7.4 ECONOMIC IMPACTS

The following sections analyze the economic impacts of the management alternatives considered in Framework 30 and compare these with two baselines, No Action alternative and Status Quo scenario. The objective of the cost-benefit analysis is to evaluate the net economic benefits arising from changes in consumer and producer benefits that are expected to occur with implementation of a regulatory action. As the NMFS Guidelines for the Economic Analysis of the Fishery Management Action (NMFS, 2007) [1] state "the proper comparison is '*with the action' to 'without the action'* rather than to *'before and after the action,*' since certain changes may occur even without action and should not be attributed to the regulation." The guidelines also state that "No Action alternative does not necessarily mean a continuation of the present situation, but instead is the most likely scenario for the future, in the absence of other alternative actions"[2]. Even without action, the scallop stock abundance in open and access areas will be different, and as a result, landings, scallop prices, fishing costs, revenues and benefits from the fishery would change compared to the present levels. The Status Quo scenario as projected in this Framework action reflects this reality and, in addition to the No Action alternative, is used as one of the baselines to assess economic impacts of the proposed measures especially for the purposes of E.O.12866.

While NMFS 2007 guidelines indicate "The No Action alternative should be the basis of comparison for other alternatives", it very often uses the terms "No Action" and "Status Quo" interchangeably[3]. The economic analyses presented in this section make a distinction in the definition of those terms, however, with "No Action" referring to a "regulatory" baseline and "Status Quo" referring to a state with no changes from the present allocations for open area DAS and access area trips. The definition of "No Action" as described in Section 2.2.1.1 of the document refers to the default measures that are specified in Framework 29 until the next Framework action is implemented.

However, default measures are temporary in nature and as such, allocations under those measures are usually set at considerably lower levels than the allocations either in the current (in 2018) or the projected allocations in the next fishing year (2019) to prevent fishing effort exceeding the sustainable levels due to the delays in the implementation of the proposed measures in next Framework Action. As a result, the projections for landings, revenues and economic benefits under the No Action alternative are considerably lower than the current levels and the levels that are expected under the proposed measures. Because of this, if economic benefits of the proposed alternatives were estimated using No Action as the baseline, the impacts on the economy would be overstated in the short-term compared to the present circumstances.

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[1] Guidelines for Economic Reviews of National Marine Fisheries Service Regulatory Actions, March 2007,

http://www.nmfs.noaa.gov/sfa/domes_fish/EconomicGuidelines.pdf

[2] Ibid, p.12

[3]For example, see p. 15 of 2007 NMFS guidelines: "For economic analysis of regulatory actions, changes in net benefits are measured by the difference in the present value of the discounted stream of net benefits of regulatory action, as compared to the status quo. In this context, a positive result means that the net present value of the regulatory action exceeds that of the status quo."

For these reasons, the economic analyses in this framework also include a Status Quo scenario *(SQ)* to provide an assessment of how landings, revenues and total economic benefits from the scallop fishery would change if the current allocations were continued in 2019 but taking into account the impacts of projected changes in the productivity and the spatial distribution of the scallop resource on landings, revenues and total economic benefits. From that perspective, SQ is a more realistic baseline to assess the impacts of the proposed measures on the economy from the perspective of E.O.12866.

As the Guidelines for Economic Analysis of Fishery Management Actions specify, "benefits and costs are measured from the perspective of the Nation, rather than from that of private firms or individuals. Benefits enjoyed by other nations are not included, although tax payments by foreign owners, and export revenues, are benefits to the Nation."

Because fishery management actions in general result in short-term costs for the industry in terms of foregone revenue, "choosing a period of analysis that is too short may bias the analysis toward costs, where costs are incurred in the short-term and benefits are realized later." Similarly, the Office of Management and Budget (OMB, 2003) indicated that the analyses should "present the annual time stream of benefits and costs expected to result from the rule," and state that "the beginning point for your stream of estimates should be the year in which the final rule will begin to have effects" and "the ending point should be far enough in the future to encompass all the significant benefits and costs likely to result from the rule."[4] For these reasons, guidelines indicate that "a reasonable attempt should be made to conduct the analysis over a sufficient period of time to allow a consideration of all expected effects."

Furthermore, the economic impacts of the proposed regulations over the long-term should be evaluated by the discounted cumulative present value of the stream of benefits since benefits or costs that occur sooner are generally more valuable (or have a positive time preference). Discount rate is the interest rate used in calculating the present value of expected yearly benefits and costs.

This section examines the economic impacts of the proposed regulations in Framework 30. Although Framework 30 is a one-year action, it will have impacts on the future yield from scallop resources, on scallop revenues and total economic benefits. The short- and the long-term economic impacts of the specification alternatives are analyzed in Section 7.4.3. The present value of long-term benefit and costs of the specification alternatives are estimated using both a 3% and a 7% discount rate. The higher discount rate (7%) provides a more conservative estimate and a lower bound for the economic benefits of alternatives compared with the benefits predicted using a lower discount rate (3%).

7.4.1 Updated OFL and ABC for FY 2019 and FY 2020 (default)

7.4.1.1 No Action ABC

Reauthorization of the MSA requires the SSC to set an acceptable biological catch (ABC), or maximum catch level that can be removed from the resource taking into account all sources of biological uncertainty. The Council is prohibited from setting catch limits above that level. This requirement is expected to have long-term economic benefits on the fishery by helping to ensure

[4] OMB Circular A-4 (September 17, 2003), http://www.whitehouse.gov/omb/circulars_a004_a-4/

that catch limits and fishing mortality targets are set at or below ABC. This should help prevent overfishing and optimize yield on a continuous basis. Under "No Action" for FY 2019, the overall ABC for each year would be identical to that of the default FY 2019 ABC for the fishery. No Action ABC (43,142 mt.) after discards removed is about 7% lower than the proposed ABC in this action because biomass has increased from 2017 levels. Therefore, the potential impacts of the No Action ABC on economic benefits are negative.

7.4.1.2 Alternative 2 - ABC for 2019 and default for 2020

Alternative 2 would specify OFLs and ABCs for FY 2019 and set default values for FY 2020 based on the SSC recommendation. The fishing mortality rates for OFL and ABC would be based on the results of SARC 65 (2018). The updated ABC estimates (57,003 mt. after discards removed) for 2019 are about 32% higher and the default ABC estimates for 2019 (46,028 mt.) are about 7% higher than the No Action values because updated surveys suggest scallop biomass is higher than previous estimates. Overall, using these estimates to set fishery specifications should have positive economic impacts over the long-term because the ABC values were determined based on the recent surveys and best available science to prevent overfishing of the scallop resource.

7.4.2 Northern Gulf of Maine Management Area

7.4.2.1 Alternative 1 (Section 4.1.2) – No Action (Default measures from Framework 28)

The total NGOM hard TAC would be set at 135,000 pounds, which is based on fishing the Stellwagen Bank portion of the management area at a F=0.18 in FY 2018 and FY 2019. The overall TAC would be split between the LA and LAGC, with 32,500 pounds available to support RSA compensation fishing (LA share), and 102,500 pounds available for harvest by the LAGC component. The area would open on April 1, 2019 with no change to the current management program.

In terms of economic benefits, this alternative will have neutral impacts because will maintain the status quo NGOM management. Estimated scallop revenue for the LAGC NGOM fleet would be about $0.95 million under this alternative using an estimated price of $9.23 per pound and assuming landings will be equivalent to 102,500 lb. Fishing costs are estimated to be about $0.22 million and net revenue would be about $0.73 million for the LAGC NGOM fleet[5] (Table 1). **If** the NGOM TAC kept at a lower level compared to Alternative 2, it could relatively have some negative impacts on the overall scallop resource in other areas. When LA vessels fish their DAS in the NGOM, it reduces fishing pressure in the open areas with a less than optimal recruitment. The same can be said for LAGC IFQ fishing in the NGOM management area, because these vessels use quota that can be fished in any part the resource in the management area, effectively reducing fishing pressure from other places. Due to potential displacement of

[5] Scallop revenue and cost estimates are based on the following assumptions and data. The assumed price per pound of scallops, $9.23, is roughly equivalent to the average estimated price for under Alt.3, Option 2 (Table 3?). Trip costs estimates are based on cost function estimated using observer data for 1994-2017 and corresponds to estimated fuel, oil, water, food, ice, supply costs per trip for the NGOM fishery. Average trip cost was then adjusted by inflation to estimate costs in terms of 2017 dollars (Appendix to Framework 30, Economic Model). Total DAS for the NGOM fleet was estimated by dividing TAC with the 200 lb. possession limit.

effort, this alternative could increase fishing costs, reduce scallop yield from other areas even though marginally. Therefore, this alternative would result in lower revenues relative to Alternative 2 if NGOM TAC is set at a higher level under Alternative 2.

Table 1. NGOM TAC, Scallop revenue and costs under Alternative 1, No Action (Monetary values are in 2018 million dollars)

Values	Estimated values for 2019
LA scallop pounds	32,500
LAGC scallop pounds	102,500
Total Pounds	135,000
Estimated LA RSA value	$0.29
Economic Impacts on the LAGC NGOM	
Estimated LAGC scallop revenue	$0.95
DAS	513
Trip costs ($433per day)	$0.22
Net revenue	$0.73

7.4.2.2 Alternative 2 - NGOM TAC split first 70,000 lbs. to LAGC, then 50/50 split, LA share harvested as RSA compensation fishing.

TO BE COMPLETED ONCE NGOM TAC IS ESTIMATED

7.4.3 Economic impacts of the proposed specification alternatives

Open area DAS and access area trip allocations are updated based on the recent estimates for Overfishing Limit and Acceptable Biological Catch. Alternatives considered in Framework 30 is described in **Error! Reference source not found.** below for a full-time limited access vessel. No Action corresponds to the default measures in Framework 29 and Status Quo "Status Quo" refers to a state with no changes from the present allocations in Framework 29 for open area DAS and access area trips.

Table 2. Specification alternatives under consideration in FW 30

Alternative	Section	RUN	DAS	Scenario
Alternative 1	4.3.1	No Action	18 DAS (F=0.18)	One MAAA at 18k
Alternative 2	4.3.2	7at15k	26 DAS (F=0.25)	7 trips at 15k
Alternative 3	4.3.3.1	F25FLEX18k	26 DAS (F=0.25)	1 CAI FLEX trip, 7 trips at 18k
	4.3.3.2	24DASFLEX18k	24 DAS (F=0.23)	1 CAI FLEX trip, 7 trips at 18k
Alternative 4	4.3.4	24DASFLEX15k	24 DAS (F=0.23)	1 CAI FLEX trip at 15k, 6 trips at 18k
Alternative 5	4.3.5	Status Quo	F=0.295 (30 DAS)	For Comparison Only

7.4.3.1 Summary of economic impacts

Short-term impacts – 2019

Table 3 - Economic Impacts for 2019: Estimated landings (Mill.lb.), revenue and economic benefits (Mill. $, in 2018 dollars)

Section Alternative	4.3.1 Alt.1	4.3.2 Alt.2	4.3.3.1 Alt.3	4.3.3.2 Alt.3	4.3.4 Alt.4	4.3.5 Alt.5
Values/ RUN	**No Action**	**7at15k**	**F25FLEX18k**	**24DASFLEX18k**	**24DASFLEX15k**	**Status Quo**
Landings	22.9	57.6	64.2	62.5	61.5	63.0
Price	10.5	9.4	9.2	9.2	9.3	9.2
Revenue	241.7	542.4	587.5	577.5	569.8	578.9
Revenue - Difference from SQ	-337.2	-36.5	8.6	-1.4	-9.1	0.0
Producer Surplus	166.7	436.4	475.9	468.0	461.0	464.8
Consumer Surplus	10.1	68.9	82.7	79.4	75.9	82.7
Total Benefits	176.8	505.3	558.6	547.5	536.9	547.5
Total Benefits - Difference from SQ	-370.7	-42.2	11.1	0.0	-10.6	0.0

- Scallop revenue are estimated to range from a little over $542 million under ALT 2 to over $587 million for ALT 3 with 26 open area DAS. Total economic benefits under all alternatives except for No Action are estimated to be over $500 million as well in 2019. Under the Status Quo (SQ) conditions, revenues would be larger than all other alternatives except for ALT 3 with 26 Open area DAS.
- However, actual values of prices, revenues and total economic benefits will differ than those estimates depending on the actual landings, size composition of landings, and values of

variables that effect prices including import prices, disposable income of consumers and imports of scallops from countries such as Canada and Japan that are a close substitute for the large domestic scallops. When estimating prices, it was assumed that the values of these variables will not change from the current levels and that actual landings will equal to the projected landings from the biological model. For these reasons, the numbers provided in the Tables should be mainly used to compare one alternative with another rather than to predict future values.

- The specification alternative Alt.3 that allocates 26 DAS for full-time limited access vessels with 7 access area trips (4.3.3.1) has the highest landings, revenues and total benefits in 2019. Total revenues under this alternative is estimated to exceed the status quo scenario (continuation of FRM 29 measures) by over $8.6 million in 2019. Total economic benefits net of SQ values are estimated to be about $11.1 million under the same option.
- Under Status Quo, FT DAS allocations would be 30 DAS and 6 access area trips, total landings would equal to 63 million (Table 3). As a result, alternatives other than Alt.3 with 26 DAS would have lower revenue compared to SQ, about $36.5 million lower revenue under Alt.2, and about $9.1 million lower under Alt.4. Total economic benefits would be lower under those options as well compared to SQ levels.

Long-term impacts– 2018 to 2032

Table 4 - Long-term Economic Impacts (2019-2033): Cumulative present value of revenues, producer surplus and total economic benefits net of Status quo values (in 2018 dollars, 7% Discount rate)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	26DASFLEX 18k	24DASFLEX 18k	24DASFLEX 15k	Status Quo
Landings	1113.8	1125.8	1128.0	1127.7	1127.3	1126.6
Price	8.7	8.7	8.7	8.7	8.7	8.7
Revenue	6209.7	6421.7	6448.8	6444.6	6439.6	6439.9
Revenue - Difference from SQ	-230.2	-18.2	8.9	4.7	-0.3	0.0
Producer Surplus	4995.3	5190.4	5214.5	5211.3	5206.7	5204.0
Consumer Surplus	1157.3	1149.5	1150.2	1150.6	1149.9	1148.2
Total Benefits	6152.6	6339.9	6364.7	6361.9	6356.6	6352.1
Total Benefits - Difference from SQ	-199.6	-12.2	12.5	9.8	4.4	0.0

Table 5 - Long-term Economic Impacts (2019-2033): Cumulative present value of revenues, producer surplus and total economic benefits net of Status quo values (in 2018 dollars, 3% Discount rate)

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	Alt.1	Alt.2	Alt.3	Alt.3	Alt.4	Alt.5
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
Landings	1113.8	1125.8	1128.0	1127.7	1127.3	1126.6
Price	8.7	8.7	8.7	8.7	8.7	8.7
Revenue	7832.7	8034.8	8060.0	8056.3	8051.6	8050.4
Revenue - Difference from SQ	-217.6	-15.6	9.6	5.9	1.2	0.0
Producer Surplus	6308.0	6494.6	6517.0	6514.3	6509.9	6506.0
Consumer Surplus	1426.4	1412.2	1411.7	1412.3	1411.9	1408.9
Total Benefits	7734.4	7906.7	7928.7	7926.6	7921.9	7914.9
Total Benefits - Difference from SQ	-180.5	-8.1	13.8	11.7	7.0	0.0

- The results are expected to be similar over the long-term and the differences in economic benefits of various specification alternatives would be small both in the short- and long-term.

- Present value of the cumulative economic benefits net of SQ would be higher for all the specification alternatives except for Alt.2 and No Action whether the long-term benefits are discounted at 3% or 7% (Table 4 and Table 5). Again, specification alternative 3 with 26 DAS (ALT 3, 4.3.3.1) results in slights higher benefits than other alternatives. Present value of the estimated total revenues net of SQ values would range from $1.2 million to $9.6 million, and present value of the cumulative net economic benefits would range from $7 million to $13.8 million using a discount rate of 3%. A higher discount rate at 7%, do not alter the rank of alternatives, although the cumulative present value of revenues and total economic benefits would be lower due to the discounting the long-term benefits at a higher rate (Table 4) .

- Cumulative present value of total revenue over the long-term would be lower by $15.5 million and present value of the cumulative net economic benefits would be lower by $8.1 million for ALT 2 using a discount rate of 3%. This is because ALT2 results in lower benefits in 2019 compared to SQ ($42,2 million lower) but similar benefits in rest of the period due to lower access area allocations (at 15K possession limit) compared to other alternatives.

- The numerical results of these analyses should be interpreted with caution and should be used solely to compare one alternative with another rather than to predict future values. The costs and the benefits of the alternatives were analyzed based on the biological projections of landings, DAS and LPUE and the available information about the vessel costs and characteristics and price model. Actual value of landings, size composition and other biological variables are likely to be different, at least to some extent, than the projected values due to scientific and management uncertainties. Price projections are derived from the price model presented in the Appendix which estimated the impact of landings and size composition on prices after taking into account the impact of exogenous variables including the import prices, per capita disposable income and scallop imports from Japan and Canada as a proxy of changes in international markets for large scallops. Future price projections hold all the exogenous explanatory variables constant in order to estimate the economic impacts of alternative management measures on landings, scallop size composition, LPUE and effort. Actual prices will be different than estimated depending on the differences in actual landings and in size composition from projected values as well as due to changes inflation, consumer demand, price and composition of imports.

7.4.3.2 LAGC IFQ allocations

LAGC IFQ fishery is allocated 5.5% of the 5 annual projected landings (APL) those with IFQ permits receiving 5% and those with both IFQ and LA permits receiving 0.5% of the total APL. Under No Action, allocations would be equivalent to FW29 default measures for FY 2019 the LAGC IFQ allocation would be 1,050 mt. (or 2,314,851 lb.) for LAGC IFQ and LA with LAGC IFQ quota. LAGC IFQ vessels would also have access in the Mid-Atlantic Access Area on April 1, 2019 under default measures, with a fleet wide maximum of 558 trips from the area.

For ALT 2 and ALT 4 LAGC IFQ fishery allocations would be set at 3,025,697 lbs., lower compared both Sub-options under ALT 3. The LAGC IFQ only (5% of APL) would be set at 2,750,634 lbs. ALT 3, Sub-option 1 would set The LAGC IFQ allocations at 3,390,066 lbs. and Sub-option 2 would set it at 3,299,247 lbs. for all IFQ fishery. The LAGC IFQ only (5% of APL) would be set at 3,081,878 lbs. under Sub-option 1 and to 2,999,315 lbs. under Sub-option 2. Alt. 4: The LAGC IFQ APL (5.5%) would be set at 3,025,697 lbs. The LAGC IFQ only (5% of APL) would be set at 2,750,634 lbs.

ALT 5 is the Status Quo scenario for comparison purposes of the relative economic benefits. Under this scenario, allocations for the LAGC IFQ fishery would be set at the same level as in FRM 29, at 3,086,050 lbs. The LAGC IFQ only (5% of APL) would be set at 2,805,500 lbs.

Under the specification alternative 3, allocation for the LAGC IFQ fishery will be about 7% (Sub-option 2 with 24 DAS) to 10% (Sub-option 1 with 26 DAS) higher than the allocation under the Status Quo. ALT 2 would result in marginally higher and ALT 4 in marginally lower scallop revenue compared to the SQ scenario (Table 6).

Table 6. Impacts of the LAGC IFQ TAC for 2018 fishing year

Section	Alternative	Run	IFQ TAC for IFQ permits only	IFQ TAC for LA vessels with IFQ permits	Total IFQ TAC (Million lb.)	% Change in estimated scallop landings	Estimated Revenue	% Change in estimated scallop revenue
4.3.1	**Alt.1**	No Action: Default measures in FRM 29	2.10	0.21	2.31	-25%	24.31	-14.2%
4.3.2	**Alt.2**	F=0.25, 26 DAS, 15 K, 7 trips	2.75	0.28	3.03	-2%	28.44	0.4%
4.3.3.1	**Alt.3**	Sub-option 1: F=0.25, 26 DAS, 18 K, 7 trips	3.08	0.31	3.39	10%	31.19	10.1%
4.3.3.2		Sub-option 2: F=0.23, 24 DAS, 18 K, 7 Trips	3.00	0.30	3.30	7%	30.35	7.1%
4.3.4	**Alt. 4**	F=0.23, 24 DAS, 18 K & 6 Trips + 1 CA trip at 15K	2.75	0.28	3.03	-2%	28.14	-0.7%
4.3.5	**Alt. 5**	SQ: FRM 29 measures applied in 2019	2.80	0.28	3.08	0%	28.34	0.0%

7.4.3.3 Landings and size composition

Projected values of landings show that landings could vary from over 57.6 million to 64.2 million pounds in 2019 (except for no Action) but could reach about 100 million pounds in 2019. However, over the long-term the value of landings is expected to be stabilize about 70 million pounds (Table 7). The proportion of U10 scallops is estimated to vary from 12.7% to 13.6% in 2019 and a little bit over 13% in the long-term (Table 8, Table 10 and Table 12).

Table 7. Estimated landings (Million lb., Average per fishing year)

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	Alt.1	Alt.2	Alt.3	Alt.3	Alt.4	Alt.5
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	22.9	57.6	64.2	62.5	61.5	63.0
2020	109.6	101.3	99.6	100.2	100.5	99.9
2021-23	92.8	89.2	88.5	88.7	88.8	88.6
2024-33	70.3	69.9	69.9	69.9	69.9	69.8

Table 8. Projected landings of U10 scallops per year (Mill.lb.)

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	Alt.1	Alt.2	Alt.3	Alt.3	Alt.4	Alt.5
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	1.8	7.9	8.4	8.3	7.8	9.1
2020	16.4	14.7	14.4	14.4	14.6	14.3
2021-23	13.6	12.6	12.3	12.4	12.4	12.3
2024-33	9.4	9.3	9.3	9.3	9.3	9.2

Table 9. Historical landings of scallops by size category (in pounds)

Fishyear	U10	11 to 20	21+	UNK	Grand Total
2009	8,426,450	35,798,675	12,366,020	1,326,240	57,917,385
2010	8,770,955	36,052,201	10,895,003	939,022	56,657,181
2011	8,543,436	45,260,311	3,563,092	1,339,517	58,706,356
2012	10,485,521	41,587,639	3,550,327	1,234,715	56,858,202
2013	8,666,779	24,780,078	5,689,661	1,076,312	40,212,830
2014	8,046,766	19,084,369	4,365,448	873,788	32,370,371
2015	6,115,533	21,138,141	7,889,933	771,342	35,914,949
2016	4,719,653	18,774,077	16,892,731	1,149,795	41,536,256
2017	10,162,331	29,351,318	13,010,332	944,255	53,468,236

Table 10. Biological projections - Percentage share of U10 scallops in total landings

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	Alt.1	Alt.2	Alt.3	Alt.3	Alt.4	Alt.5
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	8.0%	13.6%	13.0%	13.3%	12.7%	14.4%
2020	15.0%	14.5%	14.4%	14.4%	14.5%	14.3%
2021-23	14.5%	14.0%	13.9%	13.9%	13.9%	13.8%
2024-33	13.4%	13.3%	13.3%	13.3%	13.3%	13.2%

Table 11. Historical data: Percentage composition of scallop landings by size categories

Fishyear	U10	11 to 20	21+	UNK
2009	14.55	61.81	21.35	2.29
2010	15.48	63.63	19.23	1.66
2011	14.55	77.10	6.07	2.28
2012	18.44	73.14	6.24	2.17
2013	21.55	61.62	14.15	2.68
2014	24.86	58.96	13.49	2.70
2015	17.03	58.86	21.97	2.15
2016	11.36	45.20	40.67	2.77
2017	19.01	54.89	24.33	1.77

Table 12. Landings per pound of scallops (LPUE)

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	Alt.1	Alt.2	Alt.3	Alt.3	Alt.4	Alt.5
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	2707	2999	3040	3070	3053	2865
2020	2902	2842	2828	2831	2835	2838
2021-23	2957	2929	2921	2921	2923	2929
2024-33	2956	2953	2953	2953	2953	2953

7.4.3.4 Prices and Revenue

Prices are estimated using the ex-vessel price model that takes into account the impacts of changes in domestic landings, exports, import prices, income of consumers, composition of landings by market category (i.e., size of scallops), and changes in international markets for large

scallops using imports of Japanese and Canadian scallops as proxy variables (Appendix I. Price Model).

The price estimates shown in Table 13 correspond to the price model outputs assuming that the import prices will be constant at their average value for 2017 to 2018 so far, at about $6, scallop exports will constitute about 30% of the domestic landings and the disposable income, ratio of Japanese and Canadian imports to total scallops import will be constant at the current levels in 2018, so that only the effects of the reduction in and changes in the size composition of landings could be identified. In addition, price estimates reflect real (as opposed to nominal) prices since they are expressed in 2018 constant prices assuming inflation will be zero in the future years. Therefore, actual real or nominal prices could be higher (lower) than the values estimated in Table 13 if the import prices, exports and disposable income increase (decrease) in the future years. Nominal prices will probably higher in the future as well since it is unusual for the inflation to remain at zero. In addition, ex-vessel prices could be underestimates of true values because the biological model underestimates the proportion of U10s in landings and it doesn't have a separate category for U12 scallops.

Although the absolute values for revenues, producer and consumer surpluses, and total economic benefits would change with the value of estimated prices, the differences of these values for all the alternatives to the No Action or Status Quo scenarios would not change in any substantial way. Higher prices than estimated in Table 13 would increase the short-term positive impact of all alternatives on revenues compared to No Action and SQ, while lower prices would reduce this impact. Table 14 and Table 16 provide sensitivity analyses using an import price of $6.5 per lb. roughly equivalent to average for 2017 fishing year. Increase in import prices leads to higher ex-vessel prices and revenues as these Tables show.

In short, absolute values of short- and long-term revenues and economic will be greater with higher prices and smaller with lower prices, but the ranking of alternatives are not expected to change than presented in the tables below (Table 15 to Table 23).

Table 13. Estimated ex-vessel prices (in 2018 dollars, assuming an import price of $6 per lb.)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	10.5	9.4	9.2	9.2	9.3	9.2
2020	7.5	7.8	7.8	7.8	7.8	7.8
2021-23	8.1	8.2	8.2	8.2	8.2	8.2
2024-33	8.9	8.9	8.9	8.9	8.9	8.9

Table 14. Estimated ex-vessel prices (in 2018 dollars, assuming an import price of $6.5 per lb.)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	11.3	10.1	9.8	9.9	9.9	9.8
2020	8.1	8.4	8.4	8.4	8.4	8.4
2021-23	8.7	8.8	8.8	8.8	8.8	8.8
2024-33	9.5	9.5	9.5	9.5	9.5	9.5

Table 15. Scallop revenue per Fishyear (Million $, in 2018 dollars, *not discounted,* assuming an import price of $6 per lb.)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	242	542	587	577	570	579
2020	824	789	781	784	785	783
2021-23	747	731	727	728	729	728
2024-33	623	621	621	621	621	620

Table 16. Scallop revenue per Fishyear (Million $, in 2018 dollars, *not discounted,* assuming an import price of $6.5 per lb.)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	260	582	630	620	611	621
2020	885	847	839	842	843	841
2021-23	802	784	781	782	783	781
2024-33	669	667	666	666	666	666

7.4.3.5 Estimated impacts on DAS, fishing costs and open area days and employment

Total effort measured in terms of DAS used as a sum total of all areas will be lower in the short-term in 2019 for all the alternatives compared to SQ scenario which allocates fewer DAS and access trips. Changes in employment level in the scallop fishery as measured by CREW*DAS will be proportional to total effort under all alternatives compared to No Action and SQ. Because overall DAS will decrease under all alternatives compared to the levels under SQ in 2019,

employment is expected to decrease as well by 7% (ALT3, 26 DAS) to 13% (ALT 2) except for No Action the decrease would exceed 60% (Table 9). However, over the long-term, total effort and employment is expected to be slightly higher compared to SQ under all alternatives. Even though, employment in terms of CREW*DAS would be lower under some options and higher on others, it is uncertain to what extent this would lead to a reduction or increase in the actual numbers of crew employed.

Trip costs for all the alternatives are expected to be lower than SQ levels in 2019, but have small differences in magnitude from one alternative to the other as well as compared to SQ over the long-term (Table 20).

Table 17. Projected DAS per FT vessel per year (including open and access areas)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	23.7	53.8	59.2	57.1	56.5	61.7
2020	105.9	99.9	98.7	99.2	99.4	98.7
2021-23	88.0	85.5	85.0	85.2	85.3	84.8
2024-33	66.7	66.4	66.3	66.3	66.3	66.3

Table 18. Percentage change in total DAS from SQ levels (open and access areas)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	-61.5%	-12.8%	-4.0%	-7.4%	-8.5%	0.0%
2020	7.3%	1.3%	0.1%	0.6%	0.7%	0.0%
2021-23	3.7%	0.7%	0.2%	0.5%	0.5%	0.0%
2024-33	0.6%	0.2%	0.1%	0.1%	0.1%	0.0%

Table 19. Projected open-area DAS per FT vessel per year

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	18	26	26	24	24	30
2020	51	50	50	50	50	49
2021-23	57	56	56	56	56	56
2024-33	57	57	57	57	57	57

Table 20. Trip costs per year for the scallop fleet (Undiscounted, in million 2018 dollars)

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	13.8	31.3	34.5	33.3	32.9	35.9
2020	61.7	58.2	57.5	57.8	57.9	57.5
2021-23	51.3	49.8	49.5	49.7	49.7	49.4
2024-33	38.8	38.7	38.6	38.6	38.6	38.6

7.4.3.6 Present Value of Producer Surplus, Consumer Surplus and Total Economic Benefits

Producer surplus (benefits) for a fishery shows the net benefits to harvesters, including vessel owners and crew, and is measured by the difference between total revenue and costs including operating costs and opportunity costs of labor and capital. In technical terms, the producer surplus (PS) is defined as the area above the supply curve and the below the price line of the corresponding firm and industry (Just, Hueth & Schmitz (JHS)-1982). The supply curve in the short-run coincides with the short-run marginal cost above the minimum average variable cost. This area between price and the supply curve can then be approximated by various methods depending on the shapes of the marginal and average variable cost curves.

The economic analysis presented in this section used the most straightforward approximation and estimated PS as the excess of total revenue (TR) over the total variable costs (TVC) minus the opportunity costs of labor and capital. The fixed costs were not deducted from the producer surplus since the producer surplus is equal to profits plus the rent to the fixed inputs. More information about the producer surplus estimates, an opportunity costs are provided in the Appendix for Economic Model.

It must also be emphasized that the empirical results of the economic analyses should be used to compare alternatives with each other and with No Action or Status Quo rather than to estimate the absolute values since the later will be change according to the several external variables that affect prices, revenues and costs including changes in import prices, exports of scallops, disposable income of consumers, size composition of scallop landings, oil prices and inflation.

Consumer surplus for a fishery is the net benefit that consumers gain from consuming fish based on the price they would be willing to pay for them. Consumer surplus will increase when fish prices decline, and/or the amount of fish harvested goes up. Present value of the consumer surplus (using a 7% discount rate), and the cumulative present values net of Status Quo levels are summarized in Table 22.

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 benefits and economic benefits net of Status Quo (SQ) levels are shown in Table 23 (7% discount rate). The cumulative present value of economic benefits is also estimated Table 5 at a 3% discount rate. Discounting future benefits at a lower level resulted in higher benefits for all options without changing the ranking of the alternatives in terms of magnitude of benefits.

The results are similar to what was summarized in Section 7.4.3 above. Consumer and producer surpluses and total economic benefits would be largest under ALT 3 and lowest under ALT 2 compared to SQ in 2019 (excluding No Action with lowest benefits) as well as in the long-term. However, the differences between those alternatives are small over the long-term.

Table 21. Present value of producer surplus (using 7% discount rate, Million $, in 2018 dollars)

Section	**4.3.1**	**4.3.2**	**4.3.3.1**	**4.3.3.2**	**4.3.4**	**4.3.5**
Alternative	**Alt.1**	**Alt.2**	**Alt.3**	**Alt.3**	**Alt.4**	**Alt.5**
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	167	436	476	468	461	465
2020	621	594	588	590	591	589
2021-23	1,491	1,455	1,448	1,450	1,451	1,449
2024-33	2,717	2,705	2,703	2,703	2,704	2,701
Grand Total	4,995	5,190	5,215	5,211	5,207	5,204
Producer Surplus net of SQ values						
2019	-64.1%	-6.1%	2.4%	0.7%	-0.8%	0.0%
2020	5.3%	0.8%	-0.2%	0.1%	0.3%	0.0%
2021-23	2.8%	0.4%	-0.1%	0.1%	0.1%	0.0%
2024-33	0.6%	0.2%	0.1%	0.1%	0.1%	0.0%
Grand Total	-4.0%	-0.3%	0.2%	0.1%	0.1%	0.0%

Table 22. Present value of consumer surplus (CS) using 7% discount rate (in 2017 dollars, Million $)

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	Alt.1	Alt.2	Alt.3	Alt.3	Alt.4	Alt.5
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	10	69	83	79	76	83
2020	206	178	173	175	176	173
2021-23	409	377	370	372	373	370
2024-33	532	525	524	525	525	522
Grand Total	1,157	1,149	1,150	1,151	1,150	1,148
Consumer Surplus net of SQ values						
2019	-87.8%	-16.7%	0.0%	-4.0%	-8.3%	0.0%
2020	18.8%	2.9%	-0.2%	0.8%	1.5%	0.0%
2021-23	10.6%	1.9%	0.1%	0.5%	0.9%	0.0%
2024-33	1.9%	0.6%	0.4%	0.4%	0.5%	0.0%
Grand Total	0.8%	0.1%	0.2%	0.2%	0.1%	0.0%

Table 23. Present value of total economic benefits (TB) using 7% discount rate (in 2017 dollars, Mill. $)

Section	4.3.1	4.3.2	4.3.3.1	4.3.3.2	4.3.4	4.3.5
Alternative	Alt.1	Alt.2	Alt.3	Alt.3	Alt.4	Alt.5
Values/ RUN	No Action	7at15k	F25FLEX18k	24DASFLEX18k	24DASFLEX15k	Status Quo
2019	177	505	559	547	537	547
2020	826	772	761	765	766	762
2021-23	1,900	1,832	1,818	1,822	1,825	1,819
2024-33	3,250	3,230	3,227	3,228	3,229	3,223
Grand Total	6,153	6,340	6,365	6,362	6,357	6,352
Cumulative present value of total economic benefits net of SQ values						
2019	-67.7%	-7.7%	2.0%	0.0%	-1.9%	0.0%
2020	8.4%	1.3%	-0.2%	0.3%	0.5%	0.0%
2021-23	4.4%	0.7%	-0.1%	0.2%	0.3%	0.0%
2024-33	0.8%	0.2%	0.1%	0.1%	0.2%	0.0%
Grand Total	-3.1%	-0.2%	0.2%	0.2%	0.1%	0.0%

7.4.4 Access Area Trip Allocations to the LAGC IFQ Component

7.4.4.1 Allocation of LAGC IFQ Trips in Access Areas

7.4.4.2 Alternative 1 – No Action (Default Measures from FW29)

Under No Action LAGC IFQ vessels would be allocated 558 trips in access areas starting on April 1. This is equivalent to default number of trips from FW29. Under No Action a small percentage of the LAGC IFQ catch could come from access areas, with the rest coming from open areas. However, the cost of fishing could be higher in the open compared to fishing in access areas which are expected to have a higher stock abundance. Usually larger scallops have a price premium compared to smaller ones and if larger scallops are more abundant in access areas, not being able to fish in those areas could affect the revenues negatively as well. Thus, this option could have negative economic impacts on the LAGC IFQ vessels compared to other options.

7.4.4.3 Alternative 2 – 5.5% of the Access Area Allocation

When 5.5% is applied to the 7 trip 15,000 lbs. access area allocations for FY2019, the LAGC IFQ component would receive 3,331 trips. When 5.5% is applied to the 7 trip 18,000 lbs. access area allocations for FY2019, the LAGC IFQ component would receive 3,997 total trips. When 5.5% is applied to six 18,000 lb. trip and a 15,000 lb. trip allocation the LAGC IFQ component would receive 3,902 trips (Table 12? in Section 4.4)

Alternative 2 would allow the LAGC IFQ effort to be distributed over more areas providing opportunity to vessels to fish in more productive areas to reduce their fishing costs by catching the possession limit in a shorter time-period as well as to optimize the size composition of their landings by selectively fishing in areas abundant with larger scallops. Since larger scallops in general command a higher price, this option could also have positive impacts on revenues. The number of trips and scallop pounds allocated to access areas for the LAGC fishery is higher than Alternative 1. Therefore Alternative 2 is expected to have positive economic impacts compared to No Action.

7.4.5 Additional Measures to Reduce Fishery Impacts

7.4.5.1 Alternative 1 – No Action (Default – RSA compensation fishing restricted to open areas, Section 4.6.1)

RSA compensation fishing would be restricted to open areas only. Vessels with RSA poundage would not be allowed to harvest RSA compensation from access areas. This alternative is expected to have negligible biological and economic impacts on the scallop fishery.

7.4.1 Alternative 2 – Allow RSA compensation fishing in open access areas, with limited RSA compensation fishing in the NGOM Management Area.

RSA compensation fishing would be permitted only in the Mid-Atlantic Access Area, the Nantucket Lightship-West, and in open areas. RSA compensation fishing would not be permitted in Closed Area I, Closed Area II, Nantucket Lightship North, and Nantucket Lightship South. RSA compensation fishing would also be permitted in the NGOM management area by vessels that are awarded NGOM RSA compensation pounds as described in Section 4.5. RSA compensation fishing would be allowed in all other open access areas and open areas.

This provision will help accurately account for scallop removals in the NGOM by restricting RSA compensation fishing to vessels that receive a portion of the LA TAC, will facilitate access to high densities of scallops in open access areas and reduce impacts on small scallops and overall mortality in an area. Therefore, this alternative could have low positive impacts on the scallop yield and negligible to low economic benefits over the long-term for the scallop fishery.

7.4.2 Uncertainties and risks

The economic impacts presented in the above sections are analyzed using the price model, costs, revenues and total net benefits as described in the economic model provided in Appendix II. The estimated fishing costs are used in calculating producer surplus for the proposed alternatives, which shows total revenue net of variable costs minus the opportunity costs of labor and capital. The costs and the benefits of the proposed alternatives were analyzed based on the biological projections of landings, DAS and LPUE and the available information about the vessel costs and characteristics, crew shares and prices. The numerical results of these analyses should be interpreted with caution due to uncertainties about the likely changes in:

- factors affecting scallop resource abundance
- fishing behavior
- fixed costs
- variable costs
- import prices and imports from Canada and Japan that are close substitutes for large domestic scallops.
- demand for scallop exports
- bycatch and revenues from other fisheries
- the crew share system
- change in the number of active vessels
- structural changes in ownership
- changes in the composition of fleet in terms of tonnage, HP and crew size of the active vessels
- disposable income and preferences of consumers for scallops.

The estimated values of the economic cost/benefit analysis should be used solely in comparing preferred action with the other alternatives since the uncertainties related to landings and prices are expected to affect all alternatives in the same direction.

The landings streams, DAS and LPUE were obtained from the biological model, which is based on fishing mortality by area and the inputs are not fishery-based in terms of DAS, etc. The biological simulations do not model individual vessels or trips; it models the fleet as a whole. The output of the biological model and the landings streams were used to estimate the costs and benefits of the preferred action and alternatives. The results for economic impacts would change if the actual landings, size composition of landings and LPUE are different than the forecasted values from the biological model.

The prices are estimated using the ex-vessel price model described in Appendix II. This model takes into account the impacts of changes in meat count, domestic landings, exports, price of imports, income of consumers, and composition of landings by market category (i.e., size of scallops) including a price premium on under count 10 scallops.

The important changes in external factors, i.e., in exports, imports, value of dollar, export and import prices had some unpredictable impacts on scallop prices in the past, first resulting an increase to over $9.70 per pound (in terms of 2017 dollars) in 2005, then a consequent decline to about $7.86 per pound (in terms of 2017 dollars) in 2006 as import prices declined but without a significant increase in scallop landings in 2006 (about 56 million lb.) compared to 2005 (about 54 million lb.). During the fishing years from 2010 to 2016, however, the decline in the value of dollar, strong demand for scallops especially from the European countries and a diminished supply from Japan and other competing, scallop-producing nations resulted in much higher prices than anticipated in the previous frameworks. However, in 2017 as landings of scallops reached to nearly 50 million lb. and proportion of U10 and 11 to 20 count scallops increased, average annual ex-vessel price declined to $9.7 from over $12 in 2016. The decrease in import prices and increase in imports from Japan and Canada relative to total imports played a role in this decline as well (See Price Model section in the Economic Model provided in the Appendix I.) Thus, any change in the external factors that affect price, such as in import prices or in the differences between the actual and projected landings will result in differences in the actual and estimated prices.

In addition, the prices were estimated by holding the values of the all the variables that impact prices, such as import prices and disposable income, at the recent levels. For example, disposable income per capita and import prices are assumed to stay constant at the 2017 levels for the economic analyses of this Framework action. This is because it is not possible to predict accurately the changes in the future values of the explanatory variables and also because our goal is to determine the response in scallop prices to the change in landings and the composition in terms of market category given other things held constant. Therefore, future prices could be higher (or lower) than predicted depending on the values of the explanatory variables.

For these reasons, the empirical results of the economic analyses should be used to compare alternatives with each other and with No Action or Status Quo --rather than to estimate the absolute values--since a change in the variables listed above will change the numerical results in the same direction. For example, an increase in import prices would lead to a rise in ex-vessel prices and revenues for all alternatives above the levels estimated in the sections above. An increase in the price of oil, on the other hand, would increase the variable costs and reduce the cost savings under all options. While these changes would affect the absolute values of net economic benefits, the ranking of alternatives in terms of their impacts on revenues, costs, and net benefits are not expected to change.