6.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

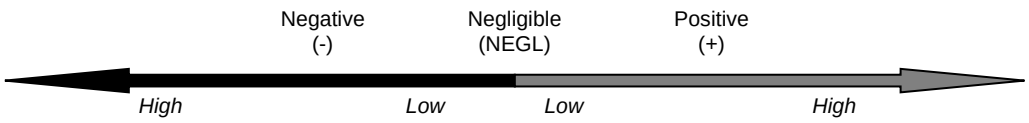
6.1 INTRODUCTION

6.1.1 Evaluation Criteria

This action evaluates the potential impacts of alternatives using the criteria in Table 1.

Table 1. Terms used to summarize impacts on VECs

	Direction		
VEC	**Positive (+)**	**Negative (-)**	**Negligible/Neutral**
Allocated target species, other landed species, and protected species	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 species, 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 species, actions that decrease the population size, or increase or maintain gear interactions.	Actions that have little or no positive or negative impacts to stocks or 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		



6.1.2 Approach to Impacts Analysis

The impacts of the alternatives under consideration are evaluated herein relative to the valued ecosystem components (VECs) described in the Affected Environment (Section 0) and to each other.

6.2 DRAFT Impacts on Regulated Groundfish and Other Species – Biological

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 in comparison to the No Action alternatives.

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 assessment projections. There is evidence, that in the case of multispecies stocks, that the projections tend to be overly 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. These uncertainties in the projection methodology should be considered when reviewing impacts that use this tool. Long term projections (greater than 3 years) should not be over interpreted since they are imprecise and are often overly optimistic. The uncertainty estimates (90% confidence intervals on SSB) from the projections do not cover the true uncertainty in the population. This is the justification for why the SSC did not use the projection uncertainty estimates to determine the scientific uncertainty buffer between the ABC and the OFL.

6.2.1 Action 1 – Specifications

6.2.1.1 Alternative 1 - No Action

Impacts on regulated groundfish

Under Alternative 1/No Action, the ACLs specified for FY2020 would be unchanged from those adopted through FW57 and FW58. There would be no changes to the specifications for FY2020 and default specifications would be set for Eastern GB cod and Eastern GB haddock for the first three months of FY2020. Under Alternative 1/No Action, there would be no new FY2020 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.

Under Alternative 1/No Action, the directed groundfish fishery would be expected to operate in all broad stock areas through July 31, 2020. As of August 1, 2020, Eastern GB cod and Eastern GB haddock would not have ACLs specified. In the absence of these specifications, commercial groundfish vessels would not be allowed to fish in the Eastern Georges Bank management area without an allocation. It is anticipated that Alternative 1/No Action would result in minimal changes in fishing effort during the first three months of the fishing year. After July 31, 2020, Option 1/No Action would be expected to reduce commercial groundfish fishing effort in the Eastern Georges Bank management area. Without specification of an ACL, a catch would not be allocated to the commercial groundfish fishery (sectors or common pool vessels) and targeted groundfish fishing activity would not occur for these stocks. Catches would not be eliminated because there would probably be incidental catches or bycatch from other fisheries. 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 Eastern GB cod and Eastern GB 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 Eastern Georges Bank that have an ACL under Option 1/No Action, and so most groundfish fishing activity would not occur on Eastern Georges Bank.

The default specifications for Eastern GB cod and Eastern GB haddock would continue to allow fishing for the first three months of the fishing year, but after that, directed fishing effort and biological impacts on regulated groundfish species would decline for stocks managed or located in that area. As a result, in general Alternative 1/No Action would be expected to result in positive biological impacts compared to Alternative 2.

An age-based assessment was used to assess the following stocks in 2019:

- GOM cod
- GB haddock
- GOM haddock
- SNE/MA yellowtail flounder
- CC/GOM yellowtail flounder
- American plaice
- GB winter flounder
- 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, 2020 and by other fisheries throughout the year under Alternative 1/No Action. An estimate of these catches was used to approximate the catches that might occur was compared to ABCs under Alternative 2 (Table 2). Using this information, a qualitative comparison of impacts on SSB by stock under Alternative 1/No Action and Alternative 2 is provided. In this section, SSB is used as a proxy for impact designation. Generally, lower fishing mortality under Alternative 1/No Action leads to increases in SSB, relative to Alternative 2 and is considered a positive impact on stocks that are not rebuilding sufficiently. For stocks that have a rebuilt status, Alternative 1/No Action may reduce fishing effort to levels substantially less than the F_{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 (mt) that may occur in FY2020 under Alternative 1/No Action. The "No Action Assumed Catch" used to compare to 2020 ABC (mt) used in Alternative 2 stock projections.

Stock	2020						
	Assumed Catch					Proposed ABC	Difference (Total - ABC)
	Commercial Groundfish Fishery	Recreational Groundfish Fishery	Other Fisheries	Canadian Fisheries	Total		
GOM cod	362	224	163		750	552	198
GB haddock	6,256		1,395	13,800	21,451	88,856	-67,405
GOM haddock	3,934	759	209		4,902	11,526	-6,624
SNE/MA yellowtail flounder	5		6		11	22	-11
CC/GOM yellowtail flounder	239		99		338	823	-485
American plaice	1,155		56	26	1,237	2,825	-1,588
GB winter flounder	494		22	39	555	587	-32
White hake	1,648		22		1,670	2,186	-516
Pollock	5,336		2,186		7,522	16,812	-9,290

Notes:

Groundfish Fishery Assumed Catch:

- Commercial - Three-year average utilization (see Economic Impacts) applied to the FY2020 sub-ACL under Alternative 1/No Action.
- Recreational – Three-year average catches for fishing year 2016-2018, Source: FY2018 GARFO catch report.

Other Assumed Catch:

- Other Fisheries –
  - Includes the state waters and other sub-components for FY2020 (Table 5 in draft alternatives, dated Nov. 25, 2019),
  - Includes the Scallop PDT's preliminary estimate of catches of SNE/MA yellowtail flounder (2 mt) for FY2020, and
  - Uses sub-ACLs for haddock stocks to approximate midwater trawl herring fishery catches based on Table 2 (Alternative 1/No Action in draft alternatives , dated Nov. 25, 2019).
- Canadian fisheries - includes quotas for FY2020 were added to GB haddock (13,800 mt) and estimated Canadian catches were added for GB winter flounder (26 mt) and white hake (39 mt), see Appendix II.

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Gulf of Maine Cod- Under Alternative1/No Action the assumed catch in FY2020 is 750 mt versus 552 mt under Alternative 2 (Table 2). Therefore, SSB increases are expected to be less under Alternative 1/No Action than Alternative 2.

Georges Bank Haddock- Under Alternative 1/No Action the assumed catch in FY2020 is 21,451 mt versus 88,856 mt under Alternative 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

Gulf of Maine Haddock- Under Alternative 1/No Action the assumed catch in FY2020 is 4,902 mt versus 11,526 mt under Option 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

Southern New England/Mid-Atlantic Yellowtail Flounder- Under Alternative 1/No Action the assumed catch in FY2020 is 11 mt and 22 mt under Alternative 2 (Table 2). Therefore, SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Cape Cod/Gulf of Maine Yellowtail Flounder- Under Alternative 1/No Action the assumed catch in FY2020 is 338 mt versus 823 mt under Alternative 2 (Table 2). Therefore, SSB increases are expected to be less under Alternative 1/No Action than Alternative 2.

American Plaice- Under Alternative 1/No Action the assumed catch in FY2020 is 1,237 mt versus 2,825 mt under Alternative 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

Georges Bank Winter Flounder- Under Alternative 1/No Action the assumed catch in FY2020 is 555 mt versus 587 mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

White Hake- Under Alternative 1/No Action the assumed catch in FY2020 is 1,670 mt versus 2,186 mt under Alternative 2 (Table 2). Therefore, SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Pollock- Under Alternative 1/No Action the assumed catch in FY2020 is 7,522 mt versus 16,812 mt under Alternative 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

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

- GB Cod
- GB Yellowtail Flounder
- Witch Flounder
- Northern Windowpane Flounder
- Southern Windowpane Flounder
- Atlantic Halibut

For index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC is based on the default control rule applied at 75% of F_{MSY}, an exploitation rate, or an alternative approach applied to the most recent estimate of stock size. Because the proposed ABCs for stocks with an empirical assessment are determined using control rules, the proposed ABCs are not expected to lead to declines in biomass for these stocks.

Impacts on other species

Alternative 1/No Action is expected to have low positive indirect effects on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops that are captured incidentally during groundfish trips. 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 Alternative 1/No Action and Alternative 2,

the fishing mortality on other stocks that are caught incidentally during groundfish trips would probably be lower under Alternative 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 and GB haddock would maintain the current sub-ACLs. Sub-ACLs for GOM haddock would decrease slightly and GB haddock would increase under Alternative 2. Since the No Action sub-ACL for GB haddock is much less than Alternative 2, this increases the likelihood that the sub-ACL for GB haddock would be exceeded, and the in-season AM would be triggered. An in-season closure of the herring fishery would reduce fishing mortality of Atlantic herring, which would have low positive biological benefits for the Atlantic herring stock.

6.2.1.2 Alternative 2 – Revised Specifications

Revised Recreational Catches in Recent Groundfish Assessments

Of the 15 groundfish stocks assessed in 2019, four (Gulf of Maine cod, Gulf of Maine haddock, Georges Bank cod, and pollock) stocks include recreational catches. The time series of recreational catches were updated in the assessments (see Figure 1 to Figure 4).

Gulf of Maine cod - The 2019 update assessment for Gulf of Maine cod revised the time series of recreational catches to account for the re-calibrated MRIP data. The re-calibration scales up recreational catches in all years, although the magnitude of the increase is not always consistent across years. In general, the re-calibration results in a substantial increase in the magnitude of recreational harvest at the beginning of the time series, and an increase in the magnitude of estimated discards (releases) in more recent years. Prior to 2004 there was limited length frequency sampling, resulting in years with either sparse or missing length frequency data. In such cases, the proportional catch-at-age data from recent years were applied to the historical data, to estimate the age structure of the recreational catch.

Gulf of Maine haddock- The 2019 update assessment for Gulf of Maine haddock revised the time series of recreational catches to account for the re-calibrated MRIP data. Prior to about 2005, the differences between the pre-calibrated and post-calibrated estimates are relatively minor. However, in more recent years, the magnitude of the difference is quite large, particularly for the estimation of discards (releases). As was noted for Gulf of Maine cod, length frequency data are sparse for the recreational catches prior to 2004.

Georges Bank cod- The recreational catches of Georges Bank cod have declined significantly since the 1980's. The re-calibrated MRIP data results in a significant revision of the time series of recreational catch, particularly in the 1980's. However, unlike Gulf of Maine cod and haddock, in some years the re-calibration results in a lower estimate of recreational catch. In recent years, the re-calibration results in an increase in total catch. As noted in the 2019 assessment, for CY2014-2016, the re-calibration resulted in a 22% increase in total catch.

MRIP estimates of Georges Bank cod catch are highly variable and uncertain. The MRIP catch estimates frequently have high (greater than 50) proportional standard errors (PSE) which means that the estimate is imprecise. There are a number of unique challenges relative to sampling the Georges Bank cod recreational fishery:

(1) Effort in the southern portion of the Georges Bank cod recreational fishery peaks in December-February, and there is no MRIP sampling during January and February,

(2) Cod catch is apportioned to stock area, and the decision is based on the intercept location (a sample collected in Boston would result in allocation to the Gulf of Maine stock, even when the vessel may have fished on Georges Bank).

Utilizing vessel trip report (VTR) data from the for-hire component of the fishery to develop estimates of effort and catch would provide valuable information on a significant portion of the Georges Bank recreational cod fishery. VTR data may also offer improved spatial resolution, which would assist in the apportionment of recreational catches to stock area. Additional MRIP sampling during the winter may also improve the precision of catch estimates and increase the quantity of length frequency samples.

The uncertainty and variability of the data should be considered during future discussions about appropriate management targets or the allocation of this stock to the recreational fishery.

Pollock - The re-calibrated MRIP data scales up the time series of pollock catches, and the estimated increase is particularly large in recent years, and at the beginning of the time series. As noted at the 2019 assessment, in recent years recreational catches contribute a significant proportion of the total catches for this stock.

Figure 1- Time series from 1982 – 2016 of total biomass (top) and total numbers (bottom) of harvest (left) and releases (right) for the pre- and post-calibrated MRIP data for GoM cod. Reproduced from GOM cod stock assessment 2019 (Figure 1), NEFSC.

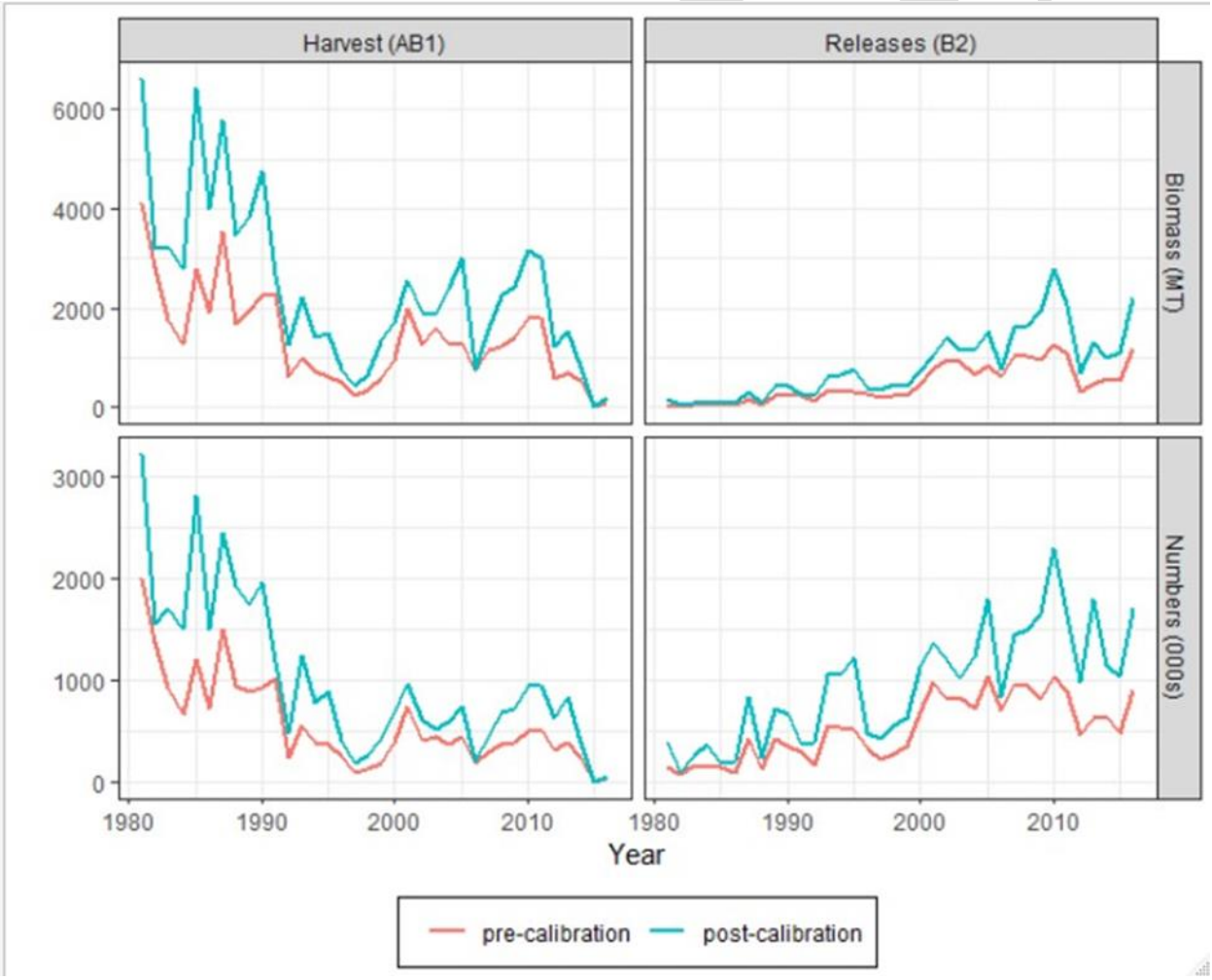


Figure 2- Time series from 1982 – 2016 of total biomass (top) and total numbers (bottom) of harvest (left) and releases (right) for the pre- and post-calibrated MRIP data for GoM haddock. Reproduced from GOM haddock stock assessment 2019 (Figure 1), NEFSC.

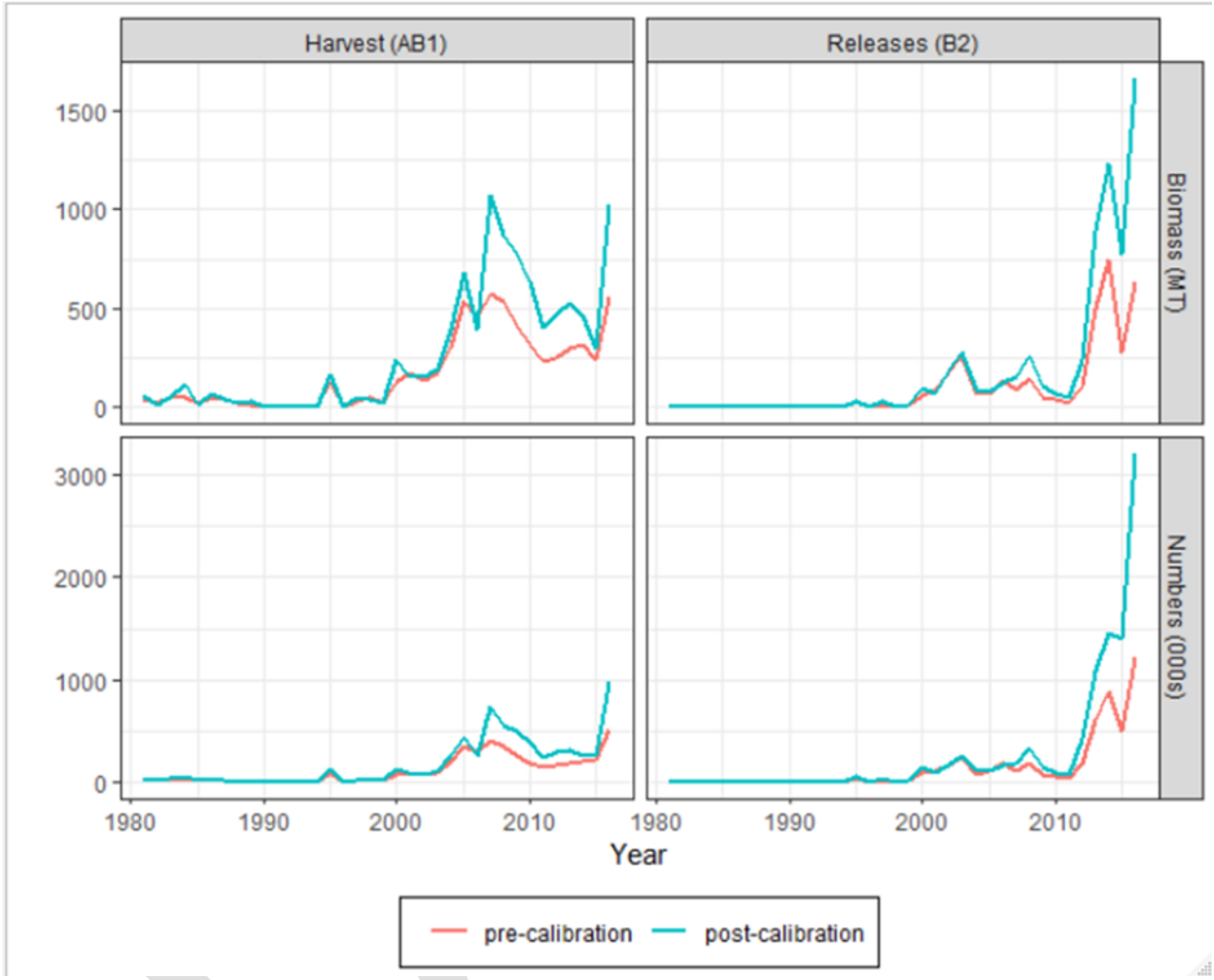


Figure 3- Comparison of US recreational catch in metric tons from old (2017) and new (2019) update assessments by catch component. Reproduced from GB stock assessment 2019 (Figure 29), NEFSC.

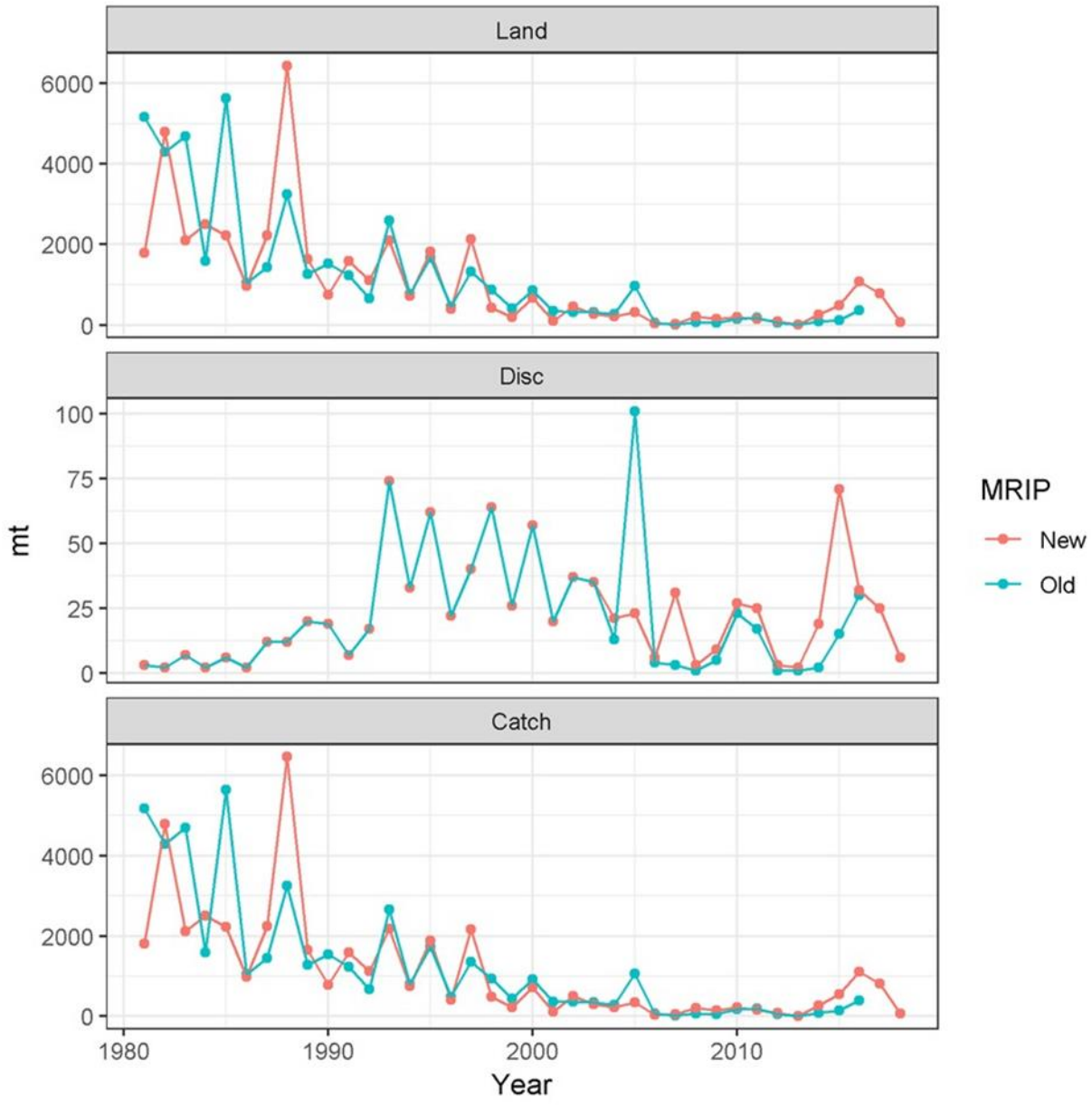
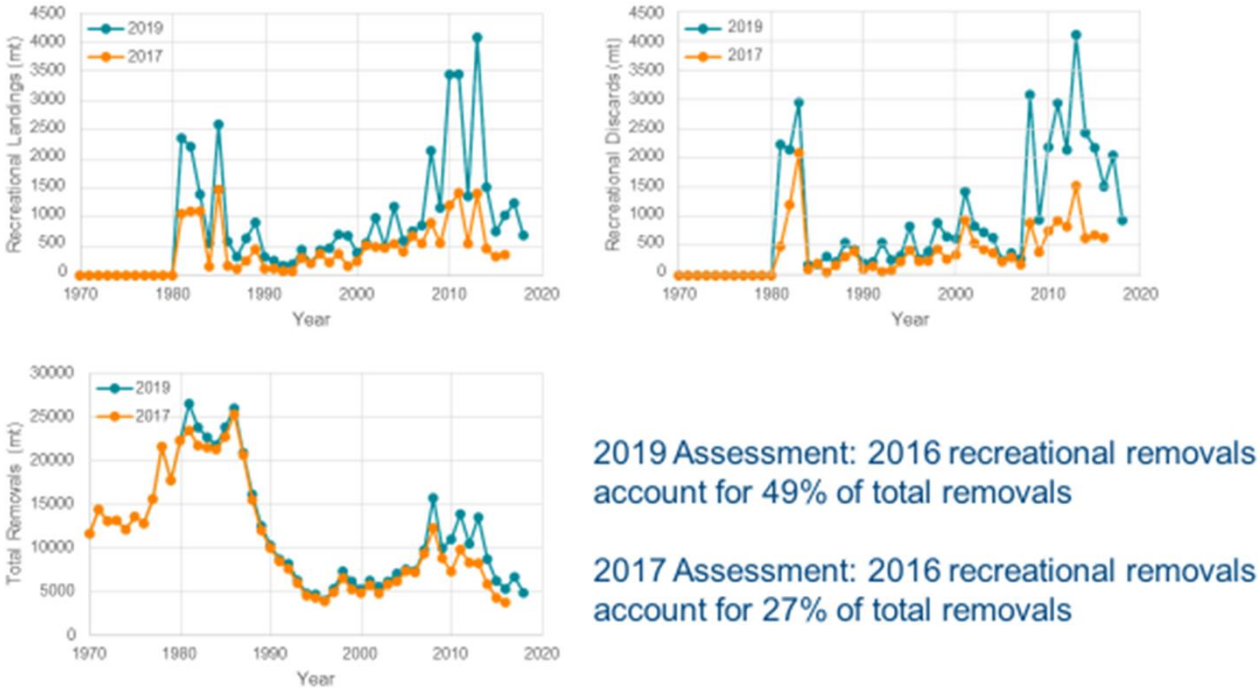


Figure 4- Pollock recreational landings (top left), discards (top right), and total fishery removals (bottom left) from the 2017 assessment (1970-2016) and 2019 assessment (1970-2018). Reproduced from pollock stock assessment for 2019, presentation to peer review, NEFSC.



Impacts on regulated groundfish

Alternative 2 would reflect the results of the 2019 groundfish operational assessments, and the 2019 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 FY2020.

Because this alternative would adopt FY2020 – FY2022 ABCs for all stocks that had assessment updates in 2019 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 alternatives is difficult as Alternative 1/No Action has no OFLs defined for some stocks.

Relative to FY2019, FY2020 ACLs under Alternative 2 would increase for several stocks including GB haddock, GB yellowtail flounder, CC/GOM yellowtail flounder, American plaice, witch flounder, redfish, and Atlantic halibut. There would also be decreases in the ACLs for GB cod, GOM cod, GOM haddock, SNE/MA yellowtail flounder, white hake, northern windowpane flounder, and southern windowpane flounder. ACLs for GOM winter flounder, SNE/MA winter flounder, ocean pout, and Atlantic wolffish would be identical for FY2019 and FY2020.

Gulf of Maine Cod- The 2019 operational assessment for GOM cod indicates that the stock is well below SSB_{MSY} (6%-9% of target SSB_{MSY} in 2018). Under Alternative 2, the projections indicate an increase in SSB after 2020. For Alterative 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 2020 but it remains well below SSB_{MSY} (Table 3, Table 4). Under Alternative1/No Action the assumed catch in FY2020 is 750 mt versus 552 mt (Table 5) under Alternative 2 (Table 2). Therefore, SSB increases are expected to be less under Alternative 1/No Action than Alternative 2.

Table 3- Projection results for Gulf of Maine cod (mt), SSB MSY = 42,692mt, F MSY = 0.173, under base (m=0.2) with rho adjustment.

Year	OFL	ABC	F	SSB
2020	689	522	0.137	3,972
2021	936	522	0.099	5,306
2022	1,216	522	0.074	7,411

Table 4- Projection results for Gulf of Maine cod (mt), SSB MSY = 63,867mt, F MSY = 0.175, under M-ramp (m=0.4).

Year	OFL	ABC	F	SSB
2020	758	522	0.125	4,762
2021	921	522	0.102	5,692
2022	1,084	522	0.086	6,926

Table 5- Averaged OFLs from the two scenarios and constant ABCs for Gulf of Maine cod (mt) used for catch advice from SSC.

Year	OFL	ABC
2020	724	522
2021	929	522
2022	1,150	522

Georges Bank Haddock- The recent assessment for GB haddock indicates that the stock is well above SSB_{MSY} (365% of target SSB_{MSY} in 2018). The stock is expected to increase from 2020 to 2021 and then decrease from 2021 to 2022 under Alternative 2 (Table 6) as the extremely large 2013 year class ages out of the population. Under Alternative 1/No Action the assumed catch in FY2020 is 21,451 mt versus 88,856 mt under Alternative 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

Table 6- Projection results for Georges Bank haddock (mt), SSB MSY = 138,924 mt, F MSY = 0.33 (average F ages 5-7). Note that F projection tables are all F mult.

Year	OFL	ABC	F	SSB
2020	184,822	88,856	0.21	611,549
2021	130,773	88,856	0.31	611,849
2022	129,580	88,856	0.31	532,886

Gulf of Maine Haddock- The recent assessment for GOM haddock indicates that the stock is well above SSB_{MSY} (790% of target SSB_{MSY} in 2018). The stock is expected to decrease from 2020 to 2022 as the extremely large 2013-year class experiences mortality (Table 7). Under Alternative 1/No Action the assumed catch in FY2020 is 4,902 mt versus 11,526 mt under Option 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

Table 7- Projection results for Gulf of Maine haddock (mt), SSB MSY = 7,993 mt, F MSY = 0.369.

Year	OFL	ABC	F	SSB
2020	25,334	11,526	0.16	97,150
2021	23,709	11,526	0.17	83,044
2022	17,945	11,526	0.23	73,542

Southern New England/Mid-Atlantic Yellowtail Flounder- The recent assessment for SNE/MA yellowtail flounder indicates that the stock is below SSB_{MSY} (5% of target SSB_{MSY} in 2018). The SSC concluded that holding the catch advice constant from the first year of the projection (22 mt) was most consistent with the rebuilding plan (Table 8). The stock biomass is expected to increase from 2020 to 2022. Under Alternative 1/No Action the assumed catch in FY2020 is 11 mt and 22 mt under Alternative 2 (Table 2). Therefore, SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Table 8- Projection results for Southern New England/Mid-Atlantic yellowtail flounder, SSB MSY = 1,779 mt, F MSY =0.355.

Year	OFL	ABC	F	SSB
2020	31	22	0.25	114
2021	71	22	0.10	428
2022	184	22	0.04	982

Cape Cod/Gulf of Maine Yellowtail Flounder- The recent assessment for CC/GOM yellowtail flounder indicates that the stock is below SSB_{MSY} (62% of target SSB_{MSY} in 2018). Under Alternative 2 the stock is expected to decrease slightly from FY2020 to FY2021, then increase slightly from FY2021 to FY2022 (Table 9). Under Alternative 1/No Action the assumed catch in FY2020 is 338 mt versus 823 mt under Alternative 2 (Table 2). Therefore, SSB increases are expected to be less under Alternative 1/No Action than Alternative 2.

Table 9- Projection results for Cape Cod/Gulf of Maine yellowtail flounder, SSB MSY = 3,3439 mt, F MSY = 0.32.

Year	OFL	ABC	F	SSB
2020	1,136	823	0.22	3,602
2021	1,076	823	0.24	3,373
2022	1,116	823	0.23	3,529

American Plaice- The recent assessment for American plaice indicates that the not overfished and overfishing is not occurring (116% of target SSB_{MSY} in 2018). The stock is expected to decrease slightly from 2020 to 2021, then increase slightly from 2021 to 2022 under Alternative 2 (Table 10). Under Alternative 1/No Action the assumed catch in FY2020 is 1,237 mt versus 2,825 mt under Alternative 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

Table 10- Projection results for American plaice, SSB MSY = 15,293 mt, F MSY = 0.258.

Year	OFL	ABC	F	SSB
2020	4,084	2,825	0.17	18,101
2021	3,806	2,825	0.19	17,202
2022	3,753	2,825	0.19	17,267

Georges Bank Winter Flounder- The recent assessment for GB winter flounder indicates that the stock is overfished (24% of target SSB_{MSY} in 2018). The stock is expected to increase during the projected years under Alternative 2 (Table 11). Under Alternative 1/No Action the assumed catch in FY2020 is 555 mt versus 587 mt under Option 2 (Table 2). Therefore, SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Table 11-Projection results for Georges Bank winter flounder, SSB MSY = 8,9107,600mt, F MSY = 0.519.

Year	OFL	ABC	F	SSB
2020	790	587	0.37	1,674
2021	944	587	0.302	1,828
2022	1,590	587	0.172	3,482

White Hake- The recent assessment for white hake indicates that the stock is below SSB_{MSY} (50% of target SSB_{MSY} in 2018). Under Alternative 2 the stock is expected to increase slightly from FY2020 to FY2022. (Table 12). Under Alternative 1/No Action the assumed catch in FY2020 is 1,670 mt versus 2,186 mt under Alternative 2 (Table 2). Therefore, SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Table 12-Projection results for white hake, SSB MSY = 31,828mt, F MSY = 0.1677.

Year	OFL	ABC	F	SSB
2020	2,857	2,186	0.13	19,758
2021	2,906	2,186	0.12	20,308
2022	2,986	2,186	0.12	20,826

Pollock- The recent assessment for pollock indicates that the stock is well above SSB_{MSY} (170% of target SSB_{MSY} in 2018; based on the 'base' model). The stock is expected to decrease slightly during the projected years under Alternative 2 (Table 13). Under Alternative 1/No Action the assumed catch in FY2020 is 7,522 mt versus 16,812 mt under Alternative 2 (Table 2). Therefore, SSB decreases are expected to be less under Alternative 1/No Action than Alternative 2.

Table 13-Projection results for pollock, SSB MSY = 124,639 mt, F MSY = 0.272.

Year	OFL	ABC	F	SSB
2020	35,358	16,812	0.18	201,031
2021	30,795	16,812	0.20	195,203
2022	24,087	16,812	0.27	190,204

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	2020	2021	2022
Cod	GB	NA	NA	NA
Cod (m=0.2 model)	GOM	0.149	0.002	0.000
Cod (mramp m=0.4)	GOM	0.073	0.013	0.001
Haddock	GB	0.002	0.044	0.085
Haddock	GOM	0.001	0.046	0.304
Yellowtail Flounder	GB	NA	NA	NA
Yellowtail Flounder	SNE/MA	0.031	0.001	0.000
Yellowtail Flounder	CC/GOM	0.005	0.020	0.031
Plaice		0..000	0.007	0.054
Witch Flounder		NA	NA	NA
Winter Flounder	GB	0.059	0.064	0.020
Winter Flounder	GOM	NA	NA	NA

		Probability of Overfishing		
Species	Stock	2020	2021	2022
Winter Flounder	SNE/MA	NA	NA	NA
Redfish		NA	NA	NA
White Hake		0.001	0.002	0.001
Pollock		0.000	0.000	0.016
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
- Witch Flounder
- Northern Windowpane Flounder
- Southern Windowpane Flounder
- Atlantic halibut

For index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC is based on an exploitation rate (e.g., GB yellowtail flounder and witch flounder) or an alternative Plan-B smooth approach (e.g., GB cod and Atlantic halibut) or 75% of FMSY (remaining stocks on the above list) applied to the most recent estimate of stock size. Empirical approaches are simple approaches that do not implicitly account for population dynamics. Nevertheless, ABCs set from empirical approaches are not expected to lead to further declines in biomass.

GB cod-A majority of the SSC accepted the PlanBsmooth model for setting the ABC for Georges Bank cod, which applies a multiplier based on recent survey trend (0.936) to the average catch of the most recent three years. Because the PlanBsmooth model does not produce biological reference points, the majority of the SSC concludes that the OFL is unknown for this stock. The SSC recommendation deviates from previous advice when the SSC has recommended that the modeled results are the OFL and set the ABC at 75% of the OFL. The ABC is recommended to remain constant for each year of the specification period.

GB yellowtail flounder-The SSC approved the use of the empirical approach for setting catch advice in 2020 and 2021. The SSC is precluded from offering a formal estimation of reference points and status of the stock given that the assessment approach is not a comprehensive analytical population assessment. Therefore, the SSC reaffirms that the OFL for GB yellowtail remains unknown for FY2020 and FY2021. The SSC can determine an ABC for this stock and recommends an ABC of up to 162 mt for FY2020 and 162 mt for FY2021. This catch advice follows from the advice of the Transboundary Resources Assessment Committee (TRAC), in that it is below the upper bound of 199 mt as recommended by the TRAC. The SSC recommended keeping this ABC in place for FY2020 and FY2021, with the

understanding that the TRAC process is annual and the 2021 recommendation will be revisited. This advice holds static the catch advice recommended by the SSC for the 2019 fishing year.

Witch flounder-The SSC approved the use of the existing empirical approach with the updated exploitation rate of 4.9% in the 2019 assessment for recommending catch advice for witch flounder. Based on the empirical approach, the SSC recommends a constant ABC for the specification setting period based on the average exploitation rate from 2007 – 2015 and recent three-year average exploitable biomass. The OFL is unknown as the empirical approach does not produce reference points.

Northern windowpane flounder-The SSC supported the continued use of the AIM model for setting catch advice of Gulf of Maine/Georges Bank (Northern) Windowpane flounder. Northern windowpane is under a rebuilding plan that specifies setting catch advice using a fishing mortality rate of 70%Fmsy (Frebuild). It is not possible to estimate retrospective patterns of AIM and thus no retrospective adjustments are made. Catch projections are not conducted for this stock; therefore, OFLs and ABCs for FY2020-FY2022 are determined by applying the survey index (three-year average of the NEFSC fall survey kg/tow index) by the Fmsy proxy and 70% of the Fmsy proxy, respectively.

Southern windowpane flounder-The SSC supported the continued use of the AIM model for setting catch advice of Southern New England/Mid-Atlantic (Southern) Windowpane Flounder. Catch advice for southern windowpane was derived using a fishing mortality rate of 75%Fmsy. It is not possible to estimate retrospective patterns for the AIM model and thus no retrospective adjustments were made. Catch projections from AIM model are not used for this stock; therefore, OFLs and ABCs for the specification setting period are determined by applying the biomass index (three-year average NEFSC fall survey kg/tow index) by the Fmsy proxy and 75% of the Fmsy proxy, respectively using a constant catch approach for three years.

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. For the 2017 assessment, an empirical approach was established to derive catch advice, which 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 approach developed catch advice options for FY2020-2022. The SSC recommended a constant ABC of 147 mt for FY2020-2022, and an OFL was not recommended, based on the assessment methodology. This represent a slight increase from the 2019 ABC recommendation of 137 mt

Overview of Scallop Framework Adjustment 32 Spatial Management and Projected Catches of Groundfish Stock for FY 2020 [to updated after Council final action]

The final Council preferred alternative for scallop fishery specifications in FY2020 is anticipated to result in XXX [to be updated].

Draft Scallop Framework 32 Overview:

Draft Framework 32 to the Scallop FMP (FW32) is considering a range of fishery allocations for FY2020 and FY2021 (default). All specification alternatives under consideration in this action would allocate access area trips to the following areas: one trip (18,000 pounds) in Closed Area II Access Area (CAII AA) , two trips (18,000 pounds each) in the Mid-Atlantic Access Area (MAAA), one trip (18,000 pounds) in the Nantucket Lightship South Deep (NLS-S-Deep), ½ Flex trip (9,000 pounds) to Closed Area I Access Area (CAI AA), and ½ trip (9,000 pounds) in the Nantucket Lightship North (NLS-North). Partial trips allocated to Closed Area I and the NLS-North may be tradeable, allowing individual vessels to land up to 18,000 pounds in one of these rotational areas. Closed Area I is designated as a "flex" allocation, which can be fished in either Closed Area I or the MAAA. Closed

Area I has been available to the fishery since fishing year 2018 and the Mid-Atlantic Access Area has supported rotational harvest at some level for over 7 years. Closed Area II Access Area and the NLS-North have not been fished since FY2017. The Nantucket Lightship South Deep area has not been fished for scallops since prior to the implementation of the Georges Bank groundfish closures in 1999. FW32 measures under development are also considering modifications to spatial management on Eastern Georges Bank to protect a large year class of small scallops observed in CAII AA and surrounding open area in the 2019 surveys. In addition to scallop conservation, the closure boundary alternatives under consideration are also expected to proactively mitigate impacts to Georges Bank yellowtail flounder.

Methods

Since bycatch sub-ACLs were first allocated to the scallop fishery in 2010, the Scallop PDT has calculated a projection of flatfish bycatch for specification alternatives being considered by the Council to inform the decision-making process and evaluate potential impacts of the scallop fishery. Bycatch estimation methods have evolved over time but in general follow these steps:

First, a discard to kept ratio (D:K) is estimated from the most recent observer data available. For in-season bycatch estimation, D:K ratios are calculated according to Area (i.e. Open, Access Area)/Gear (i.e. Dredge, Trawl)/Fleet (i.e. Limited Access, General Category) strata. For FY2020 projection estimates, D:K ratios were calculated by SAMS area. Several updates were made to the stratification scheme for FY2019 that will be applicable for FY2020 (Figure 5), including: 1) within the Southern New England/Mid-Atlantic yellowtail and windowpane stocks, the Nantucket Lightship has been split into three strata: NLS-North, NLS-South, and NLS-West (for Status Quo option only); 2) the Mid-Atlantic is split into Open/Access Areas (note that the designation between Southern New England Open (areas < SRA 614 in the stock area) and Mid-Atlantic Open (areas >=SRA 614 in the stock area) remains unchanged); 3) a rolling 12-month time period was used to generate D:K ratios for all strata; 4) only audited observer trips were used; 5) for strata where there were < 5 trips in-season, and no trips in the previous 12 months, the most closely related strata D:K was used (e.g. NLS-South, General Category). For areas that haven't been open to the fishery recently, such as the NLS-North and CAII AA, the most recent 12 months of data available were used to generate D:K ratios—data from FY2017 was used for the NLS-North and CAII AA because this is the last time the fishery had access to these areas.
Second, the baseline D:K ratio was adjusted to calculate estimates for 2020 using the formula:

$$D{:}K_y = Baseline\ D{:}K\ \left(\frac{Scallop\ EBms_{when\ data\ was\ collected}}{Scallop\ EBms_y}\right)$$

where y is the year of the estimate. Third, bycatch was calculated in each area using the formula:

$$Projected\ Catch * (D{:}K_y)$$

Bycatch estimates for each of the four flatfish stocks for FY2020 were calculated for each specification run prepared for the Scallop Committee (Table 15). The Scallop PDT calculated bycatch estimates for FY2020 only, and notes that these bycatch estimates will be updated annually as part of the specifications process.

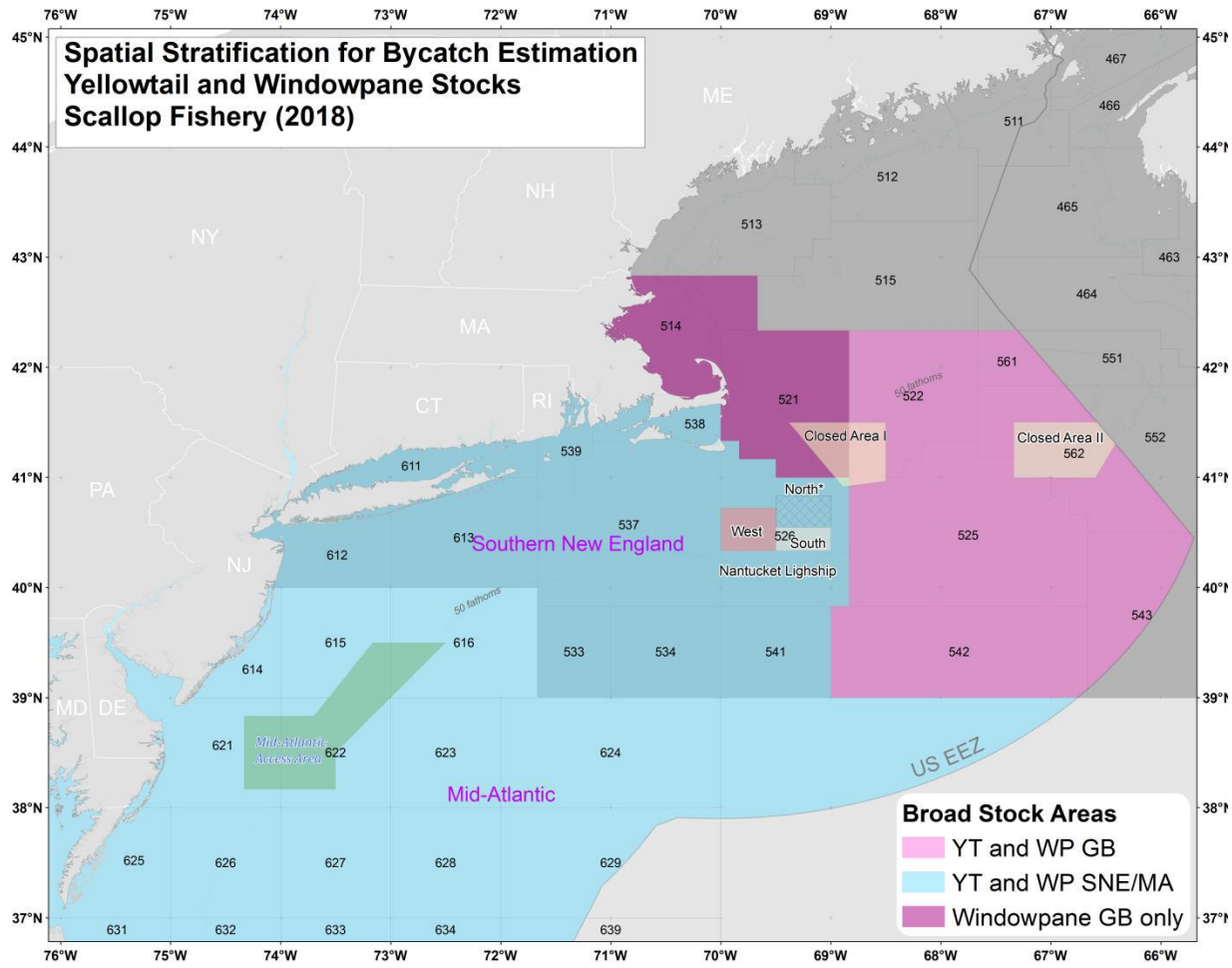


Figure 5- Updated strata used to monitor in-season scallop bycatch in FY2020 under the range of alternatives being considered in FW32.

Scallop PDT produced flatfish bycatch projections for FY2020, which are summarized in Table 15. The flatfish bycatch projections are forecasts (with error) and should not be interpreted as precise estimates. In general, the PDT feels that estimates represent a reasonable approximation of catch that may occur. Review of past estimates has shown the projections have both over-estimated and under-estimated realized catches. It is important to note that the methods and underlying assumptions used for in-season catch accounting may vary from the methods used by the Scallop PDT to project catch. Maps of spatial management under various alternatives are depicted in Figure 6 through Figure 9.

Bycatch projections for FY2020 are very close to the projected scallop fishery sub-ACL for SNE/MA yellowtail, and less than the anticipated sub-ACL for SNE/MA windowpane flounder in all specifications options except for two (Alternative 4 with 22 DAS and Alternative 4 with 24 DAS). Bycatch projections exceed the anticipated FY2020 sub-ACL for GB yellowtail by roughly 4 mt in all alternatives except for No Action and Status Quo. Bycatch projections for GOM/GB windowpane are also greater than the anticipated FY2020 sub-ACL for this stock (Table 15). Alternatives under consideration in Framework 32 would allocate access area trips to rotational areas with high densities of scallops. The majority of scallop landings in FY2020 are anticipated to come from access area fishing.

The fishery interacts with GB yellowtail and GOM/GB windowpane at a higher rate when fishing in CAII relative to other parts of the resource. All FW32 specifications options allocate access to CAII-East, but the series of spatial closures being considered are anticipated to mitigate impacts to the GB yellowtail flounder stock. For example, the area of closure options in and around Closed Area II range between 324 nmi^2 and 2,231 nmi^2, with the level of projected bycatch of GB yellowtail decreasing as the closure area increases (Table 15). Bycatch of GOM/GB windowpane appears to increase slightly as the closure area on eastern GB increases—this is likely because open area effort that would have occurred within the closure options is assumed to be redistributed to other parts of the GOM/GB windowpane stock area with high bycatch (i.e. Great South Channel).

Aside from fishery access to CAII Access Area, the majority of access area effort will be directed to the MAAA, where scallops are found in high densities, with the remainder of rotational harvest coming from the NLS-North, NLS-South-Deep and CAI. Bycatch of SNE/MA yellowtail is anticipated to be very low in the MAAA, NLS-North, and NLS-S-Deep. CAI bisects the GB and CC/GOM yellowtail stock areas; however, yellowtail bycatch is anticipated to be low in CAI overall

The PDT acknowledges that there is some additional uncertainty around the SNE/MA windowpane projections due to anticipated access to high densities of scallops in the NLS-S-Deep. This area has not been targeted in the past by the scallop fishery, meaning observer data are limited and the associated bycatch rates are uncertain (i.e. projections for the NLS-S-Deep use the NLS-North d/K considering these areas are adjacent to each other). Realized SNE/MA windowpane bycatch could swing upwards or downwards from the range presented in Table 15 depending on fishing practices in the NLS-S-Deep. For example, should vessels fish in the extraordinarily high-density part of the NLS-S-Deep, overall bycatch could be expected to decrease relative to the values provided in Table 15 if scallop catch rates are higher than projected. Conversely, should vessels target the lower density "edges" of the concentrated scallop aggregation, scallop catch rates could be lower, thereby increasing bycatch above the values presented in Table 15. Overall, the PDT notes that the range of SNE/MA windowpane bycatch projections in Table 15 are a realistic representation of a mix of these fishing practices (i.e. some vessels fishing high densities, others fishing lower densities).

The PDT also discussed the principles of rotational management, such as closing areas for multiple years to improve yield-per-recruit. In practice, F is reduced to zero in the years prior to an opening of an area. On the temporal scale of fishing years, effort in Closed Area II Access Area is periodic and is reflected by intermittently high catches of GB yellowtail, GOM/GB windowpane, and scallops in the stock area. In years when CAII AA is not fished, bycatch of GB yellowtail and GOM/GB windowpane decreases considerably, and scallops are caught elsewhere. This seesaw effect of opening and closing access areas is evident when comparing projected bycatch estimates for FY2020 with FY2019 (i.e. FY019 projection was ~12 mt). The expected catch of GB yellowtail and GOM/GB windowpane is greater than the previous year because the fishery will likely be operating in Closed Area II Access Area.

Bycatch projections are based on the most recent available observer records for a strata (i.e. in this case, SAMS area). This means that bycatch projections for CAII are based on observer records from FY2017, the last time the scallop fishery was fishing in this access area. Projecting future bycatch based on time-lagged data increases the uncertainty of the estimates, and the PDT notes that FY2020 projections may be over- or under-estimated.

The Council has taken several steps in recent years to reduce/eliminate incentives for the scallop fishery to catch yellowtail, including the prohibition of possession/landing yellowtail. In addition to the use of a 10" twine top and maximum 7-row dredge apron, there is a seasonal closure of Closed Area II AA from Aug. 15 – Nov. 15 to reduce yellowtail bycatch. FW32, like FW30, FW29 and FW28, contains measures

that prohibit RSA compensation fishing in Closed Area II AA to reduce potential impacts on GB yellowtail flounder and GOM/GB windowpane flounder.

Table 15- Overview of FY2020 projected scallop fishery bycatch estimates for each specification run under consideration in FW32, including the anticipated FY2020 scallop sub-ACL for each stock.

Alternative	Scenario		GB YT	SNE/MA YT	GOM/GB WP	SNE/MA WP
Anticipated 2020 sub-ACL		GB Closure	*~19 mt*	*~2 mt*	*~12 mt*	*~143 mt*
4.3.1	No Action 1 MAAA: 18k 1 NLS-W: 18k DAS: 18	CAII AA closed	0.76	1.45	8.35	77.06
4.3.2	2 MAAA: 18k 1 CAII East: 18k 1 NLS-S-Deep: 18k ½ CAI: 9k ½ NLS-N: 9k DAS: 20, 22, 24	CAII-West closed (area = 324 nmi^2)	23.37-27.51	1.89-2.11	30.04-31.58	130.02-136.87
4.3.3	2 MAAA: 18k 1 CAII East: 18k 1 NLS-S-Deep: 18k ½ CAI: 9k ½ NLS-N: 9k DAS: 20, 22, 24	CAII-Southwest closed (area = 1,525 nmi^2)	23.2 – 23.3	2.06-2.3	31.2-32.91	135.17-142.92
4.3.4	2 MAAA: 18k 1 CAII East: 18k 1 NLS-S-Deep: 18k ½ CAI: 9k ½ NLS-N: 9k DAS: 20, 22, 24	Southeast Part closed (area = 2,231 nmi^2)	23.04-23.12	2.31-2.59	32.96-34.92	143.23-152.23
4.3.5	Status Quo 1 CAI: 18k Flex 3 MAAA 18k 3 NLS-W 18k DAS: 24	CAII AA closed	4.01	1.42	23.21	87.95
Note: The sub-ACLs for GOM/GB WP, SNE/MA YT, SNE/MA WP were set through FW58. Groundfish Framework 59 is considering an updated GBYT sub-ACL based on the new TRAC assessment and US/Canada agreement.						

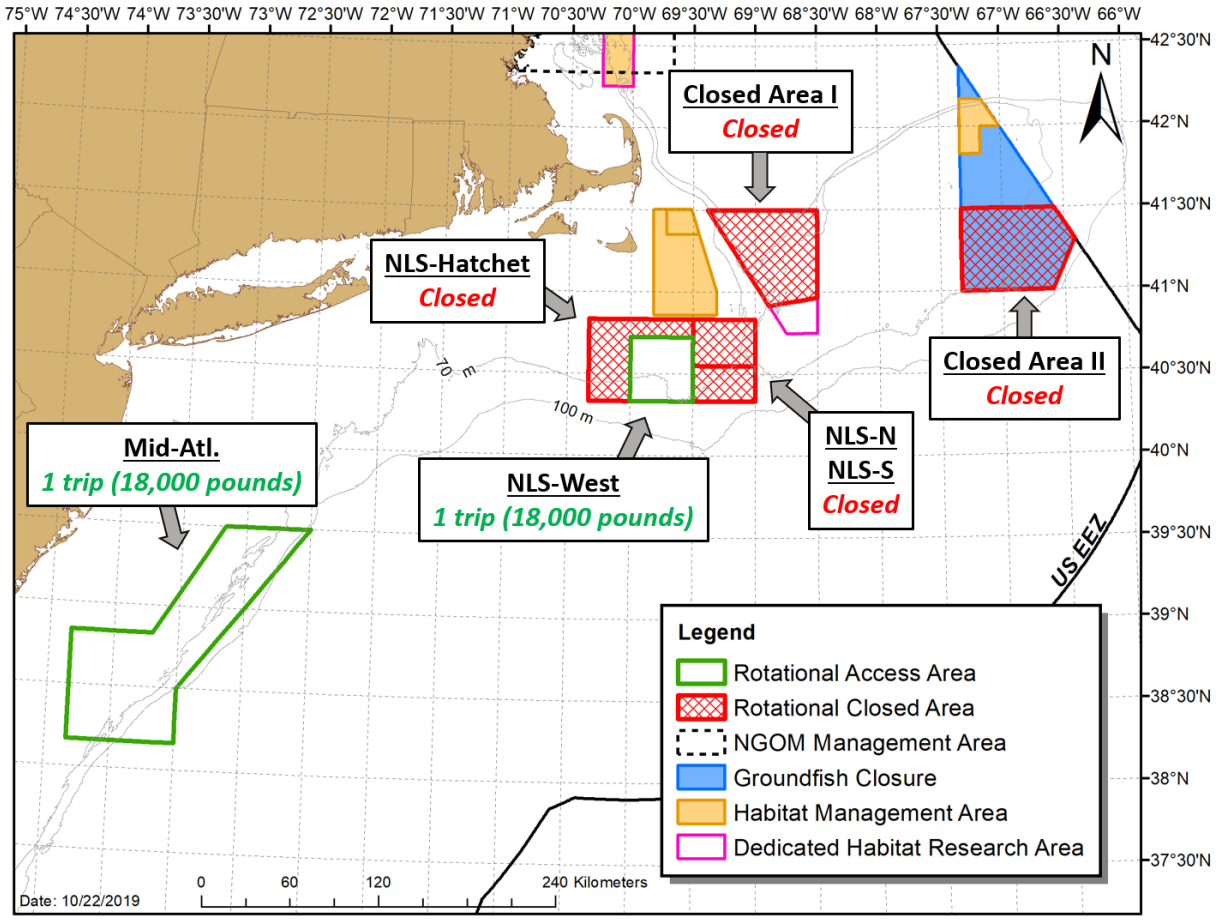


Figure 6- Spatial management configuration under Alternative 1—No Action (default measures from FW30).

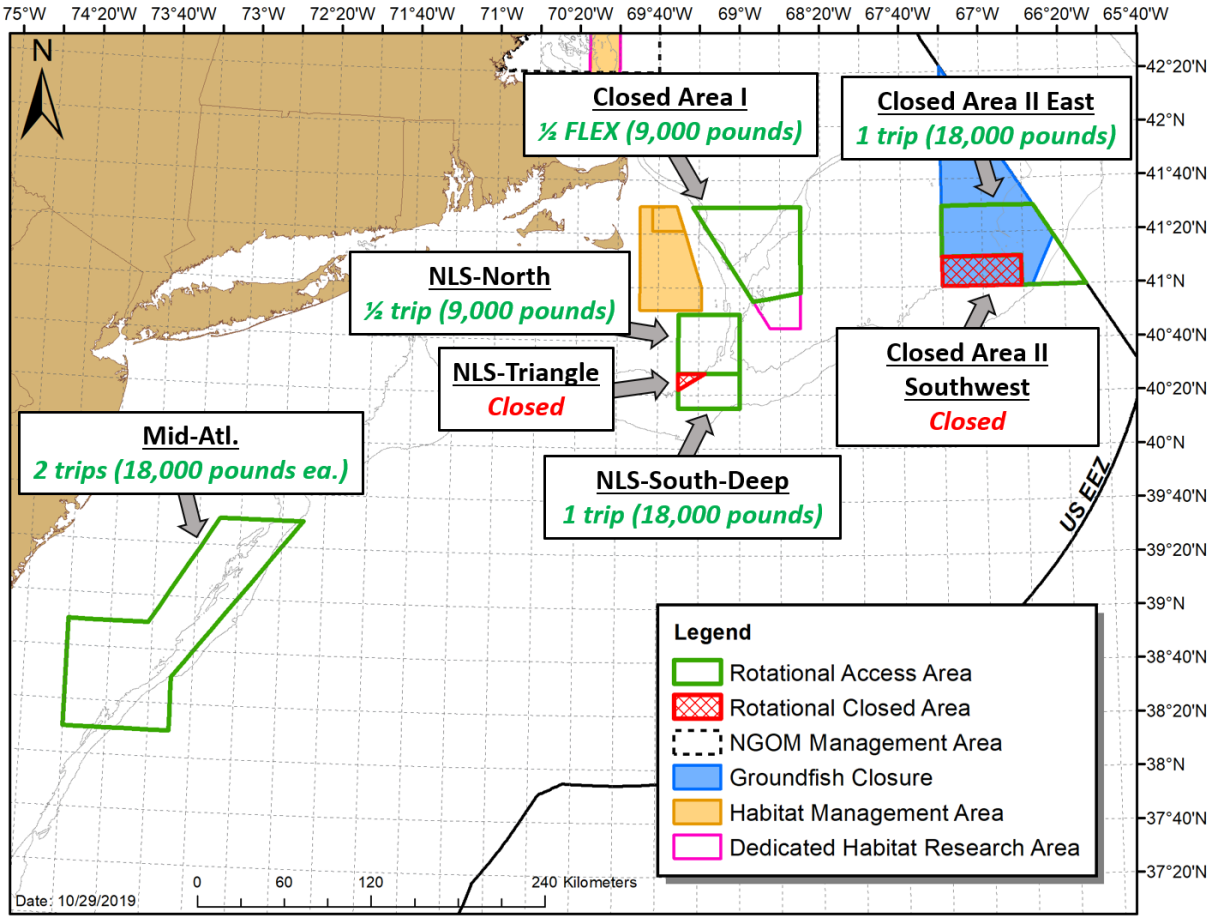


Figure 7- Spatial management configuration under Alternative 2 – six trip option with an 18,000 pound trip limit and closure in part of CAII AA.

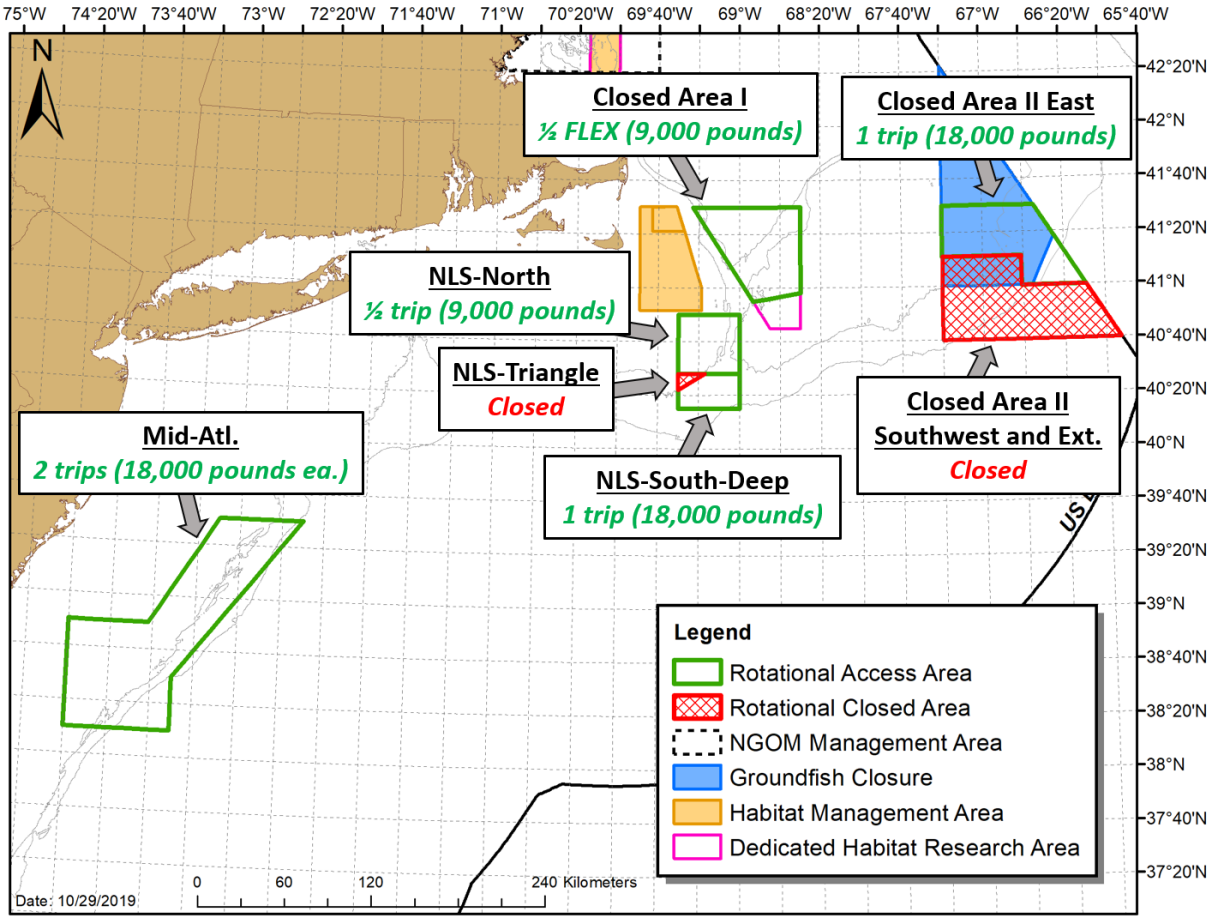


Figure 8- Spatial management configuration under Alternative 3– six trip option with 18,000 pound trip limit, with a closure in part of CAII AA and south of CAII AA.

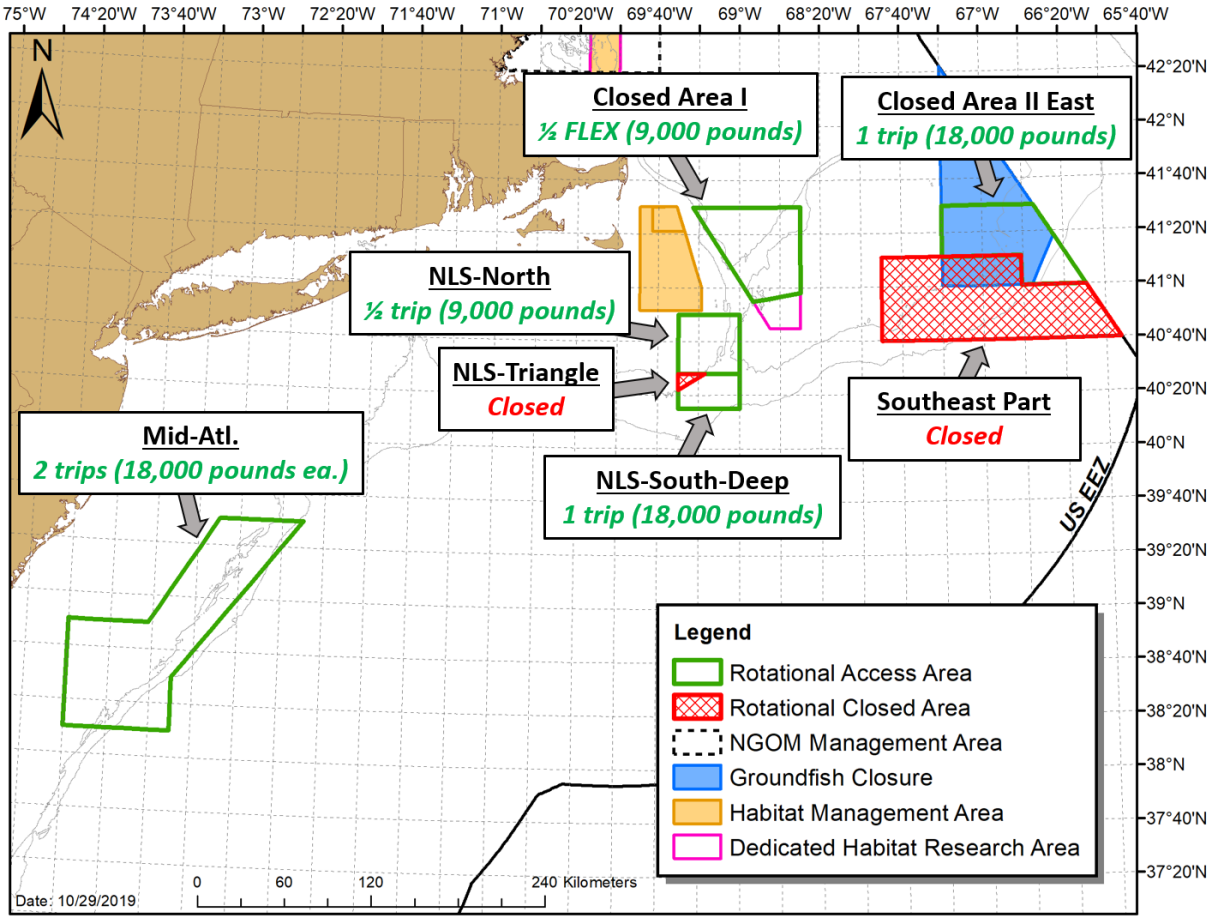


Figure 9- Spatial management configuration under Alternative 4 – six trip option with 18,000 pound trip limit and a closure in part of CAII AA as well as directly south and west of CAII AA.

Impacts on other species

The specification of groundfish ACLs are expected to have indirect impacts on other species that are captured incidentally during groundfish trips if they result in changes in groundfish fishing activity. When compared to Alternative 1/No Action, Alternative 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, which would 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 Alternative 2 would be expected to result in increased catches of other species.

Sub-ACLs for Other Fisheries [to be updated]

The ABCs and ACLs under Alternative 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 Alternative 2 specifications and the Scallop PDT's estimates of projected catch by the

scallop fishery indicates that scallop fishery catches of SNE/MA yellowtail flounder, GB yellowtail flounder, southern windowpane flounder, and northern windowpane flounder are lower, similar to, or greater than the respective sub-ACLs, depending on the specification chosen in draft Scallop FW32. Summaries of recent catches of GB yellowtail flounder, SNE/MA yellowtail flounder, northern windowpane flounder, and southern windowpane flounder in the scallop and groundfish fisheries are provided (Table 16 to Table 20). Therefore, the overall impact of Alternative 2 ABCs and ACLs are likely to be low positive, neutral or low negative with respect to the Atlantic sea scallop resource.

Table 16- Recent GB yellowtail flounder TACs, groundfish fishery sub-ACLs, and catches for fishing years 2015 through in-season 2019, Nov. 19, 2019. Values shown in metric tons (mt). Source: GARFO year-end catch reports.

	Groundfish Fishery- GB Yellowtail Flounder						
Fishing Year	Total Shared TAC – US & CA (mt)	US % Share	US TAC (mt)	% US TAC Caught	Groundfish sub-ACL (mt)	Groundfish catch (mt)	Percent Groundfish ACL Caught (%)
2015	354	70%	248	27.5%	202.9	38.4	18.9%
2016	354	76%	269	11.4%	250.8	23.9	9.5%
2017	300	69%	207	40.6%	162.6	31.4	19.1%
2018	300	71%	213	18.9%	187.9	27.6	14.7%
In-season 2019	140	76%	106	n/a	84.6	3.0	3.5%

Table 17- Recent GB yellowtail TACs and scallop fishery sub-ACLs and catches. Values are shown in metric tons (mt).

	Scallop Fishery- GB Yellowtail Flounder						
Groundfish Fishing Year	Total Shared TAC	US % Share	US TAC	% US TAC Caught	Scallop sub-ACL	Scallop catch	%Scallop sub-ACL Caught
FY2015*	354	70%	248	28%	38	29.7	78%
FY2016*	354	76%	269	12%	42	2.1	5%
FY2017*	300	69%	207	44%	32	52.6	164%
FY2018*	300	71%	213	19%	15	12.7	87.5%
FY2019*	140	76%	106	n/a	17	n/a	n/a

* retention of GB yellowtail prohibited for scallop fishery
n/a = data not yet finalized.

Table 18- 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).

	Scallop and Groundfish Fishery—SNE/MA Yellowtail Flounder								
Groundfish Fishing Year	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
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	24.4	9.6%	4	4.3	104.1	187.5	14.5	6.7%
FY2018	66	14.7	22.3%	3	2.6	79.7%	43	8.5	19.6%
* Indicates that retention of SNE/MA YT was prohibited for scallop fishery									

Table 19- Final year-end catch data (mt) for northern windowpane flounder. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO. *In FY2017 a scallop-specific AM was created, in previous years scallop landings were part of the 'other' fisheries catch, reflected here.

			Northern Windowpane Flounder Catch (mt)				
			Groundfish Fishery		**Sub-Components**		
FY	**ACL**	**Total Catch**	**Sector**	**Common Pool**	**Scallop Fishery**	**State Waters**	**Other**
2015	144	189.8	73.6	0	*114.6*	1.3	114.9
2016	177	83.7	45.0	0	*31.8*	.7	37.9
2017*	170	87.4	33.9	1.2	44.1	.5	7.7
2018	86	56.7	33	.3	22.3	.4	.7

Table 20- Final year-end catch data (mt) for southern windowpane flounder. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO.

			Southern Windowpane Flounder Catch (mt)				
			Groundfish Fishery		**Sub-Components with AMs**		
FY	**ACL**	**Total Catch**	**Sector**	**Common Pool**	**Scallop Fishery**	**State Waters**	**Other**
2015	527	22.7	-	.2	-	22.1	0.5
2016	599	417.2	45	0	84.4	28	178.1
2017	599	440.9	33.9	1.2	44.1	0.5	7.7
2018	457	454.7	49.7	16.8	157.1	26.1	205

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. A summary of recent catches by the small-mesh fisheries is provided (Table 21). 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 Alternative 2 ABCs and ACLs are likely to be low positive to negligible with respect to the squid and whiting resource on Georges Bank.

Table 21- Recent GB yellowtail flounder small-mesh fisheries sub-ACLs and catches (mt) for fishing years 2015 through 2018. Values shown in metric tons (mt). Source: GARFO year-end catch reports. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO.

	Small Mesh Fishery- GB Yellowtail Flounder		
Groundfish Fishing Year	Small-mesh fisheries sub-ACL (mt)	Small-mesh fisheries (mt)	Percent small-mesh fisheries Caught (%)
FY2015	5	0.1	1.0%
FY2016	5	4.8	95.2%
FY2017	4	0.4	9.7%
FY2018	4	0.1	2.5%
In-season FY2019	2	n/a	n/a

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. A summary of recent catches in the midwater trawl Atlantic herring fishery is provided for GOM haddock (Table 22) and GB haddock (Table 23). Option 2 for GOM and GB haddock may reduce fishing mortality of Atlantic herring which would have positive biological benefits for the Atlantic herring stock.

Table 22- Summary of recent catches (mt) of GOM haddock by the commercial midwater trawl herring fishery, groundfish FY2015-FY2018. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO.

	Midwater Trawl Atlantic Herring Fishery- Gulf of Maine Haddock				
Groundfish Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	14	-	-	-	-
2016	34	1.9	-	1.9	5.7
2017	42	-	-	-	-
2018	*122*	-	-	*0.0*	-

Table 23- Summary of recent catches (mt) of Georges Bank haddock by the midwater trawl Atlantic herring fishery, groundfish FY2015- FY2018. Source: Groundfish FY2015 – FY2018 final year-end catch reports, GARFO.

	Midwater Trawl- Georges Bank Haddock				
Groundfish Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	227	235.0	0.6	235.5	103.9%
2016	512	115.3	3.6	118.9	23.2%
2017	801	47.9	0	47.9	6.0%
2018	680	43.9	0	43.9	6.5%

Lastly, the other sub-component of Southern windowpane flounder is used to evaluate if an AM would be triggered for large-mesh non-groundfish fisheries (e.g., summer flounder and scup trawl fisheries). *Summer Flounder* - In March 2019, the commercial summer flounder quota increased by 65% (from 6.67 million pounds to 10.98 million pounds). The GARFO quota monitoring site suggests that the fishery quickly responded to this increase by landing more summer flounder (Figure 10). The 2020 summer flounder commercial quota will be identical to the 2019 quota, assuming no deductions are required due to an annual catch limit overage. For this reason, summer flounder fishing effort may be higher in upcoming years than during 2016-2018 (the years used to calculate the other sub-component allocation for southern windowpane flounder). *Scup* - Fishing effort for scup is not expected to change notably compared to 2016-2018.

Exceeding the other sub-component and the overall ACL results in triggering AMs in a future year. AMs are GRAs designed to reduce catches of flatfish, which would have positive biological benefits for summer flounder and to a lesser extent scup by reducing fishing mortality. A summary of recent catches in the other sub-component is found in Table 20. Under Alternative 2, the ABC for Southern windowpane flounder and would have low positive impacts when compared with Alternative 1/No Action.

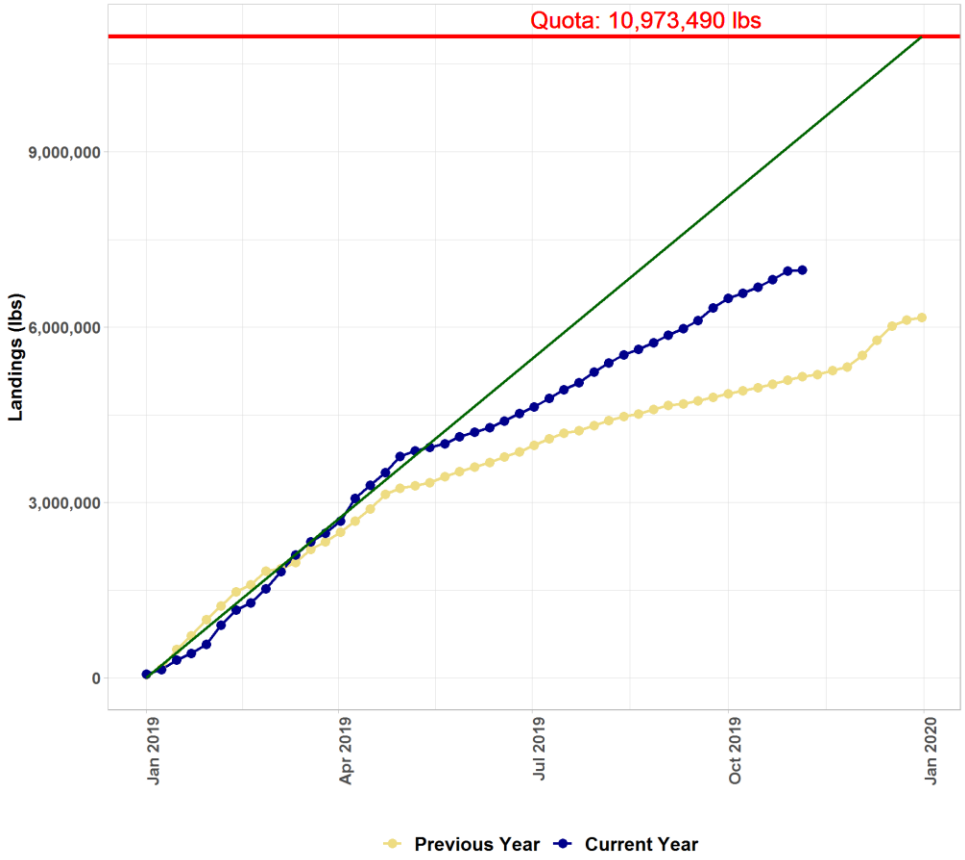


Figure 10- Quota monitoring for summer flounder. Source: GARFO website. See: https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/h/fluke/sf_coast_qm.html

6.2.1.2.1 Option A – Recreational Fishery Georges Bank Cod Catch Target

Table 24 and Table 25 summarize recent catches of GB cod by the US commercial fishery and the recreational fishery using pre-calibration MRIP data. In FY2014 through FY2017, recreational fisheries accounted for greater than 5% of US fisheries catches of GB cod. For FY2018-FY2020, a recreational fishery GB cod catch target was established to develop management measures for the recreational fishery that would not exceed the target of 138 mt. An overview of the calculation is provided in Table 26. The PDT updated the calculation using data from the 2019 stock assessment, which included the new MRIP data (Table 27). A comparison using pre and post calibration MRIP data for catch target possibilities is summarized in Table 28.

Table 24- Summary of recent catches (mt) of Georges Bank cod by the US commercial groundfish fishery, FY2015-FY2018 and preliminary in-season FY2019. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO, and FY2019 in-season catch report, GARFO, Nov. 19, 2019.

	Commercial Groundfish Fishery- Georges Bank Cod				
Fishing Year	Sub-ACL	Landings	Discards	Catch	Percentage of sub-ACL
2015	1,787	1,608.5	28.3	1,636.8	92%
2016	608	571.9	24.6	596.6	98%
2017	531	432.8	13.1	446	78%
2018	1,519	833.2	4.7	837.9	62%
In-season 2019	1,568.2	226.5	5.1	231.7	15%

Table 25- Georges Bank cod recreational catch (mt), FY2011-FY2018. Sources: FY2011 – FY2018 final year-end multispecies catch reports, GARFO.

	Recreational Fishery – Georges Bank Cod				
Fishing Year	Federal Waters Recreational Catch	State Waters Recreational Catch	All Recreational Catch	Total US Catch	Recreational Portion of Total US 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%
2017	50.1	2.8	52.9	522.5	10.1%
2018	31.6	5.5	37.1	887.3	4.2%

Table 26- Calculation of the GB cod catch target for the recreational fishery. Data source: Recreational catches in 2017 groundfish operational assessment of GB cod, 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**

Table 27- Recalculating the catch target for GB cod using new MRIP landings and discards, and updated commercial landings and discards (2019 assessment update).

Georges Bank Cod												
2019 Assessment Results												
Calandar Year	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*		
Commercial landings	2,999	2,688	3,387	2,007	1,312	1,514	1,300	1,109	464	574		
Commercial discards	385	253	122	120	83	19	31	33	20	13		
Recreational landings	142	195	142	81	7	257	486	1,075	785	66		
Recreational discards	9	27	25	3	2	19	71	32	25	6		
CA landings	1,003	748	702	395	384	430	472	428	474	510		
CA discards	206	94	43	75	39	28	20	12	14	7		
Catch for Assessment	4,744	4,005	4,421	2,681	1,828	2,267	2,380	2,690	1,782	1,176		
											Averages	
Evaluation for potential sub-ACL for recreational fishery											3-Year: 2016-2018	5-Year: 2014-2018
Recreational catch total (landings and discards)	151	222	167	84	9	276	557	1,107	810	72	663	564.4
US catch total (commerical and recreational catches)	3,535	3,163	3,676	2,211	1,404	1,809	1,888	2,249	1,294	659	1,401	1,580
Percentage of catches Rec total: US total	4.27%	7.02%	4.54%	3.80%	0.64%	15.26%	29.50%	49.22%	62.60%	10.93%	40.9%	33.5%
Percentages of catches Rec total: Total catches	3.18%	5.54%	3.78%	3.13%	0.49%	12.17%	23.40%	41.15%	45.45%	6.12%	30.9%	25.7%

Table 28- Comparison of the catch target for GB cod with pre- and post-calibration MRIP data using different time periods for the evaluation.

Data Source and Date Range	Catch Target
Pre-calibration MRIP Data Average 2012-2016	138 mt *(current catch target for FY2020)*
Post-calibration MRIP Data Average 2012-2016	406 mt
Post-calibration MRIP Data Average 2014-2018 (5-Year)	564 mt
Post-calibration MRIP Data Average 2016-2018 (3-Year)	663 mt

Option A1: No Action

Option A1/No Action would maintain the GB cod recreational catch target at 138 mt for FY2020. A 138 mt target catch is likely to be exceeded since a more appropriate sampling design has been implemented through MRIP which tend to produce higher estimates of recreational removals. Option A1/No Action would have positive impacts on GB cod if complementary management measures reduced catches to not exceed the 138 mt catch target. The catch target itself is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species or other species because the total catch is constrained by the overall ACL. Option A1/No Action compared to Option A2 would be neutral for FY2022 and uncertain for FY2021-FY2021.

Option A2: Recreational fishery GB cod catch target

Option A2 would maintain the GB cod recreational catch target at 138 mt for FY2020-FY2022. A 138 mt target catch will likely be exceeded since a more appropriate sampling design has been implemented through MRIP which tend to produce higher estimates of recreational removals. Option 2 would have positive impacts on GB cod if complementary management measures reduced catches to not exceed the 138 mt catch target. The catch target itself is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species or other species because the total catch is constrained by the overall ACL. Option A2 compared to Option A1/No Action would be neutral for FY2022 and uncertain for FY2021-FY2021.

6.2.1.2.2 Option B – Allocation between Commercial and Recreational Fisheries for Gulf of Maine Cod and Gulf of Maine Haddock

Updating the data in the GOM cod and GOM haddock allocation

Updating commercial landings and discards and recreational landings, and including recreational discards for 2001 to 2006 results in changes in allocation to the recreational fishery, for GOM cod from 33.7% to 37.5%, an increase of 3.8% (Table 29 and Table 30) and for GOM haddock from 27.5% to 33.9%, an increase of 6.4% (Table 31 and Table 32).

Table 29- Gulf of Maine Cod Existing Rec/Com Allocation (GARM III, Amendment 16)

Year	Rec Landings (A+B1)	Rec Discard Mortality	Com Landings	Com Discard Mortality	Total Mortality	Rec Share
			(1,000's of fish)			
2001	1,018	0	1,187	382	2,587	0.394
2002	551	0	898	383	1,832	0.301
2003	611	0	870	277	1,758	0.348
2004	531	0	799	99	1,429	0.372
2005	584	0	856	65	1,505	0.388
2006	250	0	761	114	1,125	0.222
						0.337

Table 30- Gulf of Maine Cod Preliminary Evaluation of Rec/Com Allocation Using New MRIP Landings and Discards, and Updated Commercial Landings and Discards (2019 Assessment Update).

Year	Rec Landings (A+B1)	Rec Discard Mortality	Com Landings	Com Discard Mortality	Total Mortality	Rec Share
		(1,000's of fish)				
2001	975	207	1,168	591	2,941	0.402
2002	626	182	882	410	2,100	0.385
2003	532	153	844	417	1,946	0.352
2004	606	188	766	546	2,105	0.377
2005	742	270	832	225	2,070	0.489
2006	212	127	733	299	1,371	0.247
						0.375

Table 31- Gulf of Maine Haddock Existing Rec/Com Allocation (GARM III, Amendment 16).

	Rec Landings (A+B1)	Rec Discard Mortality	Com Landings	Com Discard Mortality	Total Mortality	Rec Share
			(1,000's of fish)			
2001	120	0	514	39	673	0.179
2002	83	0	507	30	620	0.134
2003	120	0	577	25	722	0.166
2004	279	0	528	31	838	0.333
2005	445	0	531	42	1,017	0.437
2006	278	0	346	74	697	0.399
						0.275

Table 32- Gulf of Maine Haddock Preliminary Evaluation of Rec/Com Allocation Using New MRIP Landings and Discards, and Updated Commercial Landings and Discards (2019 Assessment Update).

Year	Rec Landings (A+B1)	Rec Discard Mortality	Com Landings	Com Discard Mortality	Total Mortality	Rec Share
			(1,000's of fish)			
2001	89	44	556	17	707	0.189
2002	80	87	531	22	719	0.232
2003	110	133	579	21	843	0.289
2004	249	70	528	13	860	0.371
2005	449	76	539	31	1,094	0.479
2006	259	94	348	40	742	0.477
						0.339

Table 33- Summary of recent catches (mt) of Gulf of Maine cod by the US commercial groundfish fishery, groundfish FY2015-FY2018 and preliminary in-season FY2019. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO, and FY 2019 in-season catch report, GARFO, Nov. 19, 2019.

	Commercial Groundfish Fishery- Gulf of Maine Cod				
Groundfish Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	207	172.4	14	186.4	90%
2016	280	256.3	10.2	266.5	95%
2017	280	250.3	18.6	268.8	96%
2018	369	306.4	8.6	315	85%
In-season 2019	*360.4*	*113.1*	*5.4*	*118.5*	*32.9%*

Table 34- Summary of recent catches (mt) of GOM cod by the US recreational groundfish fishery, groundfish FY2015-FY2018. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO.

	Recreational Groundfish Fishery- Gulf of Maine Cod				
Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	121	4.5	80	84.5	69.8
2016	157	94.5	186.4	280.9	178.9
2017	157	26.6	218.8	245.4	156.3
2018	220	4.3	142.6	146.9	66.8

Table 35- Summary of recent catches (mt) of GOM haddock by the commercial groundfish fishery, groundfish FY2015-FY2018 and preliminary in-season FY2019. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO, FY2019 in-season catch report, GARFO, Nov.19, 2019.

	Commercial Groundfish Fishery- Gulf of Maine Haddock				
Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	958	683.1	46.2	729.3	76%
2016	2416	1502.3	84.2	1586.5	66%
2017	3017.3	2167	98	2265	75%
2018	8738.4	2820	50.1	2870.1	33%
In-season 2019	*8311.8*	*2058.4*	*36.5*	*2094.9*	*25.2%*

Table 36- Summary of recent catches (mt) of GOM haddock by the recreational groundfish fishery, groundfish FY2015-FY2018 and preliminary in-season FY2019. Sources: FY2015 – FY2018 final year-end multispecies catch reports, GARFO.

	Recreational Groundfish Fishery- Gulf of Maine Haddock				
Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	372	238.3	143.6	381.9	102.7%
2016	928	560.2	326.8	887.0	95.6%
2017	1160	533.7	261.3	795.0	68.5%
2018	3358	423.9	171.1	595.0	17.7%

Option B1: No Action

Under Option B1/No Action, the allocation would not change for GOM cod and GOM haddock. If allocations are not adjusted due to higher estimated catches from the calibrated MRIP data, then measures on the recreational fishery will likely need to be further adjustment to meet the allocation that were developed under the old MRIP sampling design. Allocation between the commercial and recreational fisheries is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species or other species because the total catch is constrained by the overall ACL.

Option B2: Revise the allocation between commercial and recreational fisheries for GOM cod and GOM haddock.

Under Option B2, the allocation would change for GOM cod and GOM haddock to account for the MRIP redesign effect for years which were used to develop the original allocation. This option would adjust for higher estimated catches from the calibrated MRIP data for the years that were used to develop the original allocation between the recreational and commercial fisheries. Additional measure on the recreational fishery may still be needed to control recreational catch under this option since it appears the MRIP redesign has resulted in a relatively higher proportion of recreational catch over the last decade as opposed to the year that were used to calculate the allocation. Allocation between the commercial and recreational fisheries is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species or other species because the total catch is constrained by the overall ACL.

6.2.1.2.3 Option C – Closed Area I Hook Gear Haddock Special Access Program

Option C1: No Action

Impacts on regulated groundfish

Under Option C1/No Action, the current CAI HGH SAP allocation would remain for GB cod. Maintaining the current allocation is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the common pool fleet is still constrained by the overall GB cod incidental catch TAC.

Impacts on other species

Option C1/No Action would maintain the current CAI HGH SAP allocation for GB cod 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 C2: Revise the GB cod Incidental Catch TAC to remove the allocation for the Closed Area

I Hook Gear Haddock SAP (CAI HGH SAP).

Impacts on regulated groundfish

Under Option C2, the current CAI HGH SAP allocation would be removed for GB cod. This is an administrative measure as a follow-up to OHA2. Changing the allocation is not expected to have direct or indirect impacts, positive or negative, on regulated groundfish species because the common pool fleet is still constrained by the overall GB cod incidental catch TAC.

Impacts on other species

Option C2 would remove the CAI HGH SAP allocation for GB cod 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.

6.2.1.2.4 Option D– Midwater Trawl Atlantic Herring Fishery sub-ACL for Georges Bank Haddock

Background on the Review Process

Framework Adjustment 56 (FW56) increased the midwater trawl Atlantic herring fishery sub-ACL for GB haddock to 1.5% (up from 1%). The measure aims to incentivize the midwater trawl fleet to minimize the incidental catch of GB haddock to the extent practicable in the midwater trawl Atlantic herring fishery while providing the opportunity for the fleet to fully harvest its herring sub-ACL for Herring Management Areas 1B and 3. The measure would reduce the potential for negative impacts on the herring and Atlantic mackerel fisheries caused by reductions in fishing opportunities in Areas 1B and 3, and avoid potential market interruptions for the supply of herring as bait for the lobster fishery. The GB haddock accountability measures (AMs) for the midwater trawl Atlantic herring fishery (i.e., pound for pound payback provision and in-season closure) remain unchanged.

The measure also established a sub-ACL review process. Such that following an assessment of the entire GB haddock stock, the Groundfish PDT would conduct a review of the sub-ACL to recommend to the Council a sub-ACL for the midwater trawl Atlantic herring fishery of up to 2% of the U.S. ABC. FW56 states that the review of the sub-ACL would include a range of 1% up to 2% of the U.S. ABC. The review for GB haddock would consider but not be limited to: fishery catch performance, utilization, status of the resource, recruitment, incoming year-class strength, and evaluation of the coefficient of variation (CV) of the GB haddock incidental catch estimates for the Atlantic herring midwater trawl fishery.

The Council/Committee would then review the work of the PDT and determine if a change in the sub-ACL (up or down) would be considered in the action in which specifications for GB haddock would be adopted following an assessment of the entire GB haddock stock. Therefore, the review process would allow for consideration of the most recent stock assessment and fishery information to allow for an adjustment of the sub-ACL. The review process would not take place following the assessment of only the EGB haddock stock.

Results of the Review

The Groundfish PDT reviewed information in the 2019 GB haddock assessment, additional biological information, and information provided by the Herring PDT (see below).

Fishery catch performance -A summary of recent groundfish fishery catch performance for GB haddock is provided (Table 23).

Utilization- On average for the most recent three years (FY2016-FY2018), utilization of GB haddock by the groundfish fishery relative to the groundfish fishery sub-ACL is 9.3%. In general, groundfish fishery utilization of GB haddock is low relative to the groundfish fishery sub-ACL (range of 4.4% to 31.7% for FY2010 to FY2018). In-season data for FY2019 indicates that the groundfish fishery utilization is expected to remain low.

With respect to the midwater trawl directed Atlantic herring fishery, see information provided below from the Herring PDT.

Status of the resource- Based on the 2019 operational assessment and peer review, GB haddock is not overfished, and overfishing is not occurring. The 2019 assessment estimated SSB in 2018 to be 507,130mt, which is 365% of the biomass target. GB haddock is rebuilt.

Recruitment- The trend in recruitment is provided from the 2019 operational assessment report for GB haddock (Figure 11 also see pp. 55, Figure 21)[1]. Although there is substantial interannual variability in recruitment, recent recruitment events for the GB haddock stock have been relatively strong. The extremely large 2013 year-class is currently contributing to the majority of the stock biomass and landings. The 2016 year-class is also estimated to be relatively large (approximately double the magnitude of the 2010 year-class) but estimates of year class strength are still uncertain. The 2018 year-class is also estimated to be larger than the 2010 year-class, but the confidence interval indicates the large uncertainty in the 2018 recruitment estimate.

Incoming year-class strength- The extremely large 2013 year-class comprises the majority of the stock biomass and contributes to the majority of catch. Both the 2016 and 2018 year-classes are estimated to be relatively large (larger than the 2010 year-class) but estimates of year class strength are still uncertain. In the projections for FY2020-2022, the 2016 year-class is expected to contribute for about 20% of the projected SSB, and between 10-30% of the fishery catches. The 2018 year-class is not expected to contribute substantially to catch or SSB until 2021.

Evaluation of the coefficient of variation (CV) of the GB haddock incidental catch estimates for the Atlantic herring midwater trawl fishery - See information provided by Herring PDT as follows.

Other information- The PDT also notes the following other relevant information for future tracking in the next review: All the available survey indices indicate that the GB haddock stock is currently at record levels of abundance, and recent catches have been well below the quota. Mid-water trawl Atlantic herring fishery catches of GB haddock have been relatively low in recent years. Overall, the herring sub-ACL for Georges Bank has declined in recent years with herring catches from Area 3 decreasing, so it is not surprising that GB haddock catches in this fishery have also declined.

[1] See 2019 Georges Bank haddock operational assessment, available at: https://www.nefsc.noaa.gov/saw/sasi/sasi_report_options.php

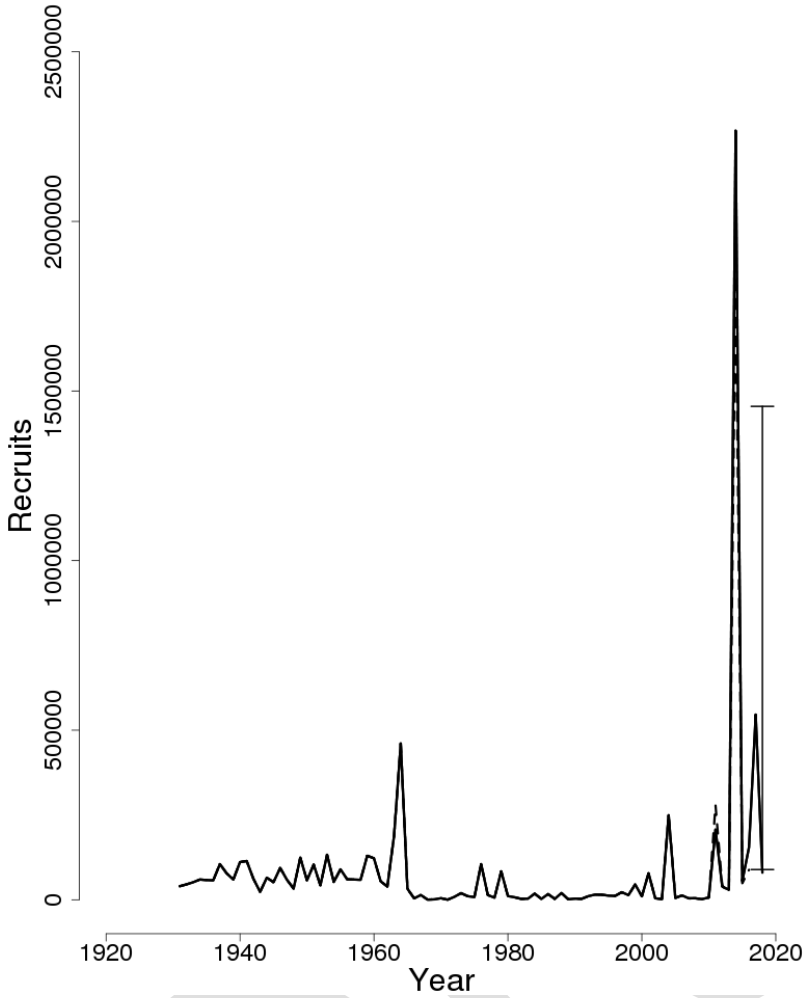


Figure 11- Trends in Recruits (age 1) (000s) of Georges Bank haddock between 1931 and 2018 from the current assessment. The 90% bootstrap probability intervals are shown for the 2018-year class. Figure 21 from the stock assessment.

Information provided by the Herring PDT

Herring Fishery Catches- This section summarizes herring catch by area, including % utilized for the last five years. The herring fishing year starts on January 1, and is monitored based on a calendar year, compared to the sub-ACL of GB haddock, which is allocated and monitored based on the Groundfish fishing year (May 1 – April 30). Table 37 includes herring sub-ACL allocations, catch, and % utilized by herring management area for FY2015-2019 to date. FY2019 data is through September 27, 2019. Overall, the herring fishery is variable from year to year in terms of utilization of area specific sub-ACLs. However, Area 1A quota is almost always fully utilized, and area 1B has been exceeded in several years in part because it is a relatively small quota that is typically fished very quickly, thus challenging to monitor and close real time. In more recent years, the utilization of Area 2 and Area 3 available quota has declined for a variety of reasons. Overall, the total ACL for this fishery has declined dramatically since 2017. Table 38 show a more historical trend of herring catch by management area in terms of percent utilized.

Table 37 – Herring sub-ACL, catches, and % utilized by herring management area (FY2015-2019 to date).

Year	Area	sub-ACL (mt)	Catch (mt)	% Utilized
2015	1A	30,580	29,406	96%
2015	1B	4,922	2,889	59%
2015	2	32,100	15,214	47%
2015	3	44,910	33,256	74%
2016	1A	30,524	27,806	91%
2016	1B	2,844	3,624	127%
2016	2	31,227	14,594	47%
2016	3	42,765	18,777	44%
2017	1A	32,115	28,682	89%
2017	1B	4,825	2,639	55%
2017	2	31,227	3,617	12%
2017	3	43,873	14,134	32%
2018*	1A	27,743	24,815	89%
2018*	1B	2,639	2,156	82%
2018*	2	8,200	7,056	86%
2018*	3	11,318	9,762	86%
2019*	1A	4,184	3,512	84%
2019*	1B	628	0	0%
2019*	2	4,062	4,722	116%
2019*	3	5,700	1,205	21%

Source: NMFS.

* Preliminary data –pulled September 27, 2019

Note: Shaded rows indicate overages.

Table 38 – Percent utilization of herring sub-ACL by herring management area (2004-2018).

Shaded cells indicate overages of management area sub-ACLs

	1A	1B	2	3
2004	100%	90%	26%	18%
2005	102%	79%	47%	26%
2006	100%	130%	71%	9%
2007	100%	73%	58%	20%
2008	97%	89%	70%	19%
2009	101%	19%	93%	50%
2010	107%	138%	94%	46%
2011	105%	81%	68%	97%
2012	88%	158%	102%	103%
2013	100%	53%	92%	90%
2014	100%	153%	68%	92%
2015	96%	59%	47%	74%
2016	91%	127%	47%	44%
2017	89%	88%	12%	32%
2018*	89%	82%	86%	86%

**Preliminary*

Seasonal and spatial distribution of herring fishing effort

In addition, this memo includes information about the seasonal and spatial distribution of herring fishing. Figure 12 shows herring catch by month and area for the last five years, 2014-2018. Overall, the seasonal trends within each herring management area are fairly consistent between years; Area 1A catch is typically concentrated between June – October and Area 1B is not as consistent, with some fishing typically in late spring and again in the fall as the fish move through that area. Area 2 fishing typically takes place in the winter (December – February), and Area 3 tends to increase in late spring through the fall. The herring fishery varies spatially from year to year, Figure 13 shows the overall fishery footprint for 2011-2015 combined, and Figure 14 has more recent years, 2016 on the left and 2017 on the right. In terms of potential overlap with GB haddock, the herring fishery primarily focuses along the northern flank of Georges Bank and southeast of Cape Cod in statistical area 521 (thirty-minute square 114).

Figure 12 – Herring catch by month and area by herring management area (2014-2018).

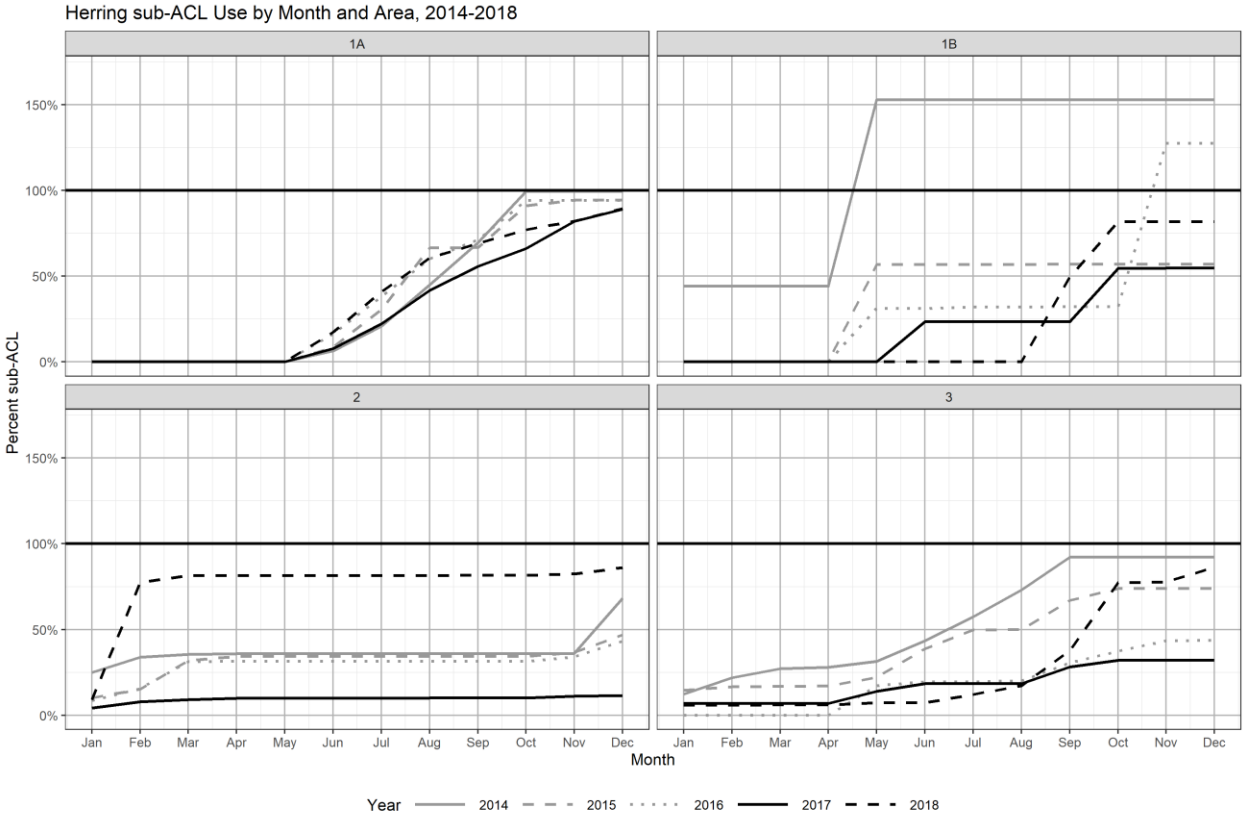


Figure 13 - Fishing footprint for Atlantic herring fishery using model-based estimate of fishing location from VTR, observer and dealer data combined (2011-2015). (DePiper et al, 2014 dataset).

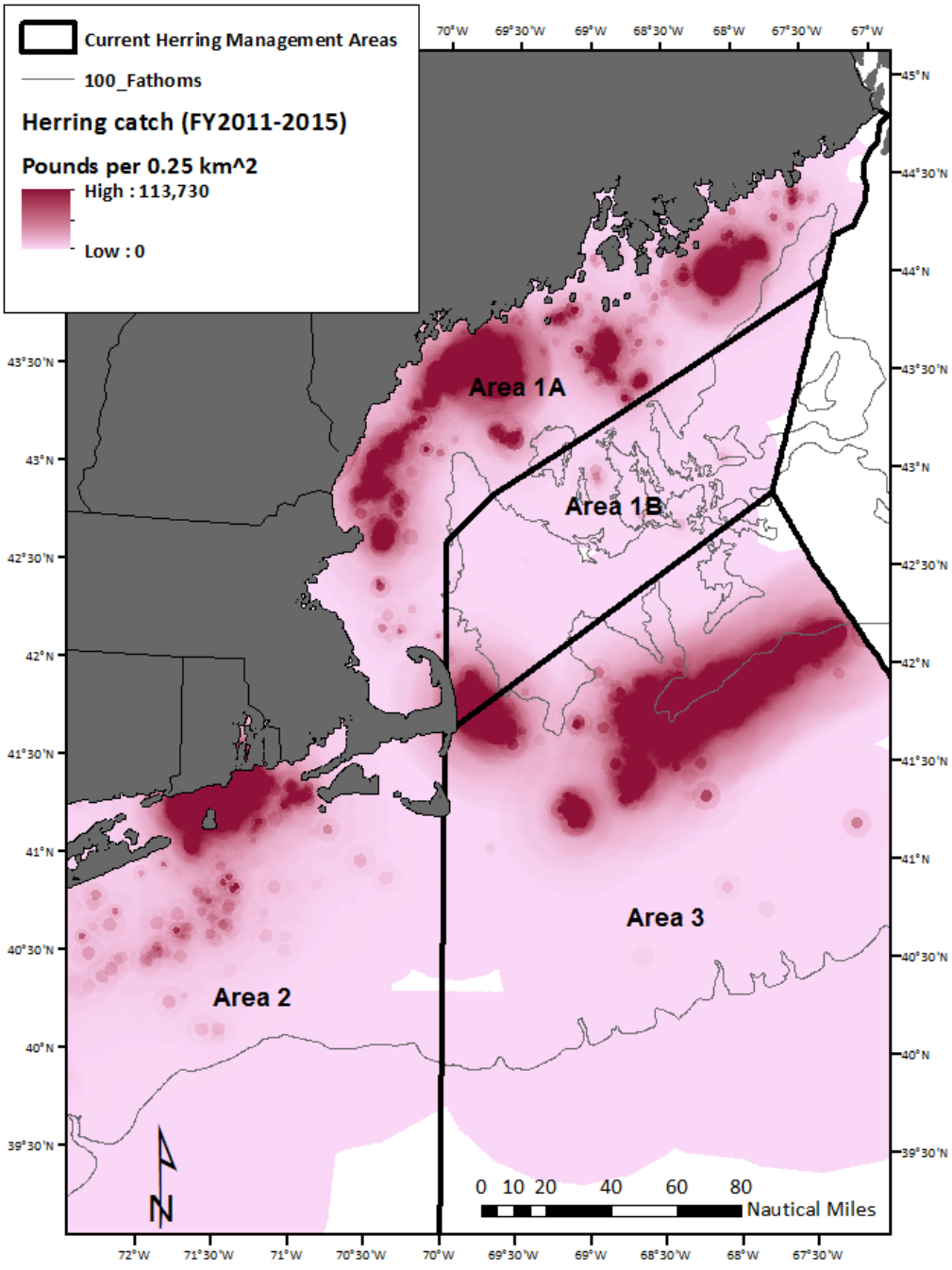
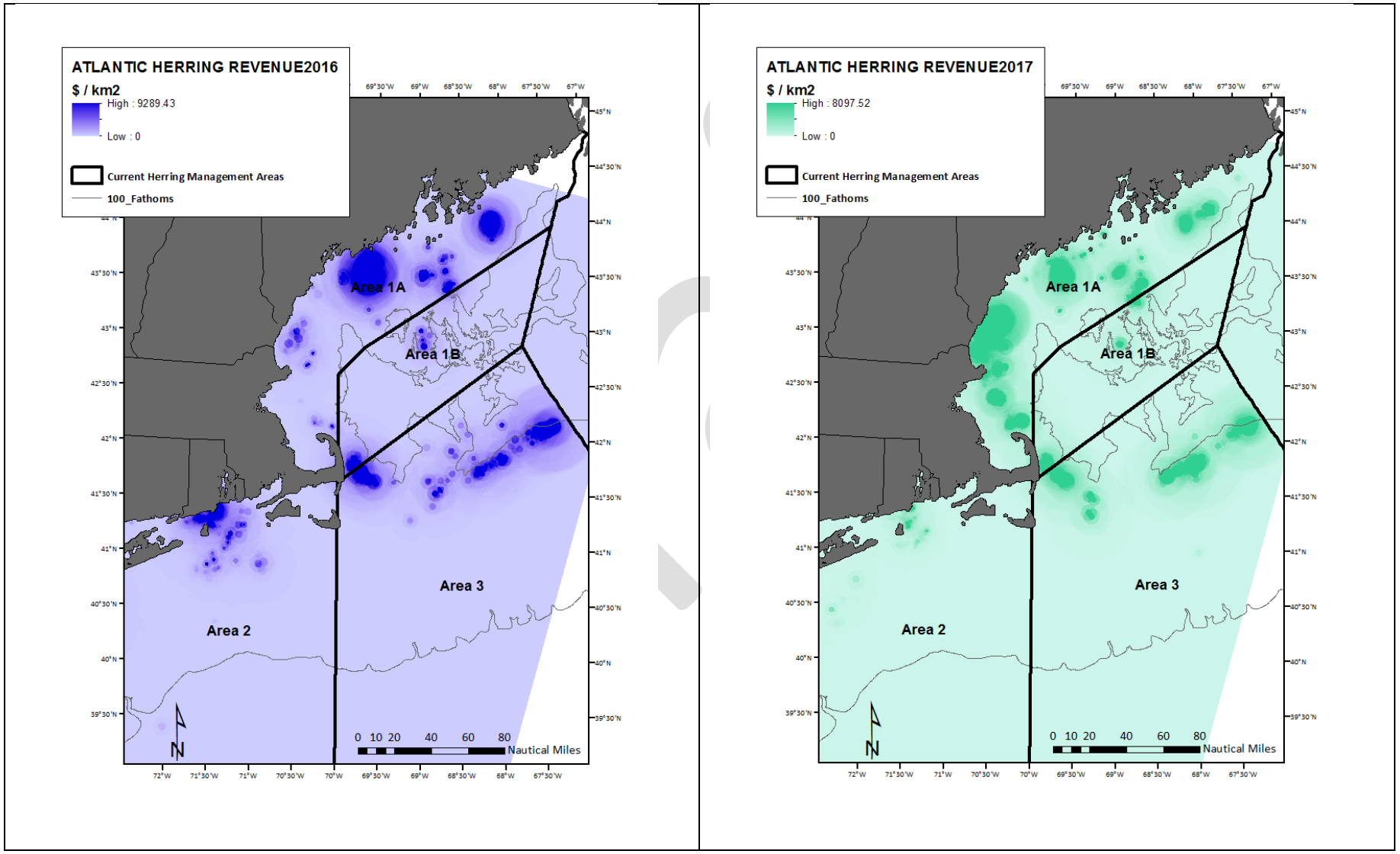


Figure 14 - Fishing footprint for Atlantic herring fishery using model-based estimate of fishing location from VTR, observer and dealer data combined (2016 on the left and 2017 on the right). (DePiper et al, 2014 dataset).



Update of GB Haddock catches in the MWT Herring Fishery- Table 39 and Table 40 below were included in Groundfish FW56, but have been updated with 2017 and 2018 year-end catch results. The estimate of haddock catch in the herring midwater trawl fishery has been relatively low in 2017 and 2018 compared to years before that, under 50mt both years. Overall, the herring sub-ACL for Georges Bank has declined in recent years with herring catches from Area 3 decreasing from over 30,000 mt in 2015 to under 20,000 mt in 2016, under 15,000 mt in 2017 and under 10,000 mt in 2018. Therefore, it is not surprising that GB haddock catches in this fishery have also declined. The haddock bycatch rate is a bit lower in recent years, but observer coverage was quite low, and CVs relatively high for both 2017 and 2018.

Table 39 – Summary of recent catches (mt) of Georges Bank haddock by the midwater trawl Atlantic herring fishery, groundfish FY 2010- FY 2018. Source: Groundfish FY2010 – FY2018 final year-end catch reports.

	Midwater Trawl- Georges Bank Haddock						
Groundfish FY	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**	**CV on Catch**	**Observer Coverage % Trips**
2010	84	69.2	0	69.2	82.3%		
2011	318	101.8	0	101.8	32.0%	17.6%	41.7%
2012	286	271.9	16.7	288.6	100.9%	12.3%	62.9%
2013	273	272.7	17.2	290	106.2%	21.3%	35.6%
2014	162	113.5	0	113.5	70.1%	20.5%	27.2%
2015	227	235.0	0.6	235.5	103.9%	61.4%	4.9%
2016	512	115.3	3.6	118.9	23.2%	42.9%	20.1%
2017	801	47.9	0	47.9	6.0%	63.7%	14.0%
2018	680	43.9	0	43.9	6.5%	91.0%	5.6%

Table 40 - GB haddock catch cap summary, FY 2011-FY2018. Years highlighted indicate when the catch cap was exceeded.

Fishing Year	Fleet Trips	Observed trips	Obs. Coverage	Haddock Rate	CV (%)	KALL (mt)	Est. Haddock (mt)[1]	Catch Cap (mt)	Pct. Cap
2011	230	96	41.70%	0.002443	17.60%	41,323	101	318	31.70%
2012	237	149	62.90%	0.006675	12.30%	46,555	310.8	286	108.70%
2013	250	89	35.60%	0.00598	21.30%	48,857	292.2	273	107.00%
2014	202	55	27.20%	0.003063	20.50%	36,592	112.1	162	69.20%
2015	164	8	4.90%	0.008489	61.40%	28,018	237.8	227	104.80%
2016	179	36	20.1%	0.004731	42.9%	26,185	123.9	512	24.2%
2017	100	14	14.00%	0.003232	63.72%	15,318	49.5	801	6.2%
2018	89	5	5.62%	0.003632	90.96%	12,163	44.2	680	6.5%

Source: DMIS and OBDBS

[1]Haddock estimate does NOT use replacement methodology and may not match GARFO quota monitoring reports

Groundfish PDT Recommendation -Based on the review, the Groundfish PDT recommends that the Committee/Council could allocate up to 2% of the U.S. ABC to the mid-water trawl directed Atlantic herring fishery. No biological information supports the need for lower sub-ACL in terms of potential impacts on the GB haddock stock.

Option D1: No Action

Impacts on regulated groundfish

The sub-ACL is designed to limit the incidental catch of GB haddock by midwater trawl Atlantic herring fisheries, and exceeding the allocations results in triggering AMs in-season. No Action would continue to provide positive benefits for GB haddock.

Therefore, biological impacts on regulated groundfish species are likely to be similar under Option D1/No Action to Option D2 and continue to provide low positive benefits for the GB haddock stock.

Impacts on other species

Option D1/No Action GB haddock specifications for the midwater trawl Atlantic herring fishery would be lower than when compared to the specifications under Option D2. By reducing the catch limit at which in-season AMs are triggered, Option D1/No Action may reduce fishing mortality of Atlantic herring which would have positive biological benefits for the Atlantic herring stock. The sub-ACLs may affect fishing mortality and stock size of Atlantic herring and Atlantic mackerel by restricting herring fishing in areas before quotas are reached. Increases to the GB haddock sub-ACL would reduce such an impact.

Option D2: Increase the MWT Atlantic herring fishery sub-ACL for GB haddock to 2 percent

Impacts on regulated groundfish

Based on the PDT review, the sub-ACL could be increased to 2% for several reasons. The 2019 assessment concluded that GB haddock is not overfished and overfishing is not occurring. Current estimates of GB haddock SSB are the highest in the time series, and there continues to be strong recruitment in this stock. The overall GB haddock stock utilization has been low in recent years. Because the GB haddock stock is so large, and directed catches in the groundfish fishery are well-below the ACL, a small increase in the sub-ACL for the MWT fleet is unlikely to have adverse impacts upon the GB haddock stock, and may allow the MWT fishery greater flexibility to achieve optimum yield.

Therefore, biological impacts on regulated groundfish species are likely to be similar under Option D1/No Action to Option D2 and continue to provide low positive benefits for the GB haddock stock.

Impacts on other species

Sub-ACLs are designed to limit the incidental catch of GB haddock by midwater trawl Atlantic herring fisheries, and exceeding the allocations results in triggering AMs in-season. The sub-ACLs may affect fishing mortality and stock size of Atlantic herring and Atlantic mackerel by restricting herring fishing in areas before quotas are reached. Increases to the GB haddock sub-ACL would reduce such an impact under Option D2 when compared to Option D1/No Action.

6.2.1.2.5 Option E – Atlantic Sea Scallop Fishery sub-ACL for Southern New England/Mid-Atlantic Yellowtail Flounder

Option E1: No Action

Impacts on regulated groundfish

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. Under Option E1/No Action, there would be no changes to the scallop fishery sub-ACL for SNE/MA yellowtail flounder for FY2020, which is 16 mt. Option E1/No Action would continue to provide positive benefits to regulated groundfish species as the sea scallop fishery will be accountable to its own catches. Relative to Option E2, Option E1 would be negative as it would not incorporate the most recent catch estimates – which are much lower than previously allocated.

Impacts on other species

Under Option E1, setting the sea scallop sub-ACL for SNE/MA yellowtail flounder at the value specified in FW 57 is not expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops. SNE/MA yellowtail flounder is a non-target (possession prohibited) bycatch species for the scallop fishery, and so overall effort in the scallop fishery, relative to current operating conditions, is not expected to increase as result of Option E1, which will not contribute to an increase or decrease in mortality of sea scallops

Option E2: Set the Atlantic Sea Scallop Fishery Sub-ACL for SNE/MA yellowtail flounder using 90% of projected scallop fishery catch

Impacts on regulated groundfish species

Table 15 indicates that scallop fishery catches of SNE/MA yellowtail flounder are predicted to be close to the sub-ACL for the fishery in FY 2020. Option E2 would continue to provide positive benefits to

regulated groundfish species as the sea scallop fishery will be accountable to its own catches. Relative to Option E1/No Action, Option E2 would be positive as it would incorporate the most recent catch estimates – which are much lower than previously allocated.

Impacts on other species

Under Option E2, setting the sea scallop sub-ACL for SNE/MA yellowtail flounder is not expected to have direct or indirect impacts, positive or negative, on non-groundfish species such as monkfish, dogfish, skates, and sea scallops. SNE/MA yellowtail flounder is a non-target (possession prohibited) bycatch species for the scallop fishery, and so overall effort in the scallop fishery, relative to current operating conditions, is not expected to increase as result of Option E2, which will not increase or decrease mortality of sea scallops.

6.2.2 Action 2 – Recreational Fishery Measures for Georges Bank Cod

In FY2018 and FY2019, the Regional Administrator has the authority to adjust recreational fishery measures for GB cod in order to stay under the recreational catch target. Figure 15 summarizes cod catch frequencies for FY2018, Figure 16 summarizes cod catch size frequencies, and Figure 17 summaries MRIP intercept data.

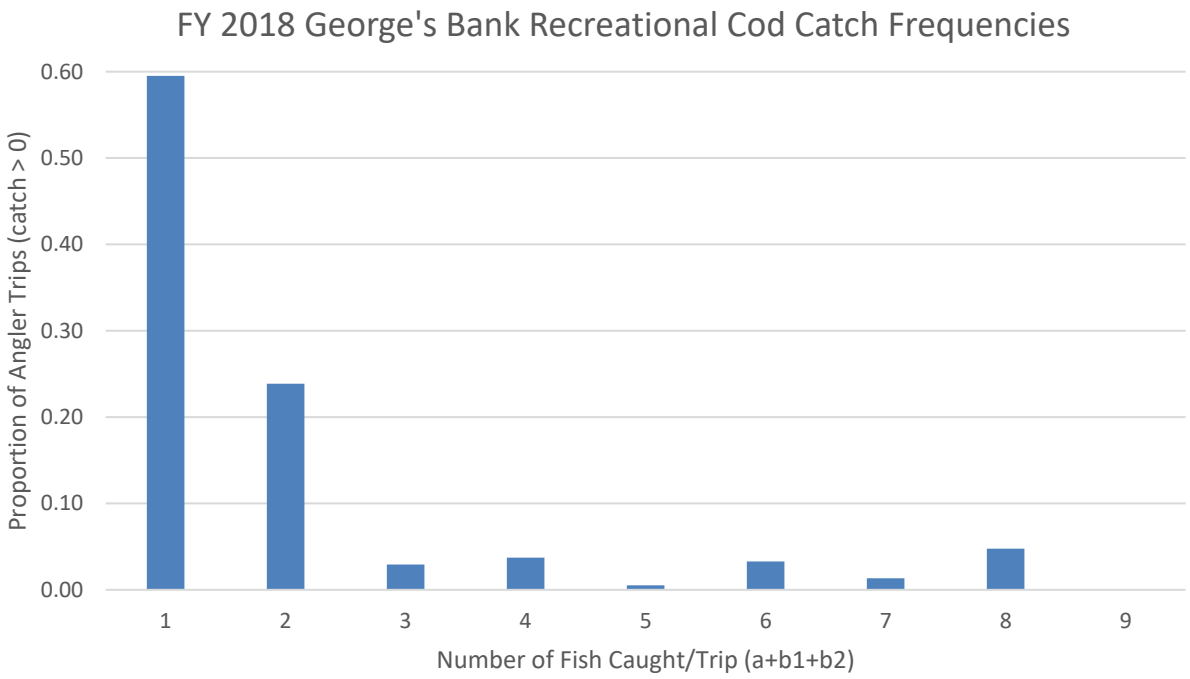


Figure 15. FY 2018 George's Bank Recreational Cod Catch Frequencies. Source: NEFSC and NEFMC. Discussion Document for 2019 Recreational Fishery Management Measures for GOM cod, GOM haddock and GB cod.

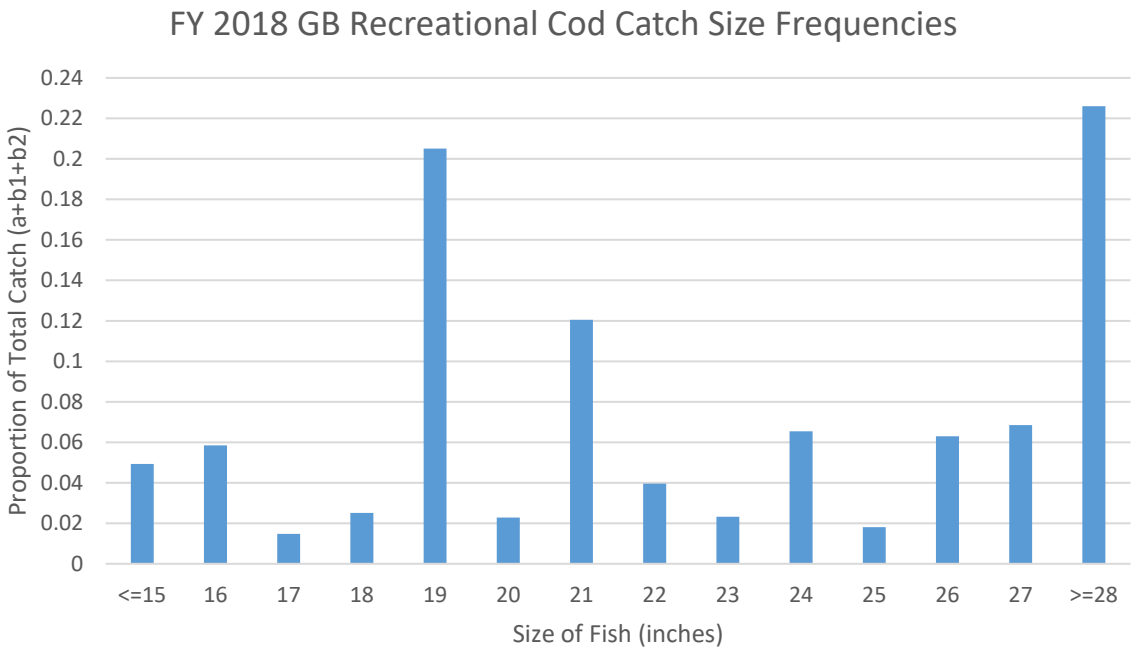


Figure 16. FY 2018 GB Recreational Cod Catch Size Frequencies. Source: NEFSC and NEFMC. Discussion Document for 2019 Recreational Fishery Management Measures for GOM cod, GOM haddock and GB cod.

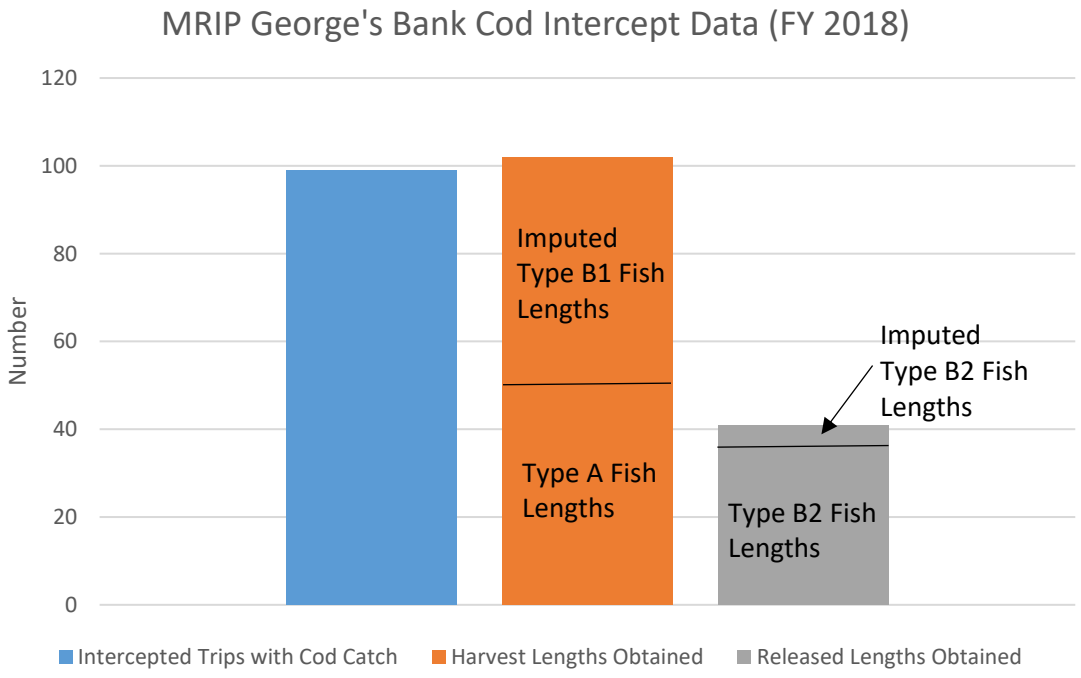


Figure 17. MRIP George's Bank Cod Intercept Data (FY 2018). Source: NEFSC and NEFMC. Discussion Document for 2019 Recreational Fishery Management Measures for GOM cod, GOM haddock and GB cod.

6.2.2.1 Alternative 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 through 2017 (Table 25). Current measures in the recreational fishery are a minimum fish size of 21 inches and a 10-fish bag limit on party, charter, and private modes. Changes to the recreational management measures require a Council action. Alternative 1/No Action would not create any additional measures to constrain the recreational harvest of GB cod, and under Alternative 1/No Action there is an increased likelihood that recreational catches could exceed the recreational catch target of 138 mt in place for FY2020 as new MRIP data would be used to evaluate the recreational catches. Therefore, relative to Alternative 2, Alternative/Option 1 would likely have a negative biological impact for GB cod.

Impacts on other species

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

6.2.2.2 Alternative 2 – Temporary Administrative Measure to Allow the Regional Administrator Authority to Adjust the Recreational Measures for Georges Bank Cod

Impacts on regulated groundfish

The catch target was apportioned into the state waters and other sub-components for FY2018-FY2020 in FW57 and used the pre-calibrated MRIP data, and the same resulting values were used for FY2020-FY2022.

> *State Waters* -The three-year (FY2014-FY2016) average non-recreational catch plus 10% of the recreational catch target of 138 mt is 23.7 mt. Management measures for the recreational fishery are expected to change through implementation of FW59 in time for FY2020. 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 138 mt is 150.6 mt. Management measures for the recreational fishery are expected to change through implementation of FW59 in time for FY2020. This evaluation assumes that federal recreational anglers will comply with the changes in measures.

Alternative 2 would allow for recreational management measures to be adjusted in FY2020 and FY2021 by the Regional Administrator to stay below a catch target of 138 mt. Alternative 2 would likely lead to positive impacts relative to Alternative 1/No Action for the regulated groundfish species, mainly GB cod. Measures to date under consideration include maintaining the minimum fish size of 21 inches and 10-fish bag limit for all anglers - party, charter, and private modes. Further changes to recreational regulations (bag limits, closed seasons, minimum sizes) could be considered to constrain catches below the catch target. The catch target is based on a five-year (CY2012-CY2016) average catch (landings and discards) from the 2017 operational assessment for GB cod for the recreational fishery (Table 26). The catch target value is 138 mt. It should be noted that the catch data used to derive the catch target did not account for the MRIP calibration.

Impacts on other species

Alternative 2 would not be expected to have any direct biological impacts on other species.