#2c

FRAMEWORK 28 - DRAFT BIOLOGICAL IMPACTS

TABLE OF CONTENTS

LIST OF TABLES:

LIST OF FIGURES:

1.0 BIOLOGICAL IMPACTS

1.1 OVERFISHING LIMIT AND ANNUAL BIOLOGICAL CATCH

1.1.1 Overfishing Limit and Annual Biological Catch

The Magnuson-Stevens Act requires that annual catch limits (ACLs) and accountability measures (AMs) be set in all fishery management plans to help control total harvest. Acceptable Biological Catch (ABC) is defined as the maximum catch that is recommended for harvest, consistent with meeting the biological objectives of the management plan. The Science and Statistical Committee (SSC) is responsible for setting ABC.

Table 1 - Comparison of the No Action OFL/ABC (default 2017 from FW27) and updated OFL and ABC estimates for 2016 (Alt. 2).

	FY	OFL	ABC including discards	Discards	ABC with discards removed
Alt. 1 – No Action	2017	68,418	55,737	17,885	37,852
Alt. 2 – Updated OFL and ABC	2017	75,485	61,741	15,004	46,737
	2018	69,678	56,992	13,850	43,142

1.1.2 Alternative 1 – No Action for OFL and ABC

Under "No Action", the overall OFL and ABC would be at the default values for FY 2017, which are equal to the OFL and ABC adopted by the Council for FY 2016 through FW27. The No Action ABC including discards is 55,737, mt or about 122 million pounds. The SSC recommended prorating the OFL and ABC for FY2017 because it will be a thirteen month fishing year to account for the change of the start of the fishing year to April 1 beginning in 2018. The twelve month OFL and ABC values for No Action and Alt. 2 are very similar, though estimated discards are lower in the updated values (Table 1). The No Action ABC with discards is lower than the proposed prorated ABC by about 6,004 mt, or about 14 million pounds. The proposed prorated ABC for FY2017 including discards is 61,741 mt or 136 million pounds. This increase is due to the growth of large year classes on both GB and MA, which have been tracked over several years. Several fishery allocations are currently directly based on the ABC. These include the observer set-aside, and the LAGC IFQ sub-ACL (FW28 is considering changes LAGC IFQ allocations to projected landings – Section 2.3.2). Therefore, all of these allocations for 2017 will increase proportionally based on the higher ABC proposed for FY2017 compared to the No Action ABC, with the exception of the research set-aside, which is a set poundage every year of 267mt, or 1.25 million pounds.

Overall, setting fishery allocations from the No Action ABC would have essentially neutral impacts on the resource because the No Action ABC is only slightly less than the FY2017 ABC propose in Alternative 2. In general there may be potentially positive impacts on the resource long term if fishery specifications are set based on the No Action ABC compared to the proposed ABC, which is higher. But the potentially negative impacts from setting specifications from a higher ABC are limited to mortality associated with higher LAGC IFQ allocations only because mortality from observer compensation fishing is linked to all fishing activity (predominantly LA fishing activity). Therefore, if there is less fishing activity overall, there is less observer compensation used. While the LAGC IFQ may be higher under the proposed ABC compared to No Action ABC, the overall increase from this source alone is a relatively small percentage of the fishery overall. Therefore, there may be some potentially positive impacts on the resource long term if the No Action ABC is used, but those impacts are limited to a relatively small fraction of overall effort, and in general the best available data should be used to set ABC, which would include updated survey and fishery data used in the proposed ABC compared to older data used in the No Action ABC.

1.1.3 Alternative 2 – Updated OFL and ABC for FY 2017 (13 month FY) and FY 2018 (default)

The values approved by the SSC are summarized in Table 1. The updated ABC estimate including discards is 61,741 mt or 136 million pounds for FY2017. This is about 6,004 mt, or about 14 million pounds higher than the No Action ABC (default). Updated survey results suggest an increase in biomass, primarily driven by the growth of large year classes on GB and the MA, which were considered above average when they were first observed. The twelve month projections for FY2017 suggest a slight increase from 2016, thought prorating the FY for thirteen months (13/12ths) results in an even greater increase than 2016. The SSC recommends that the OFL and ABC remain at the 2017 twelve-month estimate based on PDT input.

In summary, while biomass is expected to increase in 2017 the PDT is concerned that the current configuration of the model may lead to an overestimation of the growth of juvenile scallops, particularly in areas where scallops have not historically settled. The SSC adopted the PDT's recommendation that finer-scale estimates of growth and weight be used in the model this year to account for anomalously slow growth, specifically in portions of the Nantucket Lightship area. Changes to the 2016 model include finer scale shell height/meat weight (SH/MW) estimates of areas in the Nantucket Lightship (NLS) based on the 2016 VIMS dredge survey of the area, and reducing the value of the asymptotic maximum length ($L\infty$) in the NLS-AC-S zone to 90 mm. The SH/MW estimates from the 2016 VIMS dredge survey allow for the comparison of meat weights between the four NLS zones. Table 3 shows the relative meat yield (assuming equal depth and length), relative to the productive NLS-AC-N. The north area is typically considered to be one of the more productive resource areas. The PDT also noted that based on observed length frequency obtained from 2016 surveys, the four year old animals found in the shallower portions (<70m) of the NLS-AC-S zone did not appear to exhibit the same anomalous slow growth as their counterparts in the deeper portions of the southern NLS-AC-S zone (Figure 5). These adjustments to the SH/MW and the assumptions of asymptotic growth resulted in a reduction of the biomass estimates in some NLS model areas, as well as overall biomass estimates. In FW27, the PDT felt that biomass projections were overly optimistic and would likely be overestimated if higher than average natural mortality took place in areas of high densities. The 2016 and 2017 OFL and ABC values were set equal to each in that action. The 2016 survey season confirmed that higher than average natural mortality was not endemic, but that some animals in deeper water and at high densities were not growing normally. Adjustments to the model (described above) were recommended to translate on-the-water observations during the 2016 surveys into OFL and ABC outputs.

The model currently assumes constant natural mortality (0.16 on GB and 0.2 in the Mid-Atlantic on all sizes except the plus group). However, the PDT has noted that natural mortality of juveniles is higher in areas of high density. There are practical management risks with setting the 2018 default values high and potentially needing to later correct them. The IFQ allocations for the LAGC fishery and observer set-aside program are currently based on the ABC/ACL value and those go into effect at the start of the fishing year. Therefore, it is more risk averse to keep those allocations at 2017 levels until more updated estimates are completed in 2017 for FY2018 OFL and ABC estimates.

Since over half of the ABC is from scallops that are not exploitable to the fishery, primarily from high abundances of animals within closed areas and not exploitable to fishing gear, the increased allocations for the LAGC IFQ component under status quo (Section 2.3.1) will need to be fished

from areas that are accessible to the fishery. This could potentially increase overall fishing mortality on exploitable scallops available to the fishery.

Overall, these values are based on the most updated information; therefore, there should be positive impacts on the scallop resource from setting fishery limits with updated data. There may be some negative impacts on portions of the resource from higher allocations based on a higher ABC, but a large proportion of the resource is still protected in closed areas and the majority of the fishery is not allocated access based on the ABC. Instead, the limited access fishery has a limit of 94.5% of the ABC/ACL, but is allocated effort levels at ACT, or a annual catch target that is much lower. Compared to the No Action ABC, the proposed ABC values could have low negative impacts because some fishery allocations that are directly removed from the ABC will be higher, and some of the resource that led to an increase in overall ABC is not accessible to the fishery (juvenile scallops in closed areas). This could potentially increase effort in areas that are accessible, but the majority of scallop fishing effort overall is based on fishing targets well below both the No Action and proposed ABCs. Since fishing targets for the majority of the fishery are set lower than these limits, the plan reduces the risk of overfishing and optimizes overall yield from the fishery long term.

1.2 NORTHERN GULF OF MAINE TAC

The New England Council created LAGC Northern Gulf of Maine permit category and Northern Gulf of Maine Management Area through Amendment 11 to the Scallop FMP. Since its inception, the NGOM management area has been managed under a hard TAC of 70,000 lbs (through the Council has considered other TACs in the past). This TAC applies only to LAGC vessels fishing in the area under a trip limit of 200 lbs per day, and the area closes to all federal scallop permit holders when NMFS determines that the TAC has been reached. Scallop recruitment in the area is episodic.

Before this year, the NGOM was last surveyed in 2012. The ME DMR conducted a survey of the NGOM area in May and June of 2016, which overlapped with part of the 2016 fishing season, particularly in the southern extent of NGOM area off of Cape Ann.

The Northern Gulf of Maine Management Area closed on May 13, 2016 (74 day season) after it was determined that LAGC IFQ and LAGC NGOM permit holders had reached the NGOM TAC. Based on the rate of harvest in 2016, and recent survey results, it is reasonable to expect that harvest rates by the LAGC component in 2017 will be similar to those seen in 2016. It should also be noted that the number of LAGC vessels participating in the NGOM fishery has increased from a low of 9 total vessels (IFQ and NGOM) in 2012 to a high of 37 in 2016. Again, given recent fishery trends and strong survey results in 2016 relative to the last survey (2012), it is reasonable to expect that at least the same number of LAGC participants in the fishery in 2017. All federal scallop fishing in the NGOM is prohibited to all permit categories after the area closes.

Table 2 - Overview of biomass estimates from the 2016 NGOM survey.

Exploitation Rate = 0.20 Dredge Efficiency = 0.40	q0.05	q0.10	q0.15	q0.20	q0.25	Mean
Biomass Estimate (MT)	657	795	932	1018	1090	1651
TAC(MT)	131	159	186	204	218	330
Biomass Estimate (lbs)	1,447,797	1,751,822	2,055,240	2,244,263	2,402,140	3,640,385
TAC(lbs)	289,559	350,364	411,048	448,853	480,428	728,077

1.2.1 Alternative 1 – No Action (70,000 lb TAC)

The No Action alternative would maintain the NGOM TAC at 70,000 lbs. As LAGC catch exceeded the TAC in 2015 and 2016, and the accountability measure for the NGOM area is a pound for pound payback, there will be a roughly 20,000 lb reduction to the 2017 TAC. In practice, Alternative 1 would result in a roughly 50,000 lbs TAC for 2017.

The 2016 survey data and NGOM model runs suggest that 50,000 lbs of removals represents a fraction of the available exploitable biomass in the area. However, removals from the NGOM are not limited to 50,000 lbs as the area can be accessed by LA vessels operating under DAS. Limited access landings attributed to the NGOM management area were ~300,000lbs in 2016.

Alternative 1 would set the NGOM TAC at 70,000 lbs, which is well below all calculated TAC options in Table 2, assuming a F=0.2. When considering recent fishing behavior in the NGOM, Alternative 1 would likely result in a mid-season closure of the area, and landings by both the LA and LAGC components. An early closure is expected to result in lower realized F in the area because both LAGC and LA vessels would be prohibited from fishing the area after it is determined that the TAC is reached. Alternative 1 may mitigate some biological impact relative to Alternatives 2 and 3.

1.2.2 Alternative 2 – NGOM TAC based on survey and catch data

As noted above, ME DMR conducted a survey of the area in 2016 with support from the Scallop RSA funds. Biomass estimates were substantially higher in 2016 than they were the last time that the area was surveyed in 2012. The initial biomass estimates that were presented to the PDT assumed an F=0.38 and an F=0.26. The PDT requested a new model run using an F=0.2, with estimates at the q.25 and q.10. The PDT noted that the NGOM is a relatively "data poor" situation when compared to the annual surveys of Georges Bank and the Mid-Atlantic, and viewed the biomass estimates coming out of the F=0.2 runs as upper bounds of removals.

The 2016 survey data and NGOM model runs suggest that 50,000 lbs of removals represents a fraction of the available exploitable biomass in the area. However, removals from the NGOM are not limited to 50,000 lbs as the area can be accessed by LA vessels operating under DAS. Limited access landings attributed to the NGOM management area were ~300,000lbs in 2016.

To recognize recent fishing activity in the area, alternative 2 and its sub-Options would set the NGOM hard TAC would be set using biomass estimates from the 2016 survey and FY 2016 landings data from the LAGC IFQ, LAGC NGOM, and LA components. The TAC would be determined by multiplying the ratio of General Category/Limited Access landings with a range of biomass estimates using an F=0.2, and a dredge efficiency equal to 0.4. General category catch by IFQ and NGOM permits accounted for 23% of the landings attributed to the NGOM.

The NGOM hard TAC values considered in Alternative 2 follow values associated with a conservative fishing mortality (relative to the OFL and ABC in the federal fishery), as well as the low range of percentiles around the mean biomass estimate for the area. The biomass estimates for the area considered in Table 2 range from 1.45 million lbs to 3.64 million lbs. The TACs for the area range from 70,000 (Alt. 1) to 111,000 lbs (Alt. 2, Sub-Option 2). Considering the potential of an early closure in the NGOM management area, Alternative 2 would likely result in a neutral to low positive biological impact. When compared to Alternative 1, Alternative 2 and the corresponding sub-options may result in a low negative impact, though the difference between the Committee's preferred alternative (95,000 lbs) and Alternative 1, is 15,000 lbs.

1.2.1.1 Sub-Option 1 – NGOM TAC of 95,000 lbs

Sub-Option 1 would set the NGOM TAC at 95,000 lbs. As LAGC catch exceeded the TAC in 2015 and 2016, and the accountability measure for the NGOM area is a pound for pound payback, there will be a roughly 20,000 lb reduction to the 2017 TAC. In practice, Alternative 2, Sub-Option 1 would result in a roughly 75,000 lbs TAC for 2017.

The TAC associated with Sub-Option 1 (95,000 lbs) is well below all calculated TAC options in Table 2, assuming a F=0.2. When considering recent fishing behavior in the NGOM, sub-option 1 would likely result in a mid-season closure of the area. An early closure may result in a lower realized F in the area because both LAGC and LA vessels would be prohibited from fishing the area after it is determined that the TAC is reached. If landings by LAGC IFQ and NGOM permit holders track catch rates and TAC usage observed in 2016, Sub-Option 1 would likely result in neutral to low positive biological impacts relative to Sub-Option 2.

1.2.1.2 Sub-Option 2 – NGOM TAC of 111,000 lbs

The No Action alternative would set the NGOM TAC at 111,000 lbs. As LAGC catch exceeded the TAC in 2015 and 2016, and the accountability measure for the NGOM area is a pound for pound payback, there will be a roughly 20,000 lb reduction to the 2017 TAC. In practice, Alternative 2, Sub-Option 2 would result in a roughly 91,000 lbs TAC for 2017.

Alternative 3 would set the NGOM TAC at 111,000 lbs, which is well below all calculated TAC options in Table 2, assuming a F=0.2.

When considering recent fishing behavior in the NGOM, Alternative 2 would likely result in a mid-season closure of the area. An early closure is expected to result in lower realized F in the area because both LAGC and LA vessels would be prohibited from fishing the area after it is determined that the TAC is reached. If landings by LAGC IFQ and NGOM permit holders track catch rates and TAC usage observed in 2016, Sub-Option 2 would likely result in neutral to low negative biological impacts relative to Sub-Option 1.

1.3 APPLYING SPATIAL MANAGEMENT TO THE SPECIFICATION SETTING PROCESS (ACL FLOWCHART)

In this Action the Council is considering applying spatial management to the specification setting process, such that both the LA and LAGC IFQ components allocations would be based on spatial management. The status quo approach (Section 2.3.1) in this action would continue to set the LAGC IFQ allocations at 5.5% of the ACL. Alternative 2 (Section 2.3.2) would set the LAGC IFQ allocations at 5.5% of the projected landings of the fishery.

There are eight separate specification alternatives under consideration within Sections 2.3.1 and 2.3.2 in the document. In order to assess the potential impacts of the various specification alternatives compared to the current fishing year, the PDT also developed a "Status Quo" run with the FY 2016 management measures.

Table 3. Framework 28 projections with alternative specifications

ALT1 - No Action – Default measures set in Framework 28	34.55 open area DAS, 1 Megatron trip, LAGC IFQ allocation=4.5 mill.lb.
ALT2 - Basic Run – IFQ allocations=5.5% of ACL	30 DAS, LAGC IFQ allocation=5.5 mill.lb.
ALT3 – Basic Run – IFQ Allocations= 5.5% of Projected landings (Same for Basic Run+ ETC Flex at 30 DAS)	30 DAS, LAGC IFQ allocation=2.6 mill. lb.
ALT4 – Basic Run with Open area F=0.4, IFQ Allocations= 5.5% of Projected landings (Same for Basic Run+ETC Flex at F=0.4)	27.56 DAS, LAGC IFQ allocation=2.5 mill. lb.
ALT5 **– NEW RUN:** Basic Run with NLS extension+ETC Flex (F=0.44), IFQ Allocations= 5.5% of projected landings	29.20 DAS, LAGC IFQ allocation=2.4 mill. lb.
ALT6 –ETC Flex – IFQ Allocations= 5.5% of Projected landings	30 DAS, LAGC IFQ allocation=2.6 mill.
ALT7 –ETC Flex – IFQ Allocations= 5.5% of ACL	30 DAS, LAGC IFQ allocation=5.5 mill.
SQ - Status Quo scenario	34.55 open area DAS, 3 Megatron trips, LAGC IFQ allocation=4.5 mill.lb.

Additional Runs Completed for Analysis Purposes Only:

- Section 2.3.1.1.4 – Status Quo – 2017 management measures, Status Quo Allocations

1.3.1.1 Projected Total Biomass:

Overall the projected biomass for the various runs are very similar. In 2017 the projected biomass is nearly the same for all runs. In the ST (2016 and 2017) the No Action run has higher biomass because effort levels were assumed to be lower in 2017. In general, the alternative that assume spatial management allocations have slightly higher ST and LT biomass compared to other alternatives status quo alternatives, but overall there is very little difference in total biomass projections between the alternatives. Among the alternatives that consider spatial management (Section 2.3.2), run 1. No Action would result in the highest short-term projected biomass, though there is very little difference between the alternatives. It is important to keep in

mind that these are mean values, and based on various assumptions for natural mortality and future recruitment, projected landings can vary.

Figure 1 – Comparison of projected total scallop biomass (mt).

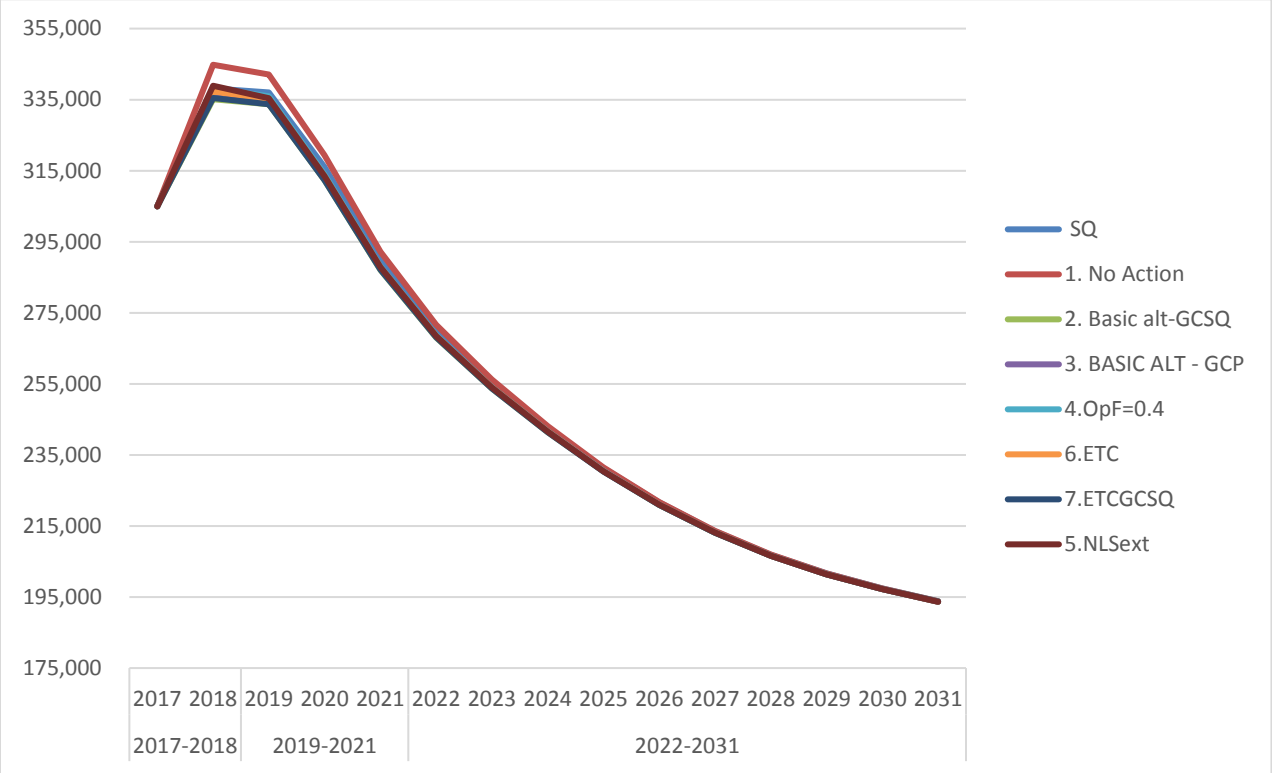


Table 4 - Projected Biomass (mt) for alternatives under consideration.

	FY	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.OpF=0.4	6.ETC	7.ETC GCSQ	5.NLS ext
2017-2018	2017	304,955	304,955	304,955	304,955	304,955	304,955	304,991	304,955
	2018	338,143	344,818	335,111	337,003	338,214	337,260	335,475	338,911
Total		**643,098**	**649,773**	**640,066**	**641,958**	**643,169**	**642,215**	**640,466**	**643,866**
2019-2021	2019	337,019	342,060	333,665	335,130	335,954	335,119	333,701	335,425
	2020	316,084	319,351	312,363	313,412	313,935	313,406	312,390	313,480
	2021	290,138	292,129	287,060	287,723	288,050	287,783	287,154	287,829
Total		**943,241**	**953,540**	**933,088**	**936,265**	**937,939**	**936,308**	**933,245**	**936,734**
2022-2031	2022	270,468	271,619	268,043	268,446	268,622	268,469	268,085	268,489
	2023	255,538	256,194	253,719	253,963	254,055	253,955	253,719	253,961
	2024	242,718	243,089	241,402	241,551	241,598	241,529	241,382	241,525
	2025	231,267	231,473	230,337	230,428	230,452	230,408	230,317	230,399
	2026	221,599	221,710	220,952	221,008	221,020	220,994	220,938	220,983
	2027	213,569	213,629	213,125	213,159	213,165	213,150	213,116	213,140
	2028	206,909	206,940	206,606	206,601	206,604	206,596	206,601	206,587
	2029	201,618	201,634	201,413	201,383	201,384	201,380	201,410	201,373
	2030	197,399	197,408	197,261	197,216	197,216	197,214	197,259	197,209
	2031	193,811	193,816	193,718	193,664	193,664	193,663	193,717	193,659
Total		**2,234,896**	**2,237,512**	**2,226,576**	**2,227,419**	**2,227,780**	**2,227,358**	**2,226,544**	**2,227,325**
Grand Total		**3,821,235**	**3,840,825**	**3,799,730**	**3,805,642**	**3,808,888**	**3,805,881**	**3,800,255**	**3,807,925**

1.3.1.2 Projected Landings:

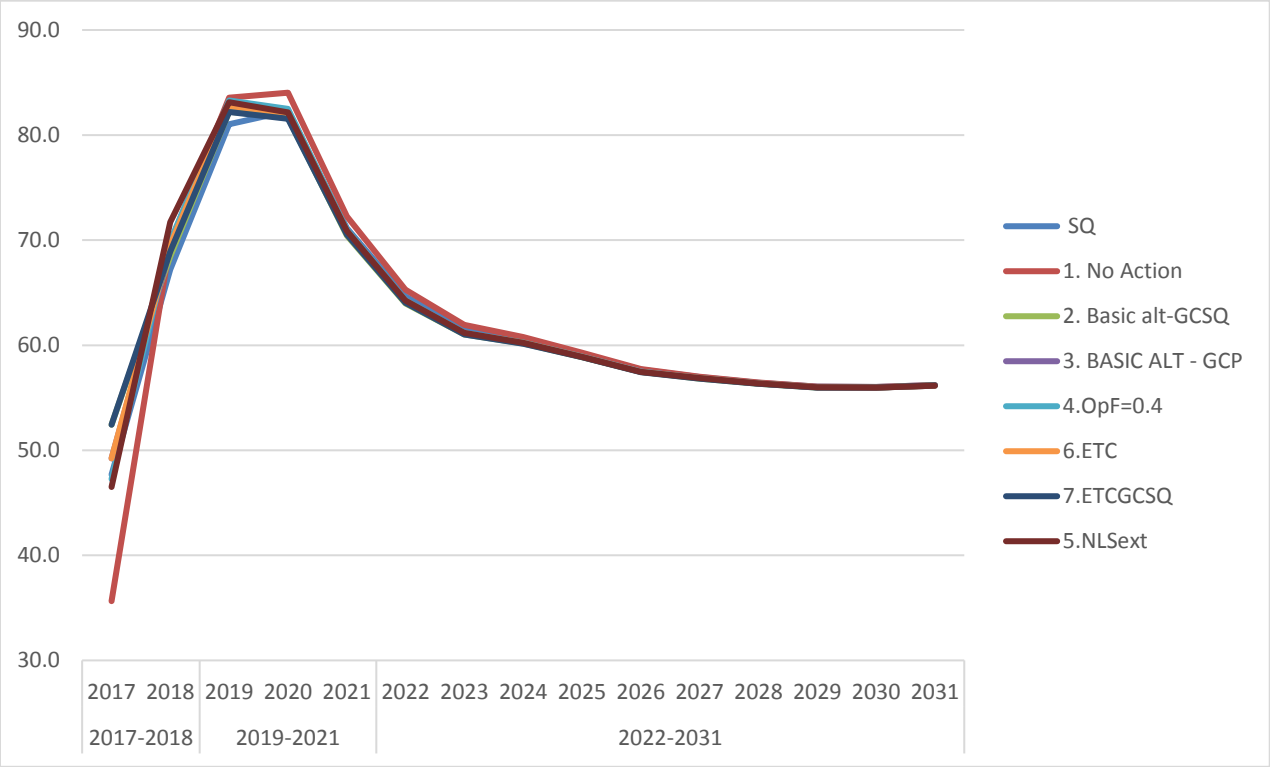
Overall the projected landings for the various runs are very similar (Table 5). In 2017 the projected landings for the options in Section 2.3.1 are identical, about 52.4 million pounds when the LAGC IFQ component is allocated based on the ACL. Options is Section 2.3.2 are also very similar, with projected landings ranging from 49.2 million lbs to 46.5 million pounds. Run 5.NLSext would include the current NLS-extention rotational closure as part of the NLS AA, so the total projected landings are lower because this area was considered to have the highest potential LPUE of open areas in other model run. The estimated open area LPUE is around 100 pounds lower in this option, which reduces the projected landings when compared to the other options in Section 2.3.2. No Action projected landings in 2017 are lower, by about 14 million pounds because it only includes default measures which are reduced allocations (about 34.55 DAS and 1 access area trip). For the 2017 and 2018 period the projected landings are very similar, as are the results in the long term.

It is important to keep in mind that these are mean values, and based on various assumptions for natural mortality and future recruitment, projected landings can vary.

Table 5 - Projected Total Landings for Alternatives under Consideration.

=	FY	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.OpF=0.4	6.ETC	7.ETCGCSQ	5.NLSext
2017-2018	2017	47.7	35.6	52.4	49.2	47.3	49.2	52.4	46.5
	2018	67.2	69.7	68.5	69.2	69.9	69.5	68.9	71.7
Total		**114.9**	**105.4**	**120.9**	**118.4**	**117.1**	**118.7**	**121.3**	**118.2**
2019-2021	2019	81.0	83.5	82.2	82.8	83.3	82.8	82.2	83.1
	2020	82.3	84.0	81.7	82.2	82.5	82.1	81.6	82.2
	2021	71.1	72.3	70.4	70.8	71.0	70.8	70.5	70.9
Total		**234.4**	**239.8**	**234.3**	**235.8**	**236.8**	**235.7**	**234.3**	**236.2**
2022-2031	2022	64.6	65.3	64.0	64.2	64.3	64.2	64.0	64.3
	2023	61.6	61.9	61.0	61.1	61.2	61.1	61.0	61.2
	2024	60.6	60.8	60.2	60.2	60.2	60.2	60.1	60.2
	2025	59.2	59.3	58.9	58.9	58.9	58.9	58.8	58.9
	2026	57.7	57.7	57.4	57.5	57.5	57.5	57.4	57.5
	2027	57.0	57.0	56.8	56.9	56.9	56.9	56.8	56.9
	2028	56.4	56.4	56.3	56.4	56.4	56.4	56.3	56.4
	2029	56.0	56.1	56.0	56.0	56.0	56.0	56.0	56.0
	2030	56.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0
	2031	56.2	56.2	56.2	56.1	56.1	56.1	56.2	56.1
Total		**585.2**	**586.8**	**582.7**	**583.2**	**583.5**	**583.3**	**582.7**	**583.3**
Grand Total		**934.6**	**932.0**	**937.9**	**937.4**	**937.4**	**937.7**	**938.3**	**937.7**

Figure 2 - Comparison of projected scallop landings (mt).



1.3.1.3 Fishing Mortality

- All the alternatives under consideration have a total estimate of fishing mortality considerably lower than the limit used for setting fishery allocations for the fishery overall. The ACT, or annual catch target includes on overall fishing limit of 0.34 for the total fishery. The range of total fishing mortality under consideration is between 0.05 (No Action) and 0.18 for options in Section 2.3.1, run 7.ETC GCSQ.
- Because there is currently a relatively large amount of total biomass within EFH, GF closed areas, as well as very high abundances of juvenile scallops in MA closed areas, GB closed areas, and open areas, much of the total biomass is small and not accessible to the fishery. Therefore, the overall F rates are projected to be very low for the fishery.
- The total fishing mortality is constrained by the fishing target principle that does not enable fishing effort to increase above Fmsy in open areas (0.48). When open area fishing mortality is set at this maximum, combined with effort in access areas that is higher to optimize yield in those areas, and zero fishing mortality on scallop in closures the overall fishing mortality projections are relatively low.
- Therefore, the risk of overfishing is relatively low for all of the alternatives under consideration since the projected F rates are well below 0.34. However, the model tends to underestimate fishing mortality. In recent years when the Scallop PDT has evaluated the projected F rate compared with the actual F rate the following year, total F has been underestimated by 20-30% in some years.
- There are two key distinctions in the mode configurations in Framework 28. The first is how fishing mortality is likely to be distributed within the Mid-Atlantic access areas

(Hudson Canyon, Elephant Trunk, and Delmarva). The second is the model's expectation about open area fishing under LA DAS.

- The Basic Run alternatives would allocate two trips to the MAAA and maintain the ET rotational closure, with the flex option would make the ET rotational closure an access area. In general, opening the ETC area for fishing reduces the expected F rates HC, ETop. and DMV, while the F associated with the ETcl area is remains low (F=0.078). See Table 12.
- Moving the NLS-ext into the NLS AA has effect of increasing the assumed F rates in other open areas (Table 13). When the NLS-ext is part of the NLS AA, the F rate reduces from F=0.65 to F=0.12).

Table 6 - Projected Average Open Area F for alternatives under consideration.

	FY	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.Op F=0.4	6.ETC	7.ETC GCSQ	5.NLSext
2017-2018	2017	0.59	0.62	0.46	0.44	0.40	0.44	0.46	0.44
	2018	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Total		**0.54**	**0.55**	**0.47**	**0.46**	**0.44**	**0.46**	**0.47**	**0.46**
2019-2021	2019	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2020	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2021	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Total		**0.48**	**0.48**	**0.48**	**0.48**	**0.48**	**0.48**	**0.48**	**0.48**
2022-2031	2022	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2023	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2024	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2025	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2026	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2027	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2028	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2029	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2030	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
	2031	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Total		**0.48**	**0.48**	**0.48**	**0.48**	**0.48**	**0.48**	**0.48**	**0.48**
Grand Total		**0.49**	**0.49**	**0.48**	**0.48**	**0.47**	**0.48**	**0.48**	**0.48**

Table 7 - Projected Average of FT LA DAS for alternatives under consideration.

	FY	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.Op F=0.4	6.ETC	7.ETC GCSQ	5.NLS ext
2017-2018	2017	34.50	34.50	30.00	30.00	27.56	30.00	30.00	29.20
	2018	33.40	33.10	35.70	35.70	36.24	35.80	34.00	36.00
Total		**33.95**	**33.80**	**32.85**	**32.85**	**31.90**	**32.90**	**32.00**	**32.60**
2019-2021	2019	53.10	55.70	58.10	58.10	58.44	59.00	56.00	59.10
	2020	70.60	72.20	74.70	74.70	74.87	74.60	72.00	74.60
	2021	59.50	60.30	63.60	63.60	63.81	63.80	60.00	63.90
Total		**61.07**	**62.73**	**65.47**	**65.47**	**65.71**	**65.80**	**62.67**	**65.87**
2022-2031	2022	56.30	56.80	60.00	60.00	60.12	60.10	57.00	60.20
	2023	55.70	56.00	59.00	59.00	59.08	59.10	56.00	59.10
	2024	55.90	56.00	59.00	59.00	59.05	59.00	56.00	59.10
	2025	55.60	55.70	58.20	58.20	58.22	58.20	55.00	58.20
	2026	55.00	55.00	57.50	57.50	57.51	57.50	55.00	57.50
	2027	55.10	55.10	57.40	57.40	57.38	57.40	55.00	57.40
	2028	54.90	54.90	57.10	57.10	57.07	57.10	55.00	57.10
	2029	54.90	54.90	56.90	56.90	56.88	56.90	55.00	56.90
	2030	55.30	55.30	57.00	57.00	57.02	57.00	55.00	57.00
	2031	55.40	55.40	57.10	57.10	57.10	57.10	55.00	57.10
Total		**55.41**	**55.51**	**57.92**	**57.92**	**57.94**	**57.94**	**55.40**	**57.96**
Grand Total		**53.68**	**54.06**	**56.09**	**56.09**	**56.02**	**56.17**	**53.73**	**56.16**

Table 8 - Projected Average LPUE of Open Areas for alternatives under consideration.

	Fishing year	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.OpF= 0.4	6.ETC	7.ETCG CSQ	5.NLS ext
2017-2018	2017	2095	2070	2312	2323	2349	2323	2312	2227
	2018	2320	2306	2320	2329	2352	2329	2320	2365
Total		**2208**	**2188**	**2316**	**2326**	**2351**	**2326**	**2316**	**2296**
2019-2021	2019	2459	2481	2462	2470	2478	2478	2473	2494
	2020	2836	2852	2836	2839	2841	2835	2831	2841
	2021	2790	2801	2791	2793	2794	2788	2785	2791
Total		**2695**	**2711**	**2696**	**2701**	**2704**	**2700**	**2696**	**2709**
2022-2031	2022	2664	2674	2667	2668	2669	2665	2663	2666
	2023	2583	2589	2585	2586	2586	2584	2583	2585
	2024	2557	2560	2558	2558	2558	2558	2557	2558
	2025	2542	2544	2542	2543	2543	2542	2542	2543
	2026	2515	2516	2515	2515	2515	2515	2515	2515
	2027	2500	2500	2500	2500	2500	2500	2500	2500
	2028	2493	2493	2493	2493	2493	2493	2493	2493
	2029	2489	2490	2489	2489	2489	2489	2490	2489
	2030	2486	2486	2486	2485	2485	2485	2486	2485
	2031	2490	2490	2490	2490	2490	2490	2490	2490
Total		**2532**	**2534**	**2533**	**2533**	**2533**	**2532**	**2532**	**2532**
Grand Total		**2521**	**2523**	**2536**	**2539**	**2543**	**2538**	**2536**	**2536**

Table 9 - Projected average LPUE all areas

subperiod	FY	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.OpF =0.4	6.ETC	7.ETC GCSQ	5.NLS ext
2017-2018	2017	2240	2139	2580	2593	2620	2635	2627	2582
	2018	2707	2709	2680	2685	2694	2681	2675	2704
Total		**2474**	**2424**	**2630**	**2639**	**2657**	**2658**	**2651**	**2643**
2019-2021	2019	2842	2847	2813	2817	2821	2809	2805	2821
	2020	2935	2949	2903	2906	2907	2902	2899	2907
	2021	2896	2906	2869	2871	2872	2866	2863	2869
Total		**2891**	**2901**	**2862**	**2865**	**2867**	**2859**	**2856**	**2866**
2022-2031	2022	2777	2785	2757	2758	2759	2755	2753	2756
	2023	2695	2701	2680	2682	2682	2680	2679	2680
	2024	2664	2667	2654	2654	2654	2654	2653	2654
	2025	2646	2648	2638	2639	2639	2638	2638	2638
	2026	2618	2619	2612	2612	2612	2612	2612	2612
	2027	2601	2601	2597	2597	2597	2596	2597	2596
	2028	2592	2592	2589	2589	2589	2589	2589	2589
	2029	2587	2587	2585	2584	2584	2584	2585	2584
	2030	2582	2582	2581	2580	2580	2580	2581	2580
	2031	2586	2586	2585	2584	2584	2584	2585	2584
Total		**2635**	**2637**	**2628**	**2628**	**2628**	**2627**	**2627**	**2627**
Grand Total		**2665**	**2661**	**2675**	**2677**	**2680**	**2678**	**2676**	**2677**

Table 10 - Projected Average Overall F for alternatives under consideration.

subperiod	Fishing year	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.OpF =0.4	6.ETC	7.ETC GCSQ	5.NLS ext
2017-2018	2017	0.08	0.05	0.17	0.16	0.15	0.16	0.18	0.11
	2018	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.17
Total		**0.12**	**0.10**	**0.16**	**0.15**	**0.15**	**0.15**	**0.16**	**0.14**
2019-2021	2019	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16
	2020	0.18	0.19	0.18	0.18	0.18	0.18	0.18	0.18
	2021	0.17	0.17	0.16	0.17	0.17	0.17	0.16	0.17
Total		**0.17**	**0.17**	**0.16**	**0.17**	**0.17**	**0.17**	**0.16**	**0.17**
2022-2031	2022	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
	2023	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
	2024	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
	2025	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16
	2026	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
	2027	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	2028	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	2029	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
	2030	0.20	0.20	0.19	0.20	0.20	0.20	0.19	0.19
	2031	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Total		**0.18**	**0.18**	**0.18**	**0.18**	**0.18**	**0.18**	**0.18**	**0.18**
Grand Total		**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**

1.3.1.4 Swept Area:

- Area swept is an indicator of the level of fishing associated with each alternative; higher area swept values represent higher potential impacts on the resource and associated impacts.
- Overall, all the alternatives under consideration have similar total area swept estimates, about 2,900 - 3,200 square nautical miles in 2016 and very similar for the first 2 years combined (Figure 3 and Table 11).
- The DAS option of F=0.4 in Section 2.3.2 (Allocations based on projected landings) would result in the lowest swept area for two reasons: 1) this is the lowest open area F rate among all alternatives, and it includes the NLS-ext as open bottom, where LPUE is expected to be very high relative to other open areas. The status quo and No Action would result in the highest swept area because they would set FT LA DAS at 34.55, which is around 1,000 DAS more than the next highest option under consideration.
- Run 5.NLS-ext, which includes the NLS-ext as part of the NLS AA would increase swept area relative to the other options because it is the only run that does not consider this area available for open bottom DAS. As such, the model sends effort to other areas which are expected to have a lower LPUE, and more bottom time is need to realize landings.

Figure 3 - Comparison of total swept area (sqnm)

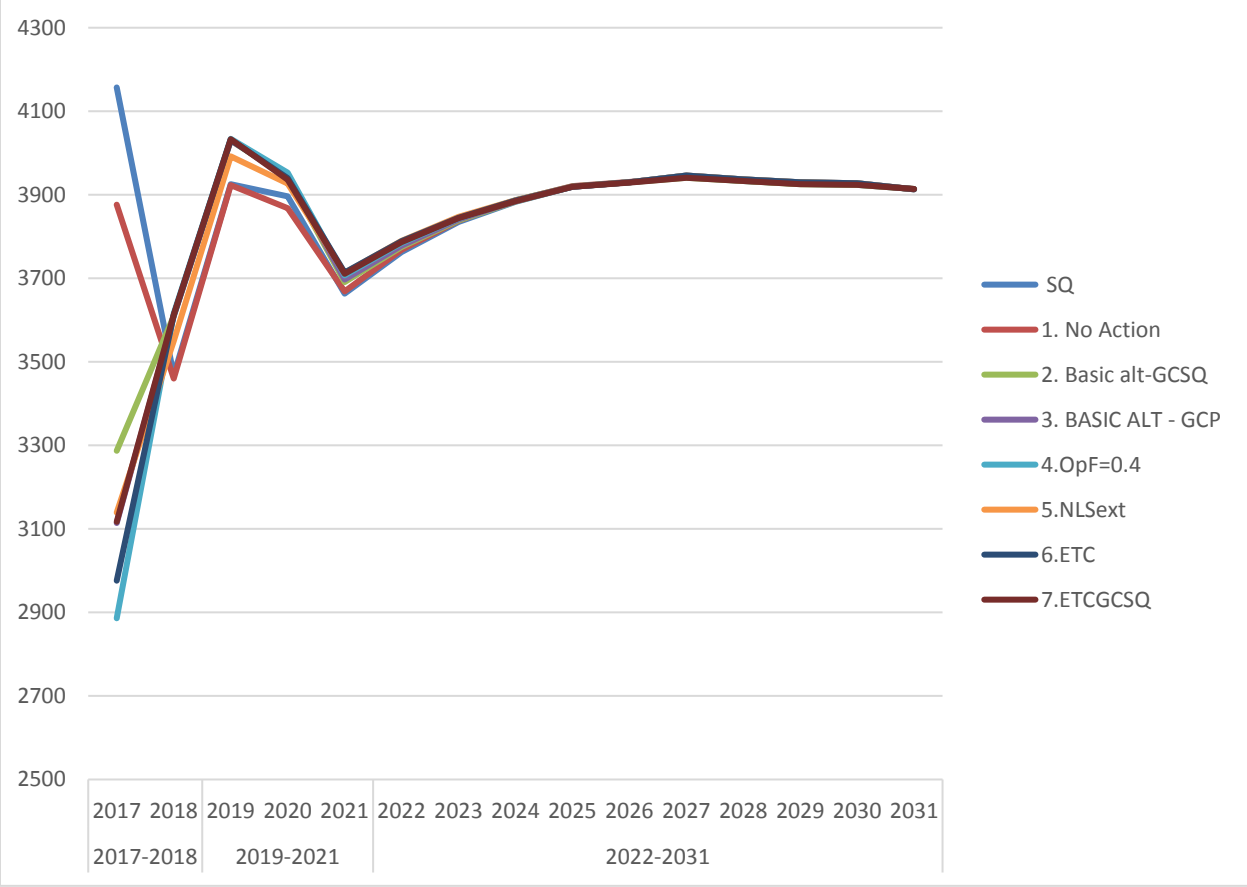


Table 11 - Comparison of projected total area swept (sqnm).

subperiod	FY	SQ	1. No Action	2. Basic alt-GCSQ	3. BASIC ALT - GCP	4.OpF =0.4	5.NLS ext	6.ETC	7.ETC GCSQ
2017-2018	2017	4157	3876	3287	3114	2886	3139	2976	3117
	2018	3468	3460	3610	3610	3616	3550	3612	3613
Total		**7625**	**7336**	**6897**	**6724**	**6502**	**6689**	**6588**	**6730**
2019-2021	2019	3925	3923	4030	4030	4034	3992	4032	4033
	2020	3896	3868	3942	3946	3953	3927	3940	3936
	2021	3663	3669	3691	3697	3707	3713	3714	3711
Total		**11484**	**11460**	**11663**	**11673**	**11694**	**11632**	**11686**	**11680**
2022-2031	2022	3763	3768	3775	3778	3784	3790	3789	3787
	2023	3835	3838	3839	3841	3843	3847	3845	3844
	2024	3883	3886	3884	3885	3887	3887	3886	3885
	2025	3919	3921	3919	3919	3920	3920	3919	3919
	2026	3930	3931	3930	3930	3930	3930	3930	3929
	2027	3942	3943	3941	3946	3946	3946	3946	3941
	2028	3933	3934	3933	3937	3937	3937	3937	3933
	2029	3926	3926	3925	3930	3930	3930	3930	3925
	2030	3924	3925	3924	3928	3928	3928	3928	3924
	2031	3914	3914	3914	3913	3913	3913	3913	3914
Total		**38969**	**38986**	**38984**	**39007**	**39018**	**39028**	**39023**	**39001**
Grand Total		**58078**	**57782**	**57544**	**57404**	**57214**	**57349**	**57297**	**57411**

Table 12 - Comparison of SAMS area F rates for model runs.

Section 2.3.2	Allocations based on GC receiving 5.5% of Projected Landings							
Area	Basic Run/30 DAS (F=0.44)		Basic Run/F=0.4		Basic Run w/ ETC Flex/30 DAS		Basic Run, ETC Flex, NLSext New Run (F=0.44)	
	2017	2018	2017	2018	2017	2018	2017	2018
Mid-Atlantic Access Areas								
HCS	0.35	0.4	0.35	0.4	0.21	0.4	0.21	0.4
ETOp	0.35	0.4	0.35	0.4	0.21	0.4	0.21	0.4
ETCl	0	0.2	0	0.2	0.078	0.2	0.078	0.2
Dmv	0.1	0.1	0.1	0.1	0.08	0.1	0.08	0.1
Georges Bank Access Areas								
CL2-Acc	0.49	0.25	0.49	0.25	0.49	0.25	0.49	0.25
NLS-AccN	0.48	0	0.48	0	0.48	0	0.48	0
NLS-AccSshal	0.27	0	0.27	0	0.27	0	0.16	0
NLS-AccSdeep	0	0	0	0	0	0	0	0
Mid-Atlantic Open								
NYB	0.47	0.59	0.42	0.6	0.47	0.59	0.5	0.58
LI	0.38	0.42	0.35	0.42	0.38	0.42	0.41	0.41
Inshore	0.25	0.26	0.23	0.26	0.25	0.26	0.27	0.25
Virginia	0.19	0.2	0.17	0.2	0.19	0.2	0.2	0.2
Georges Bank Open								
NLS-Ext	0.65	0.73	0.65	0.72	0.65	0.73	0.13	0.74
Sch	0.39	0.42	0.36	0.42	0.39	0.42	0.42	0.41
NE	0.49	0.58	0.45	0.58	0.49	0.58	0.53	0.57
SF	0.39	0.42	0.36	0.42	0.39	0.42	0.42	0.41
Rotational Closures								
CL1-NA	0	0	0	0	0	0	0	0
CL1-Acc	0	0	0	0	0	0	0	0
CL2-NA	0	0	0	0	0	0	0	0
NLS-NA	0	0	0	0	0	0	0	0
CL2-Ext	0	0.25	0	0.25	0	0.25	0	0.25

Table 13 - Comparison of F rates in the open bottom under various DAS options. Note that the rundescribed in column C considers the NLS-ext to be part of the NLS AA.

Area	30 DAS (F=0.44)	F=0.4	Basic Run, ETC Flex, NLSext New Run (F=0.44)
	A	B	C
Mid-Atlantic			
NYB	0.47	0.42	0.5
LI	0.38	0.35	0.41
Inshore	0.25	0.23	0.27
Virginia	0.19	0.17	0.2
NLS-Ext	0.65	0.65	0.13
Sch	0.39	0.36	0.42
NE	0.49	0.45	0.53
SF	0.39	0.36	0.42

1.3.1.5 Fishing Effort

Fishing year 2016 effort (hours fished) was analyzed using VMS data from both LA and LAGC IFQ vessels from March – October of 2016. The number of hours fished were binned into 3nm grid, and vessel speed of 2-5 knots used to designate fishing activity. Positions that fall outside this range are not included. A three (3) permit filter for each grid cell (3 or more boats fished the grid cell) was applied, and cells with less than 20 hours of activity are not depicted. The following figures depict the LA effort, LAGC effort, and combined effort of all components (Figure 4, Figure 5, and Figure 6).

With no access areas available to the LA component in the Georges Bank area, all access area effort in concentrated within the Mid-Atlantic Access Area, where two trip at 17,000 pounds were allocated to full time LA vessels. The majority of effort in the MAAA appears to be in the ET open and southern portion of HC, though effort increased slightly in the DMV as the year progressed.

The LAGC IFQ component's effort is broadly distributed throughout the range of the resource. Effort within the NLS access area appears to be confined to the northern boundary of the access area, while effort in the MAAA was highest along the southern boundary of the Elephant Trunk rotational closure area. Open bottom fishing has been concentrated off of Chatham and Provincetown in the Georges Bank/Gulf of Maine region, and south of Long Island around Hudson Canyon in the Mid-Atlantic.

Figure 4 - Limited Access effort in hours fished for FY2016 (March - October).

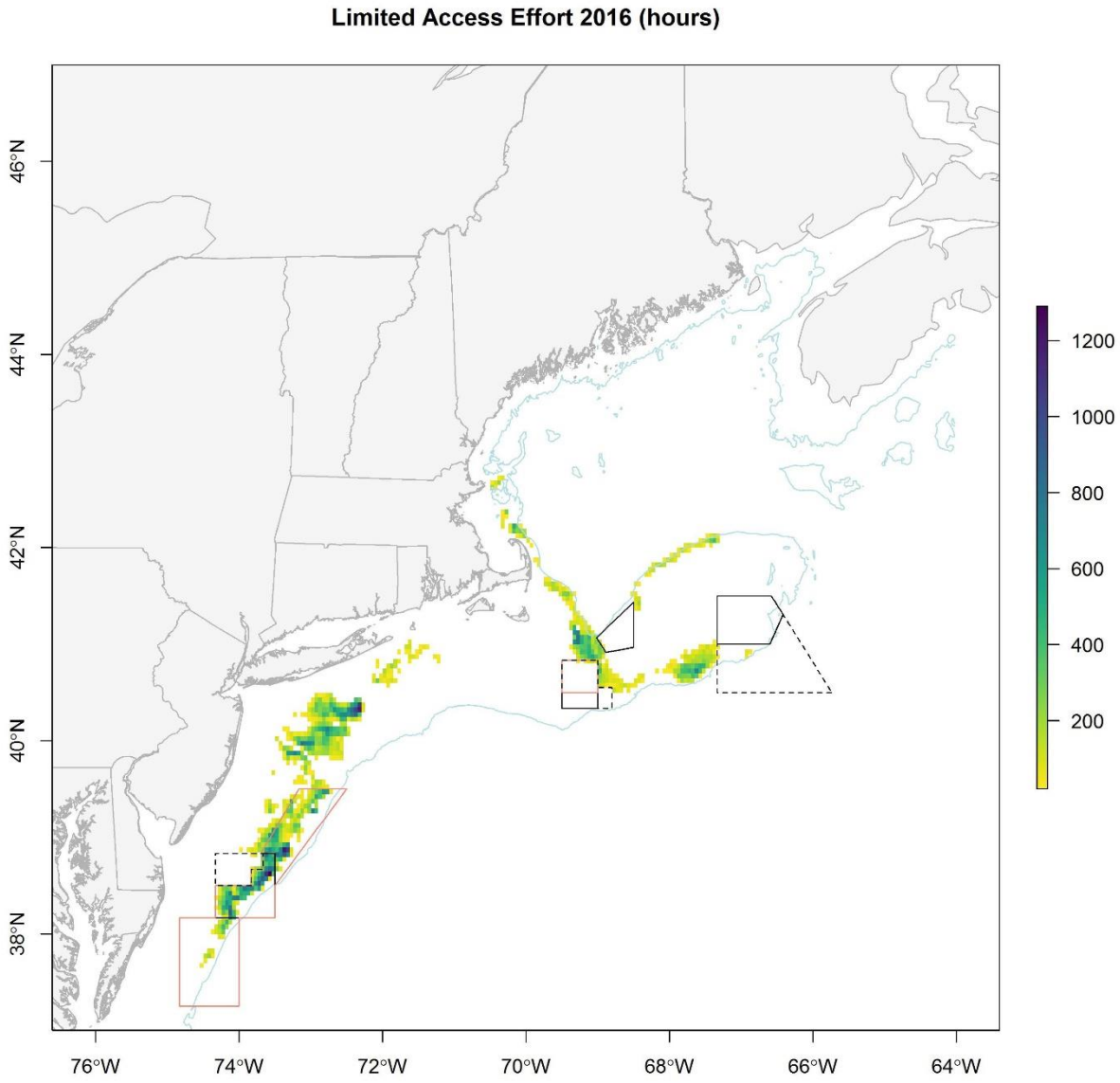


Figure 5 - General Category effort as hours fished in FY2016 (March - October).

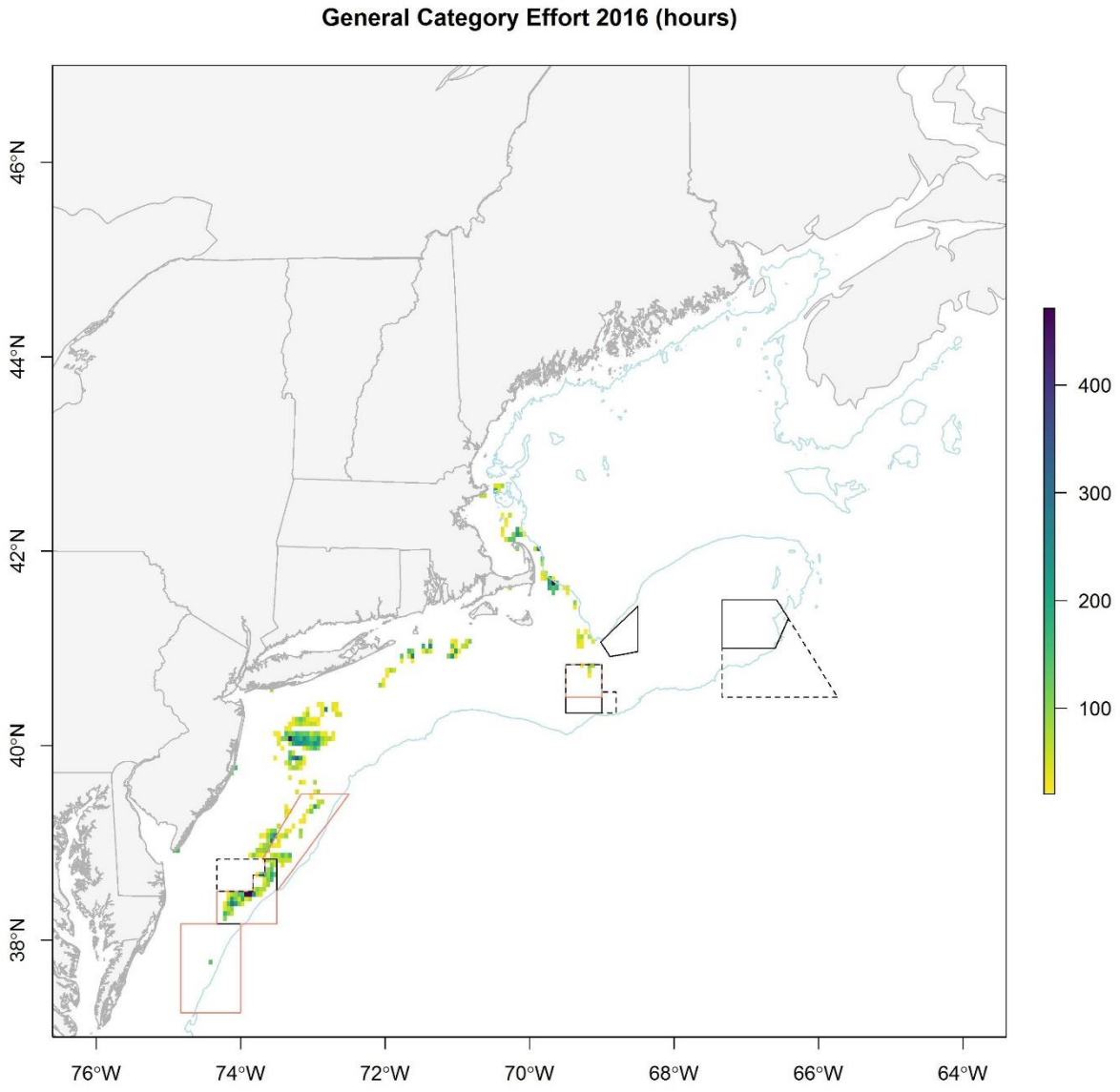
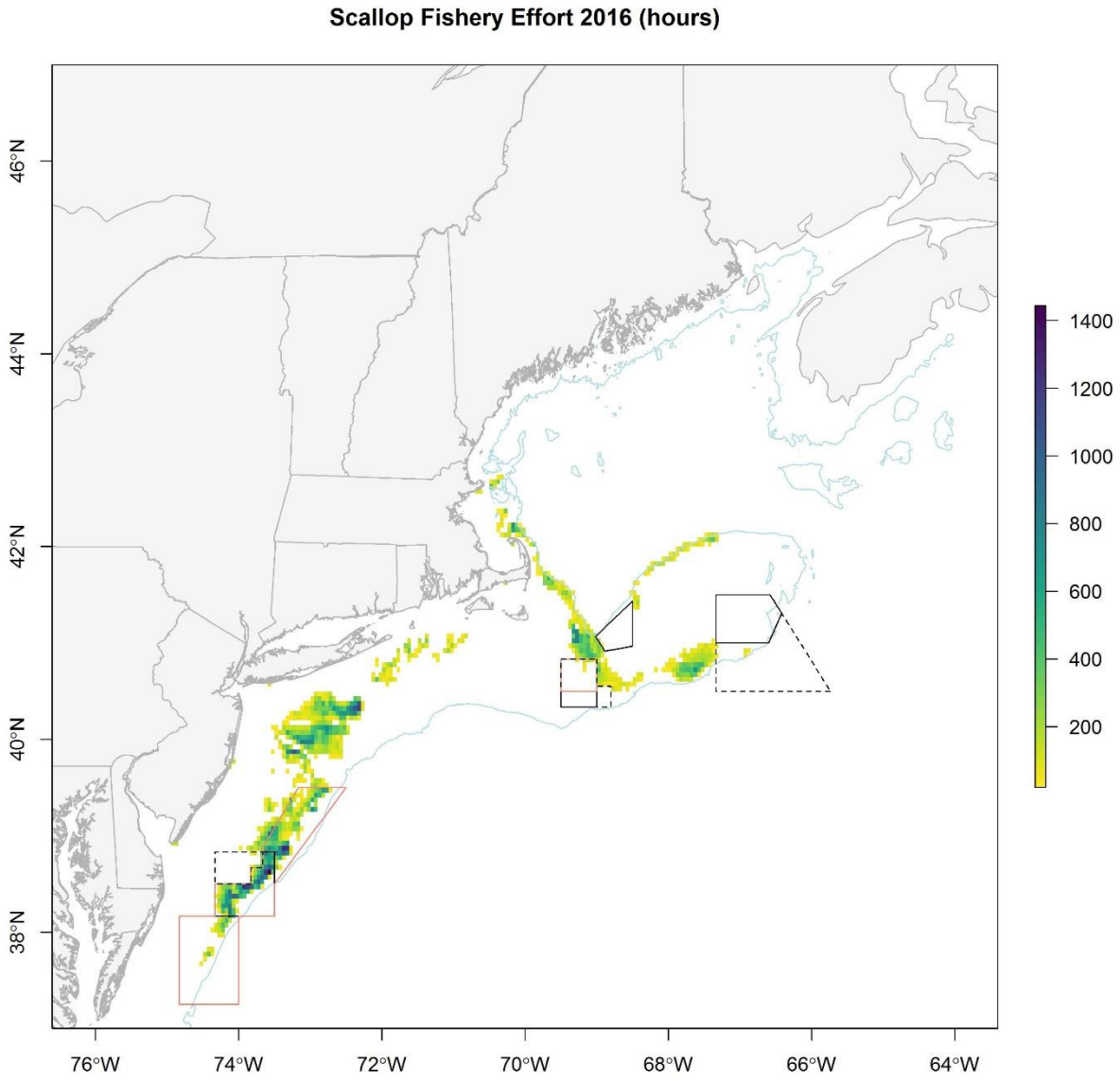


Figure 6 - Scallop fishery effort (LA and LAGC IFQ) by hours fished for FY2016 (March - October).



1.3.1.6 Projected size frequency per area:

The Scallop PDT has completed projections of shell height frequencies per area for the next several years to evaluate the potential composition of scallops in each area based on 2016 survey results and estimated growth, fishing mortality, and natural mortality. This section includes a subset of the areas to illustrate the potential size composition of scallops for different areas. The black line in the following figures is the size and frequency of scallops measured in the 2016 survey season, the blue line is the projected size and frequency of those scallops for May 2017, and finally the red line is the projected size and frequency of the same scallops for May 2017. These estimates assumed fishing effort based on F=0.38 in all areas.

In general the majority of scallops in open areas in both GB and MA are projected to be in the 100-120mm range with some larger and smaller. The Elephant Trunk Open and Closed areas are provided for comparative purposes for the Basic Run and the Basic Run with Elephant Trunk rotational flex options. The animals from the last large recruitment event will be four years old next year. The 2016 surveys did not see signs of incoming recruitment throughout the range of the fishery.

Figure 7 - Projected size frequency of the Elephant Trunk Open Area

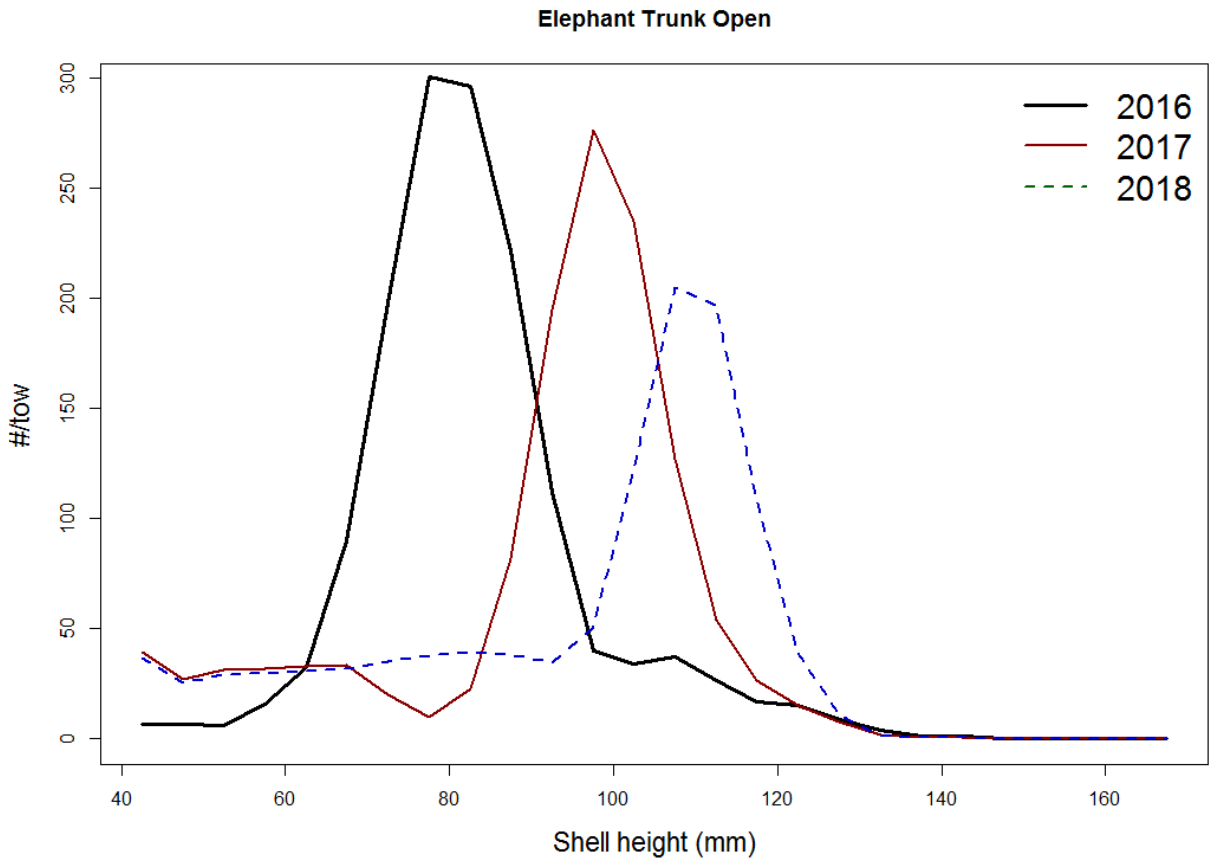
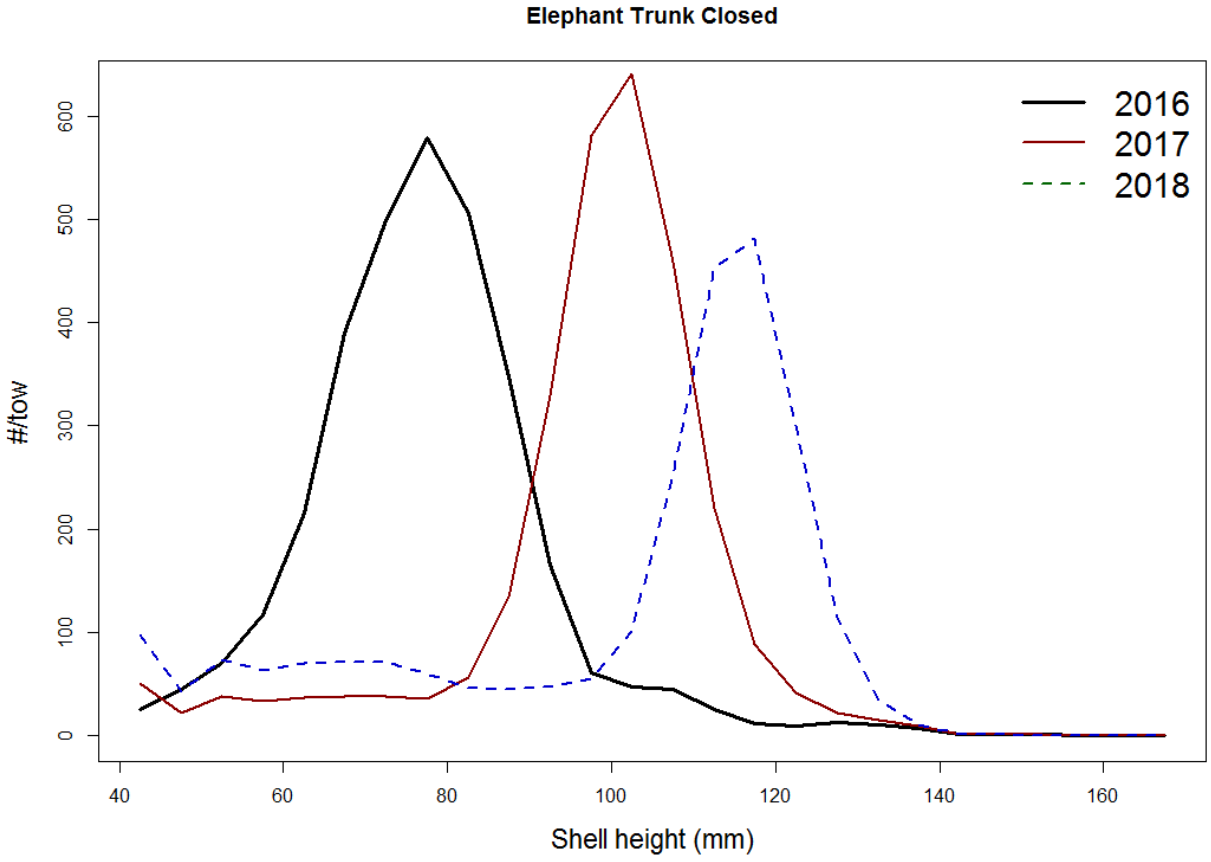


Figure 8 - Projected Size Frequency of Elephant Tunk Closed



1.3.1 Alternative 1 – Status Quo setting of Specifcations

There would be no change to the current process of specifying allocations to the LA and LAGC IFQ components of the fishery. The LAGC IFQ allocation would continue to be based on 5.5% of the ACL. In years when the ACL is much higher than projected landings, the LAGC component receives more than 5.5% of projected landings. This component of the fishery has the flexibility to harvest scallops in open areas or access areas (provided trips are available), through the range of the fishery is constrained to small dredge exemption areas (a groundfish regulation). When compared to Alternative 2 (Section 2.3.2), Alternative 1 would be expected to have a low negative biological impact on the fishery because allocations would not be based on the projected landings associated with spatial management.

1.3.1.1 Overall Fishery Specifications Under Status Quo

1.3.1.1.1 Alternative 1 – Basic Run at 30 DAS (F=0.46)

Alternative 1 would allocate FT LA vessels four access area trips (18,000 lb trip limit) and 72,000 pounds in access areas. Projected landings under this alternative would be 52.4 million lbs, which is driving by the LAGC IFQ allocation based on status quo. This alternative would allocate one trip the NLS AA, one to CAII S AA, and 2 trips to the MAAA. The Elephant Trunk rotational closure area would remain in place, as would the CAII extension rotational closure. This option is nearly identical to Alternative 2 – the only difference between these options is

where harvest/removals can take place within the MAAA. From an overall resource perspective, Alternaitve 1 would result in the similar overall F rates as Alternative 2 (depending on DAS options). Alternative 1 would result in higher F rates in the HC, ETopen, and DMV, but a F=0 in the ETC closed. This option would continue to protect high densities of three year old scallops currently in the ET rotational closure, while distributing effort between HC and ETopen (F=0.35).

The higher LAGC IFQ landings would result in a slightly higher overall F rate (F=0.46), and with no change to LA landings from AA between status quo in Section 2.3.1 and Alternative 2 in section 2.3.2, it can be assumed that more effort would take place in open areas. If the full LAGC quota is harvested (~5.5 million lbs), impacts of this alternative are potentially low negative on the scallop resource in nearshore areas since more total removals would need to come from those areas.

1.3.1.1.2 Alternative 2 – Basic Run with ETC Flex Option at 30 DAS (F=0.46)

Alternative 2 would allocate FT LA vessels four access area trips (18,000 lb trip limit) and 72,000 pounds in access areas. Projected landings under this alternative would be 52.4 million lbs, which is driving by the LAGC IFQ allocation based on status quo. This alternative would allocate one trip the NLS AA, one to CAII S AA, and 2 total trips to the MAAA. In the MAAA, one trip would be allocated a newly created Elephant Trunk Rotational Access Area, and another to the MAAA. Vessels would be able to harvest 36,000 lbs from the MAAA, 18,000 of which would be available in ET rotational closure. This option is nearly identical to Alternative 1 – the only difference between these options is where harvest/removals can take place within the MAAA (explained above). From an overall resource perspective, Alternative 2 would result in the similar overall F rates as Alternaitve 1 (depending on DAS options). Alternative 2 would result in lower F rates in the HC, ETopen, and DMV, but a F=0.078 in the ETC closed. This option would likely distribute effort across the entire MAAA (including this new AA) by allowing removals from the ET closed AA

The higher LAGC IFQ landings would result in a slightly higher overall F rate (F=0.46), and with no change to LA landings from AA between status quo in Section 2.3.1 and Alternative 2 in section 2.3.2, it can be assumed that more effort would take place in open areas. If the full LAGC quota is harvested (~5.5 million lbs), impacts of this alternative are potentially low negative on the scallop resource in nearshore areas since more total removals would need to come from those areas.

1.3.1.1.3 Alternative 3 – No Action (FW 27 Default Measures for FY 2017)

In general, the impacts of the No Action alternative are mixed on the scallop resource; estimates of overall fishing mortality are low under these specifications (F=0.5), thus the risk of overfishing is low. However, because 34.55 DAS would be allocated, the open area would be equal to F=0.62. This would likely result in a negative impact on the open areas, which have been pushed hard in recent years and fished at F=0.48. In the absence of incoming recruitment, fishing the open area at a high F rate would likely have a negative impact on the resource as a whole. Total biomass projections are higher under the No Action alternative in the early years, but in the long run the alternatives have similar biomass estimates. However, because landings are substantially lower than other alternatives the No Action does not optimize yield compared to other alternatives, and because it does not close areas with small scallops (i.e. south of Closed

Area II), No Action may not improve yield per-recruit in those closed areas compared to other alternatives considered.

1.3.1.1.4 Status Quo (FW27 measures from FY 2016)

Status Quo, which assumes the measures from FW27 are carried forward for an additional year, is included for comparison purposes but in not considered to be an option in this action. Status quo would result in similar short and long term biomass and landing as the other options considered in FW28.

1.3.1.1.5 Default Measures for FY2018

In general, default measures are put in place to provide some level of access to the fishery until final specifications can be implemented in a subsequent action based on updated data. In recent years the Council has allocated the full projected sub-ACL to LAGC vessels and about 75% of DAS to the LA fishery, and in some cases a limited amount of access area effort as well. The Scallop Committee has recommended that default measures in FW28 be set at 75% of the FT DAS allocations for FY2017, with one 18,000 lb AA trip in the MAAA for the LA component. The LAGC IFQ component would receive 75% of the 2017 IFQ allocation, and AA trips equivalent to 5.5% of the LA MAAA allocation. Overall there could be come beneficial impacts on the resource and fishery if default measures are less than projections at the start of the fishing year, and it is more precautionary to wait until more updated data are available before setting final allocations.

1.3.2 Alternative 2 - Fishery Allocations Based on Spatial Management

Annual catch limits (ACLs) in the scallop fishery are based on the overall biomass (projected landings at F=0.38 in all areas, including closed areas), while projected landings are limited to the harvestable biomass in areas that are open to the fishery in a given year. This catch limit structure can be problematic because the overall scallop management program is an area based system that is spatially explicit. The disconnect between annual catch limits and projected landings is more of an issue when higher levels of exploitable biomass are in closed areas and not available to the fishery. For example, in 2015 and 2016 a large proportion of total biomass was within EFH and GF closed areas as well as very large year classes of small scallops closed within scallop access areas.

The ACL split for the LA and LAGC fisheries are consistent with decisions made in Amendment 11 (94.5% to the LA fishery and 5.5% to the LAGC fishery). Since Amendment 15 (A15), the LAGC IFQ allocation has been based on scallop projected landings at F=0.38 in all areas, including closed areas, and the LA allocation has been based on projected landings for the fishing year, after accounting for the research set-aside, observer set-aside, incidental landings, and the LAGC IFQ share (5.5% of the ACL). In this way, the allocation to LA is spatially explicit, while the LAGC IFQ allocation is not. Another issue is spatial uncertainty, because allocations to the LAGC IFQ include harvestable biomass from areas that are not or may not be accessible to that IFQ component. When compared to Alternative 1 (Status Quo), Alternative 2 would be expected to have a low positive biological impact on the fishery because it would base allocations on only the animals that are projected to be available to the fishery for harvest. In years when the ACL is higher than projected landings, the LAGC IFQ quota would be decreased (5.5% of the smaller number). The LAGC IFQ component may fish its quota anywhere within the small dredge exemption areas (not required to harvest in access areas), and harvest is more

concentrated in near-shore areas given the size and capacity of the majority of vessels in the GC component, and the 600lb trip limit. Given the regulatory constraints of the small dredge exemption areas, and the flexibility to fish quota in open areas or access areas, there is the potential for higher realized F rates than predicted in the model when allocations to the LAGC component are based on the ACL and not the model's projected landings.

Estimates of overall fishing mortality are low under all alternatives under consideration in this Action, though they are slightly lower under options in Section 2.3.2 (Alternative 2) than in Section 2.3.1 (Alternative 1). Thus the risk of overfishing is low for this alternative, as well as all the alternatives under consideration. Total biomass projections are high under this alternative, and very similar to other alternatives under consideration in this action. The impacts of Alternative 2 on the scallop resource are neutral compared to Status Quo (Alternative 1). While Alternative 2 includes more access in several access areas, this has a small impact on overall estimates of long term fishing mortality and biomass projections since the level of effort from these access area trips is low, and a relatively high proportion of total biomass is in areas that are closed to the fishery (GF and EFH closures).

1.3.2.1 Overall Fishery Specifications under Spatial Management

1.3.2.1.1 Alternative 1 - Basic Run

Alternative 1 would allocate FT LA vessels four access area trips (18,000 lb trip limit) and 72,000 pounds in access areas. This alternative would allocate one trip the NLS AA, one to CAII S AA, and 2 trips to the MAAA. The Elephant Trunk rotational closure area would remain in place, as would the CAII extension rotational closure. This option is nearly identical to Alternative 2 – the only difference between these options is where harvest/removals can take place within the MAAA. From an overall resource perspective, Alternaitve 1 would result in the similar overall F rates as Alternative 2 (depending on DAS options). Alternative 1 would result in higher F rates in the HC, ETopen, and DMV, but a F=0 in the ETC closed. This option would continue to protect high densities of three year old scallops currently in the ET rotational closure, while distributing effort between HC and ETopen (F=0.35).

1.3.2.1.2 Alternative 2 - Basic Run with Elephant Trunk Rotational Flex Option

Alternative 2 would allocate FT LA vessels four access area trips (18,000 lb trip limit) and 72,000 pounds in access areas. This alternative would allocate one trip the NLS AA, one to CAII S AA, and 2 total trips to the MAAA. In the MAAA, one trip would be allocated a newly created Elephant Trunk Rotational Access Area, and another to the MAAA. Vessels would be able to harvest 36,000 lbs from the MAAA, 18,000 of which would be available in ET rotational closure. This option is nearly identical to Alternative 1 – the only difference between these options is where harvest/removals can take place within the MAAA (explained above). From an overall resource perspective, Alternative 2 would result in the similar overall F rates as Alternaitve 1 (depending on DAS options). Alternative 2 would result in lower F rates in the HC, ETopen, and DMV, but a F=0.078 in the ETC closed. This option would likely distribute effort across the entire MAAA (including this new AA) by allowing removals from the ET closed AA.

1.3.1.1.2.1 Sub-Option 1 - 30 DAS (F=0.44)

Sub-Option 1 would set open area DAS at 30, which corresponds to an F=0.44, and projected landings of 49.2 million pounds.

Estimates of fishing mortality are low under sub-Option 1, thus the risk of overfishing is low for this alternative, as well as all the alternatives under consideration. Total biomass projections are high under this alternative, and very similar to other alternatives under consideration in this action. The impacts of sub-Option 1 on the scallop resource are neutral compared to No Action. While sub-Option 1 includes more FT LA DAS, this has a small impact on overall estimates of long term fishing mortality and biomass projections since the level of effort is below F=0.48, and a relatively high proportion of total biomass is in areas that are closed to the fishery (GF and EFH closures).

Sub-Option 1 would have neutral impacts compared to Sub-Options 2 and 3 since these alternatives are very similar in terms of overall projected biomass and fishing mortality, with less than 2.5 DAS per FT LA vessel separating them. Since a large proportion of the total biomass is not available to the fishery the impacts on the scallop resource overall are relatively similar for all the alternatives under consideration.

1.3.1.1.2.2 Sub Option 2 - F=0.40 (27.56 DAS)

Sub-Option 2 would set open area DAS at an F=0.44, which corresponds to 27.56 DAS and projected landings of 47.3 million pounds.

Estimates of fishing mortality are low under sub-Option 2, thus the risk of overfishing is low for this alternative, as well as all the alternatives under consideration. Total biomass projections are high under this alternative, and very similar to other alternatives under consideration in this action. The impacts of sub-Option 2 on the scallop resource are neutral compared to No Action. While sub-Option 2 includes more FT LA DAS, this has a small impact on overall estimates of long term fishing mortality and biomass projections since the level of effort is below F=0.48, and a relatively high proportion of total biomass is in areas that are closed to the fishery (GF and EFH closures).

Sub-Option 2 would have neutral impacts compared to Sub-Options 1 and 3 since these alternatives are very similar in terms of overall projected biomass and fishing mortality, with less than 2.5 DAS per FT LA vessel separating them. Since a large proportion of the total biomass is not available to the fishery the impacts on the scallop resource overall are relatively similar for all the alternatives under consideration.

1.3.1.1.2.3 Sub-Option 3 - F=0.44 and NLS-ext in NLS AA (29.18 DAS)

Sub-option 3 would expand the NLS AA boundary to include the NLS-ext, and set open area DAS at F=0.44. This is the only option in the document with this expanded configuration of the NLS AA. The FT LA DAS would be set at 29.18. When compared to the previous 30 DAS/F=0.44 run, including the NLS-ext within the NLS AA in 2017 and assuming a F=0.44 in open areas would result in a 0.8 DAS decrease. Under the Base/ETC runs, the fleet would average 3 DAS in the NLS-Ext area, fishing mortality in that area is above 0.44 (F=0.65), and so F in the rest of the open areas is less than 0.44. When F is set to 0.44 in the open areas (without NLS ext), the F is other open areas is assumed to be higher than it would have been if the NLS-ext was included, thus the resulting DAS F=0.44 is not a net loss of 3 DAS. Lower F in the

NLS-ext and NLS-AC-S is expected with this run. Average Open Area LPUE would be 2,227 lbs per day (Lowest of all model runs). Projected Landings: 21,094 mt or 46.5 million lbs (Lowest of all model runs). This lower open area LPUE is a result of two things: 1) reduction in LPUE by ~100 lbs per day by moving the NLS-ext into the NLS AA, and 2) reduction in the number of DAS by 0.82. Open area landings associated with this run are 10,056 mt or 22.2 million lbs (Lowest of all model runs). Area swept under this option increases relative to other runs. The LAGC IFQ allocation would be around 2.4 million lbs (lowest of all model runs).

The PDT recommends keeping the NLS-ext as part of the NLS AA in order to address some of the uncertainty of survey estimates in this area. The PDT feels that this new NLS configuration is a conservation positive approach for the animals in this area (F=0.65 v. F=0.13). Keeping the area closed would provide for additional flexibility in designing access in the NLS area in 2018.

1.3.2.2 Fishery Allocations to the LAGC IFQ Component

The LAGC IFQ fishery is allocated a fleetwide total number of access area trips. Individual vessels are not required to take trips in specific areas like access area trips allocated to the limited access fishery. Instead, a maximum number of trips is identified for each area and once that limit is reached, the area closes to all LAGC IFQ vessels for the remainder of the fishing year.

1.3.2.2.1 Number of LAGC IFQ Access Area Trips

This action is considering three allocation options for allocating fleetwide trips to the LAGC IFQ fishery and three options related to the number of maximum trips per area. Option 1 is No Action; default trips from FW27 (851 total trips in MAAA starting on April 1); Option 2 the number of trips would be based on the total proportion of catch from AA compared to open areas (~50%, ~2,100 trips); Option 3 would be equal to the same total allocation the LAGC fishery has (5.5% of the ACL – equivalent to 2,230 trips).

If trips are not taken in these areas, LAGC catch is assumed to be taken in open areas instead. In some cases, catch rates are higher in access areas so it may take longer for a LAGC vessel to fish for IFQ in open areas; however, in other cases catch rates can be higher in some open areas compared to access areas. Overall, LAGC catch in access areas is a small percentage of the overall catch and vessels tend to fish where catch rates are higher, so if they are higher in access areas most trips should be fished there, and if they are not more LAGC catch could come from open areas.

It should be noted that these trips are voluntary, and even if LAGC IFQ trips are available in access areas, the fleet may choose to fish in open areas instead. Therefore, the impacts of these measures are generally low positive if LAGC vessels choose to fish in access areas and reduce area swept by fishing in high density areas, and generally neutral if vessels instead choose to fish in open areas. Ultimately, since the overall LAGC catch in access areas is generally a small percentage of the overall catch the spatial impacts of removing that catch in one area and not another are minimal. However, the more LAGC effort allocated to an area the higher the impacts can be if other allocations are not reduced to compensate for that allocation (LA possession limit).

1.3.1.2.1.1 Alternative 1 - No Action

Under No Action (Alternative 1) LAGC IFQ vessels would be allocated default trips from FW27 (851 total trips or about 510,000 pounds). Under this option most LAGC catch would come from open areas. Since the overall allocation of LAGC IFQ is a relatively small proportion of total scallop catch the location of effort does not have a major impact on the resource. In combination with spatial management, the impacts of Option 1 would likely be neutral on the scallop resource since more total removals from this group would be proportional to the landings projected for the fishing year. However, if the full LAGC quota is harvested, primarily from open areas, impacts of Option 1 are potentially low negative on the scallop resource in nearshore areas.

1.3.1.2.1.2 Alternative 2 - Same AA proportion as LA (~2,100 trips)

Alternative 2 would allocate about 1.26 million pounds of the total LAGC allocation of ~2.5 million pounds from access areas, so that would reduce impacts on the resource in open areas by providing more access in access areas. Overall this option could have potentially low positive impacts on the resource overall by spreading effort out and providing more access in higher catch rate areas potentially reducing total area swept compared to other options.

1.3.1.2.1.3 5.5% of overall AA Allocation

Alternative 3 would allocate about 1.34 million pounds of the total LAGC allocation of ~2.5 million pounds from access areas, so that would reduce impacts on the resource in open areas by providing more access in access areas. Overall this option could have potentially low positive impacts on the resource overall by spreading effort out and providing more access in higher catch rate areas potentially reducing total area swept compared to other options.

1.3.2.2.2 LAGC IFQ Allocations by Access Area

In addition to the three overall allocation alternatives, this action considered three different area options for where LAGC access area trips should be allocated. Option 1 is that all trips would be allocated 25% with each FT LA AA trip; Option 2 would prorate CA2 trips to evenly to other open access areas; and Option 3 would prorate all CA2 trips 50% to the NL and 50% to the MAAA/ETC AA. Overall there are minimal differences in overall impacts on the resource from these three area alternatives. So long as the access areas have similar catch rates, the impacts overall should be similar.

1.4 PRORATION OF ALLOCATIONS TO ACCOUNT FOR A 13 MONTH FISHING YEAR IN 2017

This measure would prorate DAS and corresponding IFQ quota to account for FY2017 being a 13-month fishing year.

1.4.1 Alternative 1 - No Action, Base Allocations on 12 month FY

There would be no change to any of the specification values set by the Council in Section 2.3. This measure would not increase F (relative to the projected values) in the short term, and is expected to have a neutral biological impact on the fishery. Alternative 1 would be expected to have a low positive biological impact on the resource relative to Alternatives 2 and 3. None of these options are expected to result in overfishing or components exceeding their ACL, and none are expected to result in an average open area F higher than 0.48.

1.4.1 Alternative 2 – Prorate allocations for a 13 month FY by 13/12ths (8%)

Alternative 2 would prorate the DAS allocated to the fishery (and corresponding IFQ quota) to account for a longer fishing year (13/12ths). Given the range of overall fishing mortality for all options under consideration is from F=0.11 to F=0.18, prorating by 8% would not be expected to result in overfishing in the short term or long term. With respect to average open area fishing mortality rates, the Council is not considering any options which would set open area DAS based on F=0.48. The open area DAS options available to the Council are F=0.44 and F=0.4. This option would result in the highest realized F rate relative to Alternatives 1 and 3, and is not expected to result in overfishing. When compared to Alternatives 1 and 3, Alternative two would be expected to have a neutral to low negative impact by increasing open area F by adding ~785 additional DAS.

1.4.1 Alternative 3 - Prorate allocations for a 13 month FY by March data (4.7%)

Alternative 3 would prorate the DAS allocated to the fishery (and corresponding IFQ quota) based on recent fishing activity during the month of March (4.7%). Given the range of overall fishing mortality for all options under consideration is from F=0.11 to F=0.18, prorating by 4.7% would not be expected to result in overfishing in the short term or long term. With respect to average open area fishing mortality rates, the Council is not considering any options which would set open area DAS based on F=0.48. DAS options available to the Council are F=0.44 and F=0.4. This option would likely result a higher realized F rate relative to Alternatives 1, but lower than Alternative 2, and is not expected to result in overfishing. When compared to Alternatives 1 and 2, Alternative two would be expected to have a neutral impact by increasing open area F by adding ~458 additional DAS.

1.5 ADDITIONAL MEASURES TO REDUCE FISHERY IMPACTS

1.5.1 Alternative 1 – No Action

Alternative 1(No Action) would prohibit vessels from fishing RSA compensation in access areas. While this is consistent with some of the rationale in Alternative 3, this option would increase effort in open areas, where the Council is considering setting DAS using a lower F than in recent action. This option would be expected to increase F in the open areas, and have a low negative impact on that portion of the resource relative to Alternative 3.

1.5.1 Alternative 2 – RSA Compensation Fishing Available in All Areas Open to the Fishery

In general, Alternative 2 is expected to have neutral impacts on the resource. Vessels are currently allowed to fish RSA compensation from any access area that is open to the fishery; therefore, maintaining this option would likely have similar impacts on the resource.

1.5.1 Alternative 3 – RSA Compensation Only in the MAAA and Open Area (Excluding NGOM Management Area)

Alternative 3 is expected to have low positive impacts on the resource by preventing RSA fishing in several areas. This measure would reduce F in several areas identified by the Council, and would redistribute effort to areas where overall impact on the resource is expected to be negligible.

1.6 POSSESSION OF SHELL STOCK INSHORE OF THE DAS MONITORING LINE

1.6.1 Alternative 1 – No Action

Alternative 1 would make no change rules governing the possession of shell stock inshore of the DAS demarcation line north of 42° 20’ N. When compared to Alternative 2, this measure would be expected to have a negative biological impact on the scallop resources because it would continue to allow vessels to process scallops without being charged for a DAS. This behavior can potentially inflate LPUE during DAS fishing. This can be problematic for the fishery because the spatial management uses realized LPUE in past fishing years to model projected LPUE. If vessels are circumventing the DAS program, this may have negative impacts on the resource.

1.6.1 Alternative 2 – Restrict the Possession of Shell Stock Inshore of the DAS Demarcation Line north of 42° 20’ N.

Alternative 2 would prohibit vessels from processing scallops while off the DAS clock when fishing north of 42° 20’ N. This provision would be expected to have a positive biological impact on scallop resource when compared to Alternative 1 because it would negate the ability of vessels to circumvent the DAS program.