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7.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS

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.

7.4.1 Background

Long-run economic impacts from improved monitoring are difficult to estimate quantitatively, as the feedback between accurate catch data and either higher sector sub-ACLs or improved industry stability are indirect and impossible to quantify. Accurate sector-level catch monitoring was first addressed in the NMS Amendment 13, which placed responsibility for monitoring landings and discards on sectors via their operations plans ///(CITATION - A13). Sector operations plans were required to demonstrate how each sector would accurately document landings and discards for managed species subject to their respective catch allocations (at that time these allocations were referred to as "quota," they are now called "sector ACE"). Amendment 16 subsequently expanded the sector allocation program and adopted changes to the sector monitoring requirements ///(CITATION - A13). This amendment recognized the need for "enhanced" monitoring requirements relative to those specified in Amendment 13, "because of the necessity to accurately monitor sector catch—both landings and discards". Section 6.6.10.1.4 of this document outlines the current status of monitoring requirements and their evolution since the adoption of Amendment 16.

Section 6.6.10.2 summarizes analyses designed to assess the degree to which current monitoring requirements are meeting the requirement of accurate monitoring of sector-level catch. These analyses underwent a formal peer review in April of 2019 ///(CITATION – PEER REVIEW REPORT). The resulting report concluded that current monitoring requirements were insufficient for accurate catch monitoring: "The analyses suggest that estimates of discards on unobserved trips derived from discards rates on observed trips may not be accurate, and [are] likely to be an underestimated reflection of actual discards". Importantly, these analyses and the subsequent peer review report, particularly when taken together with the federal criminal case presented against Carlos Rafael (the primary fisherman involved in one large sector) and both the Northeast Science Center and the U.S. Coast Guard reports on potential

stock-level area misreporting, support economic theory that the primary driver for mis-estimated catch is circumvention of the market for annual ACE leases (insert reference).

Economic considerations are central to sector monitoring standards, which in turn are central to the long-run benefits derived from this fishery. In the case of catch accounting there is a trade-off between the costs of monitoring catch and the potential for improving fishery performance through a robust and enforceable ACE lease market and increased catch stability. To that end, accurate (or "improved") catch accounting may ensure that:

1. Fishing practices are accurately and properly incentivized by price signals derived from the ACE lease market;
2. Fair and equitable distribution of benefits from the harvest of federal fishery resources between and among fisherman, fish dealers, seafood consumers and other interested parties;
3. Improved stability and reliability of fish stock assessments and the allocations derived therefrom; and,
4. Respect for and validation of the rules governing the sector-based allocation system.

Prior to the widespread adoption of the sector system under Amendment 16, fishing practices such as gear choice, fishing location, and other operational considerations were dictated by Days-at-Sea restrictions in combination with trip limits and other "input" controls. Under the sector system, which includes leasing ACE between sectors, these are driven instead by constraints imposed by the price of ACE leases and any frictions in the ACE lease market. Rather than regulations specifying where and how to fish, as from 2006-2010, under an ACE lease system most aspects of operations are driven by lease price signals, themselves a reflection of abundance or scarcity of quota[1]. If a species with a high, or low, lease price is caught in a given area, fishing pressure either increases or decreases in that area in response. The choices of where and how to fish are made by individual fisherman, not regulators. ACE lease prices, however, provide these signals only when catch is accurately monitored. Circumventing the ACE lease market through catch misreporting mutes the price signal and fails to properly direct fishing practices. In these circumstances, the operations of the fishery deviate from those of a comprehensively monitored fishery under prevailing ACE allocations in ways that harm the stability and equitability of the fishery.

Incentives to circumvent ACE lease markets are present (insert reference). Four inequities result:

1. ACE lease markets are "incomplete": fisherman leasing in ACE do not pay it's true cost, and fisherman leasing out ACE are insufficiently compensated.
2. Stock assessments that depend on catch information are deprived of accurate data, perhaps leading to a second-order effect where assessment quality is degraded, though inaccurate catch alone is unlikely to be the sole, or even the primary, cause of such degraded assessments.
3. To the extent that unaccounted for catch is a cause of unstable or unreliable assessments and low fishery allocations, fish dealers and consumers are deprived of the benefits of stable or, heaven help us, increasing catch.
4. In a fishery where sector-level self-governance is at the core of the regulatory system, incentives that erode trust between fishermen, sectors, regulators and the public may create a negative feedback loop where circumventing regulations leads to loss of trust on all sides, inducing further circumvention of regulations.

[1] Regulation-based fishing requirements such as minimum mesh and fish sizes, broad area closures and vessel upgrade restrictions also drive fishing operations.

The costs of catch monitoring were analyzed in Amendment 16 ///(CITATION – A16). Two reports estimating monitoring costs were presented to the Council at that time ///(Turris and McElderry 2008; McElderry and Turris 2008). Based on the data and assumptions embedded in those reports, estimates for ASM costs per monitored sea day were between a low of $600 and a high of $1,000 ($707 and $1,178, respectively, in 2018$). Electronic monitoring was incorporated as well, with daily sea day rates between $150 and $200 ($177 and $235 in 2018$). Fleet-wide annual costs were extrapolated from these estimates based on 28k total days absent, yielding a total annual monitoring cost of between $7.26mil and $11.8mil. The 2009 analysis noted that efficiencies derived from ACE leasing would result in fewer than 28k monitored sea days, and costs would likely be lower. The document goes on to state that *"by FY 2012, sectors will be required to provide an at-sea monitoring program; at that time, the issue facing vessel owners is whether sector operations can support the monitoring program expense."* This did not come to pass, and vessel owners have yet to face the issue of whether sector operations can support industry-funded monitoring.

Section ///6.6.10.1.4 discusses the trajectory of monitoring funding from the time it was intended to shift from government-subsidized to industry-funded in 2012. A report presented to the NEFMC in June of 2015 summarized the potential impacts of shifting from government to industry funding at that time, concluding in part that:

> *"The cost of ASM coverage was roughly 25% of net owner's share of fishing revenues (RTO) in 2014, down from just over 40% in 2013. Returns to owner are estimated to have declined annually from 2010-13, with an uptick in 2014. This report is restricted to the groundfish fishery in isolation. As demonstrated in Table 6, vessels engaged in the groundfish fishery do generate the majority of their revenues from this fishery, but not all—10-40% of vessel-level revenues appear to be generated in other fisheries. Implied reductions in aggregate vessel level profits will be mitigated by participation in other fisheries which are exempt from ASM coverage requirements. In the future it may be more meaningful to examine the potential impact of industry-funded ASM in light of total enterprise profits, for example at the vessel or owner level. This will be the basis for future work on this issue. The fact remains that almost 40 percent of active vessels are estimated to have earned negative returns to owner from the groundfish fishery portion of their business in FY 2014, and this number has been increasing since 2010. Predictions for FY 2015 are that nearly 60% of the fleet could see negative returns to owner when full 2015 ASM costs are factored in. This is an over-estimate, as the industry will only be responsible for ASM marginal costs from late summer onward, but it indicates that industry funded ASM could result in restructuring of the fleet, though changes are hard to predict since at least parts of the fishery have remained active despite estimated negative returns. Additionally, profit declines may have second-order effects such as the laying off of crew, reductions in maintenance and safety expenditures, etc, and these reductions in necessary inputs affect upstream shoreside markets. Reductions in profits due to industry-funded ASM may impede the ability for owners to make capital investments and may affect the ability of domestic producers to compete in the ever-more-globalized marketplace." ///(Demarest 2015)*

The intervening four years have seen substantial changes in the fishery, driven instead by substantial reductions in allocations of several key fish stocks. ///Table 13 in Section 6.6 shows that total revenues from the groundfish fishery have declined from a high of $129mil in FY2011 to a low of $68mil in FY2017. This was driven by ACE reductions for cod and yellowtail flounder stocks primarily, consequent to reductions and reconsideration of these stocks' estimated biomass. Another critical change, unforeseen in 2015, is that fuel prices have dropped, alleviating some of the negative economic impacts from these reduced allocations (Table ///, Section 6.6).

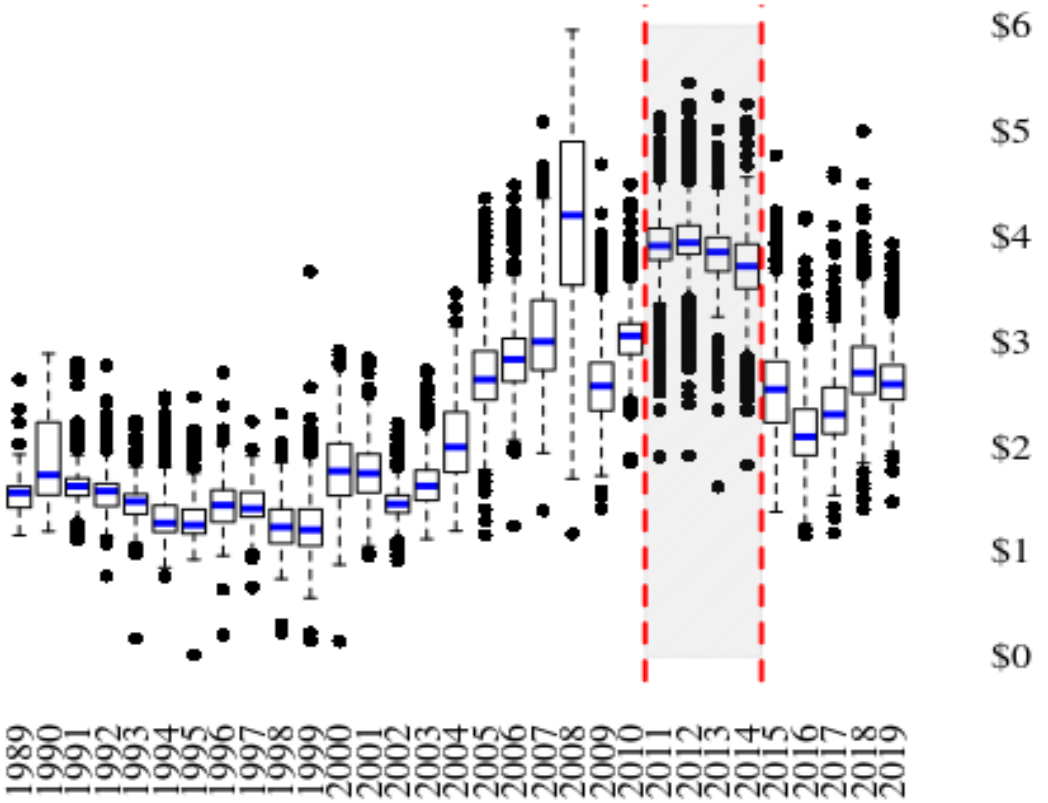


Figure 1. Fuel prices from 1989 to 2019 (2018$)

Starting in Fishing Year 2019, sector monitoring targets were assessed uniquely for each Standardized Bycatch Reporting Methodology-defined (SBRM) strata, and ASM coverage levels were allowed to vary across sector based on each sector's SBRM fleet composition ///(CITE). ///Werner and Demarest (2019) provided an estimate of the impacts stemming from this change, noting especially that should sectors become responsible for the costs of monitoring, the SBRM fleet composition of each sector may lead to disproportionate impacts across sectors. The present analysis of Amendment 23 options does not attempt to estimate costs differentially based on sector's SBRM fleet composition. Instead, for most monitoring options, the target coverage specified in the relevant option is assumed to correspond to the coverage that sector's will be responsible for funding (i.e. 25% coverage = 25% ASM coverage, etc.)[2].

7.4.2 Approach and economic models

Primarily, this Amendment focuses on varying levels of direct catch monitoring for trips regulated under the sector provisions of the Northeast Multispecies Management Plan. The impacts of monitoring catch are primarily a function of time spent fishing. Vessels that make more trips under the groundfish fishery FMP, and/or fish for more time, will experience higher monitoring costs than those fishing less. Section

[2] The No Action alternative is analyzed at both 13%, the average ASM portion of the combined coverage target for sectors, and 22%, the target. For the purposes of anlyazing costs and impacts of the 100% coverage options, in accounting for NEFOP coverage a 91% ASM coverage rate was assumed.

6.5 in the Affected Environment includes background information on relevant fishery trends for this action including fishing effort by vessel size, days absent categories, landing ports, etc.

Several models and tools are used to analyze the alternatives and options under consideration. The economic analyses focus on four dimensions of distributional effects: days absent, sectors, vessel size and home port. Where appropriate, landed pounds and/or revenues are reported as a proxy for shoreside effects. Amendment 16 to the Groundfish FMP requires that sectors are responsible for the costs of monitoring.

7.4.2.1 Timeframe

All analyses presented here estimate short-run effects, generally with a one year duration[3]. Short-run economic consequences are estimated along two dimensions: monitoring costs and fishery impacts.

7.4.2.2 Monitoring Costs: Static Approach

Monitoring costs are estimated statically by applying the cost of each monitoring technology (i.e. human or electronic) to realized fishery data using relevant parameters such as fishing time, vessel size, gear type, and home port. Low and high estimates (median plus or minus one standard deviation) are reported for the fleet as well as per vessel, trip and day. Details on estimation methods and sources of variability are provided in the Cost Efficiency Model description (below) and the source paper, included as an appendix./// This approach provides an approximate cost estimate but the underlying static assumption[4] fails to account for changes induced by those costs: some vessels will fish less, some more.

7.4.2.3 Fishery Impacts: Dynamic Approach

The second dimension, then, is an analysis of changes based on the inclusion of additional monitoring costs. This dynamic analysis captures the first-order effects of increased operating costs as some vessels chose to lease their ACE and either stop fishing or switch fisheries, while others increase their groundfish fishing effort. Using the Quota Change Model (see below) to estimate which vessels and trips are likely to take place when operating costs are increased, the dynamic impacts analysis provides an estimate of how the distribution of revenues and, of particular importance, profits will change under the myriad monitoring cost scenarios under consideration.

Impacts are reported for six metrics[5]:

1. Gross revenues, the sum of all revenue generated on a groundfish trip from all landed species;
2. ASM costs, estimated dynamically as the sum of industry-funded costs associated with trips as modeled under the QCM;
3. Cost of operations, including the cost of ice, fuel, food, the value of all utilized ACE, sector and landing fees but not including the ASM costs estimated above, crew wages or shares, or owner shares;

[3] Because EM costs change substantially by year, costs are reported for EM models across three years separately.

[4] Specifically, that all other conditions remain unchanged with the exception of additional monitoring costs.

[5] Cases where MSA confidentiality regulations (i.e. "rule of three") prohibit providing estimates are handled by reporting "C" in their place.

4. Operational profits, the difference between gross revenues and the cost of operations and monitoring;

5. Profit percent, the proportion of gross revenues represented by operational profits; and,

6. Change in profit percent relative to the Status Quo[6].

An important consideration in interpreting the results of the dynamic models on fishery impacts is that increased operating costs may increase aggregate revenues. The intuition is straightforward: if vessels with relatively higher operating costs and lower operating profits chose to decrease participation in the groundfish fishery, ACE will flow–via leasing–to vessels with lower operating costs and/or higher profits. This result has been demonstrated in previous analyses with reductions in critical ACE allocations such as witch flounder and Gulf of Maine cod, as well as in previous iterations of industry funded monitoring analyses ///(CITATION SSC PRESENTATION, DEMAREST 2015). ACE reductions increase operating costs in two ways, first by increasing ACE lease costs[7] and second through costs consistent with avoidance of constraining stocks.

The fact that increased operating costs may induce higher revenues implies that policy makers should more prominently consider factors beyond gross revenues, such as changes in fishery participation across vessel size classes, ports and gear types, as well as the distribution of fishing costs and, most importantly, operating profits.

7.4.2.4 Quantitative Models

The PDT used two models (described below) to quantitatively estimate and summarize the costs of various options under the Sector Monitoring Standards and Sector Monitoring Tools alternatives.

7.4.2.4.1 Cost Efficiency Model

The Cost Efficiency Model focuses on quantifying costs for three technologies suitable for independent catch monitoring in the Northeast US commercial groundfish fishery:

1. Human at-sea monitors/observers (ASM),
2. Electronic monitoring with video recording cameras (EM) using an Audit model and
3. EM using a Maximum Retention model.

Each of these technologies differ in the data they provide, the quality of those data, their up-front and life cycle costs, and their impact on various components of the fishing fleet. We estimate costs associated with each technology and provide estimates for fleet-wide costs based on which vessels are likely to opt into each technology under the various alternatives and options considered.

For ASM costs, estimates are based on Ardini et. al. (2019),/// with modifications as described in Demarest et. al. (2019)///. As described in the latter paper, “Since there has been limited variability in ASM coverage rates, there is some level of uncertainty regarding how costs change when coverage is

[6] The Status Quo is a synthetic version of FY18, where actual FY18 realized values across the first five metrics mentioned above are replicated using the QCM. It is described in further detail later in this document.

[7] Changing lease prices are explicitly not modeled in the QCM, so this aspect does not apply to model results though it will apply in real life.

increased or decreased. We expect that higher coverage rates will decrease observer travel costs since there will be a greater pool of available observers to cover trips. We are less certain how a change in coverage may affect seaday rates. We estimate costs at increased rates as a function of the current contracted rates, with the following assumptions: Seventy percent of the sea day cost is fixed to cover the actual cost of having a monitor at sea, 10% scales based on the number of trips covered, 10% scales based on the total number of observers required to cover the specified level of coverage and 10% of the cost scales based on the coverage rate." We use a monte carlo approach to estimate a distribution of likely ASM costs.

For EM costs, estimates are based on cost functions constructed from data provided by four EM service providers for four separate EM program aspects:

1. Equipment;
2. Field services;
3. Data review; and,
4. Data storage.

These functions randomly select input variables from the four providers. We do this to maintain data confidentiality (provider-level costs are easily inferred), but a drawback of this is that it washes out a lot of the variance in potential costs, particularly the common situation where providers optimize around different component of cost. Combining what should be inseparable components yields costs centralized around a mean that may not adequately capture the true cost from any one provider. Last, we add additional uncertainty to model variables that we have lower confidence in, based on conversations from program participants and/or actual data from pilot programs.

Equipment One-time EM equipment costs are estimated per-vessel, and include all hardware and software required for a fully functioning EM system. These do not include labor or travel costs for installation, which are included in the field services costs. We assumed three cameras are required for a system on all vessels with hook gear, and for all vessels that are less than 40 feet long. Four cameras are required for vessels using all other gear types greater than 40 feet in length.

Field services Field services include all field-based technical support such as equipment installation and maintenance, travel to and from vessels, support and feedback in case of equipment malfunction and data transfers. Where other aspects of an EM program such as equipment costs or data storage costs scale linearly with effort or are otherwise invariant, field services costs are highly variable based on the fleet's geographic composition, program design, and the desired level of operator interaction. These costs are also impacted by the enthusiasm for participation by the fleet—if vessels are committed to the process, it will run more efficiently. If they are not, costs will increase as installations are rescheduled, or proper care and maintenance of on-board EM systems do not occur. Field services are one of the most difficult aspects of EM costs to model. Further, field services, more than other aspects of EM costs, change with time. Costs are front loaded in the first year of programs when equipment installations occur and captains are getting familiar with the systems and processes and require more support. Subsequent year field service costs include maintenance costs (which decline by half in year two, by a third in year 3 and by a quarter in year four, after which they are fixed) and other costs, fixed for each year and include on-call phone response to service events plus costs for data transfer to and from the vessel. Travel costs are estimated similarly for install and maintenance. We assume technicians are traveling from one of six ports: Portland, ME, Gloucester, MA, Boston, MA, Chatham, MA, New Bedford, MA or Point Judith, RI.

We used the R package gmapsdistance to identify which of these six ports was closest to the vessel home port and the associated distance and travel time. We assume travel costs are reimbursed at the technicians

hourly rate, mileage is reimbursed at $0.54/mile, per diem is between $40 and $61 and lodging is between $120-$150/night. Consistent with federal travel regulations, lodging is only incurred if the technician is traveling over 50 miles. We assume installations are scheduled back to back in each home port. This likely overestimates installation efficiency. Maintenance and scheduling assumptions may, however, underestimate efficiency and we believe these assumptions are therefore unbiased.

Maintenance costs are estimated assuming: (1) Vessels require a visit from a technician at a rate of every 7th trip with a maximum of three visits per vessel. (2) Each maintenance check takes 4 hours and is performed by the technician at the lower hourly wage rate. (3) Two vessels can be checked per location per day but a technician spends a maximum of three days in a row in a port. (4) Technicians travel to and from their base port to the vessel's home port after each three day stay is completed.

Other costs include one technician on-call for phone response to service events and the cost to mail hard drives from the vessel after every trip plus an additional half hour for handling and tracking data. Many pilot programs mail hard drives after two or three trips are completed, which could be implemented as a cost savings measure but also increases the likelihood of lost or corrupted data.

Review Costs Video footage review is a substantial component of overall EM program costs. There are two common methods for estimating video review costs. The first is a "ratio method," which estimates the amount of time required for an analyst to review a set amount of footage based on a ratio of review time to total video footage. This estimate is multiplied by the hourly wage of an analyst to estimate cost. However, the ratio of review time to footage time is highly variable and is impacted by many factors, themselves quite variable, which include, but are not limited to, the skill and experience of the reviewer, the catch handling capabilities of the crew, the quality of the video footage, the gear type and the species composition (both total number and type of species) of the catch, and the program design. Using data from pilot projects in the region, we estimate a regression to relate review time to these other variables. Importantly, the variable that had the largest impact on review times was the individual vessel (standardizing for catch composition, gear type, trip length, etc).

Estimating the amount of footage requiring review is a challenge. One aspect of this challenge depends on the design of the program and whether transit times are reviewed, or if only haul back and catch handling/sorting require review. Another aspect is estimating the relationship between fishing effort and sorting/catch handling time.

We estimate review costs as a function of transit time (duration), the amount of time it takes to review transit time footage, fishing time, the amount of time it takes to review fishing time, footage/data preparation time and an hourly rate for a reviewer. The total cost is the sum of these costs. These are estimated separately for each program design. Under this, we assume that review costs scale linearly with fishing effort.

Fishing time is estimated based on observer-collected data on fishing duration (the time fishing gear is in the water) for observed trips. Using these data, fishing time is modeled for non-observed trips using other effort proxies such as total trip duration and number of hauls are reported for all trips on VTRs. To estimate time fishing, we used observer data from 2013-2017 and model, by gear type, the relationship between fishing time and total trip duration. These models were then used to estimate fishing duration for all FY18 trips.

Data storage There are two main options for storing data: cloud storage and on site servers. On site storage can be a less expensive option when the exact amount of data to be stored is known and servers of the appropriate size can be built; or when data locations are remote and (slow) internet speeds or other expenses prohibit sending data to the cloud. Additionally, federal data redundancy requirements impose costs for on site server storage that could require building the same storage center in two locations. Our cost estimates assume EM data will be stored in the cloud. Estimating prices for cloud based storage is relatively straightforward and many companies, such as Amazon and Google, list their price structures

publicly (Table 9). Estimating the volume of data created is more complex, as it is a function of numerous technical variables and policy decisions. Video footage data volume is primarily based on four variables:

1. Resolution (pixel dimensions) - Also referred to as frame size this is the amount of pixels an image contains. It is specified as the number of horizontal pixels by the number of vertical pixels. For example a resolution of 1280x720 is the minimum resolution to be considered high definition.

2. Frame Rate (frames per second) - The number of individual frames in each second of video recorded.

3. Bit rate (MBPS-mega bits per second) - The number of bits that are processed in a unit of time or the amount of data used for each second of video. For example most DVDs are 4-8 MBPS while a Blu-ray is 25 MBPS. Most cameras record at varying bit rates and allow you to set a maximum bit rate.

4. Subject (what you are recording) - video records a still image and software converts that to moving images. Two videos of the same duration taken with the same camera with identical resolution, frame rate and bit rate can create different amounts of data depending on how they are rendered and the content of their images. For example a two minute recording of a blank wall will be much smaller in size than a two minute recording of a kayaker going through whitewater. These variables also impact the quality of the video, noting that this is also related to external variables such as lens cleanliness and the amount of ambient light.

EM video quality specifications are mostly in the form of performance requirements specifying data needs and objectives (i.e. systems must be able to "Identify, count, and assign a catch disposition–kept or discarded–for individual catch items" or "Obtain an accurate estimated length per catch item, sufficient to obtain a weight estimate from length:weight keys" (NMFS 2016).

The latest draft specifications from the Northeast Fisheries Science Center adopt some minimum technical specifications: "Camera resolution must be a minimum of 1,280 x 720 (720p) for enhanced identification and measurement during video review" and "Each camera must record at a speed of no less than 15 unique frames per second when the use of a video monitoring system is required" (NMFS 2016).

The cost of storage is mainly a function of data volume, defined as the footage duration multiplied by the GBPH. For our estimations we assumed fishing footage would be captured at a higher quality than transit footage. Assuming Amazon and Google provide similar services, we use Amazon's price structure as it is slightly less expensive, particularly if there is no need for frequent data access, unlikely in most management scenarios. Amazon Glacier's November, 2017 pricing, as utilized here, is: Storage, per GB/Month = $0.004; Put, per 1k requests = $0.05; Get, per 1k requests = $0.025; Access, per GB = $0.0025.

The full model is described in ///Appendix XYZ.

7.4.2.4.2 Quota Change Model

The Quota Change Model (QCM) is used to analyze the impacts of each combination of measures on the sector portion of the groundfish fishery, which comprises over 98% of commercial groundfish landings and revenues. The QCM is a Monte Carlo simulation model that selects from existing records the trips most likely to take place under new regulatory conditions. We use this model to estimate impacts from regulatory changes. Trips likely to occur in the future are selected based on how efficient actual fishing trips were during the most recent year for which data exist (the reference year, in this case FY18). This efficiency-based selection is derived from three factors: (1) fishing costs, (2) ACE expended and (3) inter-

annual changes in allocations that may render a stock or stocks more constraining, or less, in the prediction year.

The model does not estimate changes in ACE lease prices, the real margin at which changes in sector sub-ACLs are experienced by fisherman but it does account for changes in allocations by assigning a higher likelihood of a trip being replicated when the allocations for stocks caught on that trip are increasing or when that stock has otherwise not been a constraint on fishing effort. And vice versa–-the probability of a trip being selected into the prediction year's pool of trips goes down if that trip caught stock(s) that are likely to be constraining due to decreasing allocations.

A large pool of actual trips is created from a reference data set, where the composition of this pool is conditioned on each trip's revenues, fishing costs and utilization of allocated ACE. An implicit assumption is that the most likely trips to take place in the FY being analyzed are those fishing efficiently under the new sector sub-ACLs. The more efficiently a trip uses its ACE, the more likely that trip is to be drawn into the sample pool. ACE efficiency is determined by the ratio of ACE expended to net revenues on a trip, iterated over each of the 17 allocated stocks. Operating profits are calculated as gross revenues minus trip costs minus the opportunity cost of quota, where trip costs are based on observer data and quota opportunity costs are estimated from an inter-sector lease value model (details on the methods can be found in Murphy et al. 2015).

After the sample pool has been constructed, trips are pulled from the pool at random, summing the ACE expended for the 17 allocated stocks as each trip is drawn. When one stock's ACE reaches the sector sub-ACL limit, no further trips from that broad stock area are selected. The model continues selecting trips until sector sub-ACLs are achieved in all three broad stock areas or, alternatively, if sub-ACLs are reached for one of the unit stocks, the trip selection process ends for all broad stock areas at once. This selection process forms a "synthetic fishing year" and a number of years, typically 500, are drawn to form a model. Median values and confidence intervals for all draws in a model are reported.

By running simulations based on actual fishing trips, the model implicitly assumes that:

- stock conditions, fishing practices and harvest technologies existing during the data period are representative;
- trips are repeatable;
- demand for groundfish is constant, noting that fish prices do vary between the reference population and the sample population, but this variability is consistent with the underlying price/quantity relationship observed during the reference period;
- as ACE leases are contracted at the vessel level, allocations to individual sectors are not influential in the ultimate allocation of ACE;
- quota opportunity costs and operating costs are both constant; and,
- ACE flows seamlessly from lesser to lessee such that fishery-wide caps can be met without leaving ACE for constraining stocks stranded.

Some or all of these assumptions will surely not hold–fishermen will continue to develop their technology and fishing practices to increase their efficiency, market conditions will induce additional behavioral changes, and fishery stock conditions are highly dynamic. Fuel prices and other operating costs may change due to larger economic shifts or shore-side industry consolidation.

The net effect of the constraints imposed by these assumptions is unclear. The selection algorithm draws only efficient trips—if fishermen make relatively less efficient trips the model estimates will be biased high. Fishermen, however, are generally good at their job, and through a combination of technological improvement (gear rigging, equipment upgrades, etc.) or behavioral modifications, they are likely to improve on their ability to avoid constraining stocks. If fishermen are able to make these adjustments, the model predictions will be biased low.

Furthermore, the model will under-predict true landings and/or revenues if stock conditions for non-constraining stocks improve, if demand for groundfish rises, or if fishing practices change and fishermen become more efficient at maximizing the value of their ACE. Conversely, the model will over-predict true landings and/or revenues if stock conditions of non-constraining stocks decline, markets deteriorate or fishing costs increase. Importantly, the model will over-predict landings and revenues if stock conditions for constraining stocks improve substantially and/or fishermen are unable to avoid the stock—in this circumstance, better than expected stock conditions will lead to worse than anticipated fishery performance. The opposite is also true—if a stock predicted to be constraining to the fishery becomes easier to avoid due to technological or behavioral improvements in targeting, or due to declining stock conditions, the model will under-predict revenues.

The QCM is used here to capture fishery wide behavioral changes with respect to increases in operating costs as monitoring costs are shifted from government subsidies to industry responsibility. Groundfish catch is maximized by the constrained optimization algorithm, which accounts for revenues generated on groundfish trips and the costs of obtaining those revenues. Catch of non-groundfish stocks on groundfish trips are captured in the model, but not explicitly modeled.

The QCM is calibrated using FY18 input data (actual fishing trips) and FY18 Sector sub-ACLs, to create a "status quo" scenario which is then compared to various scenarios reflecting the additional costs imposed by the industry-funded monitoring. Changes in fleet composition, operating costs and profits are reported.

7.4.2.5 Establishing the Status Quo

Analyzing the impacts of improved catch accounting across the various options requires a distinction between the No Action alternative, which here includes industry funded monitoring, and contemporary conditions, which do not. Under the "Status Quo" contemporary conditions, monitoring costs are zero because in fishing year 2018 sectors were responsible for negotiating contracts for monitoring but were reimbursed by NOAA for 100% of these expenses. Evaluating change relative to the No Action alternative alone would underestimate true impacts. The Status Quo is a replication of FY18.

To distinguish between effects driven by the model and effects driven by the regulatory changes, the QCM was parameterized to mimic FY18 as closely as possible using both FY18 fishing trips and FY18 sector sub-ACLs. The following tables provide context on the model's ability to replicate realized FY18 metrics. Bottom line: the QCM was able to closely replicate FY18 across nearly all margins, and is a useful tool for distinguishing effects driven by the model from the impacts of the regulatory changes considered in this Amendment[8].

Table 1. Comparison of summary estimates for realized FY18 and QCM-generated Status Quo simulation (2018$, millions)

Model	Gross rev	Gfish_gross	Ops cost	Sector cost	Quota cost	ASM cost	Operating profit
FY18 - Realized	70.9	49.4	12.3	2.0	5.4	0	51.3
FY18 - Prediction (SQ)	70.6	49.1	12.1	1.9	5.4	0	51.1

[8] Realized metrics for all metrics analyzed fall within the QCM's 99% confidence intervals.

Table 2. Comparison of fishing effort estimates for realized FY18 and QCM-generated Status Quo simulation (thousands of days/trips)

Model	Crew days	Days Absent	N trips
FY18 - Realized	39.14	10.57	7.17
FY18 - Prediction (SQ)	38.73	10.50	7.06

Table 3. Comparison of stock level estimates for realized FY18 and QCM-generated Status Quo simulation (2018$, millions)

Stock	subACL (mt)	Real Catch(mt)	Pred Catch(mt)	Real Util	Pred Util	Real Gross	Pred Gross	Pct Diff, Gross
GB Haddock	28,857	4,590	4,353	0.16	0.15	7.75	7.44	-4%
GOM	8,643	2,843	2,908	0.33	0.34	6.26	6.43	2.7%
Redfish	10,696	5,369	5,189	0.50	0.49	5.92	5.70	-3.7%
Pollock	37,163	3,482	3,249	0.09	0.09	5.42	5.23	-3.5%
Plaice	1,550	1,071	1,125	0.69	0.73	4.84	5.08	5%
White	2,713	2,096	2,162	0.77	0.80	4.36	4.52	3.7%
GB Cod	1,083	726	735	0.67	0.68	3.13	3.16	1%
GB Winter	725	420	363	0.58	0.50	3.02	2.67	-11.6%
Witch	830	799	830	0.96	1.00	2.77	2.88	4%
GOM	377	310	302	0.82	0.80	1.61	1.58	-1.9%
SNE Winter	456	229	224	0.50	0.49	1.38	1.39	0.7%
GB Haddock	15,491	637	622	0.04	0.04	1.02	1.02	0%
GOM Winter	339	91	98	0.27	0.29	0.53	0.57	7.5%
GB Cod	252	107	105	0.42	0.41	0.49	0.48	-2%
CC/GOM Yellowtail	381	165	179	0.43	0.47	0.37	0.40	8.1%
GB Yellowtail	167	28	20	0.17	0.12	0.10	0.08	-20%
SNE/MA Yellowtail	34	7	7	0.21	0.21	0.03	0.03	0%

Table 4. Comparison of vessel home port level estimates for realized FY18 and QCM-generated Status Quo simulation (2018$, millions. "p5" and "p95" are 95% confidence intervals)

Port	Real Gross	Pred Gross	Pct Diff, Gross	p5 Pred Gross	p95 Pred Gross
CT PORTS	0.0	0.0		0.0	0.0
OTHER MA PORTS	3.8	3.8	-1.3%	3.2	4.5
BOSTON	13.8	11.7	-14.7%	10.7	12.9
CHATHAM	0.6	0.4	-38.7%	0.3	0.5
GLOUCESTER	13.1	13.4	1.8%	12.4	14.4
NEW BEDFORD	6.0	6.6	9.3%	5.6	7.6
OTHER ME PORTS	1.5	1.8	24.7%	1.6	2.0

Port	Real Gross	Pred Gross	Pct Diff, Gross	p5 Pred Gross	p95 Pred Gross
PORTLAND	6.6	8.6	29.2%	7.4	9.8
NH PORTS	1.5	1.5	6.2%	1.4	1.7
NY PORTS	0.0	0.0		0.0	0.0
OTHER RI PORTS	0.3	0.3	-3.3%	0.2	0.5
POINT JUDITH	0.9	1.0	7.5%	0.8	1.2
OTHER NORTHEAST PORTS	1.2	0.0		2.0	3.0

Table 5. Comparison of vessel size class estimates for realized FY18 and QCM-generated Status Quo simulation (2018$, millions)

Size Class	Real Gross	Pred Gross	Pct Diff, Gross	p5 Pred Gross	p95 Pred Gross
<30'	0.00	0.03		0.00	0.08
30'to<50'	6.64	7.03	5.9%	6.50	7.55
50'to<75'	17.46	17.04	-2.4%	15.60	18.41
75'+	25.27	25.20	-0.3%	23.51	27.30

Table 6. Estimated dynamic impacts of monitoring under the Status Quo, aggregate fleet totals by days absent category (2018$, mil)

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)
<=5	0.2	0	0.1	0.1	70.9
>5, <=20	1.9	0	0.5	1.3	72.5
>20, <=50	7.8	0	2.3	5.6	71.2
>50, <=80	6.3	0	2.2	4.1	65.0
>80, <=160	27.7	0	7.5	20.3	73.1
>160	*27.0*	*0*	*7.0*	*19.9*	*73.9*

Table 7. Estimated dynamic impacts of monitoring under the Status Quo, aggregate fleet totals by vessel home port (2018$, mil)

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational	Profit (%)
CT PORTS	0.2	0	0.0	0.1	75.2
OTHER MA PORTS	5.7	0	1.9	3.9	67.3
BOSTON	16.4	0	4.6	11.8	71.9
CHATHAM	4.7	0	0.8	4.0	83.4
GLOUCESTER	16.5	0	4.5	12.0	72.9

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational	Profit (%)
NEW BEDFORD	11.4	0	3.5	7.9	69.5
OTHER ME PORTS	2.1	0	0.7	1.4	67.2
PORTLAND	5.5	0	1.6	4.0	71.7
NH PORTS	2.2	0	0.7	1.5	69.2
NY PORTS	0.5	0	0.1	0.5	89.3
OTHER RI PORTS	0.4	0	0.2	0.3	62.5
POINT JUDITH	2.4	0	0.6	1.8	74.0
OTHER NORTHEAST PORTS	C.0	C	C.0	C.0	C.0

Table 8. Estimated dynamic impacts of monitoring under the Status Quo, aggregate fleet totals by vessel size class (2018$, mil)

Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)
30'to<50'	14.7	0	3.7	11.0	74.7
50'to<75'	23.4	0	6.0	17.4	74.5
75'+	32.8	0	9.9	22.9	69.9

Table 9. Estimated dynamic impacts of monitoring under the Status Quo, aggregate fleet totals by sector (2018$, mil)

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)
Sustainable Harvest Sector	24.7	0	6.9	17.8	72.2
Northeast Fishery Sector II	14.5	0	3.8	10.7	73.9
Northeast Fishery Sector VI	5.5	0	1.5	4.0	72.5
Northeast Fishery Sector XIII	5.3	0	1.9	3.5	65.3
Northeast Fishery Sector VIII	5.1	0	1.5	3.6	70.9
Georges Bank Cod Fixed Gear Sector	4.8	0	0.8	4.0	83.8
Maine Coast Community Sector	2.6	0	0.7	1.9	71.9
Northeast Fishery Sector XI	2.1	0	0.7	1.5	69.5
Sustainable Harvest Sector - Inshore	1.9	0	0.8	1.2	60.7
Northeast Fishery Sector V	1.8	0	0.4	1.4	79.1
Northeast Fishery Sector XII	1.3	0	0.4	1.0	73.3
Northeast Coastal Communities Sector	C	C	C	C	C

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)
Northeast Fishery Sector III	0.5	0	0.2	0.3	64.2
Northeast Fishery Sector X	0.1	0	0.0	0.1	66.5
Northeast Fishery Sector VII	C	C	C	C	C

C – Confidential data

7.4.2.6 Qualitative Tools - Compliance and Enforceability Scores

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 10 - 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.

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-High	Medium-High
	100%	High	High
Human At-Sea Monitors- Percentage of catch	25% of catch (50% coverage)	Low	Low to medium
	50% of catch (70% coverage)	Medium	Medium
	75% of catch (90% coverage)	High	High
	100% of catch (100% coverage)	High	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

7.4.3 Commercial Groundfish Monitoring Program Revisions (Sectors Only)

7.4.3.1 Sector Monitoring Standards (Target Coverage Levels)

7.4.3.1.1 Sector Monitoring Standard Option 1: No Action - Electronic Monitoring in place of Human At-Sea Monitors

7.4.3.1.1.1 Sector costs and fishery impacts

Under Option 1/No Action, groundfish monitoring coverage levels would remain as defined in Amendment 16 and subsequent framework actions (FW 48 and FW 55 in particular). The target at-sea monitoring/electronic monitoring coverage level must meet the 30 percent CV precision-based standard for estimating stock level discards for all sectors, as specified in the SBRM Report ///CITE. A minimum coverage level based on this CV standard is appropriate for sector monitoring purposes if there is no evidence that behavior on observed and unobserved trips differs in meaningful ways (i.e. statistically different). If there is such evidence, a higher coverage level may be required to ensure discards are estimated accurately. As previously noted, statistically significant behavior differences along several dimensions critical to catch monitoring were documented in the ///PEER REVIEW REPORT CITE and the No Action option may not meet either the stated purpose for this amendment, or the legal requirements for catch monitoring.

Impacts of the No Action alternative in the context of industry funded monitoring costs, and the costs of industry funded ASM coverage in particular, are a function of the coverage levels emerging from the current SBRM standard. Since 2010, the combined NEFOP and ASM target coverage level has averaged ~22%. The ASM component of this has averaged ~13%. Because it remains unclear if a combined target will endure, or if NEFOP and ASM will be decoupled in a way that ASM coverage alone will be needed to meet targets, both 13% and 22% ASM coverage are analyzed as the No Action alternative. This also provides additional context for the costs and impacts of incremental changes in monitoring coverage rates.

Sector monitoring costs under the No Action are estimated at both 13% and 22% coverage, the former representing the average 2010-2017 ASM component of the combined coverage target and the latter the combined coverage target over those years. At 13% coverage, the annual industry component of fleet-wide ASM costs are estimated to be between $0.86 and $0.93 mil. At 22% coverage, this increases to between $1.45 and $1.57 mil. These costs are spread across the fleet as detailed in the following tables ///.

Costs scale linearly as coverage levels increase, and the $0.64 mil difference between 13% and 22% coverage is a suitable proxy for the value of the NEFOP contribution toward a combined coverage target.

The QCM is run incorporating monitoring costs associated with both 13% and 22% coverage levels. An annual monitoring cost is estimated for each vessel and apportioned to trips by days absent. At 13% coverage, the estimated realized ASM cost is $0.9 mil, essentially in line with the midpoint of the low and high estimates static estimates. Dynamically estimated realized costs may differ from static costs due to changes in who fishes and who opts to lease out their ACE as costs increase. At 22% coverage dynamic ASM costs are estimated to be $1.5 mil.

As predicted by the QCM, aggregate fleet-wide revenues are estimated to be lower at 13% coverage than at 22% coverage, with gross revenues of $70.8 mil at 13% and $71.3 mil at 22%. Status Quo (zero ASM costs) gross revenues are in line with those of 13%, at $70.9 mil. As previously noted, increased costs may induce higher aggregate gross revenues as fisherman with higher operating expenses to exit the

fishery, freeing up ACE to be used by more efficient fisherman. Note that efficiency here is a function of fishing practices, prevailing ACE allocations and environmental conditions, and not solely a function of skipper and crew skill. Some vessels and ports are better suited to prevailing conditions than others, independent of a vessel and crew's production efficiency.

Higher gross revenues are not as important to fisherman as operating profits, which are estimated at $51.3 mil, $50.4 mil, and $50.2 mil for the Status Quo, 13% and 22% coverage, respectively. The higher gross revenues predicted under the No Action at 22% coverage do not compensate for the higher operating costs, and here the Status Quo (with no ASM costs) is estimated to yeild approximately $0.9 mil higher operating profits than No Action at 13% and approximately $1.1 mil higher operating profits than at 22% coverage.

These two versions of the No Action option capture the magnitude of the monitoring subsidy currently provided to the groundfish fleet, as they represent the costs the industry would currently be required to fund in the absence of government support. If a subsidy continued in the future, these analyses help capture the magnitude of potential savings, or reduced costs associated if monitoring was funded by outside sources, at least in the short term.

The following tables demonstrate that these costs and benefits are not uniformly distributed across the fleet. As operating costs increase, smaller vessels and those with lower groundfish fishery participation are more negatively impacted, while larger vessels and those participating more intensively may see increased gross revenues and operating profits.

Table 11. Estimated static costs of monitoring under No Action at 13% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	6	7	0.27	0.28	0.07	0.07	0.08	0.08
>5, <=20	41	43	1.31	1.39	0.07	0.08	0.08	0.08
>20, <=50	166	177	3.61	3.84	0.08	0.09	0.08	0.08
>50, <=80	101	108	7.24	7.74	0.1	0.11	0.08	0.08
>80,	296	323	7.78	8.51	0.19	0.21	0.08	0.08
>160	249	274	12.47	13.72	0.33	0.36	0.08	0.08
TOTAL	*860*	*933*	-	-	-	-	-	-

Table 12. Estimated static costs of monitoring under No Action at 22% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	11	11	0.45	0.47	0.12	0.12	0.13	0.14
>5, <=20	69	73	2.22	2.34	0.12	0.13	0.13	0.14
>20, <=50	280	298	6.09	6.48	0.14	0.15	0.13	0.14
>50, <=80	171	183	12.2	13.05	0.17	0.18	0.13	0.14
>80, <=160	497	544	13.09	14.31	0.33	0.36	0.13	0.14

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
>160	419	461	20.96	23.06	0.55	0.61	0.13	0.14
TOTAL	*1,447*	*1,569*	-	-	-	-	-	-

Table 13. Estimated static costs of monitoring under No Action at 13% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
OTHER MA PORTS	68.2	73.7	3.25	3.51	0.12	0.13	0.08	0.08
BOSTON	176.2	193.2	7.66	8.4	0.28	0.31	0.08	0.08
CHATHAM	48.9	51.2	2.22	2.33	0.06	0.06	0.08	0.08
GLOUCESTER	204.4	221.5	6.01	6.52	0.14	0.15	0.08	0.08
NEW BEDFORD	123.7	136.4	9.52	10.49	0.39	0.43	0.08	0.08
OTHER ME PORTS	42.1	44.9	3.24	3.46	0.09	0.1	0.08	0.08
PORTLAND	54.4	60	6.04	6.66	0.37	0.41	0.08	0.08
NH PORTS	59.2	63.5	4.94	5.29	0.1	0.11	0.08	0.08
NY PORTS	12.6	13.1	2.52	2.63	0.07	0.07	0.08	0.08
OTHER RI PORTS	5.3	5.8	1.76	1.94	0.33	0.36	0.08	0.08
POINT JUDITH	50.5	53.6	2.97	3.15	0.08	0.09	0.08	0.08
OTHER NORTHEAST	C	C	C	C	C	C	C	C

C – Confidential data

Table 14. Estimated static costs of monitoring under No Action at 22% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
OTHER MA PORTS	114.9	124	5.47	5.9	0.21	0.22	0.13	0.14
BOSTON	296.2	324.8	12.88	14.12	0.47	0.51	0.13	0.14
CHATHAM	82.6	86.6	3.75	3.93	0.1	0.1	0.13	0.14
GLOUCESTER	344	372.8	10.12	10.96	0.23	0.25	0.13	0.14
NEW BEDFORD	207.8	229	15.99	17.62	0.66	0.72	0.13	0.14
OTHER ME PORTS	70.9	75.7	5.46	5.83	0.15	0.16	0.13	0.14
PORTLAND	91.4	100.7	10.15	11.19	0.63	0.69	0.13	0.14
NH PORTS	99.8	107	8.32	8.92	0.17	0.18	0.13	0.14
NY PORTS	21.3	22.2	4.27	4.44	0.11	0.12	0.13	0.14
OTHER RI PORTS	8.8	9.8	2.95	3.25	0.55	0.61	0.13	0.14
POINT JUDITH	85.3	90.4	5.02	5.32	0.14	0.14	0.13	0.14
OTHER NORTHEAST	C	C	C	C	C	C	C	C

C – Confidential data

Table 15. Estimated static costs of monitoring under No Action at 13% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	282	299	3.10	3.29	0.08	0.09	0.08	0.08
50'to<75'	282	307	5.22	5.68	0.16	0.18	0.08	0.08
75'+	296	327	10.58	11.67	0.42	0.47	0.08	0.08

Table 16. Estimated static costs of monitoring under No Action at 22% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	475	505	5.22	5.55	0.14	0.14	0.13	0.14
50'to<75'	474	516	8.78	9.55	0.28	0.30	0.13	0.14
75'+	498	549	17.77	19.59	0.71	0.78	0.13	0.14

Table 17. Estimated static costs of monitoring under No Action at 13% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	225.7	248.7	9.4	10.36	0.39	0.43	0.08	0.08
Northeast Fishery Sector II	165.1	178.2	6.6	7.13	0.13	0.14	0.08	0.08
Northeast Fishery Sector XIII	71.9	79	4.8	5.27	0.29	0.32	0.08	0.08
Northeast Fishery Sector VI	63.4	69.9	9.06	9.99	0.44	0.49	0.08	0.08
Northeast Fishery Sector VIII	56.9	62.7	7.11	7.84	0.33	0.36	0.08	0.08
Northeast Fishery Sector XI	58.1	62.3	5.28	5.66	0.1	0.11	0.08	0.08
Georges Bank Cod Fixed Gear Sector	46.1	48.3	2.3	2.42	0.06	0.06	0.08	0.08
Northeast Fishery Sector V	45.4	47.5	3.03	3.17	0.07	0.07	0.08	0.08
Maine Coast Community Sector	40.2	43.6	2.68	2.91	0.12	0.13	0.08	0.08
Sustainable Harvest Sector - Inshore	30.3	32.8	3.79	4.09	0.12	0.12	0.08	0.08
Northeast Fishery Sector XII	28.6	30.1	4.09	4.31	0.07	0.08	0.08	0.08
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector III	10.7	11.3	1.34	1.41	0.06	0.07	0.08	0.08
Northeast Fishery Sector X	5.2	5.4	0.74	0.77	0.07	0.07	0.08	0.08
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 18. Estimated static costs of monitoring under No Action at 22% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet	Fleet	Vessel	Vessel	Trip	Trip	Day	Day
Sustainable Harvest Sector	379.1	417.7	15.8	17.4	0.66	0.72	0.13	0.14
Northeast Fishery Sector II	277.9	300.1	11.12	12	0.21	0.23	0.13	0.14
Northeast Fishery Sector XIII	120.9	132.8	8.06	8.85	0.49	0.54	0.13	0.14
Northeast Fishery Sector VI	106.5	117.4	15.22	16.78	0.74	0.82	0.13	0.14
Northeast Fishery Sector VIII	95.5	105.3	11.94	13.16	0.56	0.61	0.13	0.14
Northeast Fishery Sector XI	97.8	104.9	8.89	9.54	0.17	0.18	0.13	0.14
Georges Bank Cod Fixed Gear	77.8	81.6	3.89	4.08	0.1	0.1	0.13	0.14
Northeast Fishery Sector V	76.7	80.3	5.12	5.35	0.11	0.12	0.13	0.14
Maine Coast Community	67.7	73.3	4.51	4.89	0.2	0.22	0.13	0.14
Sustainable Harvest Sector -	51	55.1	6.38	6.89	0.19	0.21	0.13	0.14
Northeast Fishery Sector XII	48.3	50.9	6.9	7.27	0.12	0.13	0.13	0.14
Northeast Coastal	C	C	C	C	C	C	C	C
Northeast Fishery Sector III	18.1	19	2.26	2.38	0.11	0.11	0.13	0.14
Northeast Fishery Sector X	8.7	9.1	1.24	1.3	0.11	0.12	0.13	0.14
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 19. Estimated dynamic impacts of monitoring under No Action at 13% coverage, aggregate fleet totals by days absent category (2018$, mil)

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
<=5	0.2	0.0	0.1	0.1	68.1	0.0
>5, <=20	1.8	0.0	0.5	1.3	70.1	0.0
>20, <=50	7.8	0.2	2.3	5.4	68.9	-3.6
>50, <=80	6.3	0.1	2.2	4.0	63.3	-2.4
>80, <=160	27.7	0.3	7.4	19.9	71.9	-2.0
>160	27.0	0.3	7.0	19.7	73.0	-1.0
TOTAL	*70.8*	*0.9*	*19.5*	*50.4*	*71.2*	*-1.2*

Table 20. Estimated dynamic impacts of monitoring under No Action at 22% coverage, aggregate fleet totals by days absent category (2018$, mil)

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
<=5	0.2	0.0	0.1	0.1	66.0	0.0
>5, <=20	1.8	0.1	0.5	1.2	69.1	-7.7

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
>20, <=50	7.8	0.3	2.2	5.3	67.8	-5.4
>50, <=80	6.2	0.2	2.1	3.9	62.8	-4.9
>80, <=160	27.5	0.5	7.3	19.7	71.6	-3.0
>160	27.8	0.4	7.3	20.0	72.1	0.5
TOTAL	*71.3*	*1.5*	*19.5*	*50.2*	*70.4*	*-1.6*

Table 21. Estimated dynamic impacts of monitoring under No Action at 13% coverage, aggregate fleet totals by vessel home port (2018$, mil)

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational	Profit (%)	Rel to SQ
CT PORTS	0.2	0.0	0.0	0.1	75.2	0.0
OTHER MA PORTS	5.7	0.1	1.9	3.8	66.1	-2.6
BOSTON	16.3	0.2	4.6	11.5	70.7	-2.5
CHATHAM	4.7	0.1	0.8	3.9	82.4	-2.5
GLOUCESTER	16.4	0.2	4.5	11.8	71.6	-1.7
NEW BEDFORD	11.4	0.1	3.5	7.8	68.5	-1.3
OTHER ME PORTS	2.1	0.0	0.7	1.4	65.0	0.0
PORTLAND	5.5	0.1	1.6	3.9	70.6	-2.5
NH PORTS	2.2	0.1	0.7	1.4	66.3	-6.7
NY PORTS	0.5	0.0	0.1	0.5	87.3	0.0
OTHER RI PORTS	0.4	0.0	0.2	0.3	60.9	0.0
POINT JUDITH	2.4	0.1	0.6	1.7	71.7	-5.6
OTHER NORTHEAST PORTS	C	C	C	C	C	0.0

Table 22. Estimated dynamic impacts of monitoring under No Action at 22% coverage, aggregate fleet totals by vessel home port (2018$, mil)

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
CT PORTS	0.2	0.0	0.0	0.1	76.6	0.0
OTHER MA PORTS	5.8	0.1	1.8	3.8	66.2	-2.6
BOSTON	16.6	0.3	4.7	11.6	70.1	-1.7
CHATHAM	4.8	0.1	0.8	3.9	81.5	-2.5
GLOUCESTER	16.4	0.4	4.4	11.7	71.2	-2.5
NEW BEDFORD	11.7	0.2	3.6	8.0	67.7	1.3
OTHER ME PORTS	2.1	0.1	0.7	1.3	63.7	-7.1

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
PORTLAND	5.3	0.1	1.5	3.7	69.6	-7.5
NH PORTS	2.2	0.1	0.7	1.4	64.6	-6.7
NY PORTS	0.6	0.0	0.1	0.5	85.5	0.0
OTHER RI PORTS	0.4	0.0	0.1	0.2	58.6	-33.3
POINT JUDITH	2.2	0.1	0.6	1.6	70.3	-11.1
OTHER NORTHEAST PORTS	C	C	C	C	C	0.0

Table 23. Estimated dynamic impacts of monitoring under No Action at 13% coverage, aggregate fleet totals by vessel size class (2018$, mil)

Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
30'to<50'	14.6	0.3	3.7	10.6	72.7	-3.6
50'to<75'	23.4	0.3	6.0	17.2	73.2	-1.1
75'+	32.7	0.3	9.8	22.6	69.0	-1.3

Table 24. Estimated dynamic impacts of monitoring under No Action at 22% coverage, aggregate fleet totals by vessel size class (2018$, mil)

Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
30'to<50'	14.6	0.5	3.7	10.5	71.6	-4.5
50'to<75'	23.6	0.5	5.9	17.2	72.8	-1.1
75'+	33.1	0.5	9.9	22.6	68.5	-1.3

Table 25. Estimated dynamic impacts of monitoring under No Action at 13% coverage, aggregate fleet totals by sector (2018$, mil)

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Sustainable Harvest Sector	24.7	0.2	6.8	17.6	71.3	-1.1
Northeast Fishery Sector II	14.5	0.2	3.8	10.5	72.6	-1.9
Northeast Fishery Sector VI	5.5	0.1	1.5	3.9	71.3	-2.5
Northeast Fishery Sector XIII	5.4	0.1	1.9	3.4	63.9	-2.9
Northeast Fishery Sector VIII	5.0	0.1	1.5	3.5	69.7	-2.8
Georges Bank Cod Fixed Gear Sector	4.8	0.0	0.8	4.0	82.9	0.0
Maine Coast Community Sector	2.6	0.0	0.7	1.8	70.2	-5.3

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Northeast Fishery Sector XI	2.1	0.1	0.6	1.4	66.7	-6.7
Sustainable Harvest Sector - Inshore	1.9	0.0	0.8	1.1	58.9	-8.3
Northeast Fishery Sector V	1.8	0.0	0.4	1.4	76.6	0.0
Northeast Fishery Sector XII	1.3	0.0	0.4	1.0	70.8	0.0
Northeast Coastal Communities Sector	C	C	C	C	C	0.0
Northeast Fishery Sector III	0.5	0.0	0.2	0.3	62.0	0.0
Northeast Fishery Sector X	0.1	0.0	0.0	0.1	62.4	0.0
Northeast Fishery Sector VII	C	C	C	C	C	0.0

Table 26. Estimated dynamic impacts of monitoring under No Action at 22% coverage, aggregate fleet totals by sector (2018$, mil)

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Sustainable Harvest Sector	25.0	0.4	6.9	17.7	70.9	-0.6
Northeast Fishery Sector II	14.5	0.3	3.7	10.5	72.3	-1.9
Northeast Fishery Sector VI	5.5	0.1	1.5	3.8	70.4	-5.0
Northeast Fishery Sector XIII	5.3	0.1	1.9	3.4	62.9	-2.9
Northeast Fishery Sector VIII	5.3	0.1	1.6	3.7	68.9	2.8
Georges Bank Cod Fixed Gear Sector	4.8	0.1	0.8	3.9	82.2	-2.5
Maine Coast Community Sector	2.6	0.1	0.7	1.8	69.4	-5.3
Northeast Fishery Sector XI	2.2	0.1	0.7	1.4	65.0	-6.7
Sustainable Harvest Sector - Inshore	1.9	0.1	0.7	1.2	59.2	0.0
Northeast Fishery Sector V	1.8	0.1	0.4	1.3	74.9	-7.1
Northeast Fishery Sector XII	1.3	0.1	0.4	0.9	69.2	-10.0
Northeast Coastal Communities Sector	C	C	C	C	C	0.0
Northeast Fishery Sector III	0.5	0.0	0.2	0.3	63.0	0.0
Northeast Fishery Sector X	0.1	0.0	0.0	0.1	61.6	0.0
Northeast Fishery Sector VII	C	C	C	C	C	0.0

7.4.3.1.1.2 Compliance and Enforceability—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**'.

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

7.4.3.1.2.1 Sub-option 2A – 25 percent

Sector costs and fishery impacts

At a 25% target coverage, fleet-wide ASM costs are estimated to be between $1.64 and $1.8 mil. These costs scale linearly with time spent fishing–nearly all vessels have similar per-day costs, while per-trip costs are higher for vessels making longer trips. Vessels with lower groundfish participation–those fishing less than 20 days annually–have low per-vessel costs, cumulatively accounting for less than 6% of the aggregate statically-estimated monitoring cost associated with this option. Estimates at the vessel size class, home port and sector levels are differentiated primarily by intensity of fishery participation.

Sub-option 2A has statically estimated costs that are nearly identical to those of the No Action alternative at 22% ASM coverage, with a difference of only $0.23 mil. Static costs are $0.87 mil higher than the No Action at 13% ASM coverage.

Fishery impacts are estimated using the QCM. The dynamically-estimated ASM cost is $1.7 mil, just slightly lower than the midpoint of the low and high static estimates ($1.72). Increased monitoring costs under this sub-option induce higher fishery gross revenues relative to the Status Quo, generating an additional $0.6 mil. Operating profits, however, are reduced by $-1.1 mil.

Sub-option 2A is estimated to generate fleet-wide gross revenues of $71.5 mil, slightly higher than those estimated at 22% coverage ($71.3 mil) and $0.6 mil higher than the Status Quo. Relative to the No Action at 13% coverage, revenues differ only by $0.7 mil.

Revenues are not as important to fisherman as operating profits, and the higher gross revenues predicted under the 25% coverage are somewhat eroded by higher operating costs. Operating profits are estimated at $50.2 mil for sub-option 2A, lower than Status Quo profits ($51.3 mil) and those estimated for 13% coverage ($50.4 mil). Profits for sub-option 2A are identical, however, to those estimated for the No Action at 22% coverage ($50.2 mil). Overall, this option is unlikely to have outcomes that differ substantially from No Action in terms of fleet operations and the function and structure of the ACE lease market. This is particularly true if monitoring costs continue to be subsidized, as they have been in past years, which in case there would be neutral impacts relative to Status Quo.

The following tables demonstrate that static costs and dynamic impacts are not uniformly distributed across the groundfish fleet.

Table 27. Estimated static costs of monitoring under Sub-option 2A at 25% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	12	13	0.51	0.54	0.13	0.14	0.15	0.16
>5, <=20	78	83	2.51	2.68	0.14	0.15	0.15	0.16
>20, <=50	317	341	6.9	7.41	0.16	0.17	0.15	0.16
>50, <=80	193	209	13.81	14.94	0.19	0.2	0.15	0.16
>80, <=160	564	624	14.84	16.43	0.37	0.41	0.15	0.16
>160	475	530	23.77	26.51	0.63	0.7	0.14	0.16
TOTAL	*1,640*	*1,800*	-	-	-	-	-	-

Table 28. Estimated static costs of monitoring under Sub-option 2A at 25% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
OTHER MA PORTS	130.1	142.2	6.2	6.77	0.23	0.25	0.15	0.16
BOSTON	335.9	373.2	14.6	16.22	0.53	0.59	0.15	0.16
CHATHAM	93.3	98.8	4.24	4.49	0.11	0.12	0.15	0.16
GLOUCESTER	389.8	427.6	11.46	12.58	0.26	0.29	0.15	0.16
NEW BEDFORD	235.7	263.4	18.13	20.26	0.74	0.83	0.14	0.16
OTHER ME PORTS	80.3	86.7	6.18	6.67	0.17	0.18	0.15	0.16
PORTLAND	103.6	115.8	11.52	12.87	0.71	0.79	0.14	0.16
NH PORTS	113	122.6	9.42	10.21	0.19	0.21	0.15	0.16
NY PORTS	24.1	25.3	4.82	5.06	0.13	0.13	0.15	0.16
OTHER RI PORTS	10	11.2	3.35	3.74	0.63	0.7	0.14	0.16
POINT JUDITH	96.5	103.3	5.67	6.08	0.15	0.16	0.15	0.16
OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 29. Estimated static costs of monitoring under Sub-option 2A at 25% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	538	577	5.91	6.34	0.15	0.16	0.15	0.16
50'to<75'	538	592	9.95	10.97	0.31	0.34	0.15	0.16
75'+	565	631	20.16	22.53	0.81	0.90	0.14	0.16

Table 30. Estimated static costs of monitoring under Sub-option 2A at 25% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	430.1	480.3	17.92	20.01	0.75	0.83	0.14	0.16
Northeast Fishery Sector II	314.8	344	12.59	13.76	0.24	0.26	0.15	0.16
Northeast Fishery Sector XIII	137.1	152.6	9.14	10.17	0.56	0.62	0.14	0.16
Northeast Fishery Sector VI	120.8	135	17.26	19.29	0.84	0.94	0.14	0.16
Northeast Fishery Sector VIII	108.4	121.1	13.55	15.14	0.63	0.7	0.14	0.16
Northeast Fishery Sector XI	110.8	120.1	10.07	10.92	0.19	0.21	0.15	0.16
Georges Bank Cod Fixed Gear Sector	88	93.2	4.4	4.66	0.11	0.12	0.15	0.16
Northeast Fishery Sector V	86.8	91.7	5.78	6.11	0.13	0.13	0.15	0.16
Maine Coast Community Sector	76.7	84.1	5.11	5.61	0.23	0.25	0.15	0.16
Sustainable Harvest Sector - Inshore	57.8	63.2	7.23	7.9	0.22	0.24	0.15	0.16
Northeast Fishery Sector XII	54.6	58.1	7.8	8.3	0.14	0.15	0.15	0.16
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector III	20.5	21.7	2.56	2.71	0.12	0.13	0.15	0.16
Northeast Fishery Sector X	9.8	10.4	1.4	1.48	0.12	0.13	0.15	0.16
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 31. Estimated dynamic impacts of monitoring under Sub-option 2A at 25% coverage, aggregate fleet totals by days absent category (2018$, mil)

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
<=5	0.2	0.0	0.1	0.1	66.0	0.0
>5, <=20	1.8	0.1	0.5	1.3	69.0	0.0
>20, <=50	7.9	0.3	2.2	5.3	67.4	-5.4

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
>50, <=80	6.5	0.2	2.2	4.1	62.7	0.0
>80, <=160	27.4	0.6	7.3	19.5	71.2	-3.9
>160	27.7	0.5	7.2	19.9	72.0	0.0
TOTAL	*71.5*	*1.7*	*19.5*	*50.2*	*70.2*	*-1.6*

Table 32. Estimated dynamic impacts of monitoring under Sub-option 2A at 25% coverage, aggregate fleet totals by vessel home port (2018$, mil)

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
CT PORTS	0.2	0.0	0.0	0.1	77.0	0.0
OTHER MA PORTS	5.9	0.1	1.9	3.8	65.6	-2.6
BOSTON	16.8	0.4	4.6	11.8	70.2	0.0
CHATHAM	4.8	0.1	0.8	3.9	81.4	-2.5
GLOUCESTER	16.4	0.4	4.4	11.6	70.8	-3.3
NEW BEDFORD	11.8	0.2	3.6	8.0	67.2	1.3
OTHER ME PORTS	2.1	0.1	0.7	1.4	63.7	0.0
PORTLAND	5.0	0.1	1.4	3.4	68.9	-15.0
NH PORTS	2.2	0.1	0.7	1.4	64.3	-6.7
NY PORTS	0.5	0.0	0.1	0.5	85.0	0.0
OTHER RI PORTS	0.4	0.0	0.2	0.3	62.4	0.0
POINT JUDITH	2.4	0.1	0.6	1.6	70.0	-11.1
OTHER NORTHEAST PORTS	C	C	C	C	C	0.0

Table 33. Estimated dynamic impacts of monitoring under Sub-option 2A at 25% coverage, aggregate fleet totals by vessel size class (2018$, mil)

Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
30'to<50'	14.6	0.6	3.6	10.4	71.5	-5.5
50'to<75'	24.1	0.6	6.1	17.5	72.4	0.6
75'+	32.7	0.6	9.8	22.3	68.1	-2.6

Table 34. Estimated dynamic impacts of monitoring under Sub-option 2A at 25% coverage, aggregate fleet totals by sector (2018$, mil)

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Sustainable Harvest Sector	24.8	0.5	6.8	17.5	70.5	-1.7
Northeast Fishery Sector II	14.5	0.3	3.7	10.5	72.0	-1.9
Northeast Fishery Sector VI	5.6	0.1	1.5	3.9	70.6	-2.5
Northeast Fishery Sector XIII	5.5	0.1	1.9	3.5	62.5	0.0
Northeast Fishery Sector VIII	5.2	0.1	1.5	3.6	68.6	0.0
Georges Bank Cod Fixed Gear	4.8	0.1	0.8	4.0	81.9	0.0
Maine Coast Community	2.7	0.1	0.7	1.9	69.3	0.0
Northeast Fishery Sector XI	2.2	0.1	0.6	1.4	64.6	-6.7
Sustainable Harvest Sector - Inshore	1.9	0.1	0.7	1.1	58.5	-8.3
Northeast Fishery Sector V	1.8	0.1	0.4	1.3	74.2	-7.1
Northeast Fishery Sector XII	1.3	0.1	0.4	0.9	69.3	-10.0
Northeast Coastal Communities Sector	C	C	C	C	C	0.0
Northeast Fishery Sector III	0.5	0.0	0.2	0.3	62.7	0.0
Northeast Fishery Sector X	0.1	0.0	0.0	0.1	61.0	0.0
Northeast Fishery Sector VII	C	C	C	C	C	0.0

Compliance and Enforceability

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.

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.

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-high positive impact at 75%, and strongly positive impact at 100% coverage, reflected in the compliance scores at these levels of coverage.

For the reasons described above, the compliance score at 25% coverage is similar to the status quo alternative, at 'low'. For the reasons described above, enforceability at 25% coverage is therefore 'low'.

7.4.3.1.2.2 Sub-option 2B – 50 percent

Sector costs and fishery impacts

At a 50% target coverage, fleet-wide ASM costs are estimated to be between $3.24 and $3.54 mil. Static costs under sub-option 2B are estimated to differ from the No Action at 22% coverage by $1.97 mil, and from the No Action at 13% coverage by $2.61 mil.

Fishery impacts are estimated using the QCM. The dynamically-estimated ASM cost for sub-option 2B is $3.3 mil, slightly lower than the midpoint of the low and high static estimates ($3.39). Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $0.2 mil, but reducing operating profits by $-3.1 mil.

Sub-option 2B is estimated to generate fleet-wide gross revenues of $71.1 mil, slightly lower than those estimated at 22% coverage ($71.3 mil) and $0.2 mil higher than the Status Quo. Relative to the No Action at 13% coverage, revenues differ by $0.3 mil.

Revenues are not as important to fisherman as operating profits, and the higher gross revenues predicted under the 50% coverage sub-option are eroded by higher operating costs. Operating profits are estimated at $48.2 mil, lower than profits estimated for the Status Quo ($51.3 mil), the No Action at 13% coverage ($50.4 mil), and the No Action at 22% ASM ($50.2 mil). Operating profits differ from sub-option 2A (25% coverage) by $-2 mil. If monitoring costs continue to be subsidized, as they have been in past years,

economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

The following tables demonstrate that static costs and dynamic impacts are not uniformly distributed across the groundfish fleet.

Table 35. Estimated static costs of monitoring under Sub-option 2B at 50% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	24	26	1.01	1.07	0.27	0.28	0.3	0.31
>5, <=20	155	164	5	5.31	0.27	0.29	0.3	0.31
>20, <=50	630	674	13.71	14.66	0.32	0.34	0.3	0.31
>50, <=80	384	413	27.41	29.49	0.37	0.4	0.29	0.31
>80, <=160	1,112	1,224	29.26	32.21	0.73	0.81	0.29	0.31
>160	936	1,037	46.8	51.84	1.23	1.37	0.29	0.31
TOTAL	*3,241*	*3,538*	-	-	-	-	-	-

Table 36. Estimated static costs of monitoring under Sub-option 2B at 50% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
OTHER MA PORTS	257.5	279.8	12.26	13.32	0.46	0.5	0.29	0.31
BOSTON	662.1	730.6	28.79	31.77	1.05	1.15	0.29	0.31
CHATHAM	186.2	196.4	8.46	8.93	0.22	0.23	0.3	0.31
GLOUCESTER	770.7	840.5	22.67	24.72	0.52	0.57	0.29	0.31
NEW BEDFORD	464	514.8	35.69	39.6	1.46	1.62	0.28	0.31
OTHER ME PORTS	159.4	171.2	12.26	13.17	0.34	0.36	0.29	0.31
PORTLAND	204	226.3	22.67	25.15	1.4	1.55	0.28	0.31
NH PORTS	224.1	241.8	18.68	20.15	0.38	0.41	0.29	0.31
NY PORTS	48.2	50.4	9.63	10.09	0.25	0.26	0.3	0.31
OTHER RI PORTS	19.8	21.9	6.59	7.31	1.23	1.37	0.28	0.31
POINT JUDITH	191.8	204.6	11.29	12.04	0.31	0.33	0.3	0.31
OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 37. Estimated static costs of monitoring under Sub-option 2B at 50% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	1,069	1,142	11.74	12.55	0.30	0.33	0.30	0.31
50'to<75'	1,062	1,162	19.66	21.53	0.62	0.68	0.29	0.31
75'+	1,111	1,233	39.68	44.04	1.59	1.76	0.28	0.31

Table 38. Estimated static costs of monitoring under Sub-option 2B at 50% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	846.5	938.9	35.27	39.12	1.47	1.63	0.28	0.31
Northeast Fishery Sector II	623.1	677	24.92	27.08	0.47	0.51	0.29	0.31
Northeast Fishery Sector XIII	270.1	298.6	18.01	19.91	1.09	1.21	0.29	0.31
Northeast Fishery Sector VI	237.8	263.9	33.97	37.7	1.66	1.85	0.28	0.31
Northeast Fishery Sector XI	219.6	237	19.96	21.54	0.39	0.42	0.29	0.31
Northeast Fishery Sector VIII	213.3	236.7	26.66	29.58	1.24	1.38	0.28	0.31
Georges Bank Cod Fixed Gear	175.4	185.2	8.77	9.26	0.22	0.23	0.3	0.31
Northeast Fishery Sector V	173.1	182.3	11.54	12.15	0.25	0.27	0.3	0.31
Maine Coast Community	151.6	165.3	10.11	11.02	0.45	0.49	0.29	0.31
Sustainable Harvest Sector - Inshore	114.5	124.4	14.31	15.55	0.44	0.47	0.29	0.31
Northeast Fishery Sector XII	108.8	115.3	15.54	16.48	0.28	0.3	0.3	0.31
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector III	40.8	43.1	5.1	5.39	0.24	0.26	0.3	0.31
Northeast Fishery Sector X	19.6	20.6	2.8	2.95	0.25	0.26	0.3	0.31
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 39. Estimated dynamic impacts of monitoring under Sub-option 2B at 50% coverage, aggregate fleet totals by days absent category (2018$, mil)

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
<=5	0.2	0.0	0.1	0.1	60.6	0.0
>5, <=20	1.7	0.1	0.4	1.1	65.6	-15.4
>20, <=50	7.6	0.6	2.1	4.8	63.8	-14.3
>50, <=80	6.3	0.4	2.1	3.7	59.5	-9.8
>80, <=160	27.5	1.2	7.3	19.0	69.2	-6.4
>160	27.8	1.0	7.3	19.5	70.3	-2.0
TOTAL	*71.1*	*3.3*	*19.3*	*48.2*	*67.8*	*-5.5*

Table 40. Estimated dynamic impacts of monitoring under Sub-option 2B at 50% coverage, aggregate fleet totals by vessel home port (2018$, mil)

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
CT PORTS	0.2	0.0	0.0	0.1	76.6	0.0
OTHER MA PORTS	5.6	0.3	1.8	3.6	63.8	-7.7

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
BOSTON	16.4	0.7	4.5	11.1	68.0	-5.9
CHATHAM	4.7	0.2	0.8	3.7	79.5	-7.5
GLOUCESTER	15.9	0.8	4.2	10.9	68.6	-9.2
NEW BEDFORD	12.4	0.5	3.8	8.1	65.5	2.5
OTHER ME PORTS	2.1	0.2	0.7	1.2	59.7	-14.3
PORTLAND	5.3	0.2	1.5	3.6	67.3	-10.0
NH PORTS	2.2	0.2	0.7	1.3	59.0	-13.3
NY PORTS	0.5	0.0	0.1	0.4	80.8	-20.0
OTHER RI PORTS	0.3	0.0	0.1	0.2	55.3	-33.3
POINT JUDITH	2.2	0.2	0.6	1.4	65.5	-22.2
OTHER NORTHEAST PORTS	C.0	C.0	C.0	C.0	C.0	0.0

Table 41. Estimated dynamic impacts of monitoring under Sub-option 2B at 50% coverage, aggregate fleet totals by vessel size class (2018$, mil)

Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
30'to<50'	14.3	1.1	3.5	9.7	67.9	-11.8
50'to<75'	23.5	1.1	5.8	16.6	70.5	-4.6
75'+	33.2	1.2	10.0	22.1	66.4	-3.5

Table 42. Estimated dynamic impacts of monitoring under Sub-option 2B at 50% coverage, aggregate fleet totals by sector (2018$, mil)

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Sustainable Harvest Sector	25.7	0.9	7.0	17.8	69.2	0.0
Northeast Fishery Sector II	14.0	0.6	3.6	9.8	70.0	-8.4
Northeast Fishery Sector VI	5.2	0.2	1.4	3.5	67.6	-12.5
Northeast Fishery Sector XIII	5.3	0.3	1.9	3.2	59.3	-8.6
Northeast Fishery Sector VIII	5.5	0.2	1.6	3.7	66.8	2.8
Georges Bank Cod Fixed Gear	4.7	0.2	0.8	3.8	80.2	-5.0
Maine Coast Community	2.6	0.2	0.7	1.7	66.3	-10.5
Northeast Fishery Sector XI	2.1	0.2	0.6	1.3	59.1	-13.3
Sustainable Harvest Sector - Inshore	1.9	0.1	0.7	1.1	56.3	-8.3
Northeast Fishery Sector V	1.7	0.2	0.4	1.2	69.3	-14.3
Northeast Fishery Sector XII	1.3	0.1	0.3	0.8	65.4	-20.0
Northeast Coastal Communities Sector	C	C	C	C	C	0.0
Northeast Fishery Sector III	0.5	0.0	0.1	0.3	59.9	0.0
Northeast Fishery Sector X	0.1	0.0	0.0	0.1	55.1	0.0
Northeast Fishery Sector VII	C	C	C	C	C	0.0

Compliance and Enforceability

For the reasons described above, the compliance score at 50% coverage is similar to the status quo alternative and 25% coverage, at 'low'. For the reasons described above, enforceability at 50% coverage is therefore 'medium'.

7.4.3.1.2.3 Sub-option 2C – 75 percent

Sector costs and fishery impacts

At a 75% target coverage, fleet-wide ASM costs are estimated to be between $4.57 and $5.2 mil. Static costs under sub-option 2C are estimated to differ from the No Action at 22% coverage by $3.63 mil, and from the No Action at 13% coverage by $4.27 mil.

Fishery impacts are estimated using the QCM. The dynamically-estimated ASM cost for sub-option 2C is $4.9 mil, slightly lower than the midpoint of the low and high static estimates ($4.885). Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $1.4 mil, but reducing aggregate operating profits by $-3.7 mil.

Sub-option 2C is estimated to generate fleet-wide gross revenues of $72.3 mil, higher than those estimated at 22% coverage ($71.3 mil) and $1.4 mil higher than the Status Quo. Relative to the No Action at 13% coverage, revenues differ by $1.5 mil.

Revenues are not as important to fisherman as operating profits, and the higher gross revenues predicted under the 75% coverage sub-option are eroded by higher operating costs. Operating profits are estimated at $47.6 mil, lower than profits estimated for the Status Quo ($51.3 mil), the No Action at 13% coverage ($50.4 mil), and the No Action at 22% ASM ($50.2 mil). Operating profits differ from sub-option 2A (25% coverage) by $-2.6 mil, and from sub-option 2B (50% coverage) by $-0.6 mil. If monitoring costs continue to be subsidized, as they have been in past years, negative economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

The following tables demonstrate that static costs and dynamic impacts are not uniformly distributed across the groundfish fleet.

Table 43. Estimated static costs of monitoring under Sub-option 2C at 75% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	34	38	1.43	1.59	0.38	0.42	0.42	0.46
>5, <=20	220	244	7.09	7.87	0.38	0.43	0.42	0.46
>20, <=50	893	998	19.41	21.69	0.46	0.51	0.42	0.46
>50, <=80	543	610	38.77	43.55	0.53	0.59	0.42	0.46
>80, <=160	1,567	1,795	41.24	47.24	1.03	1.18	0.41	0.46
>160	1,318	1,518	65.9	75.89	1.74	2	0.4	0.46
TOTAL	*4,575*	*5,202*	-	-	-	-	-	-

Table 44. Estimated static costs of monitoring under Sub-option 2C at 75% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
OTHER MA PORTS	363.7	412	17.32	19.62	0.65	0.74	0.41	0.46
BOSTON	932.7	1070.8	40.55	46.56	1.47	1.69	0.41	0.46
CHATHAM	264.2	291.8	12.01	13.26	0.31	0.34	0.42	0.46
GLOUCESTER	1087.9	1236.2	32	36.36	0.73	0.83	0.41	0.46
NEW BEDFORD	653.1	753.2	50.24	57.94	2.06	2.38	0.4	0.46
OTHER ME PORTS	225.5	253	17.35	19.46	0.48	0.54	0.42	0.46
PORTLAND	287.1	331.2	31.9	36.8	1.97	2.27	0.4	0.46
NH PORTS	316.9	356.8	26.41	29.73	0.54	0.61	0.42	0.46
NY PORTS	68.4	75.1	13.68	15.02	0.36	0.39	0.42	0.46
OTHER RI PORTS	27.8	32.1	9.27	10.69	1.74	2.01	0.4	0.46
POINT JUDITH	271.8	303	15.99	17.82	0.43	0.48	0.42	0.46
OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 45. Estimated static costs of monitoring under Sub-option 2C at 75% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	1,513	1,691	16.63	18.58	0.43	0.48	0.42	0.46
50'to<75'	1,497	1,708	27.73	31.62	0.87	0.99	0.41	0.46
75'+	1,564	1,804	55.86	64.43	2.24	2.58	0.40	0.46

Table 46. Estimated static costs of monitoring under Sub-option 2C at 75% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	1191.6	1373.9	49.65	57.25	2.07	2.38	0.4	0.46
Northeast Fishery Sector II	880	996.9	35.2	39.88	0.67	0.76	0.42	0.46
Northeast Fishery Sector XIII	380.4	437.4	25.36	29.16	1.54	1.77	0.4	0.46
Northeast Fishery Sector VI	334.7	386.1	47.82	55.16	2.34	2.7	0.4	0.46
Northeast Fishery Sector XI	310.5	349.7	28.23	31.79	0.55	0.61	0.42	0.46
Northeast Fishery Sector VIII	300.2	346.3	37.53	43.28	1.75	2.01	0.4	0.46
Georges Bank Cod Fixed Gear Sector	248.9	275.1	12.45	13.76	0.31	0.34	0.42	0.46
Northeast Fishery Sector V	245.7	271	16.38	18.07	0.36	0.39	0.42	0.46
Maine Coast Community Sector	214	243.2	14.26	16.21	0.63	0.72	0.41	0.46
Sustainable Harvest Sector - Inshore	161.6	183.2	20.2	22.89	0.61	0.7	0.41	0.46
Northeast Fishery Sector XII	154.3	171.1	22.04	24.45	0.4	0.44	0.42	0.46
Northeast Coastal Communities	C	C	C	C	C	C	C	C
Northeast Fishery Sector III	57.9	64	7.24	8.01	0.35	0.38	0.42	0.46
Northeast Fishery Sector X	27.9	30.7	3.98	4.38	0.35	0.39	0.42	0.46
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 47. Estimated dynamic impacts of monitoring under Sub-option 2 at 75% coverage, aggregate fleet totals by days absent category (2018$, mil)

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
<=5	0.2	0.0	0.0	0.1	58.9	0.0
>5, <=20	1.8	0.2	0.5	1.1	62.1	-15.4
>20, <=50	7.6	0.9	2.1	4.6	60.6	-17.9
>50, <=80	6.3	0.6	2.2	3.6	56.7	-12.2
>80, <=160	28.0	1.7	7.5	18.7	67.0	-7.9
>160	28.4	1.5	7.4	19.5	68.9	-2.0
TOTAL	*72.3*	*4.9*	*19.7*	*47.6*	*65.8*	*-6.7*

Table 48. Estimated dynamic impacts of monitoring under Sub-option 2C at 75% coverage, aggregate fleet totals by vessel home port (2018$, mil)

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
CT PORTS	0.2	0.0	0.0	0.1	76.0	0.0
OTHER MA PORTS	5.6	0.4	1.8	3.4	61.2	-12.8
BOSTON	16.9	1.0	4.7	11.2	66.0	-5.1
CHATHAM	4.8	0.3	0.8	3.7	77.6	-7.5
GLOUCESTER	16.2	1.1	4.3	10.8	66.8	-10.0
NEW BEDFORD	12.4	0.7	3.8	7.9	63.7	0.0
OTHER ME PORTS	2.1	0.2	0.7	1.2	56.5	-14.3
PORTLAND	5.3	0.3	1.5	3.5	65.4	-12.5
NH PORTS	2.1	0.3	0.6	1.2	54.9	-20.0
NY PORTS	0.5	0.1	0.1	0.4	77.2	-20.0
OTHER RI PORTS	0.4	0.0	0.1	0.2	56.8	-33.3
POINT JUDITH	2.3	0.3	0.6	1.4	61.1	-22.2
OTHER NORTHEAST PORTS	C.0	C.0	C.0	C.0	C.0	0.0

Table 49. Estimated dynamic impacts of monitoring under Sub-option 2C at 75% coverage, aggregate fleet totals by vessel size class (2018$, mil)

Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
30'to<50'	14.5	1.6	3.5	9.4	65.0	-14.5
50'to<75'	24.3	1.6	6.0	16.6	68.5	-4.6
75'+	33.5	1.7	10.1	21.6	64.7	-5.7

Table 50. Estimated dynamic impacts of monitoring under Sub-option 2C at 75% coverage, aggregate fleet totals by sector (2018$, mil)

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Sustainable Harvest Sector	25.7	1.3	7.0	17.4	67.6	-2.2
Northeast Fishery Sector II	14.3	0.9	3.6	9.8	68.4	-8.4
Northeast Fishery Sector VI	5.5	0.4	1.5	3.6	65.5	-10.0
Northeast Fishery Sector XIII	5.5	0.4	1.9	3.2	57.2	-8.6
Northeast Fishery Sector VIII	5.6	0.3	1.6	3.6	64.7	0.0
Georges Bank Cod Fixed Gear Sector	4.8	0.3	0.8	3.8	78.3	-5.0
Maine Coast Community Sector	2.6	0.2	0.7	1.6	63.2	-15.8
Northeast Fishery Sector XI	2.1	0.3	0.6	1.2	55.2	-20.0
Sustainable Harvest Sector - Inshore	1.9	0.2	0.7	1.0	53.5	-16.7
Northeast Fishery Sector V	1.8	0.3	0.4	1.1	65.0	-21.4
Northeast Fishery Sector XII	1.4	0.2	0.4	0.8	61.4	-20.0
Northeast Coastal Communities Sector	C	C	C	C	C	0.0
Northeast Fishery Sector III	0.4	0.0	0.1	0.3	59.7	0.0
Northeast Fishery Sector X	0.1	0.0	0.0	0.1	48.3	0.0
Northeast Fishery Sector VII	C	C	C	C	C	0.0

Compliance and Enforceability

For the reasons described above, 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. For the reasons described above, enforceability at 75% coverage is therefore 'medium-high'.

7.4.3.1.2.4 Sub-option 2D – 100 percent

Sector costs and fishery impacts

100% monitoring is estimated at 91% ASM coverage to account for SBRM-mandated NEFOP coverage, which has averaged ~9% over the past eight years. As previously stated, this analysis makes no attempt to estimate and account for sector's SBRM fleet composition.

Fishery impacts are estimated using the QCM. The dynamically-estimated ASM cost for sub-option 2D is $5.5 mil, slightly lower than the midpoint of the low and high static estimates ($5.72). Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $0.1 mil, but reducing aggregate operating profits by $-5.1 mil.

Sub-option 2D is estimated to generate fleet-wide gross revenues of $71 mil, lower than those estimated at 22% coverage ($71.3 mil) and $0.1 mil higher than the Status Quo. Relative to the No Action at 13% coverage, revenues differ by $0.2 mil.

Revenues are not as important to fisherman as operating profits, and the higher gross revenues predicted under the 91% coverage sub-option are eroded by higher operating costs. Operating profits are estimated at $46.2 mil, lower than profits estimated for the Status Quo ($51.3 mil), the No Action at 13% coverage

($50.4 mil), and the No Action at 22% ASM ($50.2 mil). Operating profits differ from sub-option 2A (25% coverage) by $-4 mil, and from sub-option 2B (50% coverage) by $-2 mil. If monitoring costs continue to be subsidized, as they have been in past years, negative economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

The following tables demonstrate that static costs and dynamic impacts are not uniformly distributed across the groundfish fleet.

Table 51. Estimated static costs of monitoring under Sub-option 2D at 100% coverage, by days absent category (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	41	44	1.69	1.84	0.45	0.49	0.50	0.54
>5, <=20	260	283	8.38	9.14	0.45	0.50	0.50	0.54
>20, <=50	1,057	1,157	22.98	25.15	0.54	0.59	0.50	0.54
>50, <=80	644	706	45.97	50.43	0.63	0.69	0.49	0.54
>80, <=160	1,867	2,067	49.13	54.41	1.23	1.36	0.49	0.53
>160	1,572	1,746	78.61	87.28	2.07	2.30	0.48	0.53
TOTAL	*5,440*	*6,004*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

Table 52. Estimated static costs of monitoring under Sub-option 2D at 100% coverage, by vessel home port (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
OTHER MA PORTS	432.1	476	20.58	22.66	0.77	0.85	0.49	0.54
BOSTON	1111.8	1232.5	48.34	53.59	1.76	1.95	0.48	0.53
CHATHAM	312	339.5	14.18	15.43	0.37	0.4	0.5	0.54
GLOUCESTER	1293.5	1426.9	38.04	41.97	0.87	0.96	0.49	0.54
NEW BEDFORD	779.5	865.9	59.96	66.61	2.46	2.73	0.48	0.53
OTHER ME PORTS	267.3	293.1	20.56	22.55	0.57	0.62	0.49	0.54
PORTLAND	342.7	380.7	38.07	42.3	2.35	2.61	0.47	0.53
NH PORTS	376	412.9	31.33	34.41	0.64	0.7	0.49	0.54
NY PORTS	80.7	87.5	16.13	17.51	0.42	0.46	0.5	0.54
OTHER RI PORTS	33.2	36.9	11.06	12.29	2.07	2.3	0.47	0.53
POINT JUDITH	321.6	351.6	18.92	20.68	0.51	0.56	0.5	0.54
OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 53. Estimated static costs of monitoring under Sub-option 2D at 100% coverage, by vessel size class (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one SD)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	1.792	1.961	19.69	21.55	0.51	0.56	0.49	0.54
50'to<75'	1,782	1,969	33.00	36.46	1.04	1.14	0.49	0.54
75'+	1,866	2,074	66.66	74.07	2.67	2.97	0.47	0.53

Table 54. Estimated static costs of monitoring under Sub-option 2D at 100% coverage, by sector (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	1422	1579.6	59.25	65.82	2.46	2.74	0.48	0.53
Northeast Fishery Sector II	1045.6	1151.7	41.82	46.07	0.79	0.88	0.49	0.54
Northeast Fishery Sector XIII	453.7	503.3	30.25	33.55	1.84	2.04	0.48	0.53
Northeast Fishery Sector VI	399.5	443.9	57.07	63.41	2.79	3.1	0.47	0.53
Northeast Fishery Sector XI	368.4	404.6	33.49	36.78	0.65	0.71	0.49	0.54
Northeast Fishery Sector VIII	358.3	398.1	44.79	49.76	2.08	2.31	0.47	0.53
Georges Bank Cod Fixed Gear Sector	294	320	14.7	16	0.37	0.4	0.5	0.54
Northeast Fishery Sector V	290	315.4	19.33	21.03	0.42	0.46	0.5	0.54
Maine Coast Community Sector	254.4	280.7	16.96	18.71	0.75	0.83	0.49	0.53
Sustainable Harvest Sector - Inshore	192.1	211.6	24.01	26.45	0.73	0.8	0.49	0.54
Northeast Fishery Sector XII	182.4	198.9	26.05	28.41	0.47	0.51	0.5	0.54
Northeast Coastal Communities	C	C	C	C	C	C	C	C
Northeast Fishery Sector III	68.4	74.5	8.55	9.31	0.41	0.45	0.5	0.54
Northeast Fishery Sector X	32.9	35.7	4.7	5.1	0.42	0.45	0.5	0.54
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 55. Estimated dynamic impacts of monitoring under Sub-option 2D at 100% coverage, aggregate fleet totals by days absent category (91% coverage analyzed, 2018$, mil)

Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
<=5	0.2	0.0	0.0	0.1	55.5	0.0
>5, <=20	1.7	0.2	0.4	1.0	61.2	-23.1
>20, <=50	7.5	1.0	2.1	4.4	58.9	-21.4
>50, <=80	6.3	0.7	2.1	3.5	55.7	-14.6
>80, <=160	27.8	2.0	7.4	18.4	66.2	-9.4
>160	27.5	1.6	7.1	18.8	68.2	-5.5
TOTAL	*71.0*	*5.5*	*19.1*	*46.2*	*65.1*	*-9.4*

Table 56. Estimated dynamic impacts of monitoring under Sub-option 2D at 100% coverage, aggregate fleet totals by vessel home port (91% coverage analyzed, 2018$, mil)

Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
CT PORTS	0.2	0.0	0.0	0.2	75.9	100.0
OTHER MA PORTS	5.2	0.4	1.7	3.1	60.0	-20.5
BOSTON	16.6	1.2	4.6	10.8	65.0	-8.5
CHATHAM	4.8	0.3	0.8	3.7	76.7	-7.5
GLOUCESTER	15.8	1.3	4.1	10.3	65.6	-14.2
NEW BEDFORD	12.3	0.8	3.7	7.8	62.9	-1.3
OTHER ME PORTS	2.1	0.3	0.7	1.1	54.9	-21.4
PORTLAND	5.3	0.4	1.5	3.5	65.2	-12.5
NH PORTS	2.1	0.4	0.6	1.1	52.5	-26.7
NY PORTS	0.5	0.1	0.1	0.4	75.5	-20.0
OTHER RI PORTS	0.3	0.0	0.1	0.2	57.0	-33.3
POINT JUDITH	2.2	0.3	0.6	1.3	60.1	-27.8
OTHER NORTHEAST	C.0	C.0	C.0	C.0	C.0	0.0

Table 57. Estimated dynamic impacts of monitoring under Sub-option 2D at 100% coverage, aggregate fleet totals by vessel size class (91% coverage analyzed, 2018$, mil)

Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
30'to<50'	14.3	1.8	3.4	9.1	63.6	-17.3
50'to<75'	24.1	1.8	6.0	16.3	67.7	-6.3
75'+	32.5	2.0	9.8	20.8	63.9	-9.2

Table 58. Estimated dynamic impacts of monitoring under Sub-option 2D at 100% coverage, aggregate fleet totals by sector (91% coverage analyzed, 2018$, mil)

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Sustainable Harvest Sector	25.2	1.5	6.8	16.9	67.0	-5.1
Northeast Fishery Sector II	13.9	1.0	3.5	9.3	67.2	-13.1
Northeast Fishery Sector VI	5.7	0.4	1.6	3.7	64.6	-7.5
Northeast Fishery Sector XIII	5.4	0.5	1.9	3.1	56.3	-11.4
Northeast Fishery Sector VIII	5.5	0.4	1.6	3.5	63.6	-2.8
Georges Bank Cod Fixed Gear Sector	4.8	0.3	0.8	3.7	77.5	-7.5
Maine Coast Community Sector	2.6	0.3	0.7	1.6	62.6	-15.8
Northeast Fishery Sector XI	2.1	0.4	0.6	1.1	52.8	-26.7
Sustainable Harvest Sector - Inshore	1.8	0.2	0.7	1.0	52.9	-16.7
Northeast Fishery Sector V	1.7	0.3	0.4	1.1	62.9	-21.4
Northeast Fishery Sector XII	1.3	0.2	0.3	0.8	59.5	-20.0
Northeast Coastal Communities Sector	C	C	C	C	C	0.0
Northeast Fishery Sector III	0.4	0.0	0.1	0.3	60.4	0.0

Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
Northeast Fishery Sector X	0.1	0.0	0.0	0.0	49.0	-100.0
Northeast Fishery Sector VII	C	C	C	C	C	0.0

Compliance and Enforceability

Only 100% coverage rate obtains a 'high' compliance score, since opportunity for illegal activity at sea is low. For the reasons described above, enforceability at 100% coverage is therefore 'high'.

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

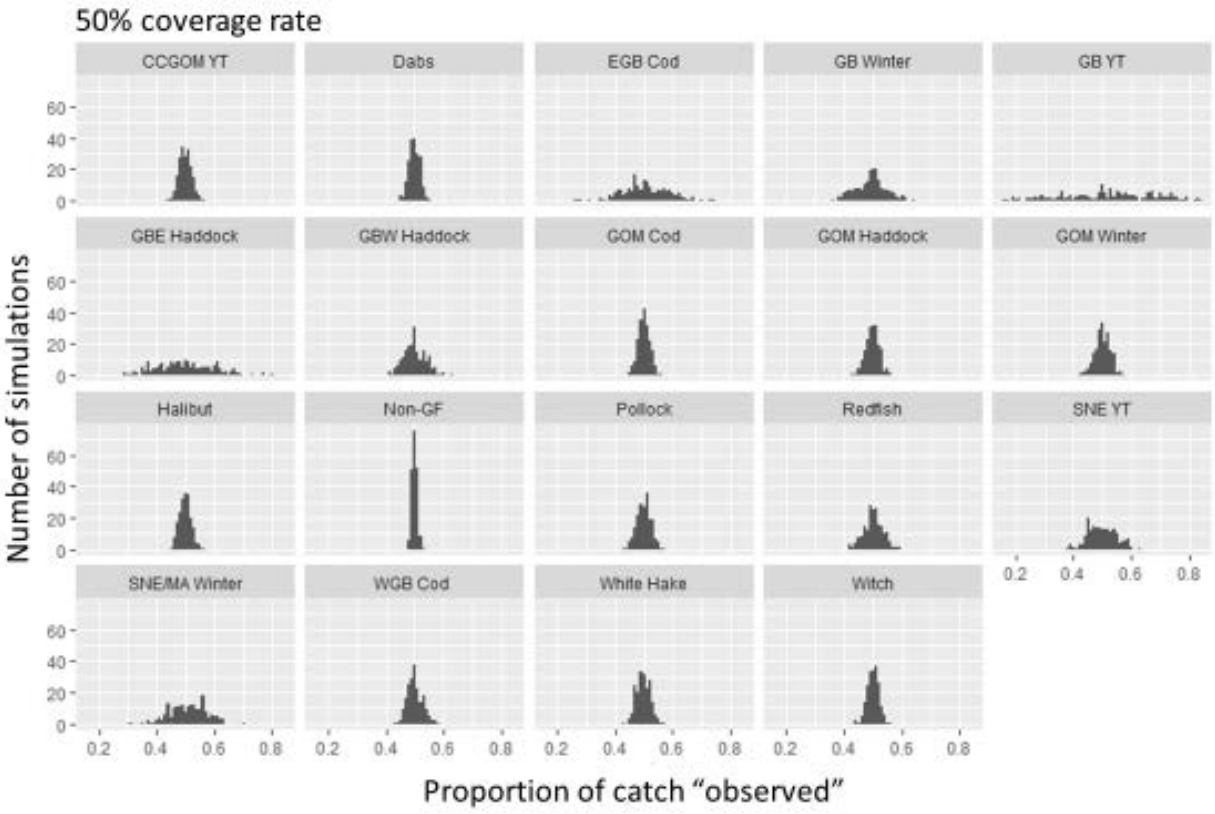
Approach for Analysis

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[9] (GARFO DMIS database) as "observed" or "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 2). 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.

[9] 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).

Figure 2 - 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 (Figure 3, Table 59). Increasing coverage rates to 70% of trips would confer roughly a 90% chance that 50% of total catch was observed for each stock (Figure 3, Table 59). Finally, increasing observer coverage to 90% would achieve the 75% of total catch per stock threshold with a similar level of confidence (Figure 4, Table 59). 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 59), 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 3 - Distribution of 200 random simulations estimating the total percentage of catch observed at a 70% coverage rate in FY2018.

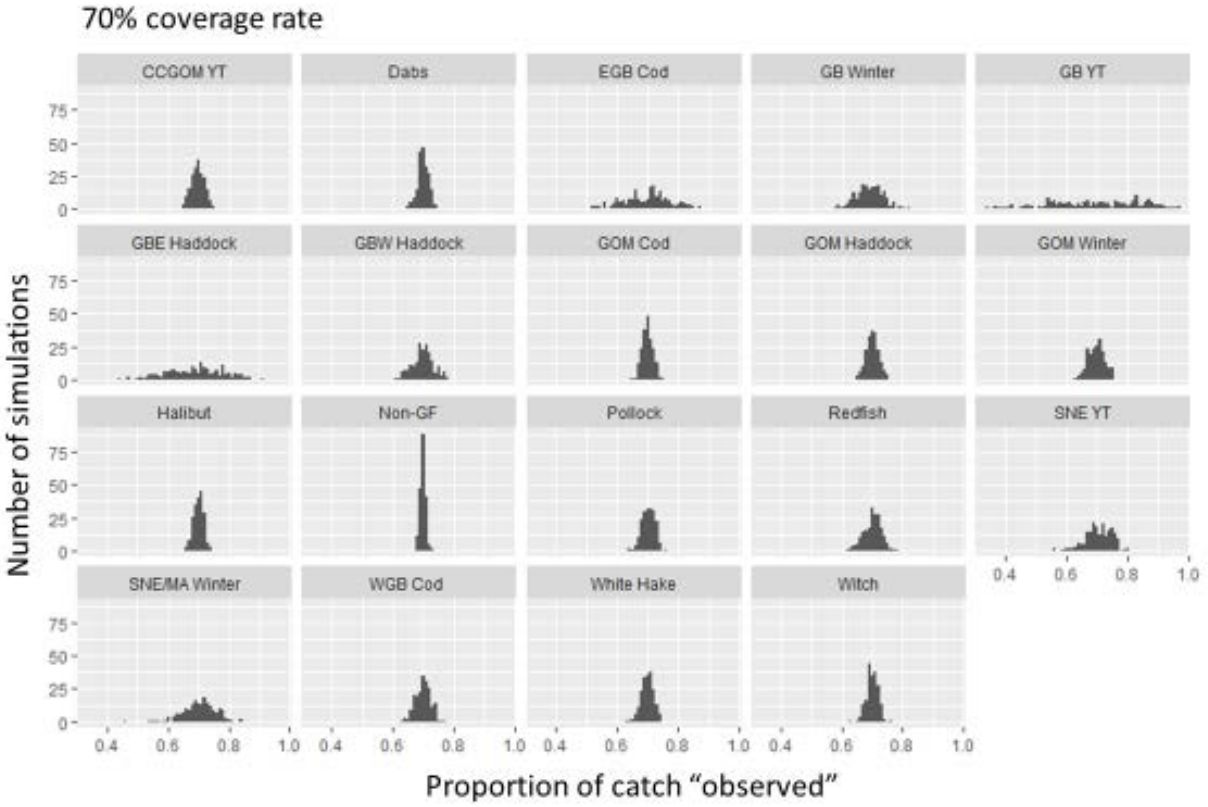


Figure 4 - Distribution of 200 random simulations estimating the total percentage of catch observed at a 90% coverage rate in FY2018.

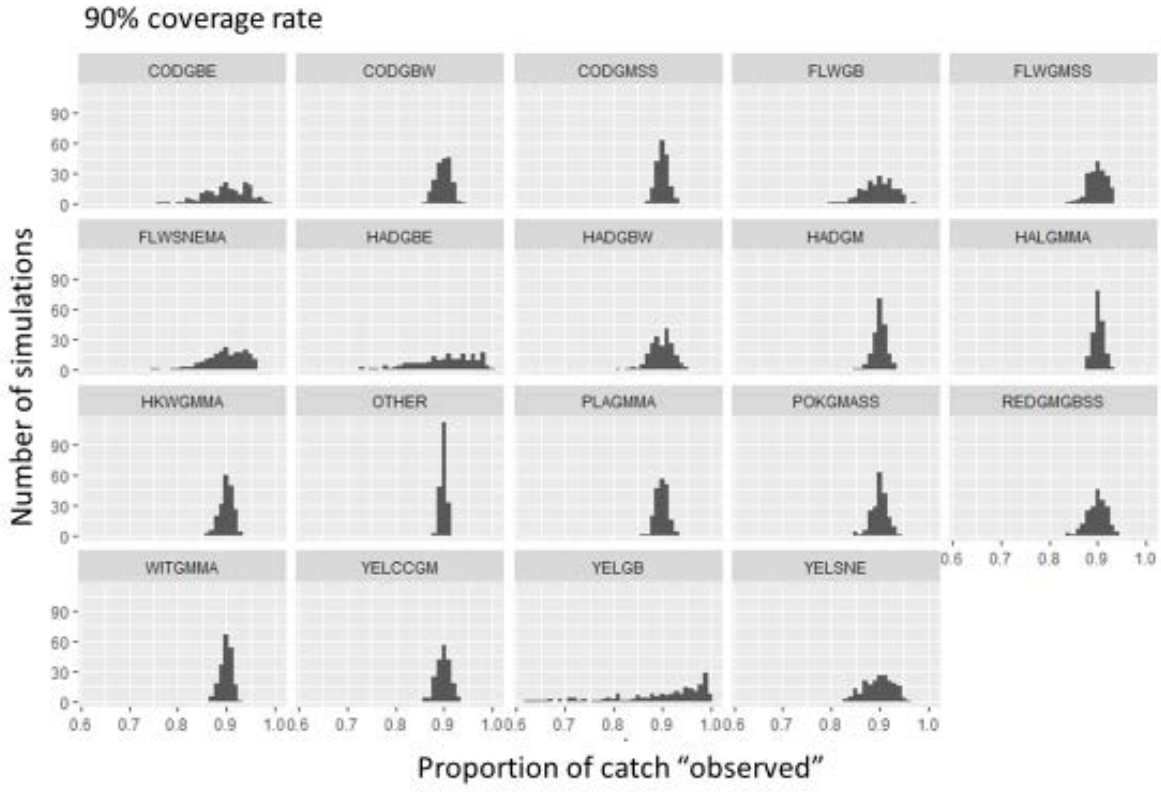


Table 59 - Results of FY 2018 simulations.

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.

7.4.3.1.3.1 Sub-option 3A – 25 percent

At a 50% target ASM coverage rate (25% catch target), fleet-wide ASM costs are estimated to be between $3.24 and $3.54 mil. Static costs under sub-option 2B are estimated to differ from the No Action at 22% coverage by $1.97 mil, and from the No Action at 13% coverage by $2.61 mil.

Fishery impacts are estimated using the QCM. The dynamically-estimated ASM cost for sub-option 3A is $3.3 mil, slightly lower than the midpoint of the low and high static estimates ($3.39). Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $0.2 mil, but reducing operating profits by $-3.1 mil.

Sub-option 3A is estimated to generate fleet-wide gross revenues of $71.1 mil, slightly lower than those estimated at 22% coverage ($71.3 mil) and $0.2 mil higher than the Status Quo. Relative to the No Action at 13% coverage, revenues differ by $0.3 mil.

Revenues are not as important to fisherman as operating profits, and the higher gross revenues predicted under the 50% coverage sub-option are eroded by higher operating costs. Operating profits are estimated at $48.2 mil, lower than profits estimated for the Status Quo ($51.3 mil), the No Action at 13% coverage ($50.4 mil), and the No Action at 22% ASM ($50.2 mil). Operating profits differ from sub-option 2A (25% coverage) by $-2 mil. If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Compliance: For the reasons described above, **the compliance score is 'low' at 25% of catch (50% ASM coverage).**

Enforceability: For the reasons described above, **the enforceability score at 25% of catch (50% ASM coverage) is therefore 'low'**

7.4.3.1.3.2 Sub-option 3B – 50 percent

70% ASM coverage is estimated to be needed to meet a 50% catch target for the groundfish fishery under Sub-Option 3B. ASM costs are estimated to be between $4.3 million and $4.8 million per fishing year, based on 2018 effort. No Action at 13% ASM coverage is expected to cost $.9 million per year, therefore, costs under this option would increase by approximately $4.4 million dollars, when static fleetwide costs are estimated. Dynamically estimated costs and revenues may decrease net economic impacts when potential increases in revenue are considered. Under 75% coverage, an additional $1.4 million dollars in revenue is generated, offsetting increased costs, revenue generation may be similar under sub-option 3B. If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Compliance: For the reasons described above, **the compliance score is 'medium' at 50% of catch (70% ASM coverage).**

Enforceability: For the reasons described above, **the enforceability score at 50% of catch (70% ASM coverage) is 'medium'**

7.4.3.1.3.3 Sub-option 3C – 75 percent

90% ASM coverage is estimated to be needed to meet a 75% catch target is estimated to be very similar to costs estimated at 91% ASM coverage to account for SBRM-mandated NEFOP coverage, which has averaged ~9% over the past eight years. As previously stated, this analysis makes no attempt to estimate and account for sector's SBRM fleet composition.

Fishery impacts are estimated using the QCM. The dynamically-estimated ASM cost for sub-option 3D is $5.5 mil, slightly lower than the midpoint of the low and high static estimates ($5.72). Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $0.1 mil, but reducing aggregate operating profits by $-5.1 mil.

Sub-option 3D is estimated to generate fleet-wide gross revenues of $71 mil, lower than those estimated at 22% coverage ($71.3 mil) and $0.1 mil higher than the Status Quo. Relative to the No Action at 13% coverage, revenues differ by $0.2 mil.

Revenues are not as important to fisherman as operating profits, and the higher gross revenues predicted under the 91% coverage sub-option are eroded by higher operating costs. Operating profits are estimated at $46.2 mil, lower than profits estimated for the Status Quo ($51.3 mil), the No Action at 13% coverage ($50.4 mil), and the No Action at 22% ASM ($50.2 mil). Operating profits differ from sub-option 3A (25% coverage) by $-4 mil, and from sub-option 3B (50% coverage) by $-2 mil. If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Compliance: For the reasons described above, **the compliance score is 'medium-high' at 75% of catch (90% ASM coverage).**

Enforceability: For the reasons described above, **the enforceability score at 75% of catch (90% ASM coverage) is 'medium-high'**

7.4.3.1.3.4 Sub-option 3D – 100 percent

Monitoring 100% catch is estimated to require 91% ASM coverage to account for SBRM-mandated NEFOP coverage, which has averaged ~9% over the past eight years. As previously stated, this analysis makes no attempt to estimate and account for sector's SBRM fleet composition.

Fishery impacts are estimated using the QCM. The dynamically-estimated ASM cost for sub-option 3D is $5.5 mil, slightly lower than the midpoint of the low and high static estimates ($5.72). Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $0.1 mil, but reducing aggregate operating profits by $-5.1 mil.

Sub-option 3D is estimated to generate fleet-wide gross revenues of $71 mil, lower than those estimated at 22% coverage ($71.3 mil) and $0.1 mil higher than the Status Quo. Relative to the No Action at 13% coverage, revenues differ by $0.2 mil.

Revenues are not as important to fisherman as operating profits, and the higher gross revenues predicted under the 91% coverage sub-option are eroded by higher operating costs. Operating profits are estimated at $46.2 mil, lower than profits estimated for the Status Quo ($51.3 mil), the No Action at 13% coverage ($50.4 mil), and the No Action at 22% ASM ($50.2 mil). Operating profits differ from sub-option 3A (25% coverage) by $-4 mil, and from sub-option 3B (50% coverage) by $-2 mil. If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Compliance: For the reasons described above, **the compliance score is 'high' at 100% of catch (100% ASM coverage).**

Enforceability: For the reasons described above, **the enforceability score at 100% of catch (100% ASM coverage) is 'high'**

7.4.3.2 Sector Monitoring Tools (Options for meeting monitoring standards)

Sectors may select one or more of the following monitoring tools options to address monitoring requirements. These options are to be used as a substitute monitoring tool for human observers or at-sea monitors. The intent is to create a suite of monitoring options that are equivalent in their ability to accurately monitor total catch, and the focus is on two specific versions of electronic monitoring (EM): the Audit Model, and the Maximized Retention (MaxRet) Model. The Audit Model employs EM as a backstop, generating kept catch and discards from vessel captain's Vessel Trip Reports (VTRs) and checking the captain's estimates against estimates generated by film review. The Maximized Retention Model requires retaining and landing all regulated groundfish species with allocated ACE, regardless of fish size. Discards of zero-retention groundfish and non-groundfish species would be generated based on human observers (NEFOP or ASM, as yet to be determined[10]), who would be employed at a reduced rate.

The cost of these options, as well as the equivalence of the monitoring they provide, depends on many details, most of which are not yet finalized. In particular, who will be responsible for which components of EM costs, and when those costs are experienced, is a critical driver of program participation. Overall cost for both programs are driven primarily by two factors: equipment and installation, and the costs of video review. The MaxRet program has a dockside monitoring component, another primary cost driver.

The following assumptions are used in generating cost and impacts analyses for the EM options presented here:

- review rates will decline over three years of a vessel's program participation, from 50% to 30% to 15% for the Audit model and 50%, 50% and 25% for the MaxRet model;
- vessels enroll in a program in year 1 and remain in the same program for all three years;
- costs vary by year, where Year 1 costs include the cost of equipment and installation, and year 2 and 3 costs include only operations and maintenance;

[10] Currently the MaxRet program requires ASM coverage for monitoring discards of species not landed. This may or may not persist. These anlyses are based on federal funding for human observers required to deploy on vessels enrolled in the MaxRet program. If the ASM program is used to monitor discards under the MaxRet program and those ASM's are industry-funded, costs associated with this program will be higher than those estimated here.

- for the MaxRet model, dockside monitoring costs (DSM) are included and are estimated to be slightly higher than those estimated for the stand-alone DSM options due to the inclusion of monitoring sub-legal catch offloads; and,
- costs do not vary across ASM sub-options and review rates apply to 100% of a vessel's days absent[11].

In recognition of the fact that some portion of EM costs may be subsidized, **a second set of models estimate costs without including equipment and installation ("Subsidy")**, under the assumption that industry would only be required to pay for the operational costs of the programs.

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

Sector costs and fishery impacts

This option would incorporate the components of the currently authorized fishery exemption program, which allows EM equipment to be installed on vessels and turned on in place of human observers when a vessel is selected for coverage through the PTNS, into the groundfish FMP. The benefits of this option to fisherman stem from potentially reduced costs associated with video review relative to an alternative where the equipment was operating on 100% of trips. Depending on the ASM coverage level selected, this option may be more costly than human observers as year one equipment and installation costs are approximately $10k per vessel. That equates to approximately 15-20 observed sea days. Then there is the cost of video review on selected trips. Because these vessels do not participate in EM full-time, their catch handling practices are reported to be less efficient than vessels enrolled in full-time EM exempted fisheries and they require relatively more video review time. Video review can be anywhere from $150 to $700 per day.

If video review for these vessels were to average $400 per day, the Council would need to select an ASM level that induces more than approximately 35 observed sea days for vessels opting EM in place of ASM in order for this option to reduce costs.

The benefits stemming from improved monitoring of the fishery are, at best, neutral relative to any selected coverage level. Implementation may render this option less effective than human monitors if, say, review rates are implemented on a per-trip rather than per-haul or per-day-at-sea margin. For example, implementing a 15% video review rate as applied to trips implies that, under a scenario where a vessel was selected for observation on 35 single-day trips, only five days would be monitored. The "effective monitoring rate" associated with this option is linearly related to the video review rate selected for implementation. The devil is, as always, in the details.

Compliance and Enforceability

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

[11] Option 1, EM in place of ASM, is not analyzed quantitatively.

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.

7.4.3.2.2 A blended analysis of sector monitoring tool options 2 and 3 – Audit and Maximized Retention Electronic Monitoring Models

Overview

Sector Monitoring Tool Options 2 and 3 are analyzed together in a quantitative model and the results will be summarized in this section. These analyses were completed to illustrate the potential combined impacts of adopting both Audit model and maximum retention electronic monitoring options under consideration. The sections that follow will address the specific stand-alone costs of Option 2 separate from Option 3 (7.4.3.2.3 and 7.4.3.2.4 respectively).

These two EM options are voluntary equivalent substitutes for human observers (ASM) and a sector or vessel's decision to opt in to one of them will be driven by a combination of cost and preference. Generally, EM is a lower cost alternative to human observers when a vessel fishes more than 20 days a year. Below this threshold, the cost of equipment, installation, maintenance and video review combine to make human observers the more cost-effective option. Preferences matter greatly, however, and many sectors and vessels will not opt into the option that has the lowest cost due to a preference for EM and/or human observers. These preferences may be driven by fishing practices such as high-volume fishing and long trips, or by vessel construction and equipment (i.e. an on deck conveyor for sorting catch). Even then, costs matter and a vessel paying for monitoring may develop new preferences if one option or the other can save tens of thousands of dollars.

Costs of the two EM options are estimated based on the Cost Efficiency model previously discussed. Three factors drive which vessels chose which programs: (1) EM costs for the Audit and MaxRet models; (2) individual preferences; and (3) the cost of the ASM alternative, which varies by the percent coverage option selected by the Council.

Individual preferences are not known, but vessel-level EM and ASM cost estimates are. Predictions of how many vessels may opt into each monitoring technology are based on cost, but because cost alone will not be the sole driver we analyze both the lowest possible cost and, using a different model, an "expected cost" estimate that is substantially higher than the lowest possible cost. This is intended as a proxy for unknowable individual preferences.

Because the EM costs vary by year, and are highest in the first year of the program[12], estimating which vessels are likely to opt into which programs based on cost requires an assumption about how costs that vary over time are likely to be experienced by fisherman. The following ///table summarizes the statically-determined total costs of each of the EM and ASM options, including the sub-options where EM equipment and installation costs are not borne by industry[13].

Table 60. Summary of all stand-alone aggregate static costs for each option under consideration (2018$, mil)

Option	Stand-alone Cost
ASM, 100%	5.72
ASM, 75%	4.89
ASM, 50%	3.39
ASM, 25%	1.72
Audit, Yr1	5.72
Audit, Yr1-Subsidy	2.68
Audit, Yr2	2.01
Audit, Yr3	1.23
MaxRet, Yr1	5.19
MaxRet, Yr1-Subsidy	2.15
MaxRet, Yr2	2.15
MaxRet, Yr3	1.82

Equipment and installation costs in year 1 are roughly $2mil for both EM options. For the Audit model without subsidy, costs fall by $4.49mil over the three years. If sectors and owners are unable to smooth costs across these years and no subsidy emerges, under the 75% and 100% ASM options where human observer costs are roughly equivalent to EM costs, the number of vessels opting into an EM program may be substantially lower than it would be either under a subsidy scenario, or if financing is available to smooth costs over time. The ability to smooth costs, then, is a significant driver of EM program participation. The following table /// shows the aggregate static costs of the ASM options compared to those of the EM options, highlighting the difference between costs smoothed over three years and costs in year 1, as well as the influence of equipment and installation costs.

[12] This is due to equipment purchases, installation and higher review rates in the first year.

[13] This is referred to as the "subsidy" option for both Audit and MaxRet.

Table 61. Comparison of stand-alone aggregate static costs for each option under consideration, based on either year 1 costs or 3-year average costs for EM the EM options (2018$, mil)

Cost Type	ASM Option	ASM Cost	Audit Cost	Audit Cost, Subsidy	MaxRet Cost	MaxRet Cost, Subsidy
Year 1	ASM, 100%	5.72	5.72	2.68	5.19	2.15
	ASM, 75%	4.89	5.72	2.68	5.19	2.15
	ASM, 50%	3.39	5.72	2.68	5.19	2.15
	ASM, 25%	1.72	5.72	2.68	5.19	2.15
3-Yr Avg	ASM, 100%	5.72	2.99	1.97	3.05	2.04
	ASM, 75%	4.89	2.99	1.97	3.05	2.04
	ASM, 50%	3.39	2.99	1.97	3.05	2.04
	ASM, 25%	1.72	2.99	1.97	3.05	2.04

Monitoring costs at the vessel level are primarily a function of groundfish fishing participation intensity, where the more days a vessel participates in the fishery, the higher their cost. The following figure summarizes vessel-level cost variability by days absent category and monitoring technology. This highlights the fact that vessels that do not fish much will have lower costs under human observers, while vessels that fish intensively will, for all coverage level options above 25%, experience lower costs under EM. Costs for MaxRet and Audit are roughly equal under most cases, however vessels that fish in high volumes may have higher MaxRet costs due to the mandated dockside monitoring, the costs of which scale linearly with landings.

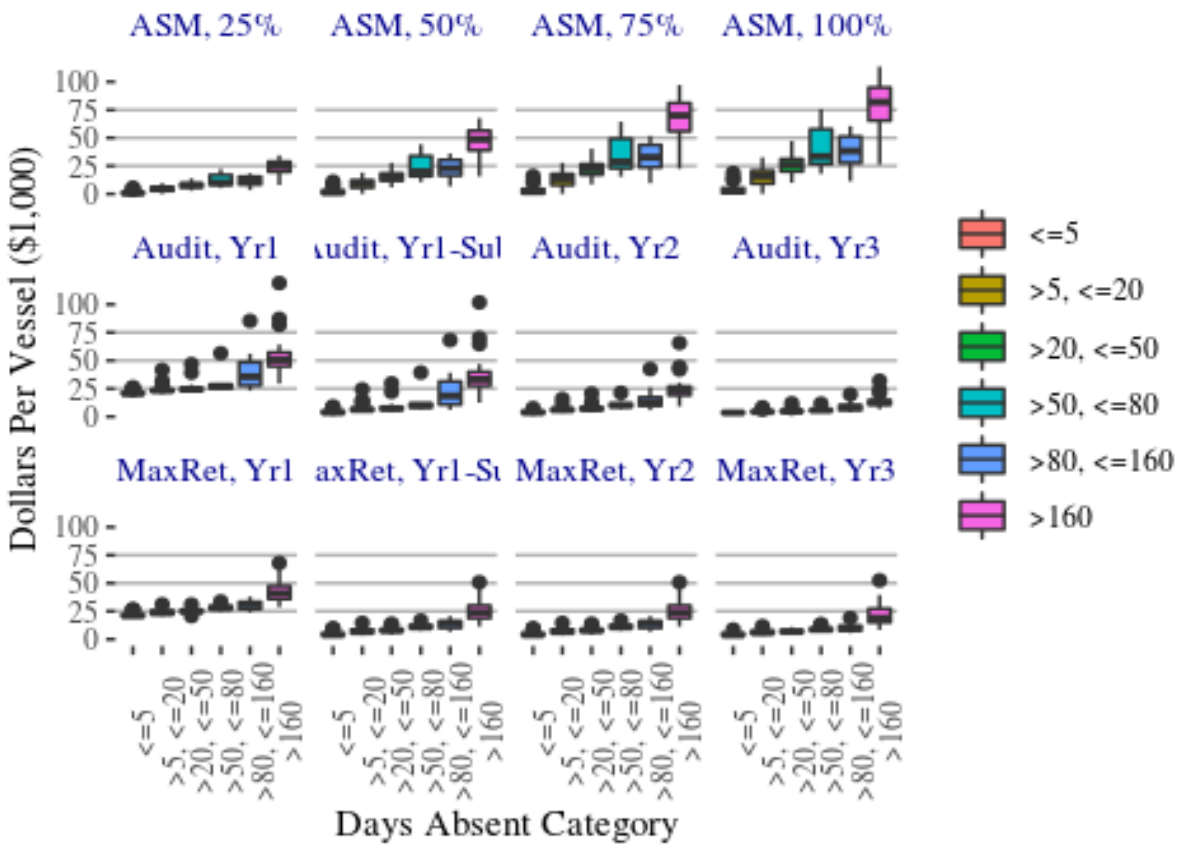


Figure 5. Annual cost of monitoring for the various options under consideration assuming 100% fleet-wide participation in each option, by days absent category (2018$, thousands)

Blended ASM and EM at the Low-Cost Frontier

One method for modeling vessel selection into one of the three monitoring technologies would simply estimate their annual cost for each technology and, assuming (a) complete vessel-level cost knowledge, and (b) no other preferences beyond cost, select each vessel into their lowest-cost technology. Such a model would represent the cost efficiency frontier, the lowest possible cost obtainable under each of the four ASM coverage options[14]. We estimate just such a model, using vessel level 3-year average costs for the two EM options relative to ASM costs across the four coverage level options. The following ///table summarizes the results of this model. Under this low-cost frontier model, the ability to chose from either of the two EM options reduces the cost of monitoring, with or without an EM subsidy, relative to ASM alone. At 50% coverage, an optimal selection of blended EM and ASM saves 36% over ASM alone without a subsidy, and 55% with equipment and installation subsidized. Total cost for comprehensive (100%) monitoring is $3.4 and $4.2 mil less expensive than ASM, without and with subsidy (a 59% and 73% reduction, respectively).

[14] This assumes our cost estimates are perfectly accurate, a herculean assumption to be sure.

Table 62. Comparison of blended ASM and EM costs at the cost-efficiency frontier (2018$, mil)

Subsidy	ASM	nVsls ASM	nVsls Aud	nVsls MaxR	Blend Cost	ASM Cost	$ Saved	% Saved	Yr1 Cost	Yr2 Cost	Yr3 Cost
0	ASM 25	156	17	6	1.67	1.72	0.05	3%	2.01	1.56	1.43
	ASM 50	86	63	30	2.19	3.39	1.21	36%	3.51	1.74	1.31
	ASM 75	62	81	36	2.30	4.89	2.59	53%	3.91	1.73	1.25
	ASM 100	54	87	38	2.33	5.72	3.39	59%	4.04	1.72	1.23
1	ASM 25	100	59	20	1.42	1.72	0.30	17%	1.64	1.49	1.14
	ASM 50	47	91	41	1.54	3.39	1.85	55%	1.83	1.64	1.14
	ASM 75	35	96	48	1.56	4.89	3.33	68%	1.85	1.66	1.16
	ASM 100	33	97	49	1.57	5.72	4.16	73%	1.86	1.67	1.17

Expected Value Model for Blended ASM and EM

Selection into the different EM options will not be optimal because cost information is imperfect and preferences may over-ride cost considerations. To model a more realistic EM selection scenario we use weighted random sampling to estimate who may opt in to which technology over the four different ASM coverage options. Sampling selection probability weights are a function of the vessel-level cost difference between the EM option and the relevant ASM coverage option. ASM weights are therefore always equal to one, while the EM weights may vary. For example, if ASM coverage is estimated to cost a vessel $10k annually, and the three year average Audit model cost is only $5k, the sampling weight for the Audit model would be (10 / 5) = 2, and the probability that this vessel would opt into the audit model is twice the probability that it would opt into ASM under these conditions. This same computation is made for MaxRet, and the sample is drawn from these three weights. This is replicated 10,000 times for each vessel, and estimates are presented based on replicate mean values. The following table/// reports expected values for blended ASM and EM costs. It is analogous to the preceeding table///, but with weighted sampling to better represent preferences and imperfect information.

The expected values from this method are 0-13% higher than those at the low-cost frontier for an ASM coverage level of 25%, and anywhere from 30-50% higher at the higher coverage levels. If the 50% ASM coverage level is selected, blending EM will save between $0.81 and 1.45 mil fleet-wide relative to ASM alone (without and with subsidy, respectively). At comprehensive (100%) coverage, it will save between $2.55 and 3.32 mil. These savings are lower than those predicted by the low-cost efficiency frontier model, but they provide a more realistic estimate of likely costs. The expected value model provides the static costs reported here, and are the costs used in the QCM for estimating dynamic impacts.

Table 63. Comparison of blended ASM and EM costs for the expected value model based on weighted sampling (2018$, mil)

Subsidy	ASM	nVsls ASM	nVsls Aud	nVsls MaxR	Blend Cost	ASM Cost	$ Saved	% Saved	Yr1 Cost	Yr2 Cost	Yr3 Cost
0	ASM 25	169	7	3	1.89	1.72	-0.17	-10%	1.94	1.73	1.67
	ASM 50	92	72	15	2.78	3.39	0.61	18%	4.34	2.17	1.58
	ASM 75	65	96	18	3.03	4.89	1.86	38%	5.00	2.19	1.50
	ASM 100	58	104	17	3.17	5.72	2.55	45%	5.27	2.23	1.51
1	ASM 25	117	49	13	1.51	1.72	0.21	12%	1.72	1.58	1.29
	ASM 50	54	105	20	2.10	3.39	1.29	38%	2.59	2.15	1.41
	ASM 75	36	120	23	2.28	4.89	2.61	53%	2.75	2.26	1.46
	ASM 100	33	125	21	2.31	5.72	3.42	60%	2.99	2.43	1.57

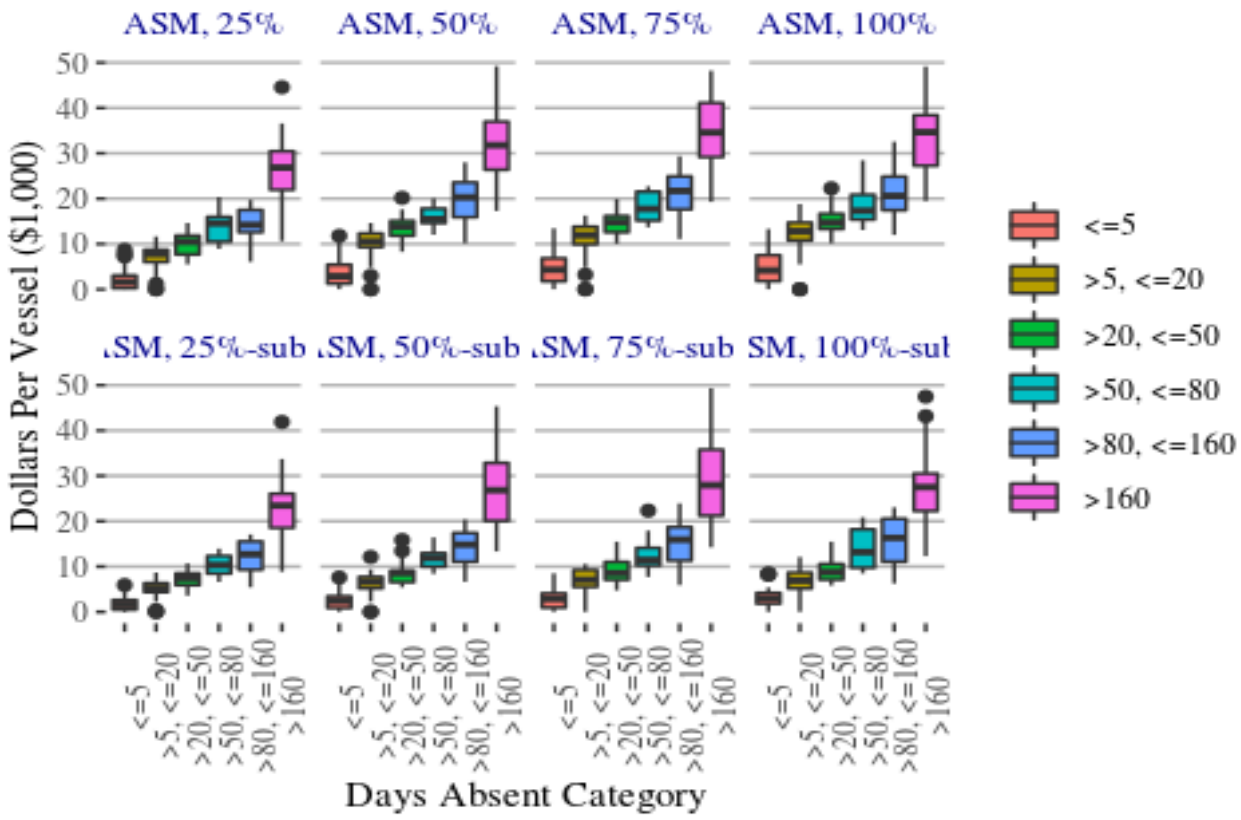


Figure 6. Annual cost of monitoring under the blended expected value model, by days absent category (2018$, thousands)

Sector costs and fishery impacts

100% monitoring is estimated at 91% ASM coverage to account for SBRM-mandated NEFOP coverage, which has averaged ~9% over the past eight year. As previously stated, this analysis makes no attempt to estimate and account for sector's SBRM fleet composition and, further, does not include SBRM-mandated NEFOP coverage in the coverage rate target. These results, therefore, represent likely overestimates if NEFOP is to provide a portion of this coverage at no cost to industry.

25% Coverage

The dynamically-estimated monitoring cost when EM is a substitute for ASM under 25% coverage is $2 mil for the no-subsidy model, and with the subsidy $1.7 mil. Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $1.4 mil without subsidy and $1 mil with subsidy. Operating profits are reduced by $1 mil without subsidy, and $0.8 mil with subsidy, relative to the Status Quo.

50% Coverage

The dynamically-estimated monitoring cost when EM is a substitute for ASM under 50% coverage is $2.6 mil for the no-subsidy model, and with the subsidy $1.9 mil. Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $1.4 mil without subsidy and $0.9 mil with subsidy. Operating profits are reduced by $1.2 mil without subsidy, and $1.1 mil with subsidy, relative to the Status Quo.

75% Coverage

The dynamically-estimated monitoring cost when EM is a substitute for ASM under 75% coverage is $2.7 mil for the no-subsidy model, and with the subsidy $1.9 mil. Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $1.6 mil without subsidy and $0.1 mil with subsidy. Operating profits are reduced by $1.1 mil without subsidy, and $1.8 mil with subsidy, relative to the Status Quo.

100% Coverage

Noting that costs were estimated based on 91% ASM coverage, the dynamically-estimated monitoring cost when EM is a substitute for ASM under 100% coverage is $3.1 mil for the no-subsidy model, and with the subsidy $1.9 mil. Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $1.4 mil without subsidy and $0.1 mil with subsidy. Operating profits are reduced by $21.1 mil without subsidy, and $21.8 mil with subsidy, relative to the Status Quo.

Under the blended model, there is no cost difference between 50-percent and 75-percent coverage when there is no subsidy. With a subsidy, 50-, 75-, and 100-percent coverage have only minor cost and impact differences. This is because, as ASM costs rise with higher coverage targets, more vessels are likely to shift into lower-cost EM programs.

Table 64. Expected static costs of monitoring under blended ASM and EM with 25% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
	<=5	10	45	0.41	1.89	0.11	0.5	0.11	0.55
	>5, <=20	66	231	2.12	7.47	0.12	0.41	0.13	0.43
0	>20, <=50	322	610	7	13.25	0.16	0.31	0.15	0.28
	>50, <=80	186	262	13.25	18.72	0.18	0.26	0.14	0.18
	>80,	562	883	14.79	23.24	0.37	0.58	0.14	0.24

Subsidy	Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
	>160	476	642	23.79	32.09	0.63	0.85	0.14	0.21
-	*TOTAL*	*1,621*	*2,673*	-	-	-	-	-	-
1	<=5	8	41	0.34	1.72	0.09	0.45	0.11	0.51
	>5, <=20	79	148	2.55	4.76	0.14	0.26	0.15	0.26
	>20, <=50	263	389	5.71	8.46	0.13	0.2	0.12	0.17
	>50, <=80	144	204	10.29	14.57	0.14	0.2	0.09	0.15
	>80,	489	716	12.87	18.85	0.32	0.47	0.12	0.18
	>160	421	578	21.04	28.88	0.55	0.76	0.13	0.18
-	*TOTAL*	*1,404*	*2,076*	-	-	-	-	-	-

Table 65. Expected static costs of monitoring under blended ASM and EM with 25% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	OTHER MA PORTS	126.4	250.1	6.02	11.91	0.23	0.45	0.14	0.3
	BOSTON	337.6	523.9	14.68	22.78	0.53	0.83	0.14	0.22
	CHATHAM	88.4	221.9	4.02	10.09	0.1	0.26	0.14	0.35
	GLOUCESTER	375.6	588.8	11.05	17.32	0.25	0.4	0.14	0.24
	NEW BEDFORD	240.9	313.9	18.53	24.15	0.76	0.99	0.14	0.2
	OTHER ME PORTS	77.9	136	5.99	10.46	0.17	0.29	0.14	0.24
	PORTLAND	112.8	164.6	12.54	18.29	0.77	1.13	0.16	0.25
	NH PORTS	111.3	189.6	9.28	15.8	0.19	0.32	0.15	0.24
	NY PORTS	25.6	53.6	5.11	10.72	0.13	0.28	0.16	0.33
	OTHER RI PORTS	8.9	30.8	2.98	10.27	0.56	1.93	0.11	0.41
	POINT JUDITH	93.2	160.1	5.48	9.42	0.15	0.25	0.14	0.24
	OTHER NORTHEAST	C	C	C	C	C	C	C	C
1	OTHER MA PORTS	112.4	165.9	5.35	7.9	0.2	0.3	0.12	0.19
	BOSTON	301.4	438.8	13.1	19.08	0.48	0.69	0.11	0.18
	CHATHAM	90.2	144	4.1	6.54	0.11	0.17	0.14	0.23
	GLOUCESTER	308.7	467.5	9.08	13.75	0.21	0.31	0.11	0.17
	NEW BEDFORD	205.8	288.3	15.83	22.18	0.65	0.91	0.12	0.18
	OTHER ME PORTS	68.4	96.8	5.26	7.45	0.14	0.21	0.12	0.17
	PORTLAND	102.4	125.9	11.38	13.99	0.7	0.86	0.14	0.19
	NH PORTS	86.8	138.2	7.24	11.52	0.15	0.24	0.11	0.17
	NY PORTS	22.2	31.8	4.43	6.37	0.12	0.17	0.14	0.2
	OTHER RI PORTS	9.6	22.9	3.2	7.64	0.6	1.43	0.13	0.48
	POINT JUDITH	74.2	113.9	4.36	6.7	0.12	0.18	0.11	0.17
	OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 66. Expected static costs of monitoring under blended ASM and EM with 25% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	30'to<50'	522	1.002	5.73	11.01	0.15	0.29	0.14	0.28
	50'to<75'	526	877	9.73	16.24	0.31	0.51	0.14	0.24
	75'+	574	794	20.49	28.38	0.82	1.14	0.14	0.20
1	30'to<50'	438	680	4.82	7.48	0.13	0.19	0.12	0.19
	50'to<75'	449	690	8.32	12.78	0.26	0.40	0.11	0.18
	75'+	516	706	18.43	25.21	0.74	1.01	0.13	0.18

Table 67. Expected static costs of monitoring under blended ASM and EM with 25% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	Sustainable Harvest Sector	433.4	611.5	18.06	25.48	0.75	1.06	0.14	0.22
	Northeast Fishery Sector II	301.6	465.3	12.06	18.61	0.23	0.35	0.14	0.22
	Northeast Fishery Sector XIII	137.9	221.1	9.19	14.74	0.56	0.9	0.14	0.26
	Georges Bank Cod Fixed Gear	84.5	210.7	4.23	10.54	0.11	0.26	0.14	0.35
	Northeast Fishery Sector VI	125	208.4	17.86	29.78	0.87	1.46	0.15	0.24
	Northeast Fishery Sector XI	108.2	177.3	9.83	16.12	0.19	0.31	0.15	0.22
	Northeast Fishery Sector VIII	110	155.5	13.75	19.44	0.64	0.9	0.14	0.22
	Maine Coast Community Sector	77.5	150.9	5.17	10.06	0.23	0.45	0.14	0.32
	Northeast Fishery Sector V	85	146.5	5.67	9.77	0.12	0.21	0.15	0.25
	Sustainable Harvest Sector -	56.2	116.7	7.02	14.58	0.21	0.44	0.14	0.26
	Northeast Fishery Sector XII	51.9	73.5	7.41	10.5	0.13	0.19	0.14	0.2
	Northeast Fishery Sector III	19.5	63.8	2.44	7.97	0.12	0.38	0.14	0.46
	Northeast Fishery Sector X	6.2	37.8	0.89	5.4	0.08	0.48	0.09	0.57
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C
1	Sustainable Harvest Sector	392.5	543.3	16.36	22.64	0.68	0.94	0.13	0.19
	Northeast Fishery Sector II	244.3	373.8	9.77	14.95	0.19	0.28	0.11	0.16
	Northeast Fishery Sector XIII	120.2	182.9	8.02	12.19	0.49	0.74	0.12	0.21
	Northeast Fishery Sector VI	115.1	171.8	16.44	24.54	0.8	1.2	0.14	0.2
	Georges Bank Cod Fixed Gear	85.4	137.8	4.27	6.89	0.11	0.17	0.14	0.23
	Northeast Fishery Sector XI	81.6	131.8	7.42	11.99	0.14	0.23	0.11	0.17
	Northeast Fishery Sector VIII	92.5	129.3	11.56	16.16	0.54	0.75	0.12	0.18
	Maine Coast Community Sector	76.6	99.4	5.11	6.62	0.23	0.29	0.14	0.2
	Northeast Fishery Sector V	65.6	97.9	4.37	6.52	0.1	0.14	0.11	0.17
	Sustainable Harvest Sector -	48.4	72.5	6.05	9.07	0.18	0.28	0.11	0.17
	Northeast Fishery Sector XII	34.3	51.1	4.9	7.3	0.09	0.13	0.09	0.14
	Northeast Fishery Sector III	20.7	35.7	2.58	4.47	0.12	0.21	0.15	0.26
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector X	10.2	22	1.46	3.14	0.13	0.28	0.16	0.34
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 68. Estimated dynamic impacts of monitoring under blended ASM and EM with 25% coverage, aggregate fleet totals by days absent category (2018$, mil, costs based on 3 year average for EM)

Subsidy	Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	<=5	0.2	0.0	0.1	0.1	54.8	0.0
	>5, <=20	1.8	0.1	0.5	1.1	65.3	-15.4
	>20, <=50	7.8	0.4	2.2	5.2	66.3	-7.1
	>50, <=80	6.4	0.2	2.2	4.0	62.2	-2.4
	>80, <=160	28.0	0.7	7.4	19.8	70.8	-2.5
	>160	28.1	0.6	7.3	20.1	71.8	1.0
	TOTAL	*72.3*	*2.0*	*19.7*	*50.3*	*69.6*	*-1.4*
1	<=5	0.2	0.0	0.1	0.1	62.9	0.0
	>5, <=20	1.8	0.1	0.5	1.2	67.4	-7.7
	>20, <=50	7.9	0.3	2.2	5.3	67.7	-5.4
	>50, <=80	6.6	0.2	2.3	4.2	63.0	2.4
	>80, <=160	28.2	0.6	7.5	20.1	71.1	-1.0
	>160	27.2	0.5	7.1	19.6	72.0	-1.5
	TOTAL	*71.9*	*1.7*	*19.7*	*50.5*	*70.2*	*-1.0*

Table 69. Estimated dynamic impacts of monitoring under blended ASM and EM with 25% coverage, aggregate fleet totals by vessel home port (2018$, mil, costs based on 3 year average for EM)

Subsidy	Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	CT PORTS	0.2	0.0	0.0	0.1	75.4	0.0
	OTHER MA PORTS	5.6	0.2	1.8	3.6	64.4	-7.7
	BOSTON	16.9	0.4	4.7	11.7	69.4	-0.8
	CHATHAM	4.9	0.2	0.8	3.9	80.6	-2.5
	GLOUCESTER	16.6	0.5	4.4	11.8	70.8	-1.7
	NEW BEDFORD	12.1	0.3	3.7	8.1	67.1	2.5
	OTHER ME PORTS	2.1	0.1	0.7	1.3	62.4	-7.1
	PORTLAND	5.3	0.1	1.5	3.6	68.6	-10.0
	NH PORTS	2.1	0.1	0.7	1.3	62.3	-13.3
	NY PORTS	0.6	0.0	0.1	0.5	83.1	0.0
	OTHER RI PORTS	0.4	0.0	0.2	0.2	56.6	-33.3
	POINT JUDITH	2.3	0.1	0.6	1.6	68.8	-11.1
1	OTHER NORTHEAST PORTS	C.0	C.0	C.0	C.0	C.0	0.0
	CT PORTS	0.2	0.0	0.0	0.1	76.7	0.0
	OTHER MA PORTS	5.5	0.1	1.8	3.6	64.9	-7.7
	BOSTON	16.7	0.4	4.6	11.7	70.1	-0.8
	CHATHAM	4.8	0.1	0.8	3.9	80.9	-2.5

Subsidy	Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	GLOUCESTER	16.5	0.4	4.4	11.7	70.9	-2.5
	NEW BEDFORD	12.3	0.2	3.8	8.3	67.3	5.1
	OTHER ME PORTS	2.1	0.1	0.7	1.3	63.7	-7.1
	PORTLAND	5.3	0.1	1.5	3.7	69.5	-7.5
	NH PORTS	2.2	0.1	0.7	1.4	64.4	-6.7
	NY PORTS	0.6	0.0	0.1	0.5	84.9	0.0
	OTHER RI PORTS	0.4	0.0	0.2	0.2	57.7	-33.3
	POINT JUDITH	2.4	0.1	0.6	1.7	70.2	-5.6
	OTHER NORTHEAST PORTS	C.0	C.0	C.0	C.0	C.0	0.0

Table 70. Estimated dynamic impacts of monitoring under blended ASM and EM with 25% coverage, aggregate fleet totals by vessel size class (2018$, mil, costs based on 3 year average for EM)

Subsidy	Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	30'to<50'	14.6	0.7	3.6	10.3	70.5	-6.4
	50'to<75'	24.1	0.7	6.0	17.4	72.1	0.0
	75'+	33.5	0.7	10.1	22.7	67.7	-0.9
1	30'to<50'	14.6	0.6	3.6	10.4	71.3	-5.5
	50'to<75'	24.0	0.6	6.0	17.4	72.6	0.0
	75'+	33.3	0.6	10.0	22.7	68.0	-0.9

Table 71. Estimated dynamic impacts of monitoring under blended ASM and EM with 25% coverage, aggregate fleet totals by sector (2018$, mil, costs based on 3 year average for EM)

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	Sustainable Harvest Sector	25.1	0.5	6.9	17.7	70.3	-0.6
	Northeast Fishery Sector II	14.9	0.4	3.8	10.7	71.9	0.0
	Northeast Fishery Sector VI	5.6	0.2	1.5	3.9	70.1	-2.5
	Northeast Fishery Sector XIII	5.6	0.2	2.0	3.5	61.4	0.0
	Northeast Fishery Sector VIII	5.2	0.1	1.5	3.5	68.2	-2.8
	Georges Bank Cod Fixed Gear Sector	4.9	0.1	0.8	4.0	81.3	0.0
	Maine Coast Community Sector	2.5	0.1	0.7	1.7	67.6	-10.5
	Northeast Fishery Sector XI	2.1	0.1	0.6	1.3	62.7	-13.3
	Sustainable Harvest Sector - Inshore	2.0	0.1	0.7	1.1	57.7	-8.3
	Northeast Fishery Sector V	1.8	0.1	0.4	1.3	72.9	-7.1
	Northeast Fishery Sector XII	1.4	0.1	0.4	0.9	68.7	-10.0
	Northeast Coastal Communities	C	C	C	C	C	0.0

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	Northeast Fishery Sector III	0.5	0.0	0.2	0.3	60.5	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.1	54.6	0.0
	Northeast Fishery Sector VII	C	C	C	C	C	0.0
1	Sustainable Harvest Sector	25.1	0.5	6.9	17.7	70.7	-0.6
	Northeast Fishery Sector II	14.6	0.3	3.8	10.5	72.0	-1.9
	Northeast Fishery Sector VI	5.2	0.1	1.4	3.7	70.1	-7.5
	Northeast Fishery Sector XIII	5.7	0.2	2.0	3.6	62.0	2.9
	Northeast Fishery Sector VIII	5.5	0.1	1.6	3.8	68.8	5.6
	Georges Bank Cod Fixed Gear Sector	4.8	0.1	0.8	3.9	81.5	-2.5
	Maine Coast Community Sector	2.6	0.1	0.7	1.8	68.9	-5.3
	Northeast Fishery Sector XI	2.1	0.1	0.6	1.4	64.8	-6.7
	Sustainable Harvest Sector - Inshore	2.0	0.1	0.8	1.2	59.0	0.0
	Northeast Fishery Sector V	1.8	0.1	0.4	1.4	75.1	0.0
	Northeast Fishery Sector XII	1.3	0.0	0.4	0.9	70.0	-10.0
	Northeast Coastal Communities	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.5	0.0	0.2	0.3	62.4	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.1	57.7	0.0

Table 72. Expected static costs of monitoring under blended ASM and EM with 50% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	<=5	15	85	0.61	3.53	0.16	0.93	0.18	1.01
	>5, <=20	150	287	4.83	9.26	0.26	0.5	0.29	0.53
	>20, <=50	474	677	10.31	14.72	0.24	0.35	0.23	0.31
	>50, <=80	197	323	14.06	23.07	0.19	0.31	0.12	0.23
	>80, <=160	666	1,037	17.52	27.29	0.44	0.68	0.18	0.29
	>160	463	789	23.17	39.46	0.61	1.04	0.15	0.24
-	*TOTAL*	*1,965*	*3,198*	-	-	-	-	-	-
1	<=5	21	62	0.86	2.59	0.23	0.68	0.26	0.74
	>5, <=20	110	167	3.54	5.38	0.19	0.29	0.2	0.3
	>20, <=50	218	490	4.75	10.65	0.11	0.25	0.1	0.21
	>50, <=80	106	238	7.54	17.04	0.1	0.23	0.06	0.17
	>80, <=160	426	887	11.2	23.34	0.28	0.58	0.11	0.22
	>160	371	794	18.57	39.68	0.49	1.05	0.11	0.24
-	*TOTAL*	*1,251*	*2,638*	-	-	-	-	-	-

Table 73. Expected static costs of monitoring under blended ASM and EM with 50% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	OTHER MA PORTS	186.6	301.3	8.89	14.35	0.33	0.54	0.22	0.36
	BOSTON	371.1	633.5	16.14	27.54	0.59	1	0.15	0.28
	CHATHAM	178.9	251.7	8.13	11.44	0.21	0.3	0.28	0.4
	GLOUCESTER	425.7	698.6	12.52	20.55	0.29	0.47	0.17	0.3
	NEW BEDFORD	212.1	398.6	16.32	30.66	0.67	1.26	0.13	0.26
	OTHER ME PORTS	114.6	170.7	8.81	13.13	0.24	0.36	0.19	0.3
	PORTLAND	139	200.8	15.44	22.31	0.95	1.38	0.2	0.3
	NH PORTS	130.4	197.3	10.87	16.44	0.22	0.34	0.19	0.26
	NY PORTS	42.8	54.2	8.56	10.84	0.22	0.28	0.26	0.33
	OTHER RI PORTS	16	40.6	5.33	13.53	1	2.54	0.2	0.62
	POINT JUDITH	120.2	193.8	7.07	11.4	0.19	0.31	0.18	0.3
	OTHER NORTHEAST	C	C	C	C	C	C	C	C
1	OTHER MA PORTS	118.9	229.6	5.66	10.94	0.21	0.41	0.13	0.25
	BOSTON	288.3	588.1	12.54	25.57	0.46	0.93	0.1	0.23
	CHATHAM	106.2	173.7	4.83	7.89	0.12	0.2	0.17	0.28
	GLOUCESTER	231.3	550.3	6.8	16.19	0.16	0.37	0.09	0.2
	NEW BEDFORD	146.9	355.7	11.3	27.36	0.46	1.12	0.09	0.22
	OTHER ME PORTS	57.1	112.7	4.39	8.67	0.12	0.24	0.1	0.2
	PORTLAND	107.2	184.8	11.91	20.54	0.73	1.27	0.15	0.26
	NH PORTS	73.7	171.4	6.14	14.28	0.13	0.29	0.09	0.22
	NY PORTS	20.9	39.4	4.18	7.87	0.11	0.21	0.13	0.24
	OTHER RI PORTS	11.5	30.5	3.84	10.17	0.72	1.91	0.17	0.54
	POINT JUDITH	55.3	143.1	3.26	8.42	0.09	0.23	0.08	0.21
	OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 74. Expected static costs of monitoring under blended ASM and EM with 50% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	30'to<50'	748	1,182	8.22	12.98	0.21	0.34	0.21	0.34
	50'to<75'	612	1,022	11.33	18.93	0.36	0.59	0.18	0.29
	75'+	604	994	21.59	35.49	0.86	1.42	0.15	0.25
1	30'to<50'	420	804	4.61	8.84	0.12	0.23	0.12	0.22
	50'to<75'	395	913	7.32	16.92	0.23	0.53	0.09	0.23
	75'+	436	920	15.57	32.86	0.62	1.32	0.11	0.24

Table 75. Expected static costs of monitoring under blended ASM and EM with 50% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	Sustainable Harvest Sector	459.8	776.6	19.16	32.36	0.8	1.35	0.16	0.28
	Northeast Fishery Sector II	354.7	555.3	14.19	22.21	0.27	0.42	0.18	0.28
	Northeast Fishery Sector XIII	142.1	271.3	9.47	18.09	0.58	1.1	0.16	0.33
	Northeast Fishery Sector VI	160.9	244.5	22.99	34.93	1.13	1.71	0.19	0.28
	Georges Bank Cod Fixed Gear	169	234.9	8.45	11.75	0.21	0.29	0.28	0.39
	Northeast Fishery Sector VIII	104.6	195.7	13.07	24.46	0.61	1.14	0.15	0.28
	Northeast Fishery Sector XI	116.3	186.7	10.57	16.97	0.2	0.33	0.16	0.25
	Maine Coast Community Sector	119.4	170.7	7.96	11.38	0.35	0.51	0.27	0.38
	Northeast Fishery Sector V	118	169.8	7.87	11.32	0.17	0.25	0.2	0.29
	Sustainable Harvest Sector -	81.1	128.5	10.14	16.06	0.31	0.49	0.17	0.3
	Northeast Fishery Sector XII	59.6	100.4	8.51	14.34	0.15	0.26	0.16	0.27
	Northeast Fishery Sector III	36.9	76.9	4.62	9.61	0.22	0.46	0.26	0.56
	Northeast Fishery Sector X	20.4	48	2.91	6.85	0.26	0.61	0.31	0.74
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C
1	Sustainable Harvest Sector	383.6	724	15.98	30.17	0.66	1.25	0.13	0.25
	Northeast Fishery Sector II	174.4	445.6	6.98	17.82	0.13	0.34	0.08	0.19
	Northeast Fishery Sector XIII	92.8	246.9	6.19	16.46	0.38	1	0.11	0.29
	Northeast Fishery Sector VI	118.2	238.4	16.88	34.06	0.83	1.67	0.14	0.28
	Georges Bank Cod Fixed Gear	102.7	166.4	5.13	8.32	0.13	0.21	0.17	0.28
	Northeast Fishery Sector XI	63.7	165.9	5.79	15.08	0.11	0.29	0.07	0.21
	Northeast Fishery Sector VIII	63.8	161.8	7.97	20.22	0.37	0.94	0.09	0.22
	Northeast Fishery Sector V	51.2	118	3.42	7.86	0.07	0.17	0.09	0.2
	Maine Coast Community Sector	70.8	116.2	4.72	7.74	0.21	0.34	0.15	0.23
	Sustainable Harvest Sector -	48.1	97.5	6.01	12.19	0.18	0.37	0.1	0.24
	Northeast Fishery Sector XII	21.8	62.1	3.12	8.87	0.06	0.16	0.06	0.17
	Northeast Fishery Sector III	25.7	37.7	3.21	4.71	0.15	0.23	0.19	0.28
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector X	17.4	25.4	2.48	3.63	0.22	0.32	0.26	0.38
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 76. Estimated dynamic impacts of monitoring under blended ASM and EM with 50% coverage, aggregate fleet totals by days absent category (2018$, mil, costs based on 3 year average for EM)

Subsidy	Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	<=5	0.2	0.0	0.1	0.1	50.8	0.0
	>5, <=20	1.7	0.2	0.4	1.1	63.8	-15.4
	>20, <=50	7.6	0.5	2.1	4.9	64.7	-12.5
	>50, <=80	6.3	0.3	2.2	3.8	61.4	-7.3

Subsidy	Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	>80, <=160	27.9	0.9	7.5	19.6	70.1	-3.4
	>160	28.6	0.7	7.4	20.6	71.9	3.5
	TOTAL	*72.3*	*2.6*	*19.7*	*50.1*	*69.3*	*-1.8*
	<=5	0.2	0.0	0.0	0.1	54.8	0.0
	>5, <=20	1.8	0.1	0.5	1.2	67.0	-7.7
	>20, <=50	7.8	0.4	2.2	5.2	66.8	-7.1
1	>50, <=80	6.4	0.2	2.2	4.0	62.8	-2.4
	>80, <=160	27.7	0.7	7.4	19.6	70.8	-3.4
	>160	27.9	0.5	7.3	20.1	71.9	1.0
	TOTAL	*71.8*	*1.9*	*19.6*	*50.2*	*69.9*	*-1.6*

Table 77. Estimated dynamic impacts of monitoring under blended ASM and EM with 50% coverage, aggregate fleet totals by vessel home port (2018$, mil, costs based on 3 year average for EM)

Subsidy	Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	CT PORTS	0.2	0.0	0.0	0.1	75.5	0.0
	OTHER MA PORTS	5.6	0.2	1.8	3.6	64.3	-7.7
	BOSTON	16.8	0.5	4.6	11.7	69.5	-0.8
	CHATHAM	4.8	0.2	0.8	3.8	79.0	-5.0
	GLOUCESTER	16.3	0.5	4.3	11.4	70.0	-5.0
	NEW BEDFORD	12.4	0.3	3.8	8.4	67.2	6.3
0	OTHER ME PORTS	2.1	0.1	0.7	1.3	60.7	-7.1
	PORTLAND	5.5	0.2	1.6	3.7	68.2	-7.5
	NH PORTS	2.2	0.2	0.7	1.4	61.3	-6.7
	NY PORTS	0.5	0.0	0.1	0.4	81.3	-20.0
	OTHER RI PORTS	0.3	0.0	0.1	0.2	58.6	-33.3
	POINT JUDITH	2.3	0.2	0.6	1.5	67.0	-16.7
	OTHER NORTHEAST PORTS	C	C	C	C	C	0.0
	CT PORTS	0.2	0.0	0.0	0.1	75.0	0.0
	OTHER MA PORTS	5.8	0.2	1.8	3.7	65.0	-5.1
	BOSTON	16.8	0.4	4.7	11.7	69.6	-0.8
	CHATHAM	4.7	0.1	0.8	3.8	80.5	-5.0
	GLOUCESTER	15.9	0.4	4.2	11.3	71.0	-5.8
	NEW BEDFORD	12.6	0.3	3.8	8.4	67.3	6.3
1	OTHER ME PORTS	2.0	0.1	0.7	1.3	63.8	-7.1
	PORTLAND	5.3	0.1	1.5	3.6	68.6	-10.0
	NH PORTS	2.1	0.1	0.7	1.3	62.7	-13.3
	NY PORTS	0.5	0.0	0.1	0.5	83.6	0.0
	OTHER RI PORTS	0.4	0.0	0.1	0.2	59.6	-33.3
	POINT JUDITH	2.3	0.1	0.6	1.6	70.2	-11.1
	OTHER NORTHEAST PORTS	C	C	C	C	C	0.0

Table 78. Estimated dynamic impacts of monitoring under blended ASM and EM with 50% coverage, aggregate fleet totals by vessel size class (2018$, mil, costs based on 3 year average for EM)

Subsidy	Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	30'to<50'	14.6	0.9	3.6	10.1	69.2	-8.2
	50'to<75'	24.1	0.8	6.1	17.2	71.4	-1.1
	75'+	33.7	0.8	10.0	22.8	67.8	-0.4
1	30'to<50'	14.4	0.6	3.6	10.2	71.0	-7.3
	50'to<75'	23.8	0.6	6.0	17.2	72.4	-1.1
	75'+	33.6	0.7	10.1	22.7	67.8	-0.9

Table 79. Estimated dynamic impacts of monitoring under blended ASM and EM with 50% coverage, aggregate fleet totals by sector (2018$, mil, costs based on 3 year average for EM)

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	Sustainable Harvest Sector	25.5	0.6	6.9	18.0	70.5	1.1
	Northeast Fishery Sector II	14.4	0.4	3.7	10.3	71.1	-3.7
	Northeast Fishery Sector VI	5.6	0.2	1.5	3.9	69.3	-2.5
	Northeast Fishery Sector XIII	5.5	0.2	1.9	3.4	61.0	-2.9
	Northeast Fishery Sector VIII	5.6	0.1	1.6	3.8	68.1	5.6
	Georges Bank Cod Fixed Gear Sector	4.9	0.2	0.8	3.9	79.7	-2.5
	Maine Coast Community Sector	2.6	0.1	0.7	1.7	67.1	-10.5
	Northeast Fishery Sector XI	2.2	0.2	0.7	1.4	62.0	-6.7
	Sustainable Harvest Sector - Inshore	1.8	0.1	0.7	1.0	56.0	-16.7
	Northeast Fishery Sector V	1.8	0.1	0.4	1.3	71.1	-7.1
	Northeast Fishery Sector XII	1.3	0.1	0.4	0.9	67.4	-10.0
	Northeast Coastal Communities	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.4	0.0	0.1	0.3	60.9	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.0	48.0	-100.0
	Northeast Fishery Sector VII	C	C	C	C	C	0.0
1	Sustainable Harvest Sector	25.5	0.5	7.0	18.0	70.5	1.1
	Northeast Fishery Sector II	14.1	0.3	3.6	10.2	72.1	-4.7
	Northeast Fishery Sector VI	5.4	0.2	1.5	3.8	69.3	-5.0
	Northeast Fishery Sector XIII	5.7	0.2	2.0	3.5	61.7	0.0
	Northeast Fishery Sector VIII	5.5	0.1	1.6	3.7	68.3	2.8
	Georges Bank Cod Fixed Gear Sector	4.8	0.1	0.8	3.9	81.0	-2.5
	Maine Coast Community Sector	2.6	0.1	0.7	1.8	69.1	-5.3
	Northeast Fishery Sector XI	2.1	0.1	0.7	1.4	63.5	-6.7
	Sustainable Harvest Sector - Inshore	2.0	0.1	0.7	1.1	58.4	-8.3
	Northeast Fishery Sector V	1.8	0.1	0.4	1.3	74.3	-7.1
	Northeast Fishery Sector XII	1.3	0.1	0.4	0.9	69.7	-10.0
	Northeast Coastal Communities	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.5	0.0	0.2	0.3	61.4	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.1	52.6	0.0

Table 80. Expected static costs of monitoring under blended ASM and EM with 75% coverage, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	<=5	20	117	0.84	4.88	0.22	1.29	0.26	1.4
	>5, <=20	193	305	6.21	9.84	0.34	0.53	0.36	0.56
	>20, <=50	448	765	9.73	16.62	0.23	0.39	0.21	0.35
	>50, <=80	151	402	10.76	28.71	0.15	0.39	0.09	0.29
	>80,	536	1,246	14.11	32.78	0.35	0.82	0.16	0.32
	>160	358	940	17.91	47	0.47	1.24	0.13	0.3
-	*TOTAL*	*1,706*	*3,774*	-	-	-	-	-	-
1	<=5	29	69	1.22	2.89	0.32	0.76	0.35	0.82
	>5, <=20	104	179	3.34	5.78	0.18	0.31	0.19	0.32
	>20, <=50	192	567	4.18	12.33	0.1	0.29	0.08	0.26
	>50, <=80	68	336	4.82	24.02	0.07	0.33	0.03	0.23
	>80,	312	1,010	8.22	26.57	0.21	0.66	0.08	0.26
	>160	251	939	12.55	46.95	0.33	1.24	0.07	0.29
-	*TOTAL*	*956*	*3,100*	-	-	-	-	-	-

Table 81. Expected static costs of monitoring under blended ASM and EM with 75% coverage, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	OTHER MA PORTS	187.6	320.4	8.93	15.26	0.34	0.57	0.22	0.39
	BOSTON	302.5	750.3	13.15	32.62	0.48	1.19	0.12	0.32
	CHATHAM	194.5	265.5	8.84	12.07	0.23	0.31	0.31	0.42
	GLOUCESTER	358.4	822.8	10.54	24.2	0.24	0.55	0.15	0.34
	NEW BEDFORD	154.4	518.9	11.88	39.91	0.49	1.64	0.1	0.34
	OTHER ME PORTS	107.9	189.9	8.3	14.61	0.23	0.4	0.18	0.34
	PORTLAND	108	242.4	12	26.93	0.74	1.66	0.16	0.37
	NH PORTS	99.3	253.6	8.27	21.13	0.17	0.43	0.16	0.34
	NY PORTS	42	64.8	8.41	12.96	0.22	0.34	0.26	0.4
	OTHER RI PORTS	19.3	47.2	6.43	15.73	1.21	2.95	0.26	0.84
	POINT JUDITH	110.6	253.6	6.5	14.92	0.18	0.4	0.16	0.37
	OTHER NORTHEAST	C	C	C	C	C	C	C	C
1	OTHER MA PORTS	96.9	253.7	4.61	12.08	0.17	0.45	0.12	0.28
	BOSTON	213.3	645.4	9.27	28.06	0.34	1.02	0.07	0.26
	CHATHAM	91	215.3	4.13	9.79	0.11	0.25	0.15	0.34
	GLOUCESTER	162.2	642.5	4.77	18.9	0.11	0.43	0.06	0.24
	NEW BEDFORD	119	439.2	9.16	33.78	0.38	1.39	0.07	0.27
	OTHER ME PORTS	44.2	147.2	3.4	11.33	0.09	0.31	0.08	0.26
	PORTLAND	73.1	208.5	8.13	23.17	0.5	1.43	0.11	0.31
	NH PORTS	52.3	209.7	4.36	17.48	0.09	0.36	0.07	0.26

Subsidy	Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
	NY PORTS	20.5	40.4	4.1	8.08	0.11	0.21	0.13	0.25
	OTHER RI PORTS	13.9	32.8	4.64	10.93	0.87	2.05	0.26	0.58
	POINT JUDITH	41.9	196.5	2.46	11.56	0.07	0.31	0.06	0.29
	OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 82. Expected static costs of monitoring under blended ASM and EM with 75% coverage, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	30'to<50	700	1,326	7.69	14.58	0.20	0.38	0.21	0.38
	50'to<75	527	1,221	9.77	22.61	0.31	0.71	0.15	0.35
	75'+	478	1,227	17.08	43.83	0.68	1.76	0.12	0.32
1	30'to<50	327	992	3.59	10.90	0.09	0.28	0.09	0.27
	50'to<75	306	1,030	5.66	19.07	0.18	0.60	0.07	0.28
	75'+	323	1,079	11.55	38.54	0.46	1.54	0.08	0.28

Table 83. Expected static costs of monitoring under blended ASM and EM with 75% coverage, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	Sustainable Harvest Sector	368.7	898.1	15.36	37.42	0.64	1.56	0.14	0.31
	Northeast Fishery Sector II	289.1	646.5	11.56	25.86	0.22	0.49	0.14	0.32
	Northeast Fishery Sector XIII	128.3	368.4	8.55	24.56	0.52	1.49	0.15	0.44
	Northeast Fishery Sector VI	135.2	295.6	19.31	42.22	0.95	2.07	0.16	0.35
	Georges Bank Cod Fixed Gear	187	249.9	9.35	12.49	0.23	0.31	0.31	0.42
	Northeast Fishery Sector VIII	81.1	239.8	10.14	29.98	0.47	1.39	0.12	0.33
	Northeast Fishery Sector XI	89.4	237	8.13	21.55	0.16	0.42	0.14	0.32
	Northeast Fishery Sector V	105.9	208.8	7.06	13.92	0.15	0.3	0.18	0.35
	Maine Coast Community Sector	112.6	191.2	7.51	12.75	0.33	0.57	0.27	0.41
	Sustainable Harvest Sector -	80	145.6	10	18.19	0.3	0.55	0.17	0.34
	Northeast Fishery Sector XII	41.6	108.5	5.95	15.5	0.11	0.28	0.11	0.29
	Northeast Fishery Sector III	48.8	80.9	6.09	10.12	0.29	0.48	0.34	0.59
	Northeast Fishery Sector X	24.2	51	3.45	7.29	0.31	0.65	0.36	0.8
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C
1	Sustainable Harvest Sector	273.2	826.9	11.38	34.45	0.47	1.43	0.09	0.28
	Northeast Fishery Sector II	121.2	519.1	4.85	20.77	0.09	0.39	0.05	0.24
	Northeast Fishery Sector XIII	77.6	318.2	5.17	21.22	0.31	1.29	0.1	0.36
	Northeast Fishery Sector VI	93.4	240.9	13.34	34.42	0.65	1.68	0.11	0.28
	Northeast Fishery Sector XI	42.5	207.1	3.86	18.83	0.07	0.36	0.05	0.27
	Georges Bank Cod Fixed Gear	89.2	203.4	4.46	10.17	0.11	0.25	0.15	0.34
	Northeast Fishery Sector VIII	58.7	168.4	7.34	21.05	0.34	0.98	0.08	0.24

Subsidy	Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
	Maine Coast Community Sector	53.4	161.7	3.56	10.78	0.16	0.48	0.11	0.32
	Northeast Fishery Sector V	39.8	152.8	2.65	10.18	0.06	0.22	0.07	0.26
	Sustainable Harvest Sector -	40.4	124.3	5.04	15.53	0.15	0.47	0.09	0.29
	Northeast Fishery Sector XII	13.1	81.8	1.87	11.69	0.03	0.21	0.03	0.22
	Northeast Fishery Sector III	23.7	36.6	2.96	4.57	0.14	0.22	0.17	0.26
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector X	16.8	26.9	2.4	3.84	0.21	0.34	0.25	0.41
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 84. Estimated dynamic impacts of monitoring under blended ASM and EM with 75% coverage, aggregate fleet totals by days absent category (2018$, mil, costs based on 3 year average for EM)

Subsidy	Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	<=5	0.2	0.0	0.0	0.1	49.9	0.0
	>5, <=20	1.7	0.2	0.4	1.1	62.4	-15.4
	>20, <=50	7.5	0.6	2.1	4.9	64.7	-12.5
0	>50, <=80	6.4	0.3	2.2	3.9	61.4	-4.9
	>80, <=160	27.7	0.9	7.4	19.4	70.1	-4.4
	>160	29.0	0.7	7.5	20.8	71.8	4.5
	TOTAL	*72.5*	*2.7*	*19.6*	*50.2*	*69.2*	*-1.6*
	<=5	0.2	0.0	0.1	0.1	52.1	0.0
	>5, <=20	1.8	0.1	0.5	1.2	66.4	-7.7
	>20, <=50	8.0	0.4	2.3	5.3	66.8	-5.4
1	>50, <=80	6.6	0.2	2.3	4.2	62.6	2.4
	>80, <=160	27.8	0.7	7.5	19.6	70.7	-3.4
	>160	26.6	0.5	6.9	19.1	71.9	-4.0
	TOTAL	*71.0*	*1.9*	*19.6*	*49.5*	*69.7*	*-2.9*

Table 85. Estimated dynamic impacts of monitoring under blended ASM and EM with 75% coverage, aggregate fleet totals by vessel home port (2018$, mil, costs based on 3 year average for EM)

Subsidy	Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	CT PORTS	0.2	0.0	0.0	0.2	75.9	100.0
	OTHER MA PORTS	5.8	0.3	1.8	3.7	64.1	-5.1
	BOSTON	17.0	0.6	4.7	11.7	69.1	-0.8
	CHATHAM	4.8	0.2	0.8	3.7	78.7	-7.5
	GLOUCESTER	16.1	0.5	4.3	11.3	70.0	-5.8
	NEW BEDFORD	12.3	0.3	3.7	8.3	67.5	5.1
0	OTHER ME PORTS	2.1	0.1	0.7	1.3	61.0	-7.1
	PORTLAND	5.5	0.2	1.6	3.8	68.2	-5.0
	NH PORTS	2.2	0.2	0.7	1.3	61.2	-13.3
	NY PORTS	0.5	0.0	0.1	0.4	80.1	-20.0
	OTHER RI PORTS	0.2	0.0	0.1	0.1	56.0	-66.7
	POINT JUDITH	2.3	0.2	0.6	1.6	67.2	-11.1
	OTHER NORTHEAST PORTS	C.0	C.0	C.0	C.0	C.0	0.0
	CT PORTS	0.2	0.0	0.1	0.2	75.9	100.0
1	OTHER MA PORTS	5.7	0.2	1.8	3.7	64.7	-5.1
	BOSTON	16.6	0.4	4.6	11.6	69.8	-1.7

Subsidy	Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	CHATHAM	4.8	0.2	0.8	3.9	80.5	-2.5
	GLOUCESTER	16.2	0.4	4.4	11.5	70.5	-4.2
	NEW BEDFORD	11.9	0.3	3.7	8.0	67.0	1.3
	OTHER ME PORTS	2.1	0.1	0.7	1.3	63.7	-7.1
	PORTLAND	5.3	0.1	1.5	3.6	68.6	-10.0
	NH PORTS	2.2	0.1	0.7	1.4	63.5	-6.7
	NY PORTS	0.6	0.0	0.1	0.5	83.9	0.0
	OTHER RI PORTS	0.5	0.0	0.2	0.3	58.2	0.0
	POINT JUDITH	2.2	0.1	0.6	1.6	69.7	-11.1
	OTHER NORTHEAST PORTS	C.0	C.0	C.0	C.0	C.0	0.0

Table 86. Estimated dynamic impacts of monitoring under blended ASM and EM with 75% coverage, aggregate fleet totals by vessel size class (2018$, mil, costs based on 3 year average for EM)

Subsidy	Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	30'to<50'	14.4	1.0	3.5	9.9	68.7	-10.0
	50'to<75'	24.1	0.9	6.0	17.2	71.5	-1.1
	75'+	33.9	0.8	10.1	23.0	67.8	0.4
1	30'to<50'	14.8	0.7	3.7	10.5	70.9	-4.5
	50'to<75'	23.2	0.6	5.9	16.7	72.1	-4.0
	75'+	33.0	0.7	9.9	22.3	67.7	-2.6

Table 87. Estimated dynamic impacts of monitoring under blended ASM and EM with 75% coverage, aggregate fleet totals by sector (2018$, mil, costs based on 3 year average for EM)

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	Sustainable Harvest Sector	26.5	0.7	7.2	18.6	70.4	4.5
	Northeast Fishery Sector II	14.3	0.4	3.7	10.2	71.1	-4.7
	Northeast Fishery Sector VI	5.6	0.2	1.5	3.9	69.0	-2.5
	Northeast Fishery Sector XIII	5.2	0.2	1.8	3.2	61.0	-8.6
	Northeast Fishery Sector VIII	5.3	0.2	1.6	3.6	68.0	0.0
	Georges Bank Cod Fixed Gear Sector	4.8	0.2	0.8	3.8	79.3	-5.0
	Maine Coast Community Sector	2.6	0.2	0.7	1.7	66.9	-10.5
	Northeast Fishery Sector XI	2.2	0.2	0.7	1.4	61.9	-6.7
	Sustainable Harvest Sector - Inshore	1.9	0.1	0.7	1.0	56.0	-16.7
	Northeast Fishery Sector V	1.8	0.1	0.4	1.3	70.7	-7.1
	Northeast Fishery Sector XII	1.3	0.1	0.3	0.9	67.8	-10.0
	Northeast Coastal Communities Sector	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.4	0.0	0.1	0.3	61.0	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.0	45.0	-100.0
1	Sustainable Harvest Sector	24.5	0.5	6.7	17.3	70.4	-2.8
	Northeast Fishery Sector II	14.3	0.3	3.7	10.3	71.7	-3.7

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	Northeast Fishery Sector VI	5.4	0.2	1.5	3.8	69.3	-5.0
	Northeast Fishery Sector XIII	5.5	0.2	2.0	3.4	61.4	-2.9
	Northeast Fishery Sector VIII	5.3	0.1	1.5	3.6	68.2	0.0
	Georges Bank Cod Fixed Gear Sector	4.9	0.1	0.8	3.9	81.1	-2.5
	Maine Coast Community Sector	2.7	0.1	0.7	1.9	69.3	0.0
	Northeast Fishery Sector XI	2.2	0.1	0.7	1.4	64.0	-6.7
	Sustainable Harvest Sector - Inshore	2.0	0.1	0.8	1.1	58.3	-8.3
	Northeast Fishery Sector V	1.8	0.1	0.4	1.3	74.1	-7.1
	Northeast Fishery Sector XII	1.4	0.1	0.4	0.9	69.3	-10.0
	Northeast Coastal Communities Sector	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.5	0.0	0.2	0.3	62.7	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.1	53.8	0.0
	Northeast Fishery Sector VII	C	C	C	C	C	0.0

Table 88. Expected static costs of monitoring under blended ASM and EM with 100% coverage, by days absent category (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	<=5	38	140	1.59	5.82	0.42	1.53	0.47	1.68
	>5, <=20	220	344	7.11	11.11	0.39	0.6	0.41	0.64
	>20, <=50	503	866	10.94	18.82	0.26	0.44	0.23	0.4
	>50, <=80	172	435	12.3	31.1	0.17	0.42	0.11	0.31
	>80, <=160	652	1,443	17.16	37.98	0.43	0.95	0.19	0.39
	>160	442	1,091	22.11	54.56	0.58	1.44	0.15	0.34
-	*TOTAL*	*2,029*	*4,320*	-	-	-	-	-	-
1	<=5	38	78	1.6	3.23	0.42	0.85	0.46	0.92
	>5, <=20	110	214	3.55	6.91	0.19	0.37	0.2	0.39
	>20, <=50	238	674	5.17	14.66	0.12	0.34	0.11	0.31
	>50, <=80	129	325	9.22	23.24	0.13	0.32	0.07	0.21
	>80, <=160	458	1,156	12.06	30.42	0.3	0.76	0.12	0.29
	>160	335	1,047	16.77	52.33	0.44	1.38	0.11	0.31
-	*TOTAL*	*1,309*	*3,494*	-	-	-	-	-	-

Table 89. Expected static costs of monitoring under blended ASM and EM with 100% coverage, by vessel home port (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	OTHER MA PORTS	198	404.4	9.43	19.26	0.35	0.72	0.25	0.48
	BOSTON	396.7	849.9	17.25	36.95	0.63	1.34	0.16	0.41
	CHATHAM	208.5	302.2	9.48	13.74	0.24	0.35	0.33	0.48
	GLOUCESTER	409.4	985.6	12.04	28.99	0.28	0.66	0.17	0.39
	NEW BEDFORD	220.7	521.5	16.98	40.12	0.7	1.65	0.14	0.33
	OTHER ME PORTS	120.3	209.5	9.25	16.11	0.25	0.44	0.21	0.36
	PORTLAND	116.6	271.8	12.96	30.2	0.8	1.86	0.18	0.41
	NH PORTS	131.7	275.8	10.97	22.98	0.22	0.47	0.18	0.4
	NY PORTS	48.3	69.8	9.65	13.96	0.25	0.37	0.3	0.43
	OTHER RI PORTS	23.2	52.2	7.73	17.41	1.45	3.26	0.33	0.93
	POINT JUDITH	125.3	286.2	7.37	16.84	0.2	0.46	0.19	0.41
	OTHER NORTHEAST	C	C	C	C	C	C	C	C
1	OTHER MA PORTS	108.5	286	5.17	13.62	0.19	0.51	0.12	0.33
	BOSTON	248.8	822	10.82	35.74	0.39	1.3	0.12	0.29
	CHATHAM	111	242.2	5.04	11.01	0.13	0.28	0.18	0.39
	GLOUCESTER	267.8	675.8	7.88	19.88	0.18	0.45	0.11	0.25
	NEW BEDFORD	222	416.9	17.08	32.07	0.7	1.32	0.14	0.26
	OTHER ME PORTS	52.3	173.4	4.02	13.34	0.11	0.37	0.08	0.31
	PORTLAND	75.1	278.7	8.34	30.96	0.51	1.91	0.11	0.4
	NH PORTS	80.8	243.6	6.73	20.3	0.14	0.41	0.11	0.31
	NY PORTS	21.7	62.6	4.34	12.51	0.11	0.33	0.13	0.39
	OTHER RI PORTS	15	38.3	5	12.77	0.94	2.39	0.27	0.68
	POINT JUDITH	79.2	170.2	4.66	10.01	0.13	0.27	0.1	0.26
	OTHER NORTHEAST	C	C	C	C	C	C	C	C

Table 90. Expected static costs of monitoring under blended ASM and EM with 100% coverage, by vessel size class (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
0	30'to<50'	815	1,509	8.95	16.58	0.23	0.43	0.24	0.44
	50'to<75'	665	1,427	12.32	26.42	0.39	0.83	0.18	0.40
	75'+	549	1,384	19.59	49.42	0.78	1.98	0.14	0.36
1	30'to<50'	446	1,110	4.91	12.19	0.13	0.32	0.13	0.31
	50'to<75'	395	1,211	7.31	22.43	0.23	0.70	0.10	0.31
	75'+	468	1,173	16.70	41.90	0.67	1.68	0.12	0.30

Table 91. Expected static costs of monitoring under blended ASM and EM with 100% coverage, by sector (91% coverage analyzed, 2018$, thousands. Low and high estimates are mean +/- one standard deviation, costs based on 3 year average for EM)

Subsidy	Sector	Fleet	Fleet	Vessel	Vessel	Trip	Trip	Day	Day
	Sustainable Harvest Sector	449.1	1041.5	18.71	43.39	0.78	1.8	0.16	0.37

Subsidy	Sector	Fleet	Fleet	Vessel	Vessel	Trip	Trip	Day	Day
0	Northeast Fishery Sector II	310.9	800.3	12.44	32.01	0.24	0.61	0.16	0.38
	Northeast Fishery Sector XIII	168	387	11.2	25.8	0.68	1.57	0.19	0.48
	Northeast Fishery Sector VI	157.9	357	22.56	51	1.1	2.5	0.19	0.42
	Georges Bank Cod Fixed Gear	200.4	285.8	10.02	14.29	0.25	0.36	0.34	0.48
	Northeast Fishery Sector XI	118.3	255.1	10.75	23.19	0.21	0.45	0.16	0.37
	Northeast Fishery Sector VIII	104.9	243.8	13.11	30.48	0.61	1.42	0.15	0.34
	Northeast Fishery Sector V	123.9	228.2	8.26	15.21	0.18	0.33	0.21	0.38
	Maine Coast Community Sector	135.9	203.4	9.06	13.56	0.4	0.6	0.29	0.46
	Sustainable Harvest Sector -	89.6	165.7	11.2	20.71	0.34	0.63	0.19	0.39
	Northeast Fishery Sector XII	53.6	159.5	7.65	22.79	0.14	0.41	0.14	0.44
	Northeast Fishery Sector III	57.2	89	7.15	11.12	0.34	0.53	0.41	0.65
	Northeast Fishery Sector X	33	56.8	4.72	8.12	0.42	0.72	0.5	0.88
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C
1	Sustainable Harvest Sector	314.3	985.8	13.1	41.07	0.54	1.71	0.11	0.33
	Northeast Fishery Sector II	216.2	553.8	8.65	22.15	0.16	0.42	0.1	0.26
	Northeast Fishery Sector VI	94.1	318.5	13.44	45.5	0.66	2.23	0.11	0.38
	Northeast Fishery Sector XIII	163.9	276.5	10.93	18.43	0.66	1.12	0.17	0.33
	Georges Bank Cod Fixed Gear	105.9	226.4	5.29	11.32	0.13	0.28	0.18	0.38
	Northeast Fishery Sector XI	73.8	216.8	6.71	19.71	0.13	0.38	0.1	0.27
	Northeast Fishery Sector VIII	82.8	207.7	10.35	25.96	0.48	1.21	0.11	0.29
	Maine Coast Community Sector	60.9	204.3	4.06	13.62	0.18	0.6	0.13	0.39
	Northeast Fishery Sector V	61.8	160.5	4.12	10.7	0.09	0.23	0.1	0.28
	Sustainable Harvest Sector -	41.1	137.8	5.14	17.23	0.16	0.52	0.09	0.32
	Northeast Fishery Sector XII	39.2	77	5.6	11	0.1	0.2	0.11	0.21
	Northeast Coastal Communities	C	C	C	C	C	C	C	C
	Northeast Fishery Sector III	27.9	44.7	3.49	5.59	0.17	0.27	0.2	0.33
	Northeast Fishery Sector X	18.9	31.6	2.69	4.51	0.24	0.4	0.28	0.49
	Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 92. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage, aggregate fleet totals by days absent category (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	<=5	0.2	0.0	0.0	0.1	47.7	0.0
	>5, <=20	1.7	0.2	0.4	1.1	62.3	-15.4
	>20, <=50	7.7	0.7	2.1	4.9	63.6	-12.5
	>50, <=80	6.1	0.3	2.1	3.7	60.0	-9.8
	>80, <=160	28.1	1.1	7.5	19.6	69.6	-3.4
	>160	28.5	0.8	7.3	20.4	71.5	2.5
	TOTAL	*72.3*	*3.1*	*19.4*	*49.8*	*68.9*	*-2.4*
1	<=5	0.2	0.0	0.0	0.1	53.3	0.0

Subsidy	Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	>5, <=20	1.7	0.1	0.4	1.1	65.3	-15.4
	>20, <=50	7.8	0.4	2.2	5.1	65.9	-8.9
	>50, <=80	6.4	0.2	2.2	4.0	62.6	-2.4
	>80, <=160	27.8	0.9	7.4	19.5	70.1	-3.9
	>160	27.1	0.6	7.2	19.3	71.3	-3.0
	TOTAL	*71.0*	*2.2*	*19.4*	*49.1*	*69.2*	*-3.7*

Table 93. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage, aggregate fleet totals by vessel home port (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	CT PORTS	0.2	0.0	0.0	0.1	76.6	0.0
	OTHER MA PORTS	5.7	0.3	1.8	3.7	63.7	-5.1
	BOSTON	17.1	0.6	4.7	11.8	68.9	0.0
	CHATHAM	4.9	0.3	0.8	3.8	78.0	-5.0
	GLOUCESTER	16.2	0.6	4.3	11.3	69.7	-5.8
	NEW BEDFORD	12.1	0.4	3.6	8.0	66.8	1.3
0	OTHER ME PORTS	2.1	0.2	0.7	1.2	59.8	-14.3
	PORTLAND	5.5	0.2	1.6	3.7	67.4	-7.5
	NH PORTS	2.2	0.2	0.7	1.3	59.9	-13.3
	NY PORTS	0.6	0.1	0.1	0.5	79.1	0.0
	OTHER RI PORTS	0.2	0.0	0.1	0.1	51.6	-66.7
	POINT JUDITH	2.3	0.2	0.6	1.5	65.0	-16.7
	OTHER NORTHEAST PORTS	C	C	C	C	C	0.0
	CT PORTS	0.2	0.0	0.0	0.2	76.5	100.0
	OTHER MA PORTS	5.7	0.2	1.8	3.6	64.3	-7.7
	BOSTON	16.3	0.5	4.5	11.2	69.0	-5.1
	CHATHAM	4.8	0.2	0.8	3.8	79.7	-5.0
	GLOUCESTER	16.1	0.5	4.3	11.3	70.2	-5.8
	NEW BEDFORD	12.0	0.3	3.7	8.0	66.4	1.3
1	OTHER ME PORTS	2.1	0.1	0.7	1.3	62.5	-7.1
	PORTLAND	5.5	0.2	1.6	3.8	68.4	-5.0
	NH PORTS	2.1	0.1	0.6	1.3	62.5	-13.3
	NY PORTS	0.6	0.0	0.1	0.5	83.1	0.0
	OTHER RI PORTS	0.3	0.0	0.1	0.2	56.1	-33.3
	POINT JUDITH	2.3	0.1	0.6	1.6	69.2	-11.1
	OTHER NORTHEAST PORTS	C	C	C	C	C	0.0

Table 94. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage, aggregate fleet totals by vessel size class (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	30'to<50'	14.5	1.1	3.5	9.9	68.0	-10.0
	50'to<75'	24.4	1.0	6.1	17.3	70.8	-0.6
	75'+	33.3	1.0	9.9	22.5	67.4	-1.7
1	30'to<50'	14.5	0.8	3.6	10.2	70.1	-7.3
	50'to<75'	23.3	0.7	5.9	16.7	71.7	-4.0
	75'+	33.1	0.9	10.0	22.2	67.2	-3.1

Table 95. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage, aggregate fleet totals by sector (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
0	Sustainable Harvest Sector	25.8	0.8	7.0	18.1	70.1	1.7
	Northeast Fishery Sector II	14.4	0.5	3.6	10.2	71.0	-4.7
	Northeast Fishery Sector VI	5.7	0.2	1.6	3.9	68.1	-2.5
	Northeast Fishery Sector XIII	5.3	0.3	1.9	3.1	59.7	-11.4
	Northeast Fishery Sector VIII	5.3	0.2	1.6	3.6	67.2	0.0
	Georges Bank Cod Fixed Gear Sector	4.9	0.3	0.8	3.9	78.9	-2.5
	Maine Coast Community Sector	2.7	0.2	0.7	1.7	65.9	-10.5
	Northeast Fishery Sector XI	2.2	0.2	0.7	1.3	60.4	-13.3
	Sustainable Harvest Sector - Inshore	1.9	0.1	0.7	1.0	55.2	-16.7
	Northeast Fishery Sector V	1.8	0.2	0.4	1.2	68.9	-14.3
	Northeast Fishery Sector XII	1.4	0.1	0.4	0.9	66.5	-10.0
	Northeast Coastal Communities	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.4	0.0	0.1	0.3	61.2	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.0	45.6	-100.0
	Sustainable Harvest Sector	24.7	0.6	6.8	17.3	69.8	-2.8
1	Northeast Fishery Sector II	14.3	0.4	3.7	10.2	71.4	-4.7
	Northeast Fishery Sector VI	5.5	0.2	1.5	3.8	69.1	-5.0
	Northeast Fishery Sector XIII	5.4	0.2	1.9	3.3	60.5	-5.7
	Northeast Fishery Sector VIII	5.4	0.2	1.6	3.7	67.8	2.8
	Georges Bank Cod Fixed Gear Sector	4.8	0.2	0.8	3.9	80.3	-2.5
	Maine Coast Community Sector	2.6	0.1	0.7	1.8	68.2	-5.3
	Northeast Fishery Sector XI	2.1	0.1	0.6	1.3	63.5	-13.3
	Sustainable Harvest Sector - Inshore	1.8	0.1	0.7	1.1	57.4	-8.3
	Northeast Fishery Sector V	1.8	0.1	0.4	1.3	73.5	-7.1
	Northeast Fishery Sector XII	1.3	0.1	0.3	0.9	68.3	-10.0
	Northeast Coastal Communities	C	C	C	C	C	0.0

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	Northeast Fishery Sector III	0.5	0.0	0.2	0.3	62.1	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.1	51.7	0.0

Compliance and Enforceability

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 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.

For the **maximized retention model**, if cameras are situated and video recorded at sufficiently high resolution as to provide full coverage of operations, video footage 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.

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

Sector costs and fishery impacts (Stand-alone Static costs)

This option would allow the Audit Model as an EM alternative to ASM. Vessels or sectors will opt in to the audit model based on its cost and their individual preference for EM in place of ASM. Costs are estimated as if every vessel were to opt into the Audit Model program. This is will not happen; vessels participating lightly in the groundfish fishery will likely opt to employ human observers at substantially lower cost. These cost estimates are presented for context alone.

EM under this option will cost between $4.9 and $6.5 million across the groundfish fleet during the first year if equipment and installation costs are not subsidized. Assuming subsidized equipment and installation costs results in a decline in year 1 EM costs to between $2.2 million and $3.1 million. EM costs are estimated to be between $1.5 to $2.5 million each year for the 2nd and 3rd year. Costs are lower in the 2nd and 3rd year as it is assumed that all equipment and installation costs are either paid by vessels or subsidized in year 1. If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Annual vessel costs increase as groundfish participation increases, but costs per day absent are considerably higher for vessels that participate lightly. For example, vessel costs in the first year for those that fish between 80 and 160 days are estimated to be about 1 ½ times more than those that fish between 20 and 50 days, relative to ASM. Yet, vessel costs per day absent for vessels that fish between 20 and 50 days are almost 3 times higher than for those that fish between 80 and 160 days in the first year. Vessel costs per day absent decline significantly across all vessels in the 2nd and 3rd year as equipment and installation costs are assumed to be paid during year 1.

Total EM costs are highest for vessels with home ports in Gloucester and Boston and lowest for vessels with home ports in Connecticut and New York ports. EM costs by vessel, however, are highest in New Bedford and Boston ports and lowest in Point Judith and NY ports.

The Sustainable Harvest Sector and Northeast Fishery Sector II have the highest total EM costs while Northeast Fishery Sector X and Northeast Fishery Sector XII have the lowest total EM costs. The highest costs per vessel are from Northeast Fishery Sector VI and the lowest belong to Northeast Fishery Sector X. In terms of costs per day absent, Northeast Fishery Sector X is the highest and Northeast Fishery Sector VI is the lowest.

Table 96. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	424	560	17.69	23.31	8.9	11.73	9.12	12.02
>5, <=20	623	822	19.48	25.67	1.98	2.62	1.68	2.21
>20, <=50	1,167	1,539	23.82	31.4	1.14	1.5	0.79	1.04
>50, <=80	409	539	27.27	35.94	0.89	1.17	0.54	0.71
>80, <=160	1,312	1,729	34.53	45.51	1.27	1.68	0.27	0.35
>160	C	1,317	47.57	62.7	1.4	1.85	0.22	0.29
TOTAL	*4,935*	*6,505*	-	-	-	-	-	-

Table 97. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	46.9	62.1	23.46	31.07	0.94	1.25	4.24	5.62
OTHER MA PORTS	528.2	699.7	24.01	31.81	2.66	3.53	3.91	5.18
BOSTON	895.6	1186.4	38.94	51.58	3.25	4.31	1.42	1.88
CHATHAM	505.6	669.7	20.22	26.79	1.27	1.68	1.94	2.57
GLOUCESTER	899	1190.8	26.44	35.02	0.95	1.25	0.61	0.81
NEW BEDFORD	533.3	706.5	41.02	54.34	3.51	4.64	0.88	1.16
OTHER ME PORTS	271.2	359.3	20.86	27.64	2.21	2.93	1.3	1.72
PORTLAND	282.3	373.9	31.37	41.55	4.4	5.83	2.47	3.27
NH PORTS	356.4	472	29.7	39.34	1.35	1.78	1.17	1.55
NY PORTS	104.3	138.2	20.86	27.63	3.85	5.1	5.1	6.76
OTHER RI PORTS	101.8	134.9	33.95	44.97	6.94	9.2	2.24	2.97
POINT JUDITH	354.5	469.6	20.85	27.62	3.08	4.09	2.36	3.13
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 98. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	2,115	2,797	21.81	28.83	1.90	2.51	2.29	3.02
50'to<75'	1,588	2,100	29.41	38.89	3.09	4.08	1.83	2.42
75'+	1,223	1,617	43.67	57.74	2.60	3.43	0.47	0.63
TOTAL	4,927	6,513	NA	NA	NA	NA	NA	NA

Table 99. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	885	1368.4	36.87	57.02	2.32	3.59	0.72	1.12
Northeast Fishery Sector II	608.4	940.7	24.34	37.63	0.75	1.17	0.43	0.66
Georges Bank Cod Fixed Gear Sector	450.1	696	18.76	29	0.83	1.28	1.9	2.94
Northeast Fishery Sector XIII	436.9	675.6	29.13	45.04	4.37	6.76	1.55	2.39
Northeast Fishery Sector VI	329.4	509.2	47.05	72.75	3.04	4.71	0.22	0.35
Northeast Fishery Sector XI	296.9	459.1	26.99	41.74	1.29	2	1.11	1.71
Maine Coast Community Sector	287.9	445.2	19.19	29.68	3.07	4.74	1.99	3.08
Northeast Fishery Sector V	277.7	429.4	18.52	28.63	2.88	4.46	3	4.63
Northeast Fishery Sector VIII	228.6	353.5	28.58	44.19	1.23	1.91	0.52	0.8
Sustainable Harvest Sector - Inshore	196.6	304	24.58	38	2	3.09	1.4	2.17
Northeast Fishery Sector III	176.7	273.3	17.67	27.33	0.99	1.53	1.78	2.75
Northeast Fishery Sector XII	132.7	205.1	18.95	29.31	2.57	3.97	3.73	5.77
Northeast Fishery Sector X	118	182.4	16.85	26.05	4.37	6.76	7.63	11.8
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 100. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model and assuming subsidized equipment and installation costs, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	70	99	2.92	4.11	1.37	1.93	1.4	1.97
>5, <=20	152	214	4.76	6.7	0.5	0.7	0.4	0.57
>20, <=50	433	610	8.84	12.44	0.57	0.8	0.23	0.33
>50, <=80	181	255	12.06	16.98	0.42	0.59	0.22	0.3
>80, <=160	724	1,019	19.04	26.81	0.75	1.05	0.12	0.17
>160	663	933	31.56	44.43	0.95	1.34	0.11	0.16
TOTAL	*2,222*	*3,129*	-	-	-	-	-	-

Table 101. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model and assuming subsidized equipment and installation costs, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	15.7	25.1	7.84	12.57	0.32	0.52	1.39	2.23
OTHER MA PORTS	184.8	296.4	8.4	13.47	0.6	0.96	0.65	1.05
BOSTON	497	797	21.61	34.65	1.47	2.36	0.29	0.46
CHATHAM	130.1	208.6	5.2	8.35	0.21	0.34	0.39	0.63
GLOUCESTER	358.8	575.4	10.55	16.92	0.35	0.56	0.14	0.22
NEW BEDFORD	304.2	487.9	23.4	37.53	1.16	1.86	0.21	0.33
OTHER ME PORTS	73.8	118.3	5.68	9.1	0.42	0.68	0.26	0.42
PORTLAND	133.9	214.8	14.88	23.87	1.16	1.86	0.39	0.63
NH PORTS	161.7	259.3	13.47	21.61	0.42	0.68	0.26	0.42
NY PORTS	27.4	43.9	5.48	8.79	0.57	0.92	0.75	1.2
OTHER RI PORTS	51.1	82	17.05	27.35	2.7	4.34	0.73	1.17
POINT JUDITH	92.5	148.4	5.44	8.73	0.52	0.83	0.37	0.59
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 102. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model and assuming subsidized equipment and installation costs, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	655	989	6.75	10.20	0.38	0.58	0.44	0.67
50'to<75'	731	1,104	13.54	20.45	0.90	1.35	0.33	0.50
75'+	746	1,126	26.63	40.23	1.44	2.17	0.16	0.25

Table 103. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of an Audit model and assuming subsidized equipment and installation costs, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	614.4	814.4	25.6	33.93	1.2	1.59	0.19	0.25
Northeast Fishery Sector II	299.2	396.6	11.97	15.86	0.36	0.48	0.13	0.17
Northeast Fishery Sector VI	257.2	340.9	36.74	48.7	2.44	3.23	0.18	0.24
Northeast Fishery Sector XIII	256.3	339.7	17.09	22.65	1.81	2.4	0.43	0.57
Northeast Fishery Sector XI	164.7	218.3	14.97	19.85	0.49	0.65	0.29	0.38
Georges Bank Cod Fixed Gear Sector	146.4	194.1	6.1	8.09	0.2	0.27	0.49	0.65
Northeast Fishery Sector VIII	132.1	175.1	16.51	21.88	0.66	0.87	0.21	0.27
Maine Coast Community Sector	99.1	131.3	6.61	8.76	0.65	0.86	0.41	0.54
Sustainable Harvest Sector - Inshore	98.5	130.6	12.31	16.32	0.71	0.94	0.36	0.48
Northeast Fishery Sector V	83	110.1	5.53	7.34	0.53	0.7	0.55	0.73
Northeast Fishery Sector III	49.4	65.5	4.94	6.55	0.26	0.34	0.54	0.71
Northeast Fishery Sector XII	42.8	56.8	6.12	8.11	0.48	0.63	0.74	0.98
Northeast Fishery Sector X	27.6	36.6	3.94	5.22	0.81	1.08	1.36	1.8
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 104. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of an Audit model, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	62	102	2.57	4.27	1.21	2.01	1.24	2.06
>5, <=20	120	200	3.76	6.24	0.38	0.63	0.31	0.52
>20, <=50	316	525	6.45	10.72	0.36	0.6	0.19	0.32
>50, <=80	133	221	8.86	14.72	0.28	0.47	0.14	0.24
>80, <=160	478	794	12.58	20.9	0.47	0.77	0.09	0.14
>160	403	670	19.19	31.89	0.57	0.95	0.08	0.13
TOTAL	*1,512*	*2,512*	-	-	-	-	-	-

Table 105. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of an Audit model, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	12.7	16.9	6.33	8.42	0.25	0.34	1.14	1.52
OTHER MA PORTS	152.5	203	6.93	9.23	0.54	0.72	0.67	0.89
BOSTON	379.9	505.6	16.52	21.98	1.14	1.52	0.28	0.37
CHATHAM	141.6	188.5	5.66	7.54	0.23	0.31	0.43	0.57
GLOUCESTER	313.2	416.8	9.21	12.26	0.3	0.4	0.14	0.19
NEW BEDFORD	243.7	324.2	18.74	24.94	0.99	1.32	0.19	0.25
OTHER ME PORTS	75.8	100.9	5.83	7.76	0.44	0.58	0.26	0.35
PORTLAND	106.3	141.4	11.81	15.72	1.02	1.35	0.42	0.56
NH PORTS	125.4	166.9	10.45	13.91	0.35	0.46	0.24	0.32
NY PORTS	25.5	34	5.1	6.79	0.61	0.81	0.8	1.07
OTHER RI PORTS	38.7	51.5	12.9	17.17	2.15	2.86	0.59	0.79
POINT JUDITH	92.6	123.2	5.45	7.25	0.55	0.74	0.41	0.54
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 106. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of an Audit model, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	595	806	6.13	8.31	0.36	0.49	0.44	0.59
50'to<75'	568	770	10.52	14.26	0.75	1.01	0.33	0.44
75'+	545	739	19.47	26.38	1.04	1.41	0.13	0.17

Table 107. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of an Audit model, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	389.3	563.9	16.22	23.49	0.79	1.15	0.15	0.21
Northeast Fishery Sector II	227.2	329.1	9.09	13.17	0.27	0.39	0.11	0.16
Northeast Fishery Sector XIII	169.3	245.2	11.29	16.35	1.28	1.85	0.34	0.49
Northeast Fishery Sector VI	160.6	232.6	22.94	33.23	1.5	2.17	0.11	0.16
Georges Bank Cod Fixed Gear Sector	132.8	192.4	5.53	8.02	0.17	0.25	0.44	0.64
Northeast Fishery Sector XI	111.6	161.6	10.15	14.69	0.34	0.5	0.24	0.34
Northeast Fishery Sector VIII	103.7	150.1	12.96	18.76	0.51	0.73	0.16	0.23
Maine Coast Community Sector	84	121.7	5.6	8.11	0.59	0.86	0.37	0.54
Northeast Fishery Sector V	72.9	105.5	4.86	7.04	0.49	0.71	0.51	0.73
Sustainable Harvest Sector - Inshore	66.7	96.6	8.34	12.08	0.51	0.74	0.3	0.43
Northeast Fishery Sector III	41.7	60.4	4.17	6.04	0.22	0.32	0.43	0.62
Northeast Fishery Sector XII	39.6	57.4	5.66	8.2	0.44	0.64	0.69	1
Northeast Fishery Sector X	23.2	33.6	3.31	4.8	0.73	1.06	1.24	1.8
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 108. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of an Audit model, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	62	102	2.57	4.27	1.21	2.01	1.24	2.06
>5, <=20	120	200	3.76	6.24	0.38	0.63	0.31	0.52
>20, <=50	316	525	6.45	10.72	0.36	0.6	0.19	0.32
>50, <=80	133	221	8.86	14.72	0.28	0.47	0.14	0.24
>80, <=160	478	794	12.58	20.9	0.47	0.77	0.09	0.14
>160	403	670	19.19	31.89	0.57	0.95	0.08	0.13
TOTAL	*1,512*	*2,512*	-	-	-	-	-	-

Table 109. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of an Audit model, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	8	11.8	4.02	5.91	0.16	0.24	0.73	1.07
OTHER MA PORTS	99.3	146.1	4.52	6.64	0.42	0.61	0.57	0.84
BOSTON	194.9	286.6	8.47	12.46	0.64	0.94	0.23	0.33
CHATHAM	89.7	132	3.59	5.28	0.2	0.29	0.32	0.46
GLOUCESTER	192.2	282.7	5.65	8.31	0.2	0.29	0.11	0.16
NEW BEDFORD	122.9	180.8	9.46	13.91	0.64	0.94	0.14	0.21
OTHER ME PORTS	51.8	76.1	3.98	5.85	0.37	0.54	0.22	0.32
PORTLAND	60.2	88.6	6.69	9.84	0.74	1.09	0.37	0.55
NH PORTS	71.9	105.8	6	8.82	0.23	0.34	0.18	0.27
NY PORTS	17.2	25.4	3.45	5.07	0.55	0.8	0.72	1.06
OTHER RI PORTS	20.4	30	6.8	10	1.27	1.86	0.38	0.55
POINT JUDITH	61.3	90.2	3.61	5.31	0.48	0.7	0.36	0.52
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 110. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of an Audit model, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	386	583	3.98	6.01	0.30	0.45	0.35	0.53
50'to<75'	314	474	5.82	8.78	0.51	0.78	0.27	0.41
75'+	284	428	10.13	15.30	0.55	0.83	0.08	0.12

Table 111. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of an Audit model, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	207.8	338.5	8.66	14.11	0.47	0.76	0.12	0.19
Northeast Fishery Sector II	134.6	219.2	5.38	8.77	0.17	0.27	0.08	0.13
Northeast Fishery Sector XIII	92	149.9	6.14	10	0.82	1.34	0.26	0.43
Georges Bank Cod Fixed Gear Sector	82.3	134	3.43	5.58	0.13	0.21	0.31	0.51
Northeast Fishery Sector VI	76.3	124.4	10.91	17.77	0.7	1.13	0.05	0.08
Northeast Fishery Sector XI	62.7	102.2	5.7	9.29	0.23	0.37	0.18	0.29
Maine Coast Community Sector	57.4	93.5	3.83	6.24	0.51	0.83	0.33	0.53
Northeast Fishery Sector VIII	53.7	87.4	6.71	10.93	0.27	0.45	0.11	0.18
Northeast Fishery Sector V	47.8	77.8	3.19	5.19	0.43	0.7	0.44	0.72
Sustainable Harvest Sector - Inshore	37.3	60.8	4.67	7.6	0.34	0.56	0.23	0.37
Northeast Fishery Sector III	31.3	51	3.13	5.1	0.18	0.29	0.32	0.52
Northeast Fishery Sector XII	23.9	39	3.42	5.57	0.38	0.62	0.57	0.93
Northeast Fishery Sector X	19.9	32.5	2.85	4.64	0.66	1.07	1.13	1.84
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Compliance and Enforceability

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.

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

Sector costs and fishery impacts (Stand-alone static costs)

This option would allow the Maximized Retention model as an EM alternative to ASM. Vessels or sectors will opt in to the MaxRet program based on it's cost and their individual preference for EM in place of ASM. Costs are estimated as if every vessel were to opt into the MaxRet program. This is will not happen; vessels participating lightly in the groundfish fishery will likely opt to employ human observers at substantially lower cost. These cost estimates are presented for context alone.

EM under this option will cost between $3.9 and $6.5 million across the groundfish fleet during the first year if equipment and installation costs are not subsidized. Assuming subsidized equipment and installation costs results in a decline in year 1 EM costs to between $2.2 million and $3.1 million. EM costs are estimated to be between $1.7 to $2.6 million each year for the 2nd and 3rd year. Costs are lower in the 2nd and 3rd year as it is assumed that all equipment and installation costs are either paid by vessels or subsidized in year 1. If additional monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Annual vessel costs increase as groundfish participation increases, but costs per day absent are considerably higher for vessels that participate lightly. For example, vessel costs in the first year for those that fish between 80 and 160 days are estimated to be about 3 1/2 times more than those that fish between

5 and 20 days. Yet, vessel costs per day absent for vessels that fish between 5 and 20 days are over 3 times higher than for those that fish between 80 and 160 days in the first year. Vessel costs per day absent decline significantly across all vessels in the 2nd and 3rd year as equipment and installation costs are assumed to be paid during year 1.

Total EM costs are highest for vessels with home ports in Gloucester and Boston and lowest for vessels with home ports in Connecticut and Rhode Island ports other than Point Judith. EM costs by vessel, however, are highest in New Bedford and Boston ports and lowest in Connecticut and Point Judith ports.

The Sustainable Harvest Sector and Northeast Fishery Sector II have the highest total EM costs while Northeast Fishery Sector X and Northeast Fishery Sector XII have the lowest total EM costs. The highest costs per vessel are from the Sustainable Harvest Sector and the lowest belong to Northeast Fishery Sector X. In terms of costs per day absent, Northeast Fishery Sector X is the highest and Northeast Fishery Sector VI is the lowest.

Table 112. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	386	632	16.1	26.35	8.33	13.63	8.55	14
>5, <=20	532	871	16.63	27.22	1.65	2.7	1.42	2.32
>20, <=50	930	1,522	18.98	31.06	0.72	1.17	0.69	1.13
>50, <=80	356	583	23.75	38.88	0.75	1.22	0.42	0.69
>80, <=160	1,036	1,696	27.27	44.64	0.93	1.52	0.22	0.35
>160	699	1,144	33.27	54.46	0.96	1.58	0.18	0.29
TOTAL	*3,940*	*6,449*	-	-	-	-	-	-

Table 113. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	44.5	51.2	22.24	25.61	0.88	1.02	4.07	4.68
OTHER MA PORTS	527.8	607.9	23.99	27.63	2.93	3.37	4.5	5.18
BOSTON	759.5	874.8	33.02	38.04	2.81	3.24	1.59	1.83
CHATHAM	582.3	670.7	23.29	26.83	1.38	1.6	2.16	2.49
GLOUCESTER	965.1	1111.6	28.39	32.69	0.98	1.13	0.66	0.76
NEW BEDFORD	450.4	518.8	34.65	39.91	3.53	4.07	0.93	1.08
OTHER ME PORTS	292.9	337.4	22.53	25.95	2.37	2.72	1.39	1.6
PORTLAND	279.2	321.6	31.02	35.73	5.13	5.91	3.05	3.52
NH PORTS	298.7	344	24.89	28.67	1.32	1.52	1.26	1.45
NY PORTS	113.1	130.2	22.62	26.05	4.29	4.94	5.69	6.55
OTHER RI PORTS	69	79.4	22.99	26.48	5.62	6.47	1.97	2.27
POINT JUDITH	382.3	440.3	22.49	25.9	3.33	3.83	2.58	2.97
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 114. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	1.866	2.927	19.24	30.17	1.77	2.78	2.16	3.39
50'to<75'	1,250	1,960	23.14	36.30	2.59	4.07	1.68	2.64
75'+	929	1,457	33.18	52.04	1.85	2.90	0.37	0.58

Table 115. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	740.3	1200.4	30.85	50.02	2.21	3.58	0.81	1.31
Northeast Fishery Sector II	615.3	997.7	24.61	39.91	0.73	1.19	0.42	0.68
Georges Bank Cod Fixed Gear Sector	466.2	756	19.43	31.5	0.84	1.36	1.94	3.14
Northeast Fishery Sector XIII	321	520.4	21.4	34.7	3.51	5.68	1.4	2.27
Northeast Fishery Sector V	276.4	448.2	18.43	29.88	2.86	4.64	2.98	4.83
Maine Coast Community Sector	270.2	438.1	18.01	29.2	2.95	4.79	1.92	3.12
Northeast Fishery Sector XI	229.2	371.6	20.84	33.79	1.15	1.86	1.09	1.77
Northeast Fishery Sector VI	210.1	340.7	30.01	48.67	1.73	2.8	0.13	0.2
Northeast Fishery Sector VIII	202.2	327.9	25.28	40.99	1.07	1.74	0.49	0.79
Northeast Fishery Sector III	163.6	265.3	16.36	26.53	0.93	1.51	1.62	2.63
Sustainable Harvest Sector - Inshore	158.6	257.2	19.83	32.15	1.73	2.81	1.31	2.13
Northeast Fishery Sector XII	137.6	223.1	19.66	31.88	2.75	4.46	3.91	6.34
Northeast Fishery Sector X	114.4	185.4	16.34	26.49	4.56	7.4	8.07	13.08
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 116. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring and assuming subsidized equipment and installation costs, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	81	123	3.36	5.12	1.83	2.79	1.89	2.88
>5, <=20	129	196	4.02	6.13	0.37	0.57	0.32	0.49
>20, <=50	313	476	6.38	9.72	0.24	0.37	0.22	0.33
>50, <=80	169	258	11.28	17.19	0.37	0.56	0.16	0.24
>80, <=160	568	866	14.94	22.78	0.51	0.78	0.1	0.15
>160	445	678	21.17	32.27	0.63	0.96	0.09	0.14
TOTAL	*1,704*	*2,597*	-	-	-	-	-	-

Table 117. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring and assuming subsidized equipment and installation costs, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	11.8	15.6	5.92	7.8	0.24	0.31	1.08	1.42
OTHER MA PORTS	167.7	221.1	7.62	10.05	0.72	0.95	0.99	1.3
BOSTON	365	481.3	15.87	20.93	1.01	1.33	0.38	0.5
CHATHAM	179.7	236.8	7.19	9.47	0.25	0.33	0.5	0.67
GLOUCESTER	397.3	523.8	11.69	15.41	0.36	0.47	0.15	0.2
NEW BEDFORD	225	296.6	17.31	22.82	1.07	1.41	0.22	0.29
OTHER ME PORTS	82.8	109.1	6.37	8.39	0.45	0.59	0.27	0.36
PORTLAND	126.5	166.8	14.05	18.53	1.65	2.18	0.8	1.05
NH PORTS	101.5	133.8	8.45	11.15	0.35	0.46	0.29	0.38
NY PORTS	31.1	41	6.23	8.21	0.76	1.01	1	1.32
OTHER RI PORTS	19.3	25.5	6.44	8.49	1.29	1.7	0.4	0.53
POINT JUDITH	103.3	136.2	6.08	8.01	0.58	0.76	0.44	0.58
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 118. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring and assuming subsidized equipment and installation costs, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	646	880	6.65	9.07	0.47	0.64	0.57	0.78
50'to<75'	574	782	10.63	14.49	0.74	1.01	0.38	0.52
75'+	600	818	21.45	29.22	0.98	1.34	0.11	0.15

Table 119. Estimated static costs of monitoring in Year 1 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring and assuming subsidized equipment and installation costs, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	467.3	648.8	19.47	27.03	1.12	1.55	0.3	0.41
Northeast Fishery Sector II	318	441.5	12.72	17.66	0.35	0.49	0.13	0.18
Georges Bank Cod Fixed Gear Sector	174.5	242.2	7.27	10.09	0.23	0.32	0.58	0.8
Northeast Fishery Sector XIII	136	188.8	9.07	12.59	0.95	1.32	0.31	0.43
Northeast Fishery Sector VI	129.9	180.3	18.56	25.76	1.03	1.42	0.07	0.1
Northeast Fishery Sector VIII	106.8	148.3	13.35	18.54	0.5	0.69	0.19	0.26
Northeast Fishery Sector XI	95.4	132.4	8.67	12.04	0.36	0.49	0.3	0.41
Northeast Fishery Sector V	88.1	122.3	5.88	8.16	0.58	0.8	0.61	0.85
Maine Coast Community Sector	86.1	119.5	5.74	7.97	0.6	0.84	0.39	0.54
Sustainable Harvest Sector - Inshore	60.4	83.9	7.55	10.48	0.46	0.64	0.3	0.41
Northeast Fishery Sector XII	51.3	71.2	7.33	10.18	0.74	1.03	1.04	1.44
Northeast Fishery Sector III	39.3	54.5	3.93	5.45	0.21	0.29	0.41	0.56
Northeast Fishery Sector X	26.6	37	3.81	5.28	1.14	1.59	2.04	2.83
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 120. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	77	127	3.21	5.27	1.75	2.87	1.81	2.97
>5, <=20	123	202	3.84	6.32	0.36	0.59	0.31	0.51
>20, <=50	298	490	6.09	10.01	0.23	0.38	0.21	0.34
>50, <=80	162	266	10.77	17.7	0.35	0.57	0.15	0.24
>80, <=160	542	891	14.27	23.45	0.49	0.8	0.09	0.15
>160	425	698	20.22	33.22	0.6	0.99	0.09	0.15
TOTAL	*1,627*	*2,673*	-	-	-	-	-	-

Table 121. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	11.7	15.8	5.82	7.9	0.23	0.32	1.06	1.44
OTHER MA PORTS	165	223.8	7.5	10.18	0.71	0.96	0.97	1.32
BOSTON	359.1	487.2	15.61	21.18	0.99	1.34	0.37	0.5
CHATHAM	176.7	239.8	7.07	9.59	0.25	0.34	0.5	0.67
GLOUCESTER	390.9	530.3	11.5	15.6	0.35	0.47	0.15	0.2
NEW BEDFORD	221.3	300.3	17.03	23.1	1.05	1.43	0.22	0.29
OTHER ME PORTS	81.4	110.5	6.26	8.5	0.44	0.6	0.27	0.37
PORTLAND	124.4	168.8	13.83	18.76	1.63	2.21	0.78	1.06
NH PORTS	99.8	135.4	8.32	11.28	0.34	0.46	0.29	0.39
NY PORTS	30.6	41.5	6.13	8.31	0.75	1.02	0.99	1.34
OTHER RI PORTS	19	25.8	6.34	8.6	1.27	1.72	0.39	0.54
POINT JUDITH	101.6	137.9	5.98	8.11	0.57	0.77	0.43	0.59
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 122. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	622	903	6.41	9.31	0.45	0.66	0.55	0.80
50'to<75'	553	804	10.24	14.88	0.71	1.04	0.37	0.54
75'+	578	840	20.66	30.01	0.95	1.38	0.11	0.16

Table 123. Estimated static costs of monitoring in Year 2 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	503.9	612.2	21	25.51	1.2	1.46	0.32	0.39
Northeast Fishery Sector II	342.9	416.6	13.72	16.66	0.38	0.46	0.14	0.17
Georges Bank Cod Fixed Gear Sector	188.1	228.5	7.84	9.52	0.25	0.31	0.62	0.76
Northeast Fishery Sector XIII	146.7	178.2	9.78	11.88	1.02	1.24	0.33	0.4
Northeast Fishery Sector VI	140.1	170.2	20.01	24.31	1.11	1.34	0.08	0.1
Northeast Fishery Sector VIII	115.2	139.9	14.4	17.49	0.54	0.65	0.2	0.24
Northeast Fishery Sector XI	102.8	124.9	9.35	11.36	0.38	0.47	0.32	0.39
Northeast Fishery Sector V	95	115.5	6.34	7.7	0.62	0.76	0.66	0.8
Maine Coast Community Sector	92.8	112.7	6.19	7.52	0.65	0.79	0.42	0.51
Sustainable Harvest Sector - Inshore	65.2	79.1	8.14	9.89	0.5	0.6	0.32	0.39
Northeast Fishery Sector XII	55.3	67.2	7.9	9.6	0.8	0.97	1.12	1.36
Northeast Fishery Sector III	42.4	51.4	4.23	5.14	0.23	0.28	0.44	0.53
Northeast Fishery Sector X	28.7	34.9	4.1	4.98	1.23	1.5	2.2	2.67
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Table 124. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by days absent category (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Cat	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
<=5	83	118	3.45	4.91	1.89	2.69	1.96	2.78
>5, <=20	122	174	3.82	5.43	0.36	0.51	0.31	0.43
>20, <=50	272	387	5.55	7.89	0.2	0.29	0.19	0.27
>50, <=80	144	205	9.62	13.67	0.32	0.46	0.13	0.19
>80, <=160	488	693	12.84	18.25	0.44	0.62	0.08	0.12
>160	394	559	18.74	26.63	0.56	0.8	0.08	0.11
TOTAL	*1,503*	*2,136*	-	-	-	-	-	-

Table 125. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by vessel home port (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Home Port	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
CT PORTS	9.6	13.1	4.81	6.57	0.19	0.26	0.87	1.19
OTHER MA PORTS	145.1	198.3	6.6	9.01	0.67	0.91	0.94	1.28
BOSTON	296.4	404.9	12.88	17.61	0.84	1.15	0.35	0.48
CHATHAM	147.5	201.6	5.9	8.06	0.23	0.31	0.43	0.59
GLOUCESTER	332.5	454.3	9.78	13.36	0.3	0.41	0.13	0.18
NEW BEDFORD	182.2	249	14.02	19.16	0.94	1.29	0.21	0.28
OTHER ME PORTS	69	94.3	5.31	7.25	0.41	0.56	0.25	0.34
PORTLAND	105.1	143.7	11.68	15.96	1.51	2.06	0.76	1.04
NH PORTS	75.5	103.1	6.29	8.59	0.29	0.39	0.27	0.36
NY PORTS	28	38.3	5.6	7.65	0.74	1.01	0.97	1.33
OTHER RI PORTS	15.6	21.3	5.19	7.09	1.1	1.5	0.34	0.47
POINT JUDITH	87	118.8	5.12	6.99	0.54	0.74	0.41	0.56
OTHER NORTHEAST PORTS	C	C	C	C	C	C	C	C

Table 126. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by vessel size class (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Size Class	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
30'to<50'	546	728	5.63	7.50	0.45	0.60	0.55	0.73
50'to<75'	491	655	9.10	12.13	0.68	0.91	0.37	0.50
75'+	522	697	18.66	24.88	0.85	1.14	0.10	0.13

Table 127. Estimated static costs of monitoring in Year 3 at 100% fleet-wide adoption of a Max Retention model including dockside monitoring, by sector (2018$, thousands. Low and high estimates are mean +/- one standard deviation)

Sector	Fleet Low	Fleet High	Vessel Low	Vessel High	Trip Low	Trip High	Day Low	Day High
Sustainable Harvest Sector	397.9	567.3	16.58	23.64	0.99	1.41	0.28	0.4
Northeast Fishery Sector II	271.7	387.4	10.87	15.5	0.3	0.43	0.11	0.16
Georges Bank Cod Fixed Gear Sector	144.6	206.2	6.03	8.59	0.21	0.3	0.51	0.72
Northeast Fishery Sector XIII	109.4	156	7.29	10.4	0.83	1.18	0.28	0.4
Northeast Fishery Sector VI	99.4	141.8	14.21	20.25	0.76	1.08	0.05	0.08
Northeast Fishery Sector VIII	90.4	128.9	11.3	16.11	0.43	0.62	0.16	0.23
Northeast Fishery Sector V	75.9	108.2	5.06	7.21	0.55	0.79	0.58	0.83
Maine Coast Community Sector	74.3	105.9	4.95	7.06	0.56	0.8	0.36	0.52
Northeast Fishery Sector XI	69.1	98.6	6.29	8.96	0.3	0.42	0.27	0.39
Sustainable Harvest Sector - Inshore	46.9	66.9	5.87	8.37	0.39	0.55	0.26	0.38
Northeast Fishery Sector XII	41.8	59.6	5.98	8.52	0.71	1.02	0.96	1.37
Northeast Fishery Sector III	34.4	49.1	3.44	4.91	0.19	0.27	0.35	0.5
Northeast Fishery Sector X	25.5	36.4	3.64	5.19	1.12	1.59	2	2.85
Northeast Coastal Communities Sector	C	C	C	C	C	C	C	C
Northeast Fishery Sector VII	C	C	C	C	C	C	C	C

Compliance and Enforceability

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.

7.4.3.3 Total Monitoring Coverage Level Timing

7.4.3.3.1 Coverage Level Timing 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 6.6.10.2). 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 low 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.

7.4.3.3.2 Coverage Level Timing Option 2: 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.

7.4.3.4 Review process for Sector Monitoring Coverage

7.4.3.4.1 Coverage Review Process 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). Therefore, no direct economic impacts are anticipated under Option 1/No Action.

7.4.3.4.2 Coverage Review Process Option 2: 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 more frequently than 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.

7.4.3.5 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.

This option would also add vessel coverage levels to the list of framework items. Initial discussion and analysis on possible impacts of vessel coverage levels can be found in "Memo from Groundfish PDT to Groundfish Committee re vessel specific coverage level option"[15], as well as in a letter from the NEFSC to the Council[16] in response to a request for information on observer deployment data at the vessel level for groundfish trips.

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

7.4.4.1 Dockside Monitoring Program (Sectors and Common Pool)

7.4.4.1.1 Analytical Approach

For several alternatives in this document, a common analytical approach is used to estimate costs and direct economic impacts resulting from an industry-funded dockside monitoring program, the methodology is briefly described here.

Dockside monitoring (DSM) costs are calculated by applying an estimate of an hourly DSM cost from recent sector ASM contract costs (FY 2016-2018) and applying this to the estimated time to offload at port, including some time for coordination, and travel expenses for vessels landings outside major ports (here, Gloucester, Boston, New Bedford, Portland, Chatham, Point Judith, Seabrook, Rye, and Portsmouth[17]). ASM costs and travel costs are calculated by adapting methods and results from Ardini et al. 2019 and Henry et al. 2019. Ardini et al. (2019) found that average sector at-sea ASM costs varied between $683 and $711 per observed day absent between FY 2016 and FY 2018[18]. This analysis specifies the hourly cost as a normally distributed random variable, using the mean cost per day absent ($698), as the mean hourly cost for DSMs— $29.08 per hour (SD=2). DSM hourly costs do not directly correspond to the wage that a DSM might receive since the ASM sector contracts are variable across providers and have different structures for including other costs into their seaday rate, such as at-sea training[19], which

[15] "Memo from Groundfish PDT to Groundfish Committee re vessel specific coverage level option", dated November 19, 2019; https://s3.amazonaws.com/nefmc.org/191119-GF-PDT-memo-to-GF-Committee-re-vessel-specific-coverage-level-option-with-attachments.pdf

[16] Letter from NEFSC to NEFMC, dated November 22, 2019; https://s3.amazonaws.com/nefmc.org/191122_Letter_NEFSC-to-NEFMC_vessel-observer-coverage-rates.pdf

[17] The Groundfish Committee added Chatham, Point Judith, and "NH" ports (identified as in the top 7 ports by landings volume) to the list of 'major' ports analyzed in section 7.4.3.2.3, Option for Lower Coverage Levels, at their meeting in October 2019. "NH" ports included Seabrook, Rye, and Portsmouth and are all included here.

[18] In 2018 dollars. Original estimates from Ardini et al. (2019) have been inflation-adjusted.

[19] Shoreside training costs are covered by NMFS.

may not be able to be linearly disaggregated into an hourly wage (See Ardini et al. page 7 for more details). To account for these additional, miscellaneous costs, we add 5% to each total cost estimate, a typical figure used in accounting.

Here, the DSMs hourly cost applies to several cost components: 1) the time it takes for a trip to fully offload its catch at port, 2) time spent communicating or coordinating with the vessel prior to offloading, and 3) any travel time to/from the offload. The time needed to offload will vary but is assumed to be affected by several factors. First, it is assumed that larger catch volumes will take longer to offload. NMFS port agents estimate that approximately between 8,000 and 10,000 pounds are offloaded per hour, but some variance might be expected depending on the dealer and target species[20]. For this reason, we apply the mean of 9,000 lbs/hour, but also generate high and low estimates using 7,000 lbs/hour and 11,000 lbs/hour, as a sensitivity. For offload volumes less than 9,000 lbs. (or 7,000 lbs./11,000 lbs.), the time to observe the offload is assumed to equal 1 hour. For all offloads greater than one hour, we round up to the nearest half hour, in order to represent lumpiness in labor costs.[21]

In the base scenario, offload rates are assumed to vary between 1 lb/hour and 9,000 lbs/hour depending on the volume of the offload, (i.e., smallest recorded offloads are 1 lb), with an average, effective offload rate across all deliveries of 3,870 pounds offloaded per hour, which likely overestimates the amount of time it takes to observe both small and large offloads. The analysis also assumes that an additional hour of DSM time is required to coordinate with the vessel, including time that a DSM spends at the dock waiting for the vessel to arrive.[22]

Travel costs were unable to be estimated based on ASM sector contracts; instead the method used by Henry et al. (2019) was adapted. Per Henry et al. (2019), monitors are assumed to be deployed from the nearest major port, thus travel costs are only incurred for offloads at minor ports. 2019 Federal (GSA) standards for reimbursement were applied when possible, including a mileage reimbursement of $.58/mile traveled, and lodging reimbursement at the annual average rate for the offload port location when travel time to the offload port exceeds 8 hours to calculate lodging costs.[23] Predicting travel costs is challenging, in part because observer providers have different travel policies, but also because for ASMs lodging is authorized on a case-by-case basis, such as if the vessel departs or returns very late or very early, or the total time the ASM was working. Since lodging is only calculated when it would be necessary because of the total travel time, lodging costs are likely underestimated, however, the total travel cost calculation may be conservative in other ways. Observer providers may choose their own mileage reimbursement rate, the federal rate may be a ceiling and a threshold for a minimum travel distance may also constrain total travel costs (e.g., 50 miles).[24]

Some ports are on islands, or the most cost-effective driving routes may include a ferry. In these cases, ferry costs were also estimated and included for these trips as well as the time spent on the ferry. Some potential costs, such as tolls, parking costs, or other incidentals, were not estimated, so on an individual trip basis travel costs may be underestimated, however, it is also assumed that a different monitor must be paid to be sent out for each individual offload from the nearest major port, which may overestimate costs if multiple offloads occur in the same area in a similar time span and could be covered by the same

[20] Personal communication with C. Gilbert and G. Power, November 2019

[21] 'lumpy' costs are those that do not increase smoothly with increases in service, also represented by a step function.

[22] In the maximized retention EFP the DSM must arrive at least a half hour before the vessel is expected to arrive (Rob Johnston, pers. Communication).

[23] These assumptions appear reasonable based on discussions with ASM providers in the NE region.

[24] Pers. Comm. with an observer provider, 12/13/2019

monitor (roving trips), as well as on trips that offload at multiple ports. Additionally, costs may be overestimated for trips ending far south, such as in Virginia or North Carolina, since flights may be more cost effective than driving.

The analysis does not cover trips that offload at a single port but deliver to dealers in different ports, suggesting a truck may be involved. Trucking may extend the time that the DSM must work by requiring them to follow the truck to the dealer and verify dealer-reported landings there, or require another DSM to be present at the dealer port. Alternatively, it may add no time if verification of landings at the offload port is deemed sufficient. In FY 2018, approximately 11% of sector groundfish trips and 29% of vessels report offloading at a different port than where the dealer is located, covering approximately 13% of sector total reported revenue (Table 128).

The analysis assumes that the sector ASM contract costs are representative of likely DSM contracts and furthermore that costs directly relate to an hourly cost. This is an important assumption and different results are possible if the imputed cost is drastically different than actual cost, such as if other costs (such as training costs) would increase the cost of DSMs beyond what is included from the ASM rate used here. Several alternatives in this document may affect the ultimate cost structure of DSM contracts. Therefore, costs estimated here might be assumed to be a ballpark estimate.

Table 128: Number of groundfish (sector and common pool) vessels and trips delivering to dealers outside the VTR reported port for fishing years (FY) 2016-2018. Landed pounds, live pounds and total revenue shown for all groundfish and non-groundfish catch (2018$). Source: DMIS data, accessed 1/7/2019.

FY	Group	# dealers outside VTR port	Vessels	Trips	Landed pounds	Live pounds	Revenue ($)
2016	common pool	0	51	599	1,844,642	2,169,127	1,233,080
2016	common pool	1	27	200	960,353	1,065,608	573,533
2016	common pool	2	3	17	75,343	84,828	73,797
2016	sector	0	196	5584	47,689,160	62,285,598	64,329,464
2016	sector	1	91	910	6,850,138	9,493,256	9,890,239
2016	sector	2	9	13	86,454	131,389	203,884
2017	common pool	0	43	409	1,081,495	1,295,659	754,495
2017	common pool	1	22	161	742,843	847,887	362,781
2017	common pool	2	4	24	324,414	332,014	87,129
2017	sector	0	186	5844	53,160,553	69,678,943	59,156,426
2017	sector	1	73	877	5,892,397	8,927,074	8,578,324
2017	sector	2	7	26	58,195	135,088	156,244
2017	sector	3	2	10	c	c	c
2018	common pool	0	45	440	1,343,362	1,648,578	819,634
2018	common pool	1	17	110	633,528	673,635	266,113
2018	common pool	2	2	8	c	c	c
2018	sector	0	165	6336	58,115,540	75,363,343	60,624,570
2018	sector	1	71	729	6,333,038	8,697,303	9,006,526
2018	sector	2	9	58	239,952	314,607	340,975
2018	sector	3	1	12	c	c	c

7.4.4.1.2 Dockside Monitoring Option 1: No Action

Under No Action there would not be any organized dockside monitoring (DSM) program for the sector and common pool components of the commercial groundfish fishery, since the DSM program implemented in Amendment 16 was removed in FY 2012. Certain components of the original dockside monitoring program would remain, namely start and end trip hails. Therefore, No Action has no direct economic impacts to the fishing industry since DSM costs will be similar to recent fishing years ($0).

Compliance: 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 investigate only 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'**.

Impact Summary: No Action would not implement a dedicated dockside monitoring program for the groundfish fishery. Therefore, No Action has no direct economic impacts to the fishing industry since dockside monitoring costs will be zero. However, No Action may have other, indirect negative economic impacts on the fishing fleet with respect to compliance and enforceability of reporting requirements. Reduced quota accountability decreases the functionality of the quota market to send appropriate price signals when quota is limiting and reduces the benefits of efficient harvesting strategies, such as decreased catch of non-target stocks. Additionally, overharvesting degrades long-term fishing revenue.

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

The analysis (described in Section 7.4.4.1) estimates potential dockside monitoring costs under a comprehensive program (100% of offloads for both sector and common pool vessels). Costs are estimated based on realized fishing effort in fishing years 2016 through 2018, giving a range of total dockside monitoring costs from approximately $941,000 in FY 2017 to $964,000 in FY 2018, or approximately $125- $129 per trip, or between $3,550 and $4,150 per vessel annually (Table 129). Based on information on the total cost billed to sectors under the 2010 sector monitoring program, this cost estimate seems reasonable; under the 2010 program, the average cost was $110 per trip.[25] The total cost for monitoring approximately 10,200 trips in 2010 was $1.2 million. The total estimated cost would be approximately 1.4% of all fishery revenue in FY 2018.

[25] in 2018 dollars. The mean nominal cost under the 2010 program was $95.73 per trip.

Results are sensitive to the selected offload rate. An offload rate of 11,000 pounds per hour decreases total estimated costs by $26-$32,000, or between 2.7% and 3.3%, while decreasing the offload rate to 7,000 pounds per hour increases costs by 4.7-5.5% or between $45,500 and $54,000, providing a range of costs with respect to offload rate ranging from a minimum of approximately $913,000 and a maximum of $1,017,000 (Table 130).

In addition, results are also sensitive to the choice of base hourly rate, based off of the observed ASM seaday rate. Economic theory suggests that ASM rates might be higher than DSM rates, particularly if the programs are contracted and operated separately, principally because ASMs might receive a wage premium due to the increased risk of their duties. At-sea, ASMs must accept higher levels of risk than their dockside counterparts, due to possible accidents at sea, vessel incidents, or the generally hazardous nature of working onboard fishing vessels. As a sensitivity, we reduce the base hourly DSM cost by 5% and 10%[26], generating a range of possible total DSM costs that are between $867,000 and $908,000, on average over three years (Table 131).

Combining the two sensitivity analyses, the mean DSM cost is minimized at $841,184 over the three years and provides a bookend to the high cost scenario at $1,000,300— or between 11.5% lower or 5% higher than the mean total cost estimate in the base scenario.

Table 129. Total estimated DSM costs across all sector and common pool trips FY 16-18 under full coverage (base scenario). Revenue includes all revenue (groundfish and non-groundfish) landed on all groundfish trips (2018$).

FY	Travel Costs ($)	Offloading Costs ($)	Misc. costs ($)	Total Costs ($)	Total Revenue ($)	Total Pounds	Trips	Vessels
2016	352,777	548,112	45,044	945,933	76,303,998	57,506,089	7,323	268
2017	332,963	562,872	44,792	940,627	69,216,748	61,303,166	7,351	252
2018	317,716	599,993	45,885	963,595	71,133,178	66,786,881	7,693	233
Average	334,485	570,326	45,241	950,052	*72,217,975*	*61,86,379*	*7,456*	*251*

[26] While no specific studies have quantified the wage differential in fisheries or fisheries observers studies looking at other dangerous jobs found that nonfatal risk premiums range from 7.3% to 9.9%, while fatal risk premiums range from 3.7% to 3.8%, but may be variable across race and gender (see Olson 1981, Leeth and Ruser 2003).

Table 130. Sensitivity Analysis. changes in offload and total costs based on different offload rates. Low= 11,000 lbs/hour, base=9,000 lbs/hour, high= 7,000 lbs/hour (2018$).

FY	Offloading costs			Total costs		
	low	**base**	high	low	**base**	high
2016	523,758	**548,112**	591,224	920,361	**945,933**	991,201
2017	536,122	**562,872**	612,024	912,539	**940,627**	992,236
2018	569,368	**599,993**	651,295	931,438	**963,595**	1,017,462
Average	*543,082*	**570,326**	*618,181*	921,446	**950,052**	1,000,300

Table 131. Risk Premiums. The effect of possible risk premiums in the base ASM rate is shown by 5% and 10% reductions in the hourly DSM cost estimate (base) on the total estimated DSM costs (2018$).

FY	5% risk premium (total cost $)	10% risk premium (total cost $)
2016	908,382	865,335
2017	898,869	858,560
2018	917,170	876,526
Average	908,140	866,807

There is considerable variability in the distribution of predicted dockside monitoring costs for sectors and the common pool under the base scenario. A the trip level, the common pool is predicted to be more expensive to monitor than the sector component of the fleet; average predicted costs for common pool trips range from $211 per trip in FY16 to $240 per trip in FY18, whereas sector trips range between $116 and $118, driven largely by differences in estimated travel costs. Travel costs compromise around 62-67% of total DSM costs for common pool trips, but only 28-32% of sector DSM costs (Table 132). This corresponds with the proportion of trips that land in minor ports. In FY2018, 49% of common pool offloads were in minor ports whereas only 17% of sector offloads occurred in minor ports in the same year. In addition, the time needed to observe small offloads is large relative to the volume-- the average common pool trip is 60% smaller than the average sector trip, which means that they are proportionally more expensive for a DSM to observe, resulting in total predicted offloading costs that are over four times as much per pound for common pool trips (approximately $.013 per pound on sector trips and $.065 per pound on common pool trips.)

At the vessel-level, the proportion of predicted monitoring costs ranges broadly, from less than 0.5% of total revenue to five times the landed value. Predicted DSM costs are high relative to landed value when large travel costs are incurred. In any given year, offloads from groundfish trips may occur as far south as North Carolina. Travel costs predictions assume there are no exclusions from the dockside monitoring program and that DSMs are deployed from the nearest major port which means that an observer must be sent from Point Judith, RI to Beaufort, NC, a distance of over 700 miles. Mileage reimbursement alone is estimated to be over $800 for such trips[27]. Therefore, in these states, a high proportion of total estimated costs are assumed to be travel costs, in contrast to Rhode Island where travel costs are predicted to be minimal (Figure 7).

Vessel-level DSM costs vary across vessel-length categories (Figure 9). Vessels less than 30 feet in length are expected to pay a much larger proportion of revenue for dockside monitoring than vessels in larger

[27] Flights for these trips would likely be more cost-effective and could reduce costs, but reconfiguring the model for including airfare and time related to flying was not attempted, so this represents an upper bound.

size classes. In FY 2018, costs as a proportion of revenue ranged between 26% and 53% of revenue for the smallest vessels (middle 50% of vessels, shown by the interquartile range, Figure 9)—a margin that likely will make these vessels' groundfish activities unprofitable[28]. For vessels landing few fish or landing in distant ports, the cost of dockside monitoring may even exceed reported revenue on groundfish trips, though instances of this are limited to 7 or fewer vessels in each year, and are generally a combination of very low total landings and/or landings in very distant ports. However, most vessels, particularly sector vessels and vessels in larger size classes are more likely to pay much smaller proportions of their revenue for DSM. The median vessel between 30 and 50 feet in length is projected to pay between 3.3% and 4.4% of their revenue. The median vessel between 50 and 75 feet in length is expected to pay between 1.6% and 2.8%. Vessels greater than 75 feet in length are projected to pay half a percent or less, with little variability. Most vessels are in the 30-50 foot length category (55%) and the fewest are in the smallest length category (4%). Overall, vessels of any size delivering to major ports will incur lower DSM costs, due to the absence of travel costs.

Table 132 Total estimated DSM costs by fleet FY 16- 18 under full DSM coverage. Revenue includes all revenue (groundfish and non-groundfish) on all groundfish trips (2018$)

FY	Fleet	Travel Costs ($)	Offloading Costs ($)	Misc. Costs ($)	Total Costs ($)	Total Revenue ($)	Total Pounds	Trips	Vessels
2016	common pool	107,179	56,698	8,194	172,071	1,880,410	2,880,337	816	59
2016	sector	245,598	491,414	36,851	773,863	74,423,588	54,625,752	6,507	209
2017	common pool	91,354	42,678	6,702	140,733	1,204,406	2,148,752	594	54
2017	sector	241,609	520,195	38,090	799,894	68,012,343	59,154,414	6,757	198
2018	common pool	89,549	38,253	6,390	134,192	1,115,513	2,064,185	558	54
2018	sector	228,167	561,741	39,495	829,403	70,017,665	64,722,697	7,135	179

Table 133. Sensitivity results. Changes in costs based on different offload rates for common pool and sector trips. Low= 11,000 lbs/hour, base=9,000 lbs/hour, high= 7,000 lbs/hour (2018$)

FY	Fleet	Offloading costs			Total costs		
		Low	*base*	High	Low	*base*	High
2016	common pool	55,514	*56,698*	58,610	170,827	*172,071*	174,078
2016	sector	468,244	*491,414*	532,614	749,534	*773,863*	817,122
2017	common pool	41,818	*42,678*	44,244	139,830	*140,733*	142,378
2017	sector	494,304	*520,195*	567,779	772,709	*799,894*	849,858
2018	common pool	37,635	*38,253*	39,578	133,543	*134,192*	135,583
2018	sector	531,733	*561,741*	611,717	797,895	*829,403*	881,878

[28] All vessels in this size class are common pool vessels.

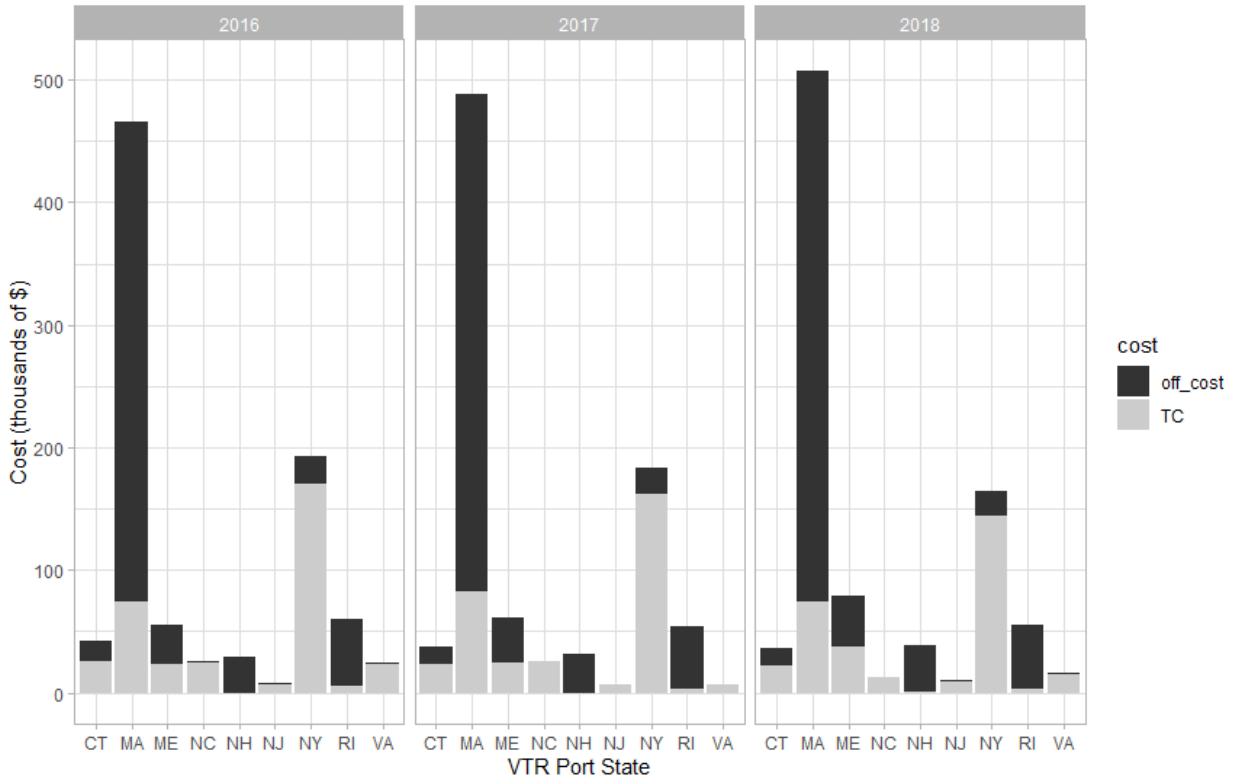


Figure 7 Proportion of estimated DSM costs by dealer state and fishing year under full coverage. Offloading costs (off_cost) are shown in dark gray while travel costs (TC) are shown in light gray.

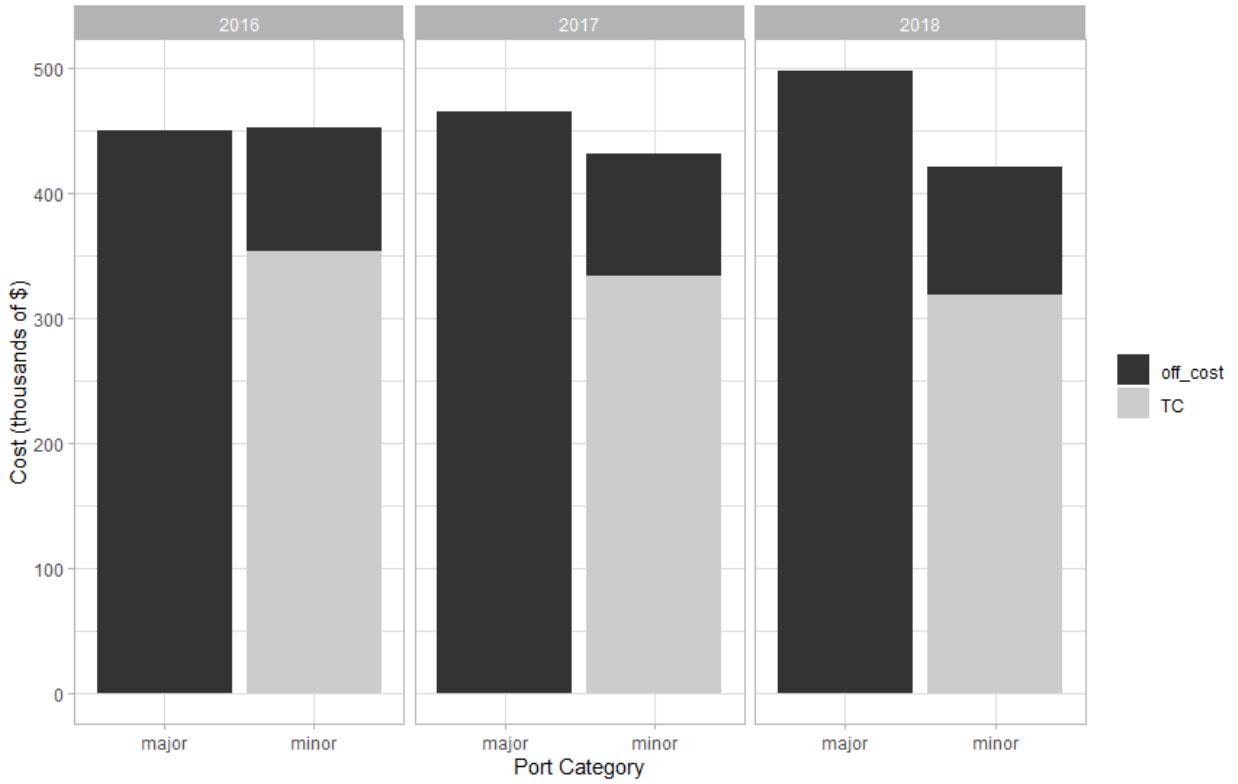


Figure 8. **Proportion of estimated DSM costs by port category (major or minor) and fishing year under full coverage. Offloading costs (off_cost) are shown in dark gray while travel costs (TC) are shown in light gray.**

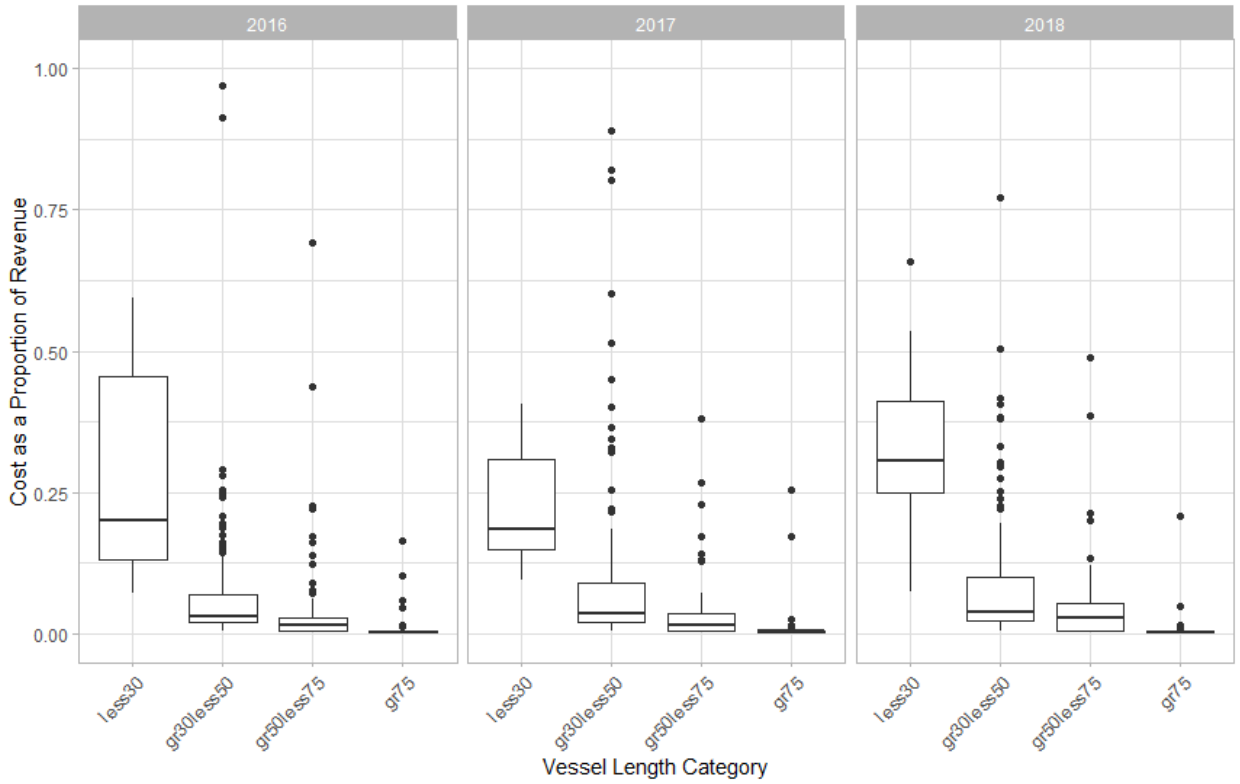


Figure 9. Vessel-level costs as a percent of revenue by vessel length category and fishing year under full coverage. Some outliers are not shown, for clarity, but fewer than 7 vessels in any year had DSM costs that exceeded reported revenue on groundfish trips.

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 low 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 high positive impacts on shoreside capabilities for enforcement, but if not coupled with increased levels of at-sea monitoring may have low positive to positive impacts on enforceability overall.

Impact summary: Relative to No Action, 100% dockside monitoring for both the common pool and sector components of the commercial groundfish fishery is expected to have low negative direct impacts

on the groundfish fishery since it could increase fleetwide operating costs by around one million dollars per fishing year, if effort is similar to previous fishing years. Operating costs could be higher or lower depending on the structure of the program, such as the ability for at-sea monitors to act as dockside monitors on the same trip, which would reduce travel costs in minor ports. Further, total costs could be lower to the extent that at-sea monitors receive a risk premium compared to dockside monitors If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Direct economic impacts are more negative for the common pool component of the fishery, vessels delivering to minor ports, and for vessels less than 35 feet in length, potentially leading to reduced participation. Over the long term, increased monitoring costs in minor ports may work to reduce effort in these areas, consolidating effort into major ports and further reducing total monitoring costs. Increased compliance and enforceability may lead to some indirect positive economic impacts relative to No Action, particularly with respect to dockside reporting requirements. Indirect benefits stem from increased quota accountability, which supports functional quota markets and efficient harvesting practices, in turn supporting long term economic viability.

7.4.4.2 Dockside Monitoring Program Structure and Design

7.4.4.2.1 Dockside Monitoring Program Funding Responsibility

7.4.4.2.1.1 Dockside Monitoring Program Funding Responsibility Option A – Dealer Responsibility

Under this option 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 between this option and Option B is uncertain. Under both option 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 in order to remain cost-neutral, decreasing ex-vessel price received by vessels. 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 (i.e., anywhere from high to low). Therefore, on its own, funding responsibility has a neutral impact on compliance. Relative to Option B, this measure is expected to have a neutral effect on compliance.

Enforceability: Dealer funding responsibility has a relatively neutral impact on enforceability relative to Option B 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.

7.4.4.2.1.2 Dockside Monitoring Program Funding Responsibility Option B – Vessel Responsibility

Under this option 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 this option is selected.

The difference in total costs for the program between Option A and Option B is uncertain. Under both Options A and B 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 Option B 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 Option 1, 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.

7.4.4.2.2 Dockside Monitoring Program Administration

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

Under Option A, either vessels or dealers (depending on 7.4.3.2.1) would be responsible for contracting with dockside monitoring providers to cover the cost of groundfish monitoring. Under both Options A and B there will be many buyers of dockside monitoring services. The difference between the two Options whether individual vessels or dealers must directly negotiate contracts with dockside monitoring providers or if they will simply be responsible for selecting from the approved providers on a trip-by-trip basis. Under both options, there will be no limit on the number of providers that may apply for approval or be approved in a given year. In each case, dealers/vessels will work to identify a dockside monitoring provider that can cover their activities at the lowest possible cost.

The potential for lower costs to vessels/dealers exists under Option A relative to Option B. These lower costs could be realized if increased competition and flexibility drives down rates. As discussed in Sub-Option B, 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. However, under Option A, dealers/vessels would be required to directly contract with one or more dockside monitoring providers to meet their needs, which may increase transaction costs, as compared to Option B.

Administrative costs to NMFS may be higher under Option A, relative to Option B. NMFS may have to review and approve more dockside monitoring applications, as is currently done in the at-sea monitoring program. Additionally, 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 Option B.

Compliance and enforceability are likely to be minimally affected by either Option A or B. If costs are lower under Option A due to increased competition between providers, then cost of landing each unit will be lower than Option B 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 Option A relative to Option B is neutral since neither changes the amount of information available for enforcement.

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

Under Option B, either vessels or dealers (depending on 7.4.3.2.1) would be responsible for hiring dockside monitoring providers to cover the cost of groundfish monitoring. Under both Options A and B there will be many buyers of dockside monitoring services. The difference between the two Options is whether individual vessels or dealers must directly negotiate contracts with dockside monitoring providers or if they will simply be responsible for selecting from the approved providers on a trip-by-trip basis. Under both options, there will be no limit on the number of providers that may apply for approval or be approved in a given year. In each case, dealers/vessels will in the supply of dockside monitoring providers that will be approved by NMFS. Under Option B, dealers/vessels will work to identify a dockside monitoring provider that can cover their activities at the lowest possible cost, but would not be required to directly contract with any provider, reducing flexibility stemming from the ability to negotiate on costs, but reducing possible transaction costs.

The potential for higher costs to vessels/dealers exists under Option B relative to Option A. These higher costs could be realized due to decreased competition. The bidding process under Option B would be competitive, but will cover the entirety of the groundfish fishery. Rates could potentially be higher relative to Option A, since providers will have to cover a wide region. Lower dockside coverage rates in remote ports could help mitigate these higher rates. Compared to Option A, transaction costs may be minimized for individual common pool vessels, since they will not have to negotiate individual contracts with providers under Option B.

Administrative costs to NMFS are likely to be lower under Option B, relative to Option A. While multiple dockside monitoring providers may bid for the NMFS contract, the chosen providers will cover the entirety of the groundfish fishery. Option B 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 Option A or B. If costs are higher under Option B due to reduced competition between providers, then cost of landing each unit will be lower than Option B 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 Option A relative to Option B is neutral since neither changes the amount of information available for enforcement.

7.4.4.2.3 Options for Lower Dockside Monitoring Coverage Levels (20 percent coverage

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

Instead of a program with 100% DSM coverage of all offloads for all sector and common pool trips, this alternative proposes randomized coverage in minor ports and full coverage in major ports. Major ports under this alternative include Boston, New Bedford, Gloucester, Portland, Point Judith, Seabrook, Portsmouth, Rye, and Chatham. The major ports were chosen based on the proportion of groundfish pounds landed over the last 3 years, with the major ports representing the vast majority (97%) of the total pounds and total groundfish revenue. Twenty percent of trips in each of the other ports were randomly selected in each year FY 2016 to FY 2018 200 times to obtain an estimate of mean monitoring costs in each year.

From FY 2016 to FY 2018 only 20% of offloads were to small ports, but under DSM Option 2 (Figure 3), monitoring costs in minor ports were estimated to be approximately $404,000 to $441,000 in any given year, or approximately 44% of total DSM costs. Under this option, DSM costs in minor ports are estimated to be between $80,000 and $87,000, reducing total estimated dockside monitoring costs by 35% from $950,000 to $613,000 over 2016 to 2018 (Table 130).

Despite large reductions in cost, random monitoring of small ports would likely have a small impact on the total proportion of groundfish pounds monitored. Between 2016-2018, major ports accounted for 98.5% of all pounds landed of any allocated groundfish stock and 89% of all non-groundfish pounds. Further, the vast majority of groundfish revenue is landed in these ports, 97% over the last three years (Table 129).

Compliance: Spot-check coverage rates may need to be revisited to revised in order to ensure compliance. Random coverage at 20% may be sufficiently high to deter violations due to a sufficiently high probability of detection, but only if fishery participants do not know they will be monitored while fishing is occurring. If that can be achieved, the compliance score of this alternative may be 'high'. In the current maximized retention EFP, the vessel and the DSM coordinate and communicate when the vessel will be at port, this type of communication and knowledge would reduce the compliance benefit of randomized coverage for minor ports and the compliance score may be **"medium" to "high".**

Enforceability: While minor ports account for very small amounts of groundfish pounds in recent years, a key assumption of this option is that effort would not shift to minor ports. Because of the reduction in monitoring costs, an incentive would exist for vessels to deliver to minor ports, provided that infrastructure was available. Enforceability benefits of a full DSM program may be weakened somewhat if violators are able to take advantage of the monitoring program and shift their operations. Furthermore, if participants know when they will be monitored, spot-check coverage will not be effective at deterring noncompliance. Therefore, the enforceability score of this alternative is **'medium' to 'high',** depending on the ability for participants to shift their operations and/or the efficacy of DSMs when they are present.

Impact summary: Relative to No Action, full coverage of major ports and 20% random coverage at minor ports would increase operational costs for the fishery by approximately $613,000 if fishing effort remains similar to previous years. This would likely have low negative direct impacts on the fishery

overall, since this represents a small proportion of fleetwide fishing revenue (less than 1%), impacts are likely to be more negative for the common pool component of the fishery and for vessels less than 35 feet in length. Relative to Dockside Monitoring Option 2 (full coverage), economic impacts of this alternative are positive, since it reduces the estimated program cost, on average, by 35% over 2016-2018. Relative to Option B, lower coverage for low volume vessels, impacts of this alternative are low negative to neutral, since total dockside monitoring costs are estimated to be somewhat higher in all years under Option A. Furthermore, under full coverage, vessels delivering to minor ports are the most expensive to monitor, particularly those south of Point Judith. For instance, New York is estimated to be one of the most expensive states to monitor since observers are assumed to be deployed from Point Judith and incur additional travel costs, such as ferry costs. Random coverage of these low-volume ports reduces total estimated monitoring costs yet would have a minimal impact on the total amount of groundfish pounds monitored moving from 100% to 97.6%[29], assuming no changes in the distribution of offloading activity. If offloading shifts to low coverage ports, efficacy of random coverage may be reduced, particularly for deterring noncompliance and increasing enforceability of reporting regulations, therefore relative to No Action/Option 1 there are positive compliance and enforceability benefits, but relative to DSM Option 2 there are low negative to negative impacts on compliance and enforceability from Option A. Furthermore, random DSM coverage will be most effective when participants do not know that they will be monitored, if participants delivering to minor ports know they will be monitored there will be a negative impact on compliance relative to Option 2. If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Table 134. Groundfish (GF) and non-groundfish (NGF) landed pounds and ex-vessel value (thousands of pounds/2018$) by port category (major or minor) and group (sector or common pool). Major ports include Boston, Number of trips and vessels exceeds the total number in any given year because of trips with multiple offloads (<6% of total trips). Source: NMFS dealer, trip, and permit data.

FY	Port cat	group	GF (lbs)	NGF (lbs)	GF ($)	NGF ($)	Trips*	Vessels*
2016	minor	sector	275	1,607	738	3,398	677	75
2016	major	sector	33,225	19,519	49,774	20,514	5966	188
2016	minor	common pool	198	1,784	501	618	465	37
2016	major	common pool	130	769	338	423	370	32
2017	minor	sector	446	933	1,099	2,561	789	66
2017	major	sector	36,606	21,169	45,138	19,214	6192	180
2017	minor	common pool	75	1,106	185	484	284	31
2017	major	common pool	111	857	261	275	331	29
2018	minor	sector	709	1,273	1,363	2,753	863	53
2018	major	sector	43,412	19,328	47,551	18,350	6510	165
2018	minor	common pool	50	1,196	110	591	274	33
2018	major	common pool	100	719	183	232	297	26
Minor port proportion (%)			*1.5%*	*11.2%*	*2.7%*	*15.0%*	*14.6%*	*32.2%*

[29] Slight differences in the proportion of total groundfish pounds monitored stem from different data sources "live pounds" was used for the original designation, "landed pounds" is reported here.

Table 135. Estimated costs for randomized selection of trips for minor ports (200 simulations). Total is based on mean estimated cost of randomly observing 20% of offloads in small/remote ports (2018$).

	Low coverage ports						
FY	Mean cost	Median cost	Standard deviation	25th percentile	75th percentile	Major port cost	**Total DSM cost**
2016	87,389	87,388	550	87,067	87,739	504,844	**592,233**
2017	80,661	80,668	503	80,313	81,029	527,071	**607,733**
2018	79,692	79,721	530	79,331	80,009	559,435	**639,127**
Average	*82,581*	*82,592*	*528*	*82,237*	*82,926*	*530,450*	***613,031***

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

Vessels landing less than the lowest 5th percentile across 2016-2018 were randomly selected for DSM coverage on 20% of their trips ("low coverage vessels", vessels landings less than 46,297 groundfish pounds in each of the last three fishing years). This included 97 unique sector or common pool vessels and 11,063 groundfish trips across 2016-2018, (approximately one quarter of all trips). The lower coverage rate reduces total estimated costs in FY 2018 from $964,000 to $609,000 or by approximately 37% (Table 132). Across all three years costs were reduced by 39%.

Low coverage vessels account for a minority of landed groundfish pounds but the majority of landed non-groundfish pounds in any year. Overall, low coverage vessels account for 65% of landed non-groundfish pounds but only 2.3% of all landed groundfish pounds. The majority of non-groundfish revenue is still accounted by vessels in the large category; only 33.9% of non-groundfish revenue accounted by low coverage vessels. While high coverage vessels account for the vast majority of landed groundfish pounds, their share of groundfish revenue is slightly less predominant—across all years the share is approximately 96% (Table 131).

Compliance: Spot-check coverage rates may need to be revisited to revised in order to ensure compliance. Random coverage at 20% may be sufficiently high to deter violations due to a sufficiently high probability of detection, but only if fishery participants do not know they will be monitored while fishing is occurring. If that can be achieved, the compliance score of this alternative may be 'high'. In the current maximized retention EFP, the vessel and the DSM coordinate and communicate when the vessel will be at port, this type of communication and knowledge would reduce the compliance benefit of randomized coverage for minor ports and the compliance score may be **"medium" to "high".**

Enforceability: While low coverage vessels account for very low amounts of groundfish pounds in recent years, a key assumption of this option is that effort would not increase. Because of the reduction in monitoring costs, some vessels may have an economic advantage relative to full-coverage vessels. Enforceability benefits of a full DSM program may be weakened somewhat if violators are able to take advantage of the monitoring program and increase their operations, however compared to Option A, this may be easier to track and regulate than at the port-level. Furthermore, if participants know when they will be monitored, spot-check coverage will not be effective at deterring noncompliance. Therefore, the enforceability score of this alternative is **'medium' to 'high',** depending on the ability for participants to shift their operations and/or the efficacy of DSMs when they are present.

Impact summary: Relative to No Action, impacts of Option B are expected to be neutral to low negative since it is expected to increase monitoring costs by approximately $582,000 if effort remains similar to recent years. However, compared to Dockside Monitoring Option 2, impacts are positive since it would reduce total monitoring costs by nearly 40%. Impacts are also neutral to low positive relative to Option A, lower coverage for small ports, since estimated costs are slightly lower under this Option. In addition, distributional impacts on low-volume vessels, those participating in the common pool, or delivering to minor ports will also be minimized under Option A while providing some compliance and enforceability benefit from randomized coverage, as long as participants do not know when they will be monitored. Because overall opportunity for noncompliance is higher than in Option 2, there are some negative compliance and enforceability impacts, but there are relatively minor because of the low amounts of groundfish caught by vessels in the low-coverage category. If monitoring costs continue to be subsidized, as they have been in past years, economic impacts may be lower, if not neutral relative to Status Quo, depending on the amount of the subsidy.

Table 136. **Groundfish (GF) and non-groundfish (NGF) landed pounds and ex-vessel value (thousands of 2018$) by vessel category (small or large) and group (sector or common pool). Source: NMFS dealer, trip, and permit data.**

FY	Coverage	Group	GF (lbs)	NGF (lbs)	GF ($)	NGF ($)	Trips*	Vessels
2016	low	sector	712	13,642	1,829	7,341	3,110	74
2016	high	sector	32,787	7,485	48,683	16,571	3,397	135
2016	low	common pool	202	1,144	516	616	461	23
2016	high	common pool	126	1,409	323	426	355	36
2017	low	sector	748	14,397	1,857	7,065	3,237	68
2017	high	sector	36,304	7,705	44,380	14,710	3,520	130
2017	low	common pool	165	1,858	397	660	509	29
2017	high	common pool	20	105	49	99	85	25
2018	low	sector	721	13,421	1,532	7,276	3,332	69
2018	high	sector	43,400	7,180	47,383	13,827	3,803	110
2018	low	common pool	123	1,316	247	559	414	28
2018	high	common pool	26	599	46	263	144	26
Low coverage proportion %			*2.3%*	*65.2%*	*4.3%*	*33.9%*	*49.5%*	*38.6%*

Table 137: **Estimated costs for randomized selection of trips for low-volume vessels (200 simulations). Total is based on mean estimated cost of randomly observing 20% of trips for low-volume vessels (2018$).**

	Low coverage vessels						
FY	Mean cost	Median cost	Standard deviation	25th percentile	75th percentile	Large vessel cost	**Total DSM cost**
2016	90,252	90,142	1,753	88,928	91,292	499,701	**589,953**
2017	97,146	96,967	1,845	95,902	98,196	450,760	**547,906**
2018	87,332	87,260	1,095	86,616	87,981	522,014	**609,347**
Average	91,577	91,456	1,564	90,482	92,490	490,825	**582,402**

7.4.4.2.4 Safety and Liability Associated with Fish Hold Inspections

7.4.4.2.4.1 Fish Hold Inspection Option A – 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 (low negative economic impacts) to either dealers or vessels depending on what sub-option is selected under Section 4.2.2.4. 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 option is expected to have low negative, neutral, or low positive economic impacts relative to Option B, 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 Option B and C this 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 Option B, this option is expected to have neutral effects on enforceability as long as monitor reports are assumed accurate and unbiased.

Relative to Option C, this option 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).

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

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 option is expected to have neutral to low negative economic impacts relative to Option A, 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, therefore direct economic impacts may be neutral to negative relative to Options A or C.

Relative to Option A, this option 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 Option C, 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).

7.4.4.2.4.3 Fish Hold Inspection Option C – 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 Option A, since neither requires vessels to purchase and maintain additional equipment, but potentially positive economic impacts relative to Option B, for vessels that do not already have cameras as part of an EM system.

Relative to Options A and B, this alternative is expected to have a negative impact on both compliance and enforceability relative to Option B or C 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).

7.4.5 Sector Reporting

7.4.5.1 Sector reporting 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. this is expected to have neutral to low negative impacts on the groundfish fishery to the extent that it simplifies the reporting process and reduces transaction costs associated with complying with regulations.

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

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.

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

7.4.6.1 Funding Provisions Option A: No Action

Option 1/No Action would continue to require industry to fund at-sea monitoring costs. However, NMFS would be required to acquire funding for shoreside administrative costs of the program, which may be limited in any given year. 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. Therefore, Option A/No Action may have neutral to high negative impacts on the groundfish fishery, depending if and what the degree of funding limitations might be for NMFS to administer the program.

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

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

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.

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

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.

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

7.4.7.1 Management Uncertainty Buffer Option 1: No Action

The current default adjustment for management uncertainty for groundfish stocks is currently 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.

Overall, the direct economic impacts of Option A/No Action are the loss of potential fishery revenue, 3-7% of each stock's ACL, which has a neutral to low-negative impact on the fishery, depending on the stock and fishing effort in any given year.

Compliance: The current management uncertainty buffers have a **neutral to low negative** impact on compliance in the Northeast multispecies fishery. As discussed under 7.4.5, 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. Therefore, Option 1 has a neutral impact on enforceability.

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

Option 2 would revise the management uncertainty buffer for the sector ACL for all allocated groundfish stocks to be zero, if the option for 100 percent at-sea monitoring, whether as a fixed percentage of sector trips (Section 4.1.1.1.2) or as a percentage of catch (Section 4.1.1.1.3) is selected. Thus, this option would increase the sector ACL's by 3 to 7 percent, depending upon the stock.

To estimate the effects of removing the management uncertainty buffers, the sector sub-ACLs that would result were input into the QCM and used in the stand-alone ASM and blended EM and ASM models (with and without subsidy).

The following tables/// show that catch increases are not uniform across stocks, and that removal of the management uncertainty buffers will not benefit all fisherman equally.

Table 138. Estimated catch under the Status Quo and with the management uncertainty buffers removed contingent upon 100% monitoring, with three 100% monitoring conditions as stand-

alone ASM, blended ASM and EM without a subsidy and blended ASM and EM with a subsidy (metric tons)

Stock	Status Quo	buffers-ASM_only	buffers-Blended_0	buffers-Blended_1
NONGROUNDFISH	16,071	16,674	16,861	16,767
Redfish	5,189	5,632	5,851	5,678
GB Haddock West	4,353	4,762	4,615	4,836
Pollock	3,249	3,443	3,593	3,667
GOM Haddock	2,908	3,094	3,119	3,087
White Hake	2,162	2,272	2,314	2,281
Plaice	1,125	1,166	1,161	1,148
Witch Flounder	830	871	871	871
GB Cod West	735	792	794	785
GB Haddock East	622	471	616	599
GB Winter Flounder	363	461	423	440
GOM Cod	302	291	302	301
SNE Winter Flounder	224	262	259	253
CC/GOM Yellowtail Flounder	179	175	178	184
GB Cod East	105	114	99	105
GOM Winter Flounder	98	94	97	100
Halibut	68	75	75	77
Southern Windowpane	52	53	53	54
TOTAL GROUNDFISH	22,564	24,026	24,420	24,469
TOTAL CATCH	38,635	40,700	41,281	41,235

Table 139. Estimated gross revenues under the Status Quo and with the management uncertainty buffers removed contingent upon 100% monitoring, with three 100% monitoring conditions as

stand-alone ASM, blended ASM and EM without a subsidy and blended ASM and EM with a subsidy (2018$, mil)

Stock	Status Quo	buffers-ASM_only	buffers-Blended_0	buffers-Blended_1
NONGROUNDFISH	21.50	22.54	22.82	22.60
GB Haddock West	7.44	8.13	7.94	8.35
GOM Haddock	6.43	6.84	6.89	6.85
Redfish	5.70	6.23	6.50	6.29
Pollock	5.23	5.51	5.65	5.83
Plaice	5.08	5.33	5.30	5.28
White Hake	4.52	4.78	4.81	4.78
GB Cod West	3.16	3.40	3.43	3.40
Witch Flounder	2.88	3.05	3.02	3.05
GB Winter Flounder	2.67	3.34	3.04	3.18
GOM Cod	1.58	1.54	1.60	1.60
SNE Winter Flounder	1.39	1.57	1.56	1.52
GB Haddock East	1.02	0.81	1.00	0.99
GOM Winter Flounder	0.57	0.55	0.57	0.58
GB Cod East	0.48	0.53	0.45	0.48
CC/GOM Yellowtail Flounder	0.40	0.40	0.41	0.42
Halibut	0.37	0.39	0.39	0.40
GB Yellowtail Flounder	0.08	0.09	0.08	0.07
TOTAL GROUNDFISH	49.00	52.49	52.64	53.07
TOTAL REVENUES	70.50	75.03	75.46	75.67

Table 140. Estimated utilization rates under the Status Quo and with the management uncertainty buffers removed contingent upon 100% monitoring, with three 100% monitoring conditions as stand-alone ASM, blended ASM and EM without a subsidy and blended ASM and EM with a subsidy

Stock	Status Quo	buffers-ASM_only	buffers-Blended_0	buffers-Blended_1
Witch Flounder	1.00	1.00	1.00	1.00
GOM Cod	0.80	0.73	0.76	0.76
White Hake	0.80	0.80	0.81	0.80
Plaice	0.73	0.72	0.71	0.71
GB Cod West	0.68	0.71	0.71	0.70
GB Winter Flounder	0.50	0.62	0.57	0.59
Redfish	0.49	0.50	0.52	0.51
SNE Winter Flounder	0.49	0.55	0.54	0.53
CC/GOM Yellowtail Flounder	0.47	0.44	0.45	0.46
GB Cod East	0.41	0.44	0.38	0.40
GOM Haddock	0.34	0.34	0.34	0.34
GOM Winter Flounder	0.29	0.26	0.27	0.28
SNE/MA Yellowtail Flounder	0.21	0.20	0.19	0.20
GB Haddock West	0.15	0.16	0.16	0.16
GB Yellowtail Flounder	0.12	0.14	0.13	0.12
Pollock	0.09	0.09	0.09	0.09
GB Haddock East	0.04	0.03	0.04	0.04

- ***100% Coverage***

Noting that costs were estimated based on 91% ASM coverage, the dynamically-estimated monitoring cost when EM is a substitute for ASM under 100% coverage with the management uncertainty buffers removed is $3.3 mil for the no-subsidy model, and with the subsidy $0 mil. Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $4.7 mil without subsidy and $4.8 mil with subsidy. Operating profits are increased by $0.4 mil without subsidy, and $1.6 mil with subsidy, relative to the Status Quo.

Compare these aggregate estimates to the case where ASM is the only technology available for monitoring (no EM) and with management uncertainty buffers removed, the dynamically-estimated monitoring cost is predicted to be $5.9. Fishery revenues relative to the Status Quo are estimated to be higher, generating an additional $4.2 mil. Operating profits, however, are decreased by $-2.6 mil, relative to the Status Quo.

Note that, for non-USCA stocks, the management uncertainty buffer is 5% and for USCA stocks it is 3%. Under FY18 conditions, a ~3-5% increase in the sector sub-ACLs allows fleet-wide catch and revenues from groundfish to increase by 7-8%, and overall catch and revenue to increase by greater than 5% (~5.5%).

Table 141. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage with management uncertainty buffers removed, aggregate fleet totals by days absent category (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Cat	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	<=5	0.2	0.0	0.1	0.1	54.9	0.0
	>5, <=20	1.8	0.2	0.5	1.1	61.3	-15.4
	>20, <=50	7.9	1.1	2.2	4.6	58.5	-17.9
ASM only	>50, <=80	6.8	0.7	2.3	3.7	55.4	-9.8
	>80, <=160	29.0	2.1	7.7	19.3	66.4	-4.9
	>160	29.4	1.8	7.7	19.9	67.8	0.0
	TOTAL	*75.1*	*5.9*	*20.5*	*48.7*	*64.8*	*-4.5*
	<=5	0.2	0.0	0.0	0.1	46.6	0.0
	>5, <=20	1.8	0.2	0.4	1.1	62.5	-15.4
	>20, <=50	8.1	0.7	2.3	5.1	63.1	-8.9
Blended, 0	>50, <=80	6.6	0.4	2.3	4.0	60.2	-2.4
	>80, <=160	28.9	1.1	7.7	20.1	69.6	-1.0
	>160	30.0	0.9	7.8	21.3	71.0	7.0
	TOTAL	*75.6*	*3.3*	*20.5*	*51.7*	*68.4*	*1.4*
	<=5	0.2	0.0	0.1	0.1	51.8	0.0
	>5, <=20	1.8	0.2	0.5	1.2	64.8	-7.7
	>20, <=50	7.7	0.5	2.2	5.1	65.7	-8.9
Blended, 1	>50, <=80	6.8	0.2	2.3	4.3	62.6	4.9
	>80, <=160	29.0	0.9	7.7	20.4	70.2	0.5
	>160	30.2	0.7	7.8	21.8	72.0	9.5
	TOTAL	*75.7*	*2.5*	*20.6*	*52.9*	*69.9*	*3.7*

Table 142. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage with management uncertainty buffers removed, aggregate fleet totals by vessel home port (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Home Port	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
ASM only	CT PORTS	0.2	0.0	0.0	0.1	74.7	0.0
	OTHER MA PORTS	6.0	0.5	1.9	3.6	60.4	-7.7
	BOSTON	18.0	1.3	5.0	11.7	65.3	-0.8
	CHATHAM	4.8	0.3	0.8	3.7	76.5	-7.5
	GLOUCESTER	16.8	1.3	4.4	11.0	65.8	-8.3
	NEW BEDFORD	12.7	0.9	3.9	8.0	62.9	1.3
	OTHER ME PORTS	2.2	0.3	0.7	1.2	54.9	-14.3
	PORTLAND	5.3	0.4	1.5	3.4	64.2	-15.0
	NH PORTS	2.2	0.4	0.7	1.2	52.7	-20.0
	NY PORTS	0.6	0.1	0.1	0.4	75.5	-20.0
	OTHER RI PORTS	0.4	0.0	0.2	0.2	54.4	-33.3
	POINT JUDITH	2.5	0.4	0.6	1.5	60.0	-16.7
	OTHER NORTHEAST PORTS	C	C	C	C	C	0.0
Blended, 0	CT PORTS	0.2	0.0	0.1	0.2	76.8	100.0
	OTHER MA PORTS	5.9	0.3	1.9	3.8	63.3	-2.6
	BOSTON	17.2	0.6	4.8	11.8	68.7	0.0
	CHATHAM	4.9	0.3	0.8	3.8	78.0	-5.0
	GLOUCESTER	17.0	0.7	4.5	11.9	69.8	-0.8
	NEW BEDFORD	13.0	0.4	4.1	8.6	65.8	8.9
	OTHER ME PORTS	2.2	0.2	0.7	1.3	59.5	-7.1
	PORTLAND	5.5	0.2	1.6	3.8	68.1	-5.0
	NH PORTS	2.3	0.2	0.7	1.4	59.2	-6.7
	NY PORTS	0.6	0.1	0.1	0.5	78.9	0.0
	OTHER RI PORTS	0.4	0.0	0.2	0.2	52.1	-33.3
	POINT JUDITH	2.5	0.2	0.6	1.6	65.2	-11.1
	OTHER NORTHEAST PORTS	C	C	C	C	C	0.0
Blended, 1	CT PORTS	0.2	0.0	0.0	0.1	76.3	0.0
	OTHER MA PORTS	6.1	0.2	1.9	3.9	64.2	0.0
	BOSTON	17.8	0.5	4.9	12.4	69.5	5.1
	CHATHAM	4.7	0.2	0.8	3.8	79.8	-5.0
	GLOUCESTER	16.8	0.5	4.5	11.8	70.3	-1.7
	NEW BEDFORD	13.2	0.4	4.0	8.9	67.3	12.7
	OTHER ME PORTS	2.2	0.1	0.7	1.4	63.0	0.0
	PORTLAND	5.6	0.2	1.6	3.8	68.2	-5.0
	NH PORTS	2.3	0.2	0.7	1.4	62.9	-6.7
	NY PORTS	0.6	0.0	0.1	0.5	83.0	0.0
	OTHER RI PORTS	0.3	0.0	0.1	0.2	57.0	-33.3
	POINT JUDITH	2.4	0.1	0.6	1.7	69.3	-5.6
	OTHER NORTHEAST PORTS	C	C	C	C	C	0.0

Table 143. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage with management uncertainty buffers removed, aggregate fleet totals by vessel size class (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Size Class	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
ASM only	30'to<50'	14.9	1.9	3.6	9.4	63.1	-14.5
	50'to<75'	25.4	2.0	6.3	17.1	67.6	-1.7
	75'+	34.8	2.1	10.4	22.2	63.9	-3.1
Blended, 0	30'to<50'	15.0	1.2	3.7	10.1	67.7	-8.2
	50'to<75'	25.7	1.1	6.4	18.3	71.1	5.2
	75'+	34.8	1.1	10.5	23.2	66.8	1.3
Blended, 1	30'to<50'	14.9	0.8	3.7	10.4	69.9	-5.5
	50'to<75'	25.5	0.8	6.3	18.4	72.1	5.7
	75'+	35.4	0.9	10.5	24.0	67.7	4.8

Table 144. Estimated dynamic impacts of monitoring under blended ASM and EM with 100% coverage with management uncertainty buffers removed, aggregate fleet totals by sector (91% coverage analyzed, 2018$, mil, costs based on 3 year average for EM)

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
ASM only	Sustainable Harvest Sector	26.4	1.6	7.3	17.6	66.6	-1.1
	Northeast Fishery Sector II	14.9	1.1	3.8	10.1	67.4	-5.6
	Northeast Fishery Sector VI	5.9	0.5	1.6	3.8	65.1	-5.0
	Northeast Fishery Sector XIII	6.0	0.5	2.1	3.4	56.4	-2.9
	Northeast Fishery Sector VIII	5.6	0.4	1.6	3.6	64.0	0.0
	Georges Bank Cod Fixed	4.8	0.3	0.8	3.7	77.2	-7.5
	Maine Coast Community	2.8	0.3	0.8	1.8	63.0	-5.3
	Northeast Fishery Sector XI	2.3	0.4	0.7	1.2	52.9	-20.0
	Sustainable Harvest Sector -	2.0	0.2	0.8	1.1	52.5	-8.3
	Northeast Fishery Sector V	1.9	0.3	0.4	1.2	62.8	-14.3
	Northeast Fishery Sector XII	1.4	0.2	0.4	0.8	59.2	-20.0
	Northeast Coastal	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.4	0.0	0.1	0.3	58.6	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.1	48.0	0.0
	Northeast Fishery Sector VII	C	C	C	C	C	0.0
Blended, 0	Sustainable Harvest Sector	26.9	0.8	7.3	18.7	69.8	5.1
	Northeast Fishery Sector II	15.1	0.6	3.8	10.7	70.9	0.0
	Northeast Fishery Sector VI	5.8	0.2	1.6	4.0	68.6	0.0
	Northeast Fishery Sector XIII	5.8	0.3	2.1	3.5	59.7	0.0
	Northeast Fishery Sector VIII	5.6	0.2	1.6	3.7	67.1	2.8
	Georges Bank Cod Fixed	4.9	0.3	0.8	3.8	78.8	-5.0
	Maine Coast Community	2.7	0.2	0.7	1.8	65.9	-5.3

Subsidy	Sector	Gross Rev	ASM Cost	Cost of Ops	Operational Profit	Profit (%)	Rel to SQ (%)
	Northeast Fishery Sector XI	2.3	0.2	0.7	1.4	59.7	-6.7
	Sustainable Harvest Sector -	2.0	0.1	0.8	1.1	54.9	-8.3
	Northeast Fishery Sector V	1.9	0.2	0.4	1.3	68.6	-7.1
	Northeast Fishery Sector XII	1.4	0.1	0.4	0.9	66.5	-10.0
	Northeast Coastal	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.5	0.0	0.1	0.3	63.2	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.0	41.5	-100.0
Blended, 1	Sustainable Harvest Sector	27.5	0.7	7.4	19.5	70.6	9.6
	Northeast Fishery Sector II	14.8	0.4	3.8	10.6	71.6	-0.9
	Northeast Fishery Sector VI	5.9	0.2	1.6	4.1	69.1	2.5
	Northeast Fishery Sector XIII	5.8	0.2	2.0	3.6	61.3	2.9
	Northeast Fishery Sector VIII	5.6	0.2	1.6	3.8	67.8	5.6
	Georges Bank Cod Fixed	4.8	0.2	0.8	3.9	80.3	-2.5
	Maine Coast Community	2.6	0.1	0.7	1.8	67.9	-5.3
	Northeast Fishery Sector XI	2.3	0.2	0.7	1.4	63.5	-6.7
	Sustainable Harvest Sector -	2.0	0.1	0.8	1.2	57.8	0.0
	Northeast Fishery Sector V	1.9	0.1	0.4	1.4	73.2	0.0
	Northeast Fishery Sector XII	1.4	0.1	0.4	1.0	68.9	0.0
	Northeast Coastal	C	C	C	C	C	0.0
	Northeast Fishery Sector III	0.5	0.0	0.2	0.3	61.0	0.0
	Northeast Fishery Sector X	0.1	0.0	0.0	0.1	51.3	0.0

Compliance and Enforceability

Compliance: As discussed under 7.4.1.1.1.2.4, a move to 100% ASM coverage would dramatically reduce the risk of non-compliance as compared to No Action/Option 1. The reduction of the management uncertainty buffer has a possible positive impact on compliance as well since the incentive to discard may be reduced because more quota will be available, decreasing demand for quota and resultantly, ACE lease prices, by some margin. Overall, this alternative gets a **'high'** compliance score, owning mostly to the fact that comprehensive monitoring would be implemented, but an additional factor is reduced discard incentives.

Enforceability: As discussed under 7.4.1.1.1.2.4, a move to 100% ASM coverage achieves a **'high'** enforceability score since it greatly increases the amount of information available for enforcement officials to detect and prosecute violations, if and when violations occur. The removal of the uncertainty buffer alone has a neutral impact on enforceability relative to No Action/Option 1 since it neither increases or decreases the information available for enforcement and does not impact the enforceability of groundfish reporting requirements.

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

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

Option 1/No Action would maintain the existing maintain the existing measures for removal of 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 removed from the at-sea monitoring coverage requirement. No Action has positive economic impacts on the groundfish fishery to the extent that it minimizes trips monitoring costs, but may carry some risk of non-compliance since discards and landings are not independently verified and incentives for non-compliance exist in the fishery, even when catch of allocated stocks may be small.

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

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

This alternative would remove the at-sea monitoring requirement for vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a trip (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. 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 since total estimated ASM cost savings are less than $30,000 in each fishing year, and less than $3,000 in FY 2018, covering just two vessels and four days absent (Table 145). In FY 2016, effort in this area was higher, but still limited to 5 vessels and 42 days absent, a relatively small proportion of total groundfish effort and a small proportion of the fleet which included 209 vessels in FY 2016 and 179 in FY 2018. Estimated ASM costs are a maximum as well, considering that the target coverage rate may be far less than 100% depending on what is selected in this action and what NEFOP coverage rates are.

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). Compared to Sub-Option 2B, this option is expected to have positive impacts on compliance to the extent that it potentially affects less of current fishing effort.

Enforceability: This alternative is expected to have neutral to low negative 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.

Impact Summary: Overall, direct economic impacts of Sub-Option 2A relative to No Action are neutral to low positive, since the entire groundfish fishery is minimally affected even if 100% ASM coverage were to be selected, but distributional impacts could be more positive to affected vessels, since it reduces their potential total ASM cost obligation. However, exempting vessels based on area fished may mean the incentive to discard illegally, or otherwise conduct illegal activities, is greater than in adjacent areas, depending on the total coverage selected in this action, resulting in low negative indirect impacts on compliance. While is it difficult to enforce retention requirements without an observer onboard, other illegal behavior, just as stat area misreporting, is enforceable to the extent enforcement agents investigate discrepancies between VMS fishing locations and VTR reported locations, therefore this measure will have a low negative to neutral impact on enforceability, but may increase workloads for enforcement agents.

Table 145 Potential ASM costs for exempted sector trips West of 72.5 degrees. Total pounds represent live pounds of groundfish (GF) and nongroundfish (NGF), while NGF and GF pounds are landed dealer pounds. All revenue and costs are in $2018. Source: GARFO DMIS data. Note: ELM exempted trips not removed.

FY	Group	Vessels	Trips	Days Absent	Total Pounds	GF (lbs)	NGF (lbs)	GF ($)	NGF ($)	ASM ($)
2016	sector	5	9	42	201,062	29,270	98,183	28,348	248,890	29,631
2017	sector	5	7	8	32,206	2,949	15,749	8,338	40,258	5,596
2018	sector	2	6	4	c	c	c	c	c	3,029

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

This alternative would remove the dockside monitoring requirement (if implemented) for vessels fishing exclusively west of 72 degrees 30 minutes west longitude on a trip (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. 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.

Overall, based on VTR reported fishing location, Sub-Option 2B would have affected a minority of groundfish vessels and trips between FY 2016 and FY 2018 (Table 146). In FY 2018, only 2 sector vessels and 4 common pool vessels reported fishing west of 7.5 degrees longitude, for a total of 15 trips in that fishing year. Using the DSM cost model, cost savings under 100% DSM monitoring would be approximately $8,700, less than 1% of total estimated DSM costs under full coverage. Under the lower-coverage options, this alternative offers even lower cost-savings.

Between groups, over the three fishing years examined, majority of the effort west of 72.5 degrees west is by the common pool. In 2017, 32 common pool trips occurred west of 72.5 which accounted for approximately 15% of total estimated DSM costs for the common pool. In other years, trips occurring in this area would have accounted for approximately 5% of total estimated DSM costs, which is much larger than for sectors, which at most was 1.5% of total estimated cost in FY 2016.

Compliance: While very little groundfish effort occurs in the proposed exempted area under Option 2, minimizing direct economic impacts, this option may nevertheless incentivize increased effort and possibly illegal behavior in the fishery in order to avoid DSM costs as well as costs imposed by being fully accountable to your quota dockside in the case of sector vessels. 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, depending on the coverage rate selected under 4.1.1.1, as well if ASM coverage is also exempted. 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 landing locations may occur, depending on what is selected under 4.1.1.1. Approximately 6-9 sector trips reported fishing in the proposed area between FY 2016 and FY 2018 while slightly more common pool trips (9-32) occurred there in the same period. Compared to Sub-Option 3B, this option is expected to have positive impacts on compliance to the extent that it potentially affects less fishing effort.

Enforceability: This alternative is expected to have negative impacts on enforceability impacts compared to No Action if 100% DSM is selected, and low positive impacts relative to Sub-Option 3B, since this option would reduce the ability for enforcement to detect misreporting dockside, but would affect a smaller proportion of trips relative to Sub-Option 3B.

Impact Summary: Overall, direct economic impacts of Sub-Option 2B are low positive to positive when compared to a comprehensive DSM program under Option 2, alternative 7.4.4.1.2. Overall direct economic impacts are low positive because the overall cost reductions of this alternative are small compared to the estimated cost of a comprehensive DSM program, but distributional impacts may be more strongly positive. In particular, common pool vessels and vessels whose activities are concentrated in southern ports may benefit more from Sub Option 2B, particularly because DSM costs are estimated to be proportionally higher for vessels offloading in New York and other states south of Point Judith. Indirect economic impacts may be low negative relative to No Action due to possible negative impacts on compliance and enforceability of reporting requirements, particularly if a high ASM/DSM rate is selected, but are relatively positive compared to Sub-Option 3B.

Table 146 Vessel and trip characteristics for vessels reporting fishing west of 72.5 W including estimated DSM costs. Source: GARFO DMIS data. Note: Not all reported groundfish trips reported fishing location on their VTR or VTR location information was otherwise unable to be matched with groundfish trip data, resulting in some loss of information (approximately 1,500 trips were unable to be matched, or 7.5% of all trips). Estimates here may be underestimates as a result.

FY	Group	Vessels	Trips	Landed pounds	Revenue ($)	Offloading costs ($)	Travel costs ($)	Total costs ($)	% of total DSM costs*
2016	common pool	3	10	30,643	32,325	692	4,858	5,828	4.6%
2016	sector	5	9	127,453	277,237	957	10,100	11,610	1.5%
2017	common pool	6	32	23,775	47,430	2,070	16,029	19,004	15.1%
2017	sector	5	7	18,698	48,596	436	4,789	5,487	0.7%
2018	common pool	4	9	17,041	33,770	484	4,663	5,404	4.7%
2018	sector	2	6	c	c	398	2,719	3,272	0.4%

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

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

This alternative would remove the at-sea monitoring requirement for vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a trip (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. On aggregate, between 2.8 and 3.5 million pounds of groundfish and non-groundfish were landed on 500 to 600 sector groundfish trips per year between FY 2016 and FY 2018 (live pounds, Table X). The value of groundfish landings on these trips ranged between $230,000 in FY18 to $591,000 in FY16. Using the average ASM daily rate of $698 per day absent, the maximum cost of observing these trips is between $214,000 and $304,000 per year, assuming every trip is observed (Table 147). Actual costs, and therefore cost savings, will depend on the level of ASM coverage selected in this action and NEFOP coverage in a given year.

Compliance: Because of the level of groundfish effort and groundfish landed in the proposed exempted area under Option 3A, this may 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). Compared to Sub-Option 2A, this option is expected to have negative impacts on compliance to the extent that it potentially affects more of current fishing effort.

Enforceability: This alternative is expected to have neutral to low negative impacts on enforceability impacts compared to No Action and neutral impacts relative to Sub-Option 2A. 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.

Impact Summary: Compared to Sub-Option 2A, levels of groundfish landings in the proposed exemption area are substantially higher, exempting these trips from monitoring coverage is expected to result in positive to high positive economic impacts to those who fish in the exempted area, but at most low 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 negative impacts compared to No Action and neutral to low negative impacts relative to Sub-Option 2A. 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.

Table 147 Potential ASM costs for exempted sector trips West of 72.5 degrees. Total pounds represent live pounds of groundfish (GF) and non-groundfish (NGF), while NGF and GF pounds are landed dealer pounds. All revenue and costs are in $2018. Source: GARFO DMIS data. Note: ELM exempted trips not removed.

FY	Group	Vessels	Trips	DA	Total (lbs)	GF (lbs)	NGF (lbs)	GF ($)	NGF ($)	ASM ($)
2016	sector	47	602	436	3,475,153	220,788	2,462,835	590,763	2,050,229	304,292
2017	sector	33	521	306	2,872,981	108,957	1,949,701	321,658	1,505,062	213,900
2018	sector	34	513	352	2,887,672	107,952	2,017,350	230,651	1,522,281	245,380

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

This alternative would remove the dockside monitoring requirement (if implemented) for vessels fishing exclusively west of 71 degrees 30 minutes west longitude on a trip (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.

Over FY 2016 to FY 2018, between 500 and 600 sector trips and 33 to 47 sector vessels reporting fishing in this proposed exempted area, landing over 2 million pounds of groundfish and non-groundfish species in each year (Table 148). While majority of landed pounds were non-groundfish pounds, between 100,000 and 200,000 pounds were of allocated groundfish stocks (Table 147). Common pool vessels also took between 200 and 300 trips per year and landed between 1 and 2 million pounds of all species. The DSM model was used to estimate potential DSM costs, as cost savings, as a result of this option. In total, between $200,000 and $300,000 per year could be saved if these trips were exempted from comprehensive DSM coverage. Cost savings would be less if lower coverage options were implemented, which affect low groundfish volume vessels or low volume ports. Because trips in this area typically deliver to southern ports, travel costs are estimated to be quite high relative to offloading costs, resulting in a high relative cost savings (total DSM costs were estimated to be approximately $940,000 to $964,000 per year).

Compliance: Because of the current levels of effort in the proposed area, this option is likely to incentivize increased effort and possibly illegal behavior in the fishery in order to avoid DSM costs as well as costs imposed by being fully accountable to your quota dockside in the case of sector vessels. 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 and land there, depending on the coverage rate selected under 4.1.1.1, as well if ASM coverage is also exempted. 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 landing locations may occur, depending on what is selected under 4.1.1.1. Compared to Sub-Option 2B, this option is expected to have negative impacts on compliance to the extent that it potentially affects more fishing effort.

Enforceability: This alternative is expected to have negative impacts on enforceability impacts compared to No Action if 100% DSM is selected, and low negative impacts relative to Sub-Option 2B, since this option would reduce the ability for enforcement to detect misreporting dockside, but would affect a greater proportion of trips relative to Sub-Option 2B.

Impact Summary: Compared to Sub-Option 2B, levels of groundfish landings in this area are substantially higher, exempting these trips from monitoring coverage is expected to result in positive to high positive economic impacts to those who fish in the exempted area, and low positive to positive economic impacts on the fishery as a whole, relative to No Action/Option 1, depending on the DSM 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 offloads needing to be covered by monitors, but could result in negative compliance outcomes to the extent that true landings in this area would be unknown and effort may shift to this area in order to further reduce monitoring costs and additional costs imposed by quota constraints. Compared to Sub-Option 2B, 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 negative impacts compared to No Action and low negative impacts relative to Sub-Option 2B since it may reduce the ability for enforcement to detect misreporting dockside.

Table 148 Vessel and trip characteristics for vessels reporting fishing west of 72.5 W including estimated DSM costs. Source: GARFO DMIS data. Note: Not all reported groundfish trips reported fishing location on their VTR or VTR location information was otherwise unable to be matched with groundfish trip data, resulting in some loss of information (approximately 1,500 trips were unable to be matched, or 7.5% of all trips). Estimates here may be underestimates as a result.

FY	Group	Vessels	Trips	Landed pounds	Revenue ($)	Offloading costs ($)	Travel costs ($)	Total costs ($)	% Total DSM costs*
2016	common pool	23	291	1,929,764	970,065	23,916	69,475	98,061	77.3%
2016	sector	47	602	2,683,623	2,640,993	38,653	132,069	179,258	23.9%
2017	common pool	26	268	1,281,137	704,098	20,200	75,039	100,001	79.5%
2017	sector	33	521	2,058,658	1,826,720	32,906	109,127	149,135	19.8%
2018	common pool	26	239	1,305,194	660,413	17,949	70,995	93,391	81.3%
2018	sector	34	513	2,125,301	1,752,932	32,782	106,452	146,196	18.8%

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

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

Under Option 1/No Action, there is no formal review process to verify that catch composition from vessels fishing on trips that are removed from monitoring requirements have little to no groundfish. 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. There may be some negative, indirect economic impacts if no review process is implemented and changes in effort or catch composition by exempted vessels change drastically.

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

This option, if selected, would establish a process for review of measures for removal of monitoring requirements for vessels that are based on catch composition, should the Council select these measures, 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 Option 2 or 3 is ultimately selected.

7.4.9 Summary of quantitative analysis (coverage rates, at-sea monitoring tools, buffers, and dockside monitoring)

- Costs matter, and the relationship between static cost and dynamic operating profit is not linear because quota are tradeable;
- EM is substantially less costly than ASM for all vessels fishing in the (non-FW55 exempt) groundfish fishery more than 20 days per year;
- The ability to select into EM reduces cost by 44% - 60% when costs are averaged over three years, noting that even this cost reduction is based on an estimate that is not optimized (ASM alone could be roughly 70% more expensive to industry than the low-cost frontier when equipment and installation are subsidized);
- Subsidizing equipment and installation in year 1 brings the three-year average cost of comprehensive monitoring **below** the cost of partial monitoring as they were initially analyzed in A16; and,
- Gross revenues and operating profits are all **higher** for comprehensive (100%) monitoring than they are estimated to be under the Status Quo (no industry funded monitoring) scenario, when the option to remove management uncertainty buffers is selected, noting that these increased profits are not uniformly distributed across the fishing fleet.

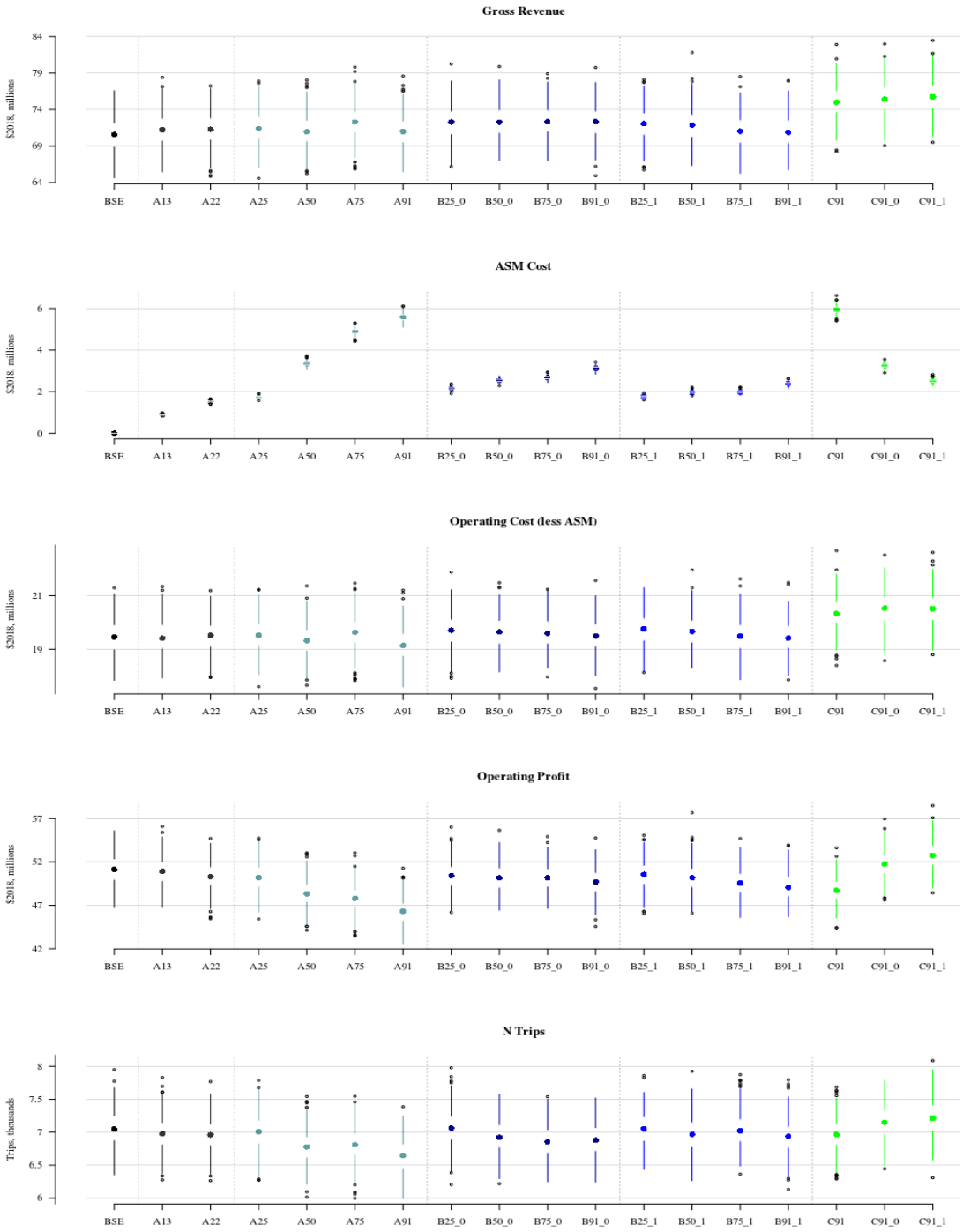


Figure 10. Summary of aggregate results across several metric for various quantitatively analyzed options under consideration (2018$, mil. Key: Black = SQ (BSE) and No Action, Aqua = Stand-alone ASM options (A_XX), Dark blue = Blended EM and ASM options with no subsidy (B_XX_0), Blue = Blended EM and ASM options with subsidy (B_XX_1) and Green = 100% monitoring with management uncertainty buffers removed under three scenarios, stand-alone ASM (C91), blended EM and ASM with no subsidy (C91_0) and blended EM and ASM with subsidy (C91_1))

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 6.5.6 above.

7.5.1 Commercial Groundfish Monitoring Program Revisions (Sectors Only)

7.5.1.1 Sector Monitoring Standards (Target Coverage Levels)

7.5.1.1.1 Sector Monitoring Standard 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. The target and realized coverage levels from FY2010-FY2017 have ranged from 14-38%, and 14-32% respectively, resulting in an average target and realized coverage level of 25% and 22%. The coverage levels under Option 1, therefore, are similar to the option for 25% coverage, and lower than the options for 50% to 100% coverage.

7.5.1.1.2 Sector Monitoring Standard Option 2: Fixed Total At-Sea Monitoring Coverage Level Based on 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.

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.

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 9 in Section 6.5.6.1.1 in the Affected Environment).

7.5.1.1.2.1 Sub-option 2A – 25 percent

For the reasons given above, at-sea monitoring coverage on 25% of trips would produce perhaps the least negative impact on attitudes towards management among commercial fishing crew. Assuming 25% coverage will cost vessel owners less, the 25% coverage level may produce less negative impacts than options for higher levels of coverage in terms of attitudes related to possible decreases in crew compensation from costs associated with increased at-sea monitoring. This option, therefore, would likely have neutral impacts relative to Option 1/No Action, and positive impacts compared to the options for higher monitoring coverage levels.

7.5.1.1.2.2 Sub-option 2B – 50 percent

For the reasons given above, at-sea monitoring coverage on 50% of trips would likely result in greater negative impacts on attitudes towards management among commercial groundfish crew and in terms of attitudes related to possible decreases in crew compensation from costs associated with increased at-sea monitoring. This option, therefore, would lively have negative impacts relative to Option 1/No Action and the option for 25% coverage, and positive impacts compared to the options for higher monitoring coverage levels (75% and 100%).

7.5.1.1.2.3 Sub-option 2C – 75 percent

For the reasons given above, at-sea monitoring coverage on 75% of trips would likely result in greater negative impacts on attitudes towards management among commercial groundfish crew and in terms of attitudes related to possible decreases in crew compensation from costs associated with increased at-sea monitoring. This option, therefore, would lively have negative impacts relative to Option 1/No Action and the options for 25% and 50% coverage, and positive impacts compared to the option for 100% coverage.

7.5.1.1.2.4 Sub-option 2D – 100 percent

For the reasons given above, at-sea monitoring coverage on 100% of trips would likely result in greater negative impacts on attitudes towards management among commercial groundfish crew and in terms of attitudes related to possible decreases in crew compensation from costs associated with increased at-sea monitoring. This option, therefore, would lively have negative impacts relative to Option 1/No Action and the options for 25%, 50%, and 75% coverage.

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

Option 3 may result in neutral-to-negative social impacts relative to the No Action alternative, and may have negative impacts relative to Option 2. 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 reliably achieve the target coverage level for each stock (see section 7.4.3.1.3). Similar to Option 2, 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. 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. 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. Similar to Option 2, Option 3 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.

Given that these coverage levels would be target percentages of catch of each allocated groundfish stock, which would determine an overall coverage level, 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 9 in Section 6.5.6.1.1 in the Affected Environment).

7.5.1.1.3.1 Sub-option 3A – 25 percent

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 reliably achieve the target coverage level for each stock (see section 7.4.3.1.3). A simulation exercise (see section 7.4.3.1.3) demonstrates that 50% randomized observer coverage across all FY2018 sector trips would result in a 90% probability that at least 25% of the total catch of every allocated stock (and halibut) was observed (Figure 2, Table 59 in section 7.4.3.1.3). The option for 25% as a target percentage of catch, therefore, may have negative impacts on attitudes towards management among commercial groundfish crew and in terms of attitudes related to possible decreases in crew compensation from costs associated with increased at-sea monitoring that are more similar to the options for higher coverage levels as described above in section 7.5.1.1.2. 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, compared to the options for higher coverage.

7.5.1.1.3.2 Sub-option 3B – 50 percent

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 reliably achieve the target coverage level for each stock (see section 7.4.3.1.3). A simulation exercise (see section 7.4.3.1.3) demonstrates that 70% randomized observer coverage across all FY2018 sector trips would result in a 90% probability that at least 50% of the total catch of every allocated stock (and halibut) was observed (Figure 3, Table 59 in section 7.4.3.1.3). The option for 50% as a target percentage of catch, therefore, may have negative impacts on attitudes towards management among commercial groundfish crew and in terms of attitudes related to possible decreases in crew compensation from costs associated with increased at-sea monitoring that are similar to the options for higher coverage levels as described above in section 7.5.1.1.2. A coverage rate based on 50 percent of catch would likely produce greater negative impacts in terms of the size and demographics, as well as the attitudes and beliefs, of sector participants in the commercial groundfish fishery, compared to the options for lower coverage.

7.5.1.1.3.3 Sub-option 3C – 75 percent

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 reliably achieve the target coverage level for each stock (see section 7.4.3.1.3). A simulation exercise (see section 7.4.3.1.3) demonstrates that 90% randomized observer coverage across all FY2018 sector trips would result in a 90% probability that at least 75% of the total catch of every allocated stock (and halibut) was observed (Figure 4, Table 59 in section 7.4.3.1.3). The option for 50% as a target percentage of catch, therefore, may have negative impacts on attitudes towards management among commercial groundfish crew and in terms of attitudes related to possible decreases in crew compensation from costs associated with increased at-sea monitoring that are similar to the options for higher coverage levels as described above in section 7.5.1.1.2. A coverage rate based on 75 percent of catch would likely produce greater negative impacts in terms of the size and demographics, as well as the attitudes and beliefs, of sector participants in the commercial groundfish fishery, compared to the options for lower coverage.

7.5.1.1.3.4 Sub-option 3D – 100 percent

100% coverage as a percentage of catch would likely result in greater negative impacts in terms of the size and demographics, as well as the attitudes and beliefs, of sector participants in the commercial groundfish fishery. This option, therefore, would lively have negative impacts relative to Option 1/No Action and the options for 25%, 50%, and 75% coverage.

7.5.1.2 Sector Monitoring Tools (Options for meeting monitoring standards)

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

Sector Monitoring Tools Option 1, electronic monitoring in place of at-sea monitors, could potentially result in long-term neutral-to-positive impacts relative to Sector Monitoring Standards Option 2 or Option

3 alone, in which at-sea monitors would be used to monitor catch, 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 human at-sea monitors over time, however, Option 1 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.

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

Sector Monitoring Tools Option 2, audit model electronic monitoring, could result in neutral-to-positive social impacts for commercial groundfish fishery sector program participants relative to Sector Monitoring Tools Option 1 or Sector Monitoring Standards Option 2 or Option 3 alone, in which at-sea monitors would be used to monitor catch. 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, 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 39 in Section 6.5.6.2.3 in the Affected Environment). 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 34 and 35 in Section 6.5.6.2.3 in the Affected Environment).

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

Sector Monitoring Tools Option 3, maximized retention electronic monitoring, could result in neutral-to-negative social impacts for commercial groundfish fishery sector program participants relative to Sector Monitoring Tools Option 1 and Option 2, or Sector Monitoring Standards Option 2 or Option 3 alone, in which at-sea monitors would be used to monitor catch. 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 39 in Section 6.5.6.2.3 in the Affected Environment). 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 34 and 35 in Section 6.5.6.2.3 in the Affected Environment).

7.5.1.3 Total Monitoring Coverage Level Timing

7.5.1.3.1 Coverage Level Timing 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 39 in Section 6.5.6.2.3 in the Affected Environment). About 14% fewer crew (61%) in other fisheries reported the same concerns about the pace of change in rules and regulations (Table 39 in Section 6.5.6.2.3 in the Affected Environment). Therefore, uncertainty in rules and regulations is a particularly salient issue among groundfish fishery participants compared with those in other fisheries.

7.5.1.3.2 Coverage Level Timing Option 2: 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 39 in Section 6.5.6.2.3 in the Affected Environment, 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.

7.5.1.4 Review process for Sector Monitoring Coverage

7.5.1.4.1 Coverage Review Process 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.

7.5.1.4.2 Coverage Review Process Option 2: 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.

7.5.1.5 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.

Additionally, this administrative measure would add vessel coverage level to the list of management measures that can be adjusted through a framework action. Similar to above, this framework process will provide greater flexibility for management and stakeholders to consider the use of new monitoring tools in the future. Initial discussion and analysis on possible impacts of vessel coverage levels can be found in "Memo from Groundfish PDT to Groundfish Committee re vessel specific coverage level option"[30], as well as in a letter from the NEFSC to the Council[31] in response to a request for information on observer deployment data at the vessel level for groundfish trips.

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

7.5.2.1 Dockside Monitoring Program (Sectors and Common Pool)

7.5.2.1.1 Dockside Monitoring 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.

[30] "Memo from Groundfish PDT to Groundfish Committee re vessel specific coverage level option", dated November 19, 2019; https://s3.amazonaws.com/nefmc.org/191119-GF-PDT-memo-to-GF-Committee-re-vessel-specific-coverage-level-option-with-attachments.pdf

[31] Letter from NEFSC to NEFMC, dated November 22, 2019; https://s3.amazonaws.com/nefmc.org/191122_Letter_NEFSC-to-NEFMC_vessel-observer-coverage-rates.pdf

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

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 9 in Section 6.5.6.1.1 in the Affected Environment). 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 29 in Section 6.5.6.1.2 in the Affected Environment) and moderate gentrification pressures (Table 30 in Section 6.5.6.1.2 in the Affected Environment) 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 38 and 39 in Section 6.5.6.2.3 in the Affected Environment).

7.5.2.2 Dockside Monitoring Program Structure and Design

7.5.2.2.1 Dockside Monitoring Program Funding Responsibility

7.5.2.2.1.1 Dockside Monitoring Program Funding Responsibility Option A – Dealer Responsibility

Option A 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 29 and 30 in Section 6.5.6.1.2 in the Affected Environment) among many of the most commercially engaged communities in the groundfish fishery (Figure 9 in Section 6.5.6.1.1 in the Affected Environment), 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.

7.5.2.2.1.2 Dockside Monitoring Program Funding Responsibility Option B – Vessel Responsibility

Option B 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 9 in Section 6.5.6.1.1 in the Affected Environment) and remote communities due to reductions in employment opportunities and economic activity.

Additionally, Option B 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 38 and 39 in Section 6.5.6.2.3 in the Affected Environment). 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 39 in Section 6.5.6.2.3 in the Affected Environment). 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.

7.5.2.2.2 Dockside Monitoring Program Administration

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

Option A 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.

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

Option B 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 Option 1/No Action.

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

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

Option A 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 a 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 9 in Section 6.5.6.1.1 in the Affected Environment). Other ports that have substantial engagement in commercial groundfish and would most likely benefit from Option A may also include, but are not limited to, Portland, ME, Narragansett, RI, Chatham, MA, Scituate, MA, and Cape May, NJ.

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

Option B is expected to have 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 surveyed in both 2012 and 2018 either agreed or strongly agreed that the regulations in their primary fisheries are too restrictive (Tables 38 and 39 in Section 6.5.6.2.3 in the Affected Environment). 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.

7.5.2.2.4 Safety and Liability Associated with Fish Hold Inspections

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

Option A 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, Option A 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 captains 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 (Tables 39 in Section 6.5.6.2.3 in the Affected Environment). 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 Option A 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.

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

Option B 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 Option A, 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.

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

Option C 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

7.5.3 Sector Reporting

7.5.3.1 Sector reporting 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 39 in Section 6.5.6.2.3 in the Affected Environment), 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.

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

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.

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

7.5.4.1 Funding Provisions Option A: 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 39 in Section 6.5.6.2.3 in the Affected Environment) and would produce disproportionate social impacts on smaller, lesser engaged ports (Figure 9 in Section 6.5.6.1.1 in the Affected Environment) and smaller or lower volume vessels due to the likelihood of outsized costs and reductions in profitability due to restrictions on fishing effort.

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

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

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.

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

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.

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

7.5.5.1 Management Uncertainty Buffer 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.

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

Option 2 may produce neutral to positive social impacts for commercial groundfish fishery participants and communities relative to Options 1. 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.

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

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

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

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

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

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

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

Sub-Option 2B would likely result in neutral social impacts for commercial groundfish fishery participants and communities. Since the measures to remove dockside monitoring requirements (if implemented) apply to vessels that primarily target non-groundfish stocks and species, and therefore catch

very few groundfish, these measures, or any changes to them, would likely not affect any commercial groundfish fishery participants.

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

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

Sub-Option 3A would likely result in neutral social impacts for commercial groundfish fishery participants and communities. Since the measures to remove at-sea monitoring requirements 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.

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

Sub-Option 3B would likely result in neutral social impacts for commercial groundfish fishery participants and communities. Since the measures to remove dockside monitoring requirements (if implemented) 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.

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

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

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

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

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