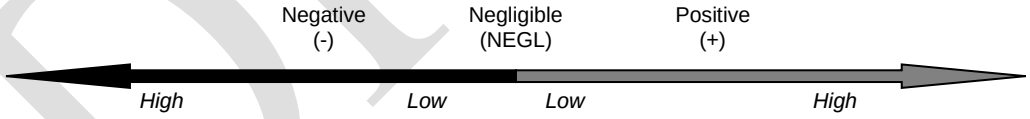
# 7.0 Environmental Consequences – Analysis of Impacts

Evaluation Criteria

This EA evaluates the potential impacts using the criteria outlined in Table 1. Impacts for all alternatives are judged relative to the baseline conditions, as described in Section 6, and compared to each other.

**Table 1 - Impact designations in this document are defined generally as positive, negligible/neutral, and negative.**

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




## 7.1 Biological Impacts

Biological impacts discussed below focus on expected changes in fishing mortality for regulated multispecies stocks. Changes in fishing mortality may result in changes in stock size. Impacts on essential fish habitat and endangered or threatened species are discussed in separate sections. Impacts are discussed in relation to impacts on regulated multispecies (groundfish) and other species. The impacts associated with the measures are anticipated to not be significant.

Throughout this section, impacts are often evaluated using an analytic technique that projects future stock size based on a recent age-based assessment. These projections are known to capture only part of the uncertainties that are associated with the assessments projections. There is evidence, that in the case of multispecies stocks, that the projections tend to be optimistic when they extend beyond a short-term

period (i.e., 1-3 years). This means that the projections tend to over-estimate future stock sizes and under-estimate future fishing mortality. Attempts to find a way to make the projections more accurate have so far have proven unsuccessful. These factors should be considered when reviewing impacts that use this tool.

### 7.1.1 Updates to Annual Catch Limits

#### 7.1.1.1 Annual Catch Limits

7.1.1.1.1 Option 1: No Action

*Impacts on regulated groundfish*

Under Option 1/No Action, the ACLs specified for FY 2018 would be unchanged from those adopted through FW 55 and FW56. There would be no changes to the specifications for FY 2018 – FY 2019 and default specifications that were adopted with the FW55 final rule and default specifications that would be set for EGB cod and EGB haddock for FY 2017. The directed groundfish fishery would be expected to operate in all BSAs, with the exception of the EGB management area which would close on August 1, 2017, when the default specifications would expire for EGB cod and EGB haddock. Under Option 1/No Action, there would be no FY 2018 quotas specified for the transboundary Georges Bank stock of GB cod, GB haddock and GB yellowtail flounder, which are managed through the US/CA Resource Sharing Understanding. These quotas are specified annually.

Under Option 1/No Action, the directed groundfish fishery would be expected to operate in all broad stock areas through July 31. 2018. As of August 1, 2018, EGB cod and EGB haddock would not have ACLs specified. In the absence of stock specific specifications, commercial groundfish vessels would not be allowed to fish in the EGB management area without an allocation. It is anticipated that Option 1/No Action would result in minimal changes in fishing effort during the first three months of the fishing year. After July 31, 2018, Option 1/No Action would be expected to reduce commercial groundfish fishing effort in the EGB management area.

After July 31, 2018, an ACL would not be defined for EGB cod and EGB haddock in the multispecies fishery. Without specification of an ACL, a catch would not be allocated to the groundfish fishery (sectors or common pool vessels) and targeted groundfish fishing activity would not occur for this stock. Catches would not be eliminated because there would probably be incidental catches or bycatch from other fisheries. Accountability Measures (AMs) in the multispecies fishery would be maintained but are expected to have a low probability of being triggered without allocations.

In addition to the lack of targeted groundfish fishing activity on EGB cod and EGB haddock without ACLs, certain provisions of the sector management system probably would constrain fishing even for stocks with an ACL. Current management measures require that a sector stop fishing in a stock area if it does not have ACE for a stock. Fishing can continue on stocks for which the sector continues to have ACE only if the sector can demonstrate it would not catch the ACE-limited stock. What these provisions mean is that in most cases there would be little opportunity for sector vessels to fish on stocks in EGB that have an ACL under Option 1/No Action, most groundfish fishing activity would not occur on EGB. As a result, in general Option 1/No Action would be expected to have positive impacts compared to the alternative specifications under Option 2. The default specifications for EGB cod and EGB haddock would continue to allow fishing for the first three months of the fishing year, but after that, effort and biological impacts on regulated groundfish species would decline for stocks managed or located in that area. As a result, in general Option 1/No Action would be expected to result in positive impacts compared to Option 2.

An age based assessment was used to assess the following stocks:

- GOM cod
- GB haddock
- GOM haddock
- SNE/MA yellowtail flounder
- CC/GOM yellowtail flounder
- American plaice
- Witch flounder
- GB winter flounder
- SNE/MA winter flounder
- Redfish
- White hake
- Pollock

These models project the estimated median stock sizes expected to result by limiting catches to the ABC. In general, recent experience suggests that the projections tend to be biased high, predicting stocks sizes that are larger than realized and fishing mortality rates that are higher than expected (Groundfish Plan Development Team, pers. comm.).

There may be catches of these stocks by the groundfish fishery under default specifications through July 31, 2016 and by other fisheries throughout the year under Option 1/No Action. An estimate of these catches to approximate the catches that might occur was compared to ABCs under Option 2 (Table 2). Using this information, a qualitative comparison of impacts on SSB by stock under Option 1/No Action and Option 2 is provided. In this section, SSB is used as a proxy for impact designation. Generally, lower fishing mortality under Option 1 /No Action leads to increases in SSB, relative to Option 2 and is considered a positive impact on stocks that are not rebuilding sufficiently. For stocks that have a rebuilt status, Option 1/No Action may reduce fishing effort to levels substantially less than the MSY, however this is considered to be a negligible impact on the stock depending on the uncertainties in the stock projections.

**Table 2-Estimated catches that might occur in FY2018 under Option 1/No Action. The "No Action Assumed Catch" used to compare to 2018 ABC used in Option 2 stock projections.**

| | 2018 | | | |
|---|---|---|---|---|
| **Stock** | **Groundfish Fishery Assumed Catch** | **Other Assumed Catch** | **Total Assumed Catch** | **ABC** |
| GOM cod | *(271+329.6)* **601** | *(47+9)* **56** | 657 | 703 |
| GB haddock | **3,525** | *(487+487+1,087+24,400)* **26,461** | 29,986 | 73,114 |
| GOM haddock | *(1,587+642.5)* **2,229** | (95+95+45) **235** | 2,464 | 13,131 |
| SNE/MA yellowtail flounder | **79** | (2+17+6) **25** | 104 | 68 |
| CC/GOM yellowtail flounder | **288** | *(51+41)* **92** | 380 | 511 |
| American plaice | **1,170** | *(35+35)* **70** | 1,240 | 1,732 |
| GB winter flounder | **442** | *(57+45)* **102** | 544 | 855 |
| SNE/MA winter flounder | **515** | *(73+109)* **182** | 697 | 727 |
| Redfish | **3,554** | *(116+116)* **232** | 3,786 | 11,552 |
| White hake | **1,494** | *(29+29+33)* **91** | 1,585 | 2,971 |
| Pollock | **2,183** | (402+402) **804** | 2,987 | 40,172 |

Notes:
Groundfish Fishery Assumed Catch:

- Commercial - Results from the quota change model – no action ACLs– were used (see Table 3 in Economic Impacts- from QCM).
- Recreational – Three-year average final catches for fishing year 2014-2016, Source: FY2016 Northeast Multispecies year-end catch report, GARFO, October 17, 2017.

Other Assumed Catch:

- Includes the state waters and other sub-components for FY2018 (Table 5 in draft alternatives under consideration, Dec.1, 2017).
- Includes the Scallop PDT's estimate of catches of SNE/MA yellowtail flounder (6 mt) for FY2018 under draft Scallop FW 29 Status Quo alternative (Table 9 in draft alternatives under consideration, Dec.1, 2017).
- However for stocks that would have default specifications under the No Action/Option 1 for FY2018 and sub-ACLs for non-groundfish catches were used to approximate catches based on Table 2 (Option 1 in draft alternatives under consideration, Dec.1, 2017).
- Canadian quotas for FY2018 were added to GB haddock (24,400mt) and GB cod (694mt) following Table 3 (Option 2 in draft alternatives, Dec. 1, 2017), and estimated Canadian catches were added for GB winter flounder (45) and white hake (33) based on Appendix II.

*Gulf of Maine Cod*- Under Option 1/No Action the assumed catch in FY2018 is 657mt versus 703mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*Georges Bank Haddock*- Under Option 1/No Action the assumed catch in FY2018 is 29,986mt versus 73,114mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*Gulf of Maine Haddock-* Under Option 1/No Action the assumed catch in FY2018 is 2,464mt versus 13,131mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*Southern New England/Mid-Atlantic Yellowtail Flounder-* Under Option 1/No Action the assumed catch in FY2018 is 104mt and 68mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 2 than Option 1.

*Cape Cod/Gulf of Maine Yellowtail Flounder-* Under Option 1/No Action the assumed catch in FY2018 is 380mt versus 511mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*American Plaice-* Under Option 1/No Action the assumed catch in FY2018 is 1,240mt versus 1,732mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*Georges Bank Winter Flounder-* Under Option 1/No Action the assumed catch in FY2018 is 544mt versus 855mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*Southern New England/Mid-Atlantic Winter Flounder-* Under Option 1/No Action the assumed catch in FY2018 is 697mt versus 727mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*Redfish -* Under Option 1/No Action the assumed catch in FY2018 is 3,786mt versus 11,552mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*White Hake-* Under Option 1/No Action the assumed catch in FY2018 is 1,585mt versus 2,971mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

*Pollock-* Under Option 1/No Action the assumed catch in FY2018 is 2,987mt versus 40,172mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

Is not possible to project stock sizes for the following stocks:

- GB Cod
- GB Yellowtail Flounder
- GOM Winter Flounder
- Winter Flounder
- Northern Windowpane Flounder
- Southern Windowpane Flounder
- Ocean Pout
- Atlantic Halibut
- Atlantic Wolffish

For index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC is based on an exploitation rate (i.e., GB yellowtail flounder and witch flounder) or the SSC's default control rule of 75% $F_{MSY}$ (i.e., GOM winter flounder) or an alternative approach (i.e., GB cod and Atlantic halibut) or 75% of $F_{MSY}$ (remaining stocks on the above list) applied to the most recent estimate of stock size. As a result, if stock size does not decline then the proposed ABC would not be expected to result in overfishing. This is an unrealistic assumption – stock size could increase or decrease but is unlikely to remain constant.

*Impacts on other species*

Option 1/No Action is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. Indirect effects are generally likely to be beneficial given the expected reduced groundfish fishing activity. Catches of other species that occur on groundfish trips would decline as a result. There are only limited opportunities for groundfish vessels to target other stocks in other fisheries, so the shifting of effort into other fisheries is not likely to occur on a large scale. These other fisheries will also have ACLs and AMs so while such effort shifts may have economic effects the biological impacts should not be negative. Considering the differences between the ACLs of Option 1/No Action and Option 2, the fishing mortality on other stocks would probably be lower under Option 1/No Action.

Lastly, sub-ACLs are designed to limit the incidental catch of GOM and GB haddock by mid-water trawl (MWT) herring fisheries, and exceeding the allocations results in triggering AMs in-season. No Action for GOM haddock may reduce fishing mortality of Atlantic herring which would have positive biological benefits for the Atlantic herring stock.

#### 7.1.1.1.2 Option 2: Revised Annual Catch Limit Specifications

*Impacts on regulated groundfish*

Option 2 would reflect the results of the 2017 groundfish operational assessments, and the 2017 Transboundary Resource Assessment Committee stock assessments for U.S./Canada stocks. Option 2 would adopt new ABC's that are consistent with the best available science, as required by the M-S Act. Option 2 would also specify total allowable catches (TACs) for the U.S./Canada Management Area for FY2018.

Because this option would adopt FY 2018 – FY 2020 ABCs for all stocks, and all the stocks have recent assessment updates, short-term projections can be used to estimate the probability of overfishing and short-term changes in stock size for those stocks listed in Table 2. These projections use

catches equal to the ABCs that would be adopted if this option is selected. Since the management goal is to keep catches at or below ACLs, and ACLs are always less than the ABC, the projection results would be expected to slightly over-estimate the risk of overfishing and under-estimate future stock size. However, experience demonstrates that projections tend to be overly optimistic, and therefore, concerns about over-estimating the risk of overfishing and under-estimating future stock size are expected to be minimal.

Projected stock sizes are provided in Table 3 to Table 13 for these stocks and the probability of overfishing is listed in Table 14. This table compares projected future stock size to both 2019 and 2020. A comparison of probability of overfishing between the two options is difficult as Option 1/No Action has no OFLs defined for some stocks.

Relative to FY2017, Option 2 would increase the FY2018 ACLs for several stocks including GB cod, GOM cod, GOM haddock, GB yellowtail flounder, CC/GOM yellowtail flounder, plaice, witch flounder, GB winter flounder, redfish, pollock, Atlantic halibut, and wolfish. There would also be decreases in the ACLs for GB haddock, SNE/MA yellowtail flounder, GOM winter flounder, SNE/MA winter flounder, white hake, northern windowpane flounder, southern windowpane flounder, and ocean pout.

*Gulf of Maine Cod*- The 2017 operational assessment for GOM cod indicates that the stock is well below SSBMSY (5%-8% of target SSBMSY in 2016). Under Option 2, the projections indicate an increase in SSB after 2018. For Option 2, two scenarios were run dependent on the natural mortality assumption, base (m=0.2) and M-ramp (m= 0.4); each show an increase in SSB after 2016 but it remains well below SSBMSY (Table 3, Table 4). Under Option 1/No Action the assumed catch in FY2018 is 657mt versus 703mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 3- Projection results for Gulf of Maine cod (mt), SSB MSY = 40,604mt, F MSY = 0.174, under base (m=0.2).**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 938 | 703 | 0.110 | 5,648 |
| 2019 | 938 | 703 | 0.095 | 6,973 |
| 2020 | 938 | 703 | 0.080 | 9,326 |

**Table 4- Projection results for Gulf of Maine cod (mt), SSB MSY = 59,714mt, F MSY = 0.177, under M-ramp (m=0.4).**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 938 | 703 | 0.164 | 4,144 |
| 2019 | 938 | 703 | 0.173 | 4,459 |
| 2020 | 938 | 703 | 0.164 | 5,430 |

*Georges Bank Haddock*- The recent assessment for GB haddock indicates that the stock is well above SSBMSY (278% of target SSBMSY in 2016). The stock is expected to increase from 2018 to 2019 and then decrease from 2019 to 2020 under Option 2 (Table 5). Under Option 1/No Action the assumed catch in FY2018 is 29,986mt versus 73,114mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 2 than Option 1.

**Table 5- Projection results for Georges Bank haddock (mt), SSB MSY = 104,312 mt, F MSY = 0.414 (average F ages 5-7). Note that F projection tables are all F mult.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 94,274 | 73,114 | 0.428 | 330,178 |
| 2019 | 99,757 | 73,114 | 0.396 | 360,270 |
| 2020 | 100,825 | 73,114 | 0.385 | 298,285 |

*Gulf of Maine Haddock*- The recent assessment for GOM haddock indicates that the stock is well above SSBMSY (706% of target SSBMSY in 2016). The stock is expected to decrease slightly from 2018 to 2019 and then decrease from 2019 to 2020 under Option 2 as the extremely large 2013-year class experiences mortality (Table 6). Under Option 1/No Action the assumed catch in FY 2018 is 2,464mt versus 13,131mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 6- Projection results for Gulf of Maine haddock (mt), SSB MSY = 6,769 mt, F MSY = 0.455.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 16,954 | 13,131 | 0.341 | 66,205 |
| 2019 | 16,038 | 12,490 | 0.341 | 53,328 |
| 2020 | 13,020 | 10,186 | 0.341 | 39,959 |

*Southern New England/Mid-Atlantic Yellowtail Flounder*- The recent assessment for SNE/MA yellowtail flounder indicates that the stock is below SSBMSY (8% of target SSBMSY in 2016). Although projections are possible, the SSC concluded that an alternative basis for catch advice was appropriate. Therefore, projections are not provided. Under Option 1/No Action the assumed catch in FY2018 is 104mt and 68mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 2 than Option 1.

The peer review panel accepted the ASAP assessment as a basis for management advice. The SSC considered two proposals for catch advice. One proposal was based on the output of the analytical assessment. This proposal also used a constant ABC approach with an OFL at 45mt and an ABC not to exceed 35mt for 2018 – 2020. The second proposal was to use the "PlanBsmooth" approach, averaging catch for 2014 - 2016. This proposal used a constant ABC approach, but resulted in an OFL at 134mt and an ABC not to exceed 100mt.

The majority of the SSC recommended averaging the two proposals as outlined above. This results in an OFL at 90mt with an ABC not to exceed 68mt for 2018 – 2020. The model averaging approach was recommended to account for the scientific uncertainty associated with the two divergent model outputs with regard to catch. There was also a minority opinion from the SSC (see Appendix I: SSC Recommendations).

Both of the recommendations are higher than what the analytical model suggests as being appropriate in the first year of the specification, but the majority OFL and ABC recommendation is similar to the projections at 75%FMSY based recommendation for FY 2019, and lower than the 75%FMSY based recommendations for FY 2020, therefore the SSC felt that it was adequately accounting for the continued poor stock status of this stock in its recommendations. Additionally, the 68mt ABC is a major reduction from the previously set 267mt ABC.

*Cape Cod/Gulf of Maine Yellowtail Flounder*- The recent assessment for CC/GOM yellowtail flounder indicates that the stock is below SSBMSY (26% of target SSBMSY in 2016). The stock is expected to increase during the projected years under Option 2 (Table 7). Under Option 1/No Action the assumed catch in FY2018 is 380mt, and 511mt under Option 2 (Table 2). Therefore, SSB increases are expected to be slightly greater under Option 1 than Option 2.

**Table 7-Projection results for Cape Cod/Gulf of Maine yellowtail flounder, SSB MSY = 4,640 mt, F MSY = 0.273.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 662 | 511 | 0.205 | 2,788 |
| 2019 | 736 | 511 | 0.183 | 2,982 |
| 2020 | 848 | 511 | 0.157 | 3,647 |

*American Plaice*- The recent assessment for American plaice indicates that the stock is increasing but remains slightly below SSBMSY (99% of target SSBMSY in 2016). The stock is expected to decrease slightly from 2018 to 2020 under Option 2 (Table 8). Under Option 1/No Action the assumed catch in FY2018 is 1,240mt, versus 1,732mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 8-Projection results for American plaice, SSB MSY = 13,503 mt, F MSY = 0.216.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 2,260 | 1,732 | 0.162 | 10,766 |
| 2019 | 2,099 | 1,609 | 0.162 | 10,191 |
| 2020 | 1,945 | 1,492 | 0.162 | 9,255 |

*Georges Bank Winter Flounder*- The recent assessment for GB winter flounder indicates that the stock is below SSBMSY (52% of target SSBMSY in 2016). The stock is expected to increase during the projected years under Option 2 (Table 9). Under Option 1/No Action the assumed catch in FY2018 is 544mt versus 855mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 9-Projection results for Georges Bank winter flounder, SSB MSY = 7,600mt, F MSY = 0.522.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 1,083 | 855 | 0.392 | 2,450 |
| 2019 | 1,182 | 855 | 0.358 | 2,583 |
| 2020 | 1,756 | 855 | 0.231 | 4,016 |

*Southern New England/Mid-Atlantic Winter Flounder*- The recent assessment for SNE/MA winter flounder indicates that the stock is below SSBMSY (18% of target SSBMSY in 2014). The stock is expected to increase from 2018 to 2020 under Option 2 (Table 10). Under Option 1/No Action the assumed catch in FY2018 is 697mt versus 727mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 10- Projection results for Southern New England/Mid-Atlantic winter flounder, SSB MSY = 24,687mt, F MSY =0.34.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 1,228 | 727 | 0.191 | 4,424 |
| 2019 | 1,228 | 727 | 0.162 | 4,698 |
| 2020 | 1,228 | 727 | 0.118 | 5,914 |

*Acadian Redfish*- The recent assessment for Acadian redfish indicates that the stock is well above SSBMSY (145% of target SSBMSY in 2016). The stock is expected to increase slightly during the projected years under Option 2 (Table 11). Under Option 1/No Action the assumed catch in FY2018 is 3,786mt versus 11,552mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 11-Projection results for Acadian redfish, SSB MSY = 247,918mt, F MSY = 0.038.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 15,451 | 11,552 | 0.029 | 401,571 |
| 2019 | 15,640 | 11,785 | 0.029 | 411,790 |
| 2020 | 15,852 | 11,942 | 0.029 | 419,790 |

*White Hake*- The recent assessment for white hake indicates that the stock is below SSBMSY (69% of target SSBMSY in 2016). Under Option 2 the stock is expected to increase slightly from FY2018 to FY2019, then the stock is expected to decrease slightly from FY2019 to FY2020 (Table 12). Under Option 1/No Action, the assumed catch in FY2018 is 1,585mt versus 2,971mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 12-Projection results for white hake, SSB MSY = 30,948mt, F MSY = 0.1839.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 3,885 | 2,971 | 0.138 | 24,969 |
| 2019 | 3,898 | 2,971 | 0.138 | 25,062 |
| 2020 | 3,916 | 2,971 | 0.138 | 24,832 |

*Pollock*- The recent assessment for pollock indicates that the stock is well above SSBMSY (174% of target SSBMSY in 2016). The stock is expected to decrease slightly during the projected years under Option 2 (Table 13). Under Option 1/No Action the assumed catch in FY2018 is 2,987mt versus 40,172mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Option 1 than Option 2.

**Table 13-Projection results for pollock, SSB MSY = 105,510 mt, F MSY = 0.26.**

| Year | OFL | ABC | F | SSB |
|---|---|---|---|---|
| 2018 | 51,680 | 40,172 | 0.360 | 286,655 |
| 2019 | 53,940 | 40,172 | 0.343 | 279,829 |
| 2020 | 57,240 | 40,172 | 0.318 | 260,255 |

**Table 14- Estimated probability of overfishing if catch is equal to ABC. Note these results are from the projection output alone. Uncertainty comes from the model and projections; therefore, these probabilities do not account for the true uncertainty and therefore should not be considered as absolutes. These estimates are likely an underestimate of the true uncertainty based on experience with model and projection results.**

| | | Probability of Overfishing | | |
|---|---|---|---|---|
| Species | Stock | 2018 | 2019 | 2020 |
| Cod | GB | NA | NA | NA |
| Cod (m=0.2 model) | GOM | NA | NA | NA |
| Cod (mramp m=0.4) | GOM | NA | NA | NA |
| Haddock | GB | 0.149 | 0.165 | 0.222 |
| Haddock | GOM | 0.105 | 0.158 | 0.208 |
| Yellowtail Flounder | GB | NA | NA | NA |
| Yellowtail Flounder | SNE/MA | NA | NA | NA |
| Yellowtail Flounder | CC/GOM | 0.054 | 0.021 | 0.005 |
| Plaice | | 0.002 | 0.009 | 0.021 |
| Witch Flounder | | NA | NA | NA |
| Winter Flounder | GB | 0.082 | 0.093 | 0.033 |
| Winter Flounder | GOM | NA | NA | NA |
| Winter Flounder | SNE/MA | 0 | NA | NA |
| Redfish | | 0 | 0 | 0 |
| White Hake | | 0.004 | 0.006 | 0.007 |
| Pollock | | 0.066 | 0.07 | 0.065 |
| Windowpane Flounder | GOM/GB | NA | NA | NA |
| Windowpane Flounder | SNE/MA | NA | NA | NA |
| Ocean Pout | | NA | NA | NA |
| Atlantic Halibut | | NA | NA | NA |
| Atlantic Wolffish | | NA | NA | NA |

Is not possible to project stock sizes for the following stocks, because these stocks do not have an accepted analytical assessment model:

- GB Cod
- GB Yellowtail Flounder
- GOM Winter Flounder
- Northern Windowpane Flounder
- Southern Windowpane Flounder
- Ocean Pout
- Atlantic halibut
- Atlantic Wolffish

For index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC is based on an exploitation rate (i.e., GB yellowtail flounder) or the SSC's default control rule of 75% $F_{MSY}$ (i.e., GOM winter flounder) or an alternative approach (i.e., GB cod and Atlantic halibut) or 75% of $F_{MSY}$ (remaining stocks on the above list) applied to the most recent estimate of stock

size. As a result, if stock size does not decline then the proposed ABC would not be expected to result in overfishing. This is an unrealistic assumption – stock size could increase or decrease but is unlikely to remain constant.

*Atlantic halibut*
The 2015 operational assessment for Atlantic halibut was rejected as a basis for management advice. The 2015 assessment report highlighted several data needs, including research on stock structure, improved biological data, and a more precise and accurate survey. The Panel also noted that more research was needed to investigate stock identity, and determine whether halibut should be managed in US and Canadian waters as a transboundary resource. The Council worked closely with the NEFSC to hire a contractor to explore data-limited assessment approaches for Atlantic halibut. The draft approach uses a combination of fishery dependent and fishery independent data sources to assess recent changes to the relative condition of the halibut resource. The assessment will recommend catch advice for FY2018-2020, and although projections are not possible under this approach, bootstrap analyses were used to derive the confidence intervals around the catch forecast, which can help managers better account for the uncertainty in the assessment. A peer review will convene to review the report on December 11, 2017. The SSC will meet on December 18, 2017 to discuss Atlantic halibut OFL and ABC recommendations for FY2018-FY2020. A range of possible ABCs (100, 125, 225 and 500 mt) is provided in this action. The OFL and ABC recommendations are expected to be based on the best available science.

*Overview of draft Scallop FW 29 and Projected Catches of Groundfish Stock for FY 2018 – FY 2020*
Framework 29 Overview:
Scallop Framework 29 is considering a range of allocations for FY 2018, which include scenarios where measures in OHA2 are approved (see Scallop PDT memo to the Groundfish PDT, dated November 22, 2017). Briefly, the Council may select a provisional preferred alternative for each scenario in Scallop Framework 29. Spatial management configuration varies substantially between some measures, which is expected to drive swings in bycatch estimates for each stock. Scallop landings may increase next year (52 mil. lbs – 60 mil. lbs), based on the 2018 projected landings estimates. This section will be updated following the Council's final action of Scallop Framework 29.

**Table 15-Range of Scallop PDT yellowtail flounder and windowpane flounder bycatch estimates (mt) for the scallop fishery for FY 2018 to FY2020, under scallop specifications options in Scallop FW29.**

| Stock | FY2018 | FY2019 | FY2020 |
|---|---|---|---|
| GB yellowtail flounder | 5.57 – 67.95 | 7.35 – 7.52 | 22.21 – 26 |
| SNE/MA yellowtail flounder | 3.84 – 5.96 | 16.45 – 17.35 | 17.94 – 18.31 |
| Southern windowpane flounder | 228.6 – 308.23 | 366.73 – 576.91 | 463.5 – 499.21 |
| Northern windowpane flounder | 46.69 – 74.79 | 66.12 – 67.86 | 73.77 – 79.06 |

*Impacts on other species*
In general, the specification of groundfish ABCs and ACLs by this option would not be expected to have direct or indirect impacts on most other species. Other species are caught on groundfish fishing trips and the ABCs/ACLs could indirectly affect species if they result in changes in groundfish fishing activity. When compared to Option 1/No Action, Option 2 would be expected to result in increased groundfish fishing effort and as a result catches of other species would be expected to be greater. This would be expected to result in increased fishing mortality rates for those species when compared to the No Action alternative. Species such as monkfish, skates, and spiny dogfish are among those most likely to be

affected. These species are subject to management controls, and it is not likely that fishing mortality will exceed targets. Indeed, when compared to recent years, the increases in some groundfish ABCs/ACLs under Option 2 would be expected to result in increased catches of other species.

The ABCs and ACLs under Option 2 include specification of sub-ACLs for other fisheries.

Sub-ACLs are designed to limit the incidental catch of yellowtail flounder and windowpane flounder by the scallop fishery. Exceeding catch limits may trigger accountability measures for the scallop fishery. A comparison of the Option 2 specifications (see Table 5 in draft alternatives, dated December 1, 2017) and the Scallop PDT's estimates of projected catch by the scallop fishery (Table 15) indicates that scallop fishery catches of SNE/MA yellowtail flounder are predicted to be less than or equal to the sub-ACL for the fishery in 2018. However, the scallop catch estimates of GB yellowtail flounder, southern windowpane flounder, and northern windowpane flounder are higher than the respective sub-ACLs. The overall impact of Option 2 ABCs and ACLs are likely to be neutral with respect to the Atlantic sea scallop resource.

In addition, sub-ACLs are designed to limit the incidental catch of GB yellowtail flounder by small-mesh fisheries, and exceeding the allocations results in triggering AMs in subsequent years. The accountability measure requires vessels to fish an approved selective trawl gear that reduces the catch of flatfish in the GB yellowtail flounder stock area. As small-mesh species can be effectively prosecuted using modified trawl gear, it is difficult to predict if groundfish sub-ACLs may affect fishing mortality and stock size of small-mesh species (e.g., whiting and squid). The overall impact of Option 2 ABCs and ACLs are likely to be low positive to negligible with respect to the squid and whiting fisheries on Georges Bank.

Sub-ACLs are designed to limit the incidental catch of GOM and GB haddock by mid-water trawl (MWT) herring fisheries, and exceeding the allocations results in triggering AMs in-season. Option 2 for GB haddock may reduce fishing mortality of Atlantic herring which would have positive biological benefits for the Atlantic herring stock.

#### 7.5.1.1.2.1 Sub-Option 1: Updates to Common Pool Vessel Accountability Measures - Target (Trimester) Total Allowable Catch (TAC)

Option 1: No Action

*Impacts on regulated groundfish*
Under No Action, the common pool trimester TAC apportionments as determined in Amendment 16 would remain unchanged. Maintaining the current trimester TAC apportionments is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the fleet is still constrained by the TAC.

*Impacts on other species*
No Action would maintain the common pool trimester TAC apportionments as determined in Amendment 16 and would not be expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops.

Option 2: Revised Common Pool Vessel Trimester Total Allowable Catch (TAC) Apportionments

*Impacts on regulated groundfish*
Under Option 2, the common pool trimester TAC apportionments would be updated, following the process outlined in Amendment 16, which specified they should be calculated using the most recent 5-year period of data available. Revisions to the common pool trimester TAC apportionments would be

limited to those stocks that have experienced early closure in trimester 1 or 2. Updates to the trimester TAC apportionments is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the fleet is still constrained by the TAC.

*Impacts on other species*
Under Option 2, updates to the trimester TAC apportionments is not expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops.

7.5.1.1.2.1 Sub-Option 2: Scallop Sub-ACL for SNE/MA Yellowtail Flounder

As indicated above, sub-ACLs are designed to limit the incidental catch of yellowtail flounder by the scallop fishery. Exceeding catch limits may trigger accountability measures for the scallop fishery. A comparison of the Option 2 specifications (see Table 5 in draft alternatives, dated December 1, 2017) and the Scallop PDT's estimates of projected catch by the scallop fishery (Table 15) indicates that scallop fishery catches of SNE/MA yellowtail flounder are predicted to be less than or equal to the sub-ACL for the fishery in 2018.

### 7.1.2 Fishery Program Administration

#### 7.1.2.1 Authority for Common Pool Trimester Total Allowable Catch (TAC) Apportionment Changes

7.1.2.1.1 Option 1: No Action

*Impacts on regulated groundfish*
Under No Action, adjusting the common pool trimester TAC apportionments would continue to be done through Council action. Maintaining the current process for updating trimester TAC apportionments is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the fleet is still constrained by the TAC.

*Impacts on other species*
No Action would maintain the current process for adjusting common pool trimester TAC apportionments and would not be expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops.

7.1.2.1.2 Option 2: Broaden Regional Administrator Authority to Modify Common Pool Trimester TACs and/or AM Closures

*Impacts on regulated groundfish*
Under Option 2, the Regional Administrator would have broader authority to modify TACs and AM closures without requiring Council action, under certain conditions. Revisions to the common pool trimester TAC apportionments would be limited to those stocks that have experienced early closure in trimester 1 or 2. Changes to the process for adjusting trimester TAC apportionments is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the fleet is still constrained by the TAC.

*Impacts on other species*
Under Option 2, changes to the process for adjusting common pool trimester TAC apportionments, by allowing the Regional Administrator broader authority to modify trimester TACs and AM closures without Council action, under certain conditions, is not expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops.

### 7.1.3 Commercial and Recreational Fishery Measures

#### 7.1.3.1 Accountability Measures

#### 7.5.3.1.1 Atlantic Halibut Accountability Measures for Federal Fisheries

7.5.3.1.1.1. Option 1: No Action

*Impacts on regulated groundfish*

This option would not change existing halibut Accountability Measures for the groundfish fishery. Under Option 1, the existing reactive accountability measures would remain in place for the federal groundfish fishery, including the no possession provision and the gear restricted areas. Although, this option would continue the requirement that Atlantic halibut possession would be prohibited if the ACL is exceeded, this requirement does not prevent federally permitted non-groundfish vessels from targeting and landing halibut. Therefore, ending overfishing is less likely under Option than it is under Option 2A. Option 2B would be expected to result in neutral to low negative impacts on regulated groundfish species, mainly halibut, depending on the modifications to the gear-restricted areas selected.

*Impacts on other species*

This option would not be expected to have any direct biological impacts on other species.

7.5.3.1.1.2 Option 2: Atlantic Halibut Accountability Measures for Federal Fisheries

7.5.3.1.1.2.1 Sub-Option 2A: Reactive AM of No Possession Would Apply to All Federal Permit Holders

*Impacts on regulated groundfish*

The revision would extend the no possession AM provision to all federally permitted fishing vessels; including lobster vessels, scallop vessels, party/charter vessels in the recreational fishery and other vessels covered under several FMP's. If the AM is triggered and the state waters sub-component catches contribute significantly to the catches, then the modified AM provision would limit catch by vessels with a federal permit that is not a groundfish permit. Other provisions of the AM would remain unchanged.

Analysis indicates that halibut landings occur on federally permitted vessels on non-groundfish trips, especially for commercial vessels with lobster and Highly Migratory Species permits, presumably from state waters. Catches from federally permitted lobster vessels are a major component of these landings. If the AM was triggered, extending the no possession provision to these vessels would be expected to result in a decrease in directed fishing effort and landings in the Maine state water fishery.

As compared to Option 1/No Action, Sub-Option 2A would be expected to lead to more control on

fishery catches of Atlantic halibut by federally permitted fishing vessels. The reduction in directed fishing effort is expected to constrain fishing effort and increase the probability that catches will be below the ACLs.

*Impacts on other groundfish*

If adopted, sub-option 2A may reduce fishing mortality for other species that are captured as bycatch by non-groundfish federally permitted fisheries that are targeting halibut. Therefore, mortality for these bycatch species would be expected to be lower than under Option 1 No Action.

7.5.3.1.1.2.2 Sub-Option 2B: Modified Gear Restricted Areas

*Impacts on regulated groundfish*

Under Sub-Option 2B the current Atlantic halibut AM areas would be modified for vessels possessing a northeast multispecies permit. Modifying the AM areas would provide additional operational flexibility for fixed gear and trawl gear multispecies vessels while continuing to reduce impacts on Atlantic halibut. The modifications to the gear restricted areas are likely to have a minimal impact on the halibut resource due to the low encounter rates and catch rates in the areas and seasons included.

Fixed Gear AM Areas – Under Sub-Option 2B there could be up to three modifications to the fixed gear AM areas.

- Exempt longline gear from the Fixed Gear AM areas - As compared to Option 1 No Action, this measure would be expected to have negligible impact on the Atlantic halibut stock. Analysis of observer data demonstrates that there is extremely low bycatch of Atlantic halibut by the federal longline fishery that targets cod, haddock, tilefish and spiny dogfish. In addition, the longline fishery has low amounts of fishing effort in Fixed Gear AM areas 1 and 2. From 2011 to August 2016 there were 1,792 observed longline hauls for vessels with a multispecies permit. Halibut were only encountered in four of the 1,792 observed hauls (0.22%), and this fishery did not have any observed halibut catches within fixed gear AM areas 1 or 2. Therefore, allowing longline effort by multispecies permit holders in the Fixed Gear AM areas is not expected to result in an increase in halibut catches.
- Remove Fixed Gear AM Area 1 - As compared to Option 1/No Action, this measure would be expected to have low negative impacts on the Atlantic halibut stock. Data analyzed was collected between January 2011 and August 2016 from 2,130 observed gillnet hauls in the Stellwagen Bank fixed gear AM area (Fixed Gear AM area 1). Halibut were encountered on <10% of all observed gillnet hauls in the Stellwagen Bank AM area in all months except April and May (Table 16), and the mean halibut catch rates were <1 kg/tow in all months except April and June. Monthly catch rates were generally lower in the Stellwagen Bank AM area than the Platts Bank AM area (Table 16 and Table 17). Because observed halibut encounter rates (and overall halibut catches) were generally low for the gillnet fishery in Fixed Gear AM Area 1, the proposed modification is not expected to lead to a substantial increase in halibut catches.

**Table 16-Number of observed gillnet hauls, and proportion of positive hauls, by month within the Stellwagen Bank halibut fixed gear AM area (Fixed Gear AM area 1) from 2011 to 2016.**

| Month | Number of observed gillnet hauls | % positive hauls | Total halibut catch (kg) | Mean catch/haul (kg) |
|---|---|---|---|---|
| 1 | 239 | 5.0% | 59 | 0.2 |
| 2 | 210 | 4.8% | 49 | 0.2 |
| 3 | 194 | 6.7% | 73 | 0.4 |
| 4 | 25 | 36.0% | 56 | 2.2 |
| 5 | 289 | 10.0% | 267 | 0.9 |
| 6 | 243 | 9.9% | 556 | 2.3 |
| 7 | 269 | 5.2% | 211 | 0.8 |
| 8 | 135 | 2.2% | 28 | 0.2 |
| 9 | 68 | 4.4% | 49 | 0.7 |
| 10 | 133 | 5.3% | 52 | 0.4 |
| 11 | 178 | 5.1% | 150 | 0.8 |
| 12 | 147 | 1.4% | 10 | 0.1 |

- Allow gillnet gear in Fixed Gear AM Area 2 seasonally from November through February - As compared to Option 1/No Action, this measure would be expected to have low negative impacts on the Atlantic halibut stock. Data analyzed was collected between January 2011 and August 2016 from 936 observed gillnet hauls in the Platts Bank fixed gear AM area (Fixed Gear AM Area 2). The analysis demonstrates that halibut catch rates, and overall halibut catches vary seasonally within Fixed Gear AM area 2. Most observed gillnet hauls in Fixed Gear AM area 2 occurred from July through October, and halibut catch rates were generally high across these four months (Table 17). Halibut were not observed in gillnet hauls from Fixed Gear AM area 2 in January and February, and relatively low catch rates and catch amounts were also observed in November and December, but observed gillnet was relatively low in these months (Table 17). The analysis suggests that halibut catch rates, and gillnet fishing effort are low in Fixed Gear AM area 2 from November to February, and allowing gillnet fishing effort in Fixed Gear AM area 2 during these months would provide additional fishing opportunities for the federal gillnet fishery while having minimal impact on the halibut resource. Therefore, the proposed modification is not expected to lead to a substantial increase in halibut catches.

**Table 17-Number of observed gillnet hauls, and proportion of positive hauls, by month within the Platts Bank halibut fixed gear AM area (Fixed Gear AM area 2) from 2011 to 2016.**

| Month | Number of observed gillnet hauls | % positive hauls | Total halibut catch (kg) | Mean catch/haul (kg) |
|---|---|---|---|---|
| 1 | 18 | 0.0% | 0 | 0.0 |
| 2 | 17 | 0.0% | 0 | 0.0 |
| 3 | 33 | 24.2% | 132.7 | 4.0 |
| 4 | 40 | 27.5% | 265.8 | 6.6 |
| 6 | 90 | 23.3% | 432.1 | 4.8 |
| 7 | 142 | 25.4% | 660.45 | 4.7 |
| 8 | 247 | 16.6% | 820.8 | 3.3 |
| 9 | 161 | 24.8% | 944.25 | 5.9 |
| 10 | 110 | 25.5% | 898.6 | 8.2 |
| 11 | 34 | 8.8% | 85 | 2.5 |
| 12 | 44 | 13.6% | 55 | 1.3 |

- Trawl Gear AM Area – Under Sub-Option 2B the Trawl Gear AM area would be modified to allow standard trawl gear in the area between 41 degrees 40 minutes and 42 degrees seasonally from April 1 through July 31. As compared to Option 1/No Action, this measure would be expected to have low negative impacts on the Atlantic halibut stock. Data analyzed was collected on 4,184 observed large mesh trawl (NEGEAR code = 050) tows with kept catch (any species) that occurred in the Trawl Gear AM area from January 2011 to August 2016. The greatest proportion of positive tows and the highest mean halibut CPUE were observed in March (Table 18; Figure xx). However, March also represents the month with the fewest observed trawl tows in the mobile gear AM area. Aside from March, the observed halibut CPUE and percent of positive tows with halibut are rather consistent across months, although it should be noted that observed halibut catch rates are lowest in the mobile gear AM area in June and July. Across the six-year period, the lowest monthly halibut catches were observed in June, while the greatest catches were observed in September and October (Table 18; Figure 1). From 2011 to 2016 the proportion of trawl tows that encountered halibut were greatest for trawl tows that were made in the central and western portions of the mobile gear AM area, particularly in the ten-minute squares that are adjacent to the northern boundary of Closed Area 1 (e.g., 416936, 416831, and 416832; Figure 2). Large mesh trawl effort in each ten-minute square from 2011 to 2016 were aggregated by quarter to examine seasonal trends in halibut catch locations (Figure 3) and the proportion of positive tows in each ten-minute square (Figure 5). Some general trends emerge when the data is aggregated by seasons. Halibut catches (kg) were typically lower in the northern portion of the mobile gear AM area, particularly in quarter 2 (Figure 4). The analysis suggests that halibut catch rates, and trawl fishing effort (Figure 4) are low in the northern portion of the Trawl Gear AM area from April to July, and allowing vessels to fish using a standard trawl during these months would provide additional fishing opportunities for the federal trawl fishery while having minimal impact on the halibut resource. Therefore, the proposed spatial and seasonal modifications to the Trawl Gear AM area are not expected to lead to a substantial increase in halibut catches.

**Table 18-Number of observed large mesh trawl tows in the halibut Trawl Gear AM area each month from 2011 to 2016, and the percentage of tows where a halibut was recorded in the catch.**

| Month | Number of tows | Number of tows without halibut | Number of tows with halibut | % Positive | Mean CPUE (halibut(kg) per hour) | Total halibut catch (kg) |
|---|---|---|---|---|---|---|
| 1 | 501 | 439 | 62 | 12.4% | 0.6 | 1224 |
| 2 | 343 | 296 | 47 | 13.7% | 0.8 | 1056 |
| 3 | 157 | 112 | 45 | 28.7% | 1.2 | 807 |
| 4 | 239 | 205 | 34 | 14.2% | 0.7 | 633 |
| 5 | 197 | 171 | 26 | 13.2% | 0.9 | 852 |
| 6 | 180 | 169 | 11 | 6.1% | 0.5 | 298 |
| 7 | 294 | 266 | 28 | 9.5% | 0.7 | 978 |
| 8 | 417 | 361 | 56 | 13.4% | 0.7 | 1339 |
| 9 | 508 | 451 | 57 | 11.2% | 0.6 | 1656 |
| 10 | 462 | 387 | 75 | 16.2% | 1.1 | 2230 |
| 11 | 360 | 331 | 29 | 8.1% | 0.5 | 753 |
| 12 | 518 | 466 | 52 | 10.0% | 0.4 | 888 |

**Figure 1-Number of observed large mesh trawl tows in the halibut Trawl Gear AM area each month from 2011 to 2016, and the percentage of tows where a halibut was recorded in the catch.**

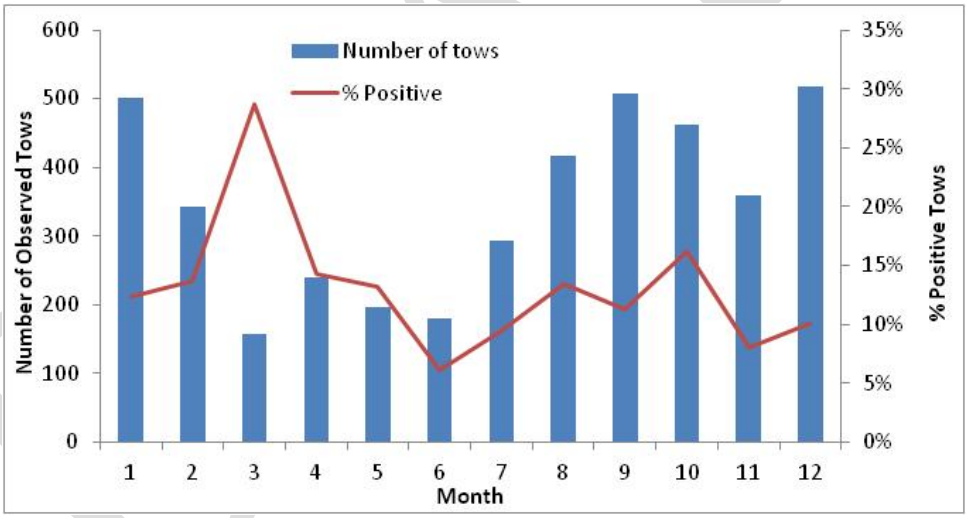


**Figure 2-Proportion of observed standard trawl tows that encountered halibut in each ten-minute square of the mobile gear AM area from January 2011 to August 2016.**

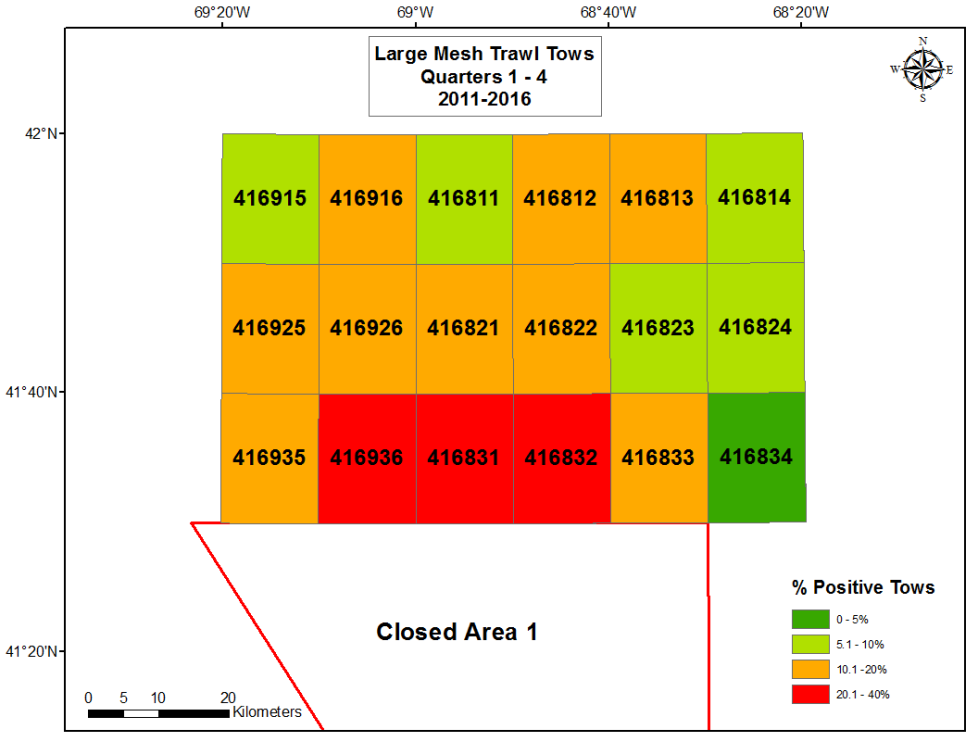



**Figure 3-Observed catches of halibut (kept and discard) in each ten-minute square of the halibut Trawl Gear AM area from 2011 to 2016.**

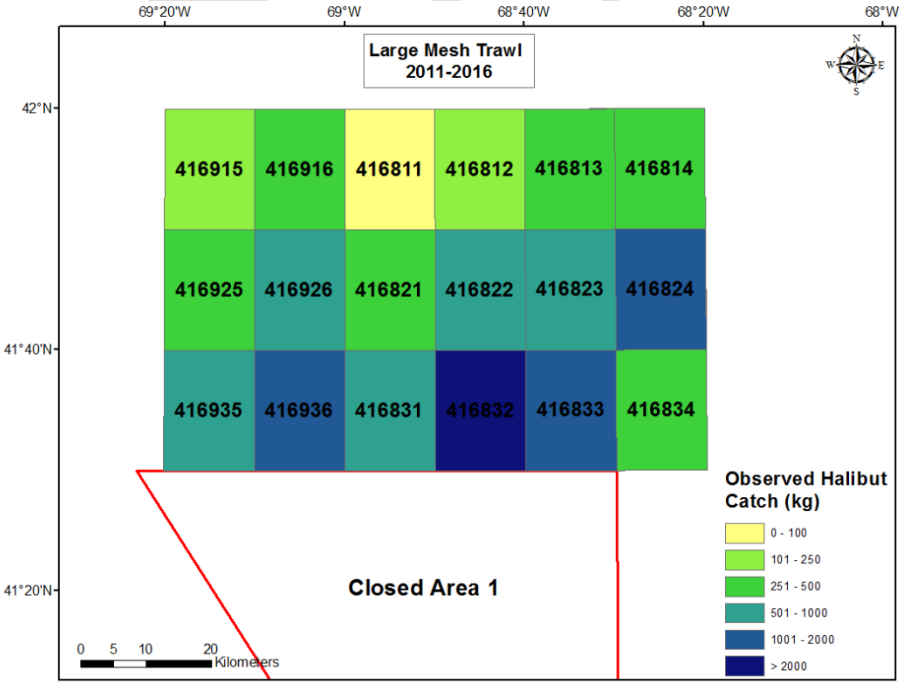


**Figure 4-Observed halibut catches (total kept and discard) in each ten-minute square of the halibut Trawl Gear AM area, by quarter, from January 2011 to August 2016. Top left = quarter 1, top right = quarter 2, bottom left = quarter 3, bottom right = quarter 4.**

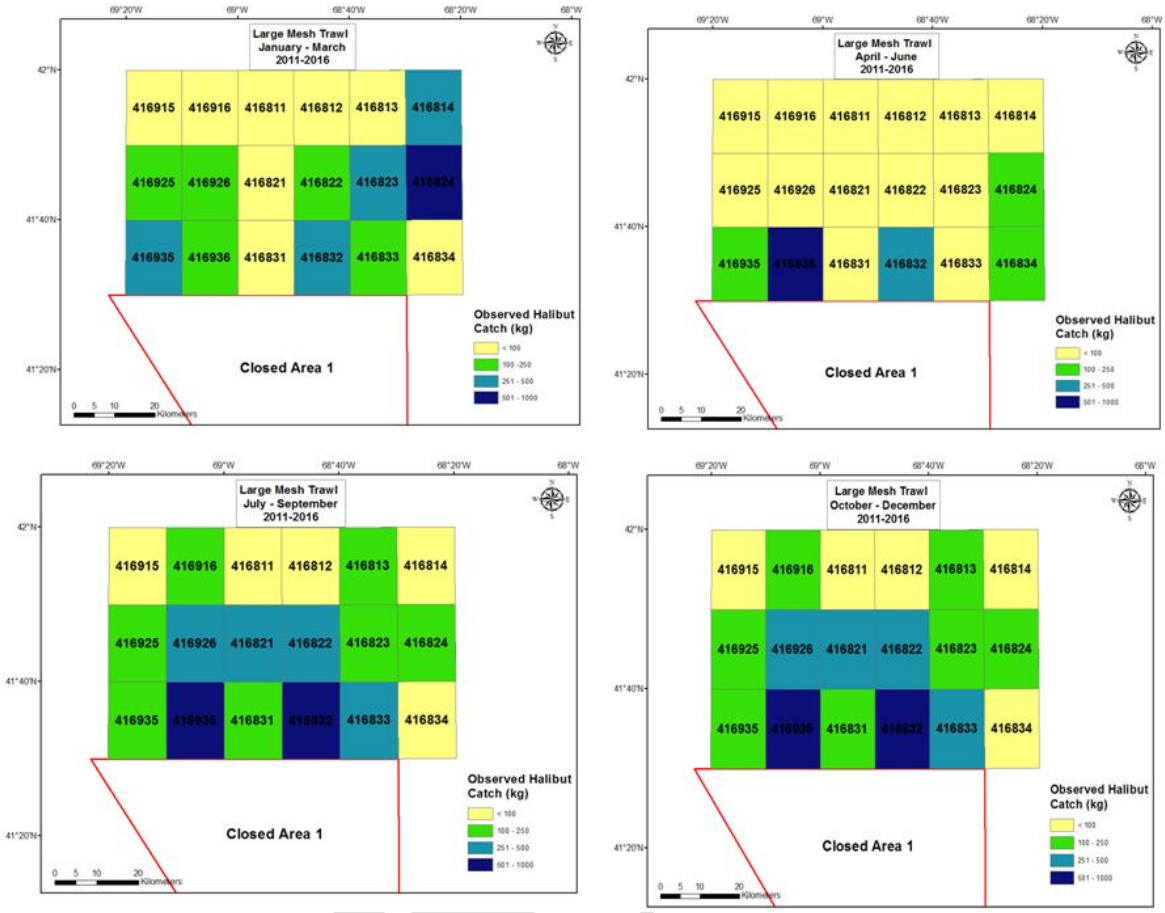


**Figure 5-Proportion of positive tows observed in each ten-minute square, by quarter. Top left = quarter 1, top right = quarter 2, bottom left = quarter 3, bottom right = quarter 4.**

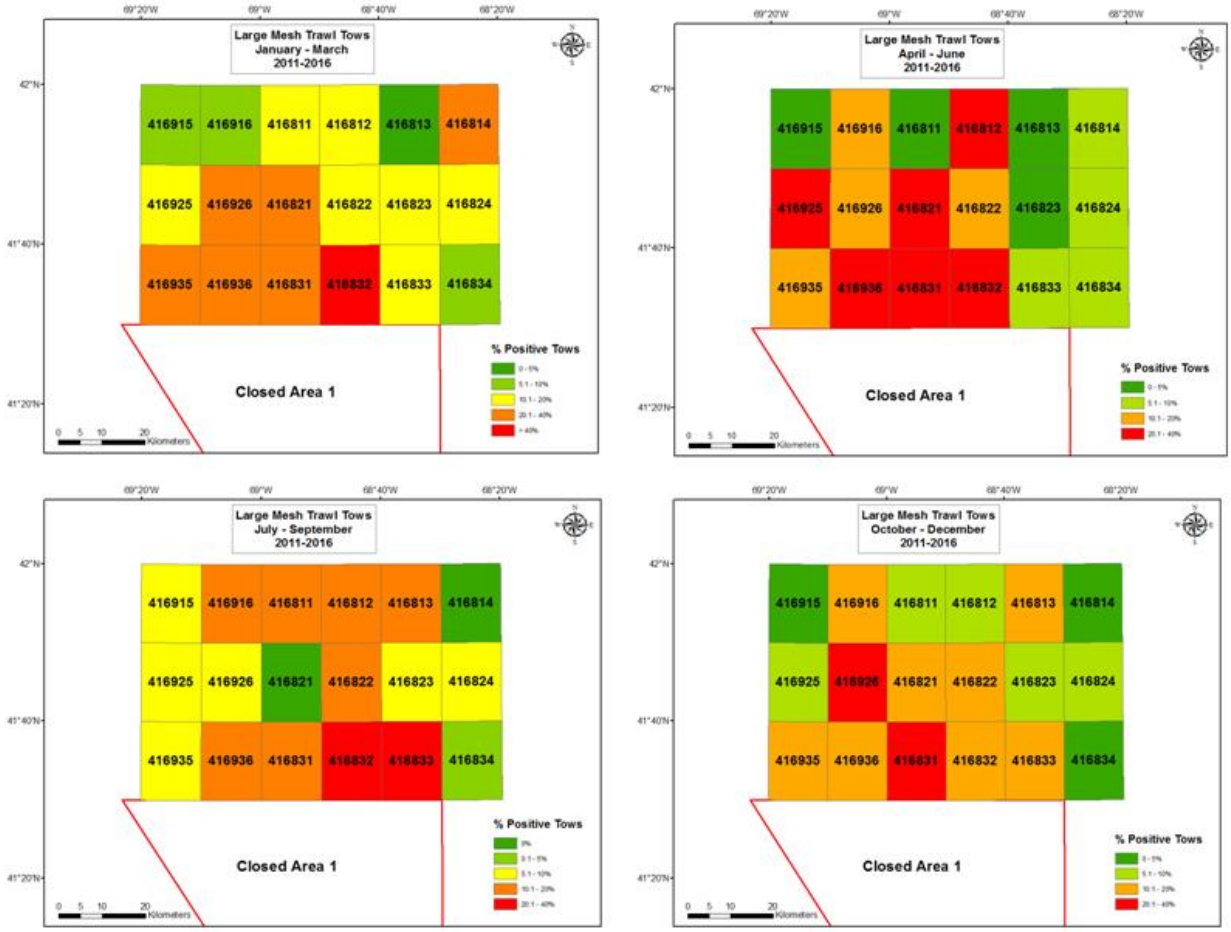
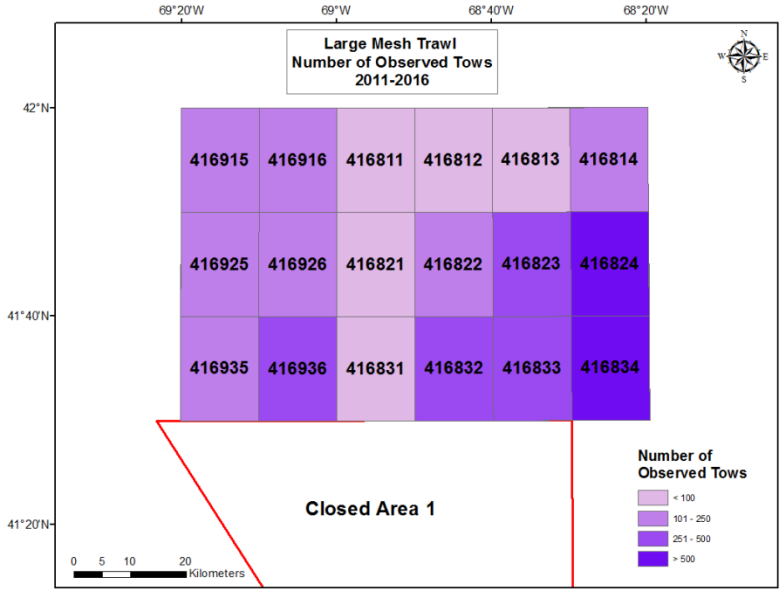


**Figure 6-The number of observed large mesh trawl tows reported from 2011 to 2016 in each of the ten-minute squares that comprise the halibut mobile gear AM area.**




*Impacts on other species*
If adopted, Sub-Option 2B may slightly increase fishing mortality for other species that are captured as bycatch in the commercial groundfish fishery when targeting halibut. Therefore, mortality for these bycatch species would be expected to be slightly higher than under Option 1/No Action.

### 7.5.3.1.2 Revised Southern Windowpane Accountability Measures for Large-Mesh Non-Groundfish Fisheries

7.5.3.1.2.1 Option 1: No Action

No action would maintain the current southern windowpane AMs for large-mesh non-groundfish fisheries. These AMs were developed with the intent of mitigating negative biological impacts of southern windowpane flounder ACL overages on the southern windowpane flounder stock. The AM areas were developed through Framework 47, in 2009, based on an analysis of observer data for tows using large mesh otter trawls, large and extra-large sink gillnets, and longlines during 2008-2010. Ratios of windowpane discards to all kept catch were calculated by ten-minute squares. These discard ratios were compared to total catch by area to estimate total windowpane discards by ten-minute square. The AM areas were drawn to achieve a desired reduction in windowpane catches. This analysis is described in more detail in Appendix IV to Framework 47.

Windowpane catch ratios by ten-minute squares were re-calculated using a similar methodology to that used in Framework 47 (Figure 7). Observer data from 2010 through 2016 for all trawl gear types were examined; however, bottom otter trawls were the only gear type which had observed windowpane flounder catch when a mesh size of at least five inches was used. Other gear types besides trawls were not examined because the current AMs for non-groundfish fisheries apply only to trawl vessels. These catch ratios can be compared to maps such as those shown in Figure 8 and Figure 9, which illustrate the spatial distribution of revenues in summer flounder and scup fisheries, two major non-groundfish fisheries which are impacted by the southern windowpane flounder AMs. These revenue distributions mirror effort distributions. Catch ratios within the AM areas can give an idea of whether windowpane bycatch may

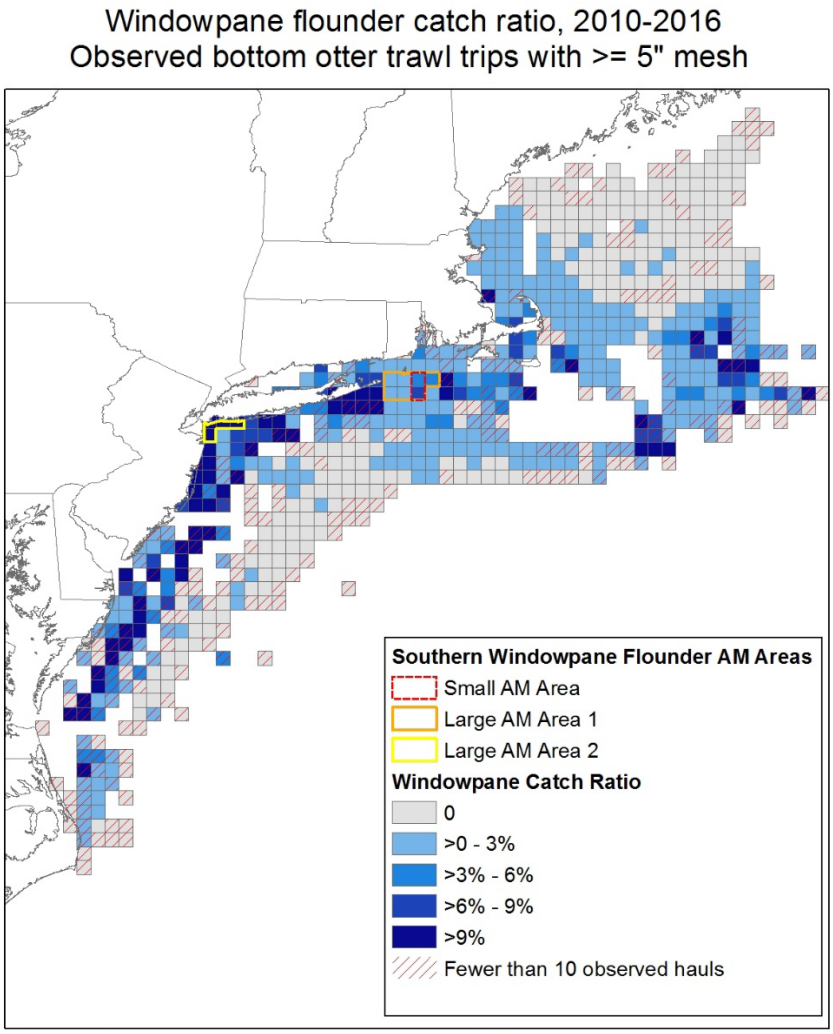
increase or decrease because of implementing the AMs. The effort maps can give an idea of the scale of the increase of decrease. For example, moderate or high catches of windowpane flounder may occur in locations with low windowpane flounder catch rates, but high effort in fisheries that catch windowpane flounder as bycatch. The methodology used to generate the effort maps is described in DePiper (2014).

This updated analysis suggests that the small AM area may provide a moderate benefit to the windowpane flounder stock, as windowpane catch ratios in the ten-minute squares within the small AM area are 6% or greater and the small AM area includes some areas of high effort in non-groundfish fisheries which catch windowpane flounder as bycatch (Figure 7- Figure 9). Implementing this AM area could result in a moderate decrease in windowpane flounder catches within that area. The large AM area 1 (i.e. the AM area off Montauk, NY) does not appear to provide much additional benefit beyond that provided by the small AM area, which is enclosed within the large AM area 1. Moreover, the large AM area 1 could have negative impacts for windowpane flounder. The ten-minute squares in the large AM area 1 which are not also included in the small AM area have windowpane catch ratios of 3% or less. Importantly, some of these ten-minute squares are bordered by ten-minute squares outside of the AM area with higher catch ratios, on the order of 10% or higher. They are also bordered by areas with relatively high effort in summer flounder and scup fisheries (Figure 8 and Figure 9). Implementation of the large AM area 1 would be expected to result in a shift in fishing effort out of the AM area and into neighboring areas as trawl vessels using five-inch mesh or greater without the approved selective gears attempt to maintain catches of target species. Because the four eastern-most ten-minute squares in the large AM area 1 have relatively low windowpane flounder catch ratios, but are bordered by ten-minute squares with higher catch ratios, implementation of the large AM area 1 would be expected to result in an increase in windowpane flounder bycatch, rather than a decrease. Thus, based on this updated analysis, the current large AM area 1 would be expected to result in negative impacts for the windowpane flounder stock, rather than the positive impacts which it was intended to impart. If trawl vessels using greater than five-inch mesh without the approved selective gears switch to use of the selective gears as a result of the AM, then the large AM area 1 could have some positive impacts for windowpane flounder by reducing windowpane flounder catches; however, it may be more likely that these vessels would simply move to nearby areas, where windowpane catch ratios are higher, and continue to use the non-selective gear.

The ten minute squares within the large AM area 2 (i.e. the large AM area off western Long Island and northern New Jersey) have windowpane catch ratios of at least 10% (Figure 7), as well as high effort in the summer flounder fishery (Figure 8). Unlike the large AM area 1, the large AM area 2 would be expected to have positive impacts on the windowpane flounder stock by reducing catch of windowpane when it is implemented.

Bycatch ratios for other non-target species were not examined; therefore, it is not known how changes in the distribution of fishing effort as a result of the AMs may impact other non-target stocks. Use of selective trawl gear in the AM areas may result in reduced catches of other non-target species (e.g. other flounders, skates, monkfish, and lobsters), which would result in positive impacts for those species within those areas.

**Figure 7-Windowpane flounder catch as a proportion of all observed kept catch in bottom otter trawl trips using 5-inch mesh or greater, 2010-2016.**




Catch ratio = observed windowpane flounder catch / all observed kept catch

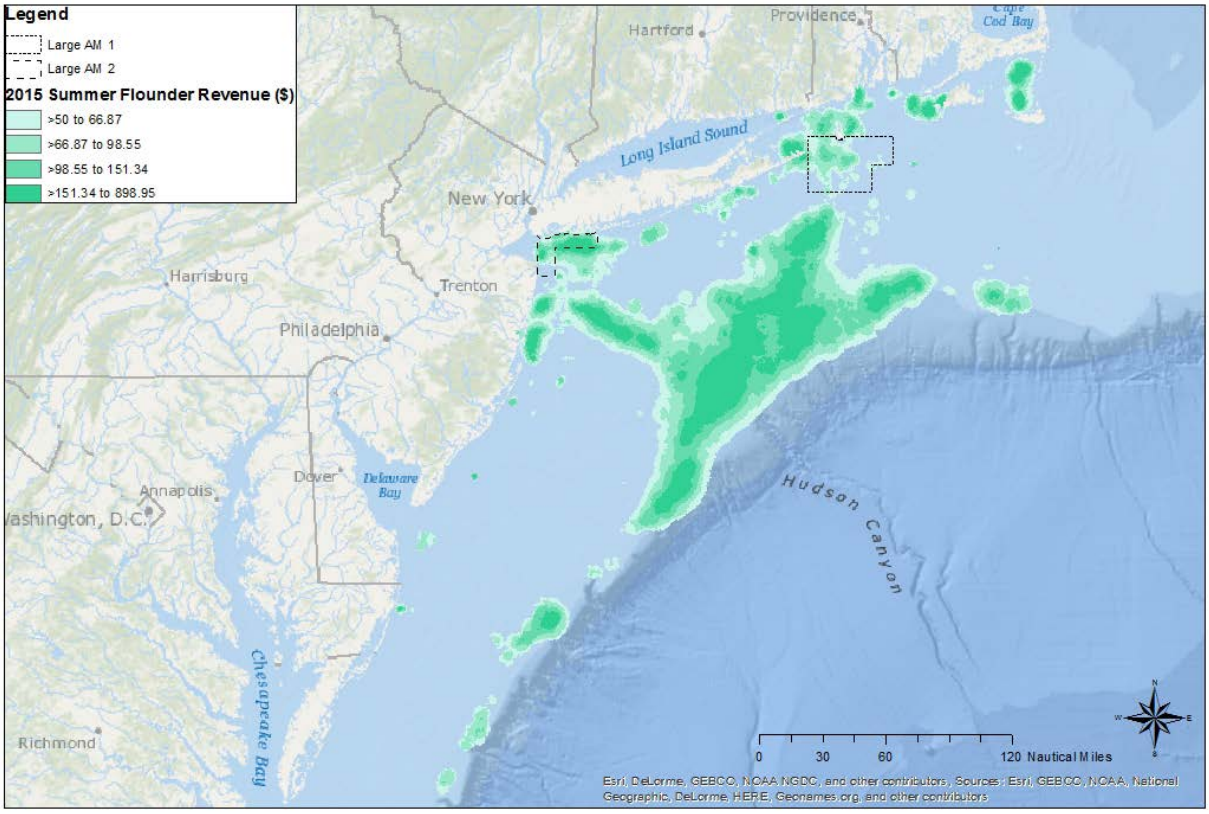



**Figure 8: Model-estimated 2015 revenue of summer flounder, overlaid with the southern windowpane flounder accountability measures areas. Only revenues greater than $50 per cell displayed. Revenue partitioned into four quantiles (see DePiper 2014 and NEFMC 2017 for more details).**

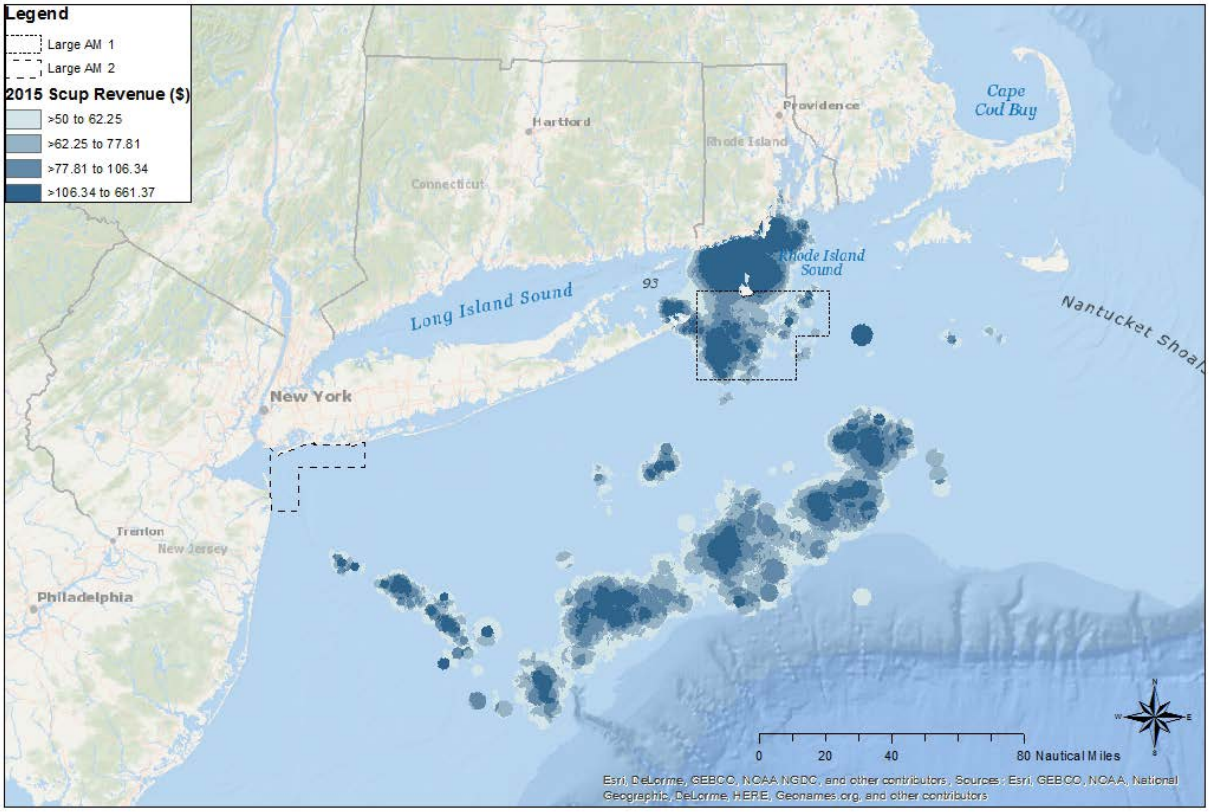



**Figure 9: Model-estimated 2015 revenue of scup, overlaid with the southern windowpane flounder accountability measures areas. Only revenues greater than $50 per cell displayed. Revenue partitioned into four quantiles (see DePiper 2014 and NEFMC 2017 for more details).**

7.5.3.1.2.2 Option 2: Revised Southern Windowpane Accountability Measures for Large-Mesh Non-Groundfish Fisheries

The Council may select both Sub-Option 2A and 2B. The expected impacts of these alternatives on windowpane flounder and other non-target species are described in the following sections. If both alternatives were to be implemented, the expected impacts would be additive.

7.5.3.1.2.2.1 Sub-Option 2A: Extension of FW 52 Provisions to Large-Mesh Non-Groundfish Trawl Fisheries

This sub-option would allow the small AM area to be implemented instead of the large AM areas and could also allow the AM to be removed mid-year if the conditions described in section 4.3.1.2.2.1, are met. These options, described in this document as "Framework 52 provisions", currently only apply to groundfish fisheries. This sub-option would extend these provisions to non-groundfish trawl fisheries.

*Modification of AM Area*
As described in section 4.3.1.2.2.1, the small AM area can be implemented instead of the large AM area only when the southern windowpane flounder stock is rebuilt and when the biomass criterion (i.e. the most recent 3-year average of catch per tow from the NEFSC fall bottom trawl survey multiplied by 75% of $F_{MSY}$) is larger than the monitored catch. If these requirements are met, it is assumed that the ACL

overage which triggered the AM did not have a large negative biological impact on the stock and that the small AM area would adequately mitigate the overage. The biomass criterion is sensitive to fluctuations in survey catches year to year. It is possible that an increase in biomass could be overestimated or a decrease in biomass could be underestimated; therefore, if the stock condition is worsening it may go unnoticed until the next available stock assessment. However, overall, this aspect of sub-option 2A would have positive biological impacts on windowpane flounder because the AM would still correct for the ACL overage and thus would still help prevent overfishing. Additionally, by requiring the use of selective trawl gear in the small AM area, sub-option 2A could also have positive impacts for other non-target species such as skates, monkfish, and lobster by reducing their catches within the small AM area. Some of these positive impacts for windowpane flounder and other non-target species may be mitigated if fishermen simply shift their effort to areas outside of the AM areas.

As described in section 7.5.3.1.2.1, an updated analysis of windowpane flounder bycatch suggests that the small AM area could have positive impacts on the windowpane flounder stock; however, the large AM area 1 (i.e. the AM area off Montauk, NY) could have unintended negative biological consequences if it is implemented. This is because the areas within the large AM area 1 have relatively low windowpane flounder catch ratios, but are bordered by areas with relatively high catch ratios (Figure 7). Rather than switching to approved selective gears, trawl vessels could simply move to neighboring areas outside of the AM areas and continue to fish with non-selective gears when the AM is implemented. This could result in increased windowpane flounder bycatch. For this reason, implementing the small AM area instead of the large AM areas could be beneficial for southern windowpane flounder. Sub-option 2A would increase the likelihood that the small AM area is implemented instead of the large AM area.

*In-Season Removal of AM*

As described in section 4.3.1.2.2.1, under sub-option 2A, if an ACL overage in year 1 is detected in year 2, requiring implementation of the AM for non-groundfish fisheries in year 3, that AM could be lifted after August 31 of year 3 if there is an ACL underage in year 2. The underage of the total ACL need not be equal to the overage that triggered the AM. An ACL overage implies that overfishing is occurring; an underage of the total ACL would imply that overfishing is no longer occurring, and the AM can be scaled back.

The reason for the underage in year 2 might be important. For example, removing the AM in year 3 could make the situation worse if the underlying reason for the decrease in catches in year 2 is because the stock is in decline. On the other hand, this option may provide fishermen with an incentive to reduce their bycatch of windowpane flounder in year 2 so the AM could be removed in-season in year 3. Overall, this aspect of sub-option 2A would have positive biological impacts on windowpane flounder because the AM would still be in place from May 1 through at least August 31, which would mitigate some of the negative biological impacts of the ACL overage and incentives would be created for industry to actively reduce windowpane flounder catch following an ACL overage.

Under sub-option 2A the AM, when triggered, would still be in place for at least four months each year. The selective trawl gear required in the AM areas would be expected to reduce catches of skates, monkfish, lobster, and other non-target species in the AM areas. Mortality of these stocks under this alternative would be expected to be greater than under the no action alternative in instances when the AM is removed mid-year.

However, it is important to note that, as described above, the large AM area 1 (i.e. the area off Montauk, NY) may result in unintended negative biological impacts for southern windowpane flounder when it is implemented. This is not the case for the large AM area 2 (i.e. the area off western Long Island Sound/northern New Jersey) and the small AM area (see previous sections for rationale). For this reason, mid-year removal of the large AM area 1 could have positive biological impacts for southern

windowpane flounder, compared to if the large AM area 1 were in place for the entire year. Because sub-option 2A would reduce the likelihood that the large AM area 1 would be in place for the entire year, it is expected to have positive biological impacts on windowpane flounder.

When the two components of sub-option 2A area considered together, they would, in effect, increase the likelihood of the small AM area being implemented instead of the large areas and would reduce the likelihood that the AMs are in place for the entire year. For the reasons described above, this is expected to result in overall positive biological impacts on southern windowpane flounder. These impacts are expected to be more positive than if the large AM area 1 were implemented for the entire year, but less positive than if the small AM area were implemented for the entire year (both of which are more likely under the no action alternative than under this alternative), for the reasons described above.

7.5.3.1.2.2.2 Sub-Option 2B: Modified Gear Restricted Areas

As described in section 4.3.1.2.2.2, under sub-option 2B, the small AM area would be a seasonal AM. When implemented, it would be in place from September 1 through April 30. It would not be in place during May through August. For the reasons described below, this is expected to result in slight negative impacts to windowpane flounder, compared to the no action alternative and sub-option 2A. In addition, under sub-option 2B the large AM area 1 (i.e. the area off Montauk, NY) would be reduced in size as shown in Figure 7 in the draft alternatives (dated December 1, 2017). For the reasons described below, this is expected to result in slight positive impacts to windowpane flounder, compared to the no action alternative and sub-option 2A.

An analysis of observed windowpane catches in bottom trawl trips using mesh of at least 5 inches during 2010-2016 shows windowpane catch ratios of 3% or less in the small AM area during May through August, with higher catch ratios during other times of the year (Figure 10). Fishing effort in non-groundfish fisheries was not examined seasonally for this analysis; however, in general, summer flounder and scup fisheries (major non-groundfish fisheries which catch windowpane flounder and are subject to these AMs) operate closer to shore in warmer months and farther offshore in colder months. As shown in Figure 8 and Figure 9, some areas within the small AM area have relatively high effort in summer flounder and scup fisheries. Thus, removing the months of May through August from the small area AM would be expected to result a slight to moderate increase in windowpane flounder bycatch, compared to if the AM were in place year-round (as under the no action alternative). This would be expected to result in slight negative impacts for windowpane flounder and non-target species which are caught in the small AM area during May through August on trips which would otherwise be prohibited in the small AM area under the no action alternative, but would be allowed under sub-option 2B. Impacts to windowpane flounder and other non-target species resulting from a seasonal small AM area are expected to be more negative under sub-option 2B than sub-option 2A. Under sub-option 2A, the small AM area, when needed, would still be in place at least from May 1 through August 31, after which it could be removed if certain conditions are met. If both sub-options 2A and 2B are selected, then the small AM, when triggered, may not be implemented at all in years when the conditions for in-season removal after August 31 are met.

A reduction in the size of the large AM area 1 as shown in Figure 7 in the draft alternatives (dated December 1, 2017) would be expected to have slight positive impacts for windowpane flounder compared to the no action alternative. Windowpane catch ratios were 3% or less on an annual basis in the four ten-minute squares which would be removed from the large AM area 1 under sub-option 2B (Figure 7). Two of these ten-minute squares had windowpane catch ratios of 3-6% during January-May or September-December (Figure 10). These four ten-minute squares had high fishing effort for summer flounder and scup (Figure 8 and Figure 9). Therefore, windowpane bycatch in those areas could be moderately high.

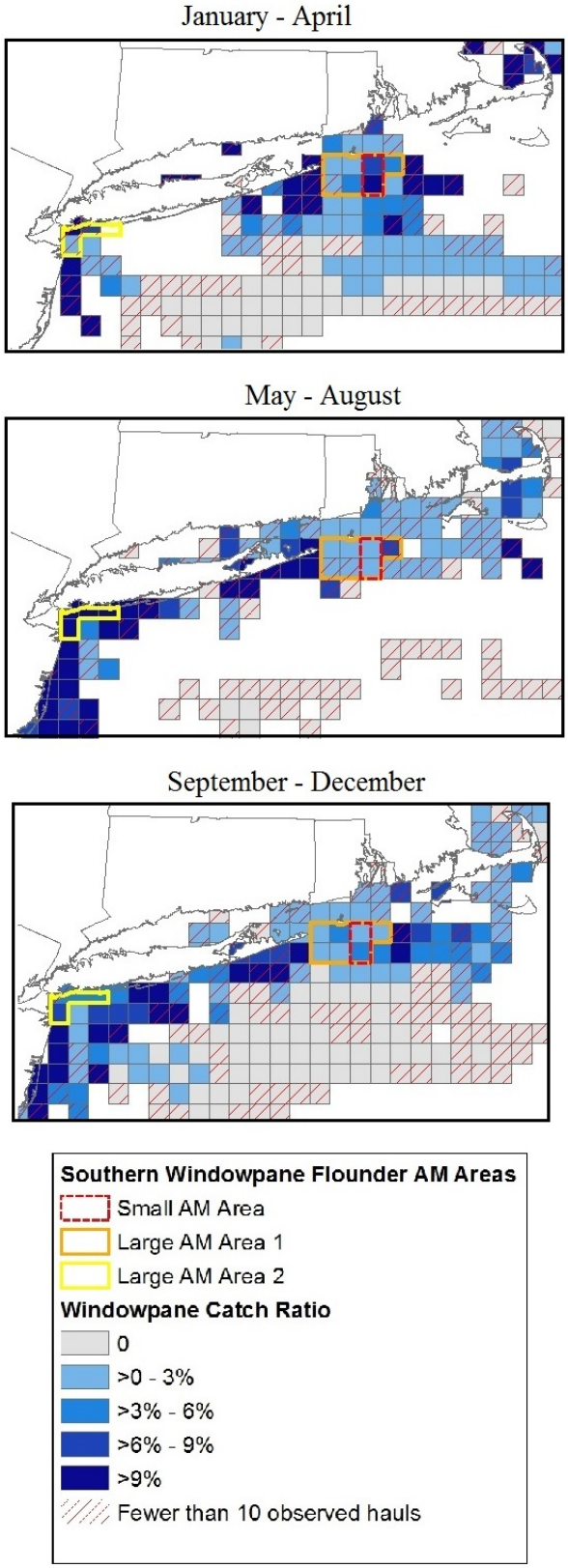
However, some neighboring areas had seasonal windowpane flounder catch ratios of greater than 9% and moderate to high fishing effort in summer flounder and scup fisheries (Figure 8 through Figure 10). Therefore, removing these four ten-minute squares from the large AM area 1 would reduce the potential for fishing effort to be displaced from areas with lower windowpane flounder bycatch to areas with higher windowpane flounder bycatch. For this reason, removal of these four ten-minute squares from the large AM area 1 would be expected to have slight positive impacts on southern windowpane flounder, compared to the no action alternative. The large AM area 1 would still be implemented year-round, unless the conditions for in-season removal described in the previous section are met.

A reduction in the size of the large AM area 1 could result in slight negative impacts for non-target species within the AM area, compared to the no action alternative, if it reduces the likelihood that trawl vessels will use selective gears. However, it is difficult to predict impacts to non-target species on a larger scale (i.e. within and outside of the AM areas) because the AMs may simply result in a change in the distribution of effort without a change in the amount of effort. It is not possible to predict with confidence how the distribution of effort might shift; therefore, it is not possible to predict with confidence how catches of non-target species might change as a result of any shifts in effort.

*Combined impacts of Sub-Option 2B with Sub-Option 2A*
If sub-option 2B were implemented in conjunction with sub-option 2A, this would result in a reduction in the size of the large AM area 1 (sub-option 2B) and a reduced likelihood that the large AM areas would be implemented instead of the small AM area (sub-option 2A). Due to the potential for the large AM area 1 to cause a shift in fishing effort from areas of lower windowpane flounder bycatch to areas of higher windowpane flounder bycatch, these changes would be expected to result in positive impacts for windowpane flounder compared to both the no action alternative and compared to if only one of sub-options 2A and 2B were implemented.

Additionally, if sub-option 2B were implemented in conjunction with sub-option 2A, it would result in the small AM area not being implemented during May 1 – August 30 (sub-option 2B) and would allow for all the AM areas to be removed after August 31 if there is an ACL underage in year 2 (sub-option 2A). The combination of these two alternatives could result in a situation where the small AM is triggered in year 1, but not implemented due to a year 2 ACL underage. Because the small AM area is more beneficial than the large AM area 1 in terms of reducing windowpane flounder bycatch, when considering only the small AM area, the combination of these two sub-options would be expected to have slight negative impacts for windowpane flounder compared to both the no action alternative and compared to if only one of sub-options 2A and 2B were implemented.

**Figure 10-Seasonal windowpane flounder catch as a proportion of all observed kept catch in bottom otter-trawl trips using 5-inch mesh or greater, 2010-2016.**



#### 7.5.3.1.3 Atlantic Scallop Fishery Measures

##### 7.5.3.1.3.1 Scallop Fishery AM Implementation Policy

The scallop fishery is allocated 90% of its projected catch of SNE/MA yellowtail flounder (FW 44, FW 50, and FW 55). Provisions in both the groundfish and scallop fishery management plans require that NMFS estimate scallop fishery catch of SNE/MA yellowtail flounder annually in January to determine if the sub-ACL is likely to be exceeded. In years when NMFS projects that less than 90% of the scallop GB or SNE/MA yellowtail sub-ACL will be caught, the agency may initiate an allocation transfer from the scallop fishery to the groundfish fishery for those stocks. This transfer has occurred for SNE/MA yellowtail flounder in FY2013, FY2015, and FY2016. In FY 2013, NMFS transferred 17.4 mt of the SNE/MA yellowtail flounder from the scallop fishery to the groundfish fishery (~29% of the FY 2013 scallop SNE/MA yellowtail flounder sub-ACL). In FY 2015, NMFS transferred 22.3 mt of the SNE/MA yellowtail flounder from the scallop fishery to the groundfish fishery (~34% of the FY 2015 scallop SNE/MA yellowtail flounder sub-ACL). In FY 2016, NMFS transferred 15.2 mt of SNE/MA yellowtail flounder from the scallop fishery to the groundfish fishery (~48% of the FY 2016 scallop SNE/MA yellowtail flounder sub-ACL).

Regulations governing the scallop fishery's retention of SNE/MA yellowtail flounder have varied in recent years. Landings of yellowtail flounder became prohibited for the scallop fishery in FY 2014 to remove any incentive to target yellowtail (). Prior to this, catch estimates were comprised of both landings and discards. In some years, there has been a requirement that vessels land any catch of yellowtail flounder.

Since FY 2010, scallop fishery catch of SNE/MA yellowtail flounder has ranged from a high of 113 mt (FY 2010) to a low of 10.7 mt. The fishery has historically encountered yellowtail within the Nantucket Lightship Access Area and in the Southern New England Access Area. Lower catches of yellowtail flounder can be expected during closures of these areas (seasonal or year-round).

**Table 19 - Recent SNE/MA yellowtail flounder ACLs, scallop fishery sub-ACLs and catches, and groundfish fishery sub-ACLs and catches. Values shown in metric tons (mt).**

| | Total ACL (mt) | Total Catch (mt) | Percent Total ACL Caught | Scallop sub-ACL (mt) | Scallop Catch (mt) | Percent Scallop ACL Caught | Groundfish sub-ACL (mt) | Groundfish Catch (mt) | Percent Groundfish ACL Caught |
|---|---|---|---|---|---|---|---|---|---|
| FY2010 | 470 | 314.7 | 67% | 135 | 113 | 83.7% | 310 | 171.9 | 55.4% |
| FY2011 | 641 | 514.9 | 76.7% | 82 | 110.9 | 135.2% | 524 | 376.2 | 67.3% |
| FY2012 | 936 | 593.5 | 59.3% | 127 | 54 | 42.5% | 760 | 463 | 55.8% |
| FY2013 | 665 | 466.1 | 70.1% | 43.6 | 48.6 | 111.4% | 585.7 | 373.3 | 63.7% |
| FY2014* | 665 | 497.1 | 74.7% | 66 | 64.8 | 98.2% | 564 | 400.4 | 71% |
| FY2015* | 666 | 326.6 | 49% | 44 | 34.6 | 79.1% | 579 | 283.5 | 48.9% |
| FY2016* | 256 | 85.2 | 33.3% | 17 | 10.7 | 63.9% | 204 | 62.5 | 30.6% |
| FY2017* | 256 | **** | **** | 34 | 4.9** | 14.5% | 187.5 | 6.3*** | 3.3% |

* Indicates that retention of SNE/MA YT was prohibited for scallop fishery
**FY2017 SNE/MA YT scallop fishery catch estimate as of October 21, 2017
***FY2017 SNE/MA YT groundfish fishery catch estimate as of November 14, 2017
****Indicates that final catch data is not yet available

#### 7.5.3.1.3.1.1 Option 1: No Action

*Impacts on regulated groundfish species*

The AM policy established in FW 47 for the scallop fishery would remain unchanged. Option 1/No Action would continue to provide positive impacts on all groundfish stocks in which the scallop fishery has a sub-ACL.

*Impacts on other species*

Option 1/No Action is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, and skates. The impacts of Option 1/No Action on Atlantic sea scallops would be negligible if the scallop fishery was able to continue to prosecute their fishery in times/areas outside of the AM areas.

#### 7.5.3.1.3.1.2 Option 2: Extend the Temporary Change to the Scallop Fishery AM Implementation Policy to the SNE/MA Yellowtail Flounder Stock

Option 2 would allow for a temporary change to the AM implementation policy for the SNE/MA yellowtail flounder stock so that the only criteria to determine if an AM would be implemented would be if the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded. This measure includes a 1-year "sunset" provision. Therefore, if the measure was implemented in FY 2018, the temporary change to AM policy would only apply for FY 2018 catches and in FY 2019 and beyond the underlying policy would apply (i.e., as described under No Action).

*Impacts on regulated groundfish species*

The information provided on the scallop and groundfish fisheries suggests that the SNE/MA yellowtail flounder ACL may be exceeded in FY 2018. Relative to No Action/Option 1, Option 2 would be low negative to neutral impacts on regulated groundfish species depending on the magnitude of all fisheries catches and the fact that this option would be put in place as a temporary measure for one year (for catches occurring in FY 2018).

*Impacts on other species*

Compared with No Action/Option 1, Option 2 is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, and skates. The impacts of Option 1/No Action or Option 2 on Atlantic sea scallops would be negligible if the scallop fishery was able to continue to prosecute their fishery in times/areas outside of the AM areas.

#### 7.5.3.1.4 Recreational Fishery Measures

##### 7.5.3.1.4.1 Georges Bank Cod Accountability Measures for the Recreational Fishery

7.5.3.1.4.1.1 Option 1: No Action

*Impacts on regulated groundfish*
Catches of GB cod by the recreational fishery in FY2016 lead to overages of the ABC. In addition, recreational catches account for greater than 5% of total U.S. catches in fishing years 2014, 2015, and 2016 (Table 20). Current measures in the recreational fishery are a minimum fish size of 22 inches and a 10-fish bag limit on private mode and no limit on party/charter mode. Changes to the recreational management measures require a Council action. No Action/Option 1 would result in no changes to management measures and may increase the risk of overfishing the GB cod stock, if catches continue to increase.

**Table 20- Georges Bank cod recreational catch, FY2011-2016. Source: GARFO.**

| Year | Federal Waters Recreational Catch (mt) | State Waters Recreational Catch (mt) | All Recreational Catch (mt) | Total Catch (mt) | Recreational Portion of Total Catch (Percent) |
|---|---|---|---|---|---|
| 2011 | 54.6 | 0.0 | 54.6 | 3,405.9 | 1.6 |
| 2012 | 62.7 | 4.4 | 67.1 | 1,724.1 | 3.9 |
| 2013 | 8.0 | 0.0 | 8.0 | 1,616.3 | 0.5 |
| 2014 | 75.9 | 15.5 | 91.4 | 1,514.4 | 6.0 |
| 2015 | 132.1 | 33.0 | 165.1 | 1,835.4 | 9.0 |
| 2016 | 419.7 | 57.8 | 477.5 | 1,125.5 | 42.4 |

*Impacts on other species*
No Action/Option 1 would not be expected to have any direct biological impacts on other species.

7.5.3.1.4.1.2 Option 2: Temporary Administrative Measure to Allow the Regional Administrator Authority to Adjust the Recreational Measures for Georges Bank Cod

*Impacts on regulated groundfish*
Option 2 would allow for recreational management measures to be adjusted in FY2018 and FY2019 by the Regional Administrator to stay below a catch target of 138mt. Option 2 would likely lead to positive impacts relative to Option 1 for the regulated groundfish species, mainly GB cod. Measures to date under consideration include increasing the minimum fish size up to 24 inches (from 22 inches) and implementing a 10-fish bag limit for all anglers - party, charter, and private modes (from a 10-fish bag limit on private mode and no limit on party/charter mode). The catch target is based on the most recent five-year (CY2012-CY2016) average catch (landings and discards) from the 2017 operational assessment for Georges Bank cod for the recreational fishery (Table 21). The catch target value is 138mt.

The catch target was apportioned into the state waters and other sub-components for FY2018-FY2020. *State Waters* -The three-year (FY2014-FY2016) average non-recreational catch plus 10% of the recreational catch target of 138mt is 23.7mt. Management measures for the recreational fishery are expected to change through implementation of FW57 in time for FY2018. This evaluation assumes that states will adjust their measures accordingly and that state recreational anglers will comply with changes

in management measures. *Other Sub-Component* – The three-year (FY2014-FY2016) average non-recreational catch plus 90% of the recreational catch target of 138mt is 150.6 mt. Management measures for the recreational fishery are expected to change through implementation of FW57 in time for FY2018. This evaluation assumes that federal recreational fisheries will comply with the changes in measures and that measures are designed to reduce catches from FY2016 to the catch target.

**Table 21- Calculation of the catch target for the recreational fishery. Data source: Recreational catches in 2017 groundfish operational assessments, NEFSC.**

| | Calandar Year | | | | | | **Recreational** |
|---|---|---|---|---|---|---|---|
| Catch (mt) | 2012 | 2013 | 2014 | 2015 | 2016 | | Average 12-16 |
| Commercial landings | 2,007 | 1,312 | 1,514 | 1,300 | 1,109 | | |
| Commercial discards | 120 | 83 | 19 | 31 | 33 | | |
| Recreational landings | 56 | 6 | 88 | 124 | 369 | sum = | 643 |
| Recreational discards | 1 | 1 | 2 | 15 | 30 | sum = | 49 |
| Canadian landings | 395 | 384 | 430 | 472 | 428 | | |
| Canadian discards | 75 | 39 | 28 | 20 | 12 | | + |
| **Catch for Assessment** | **2,653** | **1,824** | **2,081** | **1,962** | **1,982** | | 692 |
| | | | | | | 5-yr avg | **138.4** |

Based on its preliminary review of recreational catch and effort data (see Economic Impacts section), the PDT recommended the following management measures to meet the catch target:

- Increase the minimum fish size from 22 inches up to 24 inches, and
- Harmonize the bag limit for all modes to a 10-fish bag limit (from a 10- fish bag limit for private anglers and no bag limit for party/charter)

Amendment 16 allows for separate measures by fishing mode, but these were not developed to date due to time constraints. Preliminary data for FY2017 also suggests that catches may be lower than those in FY2016 under current management measures. No known changes to federal or states recreational measures would have precipitated a decline in catches between FY2016 and FY2017. Outreach would be needed to ensure compliance with any changes to regulations as management measures have remained unchanged for many years. Also, the minimum size for Gulf of Maine cod is 24 inches. An ancillary benefit of having identical minimum fish sizes between the two stocks may be improved compliance with measures.

*Impacts on other species*
Option 2 may have indirect biological impacts on other species if recreational fishery effort declines due to more restrictive GB cod measures.

# 7.0 Environmental Consequences – Analysis of Impacts
# 7.4 Economic Impacts

## Introduction

Consideration of the economic impacts of the changes made in this framework 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.

### 7.1.1 Updates to Annual Catch Limits

#### 7.1.1.1 Annual Catch Limits

Methods

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. To do this, a large pool of actual trips is created from a reference data set. The composition of this pool is conditioned on each trip's utilization of allocated ACE, under the assumption 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;
- 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.

Because the fishery is modeled as a whole, allocations to individual sectors are not considered.

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 reveues 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 model is intended to capture fishery wide behavioral changes with respect to groundfish sub-ACL changes, and groundfish catch is maximized by the constrained optimization algorithm. Catch of non-groundfish stocks on groundfish trips are captured in the model, but not explicitly modeled, such that constraints on other fisheries are not incorporated.

Each year the QCM is updated to reflect regulations and on-the-water conditions. In FW's 47, 51, and 53 the QCM drew from the most recent fishing year for which a full year of data was available. To better capture current stock conditions, operating costs and fishing practices, trips from two fishing years were used in FW55 (FY14 through November FY15) and FW 56 (FY15 through November FY16) The model for 2015 and 2016 over-predicted groundfish revenues and this may be due to the additional partial-year of trips included in the sample pool—the model was able to draw in more efficient trips than the fishery was able to realize. For FW 57 the model reverts to drawing the sample pool from one FY of data, in this case FY16. Trips taken during FY16 to areas that will be closed in FY18 are removed from the selection pool, including removal of eastern US/CA trips from the No Action alternative models. Industry-funded

at-sea monitoring (ASM) is explicitly modeled within the QCM at a rate of 10% of trips observed, and a federal subsidy of 50% of costs for those trips is assumed. ASM affects the types of trips likely to be taken by negatively impacting trip-level net revenues--a sub-set of trips that are profitable under subsidized ASM coverage will not be profitable with the addition of ASM costs. This has second-order effects on the distribution of catch across stocks, as well as port and size class level impacts.

Groundfish vessels on groundfish trips form the unit of measurement for this analysis. Many groundfish fishermen are involved in other fisheries and groundfish trip revenues may represent anywhere from 100% to a small fraction of the total revenues of individual fishing business impacted by these regulations.

To understand the QCM's ability to predict groundfish fishery catch and revenues, we offer a retrospective of the models' performance. The model was developed during FY 2011 to make predictions for FW47 (FY 2012) and has been used in analyzing the impacts of all subsequent groundfish management actions that included ACL changes for the groundfish fishery. Table 1 summarizes its performance over the past few years.

Predictions for total revenue and revenue from groundfish species were within +- 7% of realized values for FYs 2012-2015, but the model over-predicted revenues from groundfish species by roughly 9% for FY 2016. The most accurate prediction for groundfish revenue came in FY 2013 when revenues were under-predicted by $1.6 million (2.7% of realized value). The most accurate prediction for total revenue came in FY 2012 when revenues were under-predicted by $0.8 million (0.9% of realized value). FY 2011 was predicted retroactively for calibration purposes. The 2011 over-prediction in groundfish revenue by 22% was caused primarily due to GB haddock rates being higher in the reference year (FY 2010) than the prediction year (FY 2011). If GB haddock revenues are backed out then gross revenues for groundfish are over-predicted by about 5%.

Cost predictions have been less accurate and more variable. For FYs 2011-2012 cost of operations predictions were slightly higher than realized costs. In FY 14 the cost of fuel dropped markedly but because the input data has about a one year lag, lower fuel costs were not incorporated into the predictions until FW 55 predicting for FY 16. Similarly, quota costs are based on the most recent FY lease prices. From FY 12 through FY 14 the model over-estimated quota costs. The opposite happened in FY 15 and 16 (Table 1).

**Table 1 - QCM predictions, FY2011-2016, 2016 dollars (millions)**

| | FY2011[1*] | | FY2012[2] | | FY2013[3**] | | FY2014[4***] | | FY2015[5] | | FY2016[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Predicted | Realized | Predicted | Realized | Predicted | Realized | Predicted | Realized | Predicted | Realized | Predicted | Realized |
| Gross Revenue | 140.3 | 129.8 | 98.5 | 99.4 | 76.9 | 82.4 | 71.5 | 88.6 | 74.3 | 79.3 | 71.0 | 74.9 |
| Groundfish Gross Revenue | 115.2 | 94.1 | 80.8 | 70.5 | 57.5 | 58.9 | 56.0 | 59.9 | 57.0 | 54.8 | 53.9 | 49.5 |
| Cost of Operations[A] | 30.8 | 34.1 | 39.2 | 31.5 | 15.1 | 26.3 | 21.8 | 22.6 | 22.9 | 15.8 | 17.1 | 13.5 |
| Sector Cost | 3.3 | 2.7 | 2.0 | 2.1 | 1.8 | 1.8 | 1.6 | 2.0 | 1.6 | 1.9 | 1.9 | 1.6 |
| Quota Cost | 29.3 | 27.7 | 21.4 | 17.7 | 12.5 | 7.9 | 12.1 | 8.3 | 6.2 | 7.9 | 5.8 | 9.7 |
| Operating Profit[B] | 82.1 | 65.3 | 59.3 | 48.2 | 47.7 | 46.5 | 37.1 | 55.6 | 39.7 | 53.8 | 51.4 | 50.1 |

[1]Calibration, reference pool=FY10
[2]FW47, reference pool=FY10-11 (last six months FY10, first six months FY11)
3FW48, reference pool=FY11
[4]FW51, reference pool=FY12-13 (interim action measures prediction component utilized partial FY13)
[5]FW53, reference pool=FY13
[6]FW55, reference pool=FY14-15 (full year FY14, FY15 through Oct 2015)

* FY 2011 revenues from GB haddock were predicted at $25.2 million. Realized revenues from GB haddock were $11.7 million.
**FY13 predictions based on white hake ACL mid-season adjustment
***FY14 predictions based on a combination of FW51 and interim action measures

[A] Cost of Operations includes fuel, food, ice and gear
[B] Operating Profit is Gross Revenue less Cost of Operations, Sector Cost and Quota Cost

#### 7.1.1.1.1 Option 1: No Action

There would be no changes to the specifications for FY 2018 – FY 2019 and default specifications that were adopted with the FW56 final rule and default specifications that would be set for EGB cod and EGB haddock for FY 2018. The default specifications would be in effect from May 1, 2018, to July 31, 2018, and are set equal to 35% of the FY 2017 catch limit for EGB cod and EGB haddock. The directed groundfish fishery would be expected to operate in all BSAs, except for the EBG management area which would close on August 1, 2018, when the default specifications would expire for EGB cod and EGB haddock. There would be no FY 2018 quotas specified for the transboundary Georges Bank stocks of GB cod, GB haddock, and GB yellowtail flounder, which are managed through the US/CA Resource Sharing Understanding. These quotas are specified annually.

***Impacts on the sector component of the commercial groundfish fishery***

Option 1 would have negative impacts to the commercial groundfish fishery relative to FY 2017 and Option 2. Groundfish vessels would only have three months (May, June, and July) to operate in the Eastern Georges Bank management area in FY2018 before the default ACLs for EGB cod and EGB haddock would expire. Based on the QCM results under No Action ACLs for FY18, predicted gross revenue from groundfish trips is $67 million. Groundfish revenue from groundfish trips is predicted to be $47 million. The QCM prediction for No Action ACLs assumes industry-funded ASM in FY18. Operating costs would be lower under this option than under Option 2, as well as relative to FY16 realized estimates and FY17 predictions, due in part to fewer trips being taken (Table 2, Figure 1, Table 3-5).

**Table 2 - Summary of realized 2016 and predicted 2017 and 2018 revenues and costs for the commercial sector groundfish fishery, nominal dollars (millions)**

| Option | Fishing Year | Gross Revenues | Gross Revenues from Groundfish | Cost of Operations | Sector Cost | Quota Cost | ASM Cost | Operating Profit | Crew Days | Days Absent |
|---|---|---|---|---|---|---|---|---|---|---|
| FY16-Realized | 2016 | 74.9 | 49.5 | 13.5 | 1.6 | 9.7 | 0.0 | 50.1 | 12,652 | 46,872 |
| FW55-Prediction | 2016 | 71.1 | 53.9 | 17.1 | 1.9 | 5.8 | 0.0 | 51.3 | 13,208 | 48,706 |
| FW56-Prediction | 2017 | 76.4 | 53.4 | 14.1 | 1.8 | 8.8 | 0.0 | 54.0 | 14,506 | 52,065 |
| FW57-No Action | 2018 | 67.0 | 46.8 | 12.6 | 1.4 | 9.9 | 0.3 | 45.6 | 11,948 | 43,571 |
| FW57-Proposed Action | 2018 | 83.9 | 59.0 | 15.6 | 1.7 | 12.0 | 0.4 | 56.2 | 14,805 | 54,418 |

Data in millions of dollars, 2016

**Figure 1 - Distribution of predictions relative to FY16 realized values, gross revenues and operating profits**

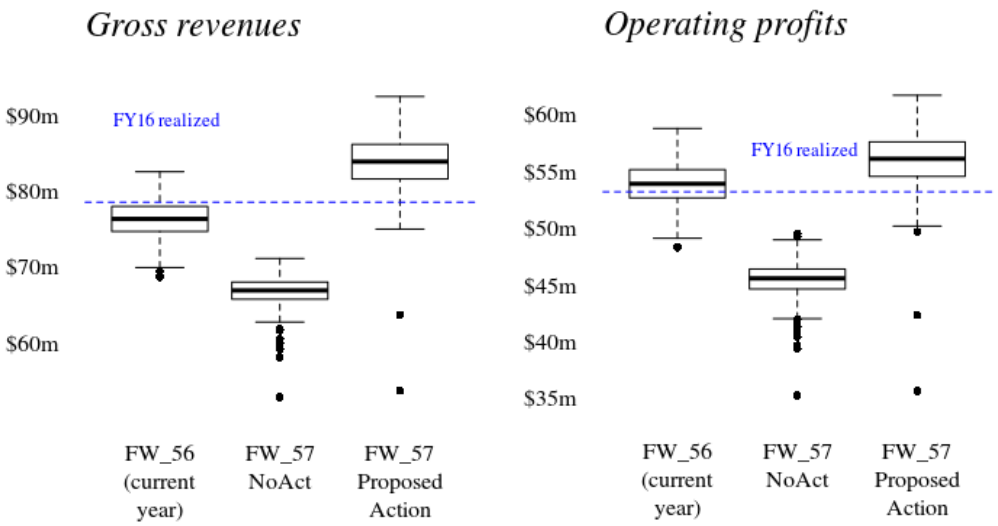


**Table 3 - No Action option stock-level groundfish species catch and revenue predictions with 5% and 95% confidence intervals, nominal dollars (millions)**

| Stock | Sub-ACL (mt) | Predicted Catch (mt) | Predicted Utilization | Predicted Revenue | p5(Revenue) | p95(Revenue) | Realized Revenue, FY16 | Predicted Revenue, FY16 | Predicted Revenue, FY17 |
|---|---|---|---|---|---|---|---|---|---|
| GB Haddock West | 52,253 | 3,086 | 6% | 6.3 | 5.6 | 7.2 | 7.7 | 10.0 | 9.9 |
| Plaice | 1,257 | 1,170 | 93% | 6.0 | 5.6 | 6.4 | 5.8 | 3.4 | 4.5 |
| Pollock | 17,704 | 2,183 | 12% | 5.0 | 4.6 | 5.3 | 6.2 | 10.2 | 8.9 |
| Redfish | 10,540 | 3,554 | 34% | 4.6 | 4.0 | 5.2 | 5.3 | 9.0 | 5.3 |
| White Hake | 3,273 | 1,494 | 46% | 4.5 | 4.2 | 4.8 | 4.5 | 5.9 | 6.6 |
| GOM Haddock | 3,169 | 1,587 | 50% | 4.5 | 4.0 | 4.9 | 4.4 | 1.1 | 3.7 |
| GB Winter Flounder | 615 | 442 | 72% | 3.4 | 2.9 | 3.9 | 3.3 | 2.4 | 2.8 |
| SNE Winter Flounder | 515 | 515 | 100% | 2.8 | 2.4 | 3.1 | 2.7 | 1.9 | 1.7 |
| GB Cod West | 471 | 470 | 100% | 2.3 | 2.2 | 2.4 | 2.5 | 2.3 | 1.5 |
| Witch Flounder | 718 | 369 | 51% | 2.1 | 2.0 | 2.3 | 2.0 | 1.3 | 2.6 |
| GOM Cod | 271 | 271 | 100% | 1.5 | 1.5 | 1.5 | 1.4 | 1.2 | 1.2 |
| CC/GOM Yellowtail Flounder | 326 | 288 | 88% | 1.0 | 0.9 | 1.1 | 0.9 | 0.4 | 0.8 |
| GB Haddock East | 10,253 | 439 | 4% | 0.9 | 0.7 | 1.2 | 1.1 | 3.4 | 2.0 |
| GOM Winter Flounder | 607 | 124 | 20% | 0.7 | 0.7 | 0.8 | 0.6 | 0.3 | 0.8 |
| SNE/MA Yellowtail Flounder | 149 | 79 | 53% | 0.3 | 0.2 | 0.4 | 0.3 | 0.4 | 0.3 |
| GB Cod East | 50 | 49 | 98% | 0.2 | 0.2 | 0.2 | 0.4 | 0.1 | 0.2 |
| GB Yellowtail Flounder | 274 | 24 | 9% | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 |

**Table 4 - No Action option groundfish species revenue predictions by port, with 5% and 95% confidence intervals and average fish prices on groundfish trips, nominal dollars (millions)**

| Port | Gross Revenue | p5(Revenue) | p95(Revenue) | Average Price |
|---|---|---|---|---|
| BOSTON MA | 11.1 | 10.1 | 12.2 | $1.34 |
| NEW BEDFORD MA | 10.3 | 9.4 | 11.3 | $1.45 |
| GLOUCESTER MA | 10.2 | 9.3 | 11.1 | $1.10 |
| PORTLAND ME | 6.8 | 5.8 | 7.8 | $1.08 |
| OTHER MA PORTS | 2.6 | 2.2 | 3.1 | $1.65 |
| NH PORTS | 1.7 | 1.4 | 2.0 | $1.61 |
| OTHER ME PORTS | 1.5 | 1.3 | 1.7 | $1.77 |
| POINT JUDITH RI | 1.4 | 1.2 | 1.7 | $1.59 |
| NY PORTS | 0.5 | 0.3 | 0.6 | $1.23 |
| OTHER RI PORTS | 0.3 | 0.2 | 0.5 | $1.84 |
| CHATHAM MA | 0.2 | 0.2 | 0.3 | $1.84 |
| CT PORTS | 0.0 | 0.0 | 0.0 | $0.08 |
| NY PORTS | 0.0 | 0.0 | 0.0 | $1.21 |

**Table 5 - No Action option groundfish species revenue predictions by size class, with 5% and 95% confidence intervals, nominal dollars (millions)**

| Size Class | Gross Revenue | p5(Revenue) | p95(Revenue) |
|---|---|---|---|
| 75'+ | 24.7 | 22.9 | 26.4 |
| 50'to<75' | 15.8 | 14.6 | 17.0 |
| 30'to<50' | 6.2 | 5.8 | 6.7 |
| <30' | 0.0 | 0.0 | 0.0 |

***Impacts on the sector component of the commercial groundfish fishery***

The QCM incorporates only sector vessels as they make up the vast majority of groundfish landings and revenue. Revenues have been steadily declining, both from groundfish and on groundfish trips, for common pool vessels since the inception of the common pool (Table 6). This trend accelerated slightly in FY 2016 and seems likely to continue under the No Action option.

**Table 6 - Common Pool catch, gross revenues and average fish prices, 2016 dollars (millions)**

| FY | Total Catch (mt) | Groundfish Catch (mt) | Total Gross Revenues | Groundfish Gross Revenues | Average Price, All Species | Average Price, Groundfish |
|---|---|---|---|---|---|---|
| 2010 | 3,742 | 667 | 7.1 | 2.2 | $0.86 | $1.51 |
| 2011 | 3,702 | 257 | 7.0 | 0.9 | $0.86 | $1.51 |
| 2012 | 2,845 | 172 | 5.0 | 0.6 | $0.80 | $1.64 |
| 2013 | 2,665 | 283 | 4.4 | 1.0 | $0.76 | $1.66 |
| 2014 | 2,127 | 234 | 3.5 | 0.9 | $0.75 | $1.71 |
| 2015 | 2,617 | 316 | 2.7 | 1.3 | $0.46 | $1.84 |
| 2016 | 1,601 | 156 | 1.9 | 0.8 | $0.53 | $2.37 |

#### 7.1.1.1.2 Option 2: Revised Annual Catch Limit Specifications

Under Option 2, the annual specification for FY2018 – FY2020 for all groundfish stocks and FY2018 – FY2019 for GB yellowtail flounder, would be as specified as in Table 5 of the draft alternatives (dated December 1, 2017). Option 2 includes adjustments to the state waters and other sub-component values.

***Impacts on the sector component of the commercial groundfish fishery***

Option 2 is predicted to generate $84 million in gross revenues, higher than the No Action option of $67 million and the FW56 prediction for the current FY ($71 million) and higher than the $75 million generated in FY16. Fishery-wide operating profits are predicted to be $56.2 million, 12% higher than FY16 realized profits and over 20% higher than the current year prediction of $45.6 million. If fuel prices remain low for the foreseeable future, the fishery will continue to enjoy slightly higher profits as a percent of revenues than those realized from 2010-2014. However, cost of quota is predicted to increase substantially to $12 million, from $9.9 million predicted for the current FY and $9.7 million estimated to have been realized for FY16. ASM costs are expected to be borne at least in part by the fishery in FY18, adding nearly $0.5 million to the cost of fishing in the groundfish fishery (Table 2).

The two southern New England flatfish stocks, yellowtail and winter flounder, are predicted to be constraining in the SNE stock area. GOM cod and CC/GOM yellowtail flounder are predicted to be constraining in the Gulf of Maine stock area. American plaice is predicted to see 100% utilization as well. With five stocks predicted to have utilization rates above 94% it will be difficult to find areas to fish without encountering constraining stocks. The model is predicting increased catches for pollock, white hake, both haddock stocks and redfish. Substantial revenue increases will come from plaice and quota increases for the two cod stocks. Witch flounder utilization is predicted to not even hit 60%, constrained undoubtedly by interactions with plaice. For the first time since the inception of the sector program a stock other than haddock, in this case pollock, is predicted to have the lowest utilization rate fishery-wide. Georges Bank winter flounder is predicted to see a utilization rate above 80% and white hake utilization is predicted to be 70%, the highest for these stocks in many years and potentially increasing ACE lease values from their recent year lows (Table 7).

Gloucester, MA is predicted to overtake Boston be the top groundfish port in the fishery with gross revenues of about $14 million while Boston falls to $13.2 million. New Bedford, MA is predicted to see a rebound to $13.2 million, up from what will hopefully prove to have been an under-predicted of $7.6 million in FY17. Portland, ME is predicted to see groundfish revenues drop to $8.3 million. Point Judith, RI and other southern New England ports are predicted to see continued depressed landings and revenues, driven primarily by low quotas on SNE flatfish stocks. New Hampshire ports are predicted to hold steady after substantial declines over the past few years, with predicted groundfish revenues of $2.2 million. (Table 8, Figure 2)

The largest size classes will continue to see the largest share of revenues from groundfish, with $31 million in predicted revenues (over 50% of the $59 million predicted for groundfish revenues overall). The 50-74 ft size class is predicted to generate nearly $19.4 million in revenues from groundfish species (33% of total). 30-49 foot vessels are predicted to generate $8.5 million, or a bit under 15% of total. (Table 9).

**Table 7 - Option 2 groundfish stock-level groundfish species catch and revenue predictions with 5% and 95% confidence intervals, nominal dollars (millions)**

| Stock | Sub-ACL (mt) | Predicted Catch (mt) | Predicted Utilization | Predicted Revenue | p5(Revenue) | p95(Revenue) | Realized Revenue, FY16 | Predicted Revenue, FY16 | Predicted Revenue, FY17 |
|---|---|---|---|---|---|---|---|---|---|
| Plaice | 1,550 | 1,550 | 100% | 7.9 | 7.5 | 8.1 | 5.8 | 3.4 | 4.5 |
| GB Haddock West | 28,857 | 3,628 | 13% | 7.3 | 6.1 | 8.8 | 7.7 | 10.0 | 9.9 |
| Pollock | 37,163 | 2,796 | 8% | 6.4 | 5.9 | 7.0 | 6.2 | 10.2 | 8.9 |
| Redfish | 10,696 | 4,650 | 43% | 6.0 | 5.2 | 7.0 | 5.3 | 9.0 | 5.3 |
| White Hake | 2,713 | 1,907 | 70% | 5.8 | 5.4 | 6.3 | 4.5 | 5.9 | 6.6 |
| GOM Haddock | 8,643 | 1,995 | 23% | 5.7 | 5.2 | 6.2 | 4.4 | 1.1 | 3.7 |
| GB Winter Flounder | 725 | 598 | 83% | 4.6 | 3.6 | 5.6 | 3.3 | 2.4 | 2.8 |
| GB Cod West | 1,083 | 616 | 57% | 3.0 | 2.7 | 3.5 | 2.5 | 2.3 | 1.5 |
| Witch Flounder | 830 | 481 | 58% | 2.7 | 2.6 | 2.9 | 2.0 | 1.3 | 2.6 |
| SNE Winter Flounder | 456 | 428 | 94% | 2.6 | 2.1 | 2.8 | 2.7 | 1.9 | 1.7 |
| GOM Cod | 377 | 354 | 94% | 2.0 | 1.8 | 2.1 | 1.4 | 1.2 | 1.2 |
| CC/GOM Yellowtail Flounder | 381 | 380 | 100% | 1.3 | 1.2 | 1.4 | 0.9 | 0.4 | 0.8 |
| GB Haddock East | 15,491 | 618 | 4% | 1.3 | 0.9 | 1.7 | 1.1 | 3.4 | 2.0 |
| GOM Winter Flounder | 339 | 164 | 48% | 1.0 | 0.9 | 1.1 | 0.6 | 0.3 | 0.8 |
| GB Cod East | 252 | 89 | 35% | 0.4 | 0.3 | 0.6 | 0.4 | 0.1 | 0.2 |
| GB Yellowtail Flounder | 167 | 37 | 22% | 0.2 | 0.1 | 0.3 | 0.1 | 0.1 | 0.1 |
| SNE/MA Yellowtail Flounder | 34 | 34 | 100% | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.3 |

**Table 8 - Option 2 groundfish species revenue predictions by port, with 5% and 95% confidence intervals and average fish prices on groundfish trips, nominal dollars (millions)**

| Port | Gross Revenue | p5(Revenue) | p95(Revenue) | Average Price |
|---|---|---|---|---|
| GLOUCESTER MA | 14.0 | 12.7 | 15.4 | $1.11 |
| BOSTON MA | 13.2 | 11.9 | 14.5 | $1.36 |
| NEW BEDFORD MA | 13.2 | 11.0 | 15.4 | $1.41 |
| PORTLAND ME | 8.3 | 7.0 | 9.6 | $1.09 |
| OTHER MA PORTS | 3.4 | 2.8 | 4.2 | $1.64 |
| NH PORTS | 2.2 | 1.9 | 2.5 | $1.59 |
| OTHER ME PORTS | 2.0 | 1.8 | 2.4 | $1.77 |
| POINT JUDITH RI | 1.3 | 1.0 | 1.6 | $1.68 |
| NY PORTS | 0.5 | 0.3 | 0.7 | $1.35 |
| OTHER RI PORTS | 0.4 | 0.2 | 0.7 | $1.91 |
| CHATHAM MA | 0.4 | 0.3 | 0.6 | $1.87 |
| CT PORTS | 0.1 | 0.1 | 0.1 | $1.21 |
| NJ PORTS | 0.0 | 0.0 | 0.0 | $1.21 |

**Figure 2 - Predicted sector sub-ACL utilization rates for allocated stocks**

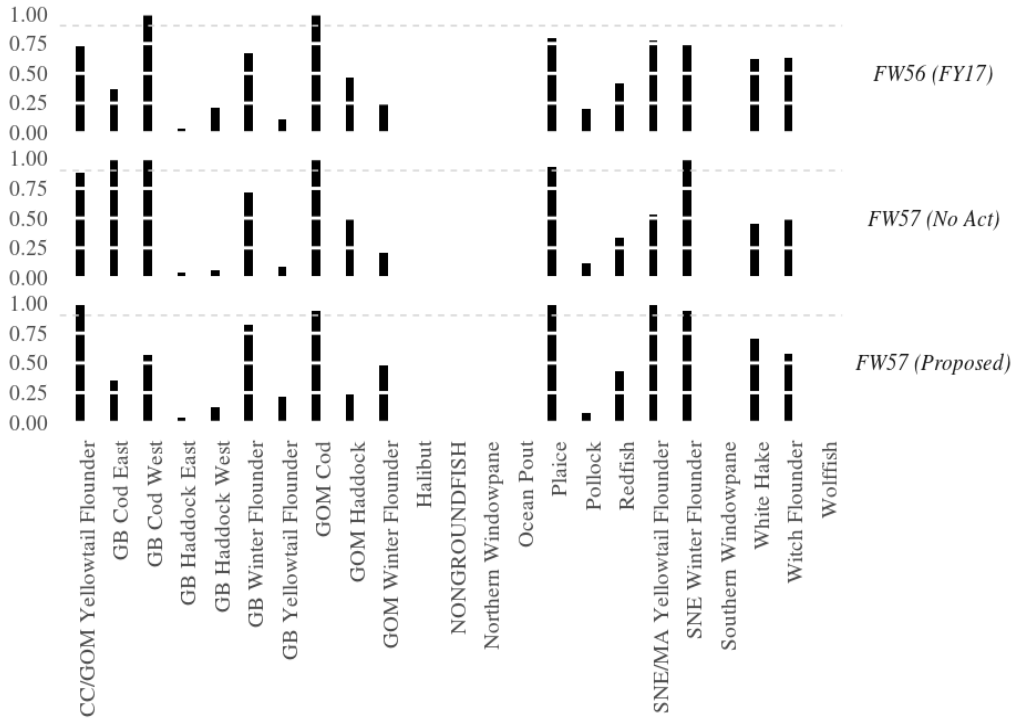


**Table 9 - Option 2 groundfish species revenue predictions by size class, with 5% and 95% confidence intervals, nominal dollars (millions)**

| Size Class | Gross Revenue | p5(Revenue) | p95(Revenue) |
|---|---|---|---|
| 75'+ | 31.0 | 28.1 | 34.0 |
| 50'to<75' | 19.4 | 17.9 | 21.1 |
| 30'to<50' | 8.5 | 7.8 | 9.1 |
| <30' | 0.0 | 0.0 | 0.0 |

***Impacts on the common pool component of the commercial groundfish fishery***

As previously noted, revenues have been steadily declining, both from groundfish and on groundfish trips, for common pool vessels since the inception of the common pool (Table 6). This trend seems likely to continue under the Option 2, especially given the low quota for SNE/MA yellowtail flounder for FY18.