

Simulation Analyses re: Economic Impacts of Modifying the LAGC IFQ Possession Limit

The following document details methods, assumptions, and simulation results presented to the PDT on August 29th, 2018. **Simulation outputs should not be considered as absolute values; instead, outputs should be considered in terms of relative change (%) compared to the 600-pound limit.**

1. Annual lease price model

Data includes annual average lease-out prices for 2010-2017 fishing years by inactive IFQ permit holders (mainly CPH) with lease value > 1 and those who leased out to vessels in different affiliations. Therefore, those lease transactions (temporary transfers) that took place within the vessels in the same affiliation are excluded from the estimation because lease values were set to either to “zero” or “one” for many observations in this group. Average lease prices by individual owners and permit banks were calculated separately for each group and the differences in lease prices were estimated by a dummy variable (AFFGRP).

Estimation of annual lease prices for the purposes of possession limit analyses is challenging due to the availability of only 8 years of annual data and 16 observations including the values for permit banks and individual leases restricting the number of explanatory variables that could be included in the model. After experimenting with a dozen models taking into account the most important variables that could impact lease prices, the following model provided the best fit with statistically significant coefficients. It is based on the actual data for lease prices representing equilibrium values each year taking into account the factors that impact the supply and demand for leasing in the scallop IFQ fishery. It shows that scallop prices, trip costs, the number of active vessels leasing quota and who leases out quota explains 89% of the variation in lease prices during 2010-2017 after correcting for the dip in lease prices in 2016 fishing year due to several factors including the peak in allocation to over 4.4 million in that year and limitations on landings of large scallops due to resource conditions resulting in over 0.9 million unused quota in that year.

Table 1 . Estimation results for lease prices

Source	Sum of DF	Squares	Mean Square	F Value	Pr > F
Model	5	2.51182	0.50236	29.07	<.0001
Error	10	0.17280	0.01728		
Corrected Total	15	2.68462			
Root MSE	0.13145	R-Square	0.9356		
Dependent Mean	0.80664	Adj R-Sq	0.9034		
Coeff Var	16.29659				
Parameter Estimates					
Parameter	Standard	--Heteroscedasticity Consistent-- Standard			

Variable	DF	Estimate	Error	t Value	Pr > t	Error	t Value	Pr > t
Intercept	1	-3.98589	1.00482	-3.97	0.0027	0.45605	-8.74	<.0001
price17	1	0.15006	0.03445	4.36	0.0014	0.02702	5.55	0.0002
trpcplb2017	1	-0.71134	0.20158	-3.53	0.0055	0.11135	-6.39	<.0001
AFFGRP	1	0.57347	0.06573	8.73	<.0001	0.05196	11.04	<.0001
d2016	1	-1.37389	0.28705	-4.79	0.0007	0.17478	-7.86	<.0001
numvesnetlsin	1	0.05169	0.01495	3.46	0.0061	0.00651	7.94	<.0001

Variables:

Leasepr: Lease price per pound of scallop leased in 2017 dollars

Price2017: Ex-vessel price per lb. of scallops in 2017 dollars

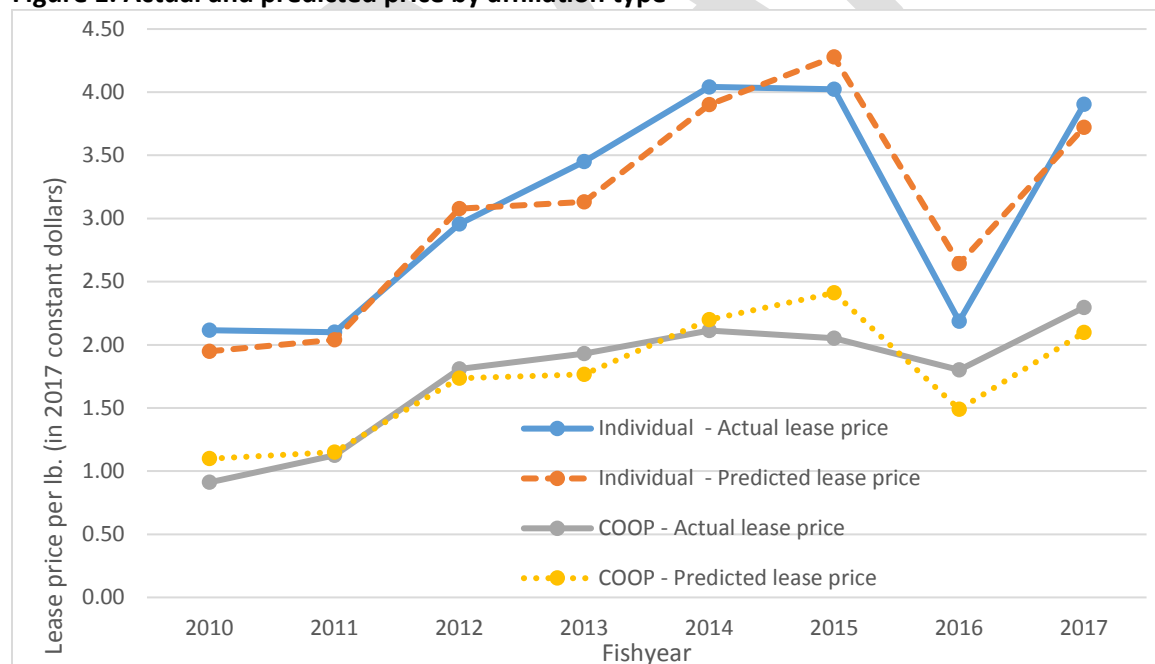
Trpcostplb: Trip costs per lb. of scallops in 2017 dollars

AFFGRP: Individual owner=1, Permit bank=0

Numvesco: Number of vessels that were net leasers (lease-in)

D2016 = Dummy variable, 2016=1, other years=0, to take into account the impacts of about 4.5 million IFQ allocations and other factors.

Figure 1. Actual and predicted price by affiliation type



The model assumes that the demand for quota is the primary factor that determines annual average lease prices as the supply of quota is mainly set by the IFQ TAC. It makes economic sense for most of inactive permit holders, especially those with CPH permits, to lease out their quota rather than to hold them without any earnings unless the lease prices are too low to justify lease transaction, or the profitability is too high to incentivize them to get a vessel to participate in the IFQ fishery. In addition, for a new vessel to become active in the fishery would require a sizeable investment, which may exceed the economic benefits if an owner with an CPH permit, or someone who is active mostly in other fisheries, doesn't have a good amount of quota to fish for scallops to justify the initial investment.

It must, however, be cautioned that this estimation is based only 8 years of data during which trip limits were 600 lb. since 2011 with vessel and dredge sizes consistent with the limits on scallop catch per trip. If significant change in trip limits leads to adjustments in vessel size and gear to increase landings per tow, that could potentially increase magnitude of impact of trip limits on lease prices.

In terms of other statistical properties, the small sample size leads to weak multicollinearity between the number of vessels that were net leasers and the dummy variable for 2016. However, for the variables we are interested to project, namely price and trip costs per pounds of scallops the variance inflation factors (VIF) are quite small. Removing year 2016 leads to normal VIFs and results in almost the same numerical values of the coefficients for ex-vessel price and trip costs per pound variables. The original model was also tested for endogeneity for the number of vessels the test results showed no significant endogeneity that will necessitate other methods of estimation. The small sample size also restricts the use of simultaneous equations.

Although more than a dozen was tested in the estimation of annual lease prices, it is possible to experiment with at least another dozen models using various other statistical models. However, the model presented above is quite robust providing a good fit to lease prices in the period of 2010-2017 and provides a useful tool for scenario analyses with a range of potential increase in lease prices corresponding to higher trip limits.

Methods for determining trip lengths by area

Updated assumptions of trip length were based on observed LAGC IFQ trip data provided by NEFOP, which estimated the following attributes for open and access area trips:

- Transit time—the average of steam time (when vessel leaves dock until gear is deployed) plus calculated time from the end of the last haul until vessel lands, all converted to hours.
- Fishing time—calculated at the trip level by taking an average haul duration for observed hauls and then multiplying that by total hauls for the trip. Then fishing time was averaged among all trips in that particular fleet.
- Trip Length was simply dateland – datesail (in hours)
- Scallops landed is number of bags for trip multiplied by average bag weight.

The NEFOP data was then used to update trip length assumptions based on the following methods:

1. Deduct the transit time (i.e. steam time) from total trip length in the observer data to estimate total fishing time (TFT)= hauling time+ other fishing operations. Other fishing operations include

clearing the deck before the next tow, cutting scallops, maybe gear work, which are all considered as fishing operations.

2. Calculate the transit and TFT as a % of the total trip length in the observer data by area (Table 1)
3. For trip length by area, use the updated *annual IFQ data*.
4. Apply the percentages for the transit and TFT from the observer data to estimate the length in hours and DAS by hours.
5. Estimate TFT in hours per lb. of scallops by area
6. Use TFT in hours per lb. of scallops per area to estimate TFT corresponding to the different trip limit options (Table 2).

Table 2. Estimated trip lengths, transit and fishing times by area (based on the updated 2017 IFQ data for trip length and observer data for % of time spent for transit and fishing)

Row s	Data	Access	Open
Observer Data			
1	Transit time (hrs)	10.1	6.3
2	Hauling (hrs)	4.2	11.5
3	Oth.fish.operations (hrs)	9.2	6.7
4	Total Fishing time (TFT, hrs)	13.4	18.2
5	Total trip length (hrs)	23.5	24.5
6	transit time as a % of trip	0.4	0.3
7	TFT % of trip length	0.6	0.7
8	Scal.land. per trip	754	604
9	Scal.land. per DAS	769	592
10	Trip length in days	0.98	1.02
11	Days to land 600 lb.	0.78	1.01
12	TFT to land 600 lb. (in days)	0.44	0.75
13	TFT per lb. of scallops (Hrs)	0.02	0.03
Annual IFQ data (update)			
14	Annual avg.trip length (hrs)	22.32	23.3
15	Annual avg.trip length (days)	0.93	0.97
16	Avg.Scal.land.per trip	593	507
17	Avg.Scal.land.per DAS	637	522
18	Transit time (Row 6*Row 14)	9.6	5.9
19	TFT (Row 7*Row 14)	12.7	17.3
19	Days to land 600 lb.	0.94	1.15
20	TFT to land 600 lb. (in days)	0.54	0.85
21	TFT per lb. of scallops (Hrs)	0.02	0.03
22	total trip length for 600 lb.	22.48	26.47

Table 3. Estimated trip lengths, transit and fishing times by area (based on the updated 2017 IFQ data for trip length and observer data for % of time spent for transit and fishing)

Access Areas: TFT per lb.= 0.02							
Trip limit	Trip length (hrs)	TFT (hrs)	Transit time (hrs)	Trip length in days	TFT in days	Transit time in days	LPUE (Scallop landings per DAS)
400	18.18	8.6	9.6	0.76	0.36	0.40	528
600	22.48	12.9	9.6	0.94	0.54	0.40	641
800	26.78	17.19	9.6	1.12	0.72	0.40	717
1000	31.08	21.49	9.6	1.29	0.90	0.40	772
1200	35.38	25.79	9.6	1.47	1.07	0.40	814
Open Areas: TFT per lb. = 0.03							
Trip limit	Trip length (hrs)	TFT (hrs)	Transit time (hrs)	Trip length in days	TFT in days	Transit time in days	LPUE (Scallop landings per DAS)
400	19.64	13.65	5.99	0.82	0.57	0.25	489
600	26.47	20.48	5.99	1.08	0.85	0.25	544
800	33.29	27.30	5.99	1.39	1.14	0.25	577
1000	40.12	34.13	5.99	1.67	1.42	0.25	598
1200	46.94	40.95	5.99	1.96	1.71	0.25	614

2. Assumptions for scenario analyses

1. Annual landings for an IFQ vessel that derives over 75% of its revenue from scallops with at least 10 days of fishing in the IFQ fishery is set to 30,000 lb. per year from all areas. This number is close to the average in 2017 fishing year.
2. It is assumed that average vessel landings from open areas will be about 59% (*previously 66%*) of the total and those from access areas are 41% (*previously 34%*) of total scallop landings. These numbers equivalent to what was observed for 2016 and 2017 fishing years using the updated annual IFQ data. Therefore, an average vessel with annual landings of 30,000 lb. is assumed to land 12,412 lb. (*previously 10,200 lb.*) from access areas and 17,587 lb. (*previously 19,800 lb.*) from open areas in the following scenario analyses below.
3. An unlimited amount of simulations could be run using different trip lengths, proportion of leasing, price, trip costs, percent of quota leased and average landings as well using alternative models. The analyses below provide results of scenarios at two different prices, maintenance costs and crew share lay formula. Lease prices are estimated separately for access and open area conditions as follows:
 - a. Access area fishing conditions: Access area trip length is set to 0.94 (*previously 0.63*) days or 22.5 hours correspond to a trip limit of 600 lb. using the updated data and methods described above in Section 0, Table 2 and Table 3 above. Steam time is estimated to be 0.4 (*previously 0.34*) days or 9.6 hours and the total fishing time is

estimated to be 0.54 (previously 0.29) days, or 12.9 hours corresponding to 600 lb. trip limit. It was also assumed that an increase in trip limit will not change the transit time but increase fishing time (TFT) in the same proportion, resulting in an increase in the trip length. This is a conservative assumption since the fishing time may increase less than proportionately to the increase in trip limit for some vessels that are fishing in areas especially with a higher stock abundance.

- b. Open area fishing conditions: Open area trip length is set to 1.08 (previously 0.89) days or 26.47 hours with a steam time of 0.25 (previously 0.19) days and a 0.85 (previously 0.70) days in total fishing time (TFT). Table?? provides the trip lengths also in hours. It was also assumed that the increase in trip limit will increase fishing time in the same proportion while the steam time will stay the same, so trip length will increase (**Error! Reference source not found.**). This is again a conservative estimate in terms of trip productivity. In reality, trip length may increase less than proportionally as the possession limit increase depending on the area fished and vessel characteristics.
4. Estimation of lease price for all areas: If the leased pounds are distributed in the same proportion of open and access area landings, then the overall lease price could be explained as a weighted average of corresponding percentage distribution of landings by area. Lease price estimates for all areas presented in the Tables below is based on this assumption and assuming that 59% of landings came from open and 49% from access areas using the 2017 fishing year data.

3. Model Validation and Estimation of lease prices

Lease prices are estimated in Table 4 below by area and using the average ex-vessel prices for 2017 (\$11.26 for the IFQ fleet), average trip costs per DAS (\$589 in 2017) and trip lengths as described in Table 2 and Table 3 above. The trip limit column in the table also includes the average scallop pounds landed per trip in the access and open areas. This shows that even though the trip limit was 600 lb., average landings per trip were less, 507 lb. for the open and 593 lb. for access areas based on the updated IFQ data by area for 2017 fishing year. Using these values in the lease price equation provided in **Table 1** above, results in a lease price estimate of \$3.67 for open and a lease price estimate of \$4.24 for the access areas. Lease prices would be higher for access areas because the increase in trip length would be lower relative to open areas due to lower fishing time in the access versus open areas.

In reality, lease prices are not determined based on which areas leased pounds are used. Therefore, the estimates in Table 4 could only be used to have a rough idea about how lease prices would vary assuming that the productivity of the fishing areas either resembled open area or access area conditions. We could, however, estimate potential lease prices for all areas as an average of open and access area lease price estimates weighted respectively by the percentage landings coming from open versus access areas. Overall trip lengths and trip costs per lb. of scallops are also estimated by a weighted average of the corresponding numbers for open and access areas. The results show that estimated lease price for all areas using the 2017 data would be \$3.91 per lb. of scallops. Incredibly, this is also equal to the **actual price** observed in the same year (see **Figure 1** above)! Of course, this result can't be used to assert that the price model will predict prices with 100% accuracy but at the least, it could be inferred that the model and the methods we used to estimate lease prices for all areas provide reasonable estimates lease prices at different trip limits.

The results also show that if trip limits were doubled from 600 lb. to 1200 lb., the lease prices would only increase by 9% if open area conditions prevailed and would increase by 15% under access area fishing conditions. For all areas, it would increase by 12%. The reason for this is that as trip limits increase, trip lengths go up as well resulting in a less than proportionate decline in trip costs per lb. of scallops. For example, increase in trip limit to 1200 would increase the average trip length from all areas from 24.82 hours for a trip limit of 600 lb. to 42.16 hours for a trip limit of 1200 lb. (Table 4). The updated estimates for the trip length, transit and total fishing time resulted in a higher trip length, lowering the increase in the lease prices. Consequently, and as the results in the following sections show, negative impacts of higher trip limits on net revenues net of trip and lease costs and the impacts of crew shares are lower compared to the previous projections.

Table 4. Estimated lease price and trip costs (fuel, food, oil, water, ice & supplies) based on 2017 ex-vessel price of \$11.26 and trip costs of \$589 per DAS

Possession limit	Transit time (hrs)	TFT (hrs)	Total Trip length (hrs)	Trip costs	Trip costs per lb.	% Ch. in trip costs per lb. relative to 600 lb.	Lease Price Estimate	% Ch. in lease price	LPUE lb./DAS
OPEN AREAS									
400	5.99	13.65	19.64	482.0	1.21	11%	3.47	-8%	489
507	5.99	17.29	23.28	571.3	1.13	4%	3.67	-3%	522
600	5.99	20.48	26.47	649.5	1.08	0%	3.79	0%	544
800	5.99	27.30	33.29	817.0	1.02	-6%	3.96	4%	577
1000	5.99	34.13	40.12	984.5	0.98	-9%	4.06	7%	598
1200	5.99	40.95	46.94	1152.0	0.96	-11%	4.13	9%	614
ACCESS AREAS									
400	9.58	8.60	18.18	446.2	1.12	21%	3.70	-13%	528
593	9.58	12.74	22.32	547.8	0.92	1%	4.24	0%	637
600	9.58	12.90	22.48	551.7	0.92	0%	4.26	0%	641
800	9.58	17.19	26.78	657.2	0.82	-11%	4.56	7%	717
1000	9.58	21.49	31.08	762.7	0.76	-17%	4.76	12%	772
1200	9.58	25.79	35.38	868.2	0.72	-21%	4.89	15%	814
ALL AREAS (59% of landings from open and 41% of landings from access areas)									
400	7.48	11.56	19.04	467.2	1.17	15%	3.57	-10%	505
539	7.48	15.40	22.88	561.6	1.04	3%	3.91	-2%	570
600	7.48	17.34	24.82	609.1	1.02	0%	3.98	0%	584
800	7.48	23.12	30.60	750.9	0.94	-8%	4.21	6%	635
1000	7.48	28.90	36.38	892.7	0.89	-12%	4.35	9%	670
1200	7.48	34.68	42.16	1034.6	0.86	-15%	4.45	12%	697

4. Scenario analyses for economic impacts

Assumptions for all scenarios:

1. Total landings from all areas are assumed to be 30,000 lb. (Equal to about average of landings per vessel that leased in from different owners in 2016-17. It's also average landings for vessels that leased in more than 50% of landings in 2017).
2. Trip costs per DAS = \$589 (Average trip costs for vessels that were net leasers= i.e., Lease-in>Lease-out)
3. Fixed costs excluding maintenance and repairs are assumed to be \$43,870, maintenance and repairs 20,330 and total fixed costs are assumed to be \$64,200 in 2017 dollars based on the projections using cost survey data for 2011-2012 and corresponding to 600 lb. trip limit (**Table 8**).
4. It is assumed that the maintenance and repair costs will change in proportion to the change in trip length relative to the trip length at 600 lb. trip length (**Table 8**).
5. Scenarios are projected for two different average ex-vessel price scallop price per lb., \$9 and \$12, as well as for varying degrees of leasing, including at 0%, 12.5%, 37.5%, 62.5% and 87.5% corresponding to mid-points of ratios of net leasing to landings using a quartile grouping.
6. Economic impacts on boat and crew shares are estimated using two different lay systems: a) Boat receives 48% of gross, crew gets 52% of gross and pays for trip and lease costs. b) Boat receives 48% of gross, crew gets 52% of gross and pays for trip costs and vessel owner and crew share the lease costs. However, the column corresponding to % change in net revenue net of trip and lease prices could be used to analyze impacts of another crew lay system where vessel owner and crew share a proportion of gross revenue net of trip costs and lease prices.

Table 5. Number of active vessels that were net leasers

Ratio of net lease to landings	2010	2011	2012	2013	2014	2015	2016	2017
<=25%	7	6	18	10	11	11	15	8
25% to 50%	17	17	9	19	15	9	9	12
50% to 75%	16	25	20	16	14	10	12	14
>75%	29	21	28	26	37	44	53	40
NO NET LEASE (0%)	73	60	42	25	26	29	25	30
LEASEOUT (net)	9	9	6	22	28	25	27	33
Total	151	138	123	118	131	128	141	137

Table 6. Number of active vessels that were net leasers as a% of total active vessels

Ratio of net lease to landings	2010	2011	2012	2013	2014	2015	2016	2017	Grand Total
<=25%	5%	4%	15%	8%	8%	9%	11%	6%	8%
25% to 50%	11%	12%	7%	16%	11%	7%	6%	9%	10%
50% to 75%	11%	18%	16%	14%	11%	8%	9%	10%	12%
>75%	19%	15%	23%	22%	28%	34%	38%	29%	26%
NOLSINACTIVE	48%	43%	34%	21%	20%	23%	18%	22%	29%
LEASEOUTACTIVE	6%	7%	5%	19%	21%	20%	19%	24%	15%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 7. Number of active vessels that were net leasers as a% of total active vessels that leased in

Ratio of net lease to landings	2010	2011	2012	2013	2014	2015	2016	2017	Grand Total
<=25%	1%	1%	6%	4%	2%	1%	3%	1%	3%
25% to 50%	13%	11%	9%	16%	16%	9%	5%	8%	10%
50% to 75%	25%	40%	36%	26%	21%	12%	9%	23%	23%
>75%	61%	47%	49%	54%	60%	78%	82%	68%	64%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Scenario A: Change in trip limits applies to all areas

Number of trips, average trip length, trip costs per lb. of scallops, annual trip and maintenance/repair costs corresponding various trip limits if they apply to all areas in provided in **Table 11** and changes in lease price, gross and net revenue is shown in **Table 9** at two different ex-vessel prices, for \$9 and for \$12. It is evident from the Table that lease price increase more than proportionately (by 57%) to the increase in price, by 33% in this case. This could be a reflection in increase in profits at higher ex-vessel prices as other costs remain constant (as it was assumed here), leading to more demand for lease. However, the percentage increase in lease price from the level at 600 lb. trip to level corresponding to 1200 lb. stays the same at different ex-vessel prices.

Table 8. Changes in trip length, DAS, trip costs and maintenance and repair expenses

Possession limit	Number of trips	Trip length	% Ch.in trip length	Trip costs per lb. of scallops	% ch.in trip costs per lb.	Annual DAS	Annual trip costs	Annual Maintenance & repair costs
400	75	19.0	-23%	1.17	15%	59	35,041	23,393
600	50	24.8	0%	1.02	0%	52	30,453	20,330
800	38	30.6	23%	0.94	-8%	48	28,159	18,799
1000	30	36.4	47%	0.89	-12%	45	26,782	17,880
1200	25	42.2	70%	0.86	-15%	44	25,865	17,267

Table 9. Changes ex-vessel price, lease price, total and net revenue

Possession limit	Ex-vessel Price	Lease price	% Ch.in lease price	Total revenue	Net revenue (Gross-Trip costs)	% ch.in net revenue
400	9	2.54	-10%	270,000	234,959	-1.9%
600	9	2.84	0%	270,000	239,547	0.0%
800	9	3.00	6%	270,000	241,841	1.0%
1000	9	3.10	9%	270,000	243,218	1.5%
1200	9	3.17	12%	270,000	244,135	1.9%
400	12	3.99	-10%	360,000	324,959	-1.9%
600	12	4.45	0%	360,000	329,547	0.0%
800	12	4.70	6%	360,000	331,841	1.0%
1000	12	4.86	9%	360,000	333,218	1.5%
1200	13	4.97	12%	360,000	334,135	1.9%

Summary of results:**1) Ex-vessel price = \$9**

Because of the relatively small increase in lease prices as trip limits increase from 600 lb. to 1200 lb., the changes in revenue net of lease and trip costs will be small, slightly positive for those who don't lease or lease a relatively smaller proportion of their landings, such as at less than 50%. This is because the savings in trip costs will outweigh the increase in lease costs at those levels as trip lengths decline for all trips. For example, if a vessel leases 37.5% of their landings and if trip limit increase to 1200 lb., trip costs will decline by \$4588 (from \$30453 at 600 lb. and \$25855 at 1200 lb., **Table 8**), while the lease prices increase less, by \$3733 (from \$31,916 at 600 lb. to \$34,649 at 1200 lb., **Table 10**). However, as the ratio of lease to landings increase, increase in lease costs starts outweighing the decrease in trip costs, such as at lease ratios 50% and higher (**Table 10**).

Given that for most of the active vessels that leased in (about 90% in 2017) this ratio was more than 50%, this scenario shows that gross revenue net of trip and lease costs may decline as trip limit increase from 600 lb. (**Table 10**).

The impacts of the increase in the trip limits on vessel owners and crew will vary, however, according to the crew lay system and to what extent the decline in the number of trips and trip length can lower some of the fixed costs, especially maintenance and repair expenditures. Vessel shares would remain constant if crew pays the lease, but would decline if vessel pays half of lease for possession limits 800 lb. or higher compared to the 600 lb. limit. However, a decline in the number of trips could benefit vessel owners by reducing the maintenance, repair and some other fixed costs. If those costs decline in proportion to the decrease in annual DAS at different trip limits and if crew pays the lease costs, the impacts on profits could be positive, ranging from 2.3% to 4.7% in **Table 10**, depending on the trip limit and the magnitude of the maintenance and repair costs.

An increase in trip limit could increase crew shares, although slightly, for those who work on boats with a low lease to landings ratio (for example, 37.5% or less) even when crew pays 100% of the lease costs, but could decline for crew working on the top leasing groups (**Table 10**). For example, crew income could decline by 12% for those boats that lease 87.5% of their landings at 1200 lb. trip limit (**Table 10**). If, however, crew pays half of the lease crew shares would remain almost constant for the top leasing group and but positive at lower lease ratios. If vessels pay half of lease costs profits could decline for those vessels especially for those in the top lease group. Even after the decline in maintenance and lease costs, the profits could decline by as much as 5% at 1200 lb. limit or more for those in the top group of leasers who comprise most of the active vessels (about 68% in 2017) that lease-in (**Table 10**).

Table 10. Impacts of trip limits on lease costs and net revenue (all areas, ex-vessel price \$9)

Ratio of lease to landing	Trip limit	leased pounds	Lease costs (\$)	Net rev.net of lease (\$)	% Change in Net.rev.net of lease	% Change in Profits (Crew pays lease)	% Change in crew shares (Crew pays lease)	% Change in profits (crew pay 50% of lease)	% Change in crew shares (crew pay 50% of lease)
0.0%	400	0	0	234,959	-1.9%	-4.7%	-4%	-5%	-4.2%
	600	0	0	239,547	0.0%	0.0%	0%	0%	0.0%
	800	0	0	241,841	1.0%	2.3%	2%	2%	2.1%
	1000	0	0	243,218	1.5%	3.7%	3%	4%	3.3%
	1200	0	0	244,135	1.9%	4.7%	4%	5%	4.2%
12.5%	400	3,750	9,531	225,428	-1.5%	-4.7%	-4%	-4%	-3.9%
	600	3,750	10,639	228,909	0.0%	0.0%	0%	0%	0.0%
	800	3,750	11,243	230,599	0.7%	2.3%	2%	2%	1.9%
	1000	3,750	11,622	231,595	1.2%	3.7%	3%	3%	3.0%
	1200	3,750	11,883	232,252	1.5%	4.7%	3%	4%	3.8%
37.5%	400	11,250	28,594	206,366	-0.6%	-4.7%	-2%	-3%	-3.1%
	600	11,250	31,916	207,631	0.0%	0.0%	0%	0%	0.0%
	800	11,250	33,728	208,113	0.2%	2.3%	1%	1%	1.5%
	1000	11,250	34,867	208,350	0.3%	3.7%	1%	2%	2.3%
	1200	11,250	35,649	208,486	0.4%	4.7%	1%	2%	2.9%
62.5%	400	18,750	47,656	187,303	0.5%	-4.7%	2%	-1%	-2.2%
	600	18,750	53,194	186,354	0.0%	0.0%	0%	0%	0.0%
	800	18,750	56,214	185,627	-0.4%	2.3%	-1%	0%	0.9%
	1000	18,750	58,112	185,105	-0.7%	3.7%	-2%	0%	1.5%
	1200	18,750	59,415	184,720	-0.9%	4.7%	-3%	0%	1.8%
87.5%	400	26,250	66,718	168,241	1.9%	-4.7%	9%	3%	-1.0%
	600	26,250	74,471	165,076	0.0%	0.0%	0%	0%	0.0%
	800	26,250	78,699	163,142	-1.2%	2.3%	-5%	-2%	0.2%
	1000	26,250	81,357	161,861	-1.9%	3.7%	-9%	-4%	0.3%
	1200	26,250	83,182	160,954	-2.5%	4.7%	-12%	-5%	0.3%

2) Ex-vessel price = \$12

The results with a \$12 price scenario are similar except that revenue net of trip and lease costs will increase less for those who are low leasers and decline relatively more for those who lease a high proportion of their landings, even though absolute values of net revenue net of lease and trip costs are larger with a \$12 ex-vessel price. A higher scallop price leads to higher lease price and lease costs resulting in a relatively smaller net revenue at trip limits higher than 600 lb. for those that lease-in even 37.5% of their landings (**Table 11**).

Results are similar in terms of profits as well, except the percentage increase in profits would be slightly less as the savings in maintenance and repair costs now comprise a smaller proportion of total profits. If crew pays the lease costs, profits would increase for all lease groups except they would decrease at 400 trip limit. The impacts on crew incomes net of trip and lease costs would be slightly positive for those

who work on boats that rely on leasing less, but negative for most of those who work on boats that lease a significant ratio of their landings. Again, with higher ex-vessel price and higher lease prices, the negative impacts on crew shares will be larger, for example, about 23% decrease at a trip limit of 1200 lb. for the top group of leasers if crew pays 100% of lease costs (**Table 11**).

However, if vessel owner pays half of the lease costs, the impacts on profits would be negative especially for the top group it could lead a decline if 8% in profits at 1200 lb. limit (**Table 11**).

Table 11. Impacts of trip limits on lease costs and net revenue (all areas, ex-vessel price \$12)

Ratio of lease to landings	Trip limit	leased pounds	Lease costs (\$)	Net rev.net of lease (\$)	% Change in Net.rev.net of lease	% Change in Profits (Crew pays lease)	% Change in crew shares (Crew pays lease)	% Change in profits (crew pay 50% of lease)	% Change in crew shares (crew pay 50% of lease)
0.0%	400	0	0	324,959	-1.4%	-2.8%	-3%	-3%	-3%
	600	0	0	329,547	0.0%	0.0%	0%	0%	0%
	800	0	0	331,841	0.7%	1.4%	1%	1%	1%
	1000	0	0	333,218	1.1%	2.3%	2%	2%	2%
	1200	0	0	334,135	1.4%	2.8%	3%	3%	3%
12.5%	400	3,750	14,951	310,009	-0.9%	-2.8%	-2%	-2%	-3%
	600	3,750	16,688	312,859	0.0%	0.0%	0%	0%	0%
	800	3,750	17,635	314,206	0.4%	1.4%	1%	1%	1%
	1000	3,750	18,231	314,987	0.7%	2.3%	2%	2%	2%
	1200	3,750	18,640	315,496	0.8%	2.8%	2%	2%	2%
37.5%	400	11,250	44,852	280,108	0.2%	-2.8%	1%	-1%	-2%
	600	11,250	50,064	279,484	0.0%	0.0%	0%	0%	0%
	800	11,250	52,906	278,935	-0.2%	1.4%	-1%	0%	1%
	1000	11,250	54,693	278,525	-0.3%	2.3%	-1%	0%	1%
	1200	11,250	55,919	278,216	-0.5%	2.8%	-1%	0%	1%
62.5%	400	18,750	74,753	250,207	1.7%	-2.8%	6%	2%	0%
	600	18,750	83,440	246,108	0.0%	0.0%	0%	0%	0%
	800	18,750	88,177	243,665	-1.0%	1.4%	-3%	-1%	0%
	1000	18,750	91,155	242,063	-1.6%	2.3%	-6%	-2%	0%
	1200	18,750	93,199	240,937	-2.1%	2.8%	-7%	-3%	0%
87.5%	400	26,250	104,654	220,305	3.6%	-2.8%	19%	6%	2%
	600	26,250	116,815	212,732	0.0%	0.0%	0%	0%	0%
	800	26,250	123,448	208,394	-2.0%	1.4%	-11%	-4%	-1%
	1000	26,250	127,617	205,601	-3.4%	2.3%	-18%	-6%	-2%
	1200	26,250	130,478	203,657	-4.3%	2.8%	-23%	-8%	-2%

3) Increase in trip costs

Higher trip costs increase the benefits of higher trip limits or reduces the loss from the increase in lease prices. **Table 13** shows the results of a scenario with an ex-vessel price of \$9 and 20% increase in trip costs from \$589 per DAS to \$707 per DAS. In this case, higher trip costs lead to larger savings in the trip cost at higher trip limits and increases crew shares even when crew pays the lease costs as long as lease

to landings ratio is not more than 50%. For the top lease groups, crew shares could still decline at higher trip limits, although relatively less compared to **Table 10** above with lower trip costs. As long as crew pays the trip costs, there would be no change in profits.

Table 12. Changes trip costs and lease price (trip limit applies to all areas)

Trip limit	Number of trips	Annual DAS	Trip cost per DAS	Lease Price	% Change in Lease Price	Annual trip costs
400	75	59	589	2.54	-10%	35,041
600	50	52	589	2.84	0%	30,453
800	38	48	589	3.00	6%	28,159
1000	30	45	589	3.10	9%	26,782
1200	25	44	589	3.17	12%	25,865
400	75	59	707	2.15	-12%	42,049
600	50	52	707	2.46	0%	36,543
800	38	48	707	2.63	7%	33,790
1000	30	45	707	2.73	11%	32,139
1200	25	44	707	2.81	14%	31,037

Table 13. Impacts of trip limits on revenue net of lease cost, profits and crew shares (all areas, ex-vessel price \$9, and an increase in trip costs by 20% - \$707 per DAS)

Ratio of lease to landings	Trip limit	leased pounds	Lease costs (\$)	Net rev.net of lease (\$)	% Change in Net.rev.net of lease	% Change in Profits (Crew pays lease)	% Change in crew shares (Crew pays lease)	% Change in profits (crew pay 50% of lease)	% Change in crew shares (crew pay 50% of lease)
0.0%	400	0	0	227,951	-2.4%	-4.7%	-5%	-5%	-5.3%
	600	0	0	233,457	0.0%	0.0%	0%	0%	0.0%
	800	0	0	236,210	1.2%	2.3%	3%	2%	2.7%
	1000	0	0	237,861	1.9%	3.7%	4%	4%	4.2%
	1200	0	0	238,963	2.4%	4.7%	5%	5%	5.3%
12.5%	400	3,750	8,074	219,877	-1.9%	-4.7%	-5%	-4%	-5.0%
	600	3,750	9,215	224,242	0.0%	0.0%	0%	0%	0.0%
	800	3,750	9,848	226,362	0.9%	2.3%	2%	2%	2.5%
	1000	3,750	10,250	227,611	1.5%	3.7%	4%	3%	3.9%
	1200	3,750	10,528	228,435	1.9%	4.7%	4%	4%	4.9%
37.5%	400	11,250	24,221	203,730	-1.0%	-4.7%	-3%	-3%	-4.2%
	600	11,250	27,645	205,812	0.0%	0.0%	0%	0%	0.0%
	800	11,250	29,544	206,665	0.4%	2.3%	1%	1%	2.0%
	1000	11,250	30,750	207,111	0.6%	3.7%	2%	2%	3.2%
	1200	11,250	31,583	207,380	0.8%	4.7%	2%	2%	3.9%
62.5%	400	18,750	40,369	187,583	0.1%	-4.7%	0%	0%	-3.3%
	600	18,750	46,074	187,383	0.0%	0.0%	0%	0%	0.0%
	800	18,750	49,241	186,969	-0.2%	2.3%	-1%	0%	1.4%
	1000	18,750	51,250	186,611	-0.4%	3.7%	-1%	0%	2.2%
	1200	18,750	52,638	186,325	-0.6%	4.7%	-2%	-1%	2.8%
87.5%	400	26,250	56,516	171,435	1.5%	-4.7%	6%	3%	-2.1%
	600	26,250	64,504	168,953	0.0%	0.0%	0%	0%	0.0%
	800	26,250	68,937	167,273	-1.0%	2.3%	-4%	-2%	0.7%
	1000	26,250	71,750	166,111	-1.7%	3.7%	-7%	-4%	1.1%
	1200	26,250	73,693	165,270	-2.2%	4.7%	-9%	-5%	1.3%

Scenario B: Change in trip limits applies only to access areas

Economic impacts of the trip limits when they only apply to access areas are analyzed by setting the trip limit at 600 lb. in the open areas, varying them in the access areas and estimating total number of trips, and DAS as a sum of the corresponding numbers in those areas (Table 14 and Table 15). The results of the simulations are provided in Table 16 at a \$9 ex-vessel price and in Table 17 for an ex-vessel price of \$12. The direction of the results is similar to the simulations provided for the open areas, however, lease prices increase less when trip limit changes apply only to the access areas. For example, at a trip limit of 1200, lease prices would increase by only 6% in this case compared to 12% if all areas could be fished at the increased trip limits. Although overall trip costs decline relatively less compared to scenario A, the economic impacts on profits and crew shares would be lower for all lease groups.

Table 14. Changes in trip length and lease price (trip limit applies to access areas only)

Possession limit	Area	Trip length (hrs)	Trip costs (per trip)	trip costs per lb.	% ch.in lease price	Lease price
600	Open	26.5	650	1.08	0%	2.70
600	Open	26.5	650	1.08	0%	2.70
600	Open	26.5	650	1.08	0%	2.70
600	Open	26.5	650	1.08	0%	2.70
600	Open	26.5	650	1.08	0%	2.70
400	Access	18.2	446	1.12	-13%	2.64
600	Access	22.5	552	0.92	0%	3.03
800	Access	26.8	657	0.82	7%	3.25
1000	Access	31.1	763	0.76	12%	3.39
1200	Access	35.4	868	0.72	15%	3.49
400	All	23.0	565	1.10	-5%	2.67
600	All	24.8	609	1.02	0%	2.84
800	All	26.6	653	0.97	3%	2.93
1000	All	28.4	696	0.95	5%	2.99
1200	All	30.2	740	0.93	6%	3.02

Table 15. Changes trip costs and lease price (trip limit applies to all areas)

Trip limit	Number of trips	Annual DAS	Trip cost per DAS	Annual trip costs	Net revenue (Gross rev.-trip cost)
400	60	55.8	589	32,886	237,114
600	50	51.7	589	30,453	239,547
800	45	49.6	589	29,236	240,764
1000	42	48.4	589	28,506	241,494
1200	40	47.6	589	28,019	241,981

Table 16. Impacts of trip limits on revenue net of trip and lease costs, profits and crew shares (ex-vessel price \$9, trip limit changes apply to access areas only)

Ratio of lease to landing	Trip limit	leased pounds	Lease costs (\$)	Net rev.net of lease (\$)	% Change in Net.rev.net of lease	% Change in Profits (Crew pays lease)	% Change in crew shares (Crew pays lease)	% Change in profits (crew pay 50% of lease)	% Change in crew shares (crew pay 50% of lease)
0.0%	400	0	0	237,114	-1.0%	-2.5%	-2.2%	-2.5%	-2.2%
	600	0	0	239,547	0.0%	0.0%	0.0%	0.0%	0.0%
	800	0	0	240,764	0.5%	1.2%	1.1%	1.2%	1.1%
	1000	0	0	241,494	0.8%	2.0%	1.8%	2.0%	1.8%
	1200	0	0	241,981	1.0%	2.5%	2.2%	2.5%	2.2%
12.5%	400	3,750	10,027	227,088	-0.8%	-2.5%	-1.8%	-2.2%	-2.0%
	600	3,750	10,639	228,909	0.0%	0.0%	0.0%	0.0%	0.0%
	800	3,750	10,978	229,786	0.4%	1.2%	0.9%	1.1%	1.0%
	1000	3,750	11,194	230,300	0.6%	2.0%	1.4%	1.7%	1.6%
	1200	3,750	11,343	230,638	0.8%	2.5%	1.7%	2.1%	2.0%
37.5%	400	11,250	30,080	207,035	-0.3%	-2.5%	-0.8%	-1.4%	-1.6%
	600	11,250	31,916	207,631	0.0%	0.0%	0.0%	0.0%	0.0%
	800	11,250	32,935	207,829	0.1%	1.2%	0.3%	0.6%	0.8%
	1000	11,250	33,582	207,912	0.1%	2.0%	0.4%	0.9%	1.2%
	1200	11,250	34,028	207,953	0.2%	2.5%	0.4%	1.2%	1.5%
62.5%	400	18,750	50,133	186,981	0.3%	-2.5%	1.1%	-0.2%	-1.1%
	600	18,750	53,194	186,354	0.0%	0.0%	0.0%	0.0%	0.0%
	800	18,750	54,892	185,872	-0.3%	1.2%	-0.8%	-0.1%	0.4%
	1000	18,750	55,969	185,524	-0.4%	2.0%	-1.5%	-0.2%	0.7%
	1200	18,750	56,713	185,267	-0.6%	2.5%	-1.9%	-0.3%	0.8%
87.5%	400	26,250	70,186	166,928	1.1%	-2.5%	5.2%	1.8%	-0.4%
	600	26,250	74,471	165,076	0.0%	0.0%	0.0%	0.0%	0.0%
	800	26,250	76,849	163,915	-0.7%	1.2%	-3.3%	-1.3%	0.0%
	1000	26,250	78,357	163,137	-1.2%	2.0%	-5.5%	-2.3%	0.0%
	1200	26,250	79,398	162,582	-1.5%	2.5%	-7.0%	-3.0%	0.0%

Table 17. Impacts of trip limits on revenue net of trip and lease costs, profits and crew shares (ex-vessel price \$12, trip limit changes apply to access areas only)

Ratio of lease to landing	Trip limit	leased pounds	Lease costs (\$)	Net rev.net of lease (\$)	% Change in Net.rev.net of lease	% Change in Profits (Crew pays lease)	% Change in crew shares (Crew pays lease)	% Change in profits (crew pay 50% of lease)	% Change in crew shares (crew pay 50% of lease)
0.0%	400	0	0	327,114	-0.7%	-1.5%	-1.6%	-1.5%	-1.6%
	600	0	0	329,547	0.0%	0.0%	0.0%	0.0%	0.0%
	800	0	0	330,764	0.4%	0.7%	0.8%	0.7%	0.8%
	1000	0	0	331,494	0.6%	1.2%	1.2%	1.2%	1.2%
	1200	0	0	331,981	0.7%	1.5%	1.6%	1.5%	1.6%
12.5%	400	3,750	15,728	311,387	-0.5%	-1.5%	-1.1%	-1.1%	-1.3%
	600	3,750	16,688	312,859	0.0%	0.0%	0.0%	0.0%	0.0%
	800	3,750	17,221	313,543	0.2%	0.7%	0.5%	0.5%	0.6%
	1000	3,750	17,559	313,935	0.3%	1.2%	0.8%	0.9%	1.0%
	1200	3,750	17,792	314,189	0.4%	1.5%	0.9%	1.1%	1.3%
37.5%	400	11,250	47,183	279,931	0.2%	-1.5%	0.4%	-0.2%	-0.8%
	600	11,250	50,064	279,484	0.0%	0.0%	0.0%	0.0%	0.0%
	800	11,250	51,662	279,102	-0.1%	0.7%	-0.4%	0.0%	0.3%
	1000	11,250	52,676	278,818	-0.2%	1.2%	-0.6%	0.0%	0.5%
	1200	11,250	53,376	278,605	-0.3%	1.5%	-0.8%	0.0%	0.6%
62.5%	400	18,750	78,638	248,476	1.0%	-1.5%	3.2%	1.2%	0.0%
	600	18,750	83,440	246,108	0.0%	0.0%	0.0%	0.0%	0.0%
	800	18,750	86,104	244,660	-0.6%	0.7%	-2.0%	-0.8%	-0.1%
	1000	18,750	87,793	243,701	-1.0%	1.2%	-3.3%	-1.3%	-0.2%
	1200	18,750	88,960	243,021	-1.3%	1.5%	-4.2%	-1.7%	-0.3%
87.5%	400	26,250	110,093	217,021	2.0%	-1.5%	10.7%	3.5%	0.9%
	600	26,250	116,815	212,732	0.0%	0.0%	0.0%	0.0%	0.0%
	800	26,250	120,545	210,219	-1.2%	0.7%	-6.3%	-2.1%	-0.7%
	1000	26,250	122,911	208,583	-2.0%	1.2%	-10.4%	-3.5%	-1.1%
	1200	26,250	124,544	207,437	-2.5%	1.5%	-13.3%	-4.5%	-1.5%

Aggregate impacts of Trip Limits– A scenario analysis using 2017 fishing year data for IFQ fishery

Assumptions

- Ex-vessel price=\$11.26 and trip costs per DAS in including food, fuel, oil, water & ice =\$589
- Trip limit changes apply all areas
- Transit time, TFT and total trip length, LPUE and lease price are provided in Table 4 of Doc.?
- 59% of total scallop landings come from open and 41% from the access areas.
- Crew share system: Crew receives 52% of gross revenue, pays trip costs and pays either 100% or 50% of lease costs.
- Those assumptions combined with the annual price model results in the following % changes in trip costs, DAS and lease prices.
- The 2017 data group by leasing activity shown in is used to estimate the aggregate impacts for different groups (**Table 19**)

Table 18. Percentage changes in average trip lengths from all areas

Possession limit	%ch.in trip length	% ch.in DAS	%ch.in LPUE (per DAS)	% Ch. Lease price	% Ch.in trip costs
400	-23%	15%	-14%	-10%	15%
600	0%	0%	0%	0%	0%
800	23%	-8%	9%	6%	-8%
1000	47%	-12%	15%	9%	-12%
1200	70%	-15%	19%	12%	-15%

Table 19. Number of IFQ holders and total net lease, DAS and landings by activity and net leasing (2017)

ACTIVITY	Ratio of net lease	Number of IFQ holders (num. of MRI)	Total net lease	Sum of SCAL_DAS	Average Scallop lb. per vessel	Ratio of net lease to landings*
ACTIVE	<=25%	8	12,205	366	18,368	8%
	26% to 50%	12	109,181	562	23,991	38%
	51% to 75%	14	320,086	945	34,532	66%
	>75%	40	958,762	1,933	25,441	94%
	NO LEASE	30	-	456	7,246	0%
	LEASE-OUT	33	-215,629)	739	9,925	*-66%
ACTIVE Total		137	1,184,605	5,002	18,108	
NOT ACTIVE	NO LEASING	67	-	-	-	NA
	LEASEOUT	111	- 1,184,605	-	-	NA
Grand Total		315	0	5,002	7,876	

Table 20. Estimated change in trip costs (in 2017 dollars & fuel prices, - indicates decline)

Lease grp/Trip limit	400	600	800	1,000	1,200
Lease out - active	50,093		-25,046	-40,074	-50,093
Zero lease	33,244		-16,622	-26,595	-33,244
<=25%	22,472		-11,236	-17,978	-22,472
26% to 50%	44,030		-22,015	-35,224	-44,030
51% to 75%	73,936		-36,968	-59,149	-73,936
>75%	155,632		-77,816	-124,506	-155,632
Grand Total	379,407		-189,703	-303,526	-379,407

Table 21. Estimated change in total maintenance and repair costs (in 2017 dollars, - indicates decline)

Lease grp/Trip limit	400	600	800	1000	1200
Lease out - active	28,639		-14,320	-22,911	-28,639
Zero lease	17,568		-8,784	-14,054	-17,568
<=25%	13,066		-6,533	-10,453	-13,066
26% to 50%	25,547		-12,774	-20,438	-25,547
51% to 75%	45,162		-22,581	-36,130	-45,162
>75%	86,069		-43,035	-68,855	-86,069
Grand Total	216,052		-108,026	-172,841	-216,052

Note: Maintenance costs for each group is estimated using the cost equation which is estimated as a function of HP*LENGTH of vessel based on 2011-2012 surveys. Then those costs are adjusted by % the ratio of landings in each group to landings of the most active group, which is the 50% to 75% net leasing group with scallop landings of over 34,000 lb. each year.

Table 22. Estimated total lease costs (-) and earnings (+) (in 2017 dollars)

Lease grp/Trip limit	400	600	800	1000	1200
Lease out - not active	4,226,424	4,717,571	4,985,409	5,153,774	5,269,343
Lease out - active	769,319	858,721	907,474	938,121	959,158
Zero lease	0	0	0	0	0
<=25%	-43,545	-48,605	-51,365	-53,099	-54,290
26% to 50%	-389,535	-434,802	-459,488	-475,006	-485,657
51% to 75%	-1,142,000	-1,274,710	-1,347,082	-1,392,575	-1,423,802
>75%	-3,420,664	-3,818,174	-4,034,949	-4,171,215	-4,264,752
Grand Total	0	0	0	0	0

Table 23. Estimated changes total lease costs (- shows increase) and lease earnings (+ shows increase) compared to the levels for 600 trip limit (in 2017 dollars)

Lease grp/Trip limit	400	600	800	1000	1200
Leaseout -not active	-491,146		267,838	436,203	551,772
Leaseout -active	-89,401		48,753	79,400	100,437
Zero lease	0		0	0	0
<=25%	5,060		-2,760	-4,494	-5,685
26% to 50%	45,267		-24,686	-40,203	-50,855
51% to 75%	132,710		-72,371	-117,864	-149,092
>75%	397,510		-216,775	-353,042	-446,578

Table 24. Estimated changes total costs including trip, lease and maintenance and repairs (- shows the increase in costs and + shows the decline and/or increase in lease revenues in 2017 dollars)

Lease grp/Trip limit	400	600	800	1000	1200	Number of Permit holders
Lease-out groups						
Lease out -not active	-491,146		267,838	436,203	551,772	111
Lease out - active	-168,134		88,120	142,386	179,169	33
Total gains for lease-out groups	-659,280		355,957	578,589	730,942	144
No lease, active	-50,812		25,406	40,649	50,812	30
Lease-in groups						
<=25%	-30,478		15,010	23,937	29,854	8
26% to 50%	-24,310		10,103	15,458	18,722	12
51% to 75%	13,612		-12,822	-22,586	-29,994	14
>75%	155,809		-95,924	-159,681	-204,877	40
Total gains for lease-in groups	114,633		-83,634	-142,872	-186,294	74

Table 25. Estimated changes in crew shares if crew pays the lease costs (as a % difference from the levels for 600 lb. trip limit)

Lease grp/Trip limit	400	600	800	1000	1200	crew	Crew numbers as a % of total
<=25%	-3%		1%	2%	3%	30	6%
26% to 50%	0%		0%	-1%	-1%	49	10%
51% to 75%	6%		-3%	-6%	-7%	58	11%
>75%	22%		-13%	-21%	-26%	149	29%
Zero lease	-3%		2%	3%	3%	103	20%
Leaseout -active	-6%		3%	5%	6%	123	24%
Grand Total	1%		-1%	-1%	-1%	512	100%

Table 26. Estimated changes in profits if crew pays lease costs (as a % difference from the levels for 600 lb. trip limit)

GROUP	400	600	800	1000	1200	Number of IFQ holders
<=25%	-2.5%		1.2%	2.0%	2.5%	8
26% to 50%	-2.5%		1.2%	2.0%	2.5%	12
51% to 75%	-2.6%		1.3%	2.1%	2.6%	14
>75%	-2.4%		1.2%	1.9%	2.4%	40
Zero lease	-2.2%		1.1%	1.8%	2.2%	30
Lease out -active	-5.8%		3.1%	5.0%	6.3%	33
Lease out -not active	-10.4%		5.7%	9.2%	11.7%	111
Grand Total	-3.6%		1.8%	3.0%	3.7%	*248

*excluding those who don't lease and not active in the fishery

Table 27. Estimated changes crew shares and profits if crew pays half of lease costs

Values	GROUP	400	600	800	1000	1200
Crew shares	<=25%	-2.7%		1.3%	2.1%	2.6%
	26% to 50%	-0.4%		0.0%	0.0%	-0.1%
	51% to 75%	3.5%		-2.2%	-3.6%	-4.7%
	>75%	11.6%		-6.8%	-11.2%	-14.3%
	Zero lease	-3.2%		1.6%	2.5%	3.2%
	Lease out -active	-5.5%		2.9%	4.7%	5.9%
	Lease out -not active	NA		NA	NA	NA
Profits	<=25%	-2.04%		1.00%	1.59%	1.98%
	26% to 50%	-0.32%		0.05%	0.04%	0.01%
	51% to 75%	1.53%		-0.98%	-1.65%	-2.12%
	>75%	5.15%		-2.98%	-4.92%	-6.27%
	Zero lease	-4.03%		2.02%	3.23%	4.03%
	Lease out -active	-5.54%		2.92%	4.73%	5.95%
	Lease out -not active	0.00%		0.00%	0.00%	0.00%
Crew shares		1.58%		-1.10%	-1.87%	-2.42%
Profits		-0.01%		-0.14%	-0.27%	-0.38%

Summary of aggregate results:

- Scenario analysis used 2017 data to estimate lease and trip costs at a range of trip limits, and showed that an increased limit could increase profits for all lease groups if crew pays for lease costs, and could decline for vessels that lease more than 50% of their landings. If the estimated lease price at each trip limit increases greater than expected, the costs and benefits would be greater than shown in the scenario analyses.
- If an increase in lease price lowers crew shares below the levels that could be earned in alternative occupations (opportunity costs of labor), either the crew lay formula will need to

adjust, or the demand for leased quota would be reduced due to fewer crew members participating in the fishery. In this scenario, the increase in lease prices could be less drastic in; however, this dynamic effect needs further analyses.

Uncertainties and caveats with analysis:

- These scenarios are based on conservative assumptions regarding in the changes in TFT and trip length. If vessel owners upgrade their gear and the capacity of the vessel to catch more scallops at each tow, trip lengths could decline more so than estimated here. This could lead to a greater increase in lease prices.
- If lease prices increase greater than estimated here, the costs and benefits would be greater than shown in the scenario analyses.
- If the decline in maintenance and repair costs is less than estimated here, the change in profits will not be as great.