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E.F. "Terry" Stockwell, Chairman | Thomas A. Nies, *Executive Director*

**MEMORANDUM**

**DATE:** December 1, 2015

**TO:** Groundfish Committee

**FROM:** Jamie M. Cournane, PhD, Groundfish Plan Development Team (PDT) Chair

**SUBJECT:** **Draft Framework Adjustment 55 (FW 55) Environmental Impacts Analysis, "Version 3"**

- This is a follow-up to "Version 1" distributed on November 25, 2015 and "Version 2" distributed on November 30, 2015. Information provided in "Version 1" and "Version 2" is not repeated in this document, "Version 3".

- "Version 3" includes remaining draft biological impacts analysis (i.e., Groundfish Sector Monitoring Program).

- Additional economic impacts analysis (i.e., results from the Quota Change Model) will be provided at the Council meeting on December 2, 2015.

# 7.1 Biological Impacts

### 7.1.1 Updates to Status Determination Criteria and Annual Catch Limits
### 7.1.2 Fishery Program Administration
### 7.1.3 Commercial and Recreational Fishery Measures

#### 7.1.3.1 Groundfish Sector Monitoring Program

In this section, the Council may combine the various action alternatives (Options 2, 3A/B, 4A/B, and 5). The action alternatives in general are intended to maintain monitoring coverage levels needed to estimate catches of groundfish stocks, and reduce or eliminate monitoring in areas where it is not needed to manage costs. Thus, the action alternatives in combination may lead to increases in fishing effort where it otherwise would have been constrained due to costs associated with ASM. Increased ASM cost sharing is forthcoming under any of these alternatives, which could lead to reduced fishing effort. However, it is difficult to predict how the industry will operate under Option 1, in terms of whether it will constrain effort, let alone under the other options in this section.

##### 7.1.3.1.1 Option 1: No Action

*Impacts on regulated groundfish*

Option 1/No Action would maintain the existing monitoring program as defined in Amendment 16 and Framework 48. The cost sharing envisioned under Amendment 16, which is just now being implemented in FY 2015, combined with no other changes to the goals or requirements of the program, could lead to reduced fishing effort under No Action as compared to current conditions, and therefore to reductions in biological impacts. It is difficult to predict the magnitude of these changes. Since Option 1 would lead to higher coverage rates it would continue to provide positive benefits for regulated groundfish species. Action alternatives (Options 2, 3A/B, 4A/B, and 5) would also provide positive benefits for regulated groundfish species, but these are likely low positive, neutral, or negative when compared to Option 1.

Generally, higher target coverage levels and realized coverage would result in multiple positive impacts on regulated groundfish species. These include benefits for stock assessments including less uncertainty with the discard estimates, less uncertainty in the size-age structure of discards and better linkage between monitoring catch and quota estimation. Further for non-allocated stock – which are essentially discards inly, estimated catch relies on observations at sea (Figure 2). Furthermore, changes to ASM could potentially improve sector based groundfish discard monitoring but depending on the change it could prevent ASM's use in stock assessments due to introduced biases from non-random sampling since stock assessments use a different stratification. Stratification in stock assessments is based on gear and mesh.

As a comparison, the CV for FY 2014 with and without ASM are provided in Table 1. Generally, increased coverage leads to a reduction in the CV for each stock and therefore improved estimations of discards. Furthermore, a benefit of higher coverage is to reduce the potential for observer bias. Although it is not possible to quantify observer bias at this time, the direction of any bias can change from year to year leading to over or under- estimates of discards.

The preliminary summary of Multispecies FY 2014 discard performance for use in the FY 2016 ASM Coverage is summarized in Table 2, Table 3, Figure 1, Figure 2, and Figure 3. The overall realized coverage level for FY 2014 is 25.7% (Table 2). The Stock CVs for FY 2014 is summarized in Table 3.

Redfish has a CV of 41.5 with an estimated coverage rate of 37 percent needed to reach a CV 30. GOM winter flounder has a CV of 29.06 with an estimated coverage rate of 26 percent to reach a CV 30.

As shown in Figure 1, a 41 percent coverage rate is estimated to be required 80 percent of the total aggregated discards to reach a CV 30 or better, based on data from FY 2014. Figure 1 also indicates that at a CV30 that with a target coverage level greater than approximately 55% the benefit of observing discards is negligible, similarly at a CV20 that with a target coverage level greater than approximately 70% the benefit of observing discards is negligible. Figure 2 and Figure 3 summarize the observed and unobserved discards in terms of percent sub-ACL and total discards. Based on this analysis, the preliminary results indicate that FY 2016 coverage would be 41% under the current approach (if including the requirement that 80% of all discards be observed); otherwise coverage would be 37%. Acadian redfish is the driver for this rate.

*Impacts on other species*

Since Option 1 would lead to higher coverage rates it would continue to provide positive benefits for other species if they are sampled on trips. Action alternatives (Options 2, 3A/B, 4A/B, and 5) would also provide positive benefits for other species, but these are likely low positive to neutral when compared to Option 1

**Table 1- Comparison of realized CVs for each stock with NEFOP and ASM and with NEFOP only for FY 2014. These are considered draft, provided for informational purposes, and subject to change. Source,: CVs - NEFOP+ ASM, GARFO, November 16, 2015 and NEFOP, NEFSC, May 28, 2015.**

| FY 2014<br>Stock | Realized CV NEFOP+ASM | Realized CV NEFOP |
|---|---|---|
| GB cod | 13.94 | 63.88 |
| GOM cod | 11.16 | 30.98 |
| Plaice | 7.33 | 19.12 |
| GB winter flounder | 20.84 | 23.34 |
| GOM winter flounder | 29.06 | 28.21 |
| Witch flounder | 8.95 | 21.60 |
| CC/GOM yellowtail flounder | 14.10 | 24.79 |
| GB yellowtail flounder | 21.14 | 20.09 |
| SNE/MA yellowtail flounder | 23.08 | 33.36 |
| GB haddock | 8.55 | 21.79 |
| GOM haddock | 12.03 | 30.72 |
| White hake | 15.29 | 26.82 |
| Pollock | 9.72 | 31.06 |
| Redfish | 41.5 | 72.19 |
| SNE/MA winter flounder | 16.66 | 38.12 |
| S windowpane flounder | 8.26 | 16.87 |
| N windowpane flounder | 12.75 | 53.65 |
| Ocean pout | 16.50 | 78.73 |
| Halibut | 6.97 | 19.35 |
| Wolffish | 9.72 | 28.38 |

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**Table 2- Target and realized coverage levels, FY 2010-FY 2014. Source: GARFO, November 16, 2015.**

| Fishing Year | NEFOP target coverage level | ASM target coverage level | Total target coverage level | Realized coverage level |
|---|---|---|---|---|
| FY 2010 | 8 % | 30 % | 38 % | 32 % |
| FY 2011 | 8 % | 30 % | 38 % | 27 % |
| FY 2012 | 8 % | 17 % | 25 % | 22 % |
| FY 2013 | 8 % | 14 % | 22 % | 20 % |
| FY 2014 | 8 % | 18 % | 26 % | 25.7 % |
| FY 2015 | 4 % | 20% | 24 % | n/a* |

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**Table 3- Realized stock CVs and percent coverage required to achieve CV30, FY 2010 - FY 2014. Source: GARFO, November 16, 2015.**

| | FY 2010 | | FY 2011 | | FY 2012 | | FY 2013 | | FY 2014 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Realized CV | CV 30 Percent Coverage Required | Realized CV | CV 30 Percent Coverage Required | Realized CV | CV 30 Percent Coverage Required | Realized CV | CV 30 Percent Coverage Required | Realized CV | CV 30 Percent Coverage Required |
| GB cod | 5.61 | 1.7 | 8.39 | 3.05 | 10.5 | 3.03 | 14.56 | 5.19 | 13.94 | 6.41 |
| GB cod E | 9.73 | 3.9 | 15.44 | 11.29 | 20.1 | 9.81 | 48.61 | 27.74 | 24.77 | 14.61 |
| GB cod W | 6.27 | 2.16 | 9.85 | 4.09 | 12.26 | 4.09 | 15.17 | 5.74 | 16.15 | 8.56 |
| GOM cod | 4.74 | 1.33 | 4.74 | 1.04 | 9.73 | 2.95 | 6.07 | 1.11 | 11.16 | 5.02 |
| Plaice | 4.96 | 1.23 | 4.36 | 0.76 | 5.52 | 0.82 | 6.51 | 1.05 | 7.33 | 1.75 |
| GB winter flounder | 16.29 | 8.77 | 27.67 | 21.71 | 21.29 | 8.87 | 23 | 10.63 | 20.84 | 11.27 |
| GOM winter flounder | 10.56 | 6.19 | 8.81 | 3.5 | 8.96 | 2.54 | 15.1 | 6.4 | 29.06 | 25.99 |
| Witch flounder | 5.76 | 1.6 | 5.11 | 1.06 | 8.87 | 2.05 | 7.41 | 1.35 | 8.95 | 2.54 |
| CC/GOM yellowtail flounder | 8.66 | 4.19 | 6.9 | 2.07 | 7.8 | 1.81 | 9.32 | 2.43 | 14.10 | 7.35 |
| GB yellowtail flounder | 11.13 | 4.29 | 10.36 | 3.69 | 15.97 | 5.11 | 24.84 | 12.42 | 21.14 | 11.59 |
| SNE/MA yellowtail flounder | 13.95 | 10.44 | 9.39 | 4.15 | 12.9 | 4.63 | 31.37 | 20.63 | 23.08 | 13.93 |
| GB haddock | 9.4 | 4.61 | 10.22 | 4.55 | 21.48 | 11.29 | 11.81 | 3.59 | 8.55 | 2.71 |
| GB haddock E | 12.73 | 6.43 | 17.36 | 13.97 | 33.64 | 23.36 | 29.98 | 12.67 | 10.79 | 3.27 |
| GB haddock W | 13.31 | 9.05 | 10.1 | 4.37 | 27.04 | 16.8 | 12.83 | 4.35 | 10.02 | 3.78 |
| GOM haddock | 9.94 | 5.56 | 9.11 | 3.68 | 12.26 | 4.6 | 12.98 | 4.84 | 12.03 | 5.76 |
| White hake | 9.21 | 4.15 | 7.76 | 2.36 | 12.95 | 4.44 | 11.94 | 3.41 | 15.29 | 7.51 |
| Pollock | 8.01 | 3.19 | 6.91 | 1.88 | 7.71 | 1.64 | 7.64 | 1.41 | 9.72 | 3.31 |
| Redfish | 11.51 | 6.15 | 8.98 | 3.11 | 13.79 | 4.87 | 21.16 | 9.87 | 41.5 | 36.83 |
| SNE/MA winter flounder | 10.61 | 7.2 | 12.85 | 7.74 | 15.44 | 7.24 | 21.05 | 11.77 | 16.66 | 10.84 |
| S windowpane flounder | 9.12 | 4.75 | 8.22 | 3.23 | 10.7 | 2.99 | 7.98 | 1.74 | 8.26 | 2.04 |
| N windowpane flounder | 13.22 | 8.08 | 9.04 | 3.05 | 11.01 | 3.21 | 16.69 | 6.45 | 12.75 | 5.31 |
| Ocean pout | 9.69 | 4.58 | 9.38 | 3.36 | 11.7 | 3.55 | 11.57 | 2.8 | 16.50 | 7.44 |
| Halibut | 6.34 | 2.01 | 6.95 | 1.93 | 6.66 | 1.22 | 7.68 | 1.43 | 6.97 | 1.68 |
| Wolffish | 6.66 | 2.18 | 7 | 1.9 | 8.34 | 1.93 | 9.55 | 2.24 | 9.72 | 3.16 |

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**Figure 1- FY 2014 percent discards at CV level (CV30 and CV20), discards (in thousands of lb), sea days (in thousands of days) and associated cost estimate (in thousands of dollars). Source: GARFO, November 16, 2015.**

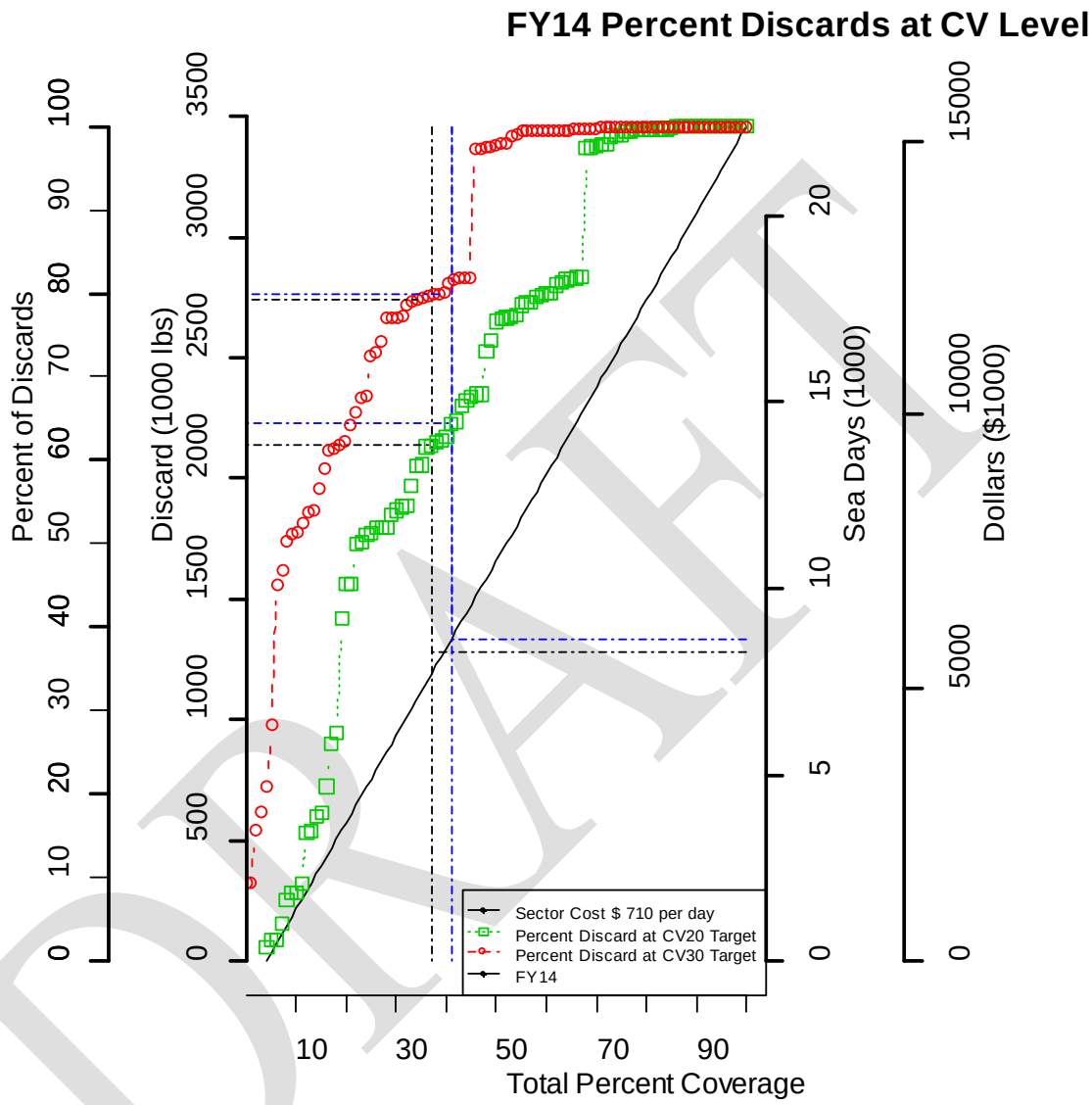


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**Figure 2- FY 2014 groundfish discards as a percentage of catch. Source: GARFO, November 16, 2015.**

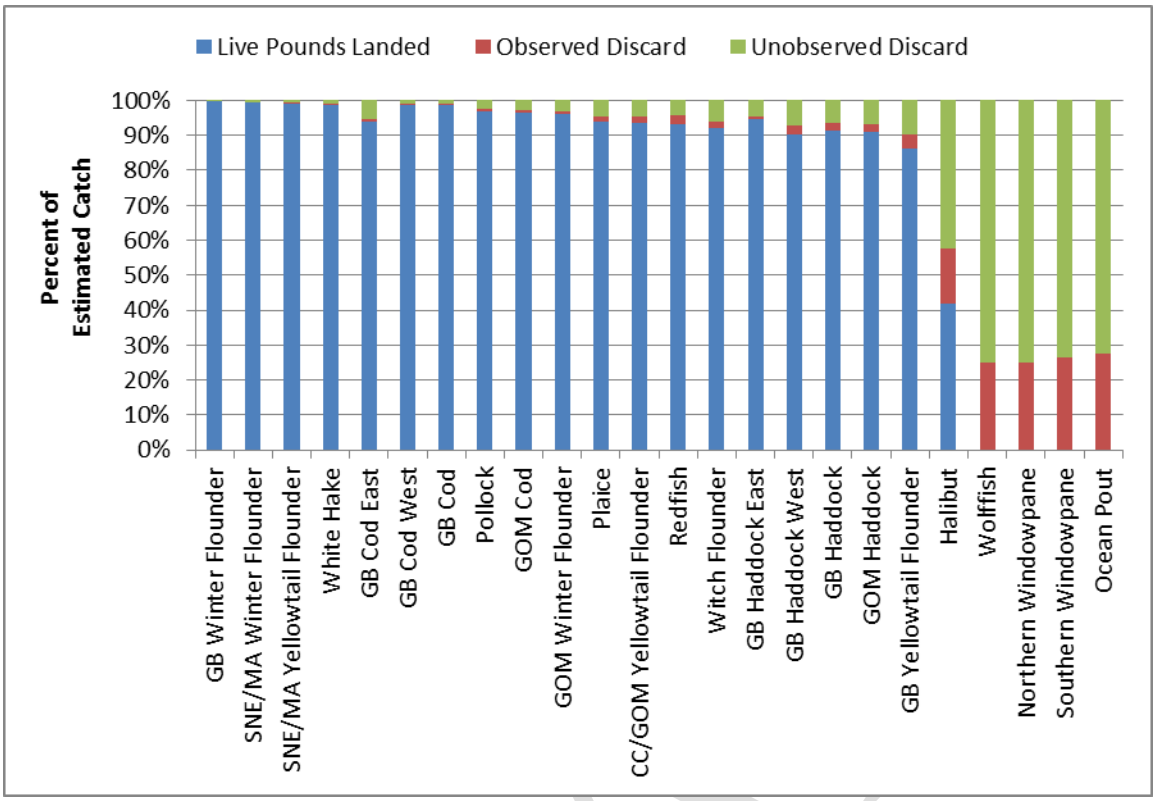


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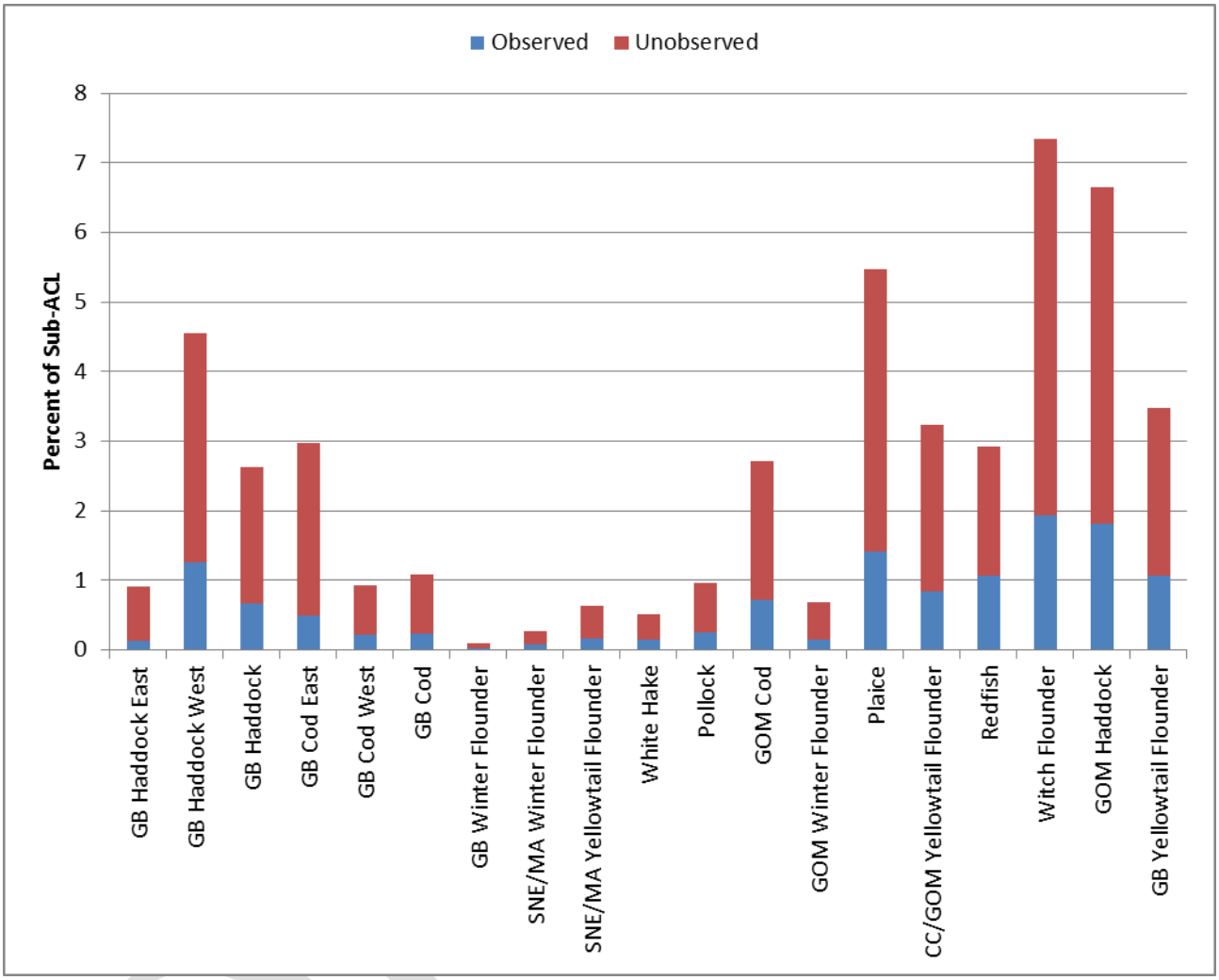
**Figure 3- FY 2014 allocated groundfish discards as a percentage of sub-ACL. Source: GARFO, November 16, 2015.**




7.1.3.1.2 Option 2: Clarify Groundfish Monitoring Goals and Objectives

*Impacts of regulated groundfish*

Option 2 would clarify that the primary goal of ASM is to verify area fished, catch, and discards by species and gear type, and that this goal should be met via the most cost effective means practicable. This clarification may help to limit ASM coverage to instances where it is necessary to achieve these objectives, therefore reducing cost burdens associated with ASM. As this option represents a change to the goals of the program only, it will have an indirect impact on coverage levels and distribution of covered trips. While adherence to this goal may mitigate any negative impacts of ASM requirements on the amount of trips a vessel takes and therefore increase fishing effort somewhat relative to maintaining the ASM program as-is via the No Action alternative. Since the goal for benefits to stock assessments would still be considered a goal albeit secondary, the impacts are likely to be low negative on regulated groundfish species.

*Impacts on other species*

Impacts on other species under Option 2 are likely to be neutral when compared with Option 1.

7.1.3.1.3 Option 3: Clarify methods used to set sector ASM coverage rates

- *Sub-Option 3A: Monitoring 80% of discarded pounds at CV30*

*Impacts of regulated groundfish*

As shown in Figure 1, a 41 percent coverage rate is estimated to be required 80 percent of the total aggregated discards to reach a CV 30 or better, based on data from FY 2014. Based on this analysis, the preliminary results indicate that FY 2016 coverage would be 41% under the current approach (if including the requirement that 80% of all discards be observed); otherwise coverage would be 37%. Acadian redfish is the driver for this rate. Figure 1 indicates that at a CV30 that with a target coverage level of 37% that approximately 78% of discards would be observed, similarly at a CV20 that 63% of the discards would be observed. Sub-Option 3A would likely provide fewer positive benefits for regulated species that Option 1.

*Impacts on other species*

Information collected on other species would be collected at a lower total coverage rate than Option 1. Sub-Option 3A would likely provide fewer positive benefits for other species that Option 1.

- *Sub-Option 3B: Multi-year approach to setting sector ASM coverage*

*Impacts on regulated groundfish*

These sub-options would refine the approaches used to set target coverage rates and should help to make these rates more stable over time and across sectors. Again, while either or both of these options may mitigate some of the negative impacts of ASM requirements on the amount of trips a vessel takes and therefore increase fishing effort somewhat relative to maintaining the ASM program as-is via the No Action alternative.

Changes in the coverage rates needed to achieve a 30% CV from one year to the next suggests that one year's estimate may not predict very well the coverage rates needed in a subsequent year. An indication of this is evident in the table below with the changes in the maximum coverage needed among the different stocks across years.

With 5 years of data we can now test how well a single year estimator performs for estimating the coverage rates needed for year t+1. A performance comparison was done for three different coverage rate estimators (3 year average, 2 year average, and a single year) to achieve a 30% stock wide CV in 2014 (((estimator-2014)/2014) X 100). A current year bridge year assumption is made for when the estimate is done (2013). For example, 2012 is used to estimate 2014 for the single year estimator. For the two year average estimator, the 2011-2012 average estimate was used to predict the coverage rate needed in 2014 and for the 3 year average, 2010-2012 was used. Therefore with only five years of data the 5 year

average estimator cannot be tested until we collect 7 years of data. Using more than one year of data tends to smooth out some of the noise assuming there are no large trends over the years that are being averaged. Overall, across stocks it appears the three year average performed relatively well for predictions of the 30% CV coverage rates needed in 2014 relative to using the 2 year and single year estimator. However more years of data and analysis is needed to make a final conclusion on this. It appears the 3 year average estimator did not perform worse relative the single year estimator but implications for coverage rate do vary among the estimators (Table 4)

For GB haddock the 3 year average estimator performed better than the 2 year or single year estimator (Table 5 and Figure 4). Perhaps the poorer performance of using fewer years with GB haddock for this comparison is due to a strong relationship with discards of strong year classes as they grow and become recruited to the fishery over time. This could occur over a two year timespan. Whether several years or a single year of data performs better for a species like haddock may depend on the size and age of strong year classes at the time of the analysis.

Option 3B would result in reductions in the target observer coverage levels. As shown in Figure 1, a 41 percent coverage rate is estimated to be required 80 percent of the total aggregated discards to reach a CV 30 or better, based on data from FY 2014. Based on this analysis, the preliminary results indicate that FY 2016 coverage would be 41% under the current approach (if including the requirement that 80% of all discards be observed); otherwise coverage would be 37%. Acadian redfish is the driver for this rate.

The total coverage rates using a multi-year approach for FY 2016 range from 11% to 37%. Figure 1 indicates that at a CV30 that with a target coverage level of 11% that approximately 78% of discards would be observed, similarly at a CV20 that 63% of the discards would be observed. Figure 1 indicates that at a CV30 that with a target coverage level of 37% that approximately 50% of discards would be observed, similarly at a CV20 that 9% of the discards would be observed. Sub-Option 3B would provide fewer positive benefits for regulated species that Option 1. Depending on the approach chosen, it could result in low positive to low negative impacts on regulated groundfish species relative to Option 1.

The current analysis to determine observer coverage rates depends on using the last full year of data at the time of analysis (e.g., coverage for FY 2015 determined using FY 2013 information). One concern is whether coverage rates at the stock level in one given year should be the driving factor when determining an overall rate for the fishery. Multiple years of information could be used to determine a target coverage rate (i.e., average or median of the CV 30 percent coverage requirement by stock across several years – 2, 3, or 5 years). This would stabilize and smooth out the estimates for the required coverage needed to obtain a CV of 30%. There is a tradeoff with smoothing out the noise in the CV estimates and ability to response to real changes in trends with the CVs over time. A five year smooth may be slow in picking up real changes in the CV over time. By definition it will take five years for a very high or low CV estimate to leave the estimator. Comparison of the three year moving average and the two year moving average in Table 5 to the yearly estimates in Table 4 should be considered for determining the tradeoffs for smoothing the estimator.

*Impacts on other species*

Information collected on other species would be collected at a lower total coverage rate than Option 1. Sub-Option 3B would likely provide fewer positive benefits for other species that Option 1.

**Table 4- Example of using multiple years of information to determine total coverage rates.**

=max within year across stocks

| | 2010 | 2011 | 2012 | 2013 | 2014 | 5 YEAR | | 3 YEAR | | 2 YEAR | single |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CV 30 Percent Coverage Required | CV 30 Percent Coverage Required | CV 30 Percent Coverage Required | CV 30 Percent Coverage Required | CV 30 Percent Coverage Required | AVG | MEDIAN | AVG | MEDIAN | AVG | year |
| GB cod | 1.7 | 3.05 | 3.03 | 5.19 | 6.41 | 3.88 | 3.05 | 4.88 | 5.19 | 5.80 | 6.41 |
| GB cod E | 3.9 | 11.29 | 9.81 | 27.74 | 14.61 | 13.47 | 11.29 | 17.39 | 14.61 | 21.18 | 14.61 |
| GB cod W | 2.16 | 4.09 | 4.09 | 5.74 | 8.56 | 4.93 | 4.09 | 6.13 | 5.74 | 7.15 | 8.56 |
| GOM cod | 1.33 | 1.04 | 2.95 | 1.11 | 5.02 | 2.29 | 1.33 | 3.03 | 2.95 | 3.07 | 5.02 |
| Plaice | 1.23 | 0.76 | 0.82 | 1.05 | 1.75 | 1.12 | 1.05 | 1.21 | 1.05 | 1.40 | 1.75 |
| GB winter | 8.77 | 21.71 | 8.87 | 10.63 | 11.27 | 12.25 | 10.63 | 10.26 | 10.63 | 10.95 | 11.27 |
| GOM winter | 6.19 | 3.5 | 2.54 | 6.4 | 25.99 | 8.92 | 6.19 | 11.64 | 6.40 | 16.20 | 25.99 |
| Witch | 1.6 | 1.06 | 2.05 | 1.35 | 2.54 | 1.72 | 1.60 | 1.98 | 2.05 | 1.95 | 2.54 |
| CC/GOM yellowtail | 4.19 | 2.07 | 1.81 | 2.43 | 7.35 | 3.57 | 2.43 | 3.86 | 2.43 | 4.89 | 7.35 |
| GB yellowtail | 4.29 | 3.69 | 5.11 | 12.42 | 11.59 | 7.42 | 5.11 | 9.71 | 11.59 | 12.01 | 11.59 |
| SNE/MA winter | 10.44 | 4.15 | 4.63 | 20.63 | 13.93 | 10.76 | 10.44 | 13.06 | 13.93 | 17.28 | 13.93 |
| GB haddock | 4.61 | 4.55 | 11.29 | 3.59 | 2.71 | 5.35 | 4.55 | 5.86 | 3.59 | 3.15 | 2.71 |
| GB haddock E | 6.43 | 13.97 | 23.36 | 12.67 | 3.27 | 11.94 | 12.67 | 13.10 | 12.67 | 7.97 | 3.27 |
| GB haddock W | 9.05 | 4.37 | 16.8 | 4.35 | 3.78 | 7.67 | 4.37 | 8.31 | 4.35 | 4.07 | 3.78 |
| GOM haddock | 5.56 | 3.68 | 4.6 | 4.84 | 5.76 | 4.89 | 4.84 | 5.07 | 4.84 | 5.30 | 5.76 |
| White hake | 4.15 | 2.36 | 4.44 | 3.41 | 7.51 | 4.37 | 4.15 | 5.12 | 4.44 | 5.46 | 7.51 |
| Pollock | 3.19 | 1.88 | 1.64 | 1.41 | 3.31 | 2.29 | 1.88 | 2.12 | 1.64 | 2.36 | 3.31 |
| Redfish | 6.15 | 3.11 | 4.87 | 9.87 | 36.83 | 12.17 | 6.15 | 17.19 | 9.87 | 23.35 | 36.83 |
| SNE/MA | 7.2 | 7.74 | 7.24 | 11.77 | 10.84 | 8.96 | 7.74 | 9.95 | 10.84 | 11.31 | 10.84 |
| S windowpane | 4.75 | 3.23 | 2.99 | 1.74 | 2.04 | 2.95 | 2.99 | 2.26 | 2.04 | 1.89 | 2.04 |
| N windowpane | 8.08 | 3.05 | 3.21 | 6.45 | 5.31 | 5.22 | 5.31 | 4.99 | 5.31 | 5.88 | 5.31 |
| Ocean pout | 4.58 | 3.36 | 3.55 | 2.8 | 7.44 | 4.35 | 3.55 | 4.60 | 3.55 | 5.12 | 7.44 |
| Halibut | 2.01 | 1.93 | 1.22 | 1.43 | 1.68 | 1.65 | 1.68 | 1.44 | 1.43 | 1.56 | 1.68 |
| Wolffish | 2.18 | 1.9 | 1.93 | 2.24 | 3.16 | 2.28 | 2.18 | 2.44 | 2.24 | 2.70 | 3.16 |

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**Table 5- Comparison of three different coverage estimators (3 year average, 2 year average, and single year) to achieve a 30%CV in FY 2014.**

| | | Estimator | | |
|---|---|---|---|---|
| Stock # | stock | 3 year average | 2 year average | 1 year |
| 1 | GB cod | -60% | -53% | -53% |
| 2 | GB cod E | -43% | -28% | -33% |
| 3 | GB cod W | -60% | -52% | -52% |
| 4 | GOM cod | -65% | -60% | -41% |
| 5 | Plaice | -46% | -55% | -53% |
| 6 | GB winter | 16% | 36% | -21% |
| 7 | GOM winter | -84% | -88% | -90% |
| 8 | Witch | -38% | -39% | -19% |
| 9 | CC/GOM yellowtail | -63% | -74% | -75% |
| 10 | GB yellowtail | -62% | -62% | -56% |
| 11 | SNE/MA winter | -54% | -68% | -67% |
| 12 | GB haddock | 152% | 192% | 317% |
| 13 | GB haddock E | 346% | 471% | 614% |
| 14 | GB haddock W | 166% | 180% | 344% |
| 15 | GOM haddock | -20% | -28% | -20% |
| 16 | White hake | -51% | -55% | -41% |
| 17 | Pollock | -32% | -47% | -50% |
| 18 | Redfish | -87% | -89% | -87% |
| 19 | SNE/MA | -32% | -31% | -33% |
| 20 | S windowpane | 79% | 52% | 47% |
| 21 | N windowpane | -10% | -41% | -40% |
| 22 | Ocean pout | -49% | -54% | -52% |
| 23 | Halibut | 2% | -6% | -27% |
| 24 | Wolffish | -37% | -39% | -39% |

**Figure 4- Comparison of three different coverage estimators (3 year average, 2 year average, and single year) to achieve a 30%CV in FY 2014, represented as a deviation from 2014. Stock numbers correspond to those in Table 5.**

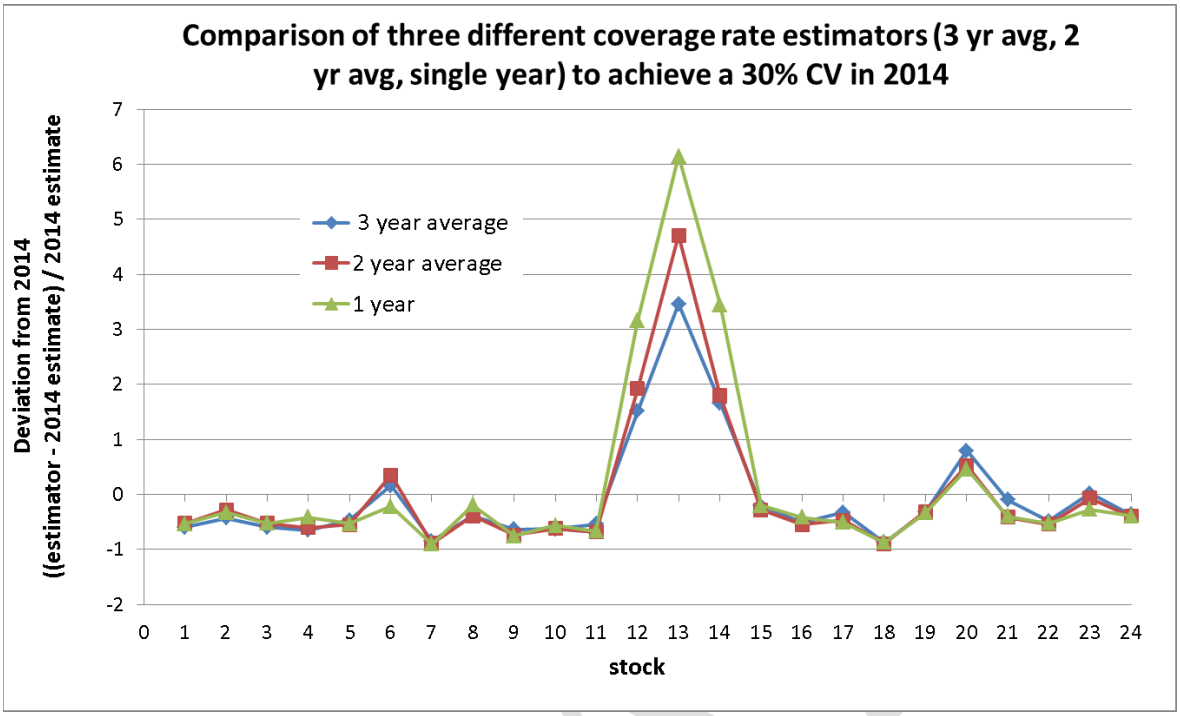


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**Table 6- Comparison of percent coverage require of the three year moving average and the two year moving average smoother to achieve a CV30 for the five years of available data. This can be compared to the single year estimate in Table 4. Blue cells are the maximum excluding the gray sub-stocks cells.**

| | 3 year moving average | | | 2 year moving average | | | |
|---|---|---|---|---|---|---|---|
| | 10-12 | 11-13 | 12-14 | 10-11 | 11-12 | 12-13 | 13-14 |
| GB cod | 2.59 | 3.76 | 4.88 | 2.38 | 3.04 | 4.11 | 5.80 |
| GB cod E | 8.33 | 16.28 | 17.39 | 7.60 | 10.55 | 18.78 | 21.18 |
| GB cod W | 3.45 | 4.64 | 6.13 | 3.13 | 4.09 | 4.92 | 7.15 |
| GOM cod | 1.77 | 1.70 | 3.03 | 1.19 | 2.00 | 2.03 | 3.07 |
| Plaice | 0.94 | 0.88 | 1.21 | 1.00 | 0.79 | 0.94 | 1.40 |
| GB winter | 13.12 | 13.74 | 10.26 | 15.24 | 15.29 | 9.75 | 10.95 |
| GOM winter | 4.08 | 4.15 | 11.64 | 4.85 | 3.02 | 4.47 | 16.20 |
| Witch | 1.57 | 1.49 | 1.98 | 1.33 | 1.56 | 1.70 | 1.95 |
| CC/GOM yellowtail | 2.69 | 2.10 | 3.86 | 3.13 | 1.94 | 2.12 | 4.89 |
| GB yellowtail | 4.36 | 7.07 | 9.71 | 3.99 | 4.40 | 8.77 | 12.01 |
| SNE/MA winter | 6.41 | 9.80 | 13.06 | 7.30 | 4.39 | 12.63 | 17.28 |
| GB haddock | 6.82 | 6.48 | 5.86 | 4.58 | 7.92 | 7.44 | 3.15 |
| GB haddock E | 14.59 | 16.67 | 13.10 | 10.20 | 18.67 | 18.02 | 7.97 |
| GB haddock W | 10.07 | 8.51 | 8.31 | 6.71 | 10.59 | 10.58 | 4.07 |
| GOM haddock | 4.61 | 4.37 | 5.07 | 4.62 | 4.14 | 4.72 | 5.30 |
| White hake | 3.65 | 3.40 | 5.12 | 3.26 | 3.40 | 3.93 | 5.46 |
| Pollock | 2.24 | 1.64 | 2.12 | 2.54 | 1.76 | 1.53 | 2.36 |
| Redfish | 4.71 | 5.95 | 17.19 | 4.63 | 3.99 | 7.37 | 23.35 |
| SNE/MA | 7.39 | 8.92 | 9.95 | 7.47 | 7.49 | 9.51 | 11.31 |
| S windowpane | 3.66 | 2.65 | 2.26 | 3.99 | 3.11 | 2.37 | 1.89 |
| N windowpane | 4.78 | 4.24 | 4.99 | 5.57 | 3.13 | 4.83 | 5.88 |
| Ocean pout | 3.83 | 3.24 | 4.60 | 3.97 | 3.46 | 3.18 | 5.12 |
| Halibut | 1.72 | 1.53 | 1.44 | 1.97 | 1.58 | 1.33 | 1.56 |
| Wolffish | 2.00 | 2.02 | 2.44 | 2.04 | 1.92 | 2.09 | 2.70 |

#### 7.1.3.1.4 Option 4: Remove ASM Coverage Requirements for a sub-set of sector gillnet trips

- *Sub-Option 4A: Eliminate ASM Coverage Requirements for Sector Trips Fishing Extra-Large Mesh (ELM) Gillnet Gear*
- *Sub-Option 4B: Remove ASM coverage requirements for sector gillnet trips fishing exclusively within the footprint of existing dogfish exempted fisheries*

Under Sub-Option 4A, ASM coverage would not be required for sector vessels that declare an ELM gillnet trips in specific BSAs. Sub-Option 4B is similar, except that it applies to sector vessels fishing with gillnets in the Cape Cod Spiny Dogfish Exemption Area and SNE Dogfish Gillnet Fishery Exemption Area. On both types of trips, groundfish catches are low. These options, singly or in combination, could help to maintain the amount of fishing on these types of trips at status quo levels, limiting any dampening effect ASM requirements have on these fisheries.

These options have the potential to introduce sampling bias if not applied across are BSAs in the same manner, which could limit the ability of using the information in stock assessments. Sampling bias could occur unless the exemption was broadly applied to the ELM gear. For example if BSA 1 (GOM) would still have the ASM requirement, but other areas would not. Another possible result could be incentivizing fishing outside of BSA 1.

*Impacts on regulated groundfish*

Under Sub-Option 4B and 4B, since groundfish catches are low, impacts relative to Option 1 are likely to be low negative since these types of fishing activities would not have any additional coverage since ELM sector trips would not be subject to ASM coverage. An analysis is not yet available to show the impact of the alternative on the overall FY 2016 sector ASM coverage rate. However, given the composition of the species that would drive the FY 2016 coverage rate (i.e., redfish and GOM winter flounder). It is not expected that removal of the ELM 10"+ trips from ASM will result in substantial changes in the outcomes from the coverage rate analysis for FY 2016 for the remaining portion of the fleet.

*Impacts on other species*

Under Sub-Option 4B and 4B, impacts on other species, such as skates, monkfish, and dogfish relative to Option 1 are likely to be low negative since ELM sector trips would not be subject to ASM coverage.

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Kept catch on sector gillnet trips fishing only mesh size of 8" or greater varies greatly by BSA fished (Table 7), with the majority of landings coming from BSA 2, inshore Georges Bank. Figure 5 depicts annual landings of ELM 8"+.

**Table 7 - Commercial landings on sector groundfish gillnet trips fishing mesh size of 8" or greater.**

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

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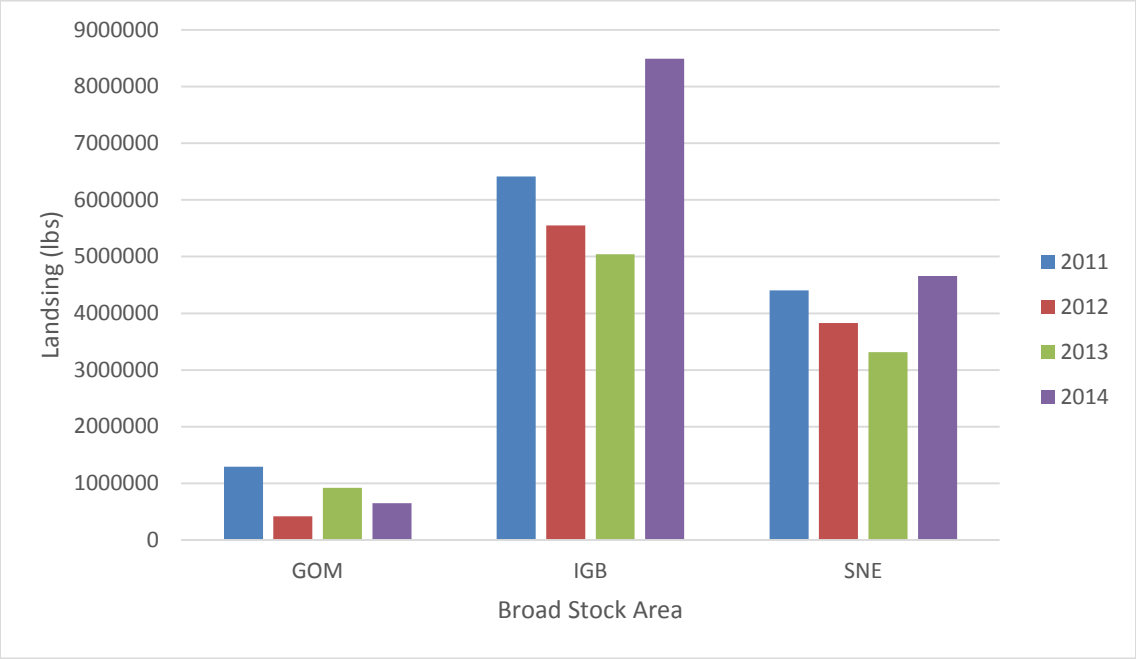
**Figure 5 - Kept catch from sector trips fishing only ELM by BSA, FY 2011 - FY2014**




## LG & ELM information

Sector vessels fishing on a sector trip may fish multiple mesh sizes on the same trip. Figure 6 depicts groundfish catch as a proportion of total catch on sector gillnet trips fish large and ELM mesh on the same trip. The number of observed trips fishing multiple mesh sizes in the GOM ranged from 74 – 132, from 97 – 143 in the Inshore GB, and 21 in trips in SNE. The boxplot in Figure 6 indicates that groundfish catch represents less than 5% of total catch on the majority of trips fishing multiple mesh sizes in BSA 2 and 4.

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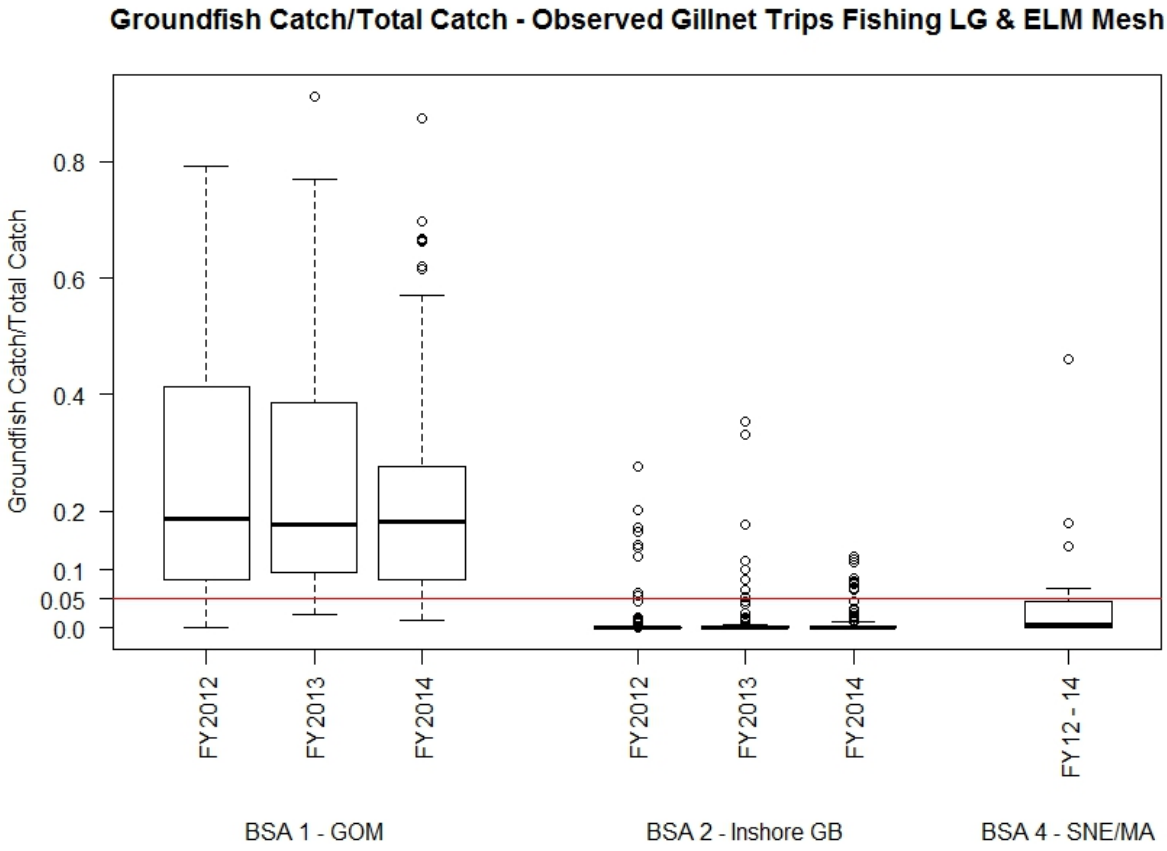
**Figure 6 - Groundfish catch to total catch ratios for sector trips fishing both LG and ELM gillnets by fishing year and broad stock area (BSA). Due to a low sample size, SNE/MA trips were binned.**




7.1.3.1.5 Option 5: Fishery Performance Criteria for Meeting the CV Standard

*Impacts of regulated groundfish*

Option 5 would set specific criteria under which the CV standard would not need to be met. The criteria are related to stock condition (exceeding reference points), low discards (5-10% of catch), and moderate percentage of the ACL harvested (50-75%). In practice, other stocks not meeting these criteria might be the primary determinants of ASM coverage levels. Option 5 may mitigate some of the negative impacts of ASM requirements on the amount of trips a vessel takes and therefore increase fishing effort somewhat relative to maintaining the ASM program as-is via the No Action alternative.

Figure 2 (Alternatives under Consideration, November 20, 2016) depicts the process for applying the prioritization criteria, and Table 8 describes how the criteria would impact ASM coverage rates since 2012. To determine this, the PDT looked at whether or not the stock with the highest coverage needed to achieve a CV30 would have been exempt from meeting the CV standard in that FY based on performance criteria developed by the PDT.

Prioritization Thresholds:

1. Stock condition
    a. Not overfished and overfishing is not occurring (7 stocks)
2. Percentage of ACL harvested
    i. 50% of sub-ACL caught
    ii. 75% of sub-ACL caught
3. Percentage of catch comprised of discards
    i. >5% of total catch
    ii. >10% of total catch

When developing catch and discard thresholds, the PDT considered additional uncertainty in discard estimates associated with high realized CVs (above the CV30). As percentages of the ACL harvested and the percentages of catch comprised as discards vary widely across stocks, a 'hybrid' approach could be to use multiple thresholds within a single option. For example, if 1) sector discards of a stock are less than 10% of total sector catch, but the fishery is catching less than 50% of the sub-ACL, or 2) sector discards of a stock are less than 5% of total sector catch, but the fishery is catching less than 75% of the sub-ACL, the stocks could be considered for exclusion from meeting the CV standard.

From FY 2012 – FY 2016, there were two years when the prioritization criteria would have reduced ASM coverage: 2015 and 2016. The result of exempting SNE/MA YT from the CV standard would be that coverage for the sectors would be set based on GB Yellowtail Flounder (12.42%) in FY2015. Without factoring in the secondary 80% discard threshold, this would result in an 8% reduction in ASM coverage (12% ASM rate for FY2015). In FY2016, application of the prioritization criteria would result in exempting redfish from meeting the CV standard, resulting in an ASM coverage rate of 25.99% (GOM winter flounder). While discards and catch of GOM winter flounder are within all of the proposed prioritization thresholds, the overfishing status of this stock is unknown, and therefore it would not qualify for exemption based on its stock status.

Table 9 shows which stocks would have met the Council's proposed performance criteria using a range of PDT proposed thresholds. All stocks listed in the table were not overfished and overfishing was not occurring (at the time). The 50/5 criteria is the most rigorous, followed by a hybrid approach (50/10 or 75/5), and 75/10. In the one instance when performance criteria would have reduced coverage, the stock met the hybrid and the 75/10 threshold.

The performance criteria seek to balance the monitoring goals. In linking ASM coverage rates to % of the ACL harvested or discarded, this alternative would create both an incentive to reduce discards, and potentially an incentive to cap landings of a stock a exceeding a threshold would lead to higher ASM coverage in subsequent fishing years.

Under the prioritization approach, the FY 2016 coverage could be as low as 26%. The rate would scale down from the redfish rate to the GOM winter flounder rate. FY 2015 total coverage is 24%. As shown in Figure 1, a 41 percent coverage rate is estimated to be required 80 percent of the total aggregated discards to reach a CV 30 or better, based on data from FY 2014. Based on this analysis, the preliminary results indicate that FY 2016 coverage would be 41% under the current approach (if including the requirement that 80% of all discards be observed); otherwise coverage would be 37%. Acadian redfish is the driver for this rate. Figure 1 indicates that at a CV30 that with a target coverage level of 26% that approximately 53% of discards would be observed, similarly at a CV20 that % of the discards would be observed. Sub-Option 5 would likely provide fewer positive benefits for regulated species that Option 1.

*Impacts on other species*

Information collected on other species would be collected at a lower total coverage rate than Option 1. Sub-Option 5 would likely provide fewer positive benefits for other species that Option 1.

**Table 8 - ASM performance criteria applied retrospectively. Note that the only year in which the**

| Fishing Year | Data used to set ASM Coverage | | | Application of Performance Criteria | | | | Adjusted ASM Rate | |
|---|---|---|---|---|---|---|---|---|---|
| | Stock driving coverage | Realized CV | Coverage Rate Needed CV30 | PDT Proposed Thresholds (Catch & Discards) | | | Criteria Met? | New Stock Driving Coverage | Coverage Rate Need CV30 |
| | | | | 50/5 | 50/10 75/5 | 75/10 | | | |
| 2012 | SNE/MA YT | 13.95 | 10.44 | n/a | n/a | n/a | No | | |
| 2013 | GB winter | 27.67 | 21.71 | n/a | n/a | n/a | No | | |
| 2014 | GB haddock | 21.48 | 11.29 | n/a | n/a | n/a | No | | |
| 2015 | SNE/MA YT | 31.37 | 20.63 | No | Yes | Yes | Yes | GB YT | 12.42 |
| 2016 | Redfish | 41.5 | 36.83 | No | Yes | Yes | Yes | GOM WF | 25.99 |

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**Table 9 - Stocks which would meet the performance criteria by FY (stock status, % of sector sub-ACL caught, and discards as % of catch)**

| Stock/FY | PDT Recommended Threshold Options (% sub-ACL caught/discards as % catch) | | |
|---|---|---|---|
| **FY2016** | **50/5** | **50/10 or 75/5** | **75/10** |
| *GB haddock* | *No* | *Yes* | *Yes* |
| *GOM haddock* | *No* | *No* | *Yes* |
| *Pollock* | *Yes* | *Yes* | *Yes* |
| *Redfish* | *No* | *Yes* | *Yes* |
| *White hake* | *Yes* | *Yes* | *Yes* |
| **FY2015** | **50/5** | **50/10 or 75/5** | **75/10** |
| GB winter flounder | Yes | Yes | Yes |
| Pollock | Yes | Yes | Yes |
| Redfish | No | Yes | Yes |
| SNE/MA yellowtail flounder | No | Yes | Yes |
| **FY2014** | **50/5** | **50/10 or 75/5** | **75/10** |
| GB winter flounder | No | Yes | Yes |
| Pollock | No | Yes | Yes |
| Redfish | No | No | Yes |
| **FY2013** | **50/5** | **50/10 or 75/5** | **75/10** |
| GB haddock | No | Yes | Yes |
| GOM haddock | No | Yes | Yes |
| Pollock | No | Yes | Yes |
| Redfish | No | Yes | Yes |
| **FY2012** | **50/5** | **50/10 or 75/5** | **75/10** |
| GB haddock | Yes | Yes | Yes |
| GOM haddock | Yes | Yes | Yes |
| Redfish | No | Yes | Yes |

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**Table 10 - Sector Discards by stock and fishing year, with total discards by stock for FY2010-2014. Stocks that are highlighted in tan are non-allocated. Note that SNE/MA winter flounder was zero a possession stock for FY2010 – FY2012.**

| Sector Discards by Fishing Year (mt) | | | | | | |
|---|---|---|---|---|---|---|
| **Stock** | FY2010 | FY2011 | FY2012 | FY2013 | FY2014 | Total Discards |
| **GB Cod** | 118 | 144.3 | 131.9 | 46.6 | 19.9 | 460.7 |
| **GOM Cod** | 79.9 | 145.5 | 122.1 | 19.7 | 24 | 391.2 |
| **GB Haddock** | 40.6 | 82 | 270.6 | 281.1 | 473.6 | 1147.9 |
| **GOM Haddock** | 2.7 | 7.4 | 33.3 | 20.8 | 29.9 | 94.1 |
| **GB YT** | 66.7 | 48.9 | 13 | 9.6 | 8.7 | 146.9 |
| **SNE/MA YT** | 4.6 | 18.7 | 41.8 | 10.9 | 3.1 | 79.1 |
| **CC/GOM YT** | 59.7 | 83.7 | 111.4 | 16.7 | 15.8 | 287.3 |
| **American Plaice** | 171.8 | 195.7 | 236.6 | 104.5 | 78.1 | 786.7 |
| **Witch Flounder** | 57.2 | 62 | 65.6 | 39.3 | 41.5 | 265.6 |
| **GB Winter Flounder** | 17.9 | 13.2 | 4.5 | 5.3 | 3 | 43.9 |
| **GOM Winter Flounder** | 1.6 | 5.1 | 8.5 | 4.5 | 4.9 | 24.6 |
| **SNE/MA Winter Flounder** | 34.3 | 83.5 | 104.2 | 6.8 | 3.1 | 231.9 |
| **Redfish** | 151.8 | 184.4 | 320 | 385.6 | 323.8 | 1365.6 |
| **White Hake** | 31.5 | 32.6 | 32.9 | 23.2 | 22.9 | 143.1 |
| **Pollock** | 78.3 | 109.4 | 98.2 | 105.4 | 133.6 | 524.9 |
| **GOM/GB Windowpane** | 151.4 | 156.2 | 129.5 | 237.3 | 157.4 | 831.8 |
| **SNE/MA Windowpane** | 52.6 | 82.8 | 95.8 | 86 | 68.2 | 385.4 |
| **Ocean Pout** | 56.4 | 56.3 | 35.4 | 27.3 | 30.8 | 206.2 |
| **Atlantic Halibut** | 19.5 | 31.1 | 45.2 | 40.4 | 26.6 | 162.8 |
| **Wolffish** | 18.7 | 32.2 | 30 | 17.1 | 14.3 | 112.3 |
| **Total Discards - All stocks (mt)** | 1215.2 | 1575 | 1930.5 | 1488.1 | 1483.2 | 7692 |
| **Total Discards - Allocated Stocks (mt)** | 882.3 | 1132.9 | 1490.4 | 1080 | 1185.9 | 5771.5 |

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**Table 11 - Stock specific discards as a proportion of total groundfish discards by stock and fishing year. Note that discard values for SNE/MA winter flounder for FY2010 - FY2012 were not used. Read this table by FY. (Stock specific discards/total groundfish discards FY). SNE/MA grayed out because the stock was zero possession.**

| Discards lbs by stock as a percentage of GF discards for allocated stocks only | | | | | | |
|---|---|---|---|---|---|---|
| **Stock** | FY2010 | FY2011 | FY2012 | FY2013 | FY2014 | Total Discards |
| **GB Cod** | 13.4% | 12.7% | 8.8% | 4.3% | 1.7% | 8.0% |
| **GOM Cod** | 9.1% | 12.8% | 8.2% | 1.8% | 2.0% | 6.8% |
| **GB Haddock** | 4.6% | 7.2% | 18.2% | 26.0% | 39.9% | 19.9% |
| **GOM Haddock** | 0.3% | 0.7% | 2.2% | 1.9% | 2.5% | 1.6% |
| **GB YT** | 7.6% | 4.3% | 0.9% | 0.9% | 0.7% | 2.5% |
| **SNE/MA YT** | 0.5% | 1.7% | 2.8% | 1.0% | 0.3% | 1.4% |
| **CC/GOM YT** | 6.8% | 7.4% | 7.5% | 1.5% | 1.3% | 5.0% |
| **American Plaice** | 19.5% | 17.3% | 15.9% | 9.7% | 6.6% | 13.6% |
| **Witch Flounder** | 6.5% | 5.5% | 4.4% | 3.6% | 3.5% | 4.6% |
| **GB Winter Flounder** | 2.0% | 1.2% | 0.3% | 0.5% | 0.3% | 0.8% |
| **GOM Winter Flounder** | 0.2% | 0.5% | 0.6% | 0.4% | 0.4% | 0.4% |
| **SNE/MA Winter Flounder** | NA | NA | NA | 0.6% | 0.3% | 0.2% |
| **Redfish** | 17.2% | 16.3% | 21.5% | 35.7% | 27.3% | 23.7% |
| **White Hake** | 3.6% | 2.9% | 2.2% | 2.1% | 1.9% | 2.5% |
| **Pollock** | 8.9% | 9.7% | 6.6% | 9.8% | 11.3% | 9.1% |

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