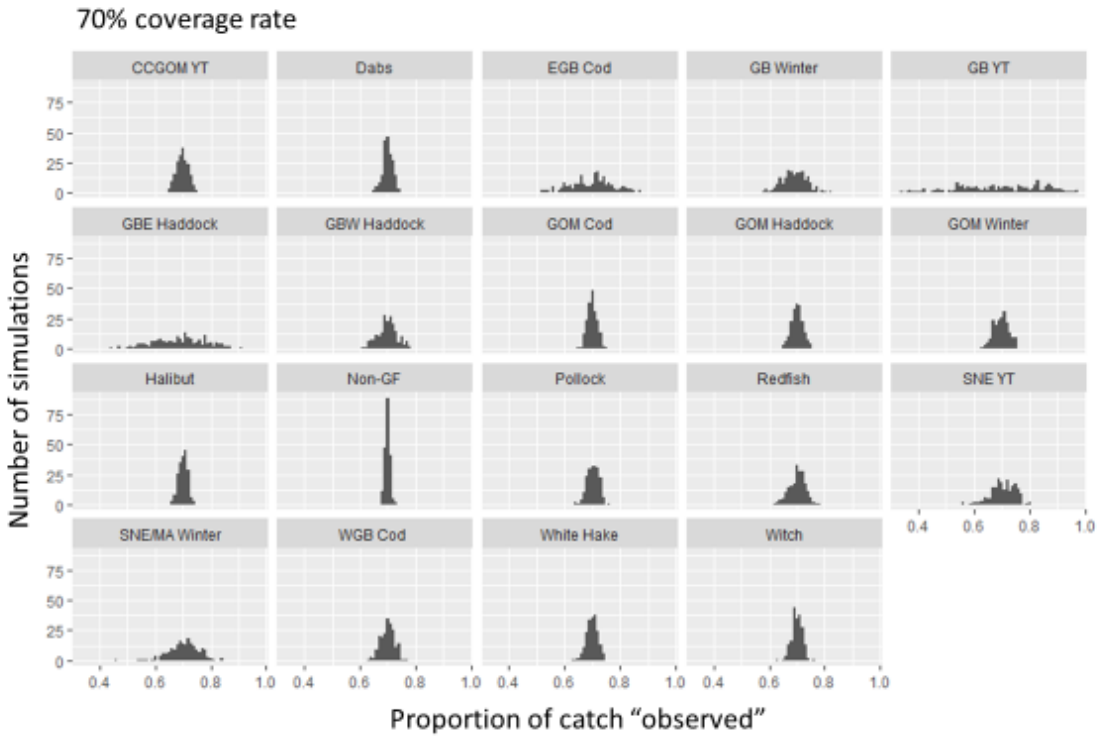


Figure 43 - Distribution of 200 random simulations estimating the total percentage of catch observed at a 90% coverage rate in FY2018.

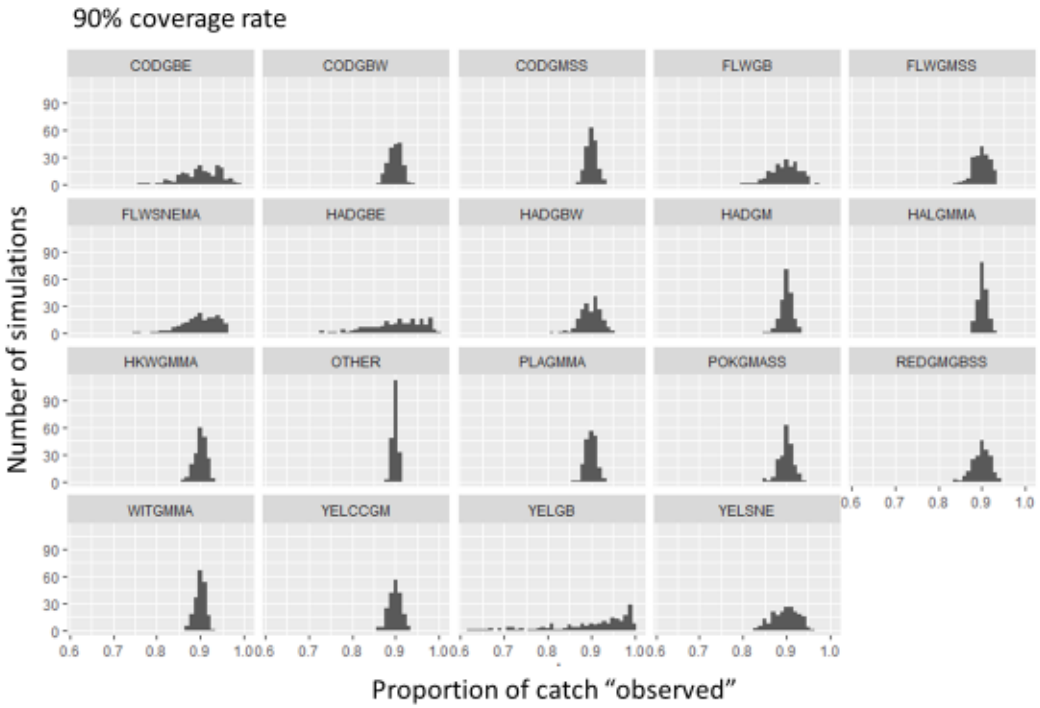


Table 66 - Results of FY 2018 simulations. For each observer coverage rate, the likelihood of achieving a given catch target for GB Yellowtail (the most limiting stock in the analysis for FY 2018) is shown as the percentage of simulations at or above that catch proportion. For the 50% of catch target two levels are shown, since the probability of achieving the catch target (50%) is near 90%. Adding 5% more observer coverage increases the likelihood to 97%. Recommended observer coverage rates to achieve specified catch targets in this action are shown in bold.

Observer Rate	50% trips		70% trips		75% trips		90% trips	
Catch Target	**25% catch**	50% catch	**50% catch**	75% catch	50% catch	75% catch	**75% catch**	90% catch
Proportion of simulations meeting catch target	**0.93**	0.47	**0.89**	0.43	0.97	0.54	**0.92**	.65

Impacts Analysis:

Compliance: The risk of non-compliance with ASM based on a fixed percentage of catch depends on the coverage rate selected. Because the compliance score depends on both the opportunity to be noncompliant and the economic incentives for noncompliance, there is less compliance risk for violations at sea when the coverage rate is higher. However, the risk for noncompliance at 50% observer coverage might be more similar to the risk of noncompliance at 25% observer coverage because of the incentive effect. That is, the incentive to misreport catch or landings may increase substantially if it means catch of certain stocks is more constraining some proportion of the time. For example, if 50% of the time catch limits are more binding since an observer is onboard, fishermen may fish differently, or pay higher prices to lease stocks that they may encounter, since they cannot as readily illegally discard. Therefore, if an observer is

not onboard, the incentive to illegally discard, which includes the cost of quota, may be higher and just as, if not more catch may be discarded at this coverage rate as at the 25% coverage rate, when the incentive effect isn't as strong. At a 70% coverage level, a potentially strong incentive effect is counteracted by a lower opportunity. Now, only on a third of trips can quota costs be evaded, which limits the amount of potential illegal activity somewhat, but not entirely. Fishermen can strategically alter their pre-catch behavior depending on whether they have an observer onboard, to the extent that it is feasible, fishermen may choose to take longer trips or have more profitable trips when an observer is not onboard, however, it becomes much more difficult to maintain profitable business operations if it is dependent on illegal activity on a minority of trips. For these reasons, the compliance score is **'low' at 50% ASM coverage and medium at 70% coverage, which is conservative based on the assumption that illegal activity will be highly incentivized on the remainder of trips. Only between 90 to 100% coverage rate obtains a 'medium high' to 'high' compliance score**, since the opportunity is very low even though economic incentives are likely highest.

Relative to No Action, the impact of moving to any coverage rate to ensure at least a given of catch of all stocks is monitored coverage depends on the target CV coverage rate in any given year. Between FY 2010 and FY 2018, the ASM target coverage rate was between 8% and 30%, with the most recent five-year average being 13.2%, with combined NEFOP and ASM realized coverage rate being 22%. If future coverage rates are similar, slight to moderate increases in the percentage of at-sea monitoring coverage is expected to have a neutral effect on compliance, since the No Action, 25%, and 50% coverage levels all receive a 'low' compliance score. Major increases in at-sea coverage are expected to have positive impacts on compliance, as the risk for noncompliance decreases at 75% and is very low at 100% coverage, reflected in the compliance scores at these levels of coverage.

Enforceability: Enforceability is expected to scale somewhat linearly at different levels of at-sea observer coverage. NOAA OLE has recommended higher levels of at-sea observer coverage to improve compliance (Compliance Improvement Recommendations, Enforcement Committee Meeting July 2019) More information available to enforcement officials will support their ability to detect and prosecute violations. In addition, other types of information may also support their operations, for example, at more equal proportions of observer coverage differences in pre-catch behavior may be more readily identified, so that enforcement may better target their efforts on likely offenders**. The enforceability score at 50% is therefore 'low', 'medium' at 70%, 'medium-high' at 90%, and 'high' at 100% ASM coverage**.

Relative to No Action, the impact on enforceability of moving to a given coverage rate to achieve a percentage of catch standard depends on the target CV coverage rate in any given year. Between FY 2010 and FY 2018, the ASM target coverage rate was between 8% and 30%, with the most recent five-year average being 13.2%. If future coverage rates are similar, slight increases in the percentage of at-sea monitoring coverage is expected to have a neutral effect on enforceability, since the No Action and 25% coverage levels receive a 'low' compliance score. Increases in at-sea monitoring coverage are expected to have positive impacts on enforceability, as enforceability increases as the more monitoring reports and independently verified information is generated. At 50% coverage, there is expected to be a low positive impact on enforceability, a positive impact at 75%, and strongly positive impact at 100% coverage, reflected in the compliance scores at these levels of coverage

7.4.1.1.1.3.1 Substitute Options for Sector Monitoring Tools

7.4.1.1.1.3.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Compliance: compliance scores for this alternative **are similar** to the scores given for the at-sea monitoring alternatives depending on the coverage rate. At status quo levels of monitoring, risk of non-compliance may still be high if cameras are only turned on 20-30% of the time. When cameras are on, fishermen are expected to be incentivized to follow rules and regulations similar to when an observer is onboard. Compliance may be somewhat higher than with human monitors to the extent that the coverage of onboard activities (sorting, discarding) is higher than with human observers (no missed hauls) and if a video record is believed to be stronger evidence of noncompliance than a human-based record, and therefore perceived to increase the likelihood of sanction. Relative to No Action, this alternative is expected to have a weakly positive impact on compliance if the at-sea target coverage level is 50% under Option 3, a positive impact if the coverage level is 70%, and positive to strongly positive impact on compliance if the coverage rate is increased to 90% or 100%, respectively.

Enforceability: Enforceability scores of this sub-option **are similar** to the enforceability scores for equivalent levels of ASM coverage, so at low levels of observer coverage, 0-25%, enforceability is 'low'. NOAA OLE supports EM implementation as means to improve compliance (Compliance Improvement Recommendations, Enforcement Committee Meeting July 2019). As mentioned for compliance, video records may potentially be more useful to enforcement than observer statements if video footage can reliably identify illegal practices.

Relative to No Action, is expected to have a strongly positive impact on enforceability if the at-sea target coverage level is 50% under Option 3, a positive impact if the coverage level is 70%, and weakly positive to neutral impact on enforceability if the coverage rate is increased to 90% or 100%, respectively.

7.4.1.1.1.3.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Compliance: Because this sub-option would require video cameras to be on 100% of the time, with a subset of video footage reviewed, it is expected that risk of non-compliance is very low. This primarily stems from the fact that unlike when an observer is onboard, vessel operators do not know what portions of a trip will be reviewed, so deterrence is constant across trips. For these reasons, this sub-option has a **'high'** compliance score. However, it should be noted that non-compliance is still possible, particularly if the review rate is low enough and operators perceive the probability of detection as low, as well as if video systems are focused on estimating discards, rather than landings, without dockside monitoring or another form of independent verification of landings, noncompliance dockside is still possible, and may have higher incentives for illegal activity under high levels ASM or under EM. Relative to No Action, this alternative would have a strongly positive impact on compliance if medium levels of coverage (50%) are selected under Option 3, and a positive impact if 75% is selected. If 90-100% coverage is selected under Option 3, this alternative would have a weakly positive impact on compliance, since even at fairly low review rates (10-15%), there is a constant deterrence since cameras are on 100% of the time, which results in a similar probability of detection as when an observer is onboard.

Enforceability: If cameras are situated and high resolution as to provide full coverage of operations, video footage collected through the audit model could provide a great deal of information useful for enforcement about the frequency and quantity of illegal activity since more footage could be reviewed as a result of a report of suspected illegal behavior. NOAA OLE supports EM implementation as means to improve compliance (Compliance Improvement Recommendations, Enforcement Committee Meeting July 2019). For these reasons, this sub-option receives a **'high'** enforceability score.
Relative to No Action, this alternative would have a positive impact on enforceability if medium levels of coverage are selected (50%), low positive impacts if medium-high levels of coverage are selected (70%), and neutral impacts if 90-100% coverage is selected.

7.4.1.1.1.3.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

Compliance: Compliance scores for the maximized retention sub-option are similar to the compliance scores for the audit-model sub-option. Specifically, the risk of non-compliance when cameras are on 100% of the time is expected to be low as long as cameras are positioned correctly and collect reliable information, this includes all fishing activities and verification of retained, sub-legal discards, dockside after the trip has concluded. Relative to No Action, this alternative would have a strongly positive impact on compliance if low to medium levels of coverage (50%) are selected under Option 3, and a positive to weakly positive impact if 70% or 90% are selected. If 100% coverage is selected under Option 3, this alternative may even have a slightly positive impact on compliance, since even at fairly low review rates (10-15%), there is a constant deterrence since cameras are on 100% of the time, which results in a similar probability of detection as when an observer is onboard.

Enforceability: If cameras are situated and high resolution as to provide full coverage of operations, video footage collected through the maximized retention model could provide a great deal of information useful for enforcement about the frequency and quantity of illegal activity since more footage could be reviewed as a result of a report of suspected illegal behavior. NOAA OLE supports EM implementation as means to improve compliance (Compliance Improvement Recommendations, Enforcement Committee Meeting July 2019). For these reasons, this sub-option receives a '**high'** enforceability score.
Relative to No Action, this alternative would have a positive impact on enforceability if medium levels of monitoring coverage are selected under Option 3 (50%), weakly positive impact if medium-high to high levels of coverage are selected (70%-90%), and neutral impacts if 100% coverage is selected.

7.4.1.1.2 Knowing the Total Monitoring Coverage Level at a Time Certain

7.4.1.1.2.1 Option 1: No Action

Currently, NMFS publishes the total monitoring coverage level once the necessary analysis is completed, which has varied year to year (See Table 55 in Section 6.6.10.1.4). There have been several years since FY 2010 when sector rosters were due before total monitoring coverage rates were announced (FY 2019, FY 2016, and FY2015), and one year when they were announced the day before (FY 2017). Option 1/No Action would continue the current process of making the total monitoring coverage level available once the necessary analyses are completed, which may result in negative economic impacts to the extent it affects the ability for businesses to anticipate their annual operating costs and make participation decisions as a result. It is unclear what economic impact resulted in the years when the coverage rate was announced after the sector roster deadline. Table 14 in section 6.6.1 shows that the number of vessels with LA permits joining sectors has decreased since FY 2010 but fluctuates some between years. Participation decisions may be affected by many other economic factors including market shifts, changes in ACLs and expected revenue in other fisheries, and other changes in costs such as fuel prices or repair and equipment costs. In addition, sectors have been partially to fully reimbursed for their monitoring costs in all years since 2012 (full funding by NMFS occurred in FY 2012-2014 and for most of FY 2015, partial reimbursement occurred from July 2016 to April 2018), so it is further unclear how much sectors anticipate to pay in monitoring costs in any given year, regardless of coverage rate.

7.4.1.1.2.2 Option 2: Administrative Measure for Knowing Total Monitoring Coverage Level at a Time Certain

This alternative only applies if No Action is selected under 7.1.1.1.1, Substitute Options for Sector Monitoring Tools. This measure would consider a time certain for knowing the total monitoring coverage

level as a target date of three weeks prior to the annual sector enrollment deadline set by NMFS. This measure would be expected to result in indirect, positive economic impacts relative to No Action to the extent that it permits advance financial planning sufficient to make participation decisions. If this option improves the ability for individuals to forecast their monitoring costs and compare costs across providers, businesses can adopt cost-minimizing strategies. However, as mentioned under Option 1, it is unclear what, if any, economic impacts resulted in past years when the coverage rate was announced after the sector roster deadline, in part due to the many other economic factors which affect participation and uncertainty surrounding federal reimbursement for monitoring costs in any given year.

7.4.1.1.3 Review Process for Sector Monitoring Coverage

7.4.1.1.3.1 Option 1: No Action

Under Option 1/No Action, the efficacy of sector monitoring coverage rates would not be reviewed on a prescribed basis. The groundfish monitoring program would continue to be reviewed as part of the goals and objectives of the groundfish sector monitoring program through Goal 6: Perform periodic review of monitoring program for effectiveness (see Section 4.1.1 for the complete list of goals and objectives of the groundfish monitoring program).

7.4.1.1.3.2 Option 2: Administrative Measure to Establish a Review Process for Monitoring Coverage Rates

This measure would establish a review process to evaluate the efficacy of sector monitoring coverage rates, to occur once two full fishing years of data is available. The review process would include establishing metrics and indicators of how well the monitoring program improved accuracy while maximizing value and minimizing costs. Therefore if review occurs less frequently under Option 1/No Action, some positive economic impacts may result if issues with monitoring coverage levels or other components of the monitoring program are detected and determined to be suboptimal to achieve the goals of the program, such as if illegal behavior persists affecting ex-vessel markets, the ACE lease market, and reduced competitiveness among rule-followers and rule-breakers.

7.4.1.1.4 Addition to List of Framework Items

Compared to No Action, this measure is expected to have neutral economic impacts. There is no expectation that the establishment of this administrative measure will have any discernibly positive or negative economic impact except for that it may confer more flexibility to the agency to consider additional monitoring tools in the future, which may permit operations to identify and adopt more cost-effective technologies more quickly than under No Action.

7.4.1.2 Groundfish Sector and Common Pool Monitoring Program Revisions

7.4.1.2.1 Dockside Monitoring Program

7.4.1.2.1.1 Option 1: No Action

Compliance: Since 2012 there has not been a dedicated dockside monitoring program for either sectors or the common pool fishery. NOAA OLE has noted that while it conducts some groundfish dockside inspections (approximately 300 in 2017), it does not believe this level of activity is sufficient to ensure

accurate reporting of landings since capacity limits efforts to the most egregious of violations (Attachment 6, PDT memo, May 3rd 2018). Incentives for misreporting catch dockside are similar to incentives for illegally discarding at sea, as they stem from both the probability that the illegal activity will be detected and benefits derived (avoided quota costs, increased access to stocks). Dockside, such illegal activities may include misreported or unreported landings (e.g., species substitutions or black fish). Under the status quo, there have been instances of misreported catch in the groundfish fishery, and without dockside monitoring the risk of noncompliance shoreside is likely to be high, therefore the compliance score for this alternative is **'low' to 'medium'**, due to the limited number and nature of dockside inspections, and somewhat lower incentives to misreport in the common pool fishery due to the absence of quota costs.

Enforceability: Enforceability is defined here as the ability for enforcement officials (NOAA OLE or Coast Guard) to detect and prosecute violations. NOAA OLE has noted that current levels of capacity makes detection of reporting violations dockside difficult (Attachment 6, PDT memo, May 3rd, 2018). Dockside monitors are not enforcement agents but their records, which include observations of potential illegal activities, can be used by enforcement to identify and prosecute violations. At current levels of dockside monitoring coverage there is little to no information confirming landings dockside so the enforceability score for this option is **'low'**.

7.4.1.2.1.2 Option 2: Dockside Monitoring Program for the Entire Commercial Groundfish Fishery (Sectors and Common Pool)

Compliance: A comprehensive dockside monitoring program covering all sector and common pool trips is likely to decrease the risk of noncompliance significantly from the status quo since the probability of detecting reporting violations would increase. The compliance score for this option is **'high'**, but it is noted that this would only ensure compliance with dockside reporting requirements, and without commensurate increases in at-sea coverage, this option alone may not ensure overall compliance since increasing dockside monitoring may increase the incentive to illegally discard at sea, among other forms of at-sea noncompliance.

Relative to No Action, this measure is expected to have a positive impact on compliance with dockside reporting requirements in the groundfish fishery but may only have a marginal positive impact on compliance overall if not coupled with additional at-sea monitoring coverage, through humans or EM, under Sector Monitoring Standards and Tools Options 2 or 3.

Enforceability: Dockside monitors are not enforcement agents but their records, which include observations of potential illegal activities and independent records of catch, can be used by enforcement to identify and prosecute violations, therefore full coverage of landings by monitors would greatly increase the amount of information available for enforcement and gets a **'high'** enforceability score. Relative to No Action, this measure is expected to have strongly positive impacts on shoreside capabilities for enforcement.

7.4.1.2.1.3 Option 3: Dockside Monitoring Program as an Optional Program for Sectors

Compliance: An optional program for dockside monitoring helps ensure that landings are verified but only decreases the risk of non-compliance for the fishery for the sectors that voluntarily select to use it. If a high proportion of sectors and/or catch is covered by dockside monitoring risk may be minimized, however, businesses within sectors that voluntarily pay for dockside monitoring may be at a competitive

disadvantage to those that do not, due primarily to increased operating costs of dockside monitors, but additionally if those who do not opt in are also noncompliant with regulations and incur fewer costs as a result. Therefore, it is not expected that over the long term many sectors will opt to voluntarily pay for dockside monitors and therefore the compliance score for this alternative is **'low'**. Compared to No Action, this measure is expected to have neutral impacts on compliance.

Enforceability: Dockside monitors are not enforcement agents but their records, which include observations of potential illegal activities and independent records of catch, can be used by enforcement to identify and prosecute violations, therefore some coverage of landings by monitors would increase the amount of information available for enforcement, but the enforcement score is driven by the amount of participation, which is expected to be low, therefore this option gets a **'low'** enforceability score. Compared to No Action, this measure is expected to have neutral impacts on enforceability.

7.4.1.2.1.4 Dockside Monitoring Program Structure and Design

7.4.1.2.1.4.1 Sub-Option 1: Dockside Monitoring Program Funding Responsibility

Sub-Option 1A: Dockside Monitoring as a Dealer Responsibility

Under Sub-Option 1A dealers would be responsible for covering the cost of groundfish monitoring. Since each individual dealer would be responsible for covering the costs of having their transactions observed, the funding of the program would be straightforward. Dealers would likely be invoiced on regular (e.g. monthly) intervals and directly pay for the cost of monitoring.

The difference in total costs for the program before Sub-Option 1A and Sub-Option 1B is uncertain. Under both Sub-Options 1A and 1B there will be many buyers of dockside monitoring services. The number of dockside monitoring providers that will be approved by NMFS is not certain. Dealers will work to identify dockside monitoring providers that can cover their transactions at the lowest possible cost. Dealers will work to have dockside monitors close to their primary ports, and would ideally have wide windows for landing, without added costs.

Compliance: If dealers are responsible for paying for dockside monitoring, they may pay less for each pound of groundfish, decreasing ex-vessel price. Decreasing ex-vessel price will increase the ratio of ex-vessel price to the ACE lease price for a given stock, holding all else constant, which will increase the vessel's incentive to be noncompliant either dockside or at-sea. However, if a dockside monitoring program is comprehensive, the opportunity for noncompliance will depend on the level of at-sea monitoring, either through humans or EM—therefore the risk for noncompliance depends on the level of at sea monitoring coverage. Relative to Sub-Option 1B, this measure is expected to have a neutral effect on compliance.

Enforceability: Dealer funding responsibility has a relatively neutral impact on enforceability relative to Sub-Option 1B since the presence of a dockside monitor and the creation of an independent data source will further enable enforcement action regardless of whether the program is dealer or vessel based.

Sub-Option 1B: Dockside Monitoring as a Vessel Responsibility

Under Sub-Option 1B sectors would develop and implement a third-party dockside monitoring program. Sectors will have some level of discretion in how they would have their members contribute to the funding of the program. The most straightforward, and perhaps most likely, would be to institute a fee on landings. Many sectors already have a landings fee in place in order to cover the administrative costs with

running a sector. Under this payment regime, costs would be proportional to landings, with the possible exception of low volume vessels that could qualify for lower coverage if Sub-Option 1B is selected.

The difference in total costs for the program before Sub-Option 1A and Sub-Option 1B is uncertain. Under both Sub-Options 1A and 1B there will be many buyers of dockside monitoring services. The number of dockside monitoring providers that will be approved by NMFS is not certain. Sectors and common pool vessels will work to identify dockside monitoring providers that can cover their primary ports at the lowest possible cost. The transition to industry-funded at-sea monitoring may provide some insight into how sector contract negotiations with providers may occur. Sectors will work to have dockside monitors close to their primary ports, and would ideally have wide windows for landing, without added costs. With ASM, sectors have been able to incur very low costs related to observer travel to and from ports due to observers being stationed in close proximity. Sectors have also been able to negotiate seaday rates to minimize costs, based on the makeup of trips in the sector. Sectors may work to do something similar in terms of offload times for cost minimization.

Compliance: If vessels are responsible for dockside monitoring, it may also increase the incentive to be non-compliant at sea, similar to a dealer-based program. Instead of a decrease in the ex-vessel price, costs associated with landing each unit of fish will increase, which may similarly increase the incentive to illegally discard, resulting in a neutral impact on compliance relative to Sub Option 1A as long as total dockside monitoring costs are the same regardless of whether the program is dealer or vessel based.

Enforceability: Vessel funding responsibility will have a neutral impact on enforceability as compared to Sub-Option 1A, since the presence of a dockside monitor and the creation of an independent data source will further enable enforcement action regardless of whether the program is dealer or vessel based.

7.4.1.2.1.4.2 Sub-Option 2: Dockside Monitorng Program Administration

Sub-Option 2A: Individual contracts with dockside monitor providers

Under Sub-Option 2A, either vessels or dealers (depending on Sub-Option 1) would be responsible for contracting with dockside monitoring providers to cover the cost of groundfish monitoring. Under both Sub-Options 2A and 2B there will be many buyers of dockside monitoring services. The difference between the two Sub-Options is in the supply of dockside monitoring providers that will be approved by NMFS. Under Sub-Option 2A, dealers/vessels will work to identify a dockside monitoring provider that can cover their transactions at the lowest possible cost.

The potential for lower costs to vessels/dealers exists under Sub-Option 2A relative to Sub-Option 2B. These lower costs could be realized if increased competition drives down rates. As discussed in Sub-Option 1B, the transition to industry-funded at-sea monitoring may provide some insight into how contract negotiations with providers may occur. Dealers/vessels will work to contract with providers that have dockside monitors stationed close to their primary ports, with wide windows for catch offloading. Dealers/vessels will work to minimize costs, provided sufficient flexibility for landing location and time.

Administrative costs to NMFS are likely to be higher under Sub-Option 2A, relative to Sub-Option 2B. NMFS will have to review and approve multiple dockside monitoring applications, as is currently done in the at-sea monitoring program. Dealers/vessels may end up changing dockside monitoring providers on a semi-regular basis (e.g. annual or semi-annual), creating the potential for added administrative costs relative to Sub-Option 2B.

Compliance and enforceability are likely to be minimally affected by either Sub Option 2A or 2B. If costs are lower under Sub Option 2A due to increased competition between providers, then cost of landing each unit will be lower than Sub-Option 2B as a result, which could reduce the incentive to illegally discard, which would have a positive impact on compliance, but the likelihood and magnitude of this impact is uncertain. Enforceability of Sub Option 2A relative to Sub Option 2B is neutral since neither changes the amount of information available for enforcement.

Sub-Option 2B: NMFS-administered dockside monitoring program

Under Sub-Option 2B, either vessels or dealers (depending on Sub-Option 1) would be responsible for contracting with a single dockside monitoring provider to cover the cost of groundfish monitoring. Under both Sub-Options 2A and 2B there will be many buyers of dockside monitoring services. The difference between the two Sub-Options is in the supply of dockside monitoring providers that will be approved by NMFS. Under Sub-Option 2B, dealers/vessels would be required to work with a single dockside monitoring provider.
The potential for higher costs to vessels/dealers exists under Sub-Option 2B relative to Sub-Option 2A. These higher costs could be realized due to decreased competition. The bidding process under Sub-Option 2B would be competitive, but will cover the entirety of the groundfish fishery. Rates could potentially be higher relative to Sub-Option 2A, since a single provider will have to cover a wide region. Lower dockside coverage rates in remote ports (Sub-Option 4) could help mitigate these higher rates.
Administrative costs to NMFS are likely to be lower under Sub-Option 2B, relative to Sub-Option 2A. While multiple dockside monitoring providers may bid for the NMFS contract, the provider chosen will cover the entirety of the groundfish fishery. Sub-Option 2B does not specify how frequent the bidding process will occur. A multi-year contract will result in a reduction in NMFS administrative costs.

Compliance and enforceability are likely to be minimally affected by either Sub Option 2A or 2B. If costs are higher under Sub Option 2B due to reduced competition between providers, then cost of landing each unit will be lower than Sub-Option 2B as a result, which could reduce the incentive to illegally discard, which would have a positive impact on compliance, but the likelihood and magnitude of this impact is uncertain. Enforceability of Sub Option 2A relative to Sub Option 2B is neutral since neither changes the amount of information available for enforcement.

7.4.1.2.1.4.3 Sub-Option 3: Options for Reconciling Discrepancies between Dealer Reports and Dockside Monitor Reports

Sub-Option 3A: Whichever record is higher is the official record

Under Sub-Option 3A, if discrepancies exist between dealer reports and dockside monitor reports, this measure would allow for whichever record reports the higher value by species to be considered the official record, where in the event of exemptions for dockside monitoring, the dealer report would remain the official record.
The magnitude of this impact largely depends on the frequency and magnitude of discrepancies. If the source of the discrepancy cannot be readily identified, it is most conservative to take the higher number in order to get the most conservative estimate of total catch, but may result in some negative economic impacts to fishing businesses if the source of error was on behalf of the observer and not the fishing business, since fishing businesses would be subject to paying to lease quota to cover the amount of the discrepancy, at a minimum, with no additional revenue. Compared to Sub-Option 3B, this sub-option would be expected to result in a positive impact on compliance to the extent that fishing businesses have an incentive to underreport or misreport landings, ice weights, or other measures, in an attempt to reduce

costs, this option may mitigate that incentive and encourage accurate reporting by ensuring that businesses are accountable to the true landings amounts immediately, without further enforcement action, but in addition frequent discrepancies could be flagged for possible enforcement action and further penalty, which represents a positive impact on enforceability overall, but a neutral impact relative to Sub-Option 3B.

Sub-Option 3B: Dealer reports remain the official record, with comparison to dockside monitor reports

Under Sub-Option 3B, this measure would allow for the dealer report to still be the official record, both for trips covered by dockside monitoring and those not covered (if the option for a "spot check approach" for a subset of the fleet is selected). If discrepancies exist between dealer reports and dockside monitor reports, the amount and frequency of these events could be flagged for possible enforcement action. This measure includes recommendation of enforcement of the NOAA Office of Law Enforcement (OLE) penalty structure in place to incentivize accurate reporting of landings, such that if there is a discrepancy between the dealer and the dockside monitor report, for example, the dealer may face a penalty.

Relative to Sub-Option 3A, this measure is expected to have positive economic impacts when observer reports are higher than dealer reports due to error on the observer's behalf, but there may be slightly negative compliance impacts since this sub-option requires enforcement to take action when discrepancies occur (which does not always occur, nor have sufficient evidence to result in a sanction), whereas Sub-Option 3A would automatically correct for possible noncompliance when it occurs by simply holding the dealer accountable to the higher record. Overall, this measure is expected to have neutral economic impacts.

7.4.1.2.1.4.4 Sub-Option 4: Options for Lower Coverage Levels in Small, Remote Ports and for Small Vessels with Low Landings

Sub-Option 4A: Lower coverage levels for small, remote ports

This option would allow for lower levels of dockside monitoring for smaller, less used ports to act as a "spot check." Dockside monitors would be randomly assigned to these ports at a lower coverage level. [analysis needed here—tally GF landings from all other ports except exempted]

Approximately 95 percent of groundfish pounds between 2013 and 2018 were landed in five New England Ports, namely, Gloucester, New Bedford, Scituate, Boston, and Portland. Under this sub-option, all dealers or vessels delivering to all other ports would be exempted from acquiring dockside monitors, since together, these ports cumulatively have only accounted for 5% of total landed groundfish pounds. In 2018 Boston accounted for $11.5 million dollars in groundfish revenue, Gloucester, $17.7 million, while New Bedford and Scituate accounted for $10.4 million and $700,000 dollars of groundfish revenue, respectively, in the same year. Portland accounted for nearly $3 million (see section 6.6.6). Together, this accounts for approximately 87% of all revenue from groundfish stocks in 2018, meaning around 13% of groundfish revenue would be exempted from monitoring coverage under this alternative. This Sub-Option is expected to have a positive impact relative to Sub-Option 1, since it would reduce the number of vessels or dealers responsible for obtaining full dockside monitoring coverage, particularly since costs of monitoring remote ports may be potentially more expensive per landed pound, due to travel costs, than in ports where a stable supply of dockside monitors is needed in anticipation of regular deliveries.

Sub-Option 4B: Lower coverage for low volume vessels

This option would allow for lower levels of dockside monitoring for smaller, low volume vessels to act as a "spot check." Dockside monitors would be randomly assigned to these vessels at a lower coverage level. As Shown in Table 67, a landings threshold of 55,000 pounds would result in 106 of 179 sector vessels and all 54 common pool vessels receiving an exemption in FY 2018. Every year since 2016 the common pool would have been exempted, but in every year only 3.1% to 5.3% of total sector groundfish landings would be exempted. Therefore, this sub-option expected to have a positive economic impact on the groundfish fishery, relative to Option 1, particular for small businesses, or businesses that land little to no groundfish but declare into the groundfish fishery to target other stocks, since they would not have to arrange or pay for a dockside monitor (depending on what is selected under sub-options 1 and 2).

Table 67 - Number of exempted fishing vessels and exempted groundfish and non-groundfish pounds in fishing years 2010-2018. All landings values reported in millions of landed pounds (GARFO DMIS dealer data).

Fishing Year	Fleet	# exempt vessels	total vessels	exempted GF lbs	exempted NGF lbs	total GF pounds	total NGF lbs	% GF lbs	% NGF lbs
2010	common pool	125	129	0.59	3.53	1.23	3.88	47.9%	91.1%
2010	sector	134	299	2.50	9.93	56.19	17.81	4.5%	55.7%
2011	common pool	116	117	0.31	4.69	0.44	4.69	69.1%	100.0%
2011	sector	124	299	2.34	12.08	60.93	23.01	3.8%	52.5%
2012	common pool	97	97	0.23	3.71	0.23	3.71	100.0%	100.0%
2012	sector	154	302	2.37	12.70	46.86	23.74	5.1%	53.5%
2013	common pool	95	97	0.34	2.81	0.59	2.94	56.4%	95.6%
2013	sector	134	245	2.16	9.58	41.48	17.04	5.2%	56.2%
2014	common pool	74	76	0.29	2.27	0.49	2.49	59.1%	91.2%
2014	sector	126	228	2.28	14.18	42.51	22.43	5.4%	63.2%
2015	common pool	61	64	0.45	1.29	0.67	3.57	67.6%	36.2%
2015	sector	118	213	2.10	12.08	40.77	19.31	5.2%	62.6%
2016	common pool	59	59	0.33	2.55	0.33	2.55	100.0%	100.0%
2016	sector	130	209	1.72	14.46	33.50	21.13	5.1%	68.4%
2017	common pool	54	54	0.19	1.96	0.19	1.96	100.0%	100.0%
2017	sector	124	198	1.97	15.51	37.05	22.10	5.3%	70.2%
2018	common pool	54	54	0.15	1.91	0.15	1.91	100.0%	100.0%
2018	sector	106	179	1.37	14.41	44.12	20.60	3.1%	69.9%

7.4.1.2.1.4.5 Sub-Option 5: Options for Dockside Monitor Safety and Liability Associated with Fish Hold Inspections

Sub-Option 5A: Dockside monitor fish hold inspections required

This measure would require that monitors be allowed to access the fish hold of vessels directly to verify that all of the retained catch is offloaded and accounted for at the conclusion of an offload. This option would require that the dockside monitoring service provider is responsible for providing insurance liability associated with having monitors inspect the fish hold of the vessel, similar to how at-sea monitor and observer providers are responsible for providing insurance liability for at-sea observers on board vessels, therefore this option may increase the cost burden to either dealers or vessels depending on what sub-option is selected under 7.5.1.2.1.3.1. Due to safety reasons, dockside monitors would only enter fish holds that have been emptied in order to verify that the fish hold is empty and therefore would be unlikely to have captured gases.
This Sub-Option is expected to have neutral to low positive economic impacts relative to Sub-Option 5B, since vessels would not have to purchase cameras or other equipment to perform hold inspections.

Compliance: Ensuring that the fish hold is empty helps ensure that all landed catch went to a dealer, and that reported landings are accurate and comprehensive of kept catch. If the fish hold is not empty, it is expected that there will be at least one other offload that needs to be observed. Without hold inspections, the ability to misreport landings is increased, and in a quota managed fishery there exists an incentive to evade quota constraints through misreporting or underreporting catch (see Appendix IV, #1a). Therefore, ensuring fish holds are empty is expected to increase compliance with reporting requirements. Relative to Sub-Option 5B, Sub-Option 5A is expected to have neutral effects on compliance as long as monitor reports are assumed accurate and unbiased.

Enforceability: Requiring a dockside monitor to inspect fish holds creates an opportunity for enforcement action if it is discovered that the fish hold is not empty, and no other offloads were reported to other dealers for that trip, such as through an attempt to conceal fish. Dockside monitors, like observers, are not enforcement agents and cannot take enforcement actions but their reports can be used by enforcement (see appendix of discard incentive model, appendix 1). Therefore, requiring dockside monitors to perform fish hold inspections is expected to increase the enforceability of reporting requirements. Relative to Sub-Option 5B, Sub-Option 5A is expected to have neutral effects on enforceability as long as monitor reports are assumed accurate and unbiased.

Relative to Sub-Option 5C, Sub-Option 5A is expected to have low positive to positive impacts on both compliance and enforceability since reducing the ability to perform hold inspections has been noted by enforcement to limit their capabilities to investigate possible illegal activities (Attachment 6, Groundfish PDT memo to the Groundfish Committee, May 3rd 2018).

Sub-Option 5B: Alternative methods for inspecting fish holds

This measure would allow for the use of cameras to verify that all of the retained catch is offloaded and accounted for, as an alternative method to dockside monitors directly accessing fish holds for inspections. This option may be particularly well suited for use on vessels with EM systems. This Sub-Option is expected to have neutral to low negative economic impacts relative to Sub-Option 5A, since vessels with EM will use their cameras to perform inspections and incur no additional costs, but other vessels may have to purchase cameras or other equipment.

Relative to Sub-Option 5A, Sub-Option 5B is expected to have neutral effects on compliance and enforceability as long as monitor reports are assumed accurate and unbiased but may have some positive impacts if electronic records are perceived to be more robust in enforcement actions that human-based reports. Relative to Sub-Option 5C, this alternative is expected to have low positive to positive impacts on both compliance and enforceability since reducing the ability to perform hold inspections has been noted by enforcement to limit their capabilities to investigate possible illegal activities (Attachment 6, Groundfish PDT memo to the Groundfish Committee, May 3rd 2018).

Sub-Option 5C: No fish hold inspection required, captain signs affidavit

This option would not require inspections of fish holds at the conclusion of an offload as a part of dockside monitoring, and instead would require captains to sign an affidavit, subject to the penalties of perjury, certifying that all catch has been removed from the fish hold concluding the offload, or an estimate of retained catch. This alternative would have neutral economic impacts relative to Sub-Option 5A, since neither requires vessels to purchase and maintain additional equipment, but potentially positive economic impacts relative to Sub-Option 5B, for vessels that do not already have cameras as part of an EM system.

Relative to Sub-options 5A and 5B, this alternative is expected to have a negative impact on both compliance and enforceability since reducing the ability to perform hold inspections has been noted by enforcement to limit their capabilities to investigate possible illegal activities (Attachment 6, Groundfish PDT memo to the Groundfish Committee, May 3rd 2018).

7.4.2 Sector Reporting

7.4.2.1 Option 1: No Action

Option 1/No Action would continue to require sectors to report all landings and discards to NMFS on a weekly or daily basis, and would continue to require that sectors submit annual year-end reports to NMFS and the Council.

7.4.2.2 Option 2: Grant Regional Administrator the Authority to Streamline Sector Reporting

This measure would grant the Regional Administrator authority to revise the sector monitoring and reporting requirements currently prescribed in the regulations [648.87(b)(1)(v) and (vi)] to streamline the sector reporting process, this is expected to have neutral to low positive impacts on the groundfish fishery to the extent that it simplifies the reporting process and reduces transaction costs associated with complying with regulations. In addition, if discards and ACE balances were determined more quickly, fishing businesses might make benefit from more certain financial planning, such as when to lease in or lease out quota.

7.4.3 Funding/Operational Provisions of Groundfish Monitoring

7.4.3.1 Option 1: No Action

Option 1/No Action would continue to require industry to fund at-sea monitoring costs. If a fixed rate of target monitoring coverage is required, then vessels would be required to reduce fishing effort to match the available level of monitoring that can be covered by available funding for NMFS' shoreside costs.

7.4.3.2 Option 2: Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.4.3.2.1 Sub-Option 2A: Additional NMFS Funding for Increased Monitoring if Funds Available

This measure would allow for at-sea monitoring at a high coverage level 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 as well as sampling costs to industry in a given year. This option is expected to have neutral to strongly positive impacts relative to No Action/Option 1 depending on the coverage rate and programs selected under Sector Monitoring Standards and Tools since it could cover up to 100% of monitoring costs in a given year which could compromise a significant proportion of operating costs in any given year, particularly if a significant increases in monitoring coverage are selected under 4.1.1.1.

7.4.3.2.2 Sub-Option 2B: Waivers from Monitoring Requirements Allowed

This measure would allow vessels to obtain 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 at the specified coverage level, including at-sea monitoring, electronic monitoring, and dockside monitoring, as required. Compared to No Action, this Sub-Option is expected to have positive impacts on fishing businesses to the extent that fishing effort would be constrained by the monitoring standard and coverage rate selected under 4.1.1.1 to the level that NMFS could fund.

7.4.4 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors and Common Pool)

Approach for Analysis (from PDT memo dated August 6th, 2019)

An increase in the management uncertainty buffer on a stock-by-stock basis in combination with a low to medium levels (less than 50%, for example) of monitoring coverage would not achieve several goals of the groundfish monitoring program. Specifically, it would:

- Increase uncertainty with respect to catch and discard estimates
- Incentivize illegal discarding of constraining stocks
- Reduce information available for stock assessments

However, a combination of large increases in monitoring coverage and increases in the management uncertainty buffer across all stocks are more likely to deter noncompliance with retention requirements. High levels of monitoring coverage will incentivize changing behavior to avoid constraining stocks (leasing quota to others, fishing more selectively, etc) but any proportion of unmonitored trips allows for the possibility that some catch is discarded illegally. Single-stock buffers may mitigate the impacts of illegal discarding if the quantity is small (as discussed in the SSC sub-panel report of A23 analyses). At present, levels of unreported catch (also referred to as illegal or unreported discards) are unknown, but may be assumed to be minimal under more comprehensive levels of monitoring. Furthermore, while the buffer may allow for some cost savings, reductions in monitoring coverage will further degrade the accuracy of fishery dependent data used in stock assessment, and illegal discarding at any margin undermines the functionality of the ACE lease market. Finally, increases in the management uncertainty buffer across all stocks may better constrain total fishing effort and meet conservation objectives, but in

addition to shortcomings identified previously, this approach comes at the additional cost of lost fishery revenue.

Background

At the June Council meeting, the Council voted to add in another alternative to the Amendment 23 document for consideration:

> *"An alternative that addresses the potential for bias in fisheries dependent data under current coverage rates by increasing the management uncertainty buffers as appropriate for each allocated stock by subcomponent. Buffers should be focused on enforceability of management measures and adequacy of catch monitoring, and may differ for sectors and the common pool. Coverage levels may be achieved through any combination of approved tools, including at-sea monitoring, dockside monitoring, and electronic monitoring."*

The Council's rationale added that while the PDT's analyses of observer effects and other issues in the current monitoring system suggest that there needs to be additional monitoring coverage, the cost of increased monitoring coverage "may reduce the viability of the commercial groundfish fleet." Therefore, the motion proposes that a way to minimize the effect of bias and account for potential undocumented catch is to couple current or increased monitoring coverage rates with an increase in the management uncertainty buffers for each allocated stock. The motion suggests that this would achieve multiple goals of the groundfish monitoring plan and the amendment, including that it is more cost-effective solution to addressing concerns with accuracy of catch estimates.

Framework 55 reiterated that the primary goal of the groundfish sector at-sea monitoring program is to verify area fished, catch, and discards by species, by gear type; and meeting these primary goals should be done in the most cost-effective means practicable. The goals of the groundfish monitoring program are in Section 4.1.1 and are as follows:

Goal 1: Improve documentation of catch

Goal 2: Reduce cost of monitoring

Goal 3: Incentivize reducing discards

Goal 4: Provide additional data streams for stock assessments

Goal 5: Enhance safety of monitoring program

Goal 6: Perform periodic review of monitoring program for effectiveness

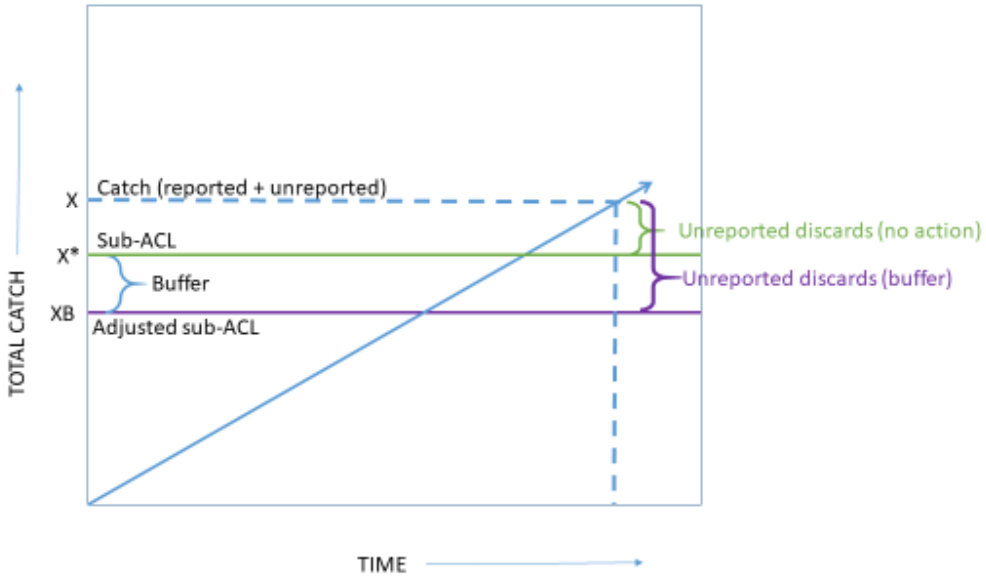
Discussion:

Increases in the management uncertainty buffer on a stock-by-stock basis are unlikely to be desirable substitutes for increases in monitoring coverage. This is because of the nature of potential overages in the groundfish fishery, as identified by the PDT's A23 analyses.

First, in a quota-based fishery where allocations may be traded or leased between individuals and sectors, such as the Northeast Multispecies Sector Program, we expect the demand for quota, or ACE, to drive lease prices in the fishery. When the available quota for a constraining stock is decreased, as would occur under a buffer, the ACE lease price is expected to increase and therefore the incentive to illegally discard that stock when it is encountered increases (Appendix 1, Attachment #1a, Errend, Henry, and Demarest, 2019). Illegal discarding is most economically rational when catch is unmonitored and the probability that illegal discarding will be detected is extremely low. Therefore, as we can see in Figure 44, we might expect that under low levels of monitoring coverage, true catch (X) is higher than the sub-ACL (X*) for a

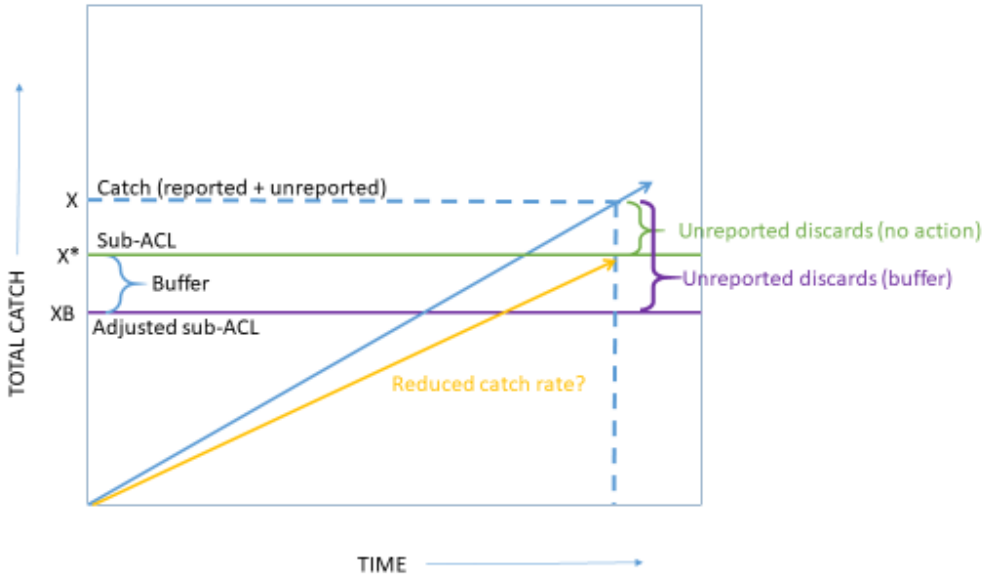
constraining stock, even if reported catch is at, or slightly less than the sub-ACL. The difference, shown in green, is due to unreported, illegal discards of the constraining stock with a positive discard incentive, for example GOM cod. If the management uncertainty buffer was increased so that the sub-ACL for GOM cod was decreased (XB, in purple, Figure 1) and catch rates remain the same, then we expect reported, legal landings not to exceed the adjusted sub-ACL, but that total catch after including unreported illegal discards may be at the same level as before (back at X). We expect catch rates to be minimally affected by the buffer, if affected at all. This is because under the single-stock reduced ACL scenario fishermen have no incentive to avoid catching GOM cod, or reducing their effort overall, because of a single-stock reduction in total catch with little catch accountability. Fishermen may even be incentivized to increase effort so that they can compensate for any lost revenue because marketable cod landings have been reduced, but this increased effort may result in incidental catch of cod which must be illegally discarded once individual, sector, or fishery wide limits are constraining or unprofitable.

Figure 44 - Stylized management uncertainty buffer schematic showing the impact of an increased management uncertainty buffer on unreported discards under low levels of monitoring.



In summary, on unobserved trips fishermen are not accountable for covering their catch with quota and thus some may choose to discard unprofitable or constraining catch in order to continue fishing on profitable stocks that are not constraining. The management uncertainty buffer would not increase accountability so it only increases the incentive to discard illegally and therefore the amount of unreported catch increases if overall effort is unaffected. A reduction in catch rates, such as through a reduction in total effort, or through the use of more selective fishing practices, is needed to ensure that the sub-ACL, or any other modified catch limit, is not exceeded (Figure 45). This approach depends on ensuring that proper incentives exist to ensure that fishing behavior changes throughout the fishing year so that the ACL is not exceeded. Increased monitoring coverage, through at-sea human observers or EM, support accurate catch estimates, such that when catch limits are reached, fishing is curtailed and catch limits are not exceeded.

Figure 45 - Stylized schematic showing the impact of reducing the catch rate on ensuring the ACL is not exceeded.



7.4.4.1 Option 1: No Action

The current default adjustment for management uncertainty for groundfish stocks is 5 percent of the ABC. For stocks with less management uncertainty, the buffer is set at 3 percent of the ABC; for stocks with more uncertainty, the buffer is set at 7 percent of the ABC. Currently, the sector and common pool components of the groundfish fishery have identical management uncertainty buffers for each groundfish stock. 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. A table of the status quo management uncertainty buffers are provided in Section 4.4.1.

Compliance: The current management uncertainty buffers have a neutral to low negative impact on compliance in the Northeast multispecies fishery. As discussed under 7.5.4, reductions in the sub-ACL for stocks may increase the discard incentive for that stock to the extent that it increases the ACE lease price to ex-vessel price ratio. At current levels of monitoring, instead of reducing effort to restrict catch of constraining stocks, on unobserved trips discard-incentivized stocks will be illegally discarded and unreported, which does not work to ensure the fishery stays within the sub-ACL as adjusted by the buffer, and possible ACL exceedances cannot be measured.

Enforceability: At current levels of monitoring it is not possible to ascertain whether or not illegal discarding is occurring at levels that exceed the ACL with or without the buffer, so the current management uncertainty buffers are not conducive for the detection of enforcement violations.

7.4.4.2 Option 2: Revised Management Uncertainty Buffers for Allocated Groundfish Stocks

This measure would revise the management uncertainty buffer for all allocated groundfish stocks. Revised management uncertainty buffers would apply to both the sector and common pool sub-ACLs.

This measure would not apply to other sub- ACLs or sub-components for any stocks. This measure has three options for adjusting the management uncertainty buffer for each of the allocated groundfish stocks. The Council would select one of the following, to be applied to all allocated groundfish stocks:
Option A -Increase the management uncertainty buffer 2 times (multiplier of 2),
Option B -Increase the buffer 5 times (multiplier of 5), or
Option C -Increase 10 times (multiplier of 10). A table of management uncertainty buffers under each of these alternatives is provided in section 4.1.1.1.

Economic impacts can be expected to flow first from direct losses of fishery revenue, especially for highly utilized stocks, from lost leasing revenue for those who lease their quota, and increased quota costs to those who rely on leasing quota. Secondly, economic impacts may also flow from the extent to which total catches are constrained by limited stock availability, however, if observer coverage is similar to status quo levels, total catch may not be readily constrained to the extent that quota constraints can be easily evaded by illegal discarding.

Compliance: As discussed in the PDT memo to the Committee on August 6th, increases to the management uncertainty buffer would not increase accountability so it only increases the incentive to discard illegally and therefore the amount of unreported catch increases if overall effort is unaffected, and the total magnitude of noncompliance may increase under each buffer scenario. Compared to No Action/Option 1, there would be low negative impacts on compliance under Option A, or a twofold increase in the management uncertainty buffer, negative impacts on compliance under Option B (5 times the management uncertainty buffer), and strongly negative compliance impacts under Option C, or increasing the management uncertainty buffer by a factor of 10. If at-sea monitoring coverage rates are increased in this action, the risk of noncompliance may decrease somewhat, which would lessen the impact of increasing the management uncertainty buffers, but this may only occur as medium high to high levels of observer coverage (e.g., >75%).

Enforceability: As the discard incentive increases with increasing management uncertainty buffers, without high levels of observer coverage or EM at-sea and dockside it will be just as, if not more difficult for enforcement to detect and prosecute violations. Therefore, all options for management uncertainty buffers have a neutral to slightly negative impact on enforceability, relative to No Action.

7.4.4.3 Option 3: Elimination of Management Uncertainty Buffer for Sector ACL with 100 Pecent Monitoring of All Sector Trips

To be provided

7.4.5 Exemptions from Groundfish Sector and Common Pool Monitoring Requirements

7.4.5.1 Option 1: No Action

Option 1/No Action would maintain the existing exemptions from groundfish monitoring program requirements. 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 Areas would continue to be exempt from the at-sea monitoring coverage requirement

7.4.5.2 Option 2: Exemption for Certain Vessels Based on Fishing Location

7.4.5.2.1 Sub-Option 2A: Exemption for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

This alternative would exempt vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a trip from at-sea monitoring and/or dockside monitoring (if implemented) (Figure 2 in the draft alternatives). VMS declaration and application of transit rules east of the line would be required.

An analysis of groundfish catch west of 72.5 degrees longitude (see 7.5.5.2) calculated total landings of groundfish stocks across 2010-2017. For most stocks, catches have been minimal in recent years. Winter flounder had the highest landings in 2016 and 2017 with 8,600 pounds in 2017, or approximately 1% of total landings. In previous years, greater quantities of both SNE winter flounder and SNE yellowtail flounder were landed in this area, but no more than 50,0000 pounds of any stock were landed in any year. While landings of windowpane flounder were low in 2016 and 2017, in 2014 nearly 8% of total windowpane landings were caught in the proposed exemption area. Average ex-vessel price in 2017 was $3.02 and $2.68 per pound for winter flounder and yellowtail flounder, respectively. Thus, approximately $26,000 of groundfish revenue was landed in this area in 2017, a de minimis proportion of total groundfish revenue ($47 million in 2017). Because of the low levels of groundfish landings in this area, exempting these trips from monitoring coverage is expected to result in positive economic impacts to those who fish in the exempted area, but neutral economic impacts on the fishery as a whole, relative to No Action/Option 1.

Compliance: While very little groundfish is landed in the proposed exempted area under Option 2, this may nevertheless incentivize increased effort and possibly illegal behavior in the fishery in order to avoid observer costs as well as costs imposed by being fully accountable to your quota when an observer is onboard. Effort west of the proposed boundary may increase as a result of these increased economic incentives to the extent it is more profitable to fish there, without an observer, than it is in other areas when you must carry an observer some proportion of the time (depending on the coverage rate selected under 4.1.1.1). It is expected that for at least groundfish vessels near or after the proposed line, such as those that are homeported or deliver to New York or Connecticut Ports, some shifts in effort and landings may occur, depending on what is selected under 4.1.1.1. Approximately 329 groundfish trips reported making landings in New York Ports in 2017, while 180 reported landings in Connecticut ports in the same years, in total around 7% of groundfish trips in 2017 (see Table 13 in Section 6.6). Compared to Sub-Option 2B, this option is expected to have positive impacts on compliance to the extent that it potentially affects less fishing effort. This alternative is expected to have neutral to positive impacts on enforceability impacts compared to No Action and neutral impacts relative to Sub-Option 2B. If new VMS codes and transit rules are put in place alongside this action enforcement may be able to detect violators who did not indicate that they would be fishing under the exemption, but would not increase the ability for enforcement to detect misreporting or illegal discarding.

7.4.5.2.2 Sub-Option 2B: Exemption for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

This alternative would exempt vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a trip from at-sea monitoring and/or dockside monitoring (if implemented) (Figure 2 in the draft alternatives). VMS declaration and application of transit rules east of the line would be required.

An analysis of groundfish catch west of 71.5 degrees longitude (see 7.5.5.2) calculated total landings of groundfish stocks across 2010-2017. For most stocks, catches have been minimal in recent years. 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. Specifically, 242,067 pounds of SNE winter flounder were landed in 2016, while 166,647 pounds were landed in 2017. 43,188 pounds and 41,138 pounds of SNE yellowtail flounder and western GB cod were also landed in 2016. Average ex-vessel price in 2017 was $3.02 per pound of winter flounder, thus, approximately $503,273 of winter flounder revenue was landed in this area in 2017, with much higher revenues coming from this area in past years. Compared to Sub-Option 1A, levels of groundfish landings in this area are substantially higher, exempting these trips from monitoring coverage is expected to result in positive to strongly positive economic impacts to those who fish in the exempted area, but low positive to positive economic impacts on the fishery as a whole, relative to No Action/Option 1, depending on the coverage rate selected under 4.1.1.1. However, these positive impacts result from cost savings to the fishery alone, in the form of reducing the number of trips needing to be covered by monitors, but could result in negative compliance outcomes to the extent that true catch in this area (landings plus unreported discards) would be unknown and effort may shift to this area in order to further reduce monitoring costs and additional costs imposed by quota constraints that cannot be easily evaded when a monitor is onboard. Compared to Sub-Option 2A, this option is expected to have negative effects on compliance since it affects a larger proportion of total fishing effort. With respect to enforceability, this alternative is expected to have neutral to low positive impacts compared to No Action and neutral impacts relative to Sub-Option 1A. If new VMS codes and transit rules are put in place alongside this action enforcement may be able to detect violators who did not indicate that they would be fishing under the exemption, but would not increase the ability for enforcement to detect misreporting or illegal discarding.

7.4.5.3 Review of Exemptions Based on Catch Composition

This option, if selected, would establish a process for review of exemptions for vessels from monitoring requirements that are based on catch composition, should the Council select these exemptions, to occur after two years of fishing data is available and every three years after that. Overall, this alternative is expected to have neutral economic impacts since it is not expected that a review will impose any additional costs on fishing businesses. However, this option is expected to have neutral to low positive impacts on compliance relative to status quo if it limits potential effort shifts in the two years before the review begins, however, if fishermen have a high discount rate, they may still perceive that benefits associated with reducing or eliminating short-term (1-2 year) monitoring costs to be worth shifting operations to an exempted area, depending on whether Sub-Option 2A or 2B is ultimately selected.

7.5 Social Impacts

National Standard 8 (NS8) requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. Thus, continued overall access to fishery resources is a consideration, but not a guarantee that fishermen would be able to use a particular gear type, harvest a particular species of fish, fish in a particular area, or fish during a certain time of the year.

A fundamental difficulty exists in forecasting social change relative to management alternatives, since communities or other societal groups are constantly evolving in response to external factors (e.g., market conditions, technology, alternate uses of waterfront, tourism). Certainly, fishery regulations influence the direction and magnitude of social change, but attribution is difficult with the tools and data available.

While the focus here is on the social impacts of the alternatives, external factors may also influence change, both positive and negative, in the affected communities. External factors may also lead to unanticipated consequences of a regulation, due to cumulative impacts. These factors contribute to a community's ability to adapt to new regulations. When examining potential social impacts of management measures, it is important to consider impacts on the following: the fishing fleet (vessels grouped by fishery, primary gear type, and/or size); vessel owners and employees (captains and crew); groundfish dealers and processors; final users of groundfish; community cooperatives; fishing industry associations; cultural components of the community; and fishing families. While some management measures may have a short-term negative impact on some communities, these should be weighed against potential long-term benefits to all communities which can be derived from a sustainable groundfish fishery.

Social Impact Factors. The social impact factors outlined below can be used to describe the Northeast multispecies (groundfish) fishery, its sociocultural and community context, and its participants. These factors or variables are considered relative to the management alternatives and used as a basis for comparison between alternatives. Use of these kinds of factors in social impact assessment is based on NMFS guidance (NMFS 2007a) and other texts (e.g., Burdge 1998). Longitudinal data describing these social factors region-wide and in comparable terms is limited. Qualitative discussion of the potential changes to the factors characterizes the likely direction and magnitude of the impacts.

The social impact factors fit into five categories:

1. *Size and Demographic Characteristics* of the fishery-related workforce residing in the area; these determine demographic, income, and employment effects in relation to the workforce as a whole, by community and region.
2. The *Attitudes, Beliefs, and Values* of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding the behavior of fishermen on the fishing grounds and in their communities.
3. The *Social Structure and Organization*; that is, changes in the fishery's ability to provide necessary social support and services to families and communities, as well as effects on the community's social structure, politics, etc.
4. The *Non-Economic Social Aspects* of the fishery; these include lifestyle, health, and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats.
5. The *Historical Dependence on and Participation in* the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights (NMFS 2007a).

Data utilized to inform the social impact factors include the 2004-2018 Groundfish-Specific Commercial Engagement Indicators, the 2012-2016 Community Social Vulnerability Indicators (CSVI), and results from both the 2012-13 and 2018-19 Socio-Economic Surveys of Hired Captains and Crew in New England and Mid-Atlantic Commercial Fisheries (Crew Survey). These data and methods for collecting them are described in section 6.5 above.

7.5.1 Groundfish Monitoring

7.5.1.1 Groundfish Sector Monitoring Program Revisions

7.5.1.1.1 Sector Monitoring Standards and Monitoring Tools

7.5.1.1.1.1 Option 1: No Action

Option 1 would likely result in neutral to positive impacts on the participants in the commercial groundfish fishery relative to Options 2 and 3. Substantial majorities of groundfish-targeting crew surveyed in both 2012-13 (77%) and 2018-19 (63%) responded that they either agreed or strongly agreed that regulations in their primary fishery are too restrictive. Additional monitoring could be viewed by sector program participants as further restricting their operations.

7.5.1.1.1.2 Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on a Percentage of Trips

Option 2 would likely result in neutral to negative social impacts relative to the No Action alternative. Majorities of groundfish crew surveyed in both 2012-13 and 2018-19 reported that regulations in their primary fishery are too restrictive (77% in 2012-13; 63% in 2018-19) and they change so quickly that it is hard to keep up (91% in 2012-13; 75% in 2018-19). Increased at-sea monitoring coverage, especially at higher levels, could exacerbate existing negative attitudes towards management among commercial fishing crew. However, lower fixed coverage levels may attenuate these negative impacts. At-sea monitoring coverage on 25% of trips would produce perhaps the least negative impact on attitudes towards management, whereas monitoring on 50% to 100% of trips will likely result in greater negative impacts on attitudes among commercial groundfish crew.

Assuming costs associated with implementing increased at-sea monitoring are passed on to crew in the form of decreased compensation, additional monitoring may also result in dissatisfaction among commercial groundfish crew. While only about 41% of groundfish crew in 2012-13 reported being satisfied or very satisfied with their actual earnings, this percentage increased dramatically in 2018-19 with three in four (75%) groundfish crew members reporting feeling either satisfied or very satisfied with their actual earnings. In addition to increased satisfaction with earnings, groundfish crew more often reported feeling satisfied or very satisfied with the predictability of their earnings in 2018-19 (42%) versus 2012-13 (13%). Given these gains in satisfaction with earnings among groundfish crew over time, Option 2 could produce negative impacts on crew attitudes if the costs associated with increased at-sea monitoring result in decreases in crew compensation. That said, lower fixed coverage levels could attenuate the negative impact on this aspect of crew job satisfaction. Assuming 25% coverage will cost vessel owners less than 50%, 75%, or 100%, the 25% coverage level may produce less negative impacts than these higher levels of coverage.

Given that these coverage levels would be percentages of trips, the impact may be disproportionately negative for commercial groundfish sector program participants operating smaller vessels or vessels contributing relatively small proportions to overall groundfish landings. Commercial groundfish sector program participants landing catch primarily with dealers in Cape May, NJ, Scituate, MA, Hampton

Bays/Shinnecock, NY, Chatham, MA, Portland, ME, and Narragansett, RI may endure relatively greater negative social impacts as a result of at-sea monitoring coverage on higher percentages of trips. While all among the top ten in engagement in the commercial groundfish fishery, these ports hosted substantially less commercial groundfish activity in recent years than the top three ports, New Bedford, MA, Gloucester, MA, and Boston, MA, and in some cases have seen declining or fluctuating engagement in commercial groundfish over time, particularly in Portland, ME and Chatham, MA (Figure 6).

7.5.1.1.1.2.1 Substitute Options for Sector Monitoring Tools

7.5.1.1.1.2.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Sub-Option A, electronic monitoring in place of at-sea monitors, could potentially result in long-term neutral-to-positive impacts relative to Option 2 alone, but short-term impacts may be negative as a result of the initial costs associated with installing electronic monitoring equipment and additional responsibilities that accompany the maintenance of electronic monitoring systems. Assuming electronic monitoring is more cost effective than at-sea human monitors over time, however, Sub-Option A can provide for positive long-term social impacts by reducing costs associated with monitoring at higher coverage levels over time. There may be a lag in terms of positive impacts on the attitudes, beliefs, and values of commercial groundfish vessel crew and hired captains due to frustrations that may arise from the initial start-up costs and obligations associated with this new electronic monitoring program

7.5.1.1.1.2.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Sub-Option B, audit model electronic monitoring, could result in neutral-to-positive social impacts for commercial groundfish fishery sector program participants relative to Sub-Option A or Option 2 alone. Under an audit model, the electronic monitoring equipment would operate on 100 percent of trips, but only a subset of these hauls or trips would be reviewed to verify vessel trip-reported discards. The review rate could theoretically even be reduced over time through future evaluations of data by NMFS staff, particularly for those vessels that are found to report accurately. That said, the audit model option may also result in negative social impacts as some sector participants may perceive 100% monitoring via electronic surveillance to be intrusive and a violation of privacy, as well as overly burdensome given extra catch handling and reporting requirements.

7.5.1.1.1.2.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

Sub-Option C, maximized retention electronic monitoring, could result in neutral-to-negative social impacts for commercial groundfish fishery sector program participants relative to Sub-Option A or Option 2 alone. Under the maximized retention model, the electronic monitoring would operate on 100 percent of trips and dockside monitoring would be required on 100 percent of trips as well. While video review rates may be lower than 100 percent once vessels establish compliance in initial reviews, the extensive monitoring coverage associated with both 100 percent electronic and dockside monitoring could be perceived by sector participants as overly burdensome, intrusive, and unnecessary, especially in view of Crew Survey results that suggest that the majority of groundfish-targeting crew in 2018-19 feel that the rules and regulations are too restrictive (63%; Table 42). Additionally, the added responsibilities associated with extra catch handling and reporting requirements could increase the number of working hours per day for crew assigned these new responsibilities as a result of this action. According to Crew Survey results, groundfish-targeting crew have seen an increase in working hours between 2012 and 2018, with an eleven percent increase in those working 15 hours or more per day (58% in 2012-13 versus 69% in 2018-19; Tables 37 and 38).

7.5.1.1.1.3 Option 3: Fixed Total Monitoring Coverage Level Based on a Percentage of Catch

Option 3 may result in neutral-to-negative social impacts relative to the No Action alternative, but may have positive impacts relative to Option 2. Lower levels of coverage under this option may mitigate the negative social impacts related to the size and demographics, as well as attitudes and beliefs, of sector participants. Coverage levels based on a percentage of catch may reduce negative social impacts on smaller size vessels that catch a smaller proportion of the overall catch in the region. The ports, and sector participants who primarily work there, that are most likely to benefit from an approach that would select for percentage of catch versus percentage of trips would likely be those less heavily engaged in the commercial groundfish fishery relative to the top three ports (Figure 6). These ports include Boston, MA, Narragansett, RI, Portland, ME, Montauk, NY, Chatham, MA, Hampton Bays, NY, Scituate, MA, Cape May, NJ, and many other ports that demonstrate lower levels of engagement in the commercial groundfish fishery. While percentage of catch selection criteria for coverage levels may be preferable to smaller vessels and lesser engaged ports, higher coverage levels, such as 75 and 100 percent of catch, would likely negate these mitigating factors related to negative social impacts on smaller vessels and lesser engaged ports. A coverage rate based on 25 percent of catch would likely produce the least negative impacts in terms of the size and demographics, as well as the attitudes and beliefs, of sector participants in the commercial groundfish fishery.

7.5.1.1.1.3.1 Substitute Options for Sector Monitoring Tools

7.5.1.1.1.3.1.1 Sub-Option A: Electronic Monitoring in place of At-Sea Monitors

Sub-Option A, electronic monitoring in place of at-sea monitors, could potentially result in long-term neutral-to-positive impacts relative to Option 3 alone, but short-term impacts may be negative as a result of the initial costs associated with installing electronic monitoring equipment and additional responsibilities that accompany the maintenance of electronic monitoring systems. Assuming electronic monitoring is more cost effective than at-sea human monitors over time, however, Sub-Option A can provide for positive long-term social impacts by reducing costs associated with monitoring at higher coverage levels over time. There may be a lag in terms of positive impacts on the attitudes, beliefs, and values of commercial groundfish vessel crew and hired captains due to frustrations that may arise from the initial start-up costs and obligations associated with this new electronic monitoring program.

7.5.1.1.1.3.1.2 Sub-Option B: Audit Model Electronic Monitoring Option

Sub-Option B, audit model electronic monitoring, could result in neutral-to-positive social impacts for commercial groundfish fishery sector program participants relative to Sub-Option A or Option 3 alone. Under an audit model, the electronic monitoring equipment would operate on 100 percent of trips, but only a subset of these hauls or trips would be reviewed to verify vessel trip-reported discards. The review rate could theoretically even be reduced over time through future evaluations of data by NMFS staff, particularly for those vessels that are found to report accurately. That said, the audit model option may also result in negative social impacts as some sector participants may perceive 100% monitoring via electronic surveillance to be intrusive and a violation of privacy, as well as overly burdensome given extra catch handling and reporting requirements.

7.5.1.1.1.3.1.3 Sub-Option C: Maximized Retention Electronic Monitoring Option

Sub-Option C, maximized retention electronic monitoring, could result in neutral-to-negative social impacts for commercial groundfish fishery sector program participants relative to Sub-Option A or Option 3 alone. Under the maximized retention model, the electronic monitoring would operate on 100 percent of trips and dockside monitoring would be required on 100 percent of trips as well. While video review rates may be lower than 100 percent once vessels establish compliance in initial reviews, the extensive monitoring coverage associated with both 100 percent electronic and dockside monitoring could be perceived by sector participants as overly burdensome, intrusive, and unnecessary, especially in view of Crew Survey results that suggest that the majority of groundfish-targeting crew in 2018-19 feel that the rules and regulations are too restrictive (63%; Table 42). Additionally, the added responsibilities associated with extra catch handling and reporting requirements could increase the number of working hours per day for crew assigned these new responsibilities as a result of this action. According to Crew Survey results, groundfish-targeting crew have seen an increase in working hours between 2012 and 2018, with an eleven percent increase in those working 15 hours or more per day (58% in 2012-13 versus 69% in 2018-19; Tables 37 and 38).

7.5.1.1.2 Knowing the Total Monitoring Coverage Level at a Time Certain

7.5.1.1.2.1 Option 1: No Action

Option 1 would likely result in negative social impacts related to the attitudes and beliefs of stakeholders in the commercial groundfish fishery. The current system for determining the monitoring coverage level is contingent upon the completion of necessary analyses, which often leads to uncertainty about coverage levels among commercial groundfish sector participants. According to results from the Crew Survey, about 75% of groundfish-targeting crew surveyed in 2018-19 reported that they either agree or strongly that the "rules and regulations change so quickly that it is hard to keep up," (Table 42). About 14% fewer crew (61%) in other fisheries reported the same concerns about the pace of change in rules and regulations (Table 42). Therefore, uncertainty in rules and regulations is a particularly salient issue among groundfish fishery participants compared with those in other fisheries.

7.5.1.1.2.2 Option 2: Administrative Measure for Knowing Total Monitoring Coverage Level at a Time Certain

Option 2 would likely result in positive social impacts related to the attitudes and beliefs of stakeholders in the commercial groundfish fishery relative to the No Action alternative. In establishing a specified date by which monitoring coverage levels will be announced to fishery participants, Option 2 will provide certainty for fishery participants in order to finalize business and fishing year planning decisions. It may also increase flexibility for vessel owners and captains to make changes to business plans and fishing activity decisions. As described in Table 42, about three-quarters of crew and hired captains in the groundfish fishery felt that rules change too quickly for them to be able to keep up. Option 2 may improve these conditions so that industry participants have certainty in at least this aspect of groundfish fishery management.

7.5.1.1.3 Review Process for Sector Monitoring Coverage

7.5.1.1.3.1 Option 1: No Action

Option 1 will likely have neutral social impacts on the commercial groundfish fishery and fishing communities. While a review process for sector monitoring coverage might improve attitudes among fishery participants about the transparency and accountability of the monitoring program, there is no

expectation that forgoing the creation of such a review process would either positively or negatively impact the social circumstances of fishery participants and communities. At best, No Action would not improve attitudes and beliefs about a program that may already be very unpopular among fishery participants.

7.5.1.1.3.2 Option 2: Administrative Measure to Establish a Review Process for Monitoring Coverage Rates

Relative to No Action, Option 2 may have positive social impacts with respect to the attitudes and beliefs of commercial groundfish fishery participants and communities. The implementation of a review process could improve attitudes among fishery participants and community members about the transparency and accountability of the process to determine monitoring coverage rates.

7.5.1.1.4 Addition to List of Framework Items

The administrative measure to add new sector monitoring tools to the list of management measures that can be adjusted through a framework action would have neutral positive social impacts on the commercial groundfish fishery and communities. While the framework process will provide greater flexibility for management and stakeholders to consider the use of new monitoring tools in the future, there is no expectation that the establishment of this administrative measure will have any discernibly positive or negative impact in terms of any of the social impact factors outlined above.

7.5.1.2 Groundfish Sector and Common Pool Monitoring Program Revisions

7.5.1.2.1 Dockside Monitoring Program

7.5.1.2.1.1 Option 1: No Action

Option 1 would likely have a neutral to positive social impact in terms of the size and demographics and attitudes and beliefs among commercial groundfish fishery participants and communities. Recent past efforts to implement dockside monitoring in the region were not viewed favorably by industry participants, communities, and relevant stakeholders, as evidenced by submissions to public comment during scoping hearings for Amendment 23 and other NEFMC meetings. At most, No Action with respect to the establishment of a new dockside monitoring program would precipitate positive impacts on the attitudes and beliefs among fishery participants and stakeholders who have in the past voiced concerns with such a program. At the very least, No Action would resume the status quo with respect to having no requirements for dockside monitoring and therefore would have neutral social impacts to the fishery and associated communities.

7.5.1.2.1.2 Option 2: Dockside Monitoring Program for the Entire Commercial Groundfish Fishery (Sectors and Common Pool)

Option 2 would likely result in negative social impacts for commercial groundfish fishery participants and fishing communities. Dockside monitoring implemented across 100 percent of the fishery, including sectors and the common pool, would likely result in increased costs to participants and community members and would create additional burdensome responsibilities for many vessel owners and crew members. These impacts may even be disproportionately impactful for smaller vessels and remote communities with proportionally less engagement in commercial groundfish than the top two or three engaged communities, such as Chatham and Scituate, MA, or Hampton Bays and Montauk, NY (Figure

6). Regardless of remoteness or extent of commercial engagement in the groundfish fishery, however, every port with substantial groundfish engagement will likely experience negative impacts in terms of the size and demographic and historical dependence on the commercial groundfish industry. In New Bedford, in particular, existing high social vulnerabilities (Table 32) and moderate gentrification pressures (Table 33) could exacerbate negative social impacts resulting from increased costs and reductions in employment opportunities tied to the local groundfish industry activity.

Assuming increased costs and responsibilities for commercial groundfish captains and crew, Option 2 would also likely result in negative impacts on the attitudes and beliefs of commercial groundfish crew and hired captains. According to Crew Survey data, the large majority of groundfish-targeting crew and hired captains from surveyed in both 2012 and 2018 either agreed or strongly agreed that the regulations in their primary fisheries are too restrictive (Tables 42 and 43).

7.5.1.2.1.3 Option 3: Dockside Monitoring Program as an Optional Program for Sectors

Option 3 will likely result in neutral to positive social impacts related to the size and demographics, attitudes and beliefs, and historical dependence of commercial fishing industry participants and communities. With optional dockside monitoring, as opposed to mandatory 100 percent coverage from dockside monitoring, sectors will have the flexibility and prerogative to opt into or out of the dockside monitoring program as one of their available monitoring tools. This may help to mitigate the anticipated negative impacts, outlined under Option 2, of implementing dockside monitoring in a uniform manner across the entire groundfish fishery.

7.5.1.2.1.4 Dockside Monitoring Program Structure and Design

7.5.1.2.1.4.1 Sub-Option 1: Dockside Monitoring Program Funding Responsibility

Sub-Option 1A: Dockside Monitoring as a Dealer Responsibility

Sub-Option 1A will likely have neutral to negative impacts on commercial groundfish fishery participants and communities. Placing the responsibility of funding a dockside program on dealers would likely increase costs for dealers and these costs could theoretically be passed on to either the consumers/customers or the vessels, or both. Moreover, very little correspondence has taken place with dealers to strategize how this approach would be implemented and to understand their attitudes and beliefs about this potential Sub-Option. Given high social vulnerabilities and gentrification pressures (Tables 32 and 33) among many of the most commercially engaged communities in the groundfish fishery (Figure 6), dealer costs could exacerbate existing social problems in these communities if these costs result in reduced employment opportunities, tax base, and economic activity related to commercial groundfish.

Sub-Option 1B: Dockside Monitoring as a Vessel Responsibility

Sub-Option 1B would likely result in negative social impacts for commercial groundfish fishery participants and communities. In particular, vessel-funded dockside monitoring would have a disproportionately negative impact on smaller vessels contributing less to the overall amount of catch and landings in the commercial groundfish fishery. It may also have an outsized negative impact on lower engagement (Figure 6) and remote communities due to reductions in employment opportunities and economic activity.

Additionally, Sub-Option 1B will likely produce negative social impacts with respect to the attitudes and beliefs of hired captains and crew in the commercial groundfish fishery. The large majority of groundfish-targeting crew and hired captains from surveyed in both 2012 and 2018 either agreed or strongly agreed that the regulations in their primary fisheries are too restrictive (Tables 42 and 43). Moreover, while most crew respondents in 2018 reported that they were satisfied with their earnings, less than half reported that they were satisfied with the predictability of their earnings (Table 40). Assuming increased vessel costs from funding a dockside monitoring program, crew earnings would likely be negatively impacted and their earnings may become less predictable depending upon the affordability for vessels to continue to participate in the commercial groundfish fishery.

7.5.1.2.1.4.2 Sub-Option 2: Dockside Monitorng Program Administration

Sub-Option 2A: Individual contracts with dockside monitor providers

Sub-Option 2A may result in neutral to negative social impacts on commercial groundfish fishery participants and communities. While individual contracts to administer the dockside monitoring program may provide greater flexibility to dealers or vessels to establish these third-party contracts and their parameters, this Sub-Option may also become burdensome by increasing the responsibilities and duties for hired captains and vessel owners to operate in the commercial groundfish fishery. If Option 3 is chosen, however, Sub-Option 2A may be the preferred Sub-Option given that sectors would opt into the program and would likely desire the flexibility and transparency associated with establishing their own independent contractors to administer the program.

Sub-Option 2B: NMFS-administered dockside monitoring program

Sub-Option 2B would likely result in neutral social impacts on the commercial groundfish fishery participants and communities. Though a NMFS-administered dockside monitoring program would remove the administrative and logistical burdens that an individually-contracted system would likely put in place, the dockside monitoring program has been historically unpopular among industry participants and stakeholders. Therefore, the preferable option in terms of social impacts related to the attitudes and beliefs, size and demographics, and historical dependence among commercial groundfish communities would be either Options 1 or 3, the no action alternative or voluntary program participation as a sector monitoring tool. In the instance that Option 3 is chosen, Sub-Option 2B would likely produce neutral social impacts because the program would be voluntary for sectors and the administration would not be their responsibility.

7.5.1.2.1.4.3 Sub-Option 3: Options for Reconciling Discrepancies between Dealer Reports and Dockside Monitor Reports

Sub-Option 3A: Whichever record is higher is the official record

Under both Options 2 and 3, Sub-Option 3A would likely result in neutral to negative impacts with respect to the attitudes and beliefs of commercial groundfish fishery participants and communities. Assuming the higher record is the dockside monitor record, commercial groundfish dealers and vessels may become increasingly frustrated with the process and this could exacerbate existing negative attitudes towards fisheries management (Tables 41 and 42).

Sub-Option 3B: Dealer reports remain the official record, with comparison to dockside monitor reports

Under both Options 2 and 3, Sub-Option 3B would likely result in neutral impacts with respect to the attitudes and beliefs of commercial groundfish fishery participants and communities. With dealer reports to remain the official record in case of discrepancies in reports, commercial groundfish dealers and vessel owners will likely not perceive unfairness or a lack of accountability and transparency associated with the circumstances that could be created as a result of Sub-Option 3A being adopted.

7.5.1.2.1.4.4 Sub-Option 4: Options for Lower Coverage Levels in Small, Remote Ports and for Small Vessels with Low Landings

Sub-Option 4A: Lower coverage levels for small, remote ports

Under both Options 2 and 3, Sub-Option 4A would likely result in positive social impacts in terms of the size and demographics, attitudes and beliefs, and historical dependence of commercial fishing communities and stakeholders. Assuming dockside monitoring becomes either an optional or mandatory program, this sub-option would provide needed relief to smaller, lesser engaged ports that are geographically remote and would require additional logistical and technical burdens and costs under such a program. The remote ports that are substantially engaged in commercial groundfish include, but are not limited to, Montauk and Hampton Bays, NY (Figure 6). Other ports that have substantial engagement in commercial groundfish and would most likely benefit from Sub-Option 4A may also include, but are not limited to, Portland, ME, Narragansett, RI, Chatham, MA, Scituate, MA, and Cape May, NJ.

Sub-Option 4B: Lower coverage for low volume vessels

Under both Options 2 and 3, Sub-Option 4B is expected to have positive social impacts on the attitudes and beliefs, size and demographics, and historical dependence of commercial groundfish fishery participants and communities. Vessel owners, hired captains, and crew members on vessels that are smaller in size or catch lower volumes of groundfish relative to larger and more engaged vessels will benefit most from this Sub-Option. The large majority of groundfish-targeting crew and hired captains from surveyed in both 2012 and 2018 either agreed or strongly agreed that the regulations in their primary fisheries are too restrictive (Tables 42 and 43). Assuming lower coverage for low volume vessels mitigates the costs associated with dockside monitoring for some of these smaller or proportionally lesser engaged commercial fishing vessels, Sub-Option 4B may improve attitudes towards management among these fishery participants and their communities.

7.5.1.2.1.4.5 Sub-Option 5: Options for Dockside Monitor Safety and Liability Associated with Fish Hold Inspections

Sub-Option 5A: Dockside monitor fish hold inspections required

Under both Options 2 and 3, Sub-Option 5A may produce neutral to negative social impacts with respect to the attitudes and beliefs and size and demographics of commercial groundfish fishery participants and stakeholders. Concerns related to the safety of monitors entering fish holds and the insurance liability of vessels have been raised numerous times at NEFMC meetings during public comment. By mandating fish hold inspections, Sub-Option 5A may worsen already negative viewpoints among hired captains and crew about the restrictive and punitive nature of fisheries management. The majority of hired captains and crew either agree or strongly agree that the rules and regulations are too restrictive and only about one in four agree that the fines associated with breaking the rules are fair (Table 42). If additional insurance liability

coverage is perceived as a penalty or undue cost, it is likely that commercial groundfish fishery participants will view this measure unfavorably. Additionally, if Sub-Option 5A results in increased costs for fishery participants, this measure may produce disproportionate negative impacts on participants that catch lower volumes or are lesser engaged in commercial groundfish. If Option 3 is adopted, however, Sub-Option 5A may produce neutral impacts because those fishery participants who view this unfavorably will likely not opt into this dockside monitoring program as their preferred monitoring tool.

Sub-Option 5B: Alternative methods for inspecting fish holds

Under both Options 2 and 3, Sub-Option 5B may produce neutral to negative social impacts related to the attitudes and beliefs and size and demographics of commercial groundfish fishery communities and participants. Relative to Sub-Option 5B, it may produce neutral social impacts because while it removes the potential safety and liability concerns associated with monitors entering the fish hold it still could precipitate increased costs in the form of purchasing and maintaining additional electronic monitoring equipment. If Option 3 is selected, however, Sub-Option 5B would likely produce neutral social impacts as those who would prefer to not utilize dockside monitoring could opt out of this program altogether.

Sub-Option 5C: No fish hold inspection required, captain signs affidavit

Under both Options 2 and 3, Sub-Option 5C may result in neutral to positive social impacts for commercial groundfish fishery participants and communities. With no requirement for fish hold inspections, hired captains and vessel owners would likely have more favorable attitudes towards a dockside monitoring program, especially if such a program were voluntary as under Option 3.

7.5.2 Sector Reporting

7.5.2.1 Option 1: No Action

Option 1 would likely result in neutral to negative social impacts for commercial groundfish fishery participants and communities. While no change in reporting procedures may be viewed by some as welcome given that many groundfish-targeting crew have reported that the rules change too quickly to keep up (Table 42), many others may find that no action with respect to the current status quo for reporting requirements would provide for the continuation of a process that is generally perceived as burdensome.

7.5.2.2 Option 2: Grant Regional Administrator the Authority to Streamline Sector Reporting

Relative to no action under Option 1, Option 2 may result in positive social impacts for commercial groundfish fishery participants and communities. A streamlined process for sector reporting requirements may reduce administrative burdens on sector program participants and would likely result in more favorable attitudes among these participants towards fisheries management.

7.5.3 Funding/Operational Provisions of Groundfish Monitoring

7.5.3.1 Option 1: No Action

Option 1 would likely result in negative social impacts for commercial groundfish fishery participants and communities. With the continuation of industry-funded monitoring and the possibility of reductions in fishing effort mandated by the availability of coverage, the No Action alternative would exacerbate

already existing negative attitudes towards fisheries management (Table 42) and would produce disproportionate social impacts on smaller, lesser engaged ports (Figure 6) and smaller or lower volume vessels due to the likelihood of outsized costs and reductions in profitability due to restrictions on fishing effort.

7.5.3.2 Option 2: Provisions for an Increase or Decrease in Funding for the Groundfish Monitoring Program

7.5.3.2.1 Sub-Option 2A: Additional NMFS Funding for Increased Monitoring if Funds Available

Sub-Option 2A under Option 2 would likely result in neutral to positive social impacts relative to Option 1, the no action alternative, due to its potential for mitigating the costs associated with increases in monitoring within the context of an industry-funded system. Additional NMFS funding for the groundfish monitoring program would reduce costs associated with monitoring for vessels and other fishery stakeholders, but regardless of the source of funding any increase in monitoring could still be perceived as overly burdensome and intrusive among fishery participants and stakeholders. The economic benefits may not always align with social and cultural costs of monitoring, which can include distrust of management intentions and objectives or frustrations with the restrictiveness and fairness of management actions among fishery stakeholders.

7.5.3.2.2 Sub-Option 2B: Waivers from Monitoring Requirements Allowed

Sub-Option 2B under Option 2 would likely result in positive social impacts related to the attitudes and beliefs and size and demographics of commercial groundfish fishery participants and communities. Allowing waivers from monitoring requirements when fishing effort might be restricted due to NMFS funding lapses would avoid the potential for substantial reductions in employment opportunities, income, and revenue for fishery participants, stakeholders, and community members.

7.5.4 Management Uncertainty Buffers for the Commercial Groundfish Fishery (Sectors and Common Pool)

7.5.4.1 Option 1: No Action

Option 1 may result in neutral to positive social impacts for commercial groundfish fishery participants and communities. Revisions to the management uncertainty buffers may not be warranted, especially in the event of the implementation of comprehensive (100%) catch monitoring through various monitoring tools. Commercial groundfish catch limits may also increase with reductions or removal of uncertainty buffers, but any revision that would result in an increase could further restrict catch, especially if accountability measures are triggered.

7.5.4.2 Option 2: Revised Management Uncertainty Buffers for Allocated Groundfish Stocks

Under Option 2, three sub-options are possible for revising management uncertainty buffers for stocks in the groundfish fishery complex. Sub-options A through C, a two-fold (multiplier of 2), five-fold (multiplier of 5), and ten-fold (multiplier of 10) increase in the buffer, respectively, would all produce neutral to negative social impacts relative to the No Action alternative. Relative to each other, these Sub-Options may produce increasingly negative impacts in terms of attitudes and beliefs, size and demographics, and the historical dependence of commercial groundfish fishery participants and

communities. Higher uncertainty buffers may not alleviate the potential bias in catch estimates with the same level of effectiveness of comprehensive monitoring and could further restrict catch if accountability measures are triggered, especially at the highest buffer level under consideration (i.e., a ten-fold increase). On the other hand, if the combination of increased catch monitoring and a moderate uncertainty buffer is considered cost-effective, Sub-option A may produce neutral social impacts if it results in cost savings for fishery participants relative to comprehensive (100%) monitoring of the fishery, especially in the context of an industry-funded system.

7.5.4.3 Option 3: Elimination of Management Uncertainty Buffer for Sector ACL with 100 Pecent Monitoring of All Sector Trips

Option 3 may produce neutral to positive social impacts for commercial groundfish fishery participants and communities relative to Options 1 or 2. The elimination of management uncertainty buffers could lead to increased quotas and/or a reduced likelihood for triggering any accountability measures associated with exceeding the buffers on the ACLs for any given stocks. While comprehensive (100%) monitoring may increase costs for commercial groundfish fishery participants, the elimination of the uncertainty buffer could help mitigate the negative impacts associated with the costs of monitoring.

7.5.5 Exemptions from Groundfish Sector and Common Pool Monitoring Requirements

7.5.5.1 Option 1: No Action

Option 1 would likely result in neutral social impacts for commercial groundfish fishery participants and communities. Since the exemptions apply to vessels using gear that primarily target non-groundfish stocks and species, and therefore these vessels catch very few groundfish, these exemptions, or any changes to them, would likely not affect any commercial groundfish fishery participants.

7.5.5.2 Option 2: Exemption for Certain Vessels Based on Fishing Location

7.5.5.2.1 Sub-Option 2A: Exemption for Vessels Fishing Exclusively West of 72 Degrees 30 Minutes West Longitude

Sub-Option 2A would likely result in neutral social impacts for commercial groundfish fishery participants and communities. Since the exemptions apply to vessels that primarily target non-groundfish stocks and species, and therefore catch very few groundfish, these exemptions, or any changes to them, would likely not affect any commercial groundfish fishery participants.

7.5.5.2.2 Sub-Option 2B: Exemption for Vessels Fishing Exclusively West of 71 Degrees 30 Minutes West Longitude

Sub-Option 2B would likely result in neutral social impacts for commercial groundfish fishery participants and communities. Since the exemptions apply to vessels that primarily target non-groundfish stocks and species, and therefore catch very few groundfish, these exemptions, or any changes to them, would likely not affect any commercial groundfish fishery participants.

7.5.5.3 Review of Exemptions Based on Catch Composition

This administrative measure would likely result in neutral social impacts for commercial groundfish fishery participants and communities. Since the exemptions apply to vessels that primarily target non-groundfish stocks and species, and therefore catch very few groundfish, these exemptions, or any changes to them, would likely not affect any commercial groundfish fishery participants.