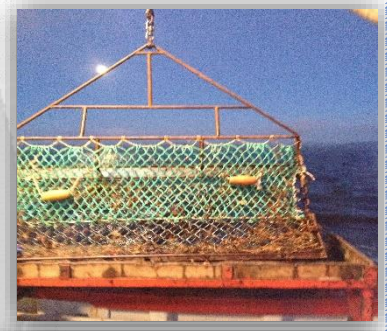
LOUGHS AGENCY

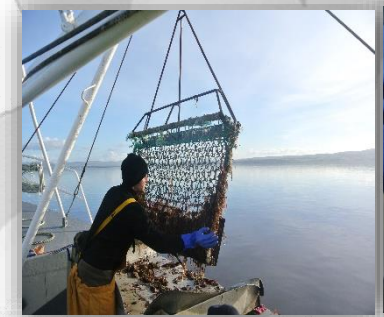
FOYLE, CARLINGFORD AND IRISH LIGHTS COMMISSION

Pre-Fishery Stock Assessment
Lough Foyle Native Oyster Fishery

Summary Report

Autumn 2016





Aquaculture & Shellfisheries

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A pre-fishery stock assessment was conducted on oyster beds in Lough Foyle during autumn 2016.

The results of this survey are in keeping with the results of the post-season survey with continued evidence of the cohort of oysters that settled in Lough Foyle in late summer 2014.

The harvestable biomass of oysters on all oyster beds is estimated to be 174 tonnes (Figure 1). Landings from the fishery in the 2015/16 season amounted to just over 69 tonnes. The total biomass of oysters on these beds has improved relative to the spring situation thanks largely to a very good growing season in 2016. The 2 year old oysters in the cohort that settled in late summer 2014 have grown as much as 40mm in 2016 and some have already reached 80mm however the vast majority are less than 35g in weight at this point in time. There was no evidence of a widespread spatfall in 2016.

It is recommended that the fishery does not remove the total harvestable biomass in the 2016/17 season. This will help to prevent the loss of an effective spawning stock for the 2017 spawning period.

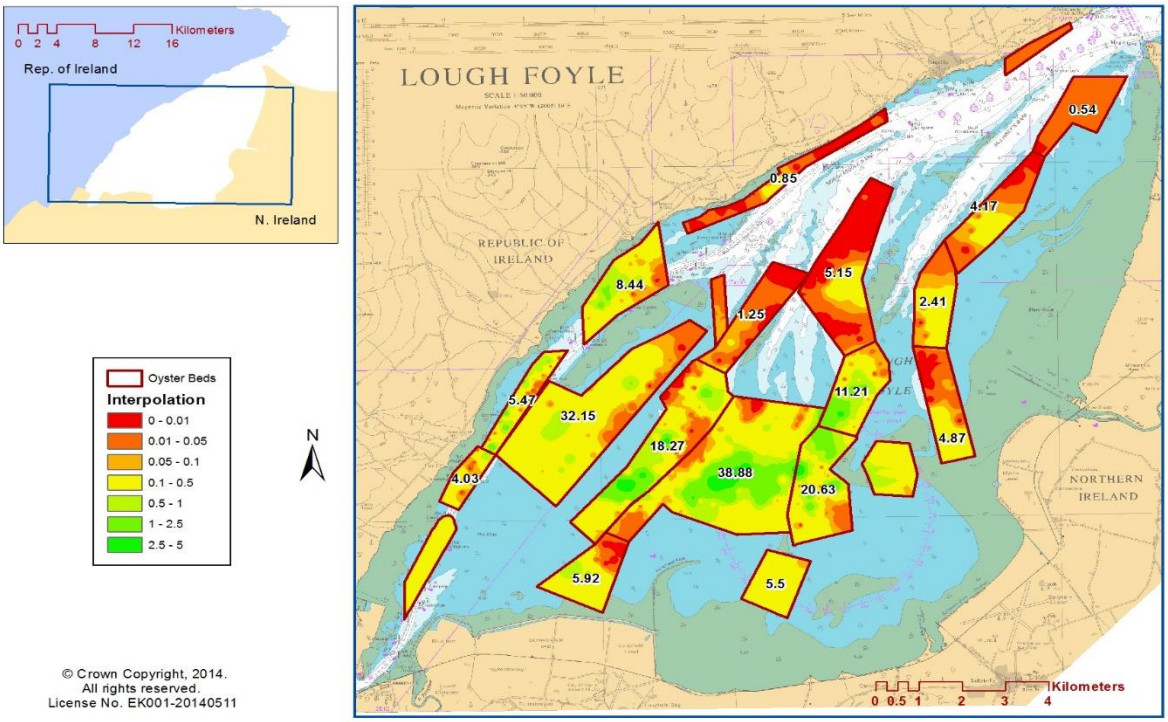

Figure 1 Harvestable Biomass (t) on Foyle oyster beds autumn 2016

2. Introduction

A pre-fishery survey of the native oyster beds in Lough Foyle took place in September 2016. This survey was conducted by Agency staff on board local fishing vessels.

3. Methods

A dredge survey was carried out in Lough Foyle using 4 local fishing vessels. Scientific staff from the Loughs Agency assessed the population distribution and abundance by analysing dredge contents from each sample location (figure 2A-B). Oyster density is calculated by dividing the area dredged (m^2) by the total number of oysters after adjusting for dredge efficiency (25%) and any sub-sampling. Dredge efficiency has been taken from the work done in Lough Foyle during the Baseline Survey of Shellfish Resources conducted by Cefas in 2006. Oyster density is interpolated across the oyster beds using a six point IDW method and this allows a biomass figure to be calculated based on the area (m^2) of the oyster bed within each density category. This follows the approach of similar work conducted in Irish oyster fishery stock assessments conducted by the Marine Institute. The average weight of the oysters on each bed is used to factor up to an overall biomass based on mean density within each bed. Any fresh dead oysters are recorded as a measure of recent mortality, these exhibit no fouling on the inner surface of the shell valves. Oyster spat (<20mm) presence or absence was recorded at each sample point as was total numbers of spat per dredge sample.

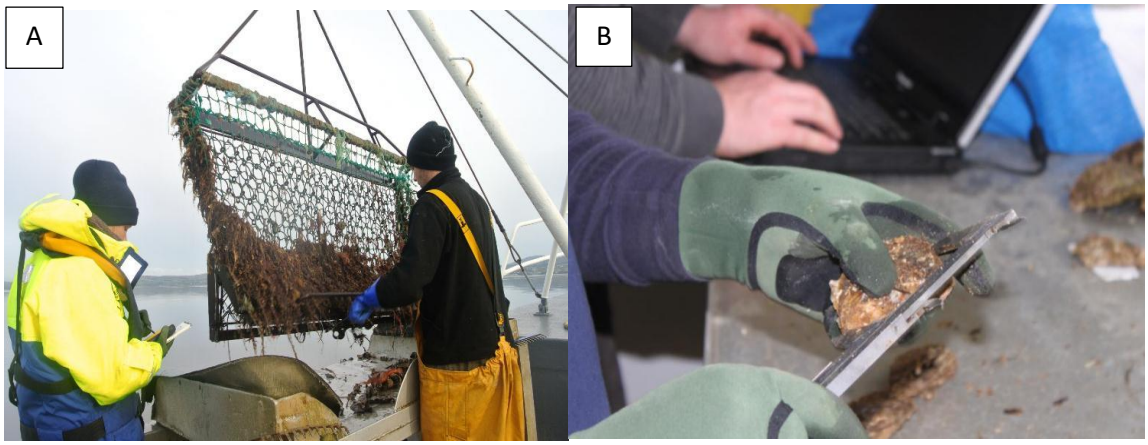

Figure 2 Methods used during survey: (A) Analysing and recording dredge contents. (B) Oysters are measured for length frequency analysis

4. Oyster Density

Oyster density has been recorded at each of the dredge locations in the fishery (figure 3). The mean density for all beds is 0.38 oysters/m^2. This figure is higher than previous post fishery surveys conducted in autumn each year likely as a result of the spatfall from 2014 now entering into the adult size classes and bolstering the adult biomass figure. It is also possible that the densities recorded during this survey are an overestimate as a result of very high water temperatures in 2016 which appears to have had an impact on the dredge efficiency on certain beds. These types of extremely high densities relative to previous surveys were also observed in 2011 after a similar period of high water temperatures. Highest density was observed on the Flat Ground with a maximum density of 5.8 oysters/m^2. Oyster density recorded from each dredge tow has been represented as point data and then interpolated using a 6 point IDW methodology. The interpolation has been performed only in areas of the oyster beds that were surveyed and have point data present. A barrier feature has been placed within the interpolation between the oyster beds in or to the north of the navigation channel and all beds on the east of the navigation channel to help replicate the impacts of a natural barrier (a sandbank) between the beds in this area.

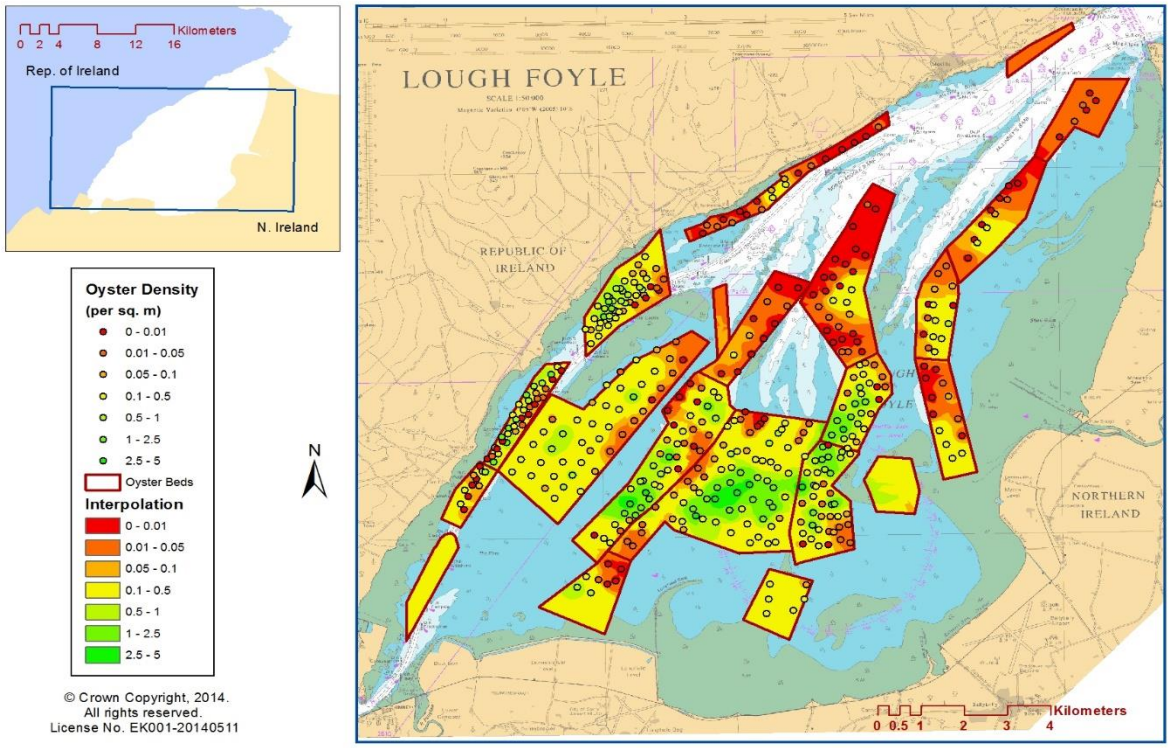

Figure 3 Interpolated oyster density in Lough Foyle Spring 2016

5. Biomass Estimate

It has been estimated that the Foyle oyster population biomass is 615 tonnes in total (table 1). This is an increase from the estimated biomass of 366 tonnes in autumn 2015. Total stock biomass above 80mm is currently estimated to be 174 tonnes.

The total stock biomass is high relative to previous years and this is likely due to good growth in the younger cohort of oysters that settled in late summer 2014. These oysters have now attained a length of around 60-80mm however they are still mostly less than 40g in weight making them less marketable. Average weight was lower in 2016 than previous seasons due to the large shell growth rates experienced on many beds.

Table 1 Oyster biomass per oyster bed in Lough Foyle Spring 2016

Bed name	Area (ha)	Mean Length (mm)	Bed Total (t)	Total (t) >80mm
Barney's Bank	200	75.5	1.08	0.54
Black Ghee	236	73.5	8.86	4.87
Drumskellan	91	78.5	9.84	4.03
Flat Ground	970	70.8	206.82	38.88
Great Bank	827	79.2	71.92	32.15
McGhee	167	72.4	9.01	5.50
Middle North	228	78.2	2.50	1.25
Middle South	531	70.7	94.61	22.61
Moville	250	78.2	9.48	4.17
Peak	208	71.24	10.48	2.41
Perch	276	70.78	37.33	8.44
Quigley'sPt	141	71.2	24.00	5.47
Redcastle	164	71.7	2.06	0.85
Sandy Ridge	474	81.6	9.28	5.15
Shooting Range	215	74.3	12.08	5.92
Southside North	235	73.1	42.62	11.21
Southside South	343	74.4	63.47	20.63
Total			**615.43**	**174.08**

6. Spatfall

Oyster spawning and larval survival is thought to be heavily dependent on good environmental conditions throughout the spring and summer and the threshold water temperature values being exceeded for a minimum period of time, usually 16^0C for 2-4 weeks. If these conditions do not occur it is expected that spawning will be limited to a small percentage of the stock on each bed and the numbers of juveniles will be minimal. Spawning is also limited by oyster density

and proximity of each individual oyster to another has an impact on fertilisation success. Removal of oysters during the fishing season reduces the oyster density.

Poor spawning and settlement was observed in the 2012, 2013 and 2015 spawning seasons and no widespread spatfall was observed in 2016 (Figure 5). The spat from 2014 has now progressed to be between 45-75mm in size (see figure 4).

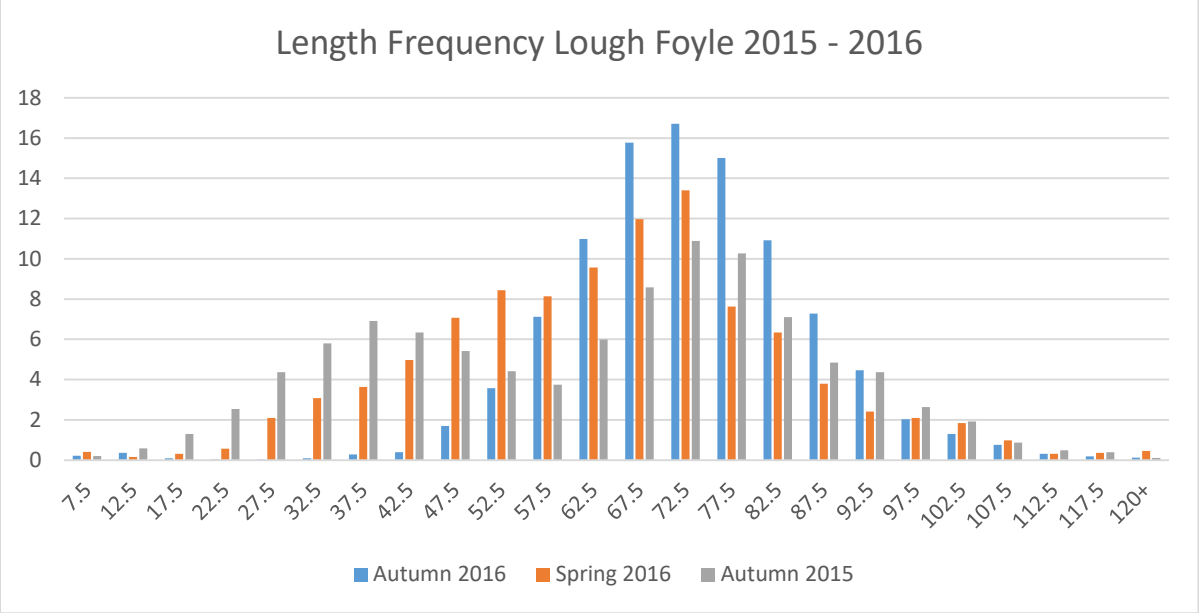

Figure 4 Length Frequency of oysters in Lough Foyle 2015-2016

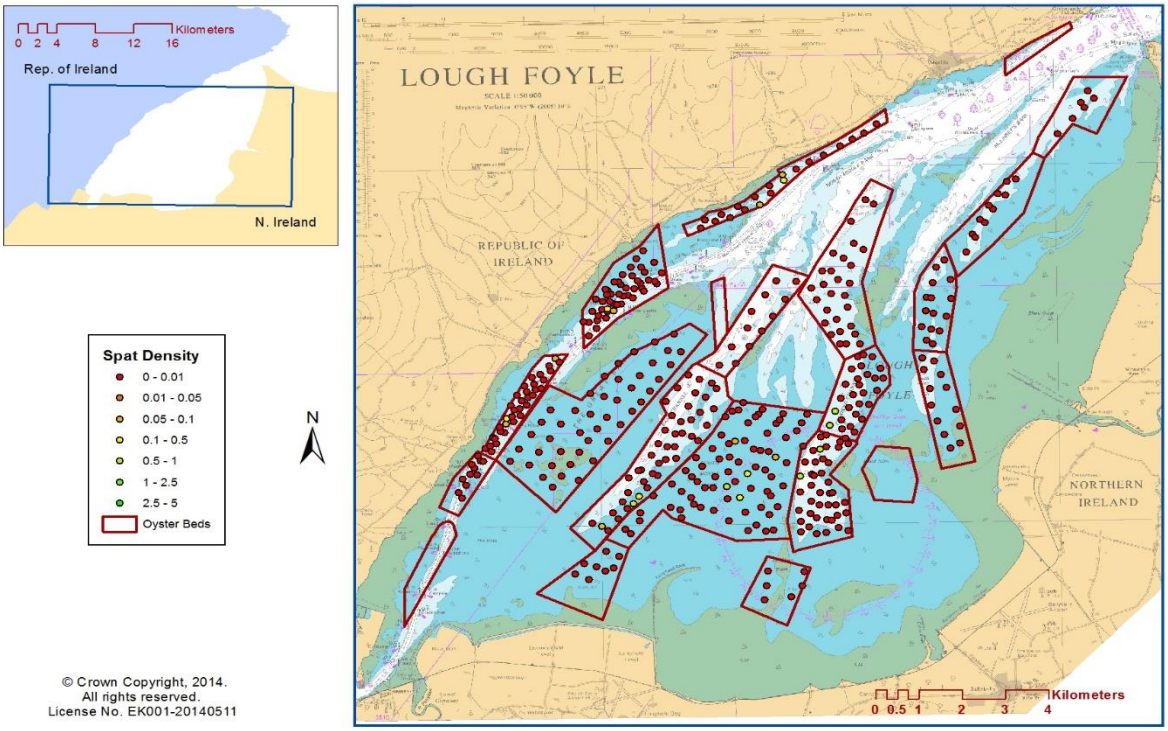

Figure 5 Oyster Spat Density in Lough Foyle 2016

7. Mortality Levels

There was very limited evidence of recent mortality on the oyster beds (figure 6). Mortality was recorded in 3.3% of the samples taken and the majority of these appeared to due to natural causes. The latest Bonamia test results show infection rates of between 0-30% on the beds and this may result in elevated mortality levels if the intensity of the infection is high.

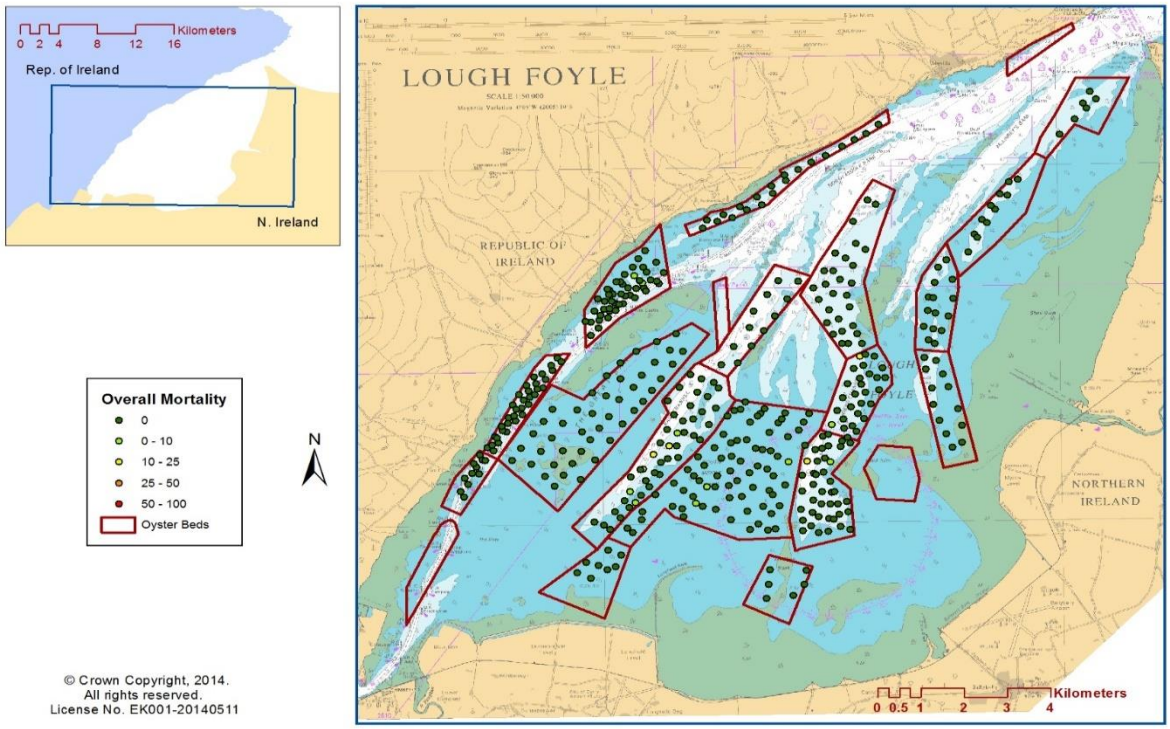

Figure 6 Overall mortality recorded in Lough Foyle Autumn 2016

8. Population Structure

The length frequency of the oyster population suggest that the proportion of larger size classes has increased since the 2007 stock survey. The 2007 results show there was poor representation of oysters 75mm and above in the population. In the years since the regulation of the fishery in 2008 there has been greater evidence of larger oysters within the population (see figure 7).

The larger oysters are an important resource within the population. These make up the majority of the spawning stock biomass. Although oysters as small as 35mm are capable of spawning, the larger oysters are capable of producing large quantities of larvae for the fishery, and are therefore of great importance. If there is a higher percentage of large oysters present in the population along with suitable environmental conditions there is a greater chance of spawning success. The overall sampled population consists of 59% above 71mm. Figure 7 highlights the bias towards larger length classes as a result of poor recruitment in 2015 and 2016.

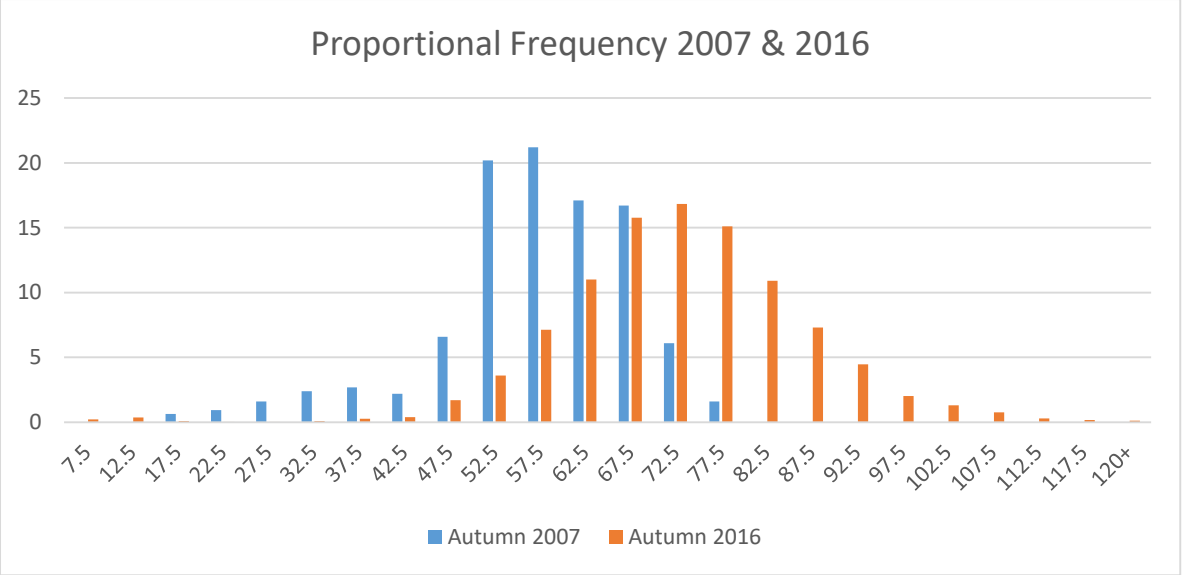

Figure 7 Length Frequency of Lough Foyle oysters 2007 & 2016

The cumulative length frequency (figure 8) shows the gradual growth in smaller size oysters with a shift of the line to the right in the all length classes as a result of good growing conditions and the absence of fishing removal of larger length classes since 2015.

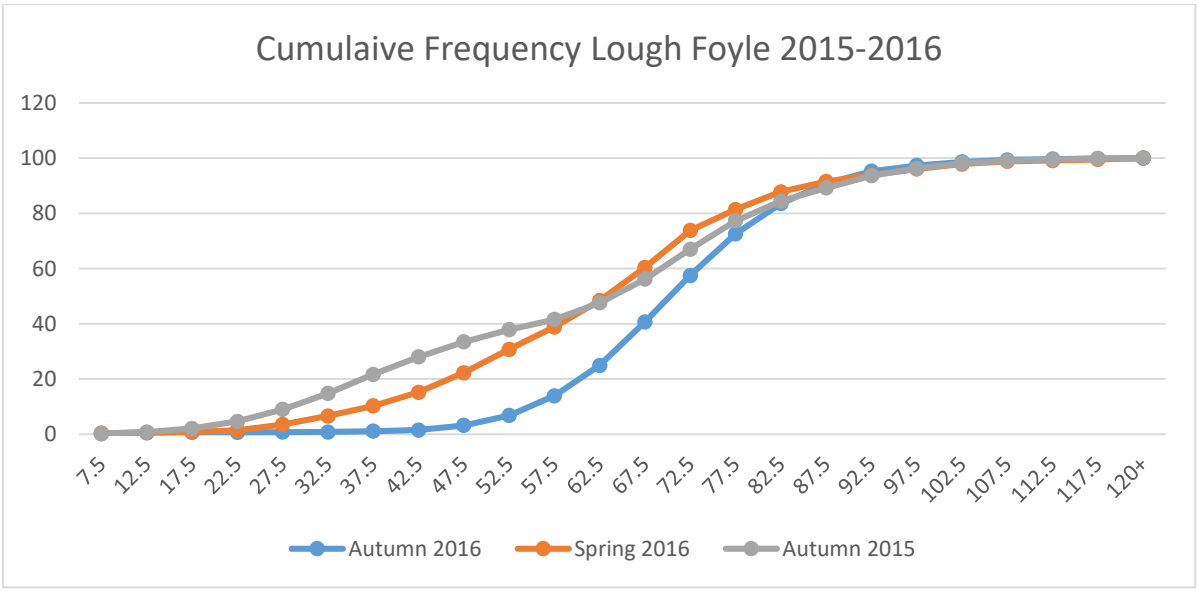

Figure 8 Cumulative Frequency across all oyster beds in Lough Foyle 2015-2016

The pie chart in figure 9 shows a bias towards larger size classes within the stock as a result of limited recruitment of juveniles into the stock in the past 2 spawning seasons. This is likely to lead to a reduction in the fishable stock size in the 2019/20 season.

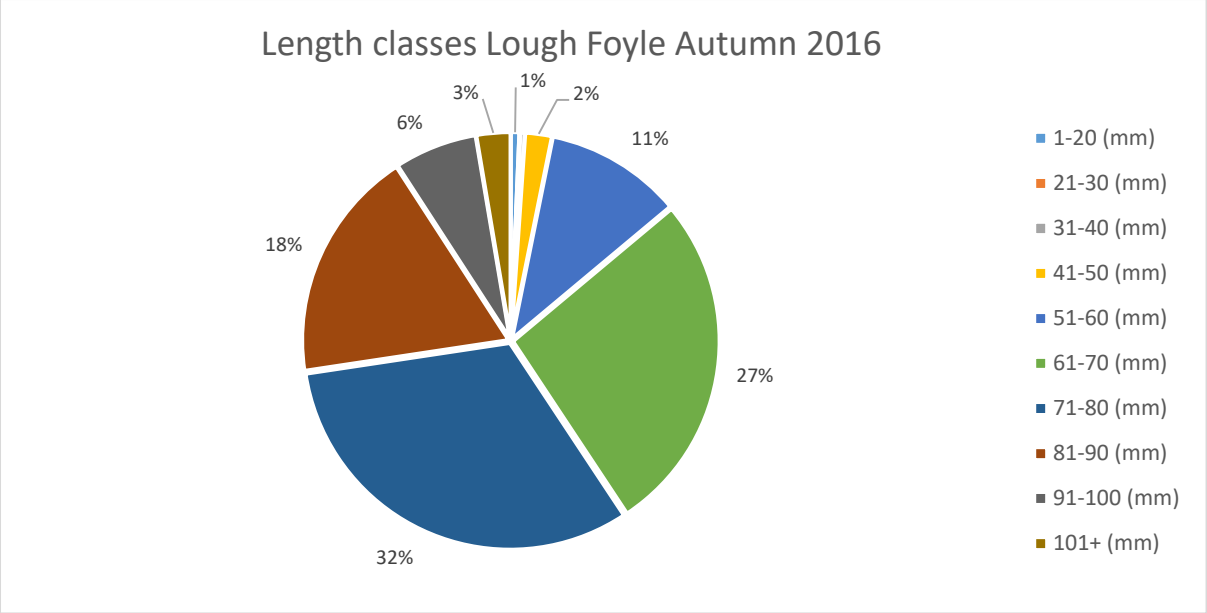

Figure 9 Length classes on oyster beds Lough Foyle 2016

Figure 10 illustrates the percentage of each length class on the oyster beds in Lough Foyle. This chart highlights the differences between beds in terms of the health of their stock structure. The beds which consistently produce commercially important quantities of oysters (Middle Bed, Perch, Flat Ground) have got good representation of most length classes from 41mm-101mm+ whilst other less productive beds (Middle Bottom, Moville) are heavily skewed towards the older age classes highlighting the lack of consistent spat settlements on these beds.

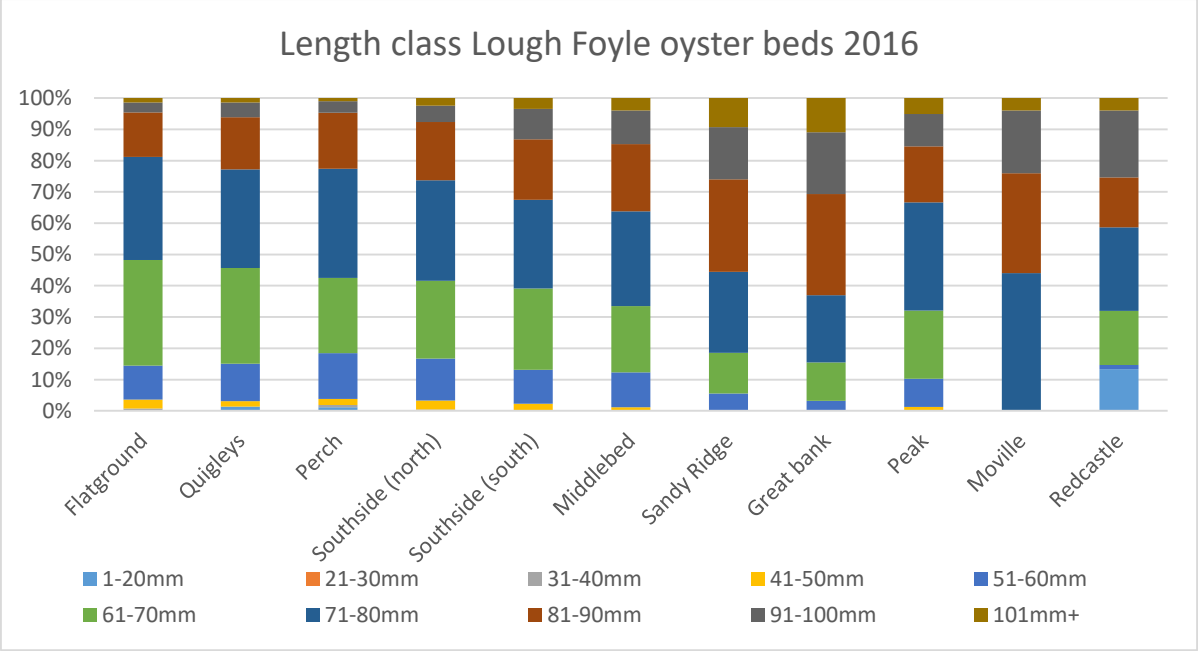

Figure 10 Size class on each bed in Lough Foyle 2016

9. Oyster Bed Review

9.1 The Perch

Table 2 Summary Information: The Perch

Bed Name	**Perch**
Area (h)	276.1
Total Biomass (t)	37.33
Biomass (t) >80mm	8.44

The Perch is one of the 5 main commercially fished oyster beds with the highest density in Lough Foyle and it covers an area of 276 hectares. The overall biomass estimated for this bed is 37.3 tonnes, 8.4 tonnes of that figure is currently above market size of 80mm and is available to the fishery. 8.8 tonnes were landed from this bed during the fishing season of 2015/16. The length Frequency for the Perch shows there is a notably higher percentage of 77- 87mm oysters recorded during the autumn 2016 survey than the spring survey, this shows the growth progression during 2016. There was only a small percentage of oysters <20mm recorded during the survey due to a relatively unsuccessful spawning season (Figure 11).

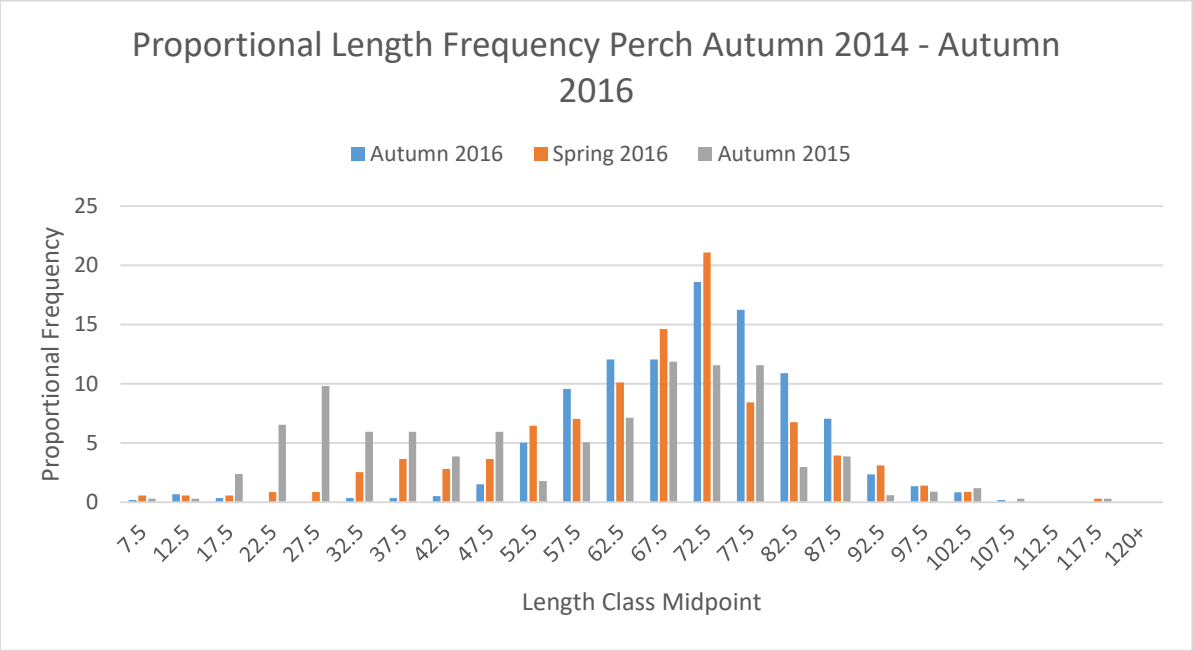

Figure 11 Proportional Length Frequency The Perch 2015-16

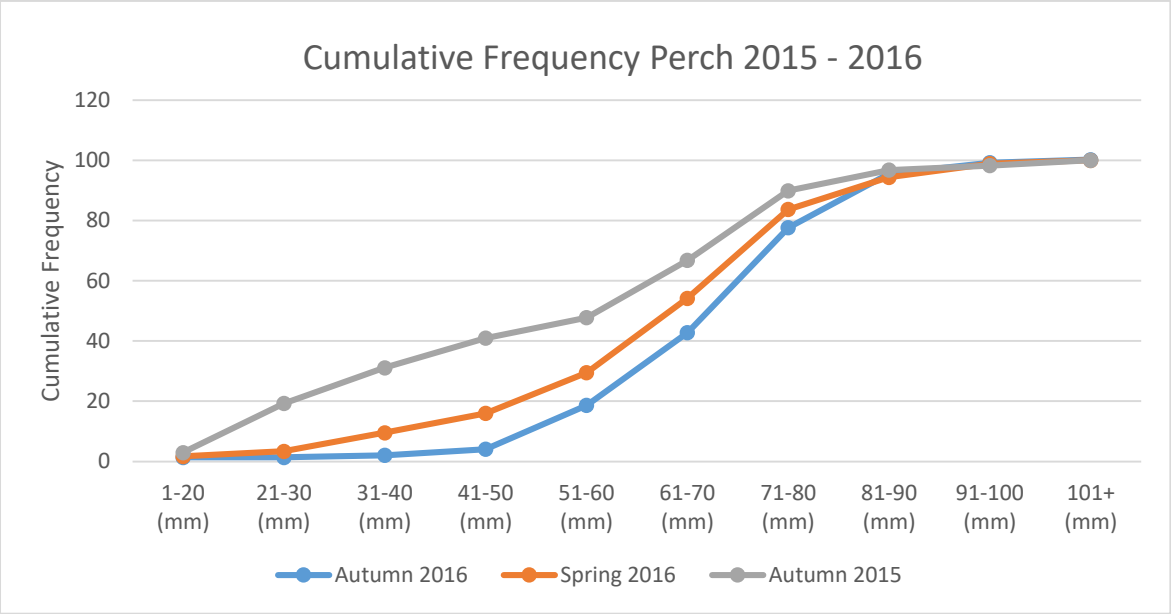

Figure 12 Cumulative Frequency: The Perch 2015-2016

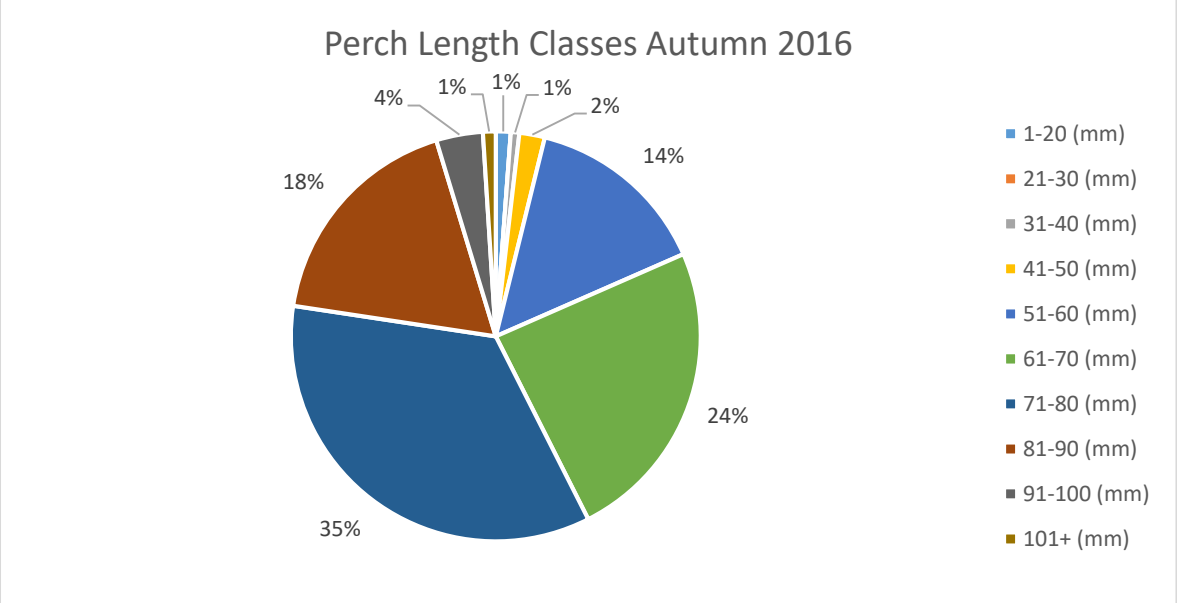

Figure 13 Percentage of length classes: The Perch 2016

9.2 The Flat Ground

Table 3 Summary Information: The Flat Ground

Bed Name	**Flat Ground**
Area (h)	970
Total Biomass (t)	206.82
Biomass (t) >80mm	38.88

The Flat Ground covers an area of 970 hectares. Total stock biomass for this bed is estimated to be 206 tonnes. 38.8 tonnes is above market size therefore harvestable biomass. 14.6 tonnes of oysters were landed from the Flat Ground during the 2015/16 season.

The length frequency (figure 14) shows very little spat (<20mm) was recorded during the survey but that a substantial amount was recorded during the 2014 survey and again this spatfall was recorded during the spring 2015 survey. The growth progression of the 2014 spat is observed in the data with an increase from an average of 12.5mm to an average of 35mm in autumn 2015 with another increase again to over 67mm in autumn 2016. In keeping with the overall length frequencies there is good representation of older age classes which would not have been recorded in the stock assessments during the period 2007-2010.

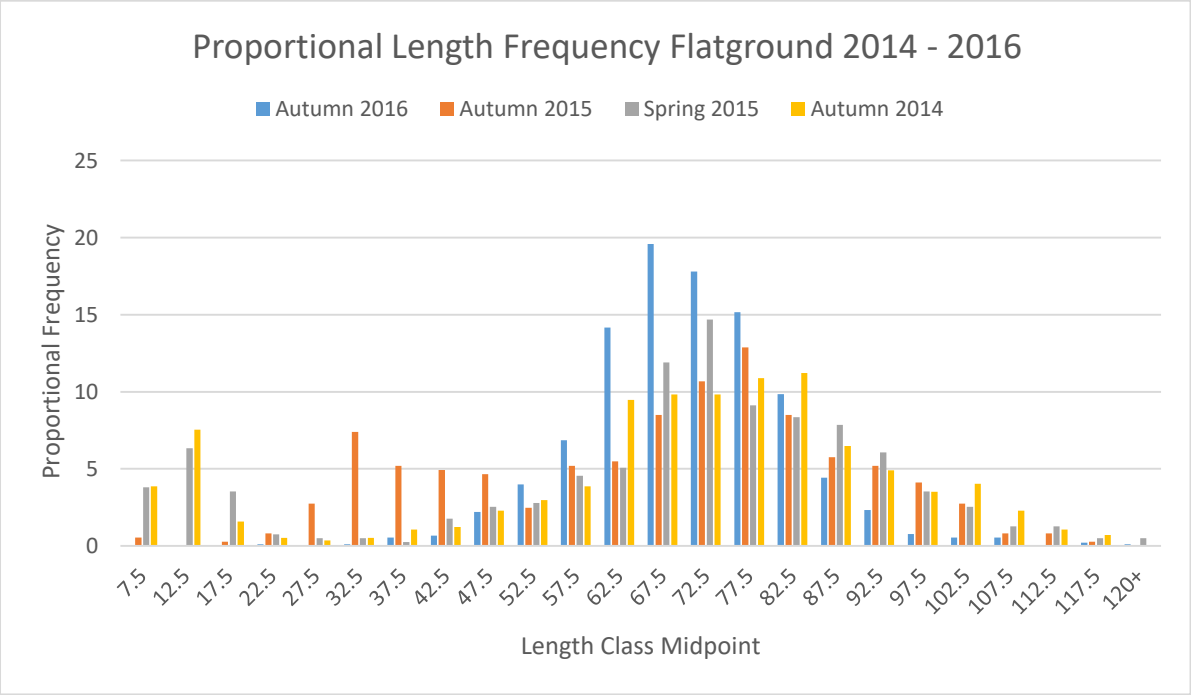

Figure 14 Proportional Length Frequency: Flat Ground 2014-16

The cumulative frequency (Figure 15) for the stock on the Flat Ground shows the rapid growth in the smallest length classes since the spring survey with the majority of the population now above 50mm on this bed.

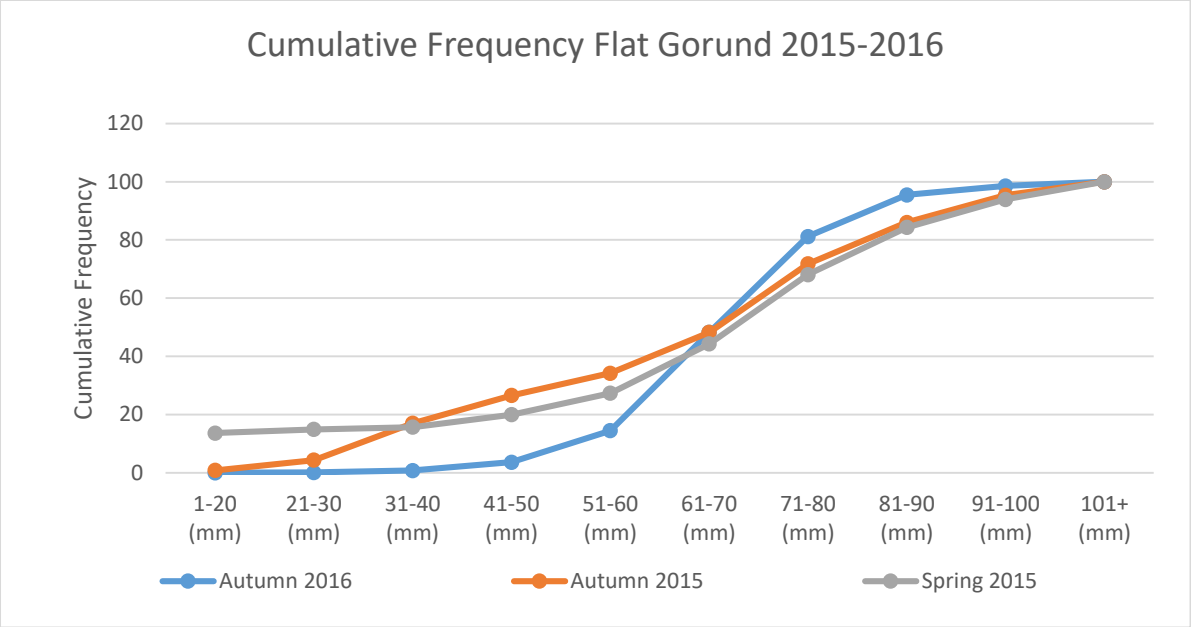

Figure 15 Cumulative Frequency: Flat Ground 2015-2016

The pie chart (Figure 16) also draws attention to the fact that the smaller size classes are not represented on this bed and the vast majority of the population on the bed is more than 50mm in size.

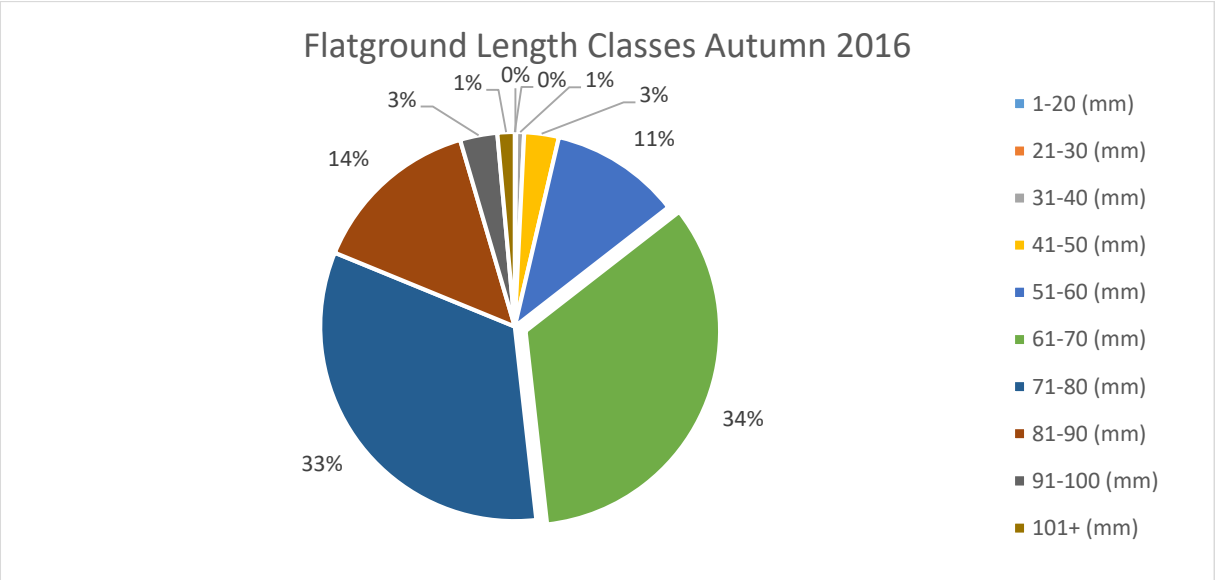

Figure 16 Percentage of each length class: Flat Ground 2016

9.3 Quigley's Point

Table 4 Summary Information: Quigley's Point

Bed Name	**Quigley's Point**
Area (h)	140.6
Total Biomass (t)	24
Biomass (t) >80mm	5.47

Quigley's point covers an area of 140.6 hectares. The total biomass has been estimated to be 24 tonnes on this bed with 5.47 tonnes above the market size of 80mm. 2.93 tonnes were landed from Quigley's bed during the fishing season of 2015/16.

The length frequency for Quigley's Point (figure 17) shows limited evidence of any spatfall on the bed. The cohort that settled in 2014 has now attained a size of between 62-72mm on average and should recruit into the fishery from 2017-18 onwards.

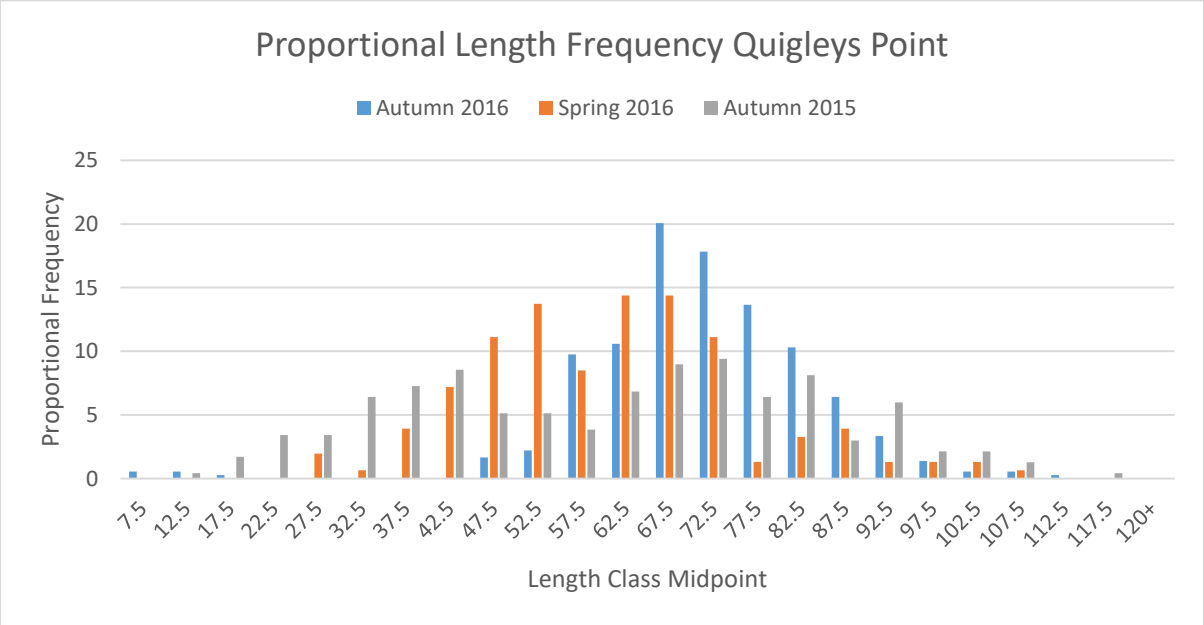

Figure 17 Proportional Length Frequency Quigley's Point 2015-16

The cumulative frequency (Figure 18) again highlights the reduction in the proportion of the stock in the smaller size classes on this bed. Only 15% of the stock is less than 50mm in size.

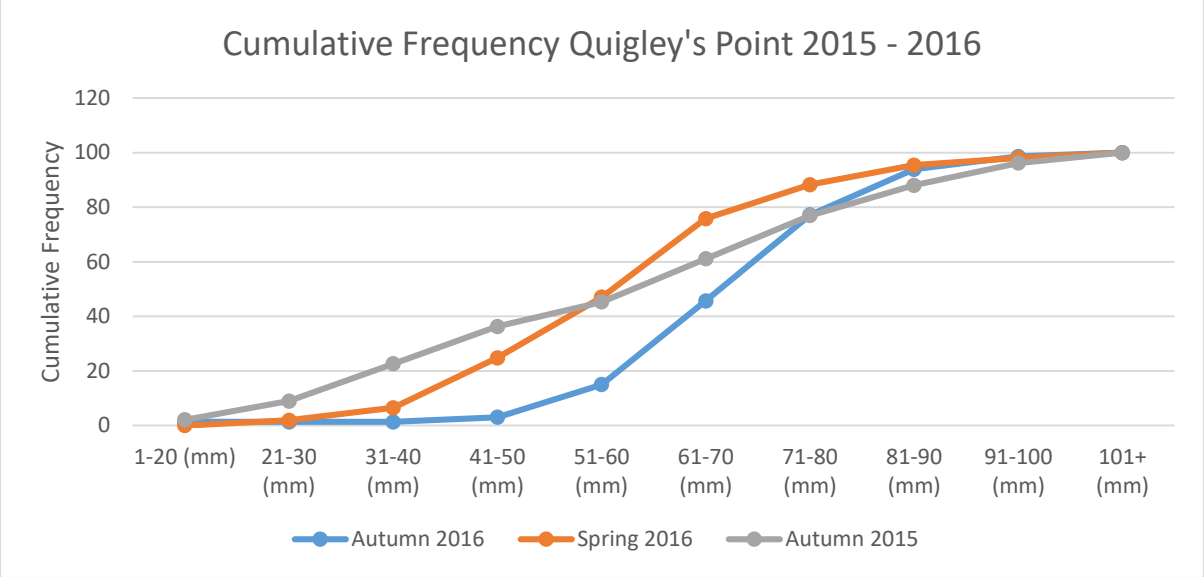

Figure 18 Cumulative Frequency: Quigley's point 2015-2016

Figure 19 shows the proportion of each length class on the bed. It is clear that smaller size classes are missing from this bed as is the case on many other beds in 2016. The market sized stock makes up 23% of the total population.

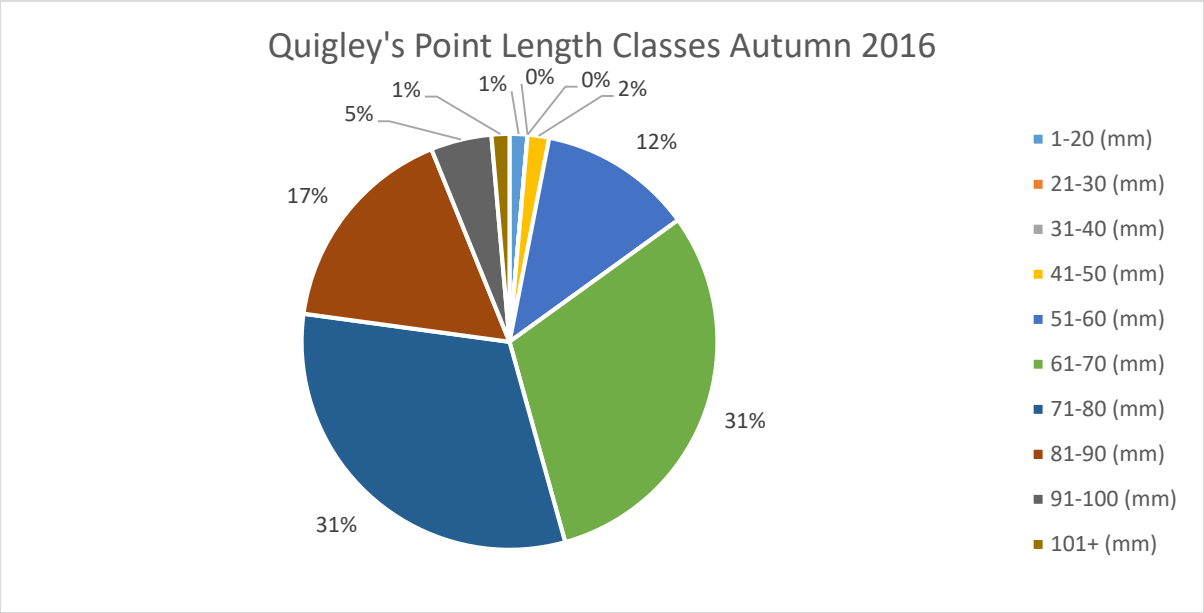

Figure 19 Percentage of length classes: Quigley's Point 2016

9.4 Middle Bed South

Table 5 Summary Information: Middle Bed South

Bed Name	**Middle Bed South**
Area (h)	531.2
Total Biomass (t)	94.61
Biomass (t) >80mm	22.61

The south section of the Middle Bed covers an area of 531.2 hectares. There is an estimated total biomass of 94.6 tonnes on this bed and 22.61 tonnes of that figure is of market size.

The length frequency for the Middle Bed South (figure 20) shows that the majority of oysters on this bed are now over 50mm indicating poor juvenile recruitment in 2015 and 2016.

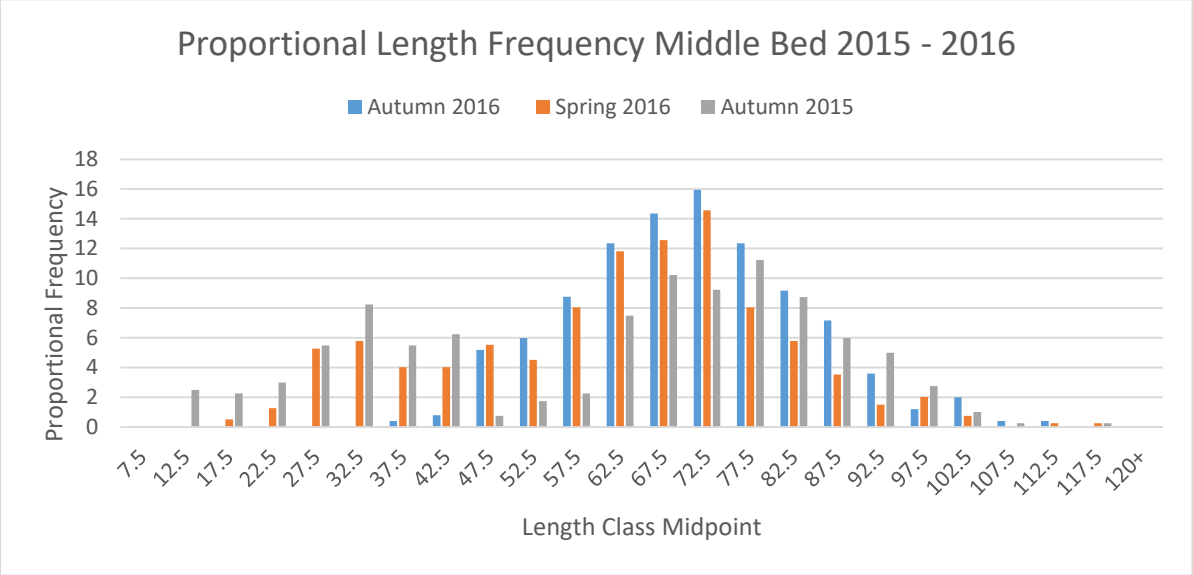

Figure 20 Proportional Length Frequency Middle bed 2015-16

The cumulative frequency (Figure 21) shows an increase in the proportion of larger length classes since the spring 2015 survey. This movement reflects the poor juvenile recruitment experienced on the bed in 2016.

The pie chart (Figure 22) reinforces this fact with only 12% of the stock less than 50mm in size highlighting the deficiency in spatfall in the previous 2 seasons.

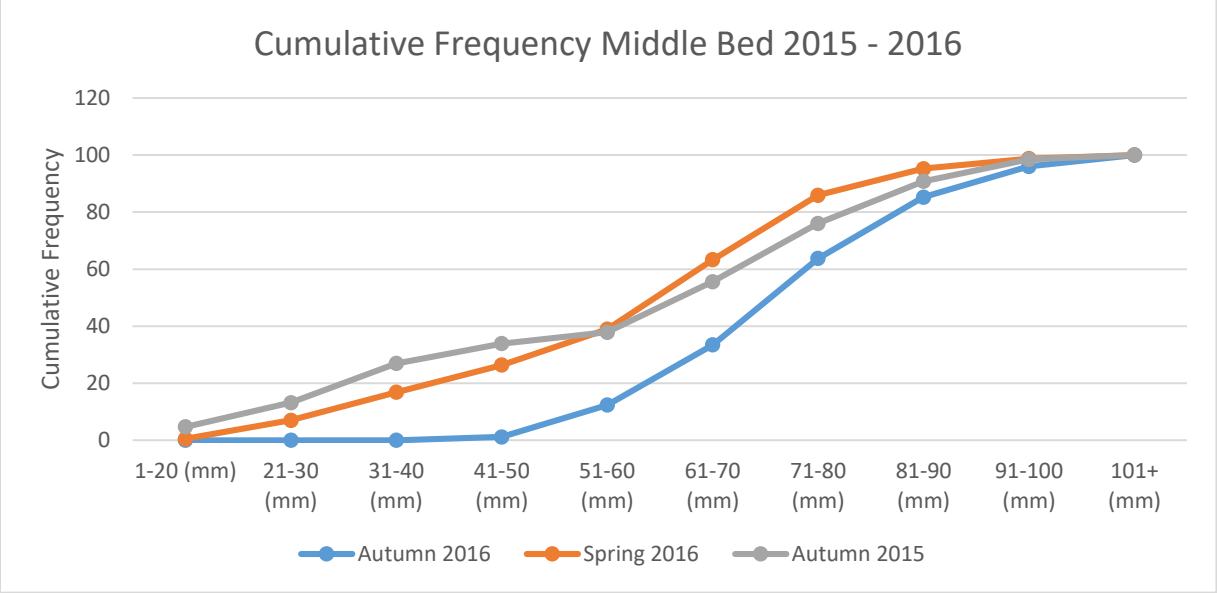

Figure 21 Cumulative Frequency Middle Bed 2015-2016

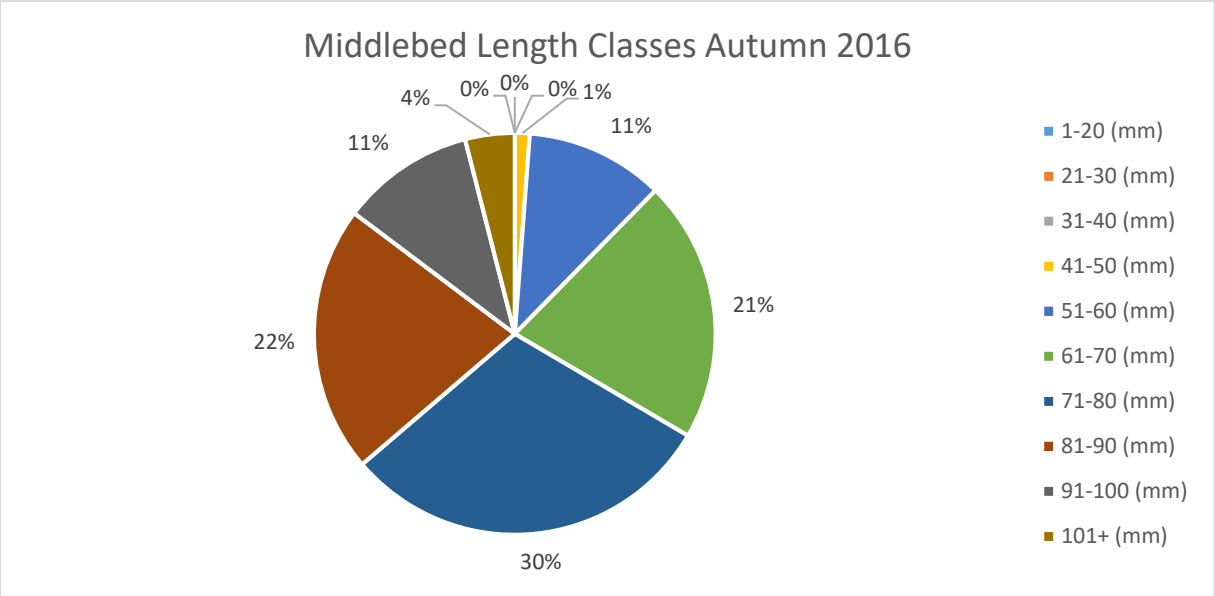

Figure 22 Percentage of length classes Middle Bed 2016

9.5 Southside North

Table 6 Summary Information: Southside North

Bed Name	**Southside North**
Area (h)	235
Total Biomass (t)	42.6
Biomass (t) >80mm	11.2

The North area of the Southside bed covers an area of 235 hectares. The overall biomass on this bed is estimated to be 42.6 tonnes, 11.2 tonnes of this figure represent oysters over 80mm in length.

The length frequency (figure23) shows very limited evidence of any settlement in 2015 or 2016 with a very small proportion of the stock less than 40mm. The spatfall from 2014 has now progressed into the 45-65mm age classes.

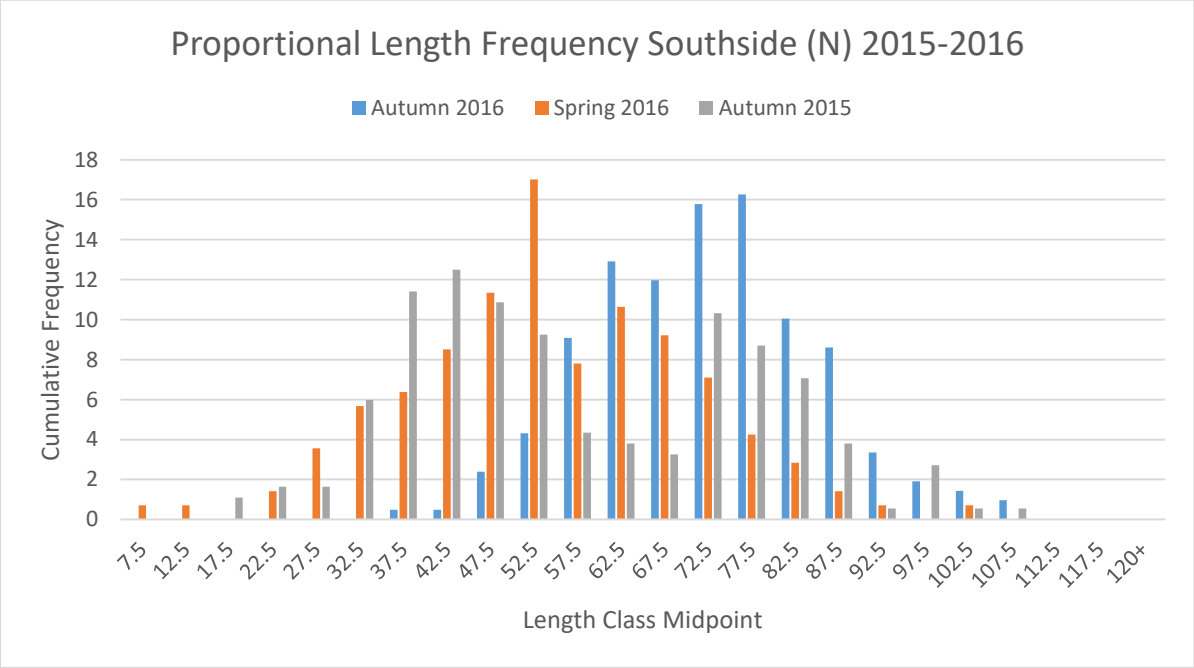

Figure 23 Proportional Length Frequency Southside (N) 2015-16

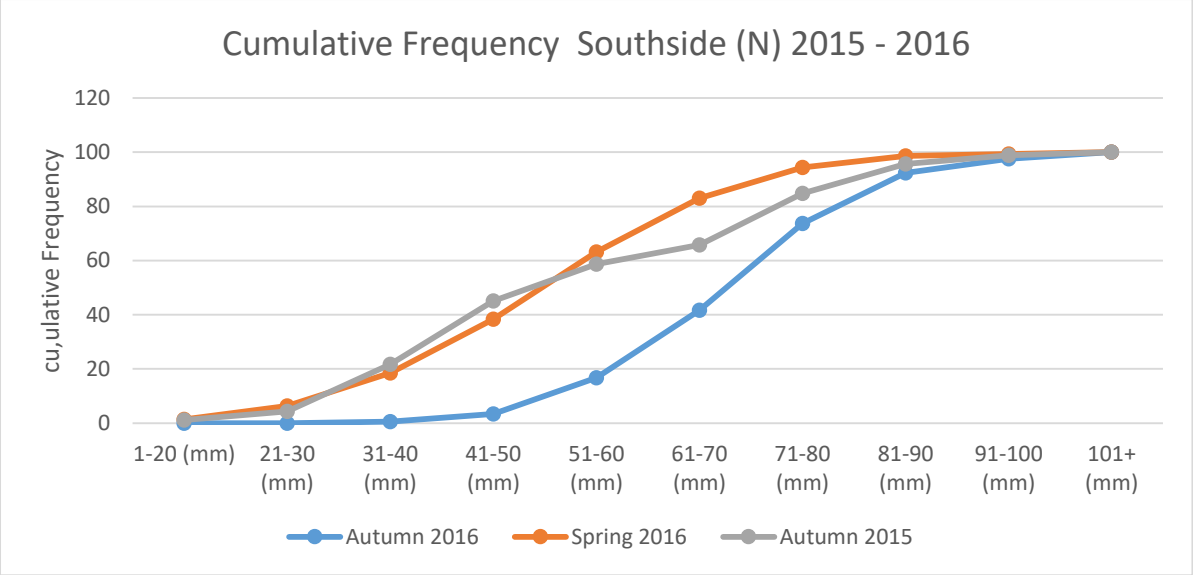

Figure 24 Cumulative Frequency Southside (N) 2015-2016

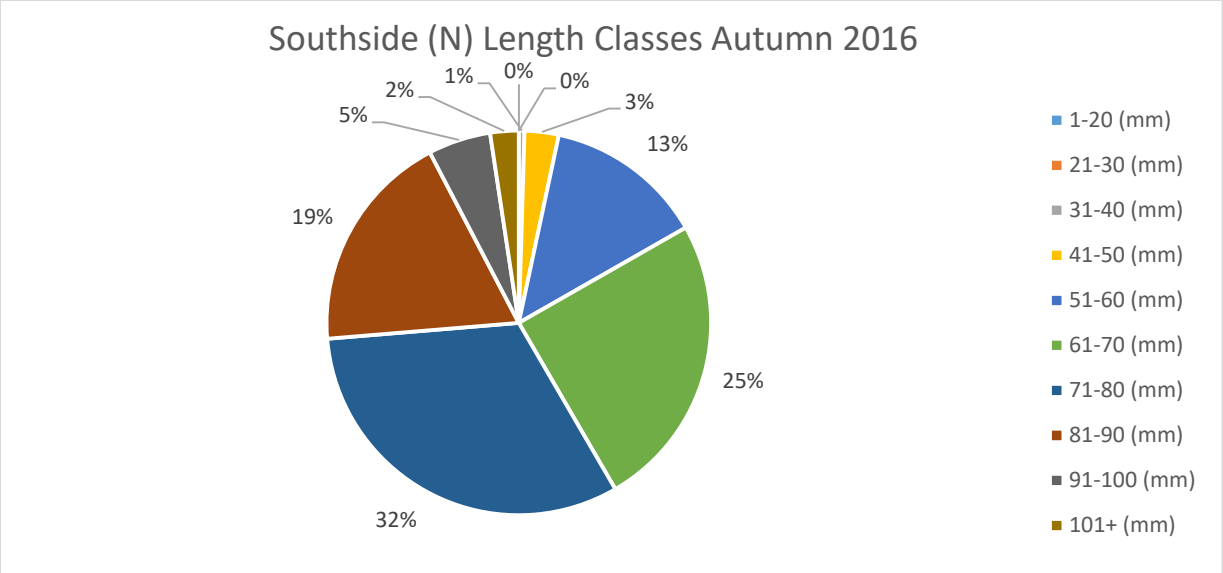

Figure 25 Percentage of length classes: Southside (N) 2016

9.6 Southside South

Bed Name	**Southside South**
Area (h)	343
Total Biomass (t)	63.4
Biomass (t) >80mm	20.6

The south section of the Southside bed covers 343.0 hectares in total. The overall biomass of oysters calculated during the autumn 2015 survey was 32.15 tonnes and 4.73 tonnes of this figure is currently above 80mm therefore available to the fishery for the 2016/17 season.

Again, like the length frequency for the northern section of the Southside there was little or no evidence of spat (<20mm) recorded for this survey but clear evidence of a late spatfall in 2014 which was picked up again during this survey. The survival of this spat is evident in the 40-55mm ages classes and this represents the growth progression of the spat. Also like the northern section of the Southside there is a poor representation of older >100mm ages classes on this section of the bed (see figure 31).

Out of the oysters that measured above market size (80mm) in autumn 2015 26% weighed <60g (see figure 32).

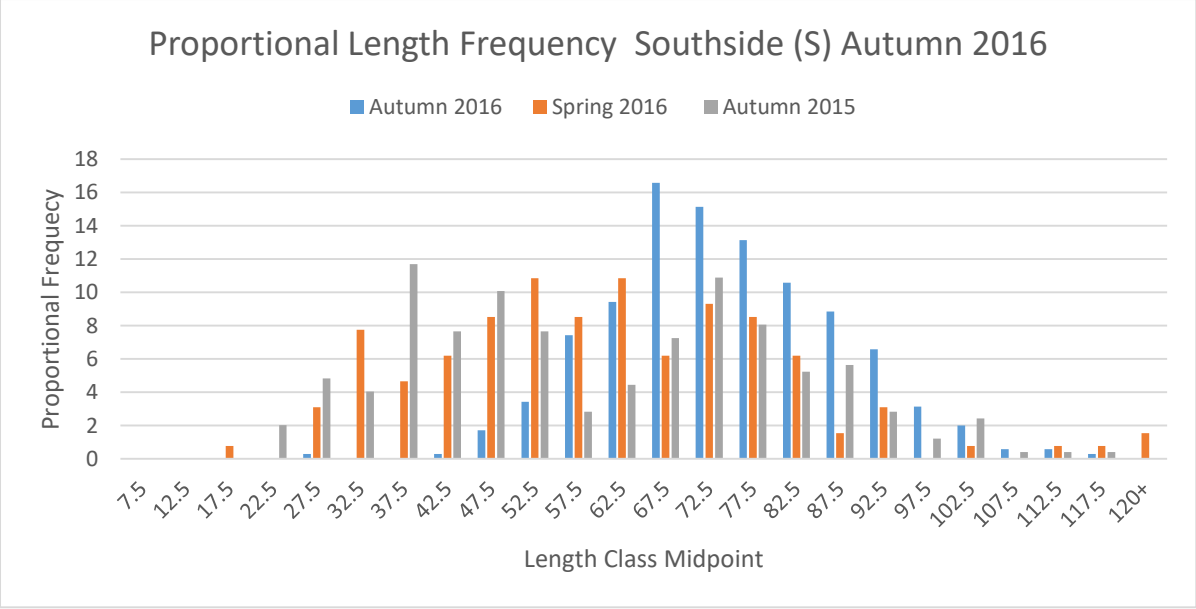

Figure 26 Length Frequency Southside (S) 2015-16

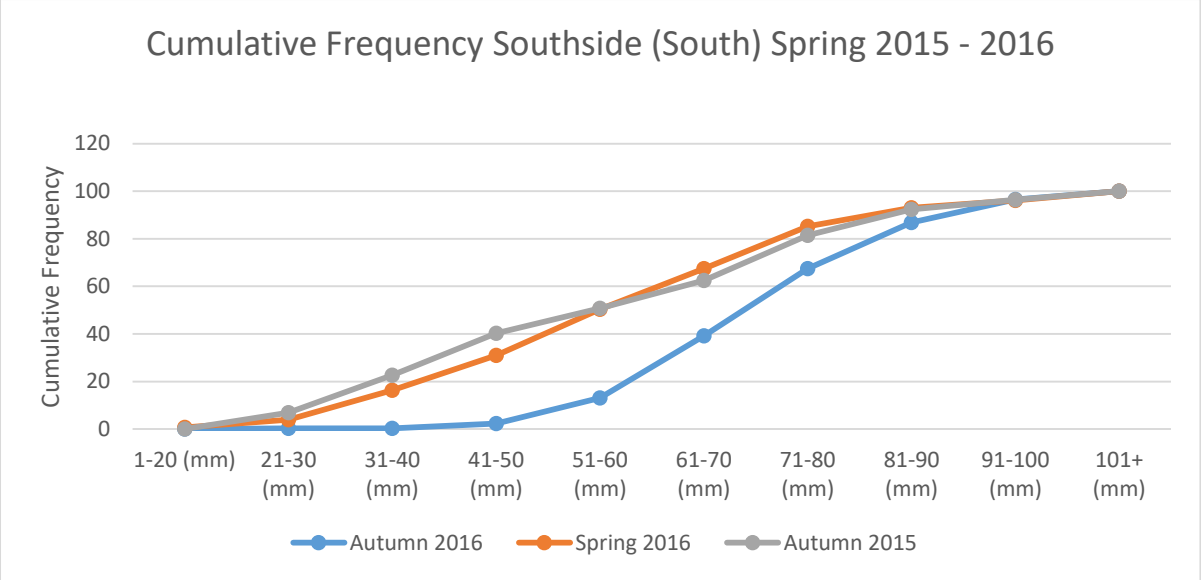

Figure 27 Cumulative Frequency Southside (S) 2015-2016

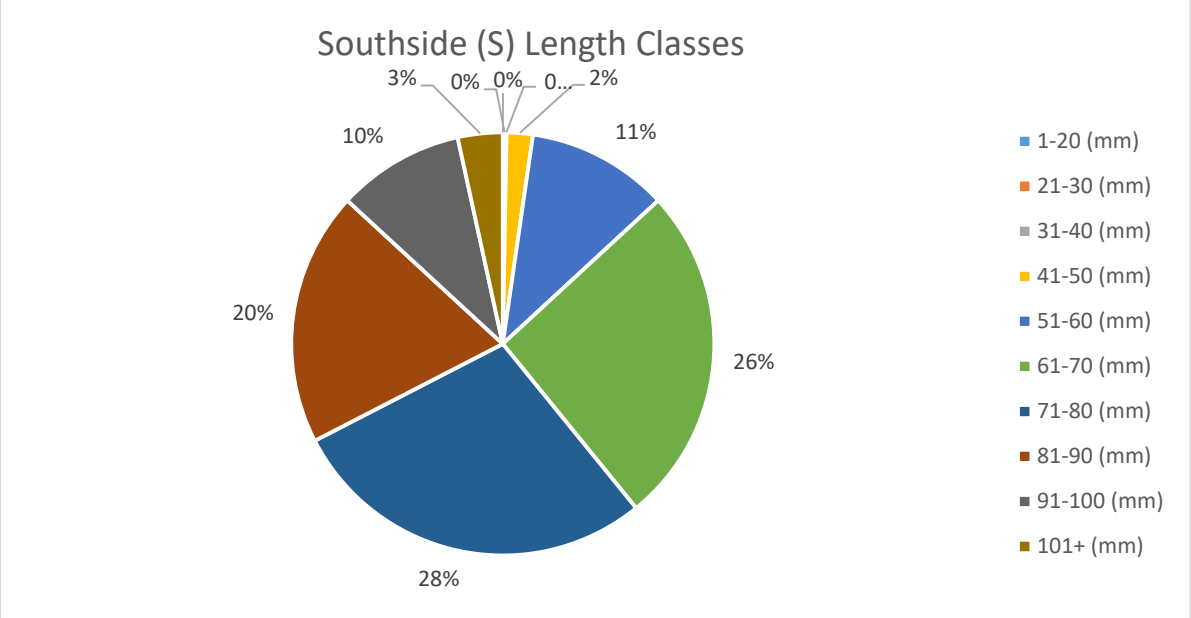

Figure 28 Percentage of length classes: Southside (S) 2016

10. Conclusions

The total biomass estimated for the stock is an increase on the estimates made in spring and autumn 2016. There is evidence that the late spatfall of 2014 survived well but not much evidence to say there was a widespread settlement in 2016. It was felt during the survey that the dredge efficiency was unusually high on some beds and this may have resulted in overestimates in some areas. It remains to be seen if the estimated biomass above 80mm is removed during the fishing season and whether Catch Per Unit Effort is unusually high in the first few weeks of the fishing season.

Total landings for the fishing season of 2015-16 came to a total of 69 tonnes, a decrease from the previous year's landings of 167 tonnes. 82% of the total landings came from 4 of the main beds: The Middle bed (33%), Perch (13%), Southside (14%) and the Flat Ground (21%). The highest recorded landings for the previous season were from the Middle bed (33%) showing an increase in landings from that bed this year.

The overall length frequency for the surveyed stock shows the length class has progressed and now the majority of the stock is >70mm. If a percentage of this stock is left behind and environmental conditions are favourable in summer 2017 there is a greater chance of a successful spawning event and recruitment into the fishery.

It is recommended that the fishery does not remove the total harvestable biomass in the 2016/17 season. This will help to prevent to limit the loss of an effective spawning stock for the 2017 spawning period.

11.Recommendations

- Consider partial removal of the harvestable stock biomass to help alleviate pressure on the stock from fishing activity and help sustain an effective spawning broodstock.

Appendix I. Raw data from interpolated density data and biomass estimates

Bed name	Density Class Range	N	Area (m^2)	Mean density (m2)	No. of Oysters	Total Biomass (tonnes)	95% CL Biomass (tonnes)
Barneys	0 - 0.01000	4	902201.98	0.001	902	0.04	na
Barneys	0.01001 - 0.05000	2	1094459.97	0.021	23127	1.04	0.68
Barneys	0.05001 - 0.10000	0	0.00	na	0	0	0
Barneys	0.10001 - 0.50000	0	0.00	na	0	0	0
Barneys	0.50001 - 1.00000	0	0.00	na	0	0	0
Barneys	1.00001 - 2.50000	0	0.00	na	0	0	0
Barneys	2.50001 - 5.00000	0	0.00	na	0	0	0
Drumskellan	0 - 0.01000	5	21192.04	0.001	21	0.00	na
Drumskellan	0.01001 - 0.05000	0	75300.99	0.010	753	0.03	na
Drumskellan	0.05001 - 0.10000	2	271480.33	0.083	22623	1.02	1.26
Drumskellan	0.10001 - 0.50000	3	489280.21	0.318	155439	6.99	2.15
Drumskellan	0.50001 - 1.00000	1	48178.81	0.842	40578	1.83	na
Drumskellan	1.00001 - 2.50000	0	0.00	na	0	0	0
Drumskellan	2.50001 - 5.00000	0	0.00	na	0	0	0
Shooting Range	0 - 0.01000	4	327892.15	0.001	328	0.01	Na
Shooting Range	0.01001 - 0.05000	1	203979.08	0.245	49912	2.25	Na
Shooting Range	0.05001 - 0.10000	0	83399.34	0.050	4170	0.19	Na
Shooting Range	0.10001 - 0.50000	1	342661.00	0.462	158161	7.12	Na
Shooting Range	0.50001 - 1.00000	2	91533.00	0.610	55793	2.51	6.58
Shooting Range	1.00001 - 2.50000	0	0.00	na	0	0.00	Na
Shooting Range	2.50001 - 5.00000	0	0.00	na	0	0.00	Na
Flat Ground	0 - 0.01000	4	299105.93	0.002	636	0.02	0.12
Flat Ground	0.01001 - 0.05000	13	709850.98	0.029	20737	0.62	0.63
Flat Ground	0.05001 - 0.10000	8	640139.32	0.068	43498	1.30	0.91
Flat Ground	0.10001 - 0.50000	28	4467476.66	0.256	1142665	34.28	32.12
Flat Ground	0.50001 - 1.00000	5	1369376.04	0.668	914558	27.44	64.94
Flat Ground	1.00001 - 2.50000	11	1793122.90	1.823	3269325	98.08	51.08
Flat Ground	2.50001 - 5.00000	5	413925.43	3.630	1502479	45.07	53.06
Great Bank	0 - 0.01000	3	135380.40	0.001	135	0.01	na
Great Bank	0.01001 - 0.05000	8	959842.47	0.032	30507	1.37	0.30
Great Bank	0.05001 - 0.10000	7	151646.61	0.079	11985	0.54	1.64
Great Bank	0.10001 - 0.50000	22	5797827.98	0.198	1148747	51.69	0.91
Great Bank	0.50001 - 1.00000	4	530200.95	0.762	403856	18.17	12.89
Great Bank	1.00001 - 2.50000	1	2798.95	1.032	2888	0.13	na
Great Bank	2.50001 - 5.00000	0	0.00	na	0	0.00	Na

Middle North	0 - 0.01000	8	994178.93	0.001	994	0.07	na
Middle North	0.01001 - 0.05000	2	916577.51	0.027	24814	1.74	28.84
Middle North	0.05001 - 0.10000	1	63280.04	0.069	4343	0.30	na
Middle North	0.10001 - 0.50000	2	29307.28	0.189	5536	0.39	2.77
Middle North	0.50001 - 1.00000	0	0.00	na	0	0.00	na
Middle North	1.00001 - 2.50000	0	0.00	na	0	0.00	Na
Middle North	2.50001 - 5.00000	0	0.00	na	0	0.00	na
Middle South	0 - 0.01000	8	324470.45	0.001	324	0.01	na
Middle South	0.01001 - 0.05000	7	467468.53	0.032	14893	0.45	0.49
Middle South	0.05001 - 0.10000	4	446182.83	0.080	35628	1.07	0.75
Middle South	0.10001 - 0.50000	10	2204316.45	0.222	488537	14.66	22.26
Middle South	0.50001 - 1.00000	4	996040.68	0.870	866115	25.98	5.72
Middle South	1.00001 - 2.50000	5	699298.08	1.633	1142161	34.26	30.57
Middle South	2.50001 - 5.00000	3	156341.31	3.876	606046	18.18	13.97
Moville	0 - 0.01000	7	721459.01	0.003	1925	0.09	0.36
Moville	0.01001 - 0.05000	1	698844.95	0.011	7487	0.34	na
Moville	0.05001 - 0.10000	1	523778.96	0.069	36263	1.63	na
Moville	0.10001 - 0.50000	2	544283.46	0.303	164907	7.42	55.99
Moville	0.50001 - 1.00000	0	0.00	na	0	0.00	0.00
Moville	1.00001 - 2.50000	0	0.00	na	0	0.00	0.00
Moville	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00
Peak	0 - 0.01000	3	168255.54	0.001	168	0.01	0.00
Peak	0.01001 - 0.05000	4	477801.57	0.023	10922	0.49	0.86
Peak	0.05001 - 0.10000	2	462889.90	0.056	25693	1.16	0.68
Peak	0.10001 - 0.50000	5	961598.37	0.204	196206	8.83	11.37
Peak	0.50001 - 1.00000	0	0.00	na	0	0.00	0.00
Peak	1.00001 - 2.50000	0	0.00	na	0	0.00	0.00
Peak	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00
Perch	0 - 0.01000	4	65203.67	0.001	65	0.00	0.00
Perch	0.01001 - 0.05000	2	167961.89	0.011	1869	0.08	0.12
Perch	0.05001 - 0.10000	8	414129.13	0.076	31676	1.43	0.82
Perch	0.10001 - 0.50000	17	1518515.39	0.228	345840	15.56	15.96
Perch	0.50001 - 1.00000	12	500364.35	0.695	347771	15.65	6.39
Perch	1.00001 - 2.50000	4	71173.28	1.439	102397	4.61	2.59
Perch	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00
Quigley's Pt	0 - 0.01000	8	22082.85	0.001	22	0.00	0.00
Quigley's Pt	0.01001 - 0.05000	6	107227.10	0.016	1694	0.08	0.07
Quigley's Pt	0.05001 - 0.10000	2	125167.12	0.080	9991	0.45	0.20
Quigley's Pt	0.10001 - 0.50000	8	692221.77	0.231	159652	7.18	6.08
Quigley's Pt	0.50001 - 1.00000	4	367632.93	0.691	254049	11.43	8.14
Quigley's Pt	1.00001 - 2.50000	6	76989.28	1.402	107926	4.86	3.42
Quigley's Pt	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00
Redcastle	0 - 0.01000	10	1100728.04	0.002	2008	0.09	0.43
Redcastle	0.01001 - 0.05000	6	198870.45	0.021	4220	0.19	0.29
Redcastle	0.05001 - 0.10000	2	171050.76	0.071	12168	0.55	0.31

Redcastle	0.10001 - 0.50000	2	151587.28	0.181	27412	1.23	6.18
Redcastle	0.50001 - 1.00000	0	0.00	na	0	0.00	0.00
Redcastle	1.00001 - 2.50000	0	0.00	na	0	0.00	0.00
Redcastle	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00
Sandy Ridge	0 - 0.01000	18	3003074.73	0.001	2880	0.13	0.80
Sandy Ridge	0.01001 - 0.05000	6	733307.18	0.014	10448	0.47	0.40
Sandy Ridge	0.05001 - 0.10000	1	344006.25	0.073	25019	1.13	na
Sandy Ridge	0.10001 - 0.50000	3	657838.67	0.255	167810	7.55	13.38
Sandy Ridge	0.50001 - 1.00000	0	0.00	na	0	0.00	0.00
Sandy Ridge	1.00001 - 2.50000	0	0.00	na	0	0.00	0.00
Sandy Ridge	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00
Southside North	0 - 0.01000	2	6478.73	0.001	6	0.00	0.00
Southside North	0.01001 - 0.05000	4	155751.23	0.027	4216	0.13	0.23
Southside North	0.05001 - 0.10000	5	279336.59	0.072	20219	0.61	0.49
Southside North	0.10001 - 0.50000	7	899864.51	0.305	274104	8.22	10.89
Southside North	0.50001 - 1.00000	4	511399.32	0.727	371767	11.15	4.67
Southside North	1.00001 - 2.50000	5	475341.72	1.457	692752	20.78	23.19
Southside North	2.50001 - 5.00000	1	18792.94	3.058	57475	1.72	na
Southside South	0 - 0.01000	3	20078.78	0.001	20	0.00	0.00
Southside South	0.01001 - 0.05000	9	317521.82	0.029	9137	0.27	0.21
Southside South	0.05001 - 0.10000	5	229021.24	0.069	15801	0.47	0.49
Southside South	0.10001 - 0.50000	11	1510788.49	0.279	421308	12.64	16.55
Southside South	0.50001 - 1.00000	5	730232.19	0.678	495441	14.86	6.65
Southside South	1.00001 - 2.50000	8	549842.04	1.664	914865	27.45	15.26
Southside South	2.50001 - 5.00000	1	52699.39	4.919	259219	7.78	na
Black Ghee	0 - 0.01000	6	651761.93	0.001	652	0.03	0.00
Black Ghee	0.01001 - 0.05000	2	630835.26	0.023	14721	0.66	5.56
Black Ghee	0.05001 - 0.10000	1	151646.61	0.062	9423	0.42	na
Black Ghee	0.10001 - 0.50000	4	912591.66	0.189	172151	7.75	7.53
Black Ghee	0.50001 - 1.00000	0	0.00	na	0	0.00	0.00
Black Ghee	1.00001 - 2.50000	0	0.00	na	0	0.00	0.00
Black Ghee	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00
McGhee Bank	0 - 0.01000	0	0.00	na	0	0.00	0.00
McGhee Bank	0.01001 - 0.05000	0	0.00	na	0	0.00	0.00
McGhee Bank	0.05001 - 0.10000	1	66878.69	0.057	3807	0.17	na
McGhee Bank	0.10001 - 0.50000	5	800000.00	0.246	196441	8.84	7.91
McGhee Bank	0.50001 - 1.00000	0	0.00	na	0	0.00	0.00
McGhee Bank	1.00001 - 2.50000	0	0.00	na	0	0.00	0.00
McGhee Bank	2.50001 - 5.00000	0	0.00	na	0	0.00	0.00