

Updated EFH Analysis

Major changes from February 2014 Council meeting

1. Council included three new areas on Northern edge for analysis
2. Reduced the length of time for spawning closure alternative in GF closed areas – 15 days shorter (end date changed from April 30 to April 15)
3. Alternative added to exempt scallop fishing from all spawning alternatives on GB
4. No preferred alternatives for the Channel or GB area

Specific updates to analyses

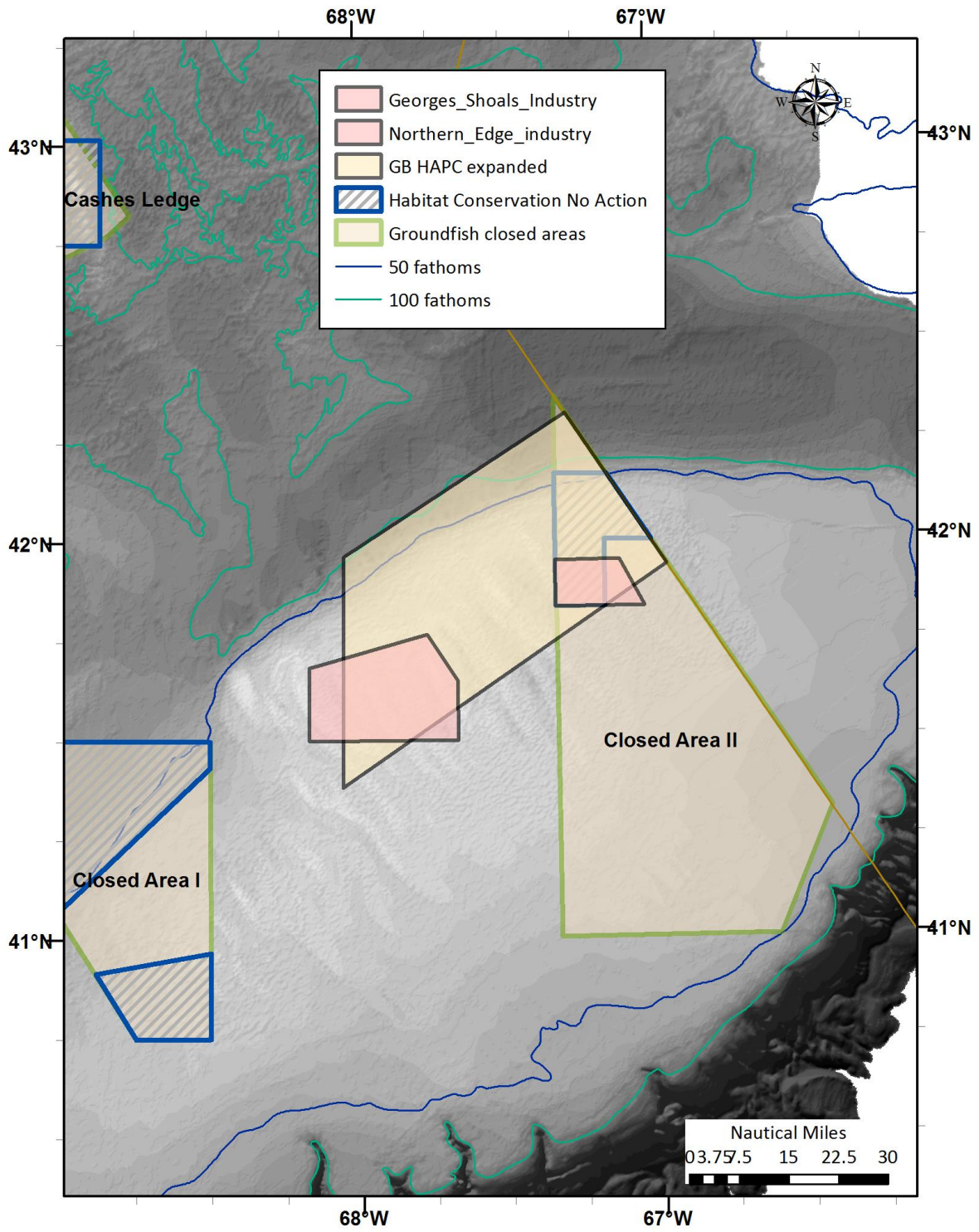
1. ST/LT yield estimates prepared for new GB areas (Dvora – need to clarify mean/median issue – 25,000 mt)
2. Modified figures and analyses for shorter spawning closure season
3. Add text about new alternative to exempt scallop fishery from all spawning measures
4. Change format of section to be more similar to other EFH analysis sections
5. Change SAMS section – only include 3 alternatives to give a sense of how range of EFH measures would fit in with scallop allocations (No Action, No EFH closures, and one run with new EFH areas)
6. Analyze 2013 VTR data in GOM (Dvora – Is SARC looking at VMS? Time to incorporate?)
7. Update GOM section overall with historic papers, GOM surveys, and SMAST 2012 paper
8. Include other literature about EFH closures and potential impacts on scallop resource etc.

PDT Today

Review handful of things that have been updated

Discuss outstanding issues and review final version by email. Staff planning to submit DEIS by end of April.

Figure 1 – New areas added to EFH Omnibus Amendment



1.1.1 Atlantic sea scallop

These sections describe potential impacts of the alternatives on the scallop resource and fishery.

1.1.1.1 *Habitat management alternatives*

1.1.1.1.1 Eastern, Central, and Western Gulf of Maine sub-regions

The potential impacts of the Habitat Management Area alternatives in the three Gulf of Maine sub-regions were evaluated using survey and fishery distribution information. Fewer data on scallop distribution are available in these sub-regions as the bulk of the scallop resource is concentrated further south. The federal scallop survey and assessment model do not include the Gulf of Maine, and there is relatively limited resource there relative to Georges Bank and areas further south. The state of Maine has conducted scallop dredge surveys which indicate relatively low scallop biomass levels. A 2009 video survey (Stokesbury et al. 2010) examined offshore bank and ledge features and found scallops on Jeffreys, Fippennies, and Cashes Ledge, as well as on Platts Bank, but not on Jeffreys Bank. Overall, scallop abundance in the GOM is temporally and spatially sporadic.

In general, the GOM habitat management alternatives are expected to have neutral impacts on the scallop resource relative to No Action. In the Central GOM sub-region, action alternatives could remove area closures on Fippennies Ledge (CGOM Alt. 2 and 4), and Cashes Ledge (CGOM Alt 2). Both areas contain sea scallops (Stokesbury et al 2010) that could be subject to fishing pressure if the areas reopen. Impacts to the resource as a whole would not be expected, but there could be local effects on these populations of scallops. Similarly, in the Western GOM sub-region, Alternatives 2, 3, and 6 could remove area closures on Jeffreys Ledge, an area which also contains sea scallops (Stokesbury et al 2010). Again, local population effects could result but impacts to the resource as a whole would not be anticipated since there is a possession limit of 200 pounds for all LAGC vessels as well as an overall hard TAC of 70,000 pounds for the entire NGOM. The NGOM TAC should effectively limit catches in the region, as larger limited access vessels would only fish in the GOM if catch rates were much higher than present levels. This is because DAS are very limited and catch rates are much higher in other areas.

In general, the GOM habitat management alternatives are expected to have slightly negative to slightly positive impacts on the LAGC scallop fishery relative to No Action, depending on the alternatives selected. Opening areas that have been closed since 1998 or 2000 will likely have beneficial impacts on the scallop fishery, at least in the short term. Specifically, CGOM Alternative 2 would open Cashes and Fippennies Ledge, CGOM Alternative 4 would open Fippennies Ledge, and WGOM Alternatives 2, 3, and 6 would reopen Jeffreys Ledge. There are some exploitable scallops within portions of these areas, and some level of effort would be expected. Conversely, Central GOM Alternative 3 would close an area that is currently open to scallop fishing (Platts Bank). This may have some negative impacts on the fishery, but the fishing level in that area is not substantial and potential impacts could be neutralized if other areas reopen to the scallop fishery. As noted above, LA scallop effort levels are very low in the GOM, so impacts on that segment of the scallop fishery are expected to be neutral.

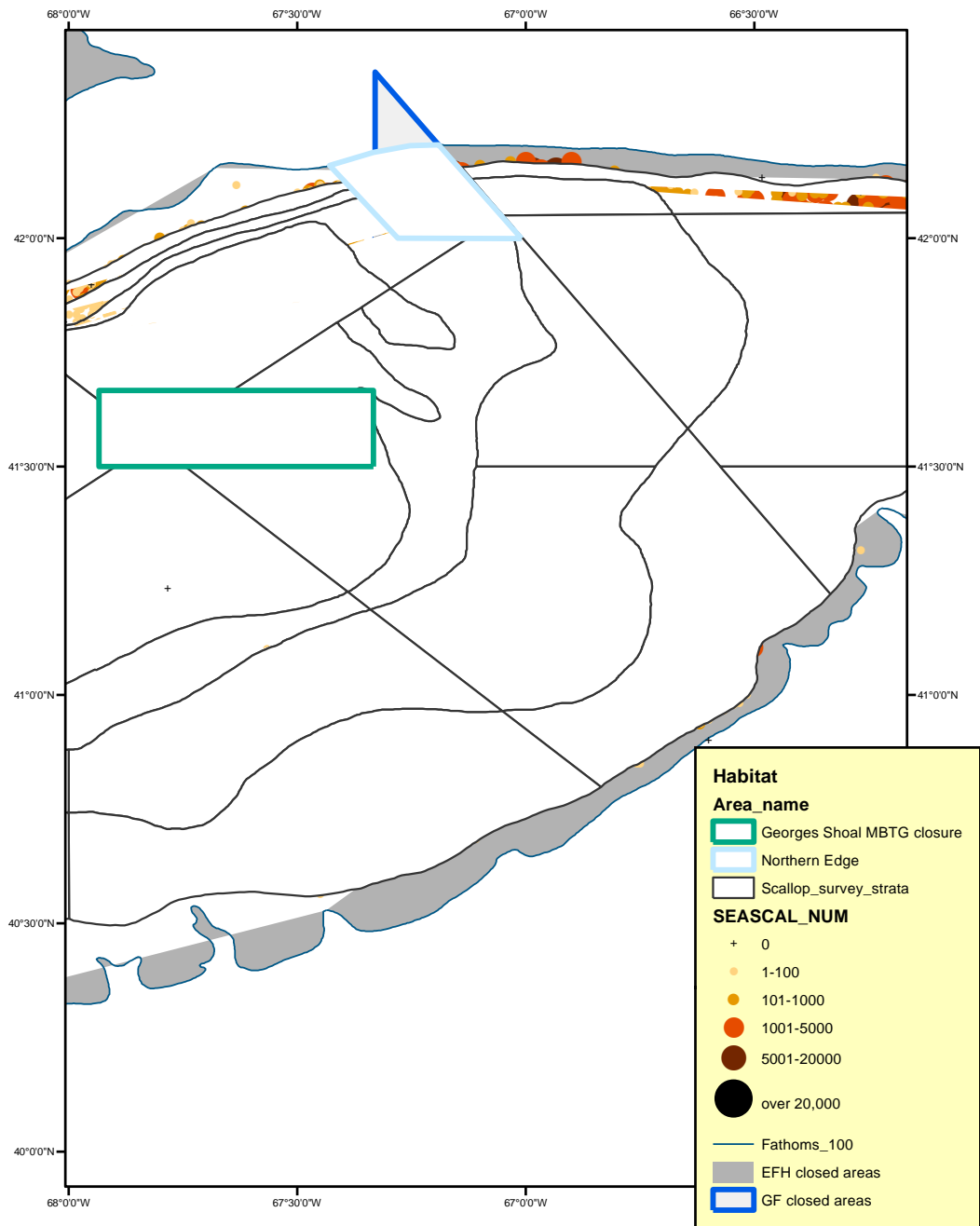
1.1.1.1.2 Georges Bank and Great South Channel/Southern New England sub-regions

The potential impacts of Habitat Management Area alternatives in the Georges Bank and Great South Channel/Southern New England sub-regions on the scallop resource and fishery were assessed using the results of the long term and short term potential yield analysis, as well as the results from the SAMS model projections.

1.1.1.1.2.1 Long and short term yield estimates

The long term yield per Habitat Management Area was calculated by multiplying the recruitment in each area by the maximum yield per recruit. A stratified mean was calculated since yield per recruit varies in each strata because of depth. First, the area (in nm²) of each habitat alternative was calculated, as well as the area within each NEFSC shellfish survey strata. This was done so that a stratified mean could be calculated for each Habitat Management Area since yield varies by depth and because all shellfish strata are not sampled equally over time. Map 1 shows the NEFSC shellfish survey strata in and around habitat management alternatives on the Northern Edge of GB, and Map 2 shows the Great South Channel. Orange circles indicate the total number of scallops per tow from all survey years combined (1966-2013).

Map 1 – NEFSC shellfish survey strata with EFH areas under consideration (Georges Bank) with scallop numbers from all scallop dredge survey years (1966-2013)



Map 2 – NEFSC shellfish survey strata with EFH areas under consideration (GSC/SNE) with scallop numbers from all scallop dredge survey years (1966-2013)

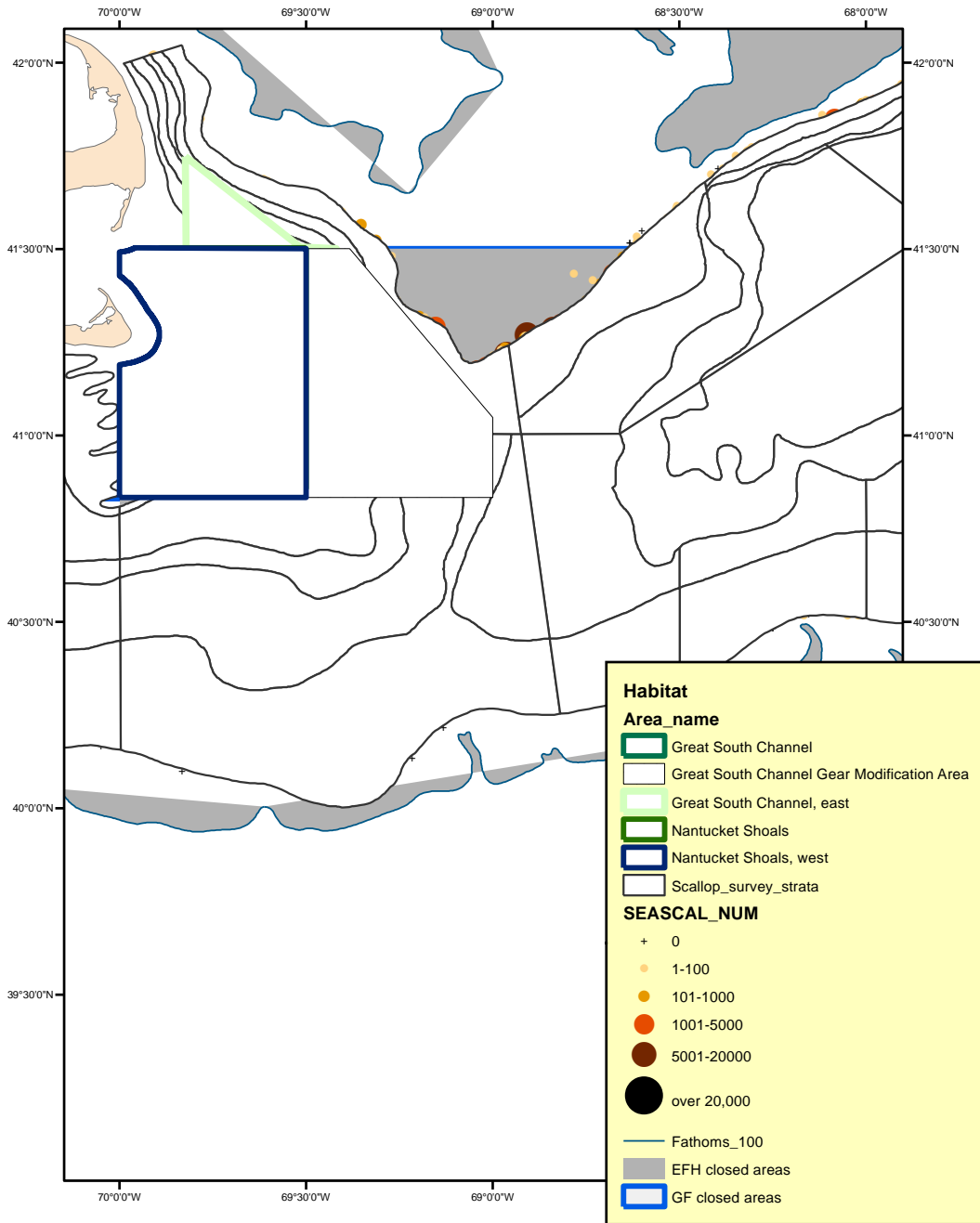


Table 1 summarizes the long-term (LT) and short-term (ST) yield potential per area. The long-term yield values vary since the recruitment data is very variable, and one or two years with very high recruitment heavily influence the mean. The mean estimate is always higher and can be viewed as an upper bound, while the median is a more conservative estimate. For reference, the median estimated LT yield from the entire scallop resource in all open and closed areas on GB and the MA is about 25,000 mt per year.

Table 1 – Long-term and short-term yield potential from current EFH closed areas and several new areas under consideration

Sub-region	Area	Status	Long-term yield (mean)	Long-term yield (median)	Biomass 2013	Short-term yield
GB	CAII North (all area north of scallop access area within CA2 closure)	Current	1,254	536	8,630	2,589
GB	CAI-N Habitat Closure (Alt 1)	Current	601	42	4,841	1,452
GB	CAI-S Habitat Closure (Alt 1)	Current	29	11	1,658	497
GB	Northern Edge HMA (Alts 3 and 4)	Proposed	1,214	502	7,433	2,230
GB	EFH Extended 1 (Alt 6A)	Proposed	1,858	800	11,519	3,456
GB	EFH Extended 2 (Alt 6B)	Proposed	825	324	4,493	1,348
GB	Georges Shoal 2 MBTG HMA (Alt 7)	Proposed	2	8	1	3
GB	EFH South MBTG HMA (Alt 7)	Proposed	23	111	139	440
GB	Northern Georges MBTG HMA (Alt 8)	Proposed	2403	12090	2319	8698
GSC-SNE	Nantucket Lightship Habitat Closure (Alt 1)	Current	552	3	93	28
GSC-SNE	Great South Channel East HMA (Alt 3)	Proposed	4,034	1,101	4,460	1,338
GSC-SNE	Great South Channel HMA (Alt 4)	Proposed	313	64	100	30

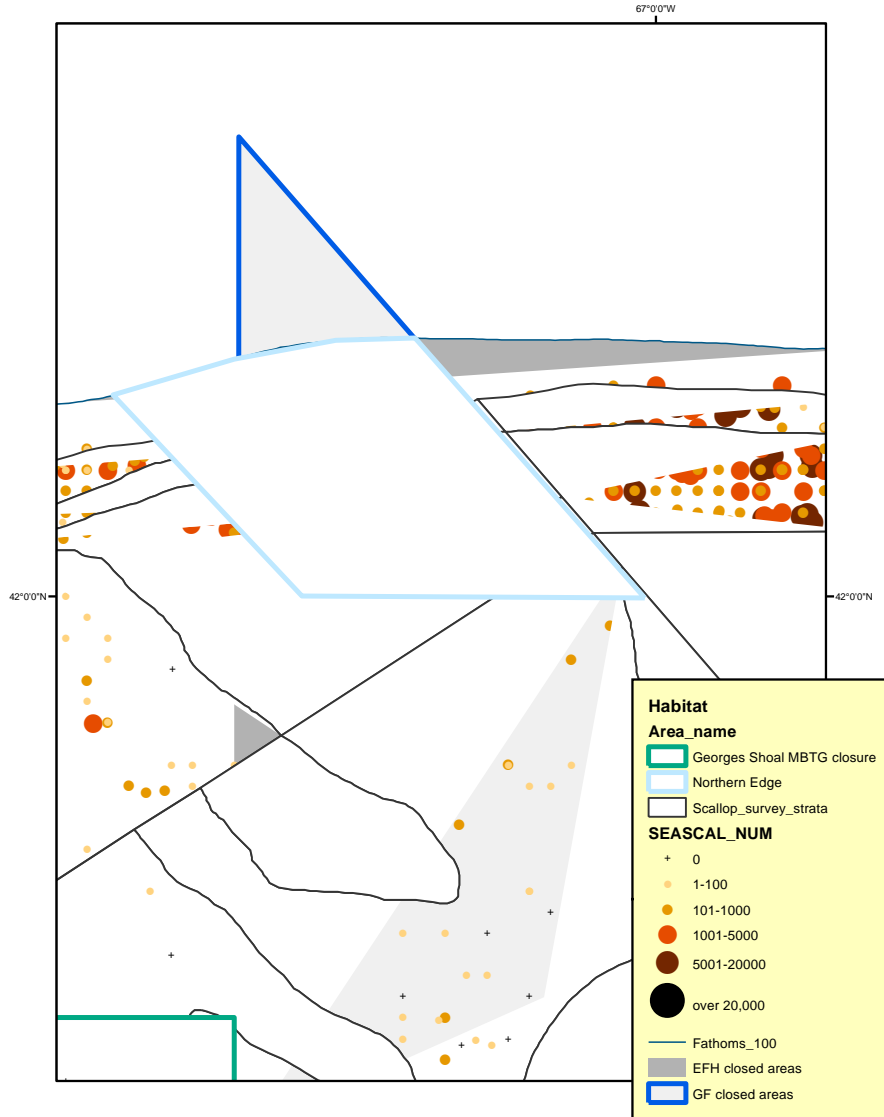
In the Georges Bank sub-region, the extended version of CAII (Alternative 6A) has the highest LT yield potential, followed by CAII North (1,254 mt), the Northern Edge HMA (1,214 mt), and CAII extended with the area along the EEZ removed (Alt 6B, 825 mt). The CAII EFH closure and all of the areas overlapping it have high short term yield estimates as well. In general, 2,500 mt is equivalent to about one 18,000 pound trip per vessel, or about 6 million pounds overall. Therefore, an area like the northern edge has an estimated LT yield mean of about 1,200 mt, so on average if that was open to the fishery it would provide about one trip for half the fishery every year, or one trip for the entire fishery every other year. CAIN has only 601 mt LT yield potential, and CAIS does not have much yield potential at all. When the three existing EFH closures on GB are combined, the LT yield potential is about 1,884 mt. Therefore, about 7% of

the total potential LT yield for the entire scallop resource is within the current EFH closed areas, using the mean LT yield estimates.

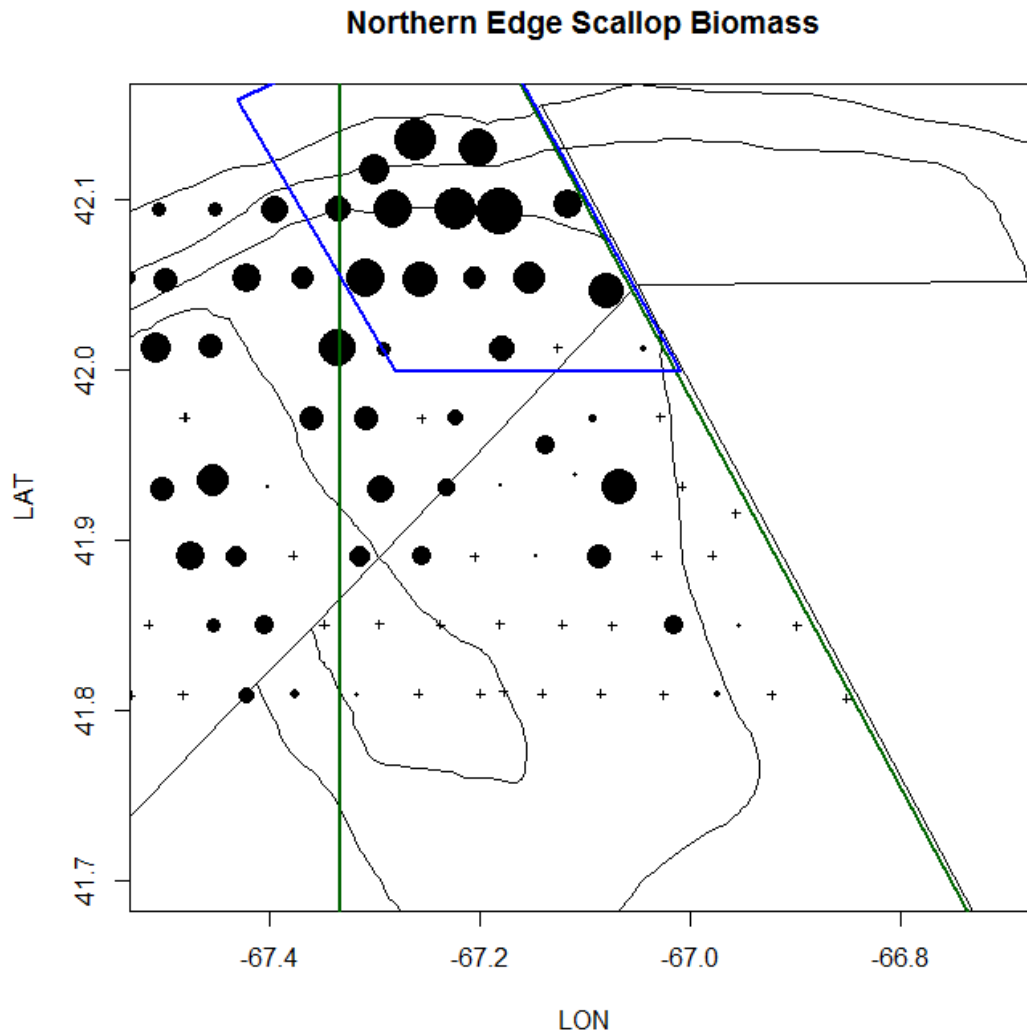
The Northern Edge HMA area under consideration has similar long term yield potential (1,214 mt) as the No Action CAII north area (all of CAII north, 1,254 mt). The majority of the yield potential in the new area comes from a very small “triangle” in shallower waters along the western boundary of CAII within the new Northern Edge HMA (indicated by green arrow in Map 3), and not the deeper waters along the northern part of the new area. The western part of the new Northern Edge HMA which is currently open to the scallop fishery likely has higher LT yield potential than the southern part of the No Action EFH area that would potentially open if the No Action EFH area is eliminated. Specifically, in terms of LT yield potential, the additional area closed in the Northern Edge HMA is more productive than the area that would open in the southern part of the existing EFH closure on the northern edge. Therefore, the potential impacts of the Northern Edge HMA (Alternatives 3 and 4) on the scallop fishery would likely be slightly negative but similar to No Action/Alternative 1. The long term yield potential of the extended version of CAII (Alternative 6A) is about 50% greater than the existing area or the Northern Edge HMA. Opening a buffer zone along the EEZ (Alternative 6B) lowers the long term yield potential. Thus Alternative 6A is expected to have negative impacts on the fishery relative to No Action due to reduced access to high abundance scallop areas, and Alternative 6B is expected to have positive impacts relative to No Action.

Add Alts 7 and 8 text and text about other alternatives that are only slightly different than ones with quantitative info.

Map 3 – Scallop (number/tow) from NEFSC scallop dredge surveys (all years) with EFH areas on the northern edge of Georges Bank. There is substantial long term yield potential in the area outlined in blue and west of the grey shaded area. This triangle would close under the new Northern Edge HMA (Alternative 3 or 4) or under Alternative 6A or 6B.



Map 4 – Estimate of 2013 scallop biomass relative to Northern Edge HMA (Alternatives 3 and 4) using 2013 VIMS dredge survey data (Dave can we add other polygons to this map)



The three areas in the Channel, NL EFH (Alt 1), GSC East (Alt 3), and GSC(Alt 4), have very different results in terms of LT and ST yield potential. The No Action NL EFH area has relatively low LT yield potential, 552 mt based on the mean and 3 mt based on the median estimate (Table 1). This large difference suggests that the yield potential from this area is dominated by a few years with high levels of observed recruitment, and most years with relatively low levels of recruitment. The GSC alternative has even less, 313 mt based on the mean and 64 based on the median.

In contrast, the GSC East HMA is a very productive scallop yield area. The LT and ST yield potential from this area is very high. Even though the boundary only extends slightly farther east than the GSC area, it includes scallop survey strata 50 which is very productive. The estimated potential yield from this area is over 4,000 mt based on the mean. That is 16% of the 25,000 mt total potential yield for the entire scallop fishery. The percentage of total yield is lower, under

5%, using the median LT yield estimate instead (1,101 mt), but both are substantial. Furthermore, this area is roughly 2-3+ times as productive as the Northern Edge HMA, depending on whether the LT median or LT mean is compared. The other Channel areas (Nantucket Shoals and Nantucket Shoals east) have not been evaluated for LT and ST impacts the same way. However, since they are shallower than the GSC alternative, the impacts on the scallop resource and fishery are expected to be lower than the GSC HMA alternative.

In summary, for both the GB and GSC-SNE sub-regions combined, about 10% of the total LT yield for the scallop fishery is estimated to be within the No Action EFH closed areas, (2,500 mt/25,000 mt). If all No Action EFH areas are eliminated in this action the overall yield available to the scallop fishery could increase by about that amount. If the No Action CAII EFH area is replaced with the Northern Edge HMA in this action, similar impacts overall would be expected since the estimates of LT yield for the areas are very similar. About 5% of the total estimated LT yield is within both areas (1,200 mt/25,000 mt), based on median estimates of LT yield.

All of the HMAs under consideration in the GSC are currently open to the scallop fishery. If the GSC HMA is closed, about 1% of the total LT yield would no longer be available to the fishery (313 mt / 25,000 mt). On the other extreme, GSC East HMA contains about 16% of the total LY yield for the fishery. Overall, closing areas with relatively low scallop biomass could have neutral to potentially positive impacts on the scallop resource and fishery by helping to prevent overfishing if some level of scallop biomass is protected from fishing pressure. However, if a substantial amount of total scallop biomass is closed, potentially negative impacts on the fishery are expected since total landings would be reduced, and fishing pressure may be higher in other areas with lower scallop catch rates.

1.1.1.1.2.2 Model projected biomass and catch

The projected impacts on scallop biomass and catch are based on results from an updated version of the SAMS (Scallop Area Management Simulator) model. This model has been used to project scallop biomass and catch to aid management decisions since 1999. SAMS is a size-structured model that forecasts scallop populations in a number of areas. In this version of the model, the PDT modified the boundaries of the typical areas (Map 5) to include a handful of the alternatives under consideration. This allows the model to estimate the long term biomass inside and outside of various Habitat Management Areas. Modifying boundaries in the SAMS model is difficult and time consuming, so the PDT identified a feasible number of areas to assess, and did not run a separate SAMS projection for all groupings of Habitat Management Areas under consideration. These results were not updated to include GB Alternative 6A/B.

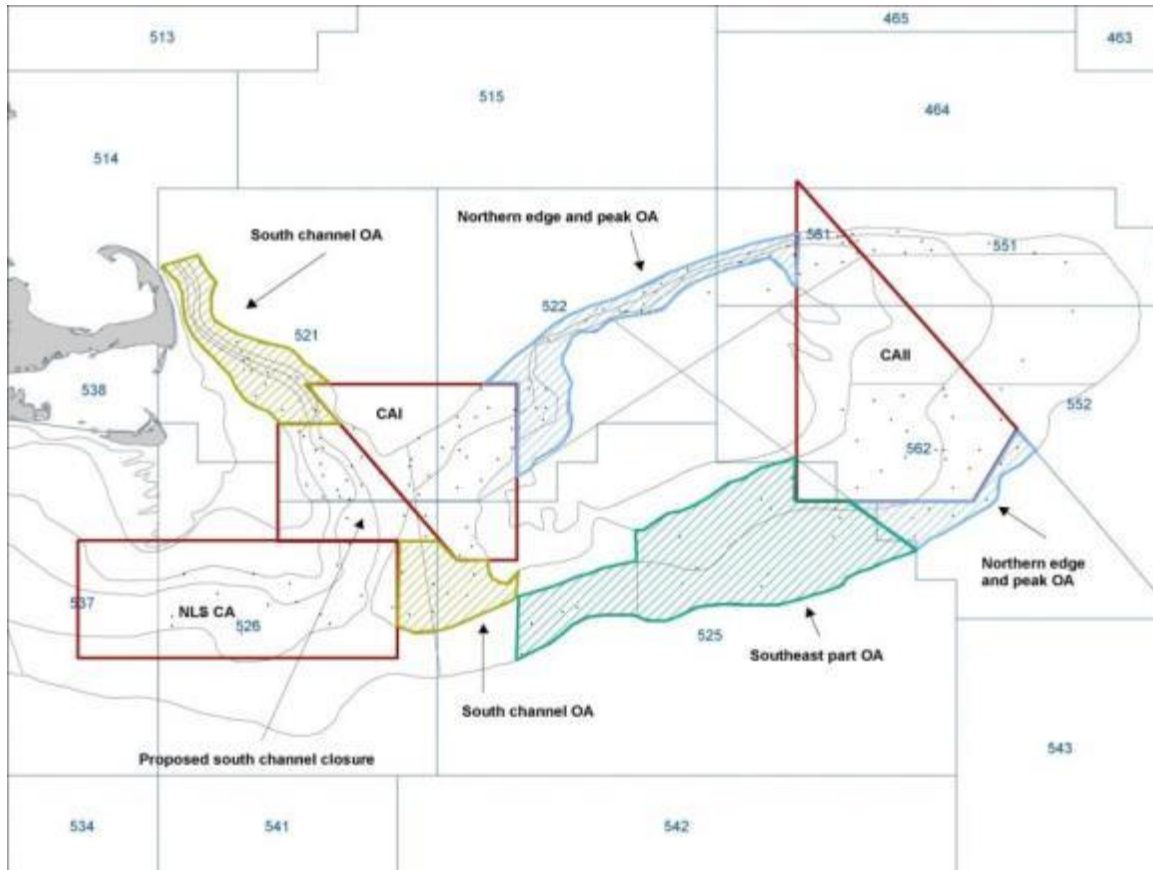
The final runs include:

1. No Action: EFH areas closed by Amendment 13 remain closed to the scallop fishery. Note that under No Action all of CAII north of 41° 30' is considered closed to the scallop fishery because it is closed to the scallop fishery under the Multispecies FMP.
2. No HMAs closed, open all A13 EFH areas. The model run assumes that all existing EFH areas would be fished at a fishing mortality rate similar to an access area for several years

(0.4), and then be fished at a more controlled level of access just below Fmsy for GB for the remainder of the time period.

3. New Northern Edge HMA (GB Alt 3) closed and other A13 EFH areas open
4. New GSC HMA in Channel (GSC Alt4) closed and A13 EFH areas open
5. Combination of Northern Edge HMA (GB Alt3) and GSC HMA (GSC Alt4) closed and A13 EFH areas open

Map 5 – Typical SAMS model areas, with statistical areas and NEFSC shellfish stratum boundaries on Georges Bank



These analyses are more dynamic than the results presented in the previous section because they do not simply focus on the area being assessed, rather these analyses simulate fishing activity and associated impacts to the fishery overall. The model makes assumptions about where effort will be displaced based on fleet dynamics observed in the fishery and estimated catch rates in various areas. When reviewing the results it is important to keep in mind that there are a handful of constraints placed on the model in terms of how much effort is allowed in a certain area. Mainly, the principles used in the Scallop FMP to set target catches (total F cannot exceed 0.28 in all areas and open area F cannot exceed 0.38) are maintained in these simulations. Therefore, these results show the potential impacts of the HMAs under consideration, but as constrained by the area management principles in the Scallop FMP.

For example, if the EFH areas are removed in OA2, the SAMS model would not simply keep open area effort as it has been, and add effort into newly opened EFH at an uncontrolled level. The FMP would still constrain the overall limit at 0.28; the fishing mortality associated with the Annual Catch Target, or the fishing mortality rate that has a 25% chance of exceeding than Annual Catch Limit. Since the overall catch for the fishery would still need to be within these limits, open area DAS would need to be reduced to keep overall F under 0.28. Thus, some of the trends in the results, especially the first few years, are an artifact of F_{target} limits used in the FMP. However, since those limits are how specifications are set in the scallop fishery, these results are more realistic than if effort simply adjusted based on available resource, without consideration for spatial and overall limits.¹

1.1.1.1.2.2.1 Short-term results

Table 2 summarizes short-term impacts (FY2015). The No Action alternative, keeping the current EFH areas closed to the scallop fishery, has the lowest 2015 projected landings (19,366 mt). Open area DAS and associated F in open areas are higher, compared to alternatives that open current EFH areas. The overall constraint on effort in 2015 for the No Action Alternative is the open area F limit of 0.38. That is the same for Run 3 and Run 5, the runs that close the Northern Edge HMA. Because the current CAII EFH area and the new Northern Edge HMA have such similar levels of biomass and potential yield, those runs overall are very similar. Run 3 and Run 5 provide higher landings with lower bottom area swept in 2015 primarily because the CA1N EFH area is available to the scallop fishery, which has a substantial amount of exploitable biomass in 2015.

The overall constraint on effort in Run 2 and Run 4 is that total F cannot exceed 0.28. When more areas become open to the scallop fishery the main constraint becomes the total F limit of 0.28, and not the open area F limit of 0.38, which is the main constraint when scallop biomass is within closed areas. For example, in Run 2 with no EFH closures, most catch is estimated to come from MA access areas and newly opened EFH areas. That represents a large portion of the total F for the fishery, leaving less F available for open areas. In Run 2, open area F falls to 0.27 and 18 DAS in areas outside of MA access areas and newly opened EFH areas. Furthermore, in 2016 open area F would need to be reduced further to keep total F below 0.28. Specifically, the model projects open area F would need to be reduced to 0.13, or 10 DAS per FT vessel in 2016, to keep total F below 0.28 since F would be higher in MA access areas and newly opened EFH areas. While these DAS allocations are much lower than present values, the total landings for this scenario is higher than current levels because substantial catches are expected in both MA access areas and newly opened EFH areas. For example, for Run 2 – no closures- total landings is projected to be 21,927 mt and 22,013 in 2016. This run has the lowest bottom area swept because more effort is in MA access areas and newly opened EFH areas, which have higher LPUEs compared to open areas.

¹ These analyses include five overall scenarios. It is possible after the public hearing process to run more scenarios based on additional input received. For example, different combinations can be run to help describe the potential cumulative impacts of several HMA alternatives together. FY 2015 is the first year that OA2 is expected to be implemented; therefore, that is the first fishing year that is included in the results. SAMS is run through 2027 to capture long-term impacts. The Scallop PDT discussed that this time period is the length of time used to assess the impacts of specification alternatives in the Scallop FMP, but an even longer time period may be more appropriate for assessing the potential impacts on long-term EFH closures. If time permits, the Scallop PDT may run these scenarios even longer to further assess the long-term impacts of these closures.

Run 3 and Run 5 have very similar short-term results again because the GSC HMA does not impact the analyses very much, so adding the GSC HMA area in Run 5 is not very different than Run 3, which is NE HMA only. Run 3 has the highest ST landings because of the windfall catch available in the southern portion of the CAII EFH area and CA1N EFH area. This could provide more landings in 2015 (about 3,500 mt or 7.7 million pounds) compared to No Action (current EFH areas remain closed). This “additional catch” does not impact open area DAS like it did in Run 2 because in Run 3 NE HMA is still closed and contains a large amount of biomass. Keeping substantial biomass in a closed area allows open area F to increase; therefore, open area DAS for Run 3 (25 DAS) are the same as Run 1 (No Action). However, in Run 2 with no closures open area DAS did need to be reduced from 25 to 18 to keep overall F below 0.28.

Table 2 – Summary of 2015 results for several scenarios under consideration in OA2 based on SAMS

	Overall fishing mortality	Open area fishing mortality	Landings	Open area DAS	Full-time DAS	Bottom Area Swept
Run 1: No Action	0.2	0.38	19,366	9,186	25	2,024
Run 2: No EFH Closures	0.28	0.27	21,937	6,648	18	1,833
Run 3: NE HMA only	0.24	0.38	22,860	9,080	25	2,334
Run 4: GSC HMA only	0.28	0.27	22,069	6,829	19	1,839
Run 5: NE and GSC HMAs combined	0.24	0.38	22,798	9,068	25	2,315

1.1.1.1.2.2.2 Long-term results

The SAMS model is even more useful for assessing the potential long-term impacts. Figure 2 - Figure 4 compare the projected landings, biomass, and bottom area swept results for the five EFH runs.

Figure 2 – Projected scallop landings (mt) for 2015-2027 for the five model runs

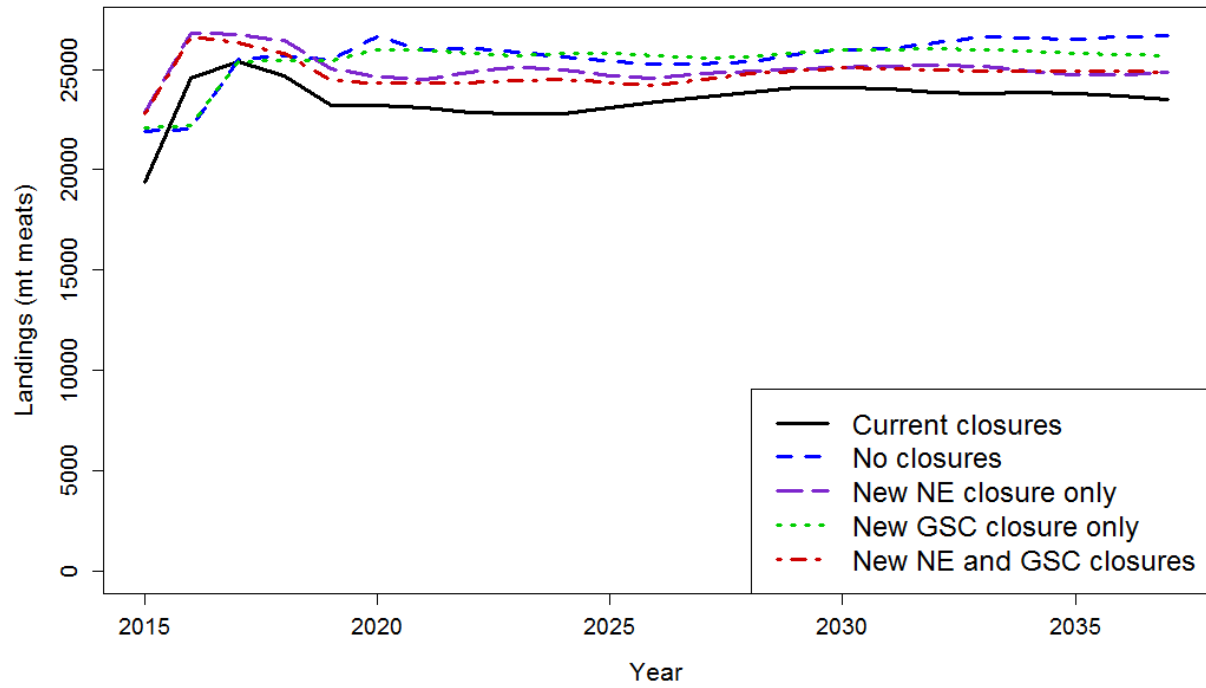


Figure 3 – Projected scallop biomass (mt) for 2015-2027 for the five model runs

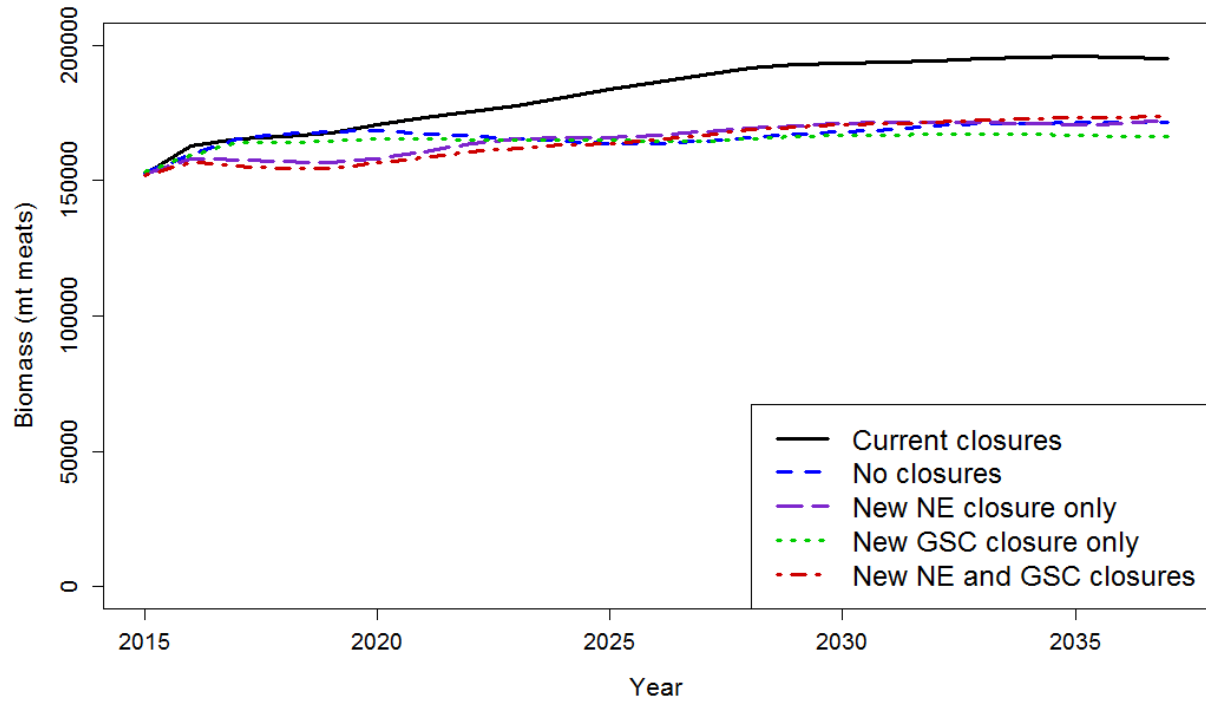
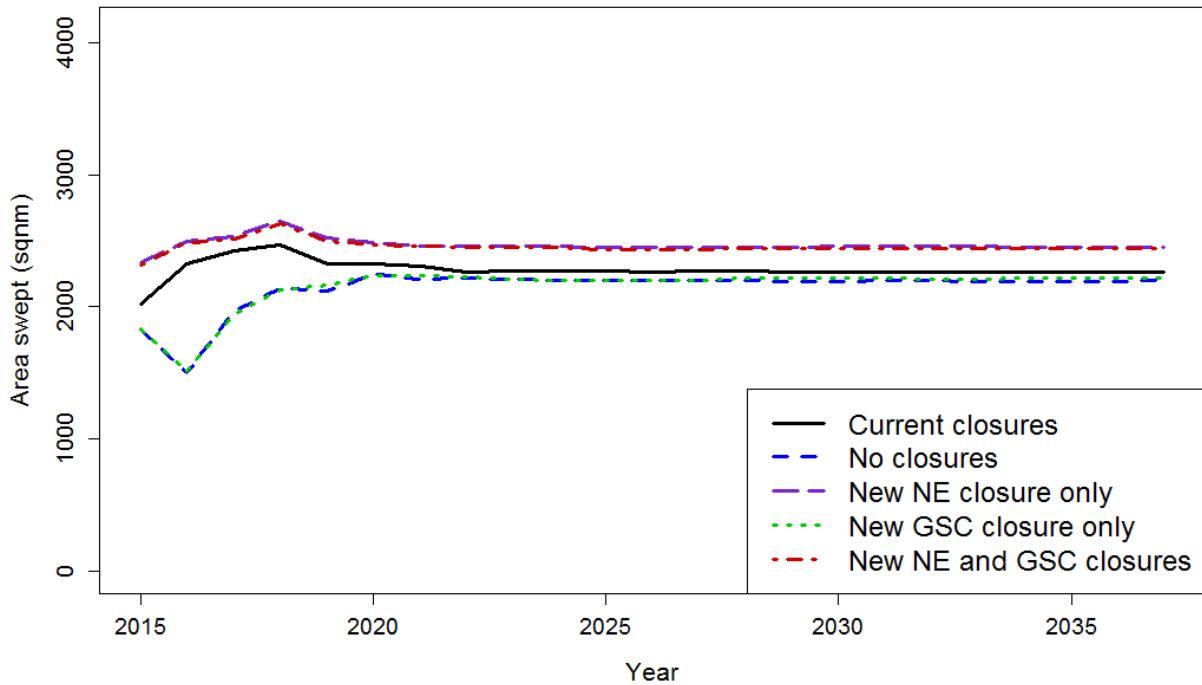


Figure 4 – Projected area swept (nm²) for 2015-2027 for the five model runs



The No Action run has the lowest projected landings at first, landings increase in 2016-2018 when the MA access areas open, and long-term landings are lower for this run compared to all the others (Figure 2). This scenario is limited by the open area F constraint (max of 0.38) in all years because a substantial amount of biomass is contained in the current EFH closed areas.

The results for Run 2 (no EFH closures) and Run 4 (GSC HMA only) are very similar because there is very little potential yield in the GSC HMA. Therefore, Run 4 is only slightly below Run 2 because there is some scallop biomass in GSC, but not a substantial amount. For Run 2, no closures, the total F limit of 0.28 is already the constraining factor for fishery allocations. Because all areas are available to the fishery, open area DAS are not higher to compensate for biomass in closed areas. Therefore, DAS and landings are lower for this run in the first few years because relatively little scallop biomass is in closed areas (22,000 mt in 2015 and increasing to 25,000 mt in 2017 and beyond).

However, long-term the projected landings for Run 2 (no closures) and Run 4(GSC HMA only) are the highest. This is evident after 2018 when the high biomass that is presently in the MA access areas is fished during 2015-2018. Not surprisingly, these results suggest that long-term landings would be higher if long-term closures did NOT overlap productive scallop grounds. Since Run 2 (no closures) and Run 4 (GSC HMA only) do not close very productive scallop grounds, long-term landings are higher compared to other runs that close portions of relatively productive scallop grounds. Run 1 (current EFH closures) has the lowest LT landings since it closes more area, and Run 3 and 5 have similar LT landings because they both close the Northern Edge HMA.

In terms of long-term biomass, Run 1 (No Action- current closures) would provide the highest LT biomass (Figure 3). For the most part, all the other runs have similar LT biomass. Run 2 (no closures) and Run 4 (GSC HMA only) have higher biomass at first, but after about 10 years the estimated biomass is similar for Runs 2-5. After 20 years it does seem that the runs with the NE HMA included (Runs 3 and 5) may provide higher biomass than the runs with no EFH closed areas (Runs 2 and 4), but the differences are not very large.

The projections of area swept are quite different for the EFH runs in the first few years (Figure 4). But again some of these trends are an artifact of how F_{target} is set in the Scallop FMP and the fact that a large proportion of total biomass is in the MA access areas that are expected to open in 2015. These factors have a large impact on future landings and F , regardless of how EFH areas are potentially modified in OA2. In brief, runs that have no EFH closures have lower ST and LT bottom area swept because the fishery has access to all areas, so catch would be concentrated in areas with highest catch rates.

Runs that close the NE HMA (Runs 3 and 5) have the highest ST and LT area swept estimates because these runs close a relatively productive scallop area, but also provide access to more fishing grounds than the No Action alternative increasing overall bottom time. Run 2 (no closures) and Run 4 (GSC HMA only) have the lowest estimates of bottom area swept, especially in the first few years when most fishing is estimated to occur in the MA access areas and newly opened EFH areas that have high catch rates.

When more area is closed to the fishery, effort is higher in open areas (up to max of 0.38), and higher open area DAS increases overall bottom area swept. The model suggests that closing the NE HMA (Run 3 and Run 5) would increase overall bottom time long-term compared to all the No Action EFH areas combined (No Action – Run1). This is the case because under Runs 3 and 5 more area is open to the fishery. Area swept in open areas is similar for all three of the runs that close part of the northern edge (Run 1, 3, and 5). But Run 1 (No Action) also closes CA1 north and other EFH and GF closed areas that have some level of scallop resource. Since those areas are open under Run 3 and 5 fishing activity is higher for those runs, thus total area swept is higher. Overall, the difference in area swept between all the runs is relatively minor. Run 2 with no EFH closed areas is about 2,100 square nautical miles overall, and Run 3 (NE HMA only) is about 2,400 square nautical miles overall.

1.1.1.1.2.2.3 Economic results

The following sections use the output results from SAMS to estimate both ST and LT economic impacts. The Scallop PDT has developed a price model that estimates revenues. The EFH runs in this section are generally described with the same nomenclature as the above section, but Table 3 shows the meaning of the terms used in the economic tables below.

Table 3 – Names used in analysis sections for various EFH scenarios

Run 1 – No Action	No Action
Run 2 – NOC	No EFH Closures
Run 3 – NE	NE HMA only
Run 4 - SCHCL	GSC HMA only
Run 5 - NESCH	NE and GSC HMAs combined

Landings and open area effort

The landings for scenarios that open current EFH areas (Run 2 to Run 5) are projected to exceed the landings for No Action scenario (that keeps those areas closed to the scallop fishery) both in 2015 and over the long-term from 2015 to 2037 (Table 4). The scenarios that include Northern Edge HMA (Run 3 and Run 5) results in higher landings (50.4 and 50.3 million lb.) in 2015 compared to other scenarios. The difference in the projected landings from the No Action levels ranges from 6 million lb. (for Run 2 and Run 4) to close to 8 million lb. (for Run 3 to Run 5) for 2015 fishing year (Table 5).

Over the long-term from 2015 to 2037 fishing years, Run 2 (no EFH closures) results in the highest landings (1298.9 million lb.) followed by Run 4(SCHCL) and Run 3(NE) (Table 4). Overall, the total landings are projected to exceed the no action landings by 65.2 million lb. (for Run 5- NESCH) or more (for Run 2, 3, and 4) (Table 5).

Projected open area DAS per limited access vessel in 2015 is lower for Run 4 (SCHCL, 19 days) and Run 2 (NOC, 18 days) compared to No Action (25) and Run 3 and Run 5 for reasons explained above. That is, because these runs have more areas open to the scallop fishery (or less biomass is closed to the fishery), the open area F limit of 0.28 becomes the constraining factor. For the same reason, over the long-term as well, total open area DAS per full time vessel is lower for Run 4 and Run 2 compared to other scenarios (Table 6).

Table 4 – Estimated landings (million lb.)

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015 Total		42.7	48.4	50.4	48.7	50.3
2016-2018	2016	54.1	48.5	59.0	49.0	58.7
	2017	56.0	56.3	59.0	55.9	58.0
	2018	54.4	56.6	58.3	56.1	56.9
2016-2018 Total		164.5	161.4	176.4	161.0	173.6
2019-2027	2019	51.2	56.3	55.2	56.1	53.8
	2020	51.1	58.6	54.3	57.2	53.6
	2021	50.9	57.3	54.0	57.3	53.6
	2022	50.3	57.4	54.8	56.9	53.6
	2023	50.2	57.0	55.3	56.7	53.8
	2024	50.3	56.4	55.0	56.8	54.1
	2025	50.9	55.9	54.4	56.8	53.6
	2026	51.5	55.7	54.2	56.6	53.4
2027	52.1	55.7	54.6	56.3	54.0	
2019-2027 Total		458.5	510.4	491.8	510.8	483.5
2028-2037 Total		525.9	578.7	550.7	570.3	549.5
Grand Total		1191.7	1298.9	1269.2	1290.7	1256.9

Table 5 – Estimated landings net of No Action landings (million lb.)

Sub-period	Fishing year	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015 Total		5.7	7.7	6.0	7.6
2016-2018	2016	-5.6	4.9	-5.1	4.5
	2017	0.2	3.0	-0.1	2.0
	2018	2.2	4.0	1.7	2.5
2016-2018 Total		-3.1	11.8	-3.5	9.0
2019-2027	2019	5.1	4.0	4.9	2.7
	2020	7.5	3.2	6.1	2.5
	2021	6.4	3.1	6.4	2.7
	2022	7.1	4.5	6.6	3.3
	2023	6.8	5.1	6.5	3.7
	2024	6.1	4.8	6.5	3.8
	2025	5.0	3.4	5.9	2.6
	2026	4.2	2.7	5.1	1.9
	2027	3.6	2.6	4.3	1.9
2019-2027 Total		51.9	33.3	52.3	25.0
2028-2037 Total		52.8	24.8	44.4	23.6
Grand Total		107.3	77.5	99.1	65.2

Table 6 - Estimated open area DAS per limited access vessel (not including effort in newly opened EFH areas – catch from those areas is not considered in these DAS estimates)

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015 Total		25.0	18.0	25.0	19.0	25.0
2016-2018	2016	27.0	10.0	25.0	11.0	25.0
	2017	28.0	23.0	28.0	23.0	27.0
	2018	29.0	27.0	30.0	27.0	28.0
2016-2018 Total		84.0	60.0	83.0	61.0	80.0
2019-2027	2019	29.0	29.0	30.0	29.0	29.0
	2020	29.0	30.0	29.0	30.0	29.0
	2021	29.0	29.0	29.0	29.0	29.0
	2022	28.0	29.0	30.0	29.0	29.0
	2023	28.0	28.0	30.0	29.0	29.0
	2024	28.0	28.0	29.0	29.0	29.0
	2025	29.0	28.0	29.0	28.0	29.0
	2026	29.0	27.0	28.0	28.0	28.0
	2027	30.0	27.0	29.0	28.0	29.0
2019-2027 Total		259.0	255.0	263.0	259.0	260.0
2028-2037 Total		298.0	285.0	288.0	284.0	291.0
Grand Total		666.0	618.0	659.0	623.0	656.0

Price and Revenue

The annual scallop revenues expressed in 2013 constant prices (undiscounted values) show that the revenues in 2015 fishing year will be considerably higher for scenarios that open current EFH areas (Run 2 to Run 5) compared to the No Action scenario both in the short- and the long-term (Table 8).

The present value of the revenues are projected to exceed the No Action values by over 50 million for scenarios with no EFH closures (RUN 2 –NOC) or with a new closure in South Channel (RUN 4 – SCHL) and by over \$60 million for the scenarios that include a new closure on the Northern Edge (Run 3 and Run 5) in 2015 fishing year using a 3% discount rate. These values are slightly lower if the present values were calculated using a 7% discount rate, ranging from \$47 million for RUN 2 (SCHCL), \$50 million for RUN 4 (SCHCL) and to about \$57 million to \$58 million for scenarios that include a new EFH Closure on the Northern Edge (RUN 3 and RUN 5).

From 2015 to 2037, Run 2 (no EFH closures) would result in the largest cumulative revenues (\$9,174 million) followed by Run 4 (SCHCL, \$9,137 million) and Run 3 (NE, \$9,035 million) estimated using a 3% discount rate (Table 9). Present value of cumulative revenues will be lower when estimated using a 7% discount rate (Table 11).

Over the long-term from 2015 to 2037, the present value of the projected revenues for the no closure scenario will exceed the no action values by \$640 million (\$399 million) using a 3% discount rate (7% discount rate). This is followed by the scenario that includes a South Channel closure (RUN 4, SCHCL), which is estimated to increase the present value of scallop revenues by \$602 million (\$381 million) using a 3% discount rate (7 % discount rate) at the 2013 inflation adjusted constant values. The present value revenues for other scenarios with new EFH closures (Run 5, NESCH and Run 3, NE) will exceed the no action values by \$422 million or more compared to levels for No Action (Table 10) over the long-term using a 3% discount rate. The ranking of the revenues is not expected to change if instead a 7% discount rate is used to estimate the present value, with RUN 2 estimated to result in largest revenues and RUN 5 with the smallest revenue gains. Nevertheless, all these new EFH scenarios will have significant positive economic impacts on the scallop fishery over the long-term.

Table 7 – Preliminary projections for price (in 2013 inflation adjusted prices; average price in 2012=\$9.77)

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015 Total		10.7	10.5	10.4	10.5	10.4
2016-2018	2016	10.1	10.5	10.0	10.5	10.0
	2017	10.0	10.1	9.9	10.1	10.0
	2018	10.1	10.1	10.0	10.1	10.1
2016-2018 Total		10.1	10.3	10.0	10.3	10.0
2019-2027	2019	10.3	10.2	10.2	10.2	10.2
	2020	10.3	10.1	10.2	10.1	10.3
	2021	10.4	10.2	10.3	10.2	10.3
	2022	10.4	10.2	10.3	10.2	10.3

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
	2023	10.4	10.2	10.3	10.2	10.3
	2024	10.5	10.3	10.3	10.2	10.3
	2025	10.4	10.3	10.3	10.2	10.4
	2026	10.4	10.3	10.4	10.3	10.4
	2027	10.4	10.3	10.3	10.3	10.4
2019-2027 Total		10.4	10.2	10.3	10.2	10.3
2028-2037 Total		10.4	10.2	10.3	10.2	10.3
Grand Total		10.4	10.2	10.3	10.2	10.3

Table 8 – Preliminary revenue projections (in 2013 inflation adjusted values prices, undiscounted)

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015 Total		456	510	522	513	521
2016-2018	2016	546	511	589	515	586
	2017	560	569	587	566	579
	2018	550	573	584	569	573
2016-2018 Total		1656	1653	1759	1650	1738
2019-2027	2019	527	572	562	570	552
	2020	528	591	556	581	551
	2021	528	583	556	583	552
	2022	525	586	564	581	553
	2023	524	583	567	580	556
	2024	527	579	566	582	558
	2025	532	576	562	582	555
	2026	536	575	561	580	555
	2027	540	575	565	579	559
2019-2027 Total		4767	5219	5059	5218	4992
2028-2037 Total		5456	5911	5681	5844	5666
Grand Total		12335	13293	13022	13224	12918

Table 9 – Cumulative present value of total scallop revenue (using 3% discount rate)

Sub-period	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	430	481	492	483	491
2016-2018	1,472	1,468	1,564	1,465	1,545
2019-2027	3,556	3,896	3,774	3,893	3,725
2028-2037	3,078	3,330	3,205	3,296	3,195
Grand Total	8,535	9,174	9,035	9,137	8,957

Table 10 – Present value of total scallop revenue net of no action revenue (using 3% discount rate)

Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
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Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	51	63	54	62
2016-2018	(4)	92	(7)	74
2019-2027	340	219	337	169
2028-2037	253	127	218	118
Grand Total	640	500	602	422

Table 11 – Present value of total scallop revenue (using 7% discount rate)

Sub-period	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	398	446	456	448	455
2016-2018	1,265	1,260	1,345	1,258	1,329
2019-2027	2,458	2,695	2,610	2,692	2,575
2028-2037	1,487	1,606	1,548	1,592	1,543
Grand Total	5,608	6,007	5,959	5,989	5,903

Table 12 – Present value of total scallop revenue net of no action revenue (using 7% discount rate)

Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	47	58	50	57
2016-2018	(5)	79	(7)	64
2019-2027	238	152	234	117
2028-2037	119	61	105	56
Grand Total	399	351	381	295

LPUE and Area Swept

LPUE for all areas are estimated to exceed 2700 lb. per DAS and to be slightly higher for RUN 2 (NOC) and RUN 4 (SCHCL) compared to other scenarios both in the short- and the long-term (Table 13). The same scenarios also result in the lowest values for area swept by providing access to a larger open area but allocating lower open area DAS compared to the other scenarios (Table 14).

Table 13 – Average LPUE for all areas

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015 Total		2729	2840	2742	2837	2745
2016-2018	2016	2803	2921	2809	2921	2813
	2017	2816	2927	2823	2934	2825
	2018	2806	2928	2809	2934	2804
2016-2018 Total		2808	2925	2814	2930	2814
2019-2027	2019	2839	2977	2839	2971	2829
	2020	2847	2970	2848	2956	2837

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
	2021	2854	2967	2847	2954	2848
	2022	2866	2964	2855	2954	2851
	2023	2868	2964	2869	2951	2854
	2024	2860	2963	2875	2953	2859
	2025	2865	2959	2875	2959	2862
	2026	2871	2954	2866	2961	2858
	2027	2873	2951	2866	2959	2856
2019-2027 Total		2860	2963	2860	2958	2850
2028-2037 Total		2890	2964	2872	2959	2872
Grand Total		2861	2953	2854	2949	2850

Table 14 – Area Swept

Sub-period	Fishing year	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015 Total		2,024	1,833	2,334	1,839	2,315
2016-2018	2016	2,325	1,503	2,498	1,516	2,487
	2017	2,424	1,970	2,528	1,939	2,517
	2018	2,472	2,142	2,648	2,133	2,628
2016-2018 Total		7,221	5,615	7,674	5,588	7,632
2019-2027	2019	2,328	2,119	2,525	2,165	2,500
	2020	2,322	2,248	2,484	2,238	2,469
	2021	2,308	2,207	2,460	2,239	2,456
	2022	2,268	2,221	2,457	2,227	2,453
	2023	2,272	2,213	2,457	2,214	2,451
	2024	2,275	2,205	2,458	2,205	2,454
	2025	2,270	2,201	2,448	2,200	2,434
	2026	2,267	2,203	2,452	2,199	2,432
2019-2027 Total		20,585	19,817	22,194	19,888	22,085
2028-2037 Total		22,655	21,961	24,557	22,157	24,417
Grand Total		52,485	49,226	56,759	49,472	56,449

Present Value of Producer Surplus

Producer surplus (benefits) for a particular fishery shows the net benefits to harvesters, including vessel owners and crew, and is measured by the difference between total revenue and operating costs. Present values of the producer surplus for scenarios other than No Action are expected to range from \$449 million (RUN 2 - NOC) to \$459 million (RUN 3 - NE), and to be about \$49 - \$57 million higher than the producer surplus for no action (\$401 million) values for 2015 fishing year using a 3% discount rate (Table 15 and Table 16). Present value of the producer surplus estimated using a 7% discount rate are shown in Table 17 and Table 18. Although using a higher discount rate lowers the present values of the producer surplus, the ranking of the scenarios are not affected by the discount rate. In both cases, RUN 3(NE) results in largest producer surplus followed by RUN 5 (NESCH) in the short-term.

Over the long-term from 2015 to 2037, the present value of the projected producer for the no closure scenario (RUN 2) will exceed the no action values by \$611 million (\$ 383 million) using a 3% discount rate (7% discount rate). The scenario that includes both a Northern Edge and South Channel closure (RUN 5 – NESCH) are estimated to result in the smallest increase the present value of the producer surplus (by \$388 million using a 3% discount rate) at the 2013 inflation adjusted constant values compared to other scenarios (RUN 2 to RUN 4) with the exception for the No Action values. For other scenarios with new EFH closures, the present value of the producer surplus will exceed the no action values by \$460 million (RUN 3, NE) or more (RUN 4, SCHCL) compared to levels for No Action (Table 16) using a 3% discount rate and by a lower amount (\$271 million or higher) using a 7% discount rate (Table 18). In short, all the new EFH scenarios (other than No Action) will have significant positive economic impacts on the producer surplus over the long-term, with RUN 2 (NOC) and RUN 4 (SCHCL) resulting in largest increases compared to No Action values.

Table 15 – Present value of producer surplus (using 3% discount rate)

Sub-period	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	401	449	459	452	458
2016-2018	1,370	1,372	1,455	1,370	1,438
2019-2027	3,322	3,644	3,524	3,641	3,477
2028-2037	2,877	3,115	2,993	3,083	2,985
Grand Total	7,970	8,581	8,430	8,546	8,358

Table 16 – Present value of producer surplus net of No Action values (using 3% discount rate)

Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	49	58	51	57
2016-2018	2	85	(0)	68
2019-2027	322	201	319	155
2028-2037	238	116	206	108
Grand Total	611	460	576	388

Table 17 – Present value of producer surplus (using 7% discount rate)

Sub-period	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	371	417	425	418	424
2016-2018	1,178	1,178	1,251	1,176	1,237
2019-2027	2,296	2,521	2,436	2,518	2,404
2028-2037	1,390	1,503	1,446	1,489	1,442
Grand Total	5,235	5,619	5,558	5,602	5,506

Table 18 – Present value of producer surplus net of No Action values (using 7% discount rate)

Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	45	54	47	53
2016-2018	0	73	(2)	59
2019-2027	225	140	222	108
2028-2037	113	56	99	51
Grand Total	383	323	366	271

Present Value of Total Economic Benefits

Economic benefits include the benefits both to the consumers and to the fishing industry and equal the sum of benefits to the consumers and producers. The cumulative present value of the total economic benefits for each run is summarized in Table 19 (3% discount rate) and Table 20 (7% discount rate).

The estimated present value of total economic benefits will be about \$722 million higher in 2015-2037 with RUN 2 (No EFH closures) compared to the no action (Table 19, 3% discount rate). Similarly, total economic benefits for RUN 4 (SCHCL) would exceed no action levels by \$679 million in 2015-2037 (3 % discount rate). RUN 3 (NE) and RUN 5 (NESCH) would result in smaller total economic benefits compared to RUN 2 and RUN 4 in the long-term whether a 3% or a 7% discount rate used although total economic benefits would still be higher than the No Action values. Table 21 shows the corresponding values by using a 7% discount rate to calculate the cumulative present value of the total economic benefits. Again, RUN 2 (No EFH closures) and RUN 4 (SCHCL) would result in largest economic benefits compared to No Action and other scenarios over the long-term (Table 20 and Table 22).

Table 19 – Present value of total economic benefits (using 3% discount rate)

Sub-period	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	436	492	505	495	503
2016-2018	1,522	1,518	1,623	1,515	1,603
2019-2027	3,655	4,040	3,894	4,036	3,838
2028-2037	3,170	3,455	3,306	3,415	3,297
Grand Total	8,783	9,504	9,329	9,462	9,241

Table 20 – Present value of total economic benefits net of no action values (using 3% discount rate)

Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	56	69	59	67
2016-2018	(4)	101	(7)	81
2019-2027	385	239	381	183
2028-2037	285	137	246	127

Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
Grand Total	722	546	679	458

Table 21 – Present value of total economic benefits (using 7% discount rate)

Sub-period	Run 1 No Action	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	404	456	468	458	466
2016-2018	1,309	1,303	1,396	1,301	1,378
2019-2027	2,526	2,795	2,693	2,791	2,653
2028-2037	1,532	1,666	1,597	1,650	1,592
Grand Total	5,770	6,221	6,153	6,200	6,091

Table 22 – Present value of total economic benefits net of no action values (using 7% discount rate)

Sub-period	Run 2 NOC	Run 3 NE	Run 4 SCHCL	Run 5 NESCH
2015	45	54	47	53
2016-2018	0	73	(2)	59
2019-2027	225	140	222	108
2028-2037	113	56	99	51
Grand Total	383	323	366	271

1.1.1.2 *Spawning management alternatives*

1.1.1.2.1 Gulf of Maine region

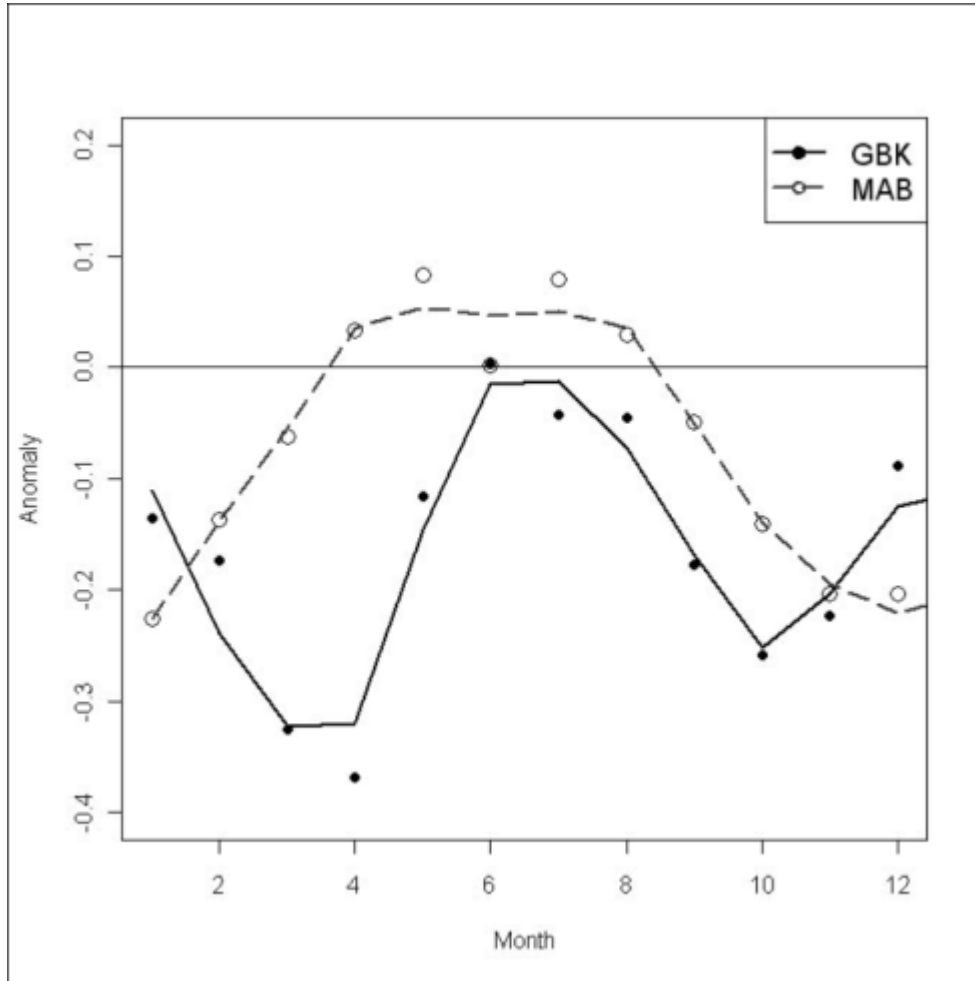
As with the GOM habitat management alternatives, the areas included in the GOM spawning management alternatives have little overlap with the scallop resource. The action alternative, Alternative 2, would remove the WGOM and Cashes Ledge groundfish closures, which could allow fishing on scallops living within those areas, unless prevented by one of the habitat management alternatives. Locally, removing these two groundfish closures could impact scallop populations, but global effects on the resource as a whole would not be expected since this is not an area with major concentrations of scallop biomass and there are measures in place to control overall effort.

1.1.1.2.2 Georges Bank and Southern New England region

In the Georges Bank region, the action alternatives (Alternatives 2 and 3) would eliminate the Nantucket Lightship Groundfish Closure Area and make CAI and CAII Groundfish Closure Areas seasonal, closed February 1 through April 15. The primary source of information used to assess the potential biological impacts of a seasonal closure to improve groundfish spawning protection is seasonal changes in scallop meat weights. Over the course of a year the scallop meat weights increase and decrease based on spawning and other factors. If a seasonal closure is during a time of year when meat weights are higher there could be negative impacts on the resource, but if the seasonal closure is when meat weights are lower there could be positive impacts.

First, shell height/meat weight data from observed trips were summarized for GB and the MA by month, and a model was generated to predict meat weight by month and region. Those estimates were compared to the month with the highest average meat weights on GB, June, to calculate a monthly meat weight anomaly (Figure 5).

Figure 5 – Scallop shell height: meat weight anomaly for GB and MA (Hennen and Hart, 2012)



Second, a Research Set-Aside (RSA) project (CFF bycatch survey) has been evaluating the seasonal changes in bycatch rates in the scallop fishery in both Closed Area I and II for over two years. Shell height/meat weight samples were collected during the monthly cruises. Data have been collected during most months since March 2011. In the first year of this study (2011) about 3,000 scallops were measured, and when all available data are combined for March 2011 through September 2013 almost 9,000 scallops have been measured to date. The meat weight model includes the following fixed effects: shell height, area (Eastern GB, Western GB), month and an interaction between month and area. Non-parametric smoothers were used to display annual and inter-annual trends in the relationship for the two areas analyzed and interpolate across any missing months.

Based on the meat weight anomaly figure, the month with the highest meat weights on GB is typically June, and the lowest is October (Figure 5). The average meat weights are about 20% greater in June than in October. There seems to be a bimodal pattern on GB for meat weights, with peaks in December and June, and lower meat weights in April and October (Hennen and Hart, 2012). One source of uncertainty with these data is that the number of observed trips is very low on GB for the months under consideration for the spawning closure (Feb-April). Most fishing activity on GB during those months is in the Channel, not CAI and CAII. The access areas on GB were closed from Feb1-June14 for most of the years in this data set. Therefore, there are fewer data for these months as compared to the months with higher fishing levels and when CAI and CAII were open (June15-Jan31).

Figure 6 and Figure 7 display trends from the RSA study for the two areas together as well as each area separately with the proposed temporal closures specific to each resource area. Results graphically depict the relative position of temporal closures with respect to observed patterns in meat weight maxima and minima. Overall, it seems that CAI has higher meat weights than CAII, at least for the first year of the study. This could be related to depth differences between the stations since scallops have different growth rates at different depths. But for these analyses depth was not considered separately. In general, the spawning season seems to overlap when scallops on GB are ascending to their max weight in June/July.

It is important to keep in mind that this data set is only 2.5 years long. The spring cycle of scallop growth does vary from year to year based on a variety of factors, so the monthly meat weight variation may not match up precisely with the observer data analyses in Figure 5, which is from a larger area (all of GB) and longer time series.

Figure 6 – Model generated estimate of meat weights for scallops larger than 125mm for Eastern and Western GB (based on scallops measured in CFF bycatch survey)

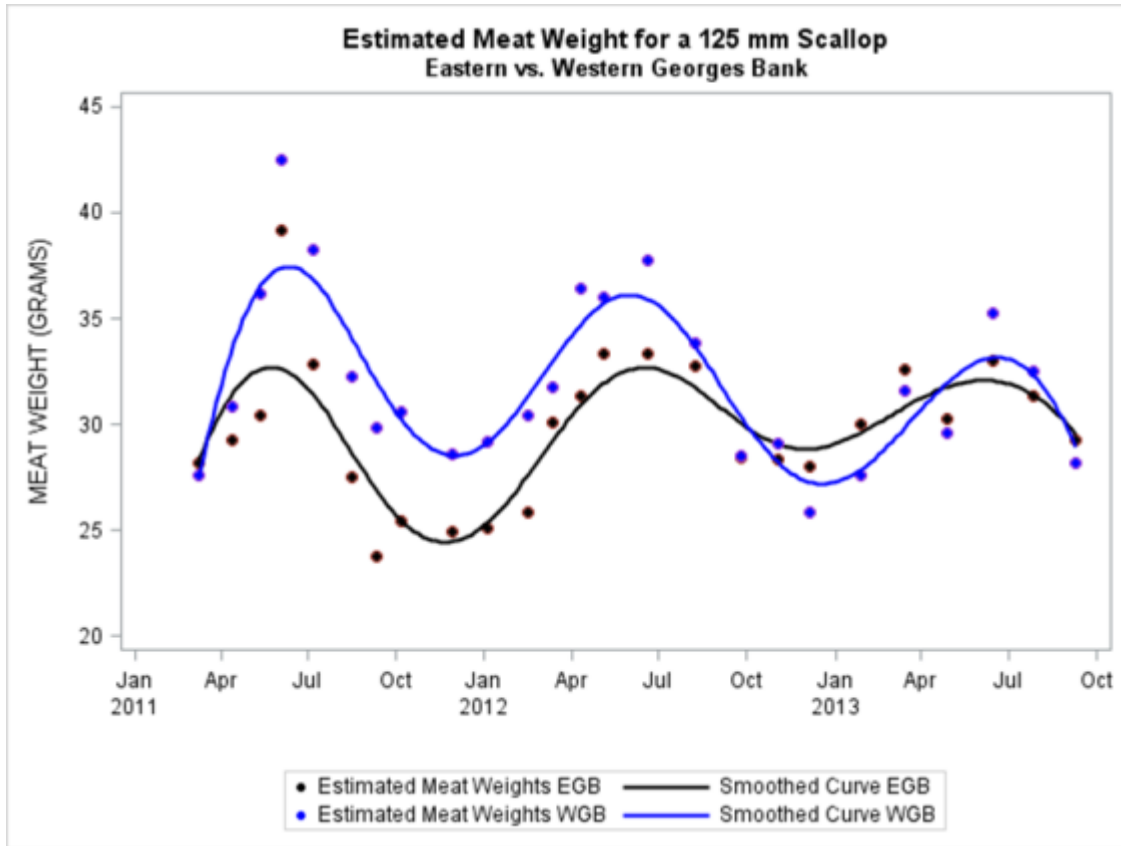
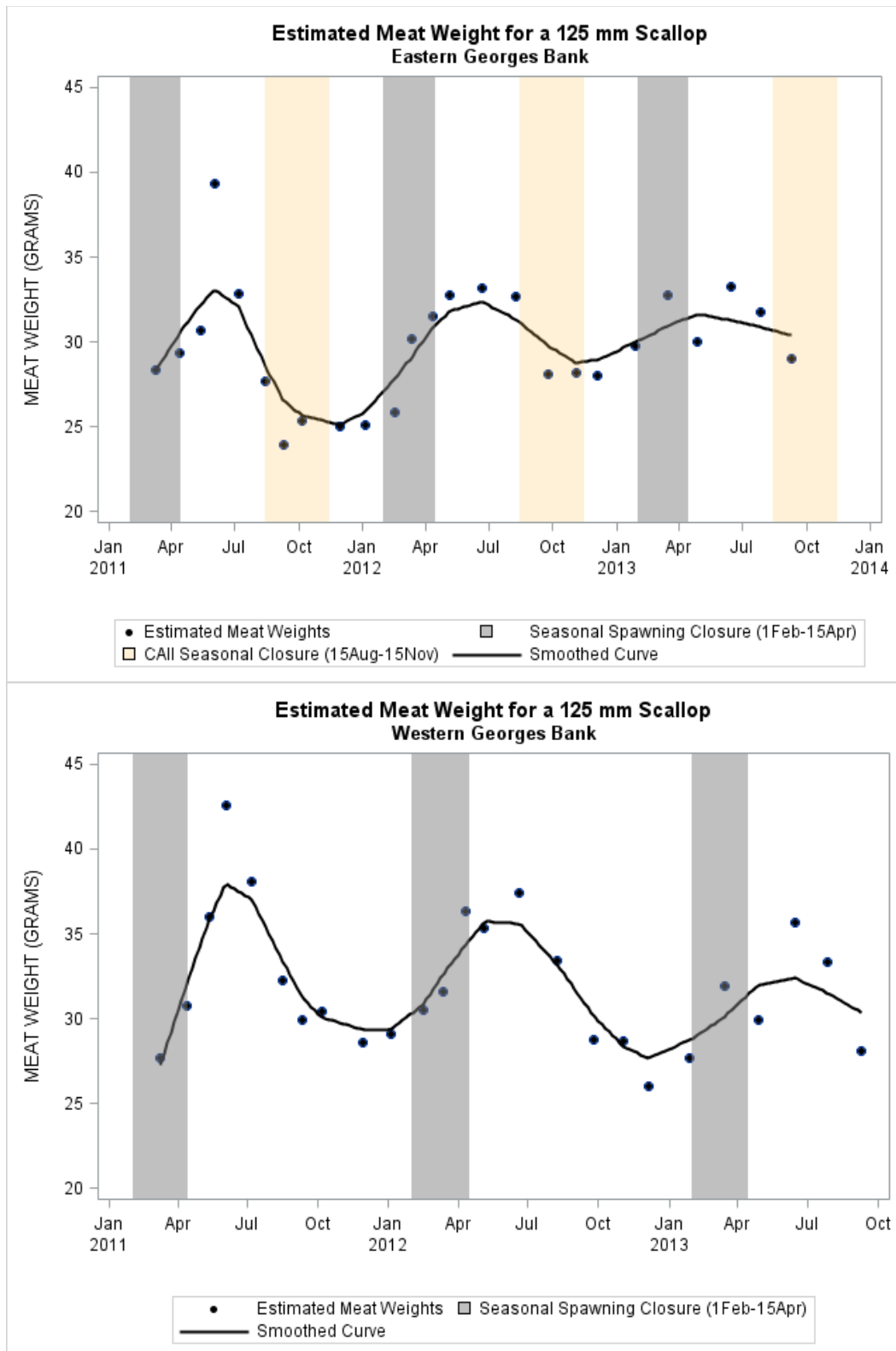


Figure 7 – Model generated estimates of meat weights for scallops larger than 125mm for Eastern (top) and Western GB (bottom) with potential seasonal closures included. Grey is spawning closure under consideration and yellow is in effect already for CAII to reduce yellowtail bycatch.



In general, the overall impacts of seasonal closures are difficult to assess because vessels shift effort differently as a result of a seasonal closure. The closed season will dictate when fishing will not occur in that area, but it could impact fishing patterns in other areas, i.e. open area fishing. Therefore, while a seasonal closure could benefit the scallop resource in that particular area, it could cause effort patterns in other areas to change by season, impacting overall scallop mortality.

Since there is a possession limit (number of pounds per trip) for access area trips, the greater the meat weight per animal the fewer scallops will be harvested. This reduces fishing time compared to fishing when scallop meats weights are less. This translates into less potential bycatch and lower scallop fishing mortality compared to months with lower scallop meat weights in the fall and winter. Because the season under consideration, Feb-April, includes several months with lower scallop meat weights, GB Spawning Alternatives 2 and 3 may have positive impacts on the scallop resource and fishery in those areas. In particular, the months of February and March are lower meat weight months, so preventing scallop effort in access areas during these months would potentially shift effort to months with higher meat weights. April is not as clear; meat weights are approaching higher levels in April based on the RSA monthly bycatch data. Note that GB Spawning Alternative 3 only includes the northern part of CAI, so fishing in the southern part of the area would be unrestricted during Feb-April. Therefore, fewer positive impacts would be expected from Alternative 3 vs. Alternative 2.

It is important to consider this seasonal restriction in combination with one that is already in place for Closed Area II under the access area regulations in the scallop FMP. Since FW24, CAII south is closed to the scallop fishery from Aug15 – Nov 15 to reduce YT bycatch. If the two seasonal restrictions are implemented, the area would only be open to the scallop fishery for 6.5 months of the year, April 16 – Aug 14 and again from Nov 15 – Jan 31. Having both seasonal restrictions could shift more effort into the winter when scallop meat weights are lower, having negative impacts on the resource and fishery. However, seasonal closures tend to shift effort right before or after a closure, so if effort is mostly concentrated in May, impacts on the resource could be positive. Finally, six months is generally enough time for a vessel to make a trip or two in CAII if allocated access, but it does reduce flexibility for the fishery, which can have potentially negative impacts.

Overall, seasonal closures have tradeoffs: limiting flexibility for the fishery, but if closures are during periods of time when scallop meat weights are lower, there can be positive impacts on the resource by maximizing yield. Since this closure season is primarily when meat weights are lower, the overall impacts are expected to be positive on the resource and fishery by potentially maximizing yield.

1.1.1.3 *Dedicated habitat research area alternatives*

The potential impacts of alternatives to designate Dedicated Habitat Research Areas (DHRAs) on the scallop resource and fishery were assessed qualitatively related to the potential indirect impacts on the scallop resource and fishery from research that may be conducted in the various areas. In addition, some input has been provided about potential fishery displacement from these candidate research areas.

The PDT considered the scallop resource and level of fishing activity in each dedicated habitat research area alternative. For the area in Closed Area I (Georges Bank DHRA, Alternative 4) the NEFSC dredge survey was used to get a sense of the scallop biomass within that alternative. For the areas in the GOM (Eastern Maine DHRA, Alternative 2, and Stellwagen DHRA, Alternative 3), results from a 2012 RSA project were used. Sampling was not very dense in this survey. In addition, VTR data for the scallop fishery were plotted to get a sense of the level of LA and LAGC fishing activity inside these areas.

In general, the dedicated habitat research areas are not expected to have major impacts on the scallop resource or fishery because none of the proposed areas overlap major concentrations of scallop biomass. Two of the areas (Alternatives 3 and 4) are within current EFH closed areas and the one in the Eastern GOM (Alternative 2) is not a major area for scallop abundance. There may be indirect benefits to the scallop resource or fishery if research is conducted in these areas, which improves the understanding of fishery impacts on EFH etc. There is one study already proposed for the area in Closed Area I south that is looking at scallop recruitment. To the extent this designation would help support research that has beneficial impacts on the scallop resource or fishery, Alternative 4 could have a positive impact.

If this amendment modifies the CAI and WGOM EFH closed areas it is possible that some scallop vessels would want to prosecute those areas. Again, scallop abundance in these areas is relatively low, but closing the areas for research could have negative impacts on the fishery if scallop catch rates are higher in those areas compared to other areas. Table 1 in the habitat alternatives section above shows the LT yield potential from CAI South to be 29 mt (mean estimate), and 11 mt (median estimate). This is a very small proportion of total scallop LT yield (about 0.1%). Therefore, the potential impacts on the scallop resource and fishery for a designation in this area are minimal.

The Stellwagen and Eastern Maine DHRAs are closer to shore so could have potentially higher impacts on smaller vessels that are homeported near these areas. VTR has been plotted for trips over 600 pounds to represent LA trips as well as trips less than 600 pounds to represent LAGC trips (Map 6). Based on these data there has been very little scallop fishing activity in any of the three DHRAs. However, any activity in the Stellwagen or Georges Bank DHRAs are likely misreported because these two areas have been closed to scallop vessels since 1998 and 1994, respectively.

Map 6 – VTR effort CY2008-2012 for LA scallop fishery (blue on left) and LAGC scallop fishery (red on right). VTR catch 600 pounds and less considered LAGC effort and trips above 600 pounds considered LA effort

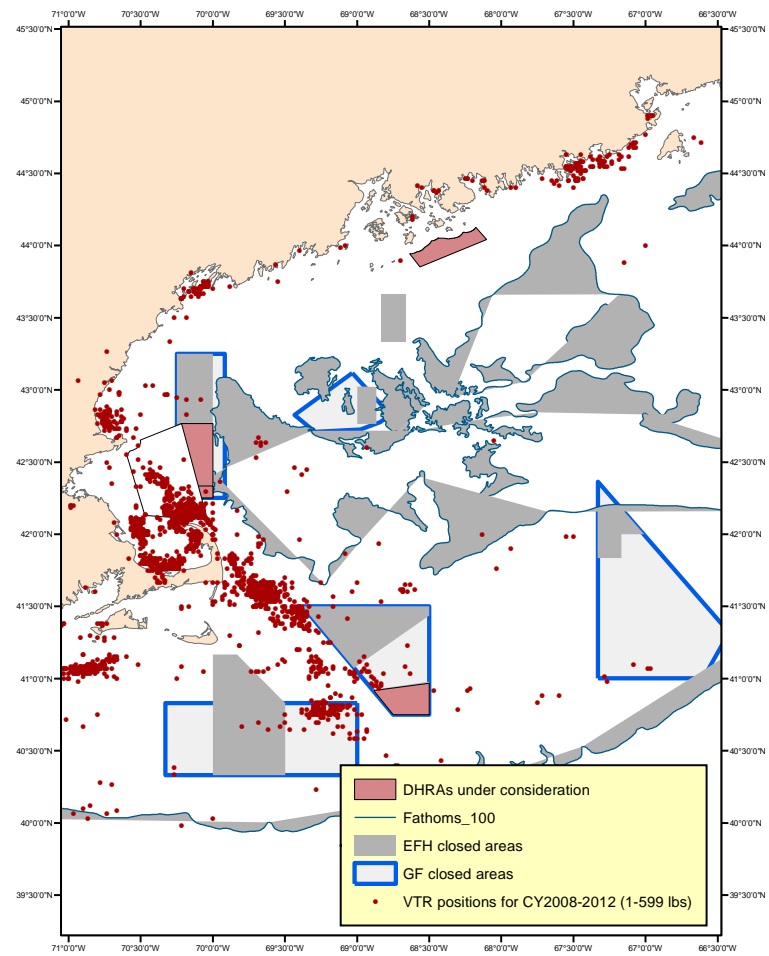
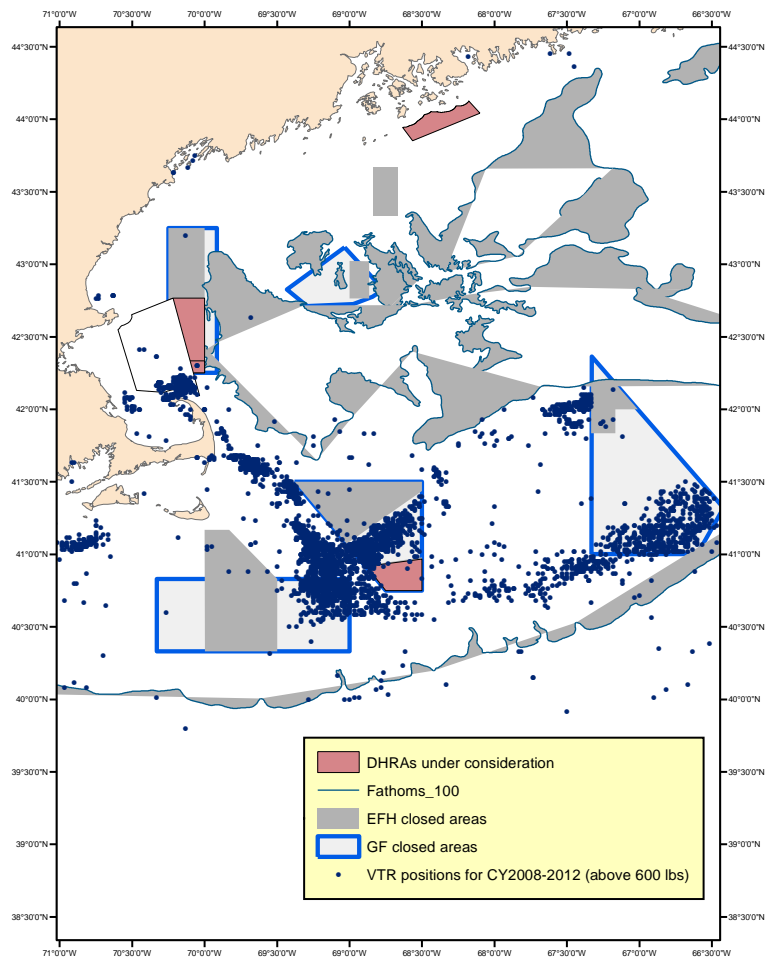


Figure 8 – 2012 and 2013 VTR data for all scallop dredge vessels

