NWIFCA Technical, Science and Byelaw Committee

7th August 2018: 10:00 a.m.

AGENDA ITEM NO. 10

COCKLE AND MUSSEL REPORT

Purpose: **to provide a report to members on the District's cockle and mussel fisheries.**

Recommendation:

i. that Members approve the report;

ii. that Members approve the actions of Officers to authorise mussel fisheries at:

a) Heysham Flat;

b) Falklands.

1. This report covers the period from 14th April to 23rd July 2018 including all surveys and inspections carried out, decisions on fishery authorisations and openings, and any other matters affecting cockle and mussel fisheries in the NWIFCA District. To be read in conjunction with the Chinese Mitten Crab report.

BMWG – Bivalve Mollusc Working group

2. Three meetings of BMWG have taken place: on 3rd May, 4th June and 4th July. Summary notes of these meetings are available from science team by email on request.

MUSSELS:

South America / Falklands

3. Officers inspected the South America and Falklands beds by foot and heliflights on 17th May and 16th July. As is often the case the condition of the mussel stock changed substantially in the time between those dates.

4. In July, from the air it appeared that the mussel between Foulney and the Falklands was patchy with large areas with no mussel present. The area of mussel on the Falklands was still present and of mixed size as previously reported, but there was a large band of starfish running the entire length of the southern extent of the mussel. Industry's view is that the starfish will have consumed most of the mussel within a month.

5. The foot inspection accessed the main area of mussels on the Falklands bed. A small patch could be seen to the north of the main bed, but was not accessible via quad. In previous surveys, a third area of mussel had also been identified, which was not visible during the quad survey.

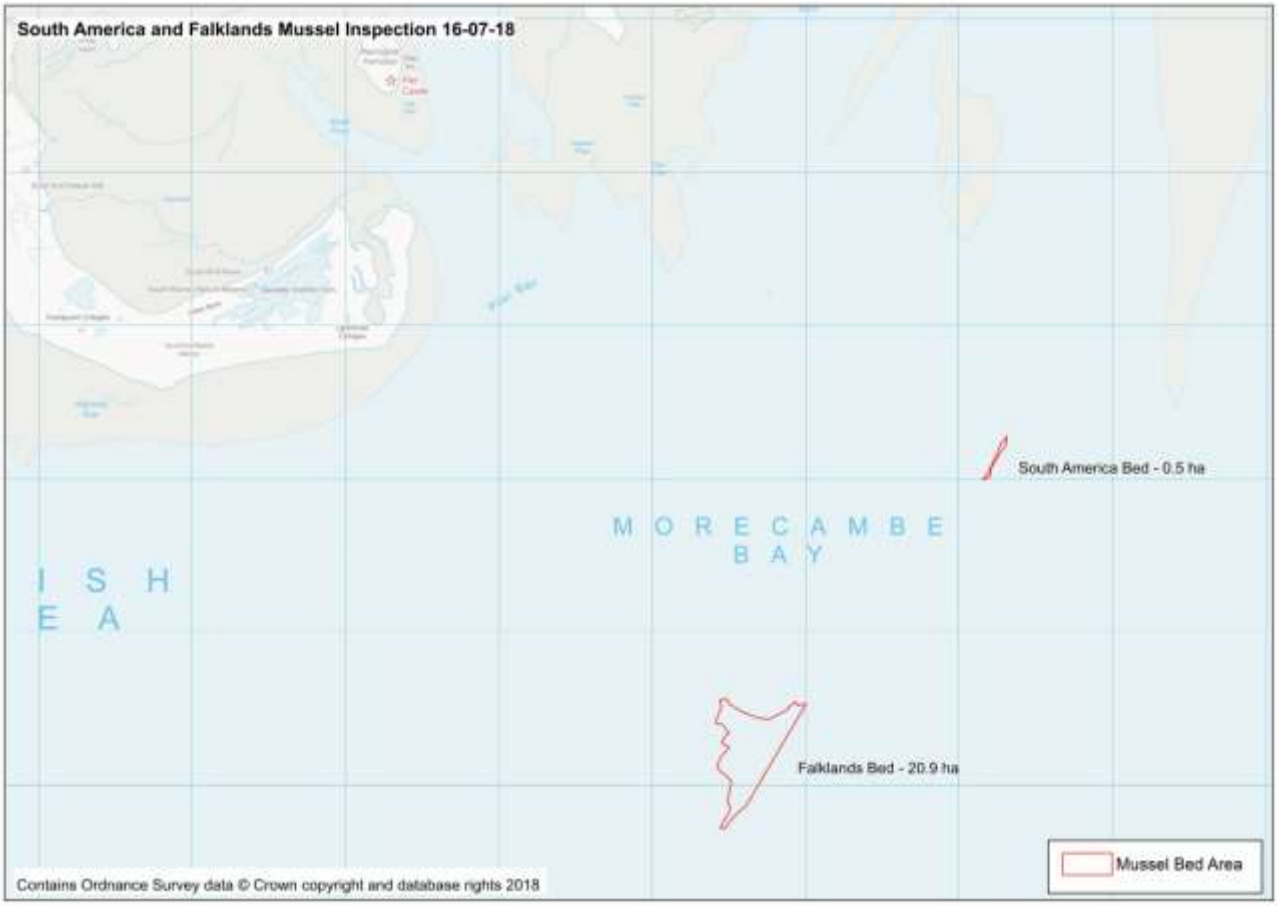
6. The main area was approximately 20.9 hectares and the overall mussel cover was 70-80%. From the rapid visual assessment undertaken, approximately 80% of the mussel was undersize, measuring from 35mm-45mm, with 15% of 20-25mm length mussel mixed in on the north-eastern edge of the bed. For the majority of the south-eastern side of the bed,

approximately 5% of the mussel was size and the rest was between 25-35mm and were clumped together. The mussel was generally well rooted in the sand with portions buried.

7. In the centre of the bed, the amount of size mussel increased to 30-40% in some patches, which were loose. The rest of the mussel in the centre was approximately 35-45mm in length. In all areas, the mussel was resting on the sand with some areas raised on sand ridges approximately 0.5m high. The mussels had not put down much mud in any of the areas surveyed on the Falklands. In some of the central areas, bare cobble was present in between the areas of mussel.

8. Dead starfish were present on the centre of the skear and large amounts of live starfish (thousands in a band) were amassed on the southern and western side of the Falklands bed area. Lesser black-backed gulls, herring gulls, and black-headed gulls were present in large numbers across the bed. Very little spat was present throughout the bed.

9. Mussel cover on South America was around 10-20% on the bed, which spanned 0.5 hectares. The mussel was clumped together resting on sand and their lengths ranged from 20-30mm. Some mussel was resting on sand ridges approximately 0.5m high and very little mud had been put down. No cobble was present between areas of mussel. No starfish were visible and very little mussel spat was present on the South American bed. Assumptions on what had happened to the remaining stock seen in June are it had either been predated on already by the starfish, washed out or covered by sand.



South America and Falklands mussel beds accessed by foot inspection 16-07-18

10. In view of the lack of mussel mud and exposed cobble substrate the area is not suitable for a dredge fishery. In view of the number and behaviour of the starfish and past experience,

science officers agree with industry that the starfish are likely to devour the majority of the stock on the Falklands mussel bed. It is therefore proposed to authorise hand-gathering of size and undersize mussel on the Falklands bed should industry be interested. An email was sent to BMWG and no objections were raised. Natural England have been verbally consulted and agreed that an amendment to the HRA and extension to the authorisation issued for one week in May would be appropriate. Officers are awaiting confirmation from Byelaw 3 permit holders whether or not to proceed with this action.

Heysham Flat

11. Foot inspections took place on 18th May with Natural England colleagues, and on 15th and 29th June. The May inspection showed that superabundant spat had settled on all of the main skear apart from a band of bare cobble through the middle. The honeycomb worm reef had now gone from the main historic area beyond Conger Rock. NE agreed as per last year there was no need to protect this area from fishing activity this year. There were a few crops of *Sabellaria alveolata* around the edges of the skear but this was in poor worn condition with mussel on or very near to it, and therefore likely to smother it.

12. The main area of the worm colony was in the north of the skear on shelly / sandy substrate. This extends a long way north now and it was agreed, even though it is unlikely that fishers would attempt to go over this ground that NWIFCA should protect this from the fishery and access to the fishery. See exclusion line in map below.

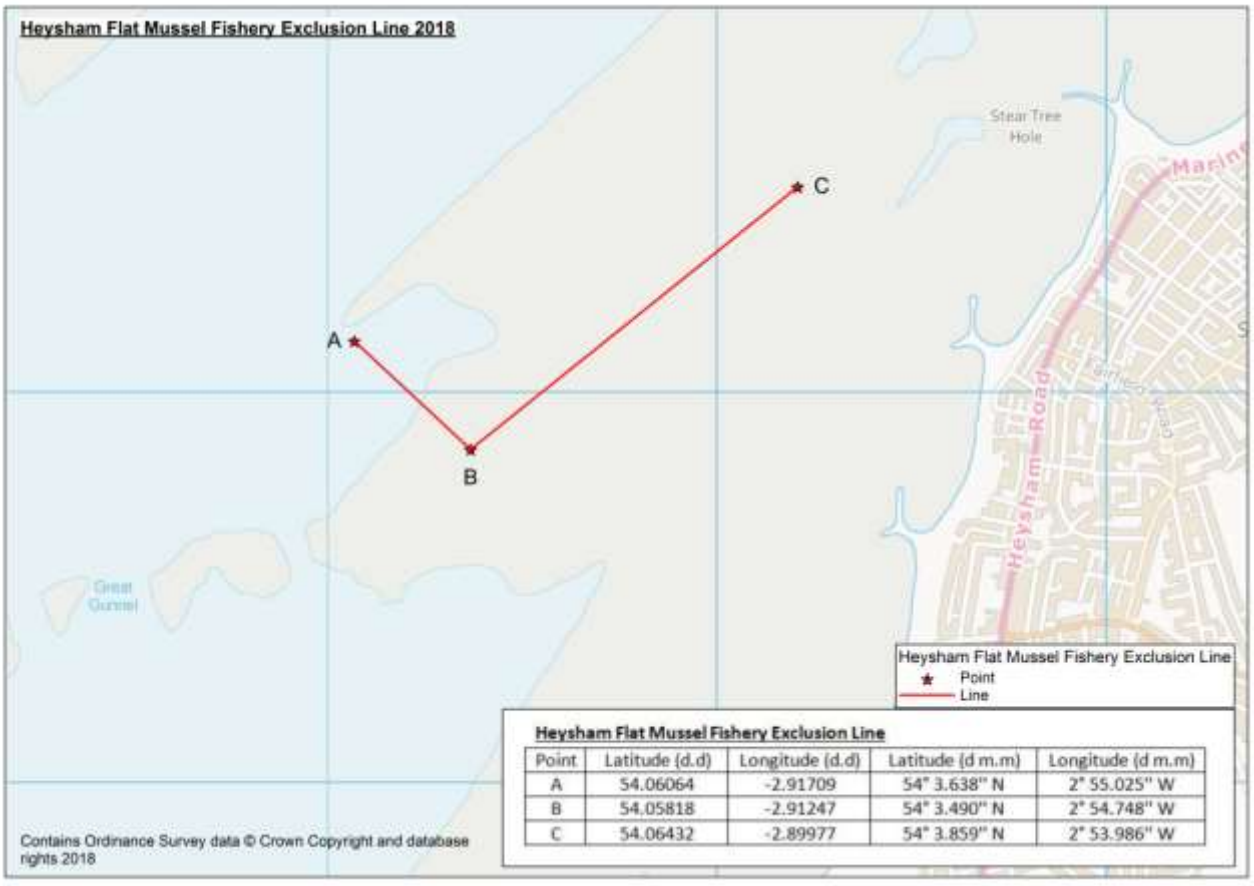
13. Knott End skear and the bottom end of the main skear had some size mussel on them mixed in with new spat so expected to get smothered. Knott End skear was mainly covered with a good spat settlement. Some oystercatchers and many gulls were feeding on all the skears. The furthest out skears were not accessible on foot but looked black and had many birds on so suggesting similar with spat settlement. There were some small areas of ground coming up in between.

14. The inspections in June confirmed the state of the ground and the stock. Assumed to be due to the prolonged extraordinary hot weather the mussel had grown extremely fast and was almost ready for fishing. The state of the *Sabellaria alveolata* was checked to ensure the management approach suggested in May was still fit for purpose, and an exclusion line was provisionally drafted on the bed from visual observation of where the worm colonies were with a handheld GPS.

15. NWIFCA suggested a means to improve the speed at which the HRA for Heysham Flat (and potentially in future for other mussel fisheries) is carried out. Extensive and detailed HRAs have been carried out for this fishery in previous years, and following the new approved template in 2017. The 2018 HRA referred heavily to the 2017 document rather than repeating the information within it. The substance of the HRA concentrated on elements that had changed since 2017 which went through to full Appropriate Assessment. What resulted was a much more succinct document which was agreed with Natural England.

16. The authorisation to Byelaw 3 permit holders was issued and the fishery opened on Monday 23rd July.

17. For the July heliflight, unfortunately due to a change in procedure in the Civil Aviation Authority the pilot did not receive authorisation to fly within the one mile exclusion zone for the nuclear power station. Therefore the outer skears could only be observed from a distance and through the zoom lens of a Canon DSLR camera. The three outer skears at Heysham appeared black in colour suggesting they are covered in seed. However no further information on level of mussel mud or any bare substrate was obtained.



Mapping illustrating exclusion zone at Heysham Flat 2018 to protect live colonies of *Sabellaria alveolata*.

Low Bottom to Foulney Ditch

Inspection / Survey 19th April:

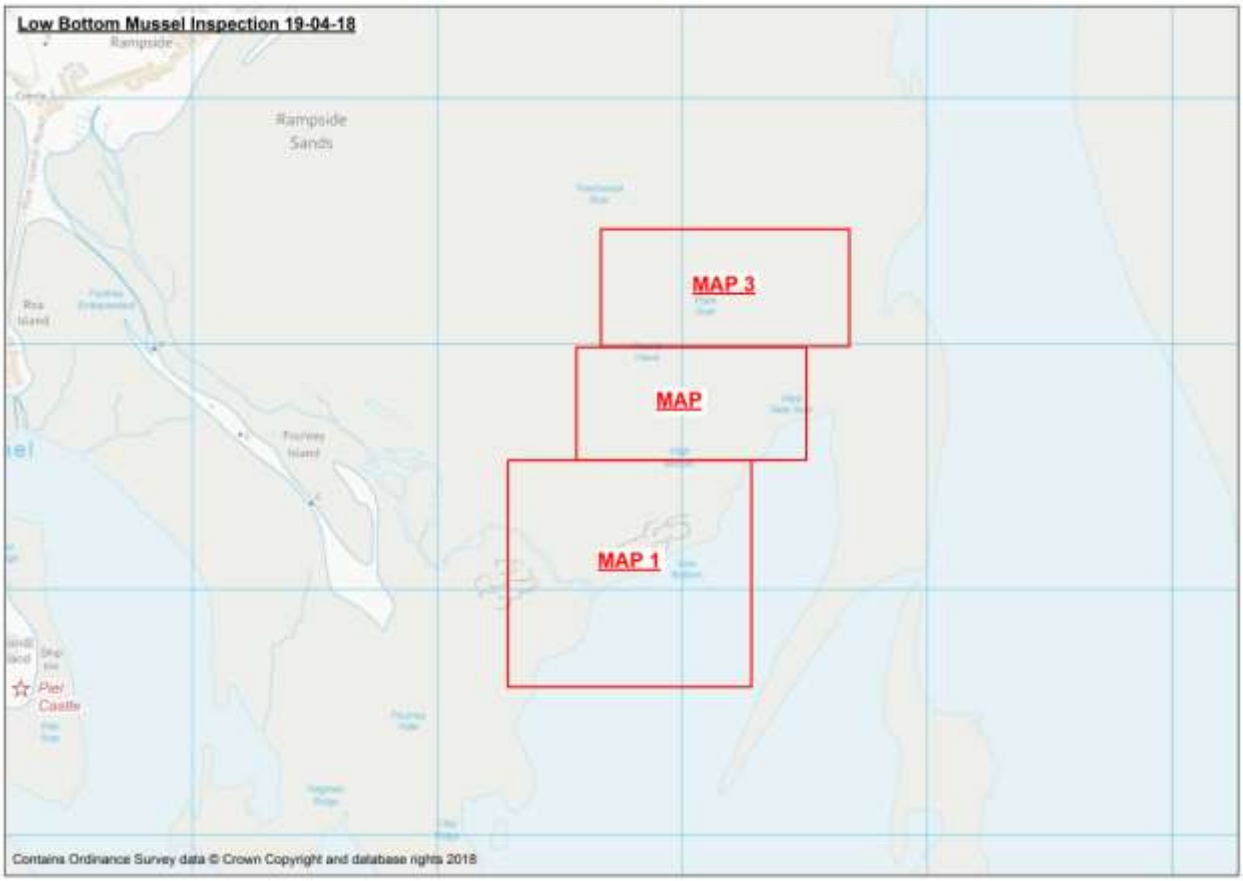
18. Officers split into two groups and walked transects across the bed covering the full extent between Foulney Ditch and the oyster frames. Waypoints were taken at intervals where the mussel changed and information about the type of mussel and the condition of the bed was recorded. Maps have been produced below with officer's observations on them.

19. Much of the area towards the oyster frames had a good settlement of mussel spat, present on most cobble, dead shell and mixed in with the remaining live mussels. Moving south west towards Foulney Ditch the amount of spat decreased moving on to the more stable area of mussel bed in the mid shore area. Samples from this area were collected and analysis is shown below. The mussel was typically 20-40mm length with the occasional size mussel. This area is often talked about being stunted, pearled and not reaching size. At the low tide line in the hollow around the bottom of the Ditch there were small patchy areas of size mussel surrounded by scoured / bare areas. Moving along the low water line north east towards the oyster frames, there was an area of bare ground around 200m wide running along the water line which was very sparse of mussel moving back to the area of spat near the oyster frames.

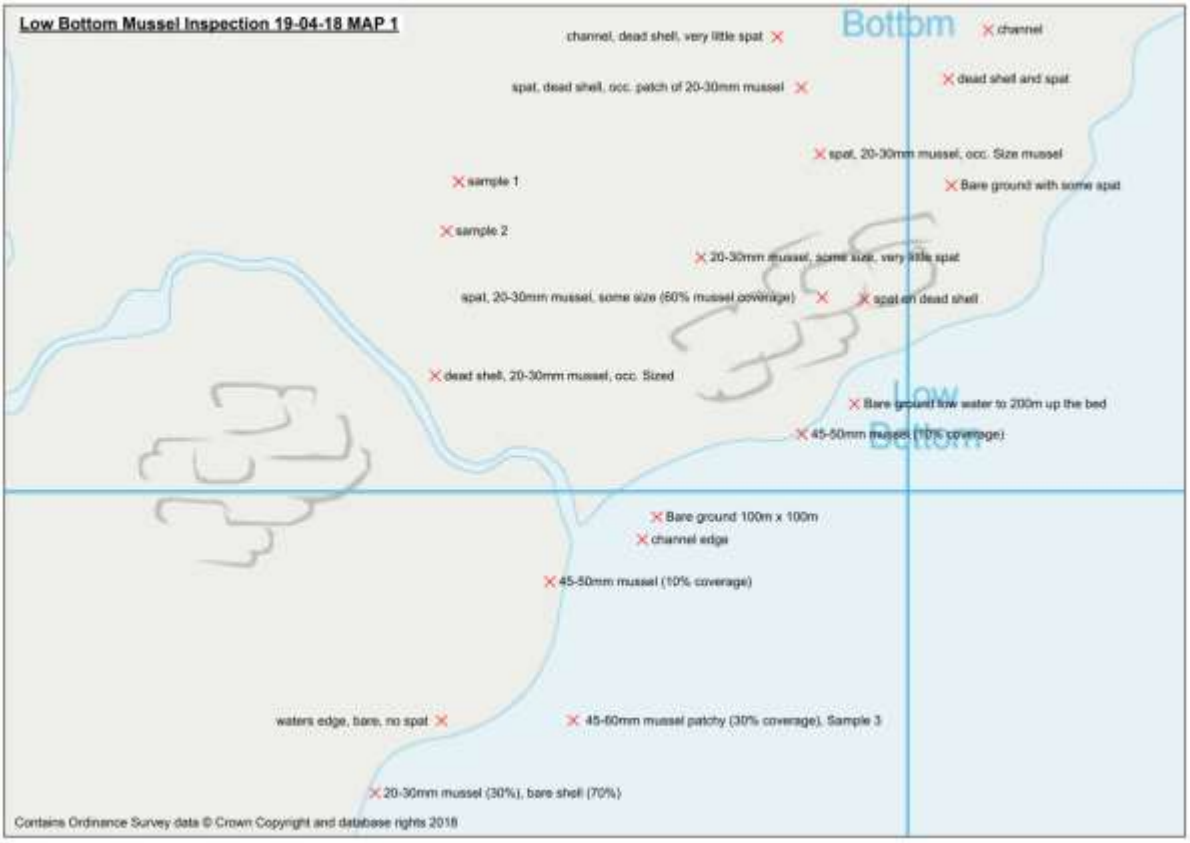
20. Three samples of mussels were collected: one from an area that does not normally reach size higher up the shore, one from an area where the mussel looks older, more rounded and potentially stunted, and one from an area of larger size mussel in the hollow at the bottom of the Ditch area (sample sites indicated on the map below). Mussel shell length size frequency was recorded and the results are presented below for each of the samples.

Sample 1: consisted mainly of 20-30mm mussel which was observed across most of map 1 area, with very little fouling by barnacles on the mussels.
Sample 2: consisted of varied size classes of mussels from 20mm – 50mm, many of the larger mussels greater than 35mm being fouled with barnacles. On dissection of the mussels from this sample it can be seen that the shells show signs of distorted growth with a greater thickness of shell.
Sample 3: consisted of large mussel 55-60mm which had very little fouling from barnacles.

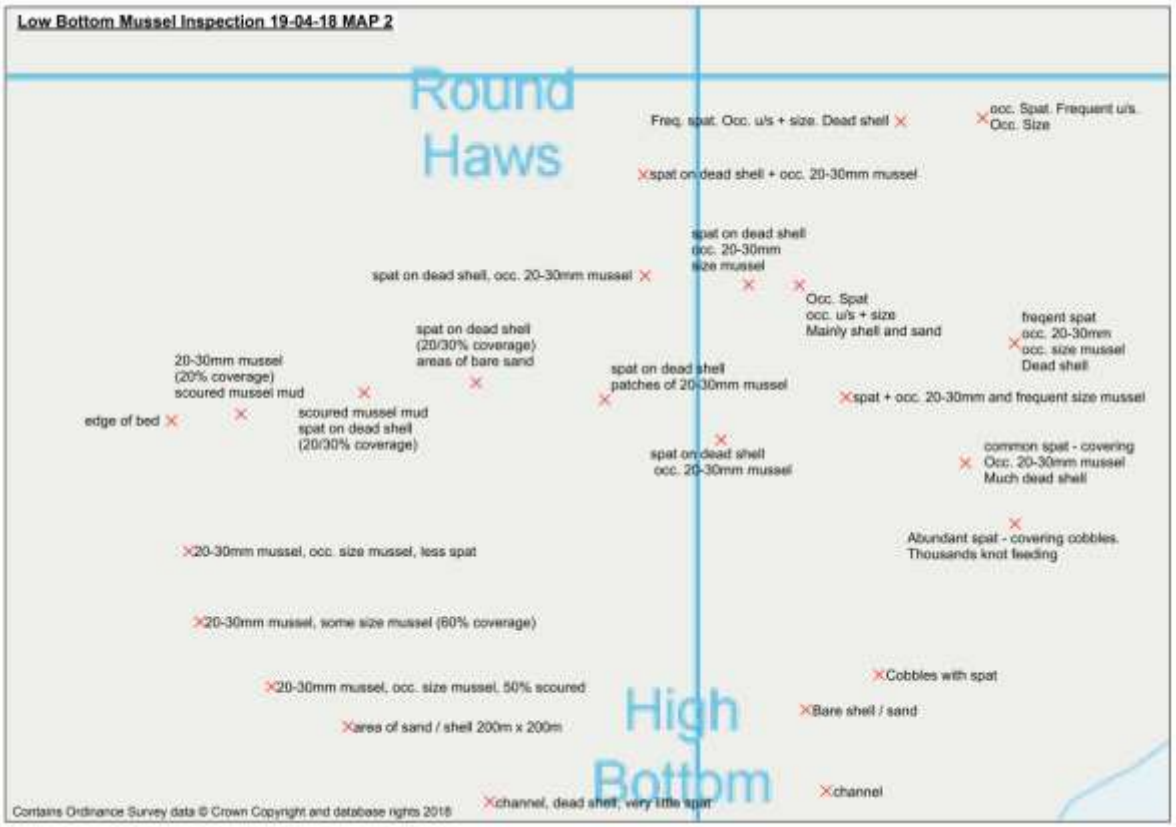
21. Bird activity - a large flock of knot (1000+) were seen at low water and were suspected to be feeding on juvenile mussel.



Low Bottom Mussel Inspection 19th April 2018



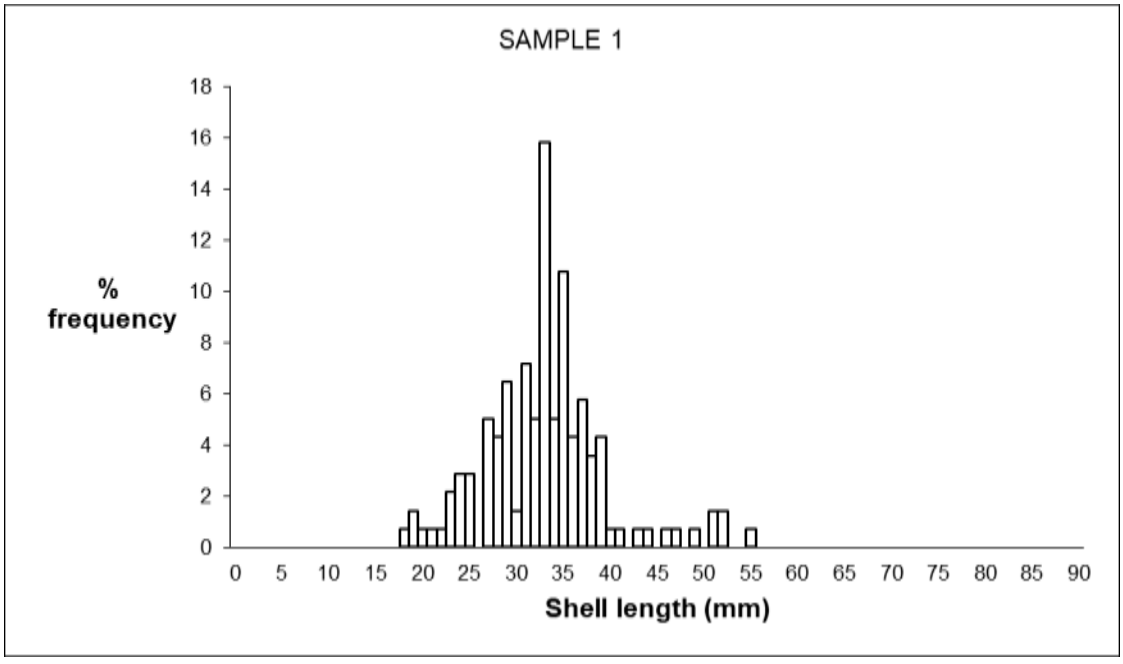
Low Bottom Mussel Inspection MAP 1 19th April 2018

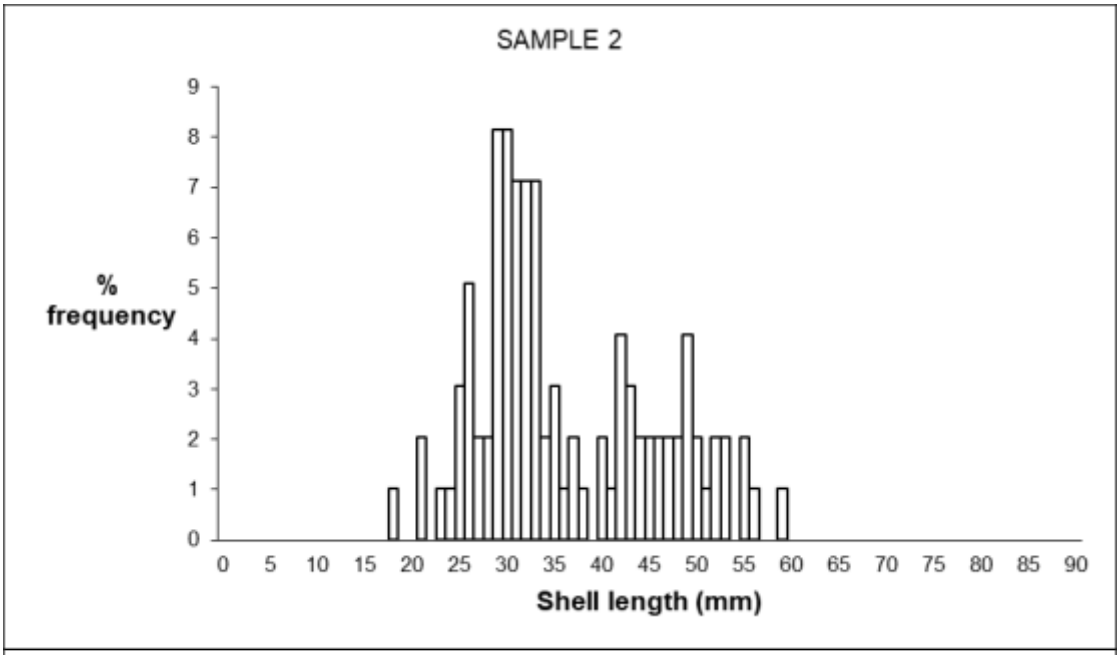


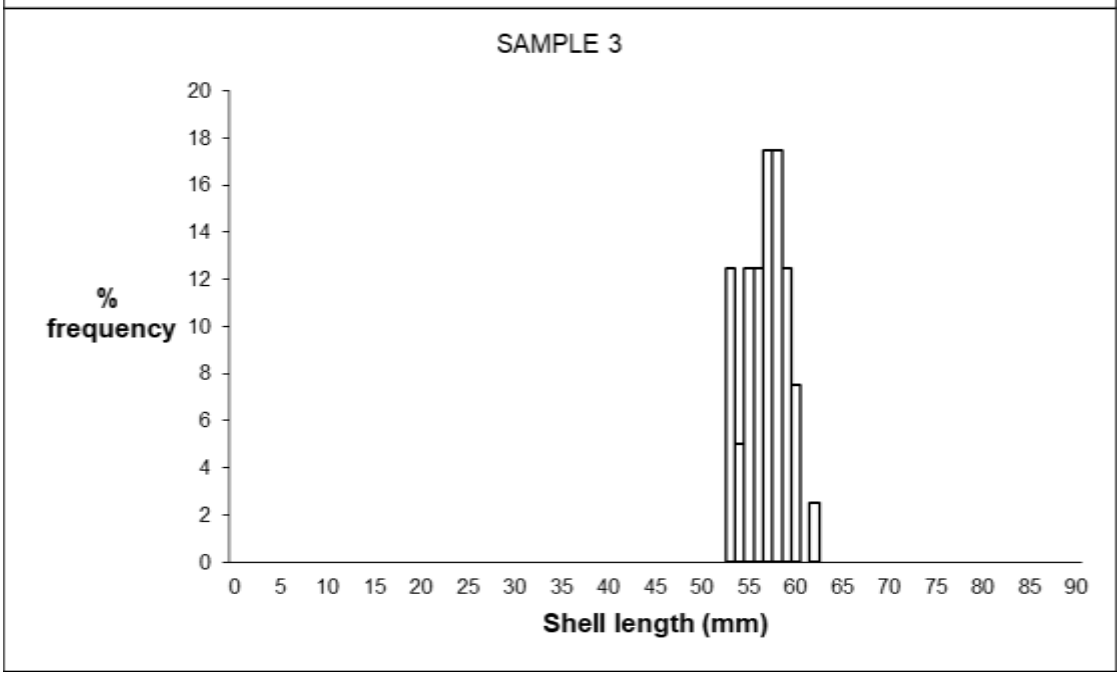
Low Bottom Mussel Inspection MAP 2 19th April 2018

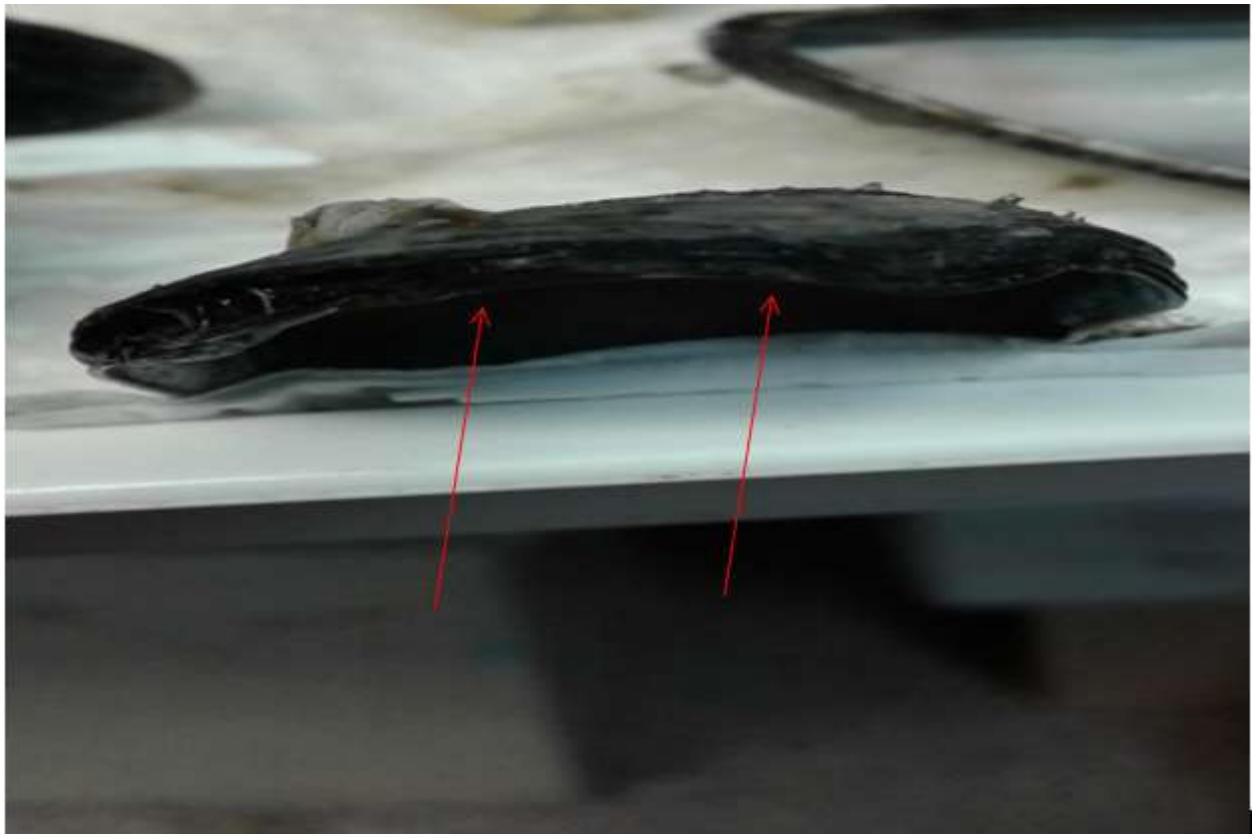
Low Bottom Mussel Inspection MAP 3 19th April 2018

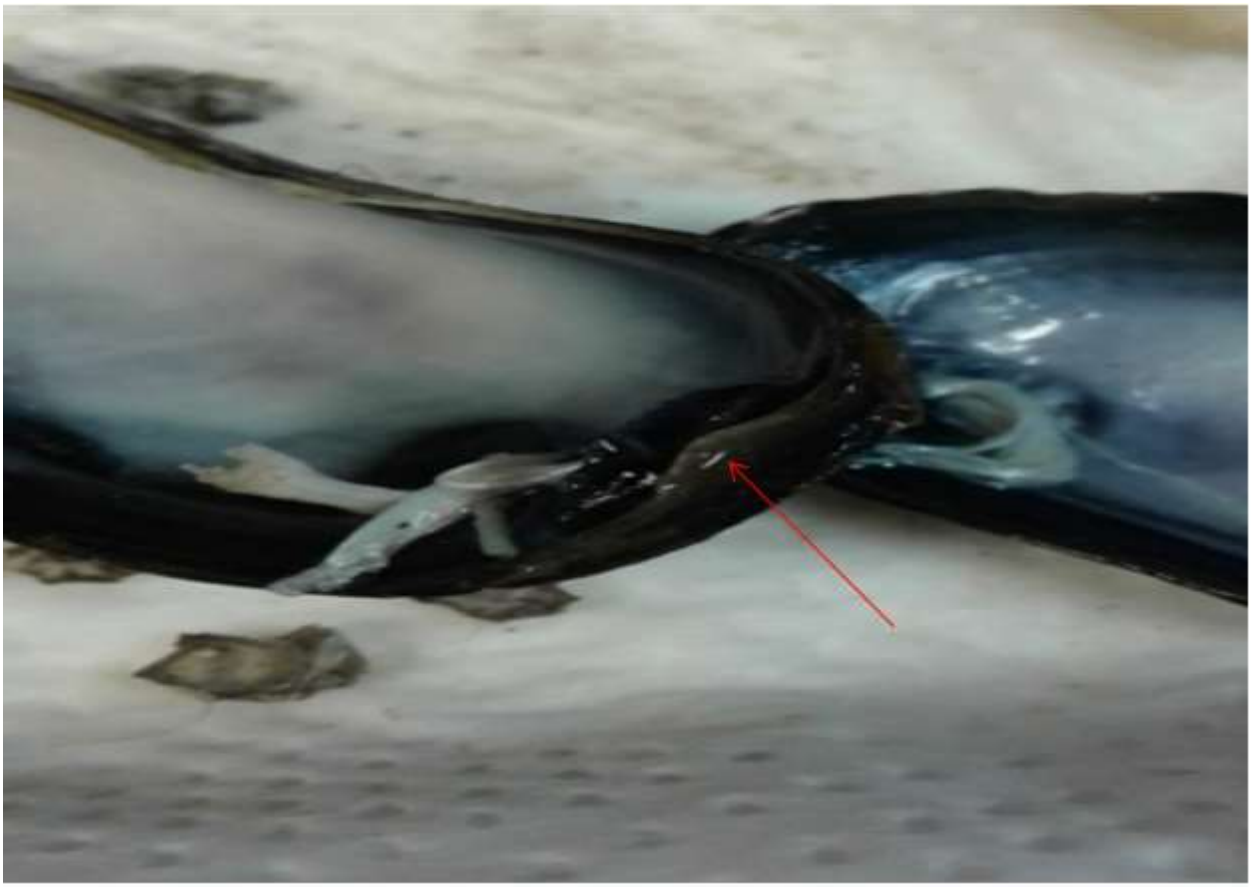
Low Bottom Mussel Shell Length Percentage Frequency for Sample Collected and Processed




SAMPLE 2
% frequency
0
1
2
3
4
5
6
7
8
9
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90
Shell length (mm)


SAMPLE 3
% frequency
0
2
4
6
8
10
12
14
16
18
20
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90
Shell length (mm)





Evidence of Stunted Growth on Low Bottom mussel – taken from sample 2,
some signs of distorted growth and increase in shell wall thickness

From Low Bottom from June heliflight:

22. Low Bottom up to Foulney Ditch was badly covered in green weed. The ditch area appeared clearer but mussel there looked to be sporadic.

Foulney

23. A Dutch Wand survey was carried out on 16th May on the size mussel on Foulney near the Green Channel Buoy. Maps and results are given below:

Foulney Dutch Wand survey 16-05-18. Red polygon indicates area surveyed

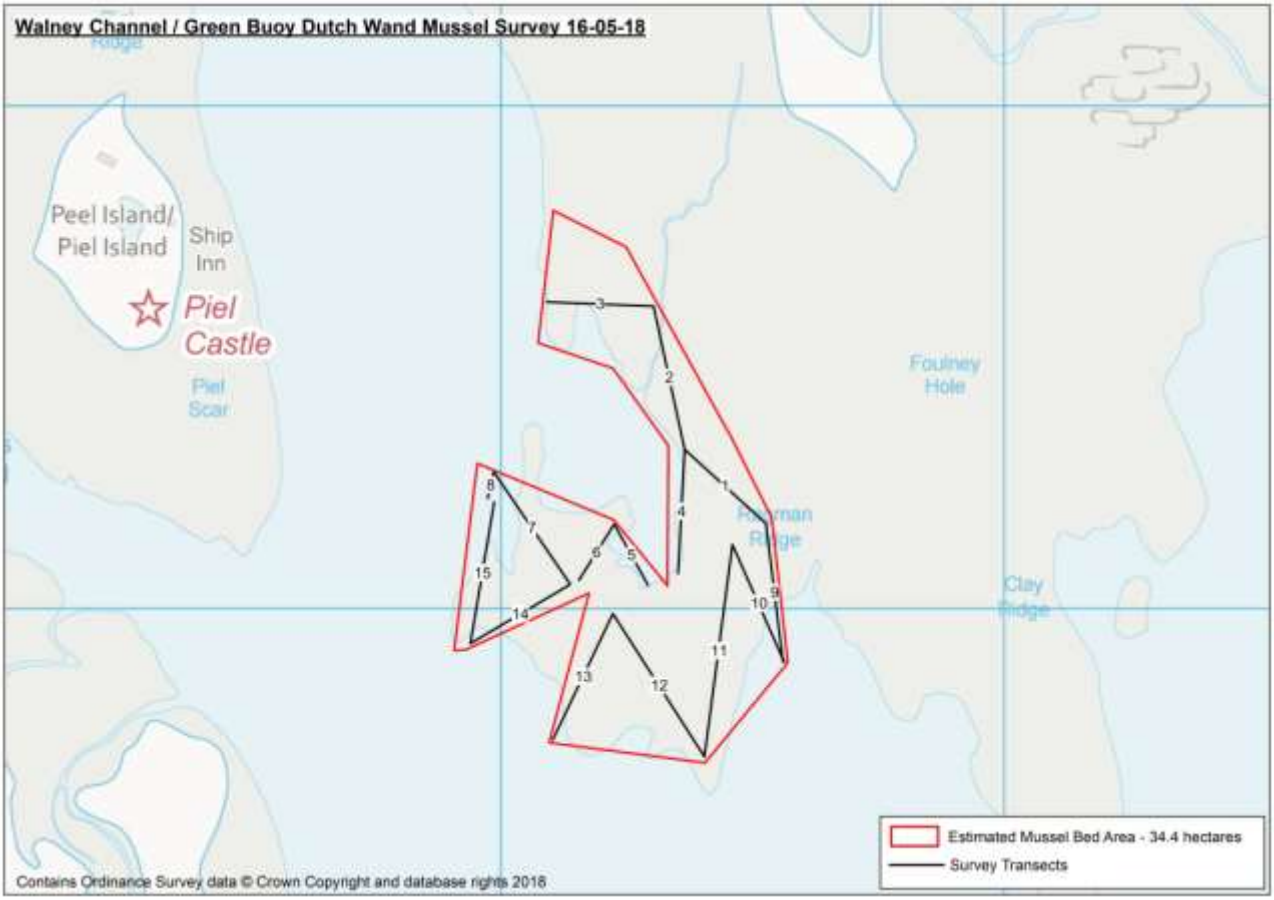
24. Line transects were completed across the bed using a Dutch Wand. The transects start and finish at the edge of the mussel bed. The number of hits and misses of live mussel were recorded to give percentage cover. The bed area was calculated from the start and end of the transects and from what the officer witnessed while surveying. It was not possible to walk the perimeter of the bed due to time restraints and the soft nature of the bed. A mussel sample was taken every 50 hits using a 10 cm diameter corer. Fifteen transects were completed and 20 samples collected. Total weight of live of undersize and size mussel was recorded as well as the size frequency of each sample.

25. From the transect and sample data, the mussel bed area surveyed is 34.4 hectares it is estimated that there is 4610 tonnes of undersize mussel and 212 tonnes of size mussel.

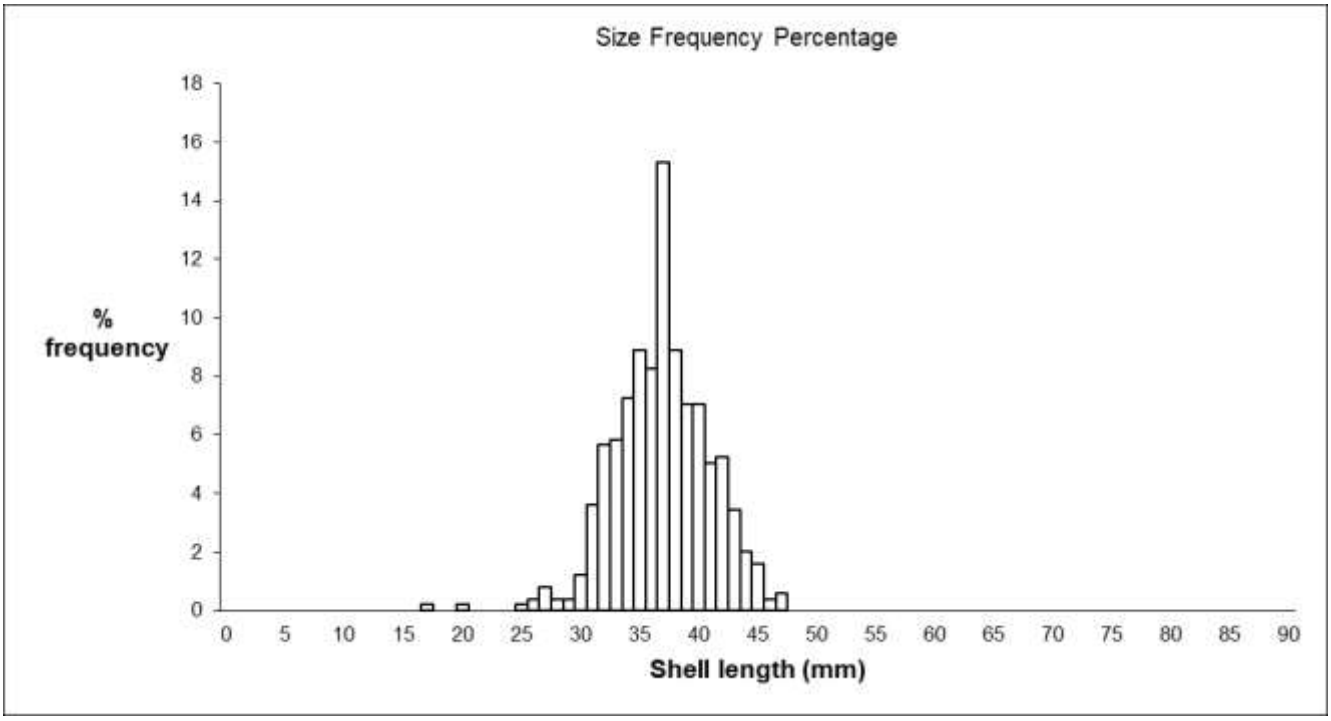
26. The total length frequency for the bed is provided in the histogram below. The highest frequency of mussel was found in the 30 to 42 mm size range with a peak at 37mm.

27. The frequency of each size class of mussels per sample has been standardised per m² and represented using pie charts in the map below. The size of the pie chart is proportional to the total number of mussels per m². It can be seen on the map that the most abundant size class is the 25-45 mm which makes up the majority of the samples with some size mussel (>45mm) mixed in.

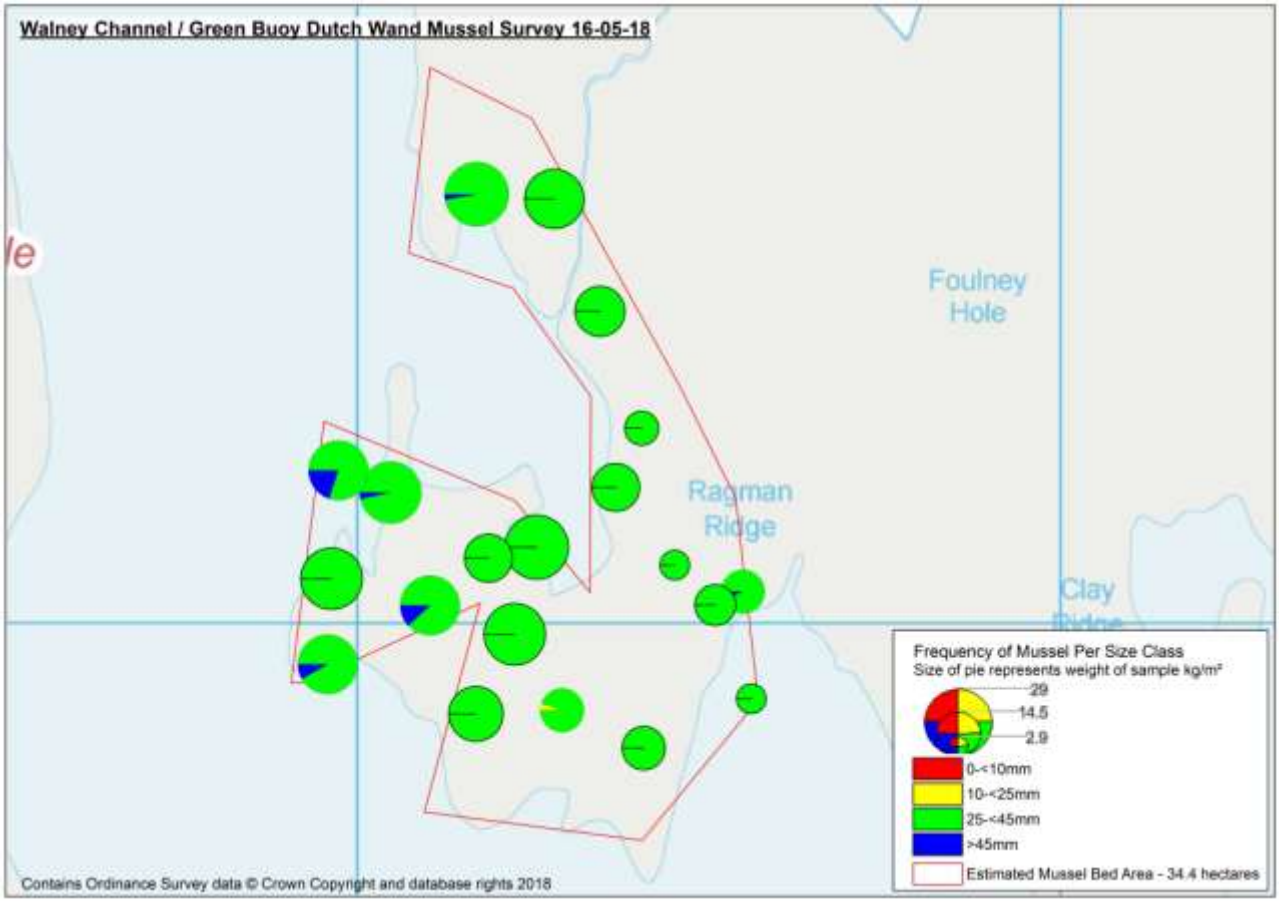
28. The weight of each sample has been standardised and is represented as kg of mussel per m² and the proportion of size and undersize is shown in the pie chart. This is shown in the map below.



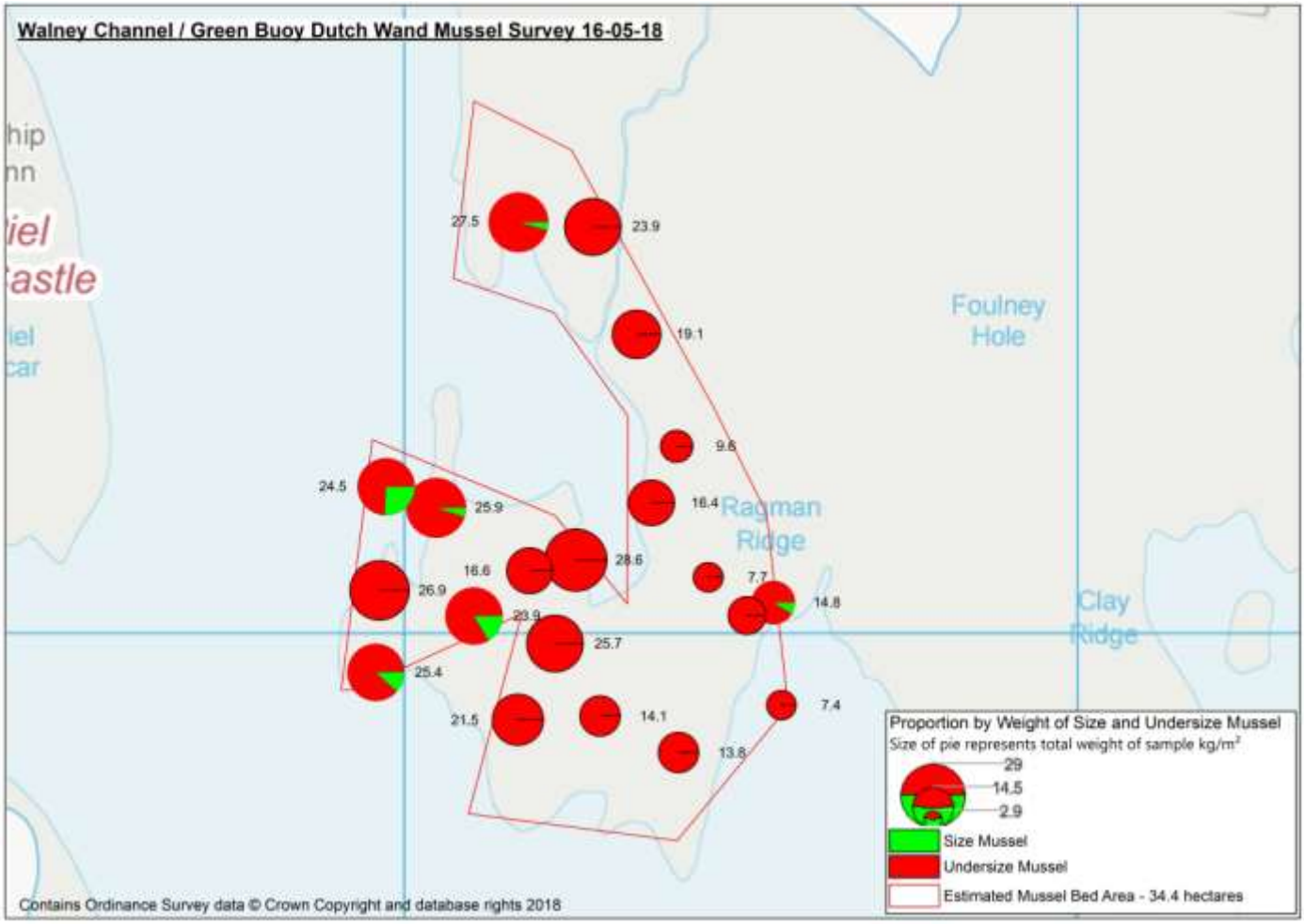
Area surveyed by Dutch Wand survey Foulney 16th May 2018



Foulney Dutch Wand survey 16-05-18.
Histogram showing shell length size frequency from all mussel samples across the mussel bed



Foulney Dutch Wand survey 16-05-18. Frequency of Mussel per Size Class.



Foulney Dutch Wand survey 16-05-18. Proportion of Weight of Size and Undersize Mussel.

Foulney from June heliflight:

29. The Green buoy area on Foulney had gone very green with the weed covering. The area under water off the bottom end of Foulney looked to have weed and no mussel. Foulney Island itself looked to have a good covering of seed.

Foulney from July heliflight:

30. Large areas from the oyster frames on to Foulney and across to the Walney Channel were covered in green algae. It was difficult to determine how much mussel was present under the algae, some areas on the main skear that were covered in algae were being fished for size mussel. The mussel near to the Walney Channel appeared to be less dense then when previously surveyed in May. Foulney island had had a good settlement of seed.

31. The effect of covering with green weed can be different in different years – it may smoother the mussel and kill it off; or it could be providing moisture and shade from the sun. The next inspection should reveal the outcome.

Fleetwood mussels

32. A foot inspection took place on all the Fleetwood mussel beds on 18th May 2018.

Black Scar

33. Black scar had had a 2018 mussel spat settlement which varied in density between 40-60% coverage. The mussel spat was small 2-4mm and had settled on the hard substrate. Along the channel edge there was a band of 20-30mm mussel. Approximate size of area with mussel on it 1.3 hectares.

Perch Scar

34. Perch Scar had a dense 80-90% 2018 mussel spat settlement on it with the density decreasing higher up the bed away from the Wyre channel. The mussel was small 2-4mm and had settled on the hard substrate. Approximate size of area with mussel on it 9.3 hectares.

King Scar

35. On King Scar the mussel was patchy and mixed, there were areas with 60-80% coverage of 2018 mussel spat, areas where the spat was mixed in with 20-40mm mussel, areas of *Sabellaria alveolata* and areas of bare substrate. Moving off of the scar there was an area of large barnacled mussel attached to an old wooden structure as seen in previous years. Approximate size of area with mussel on it 4.3 hectares.

Neckings and Rossall Scar

36. The scars were hard to define as the low water line was dominated by the presence of *Sabellaria alveolata* which was found in patches, some with mussel settled on them others not.

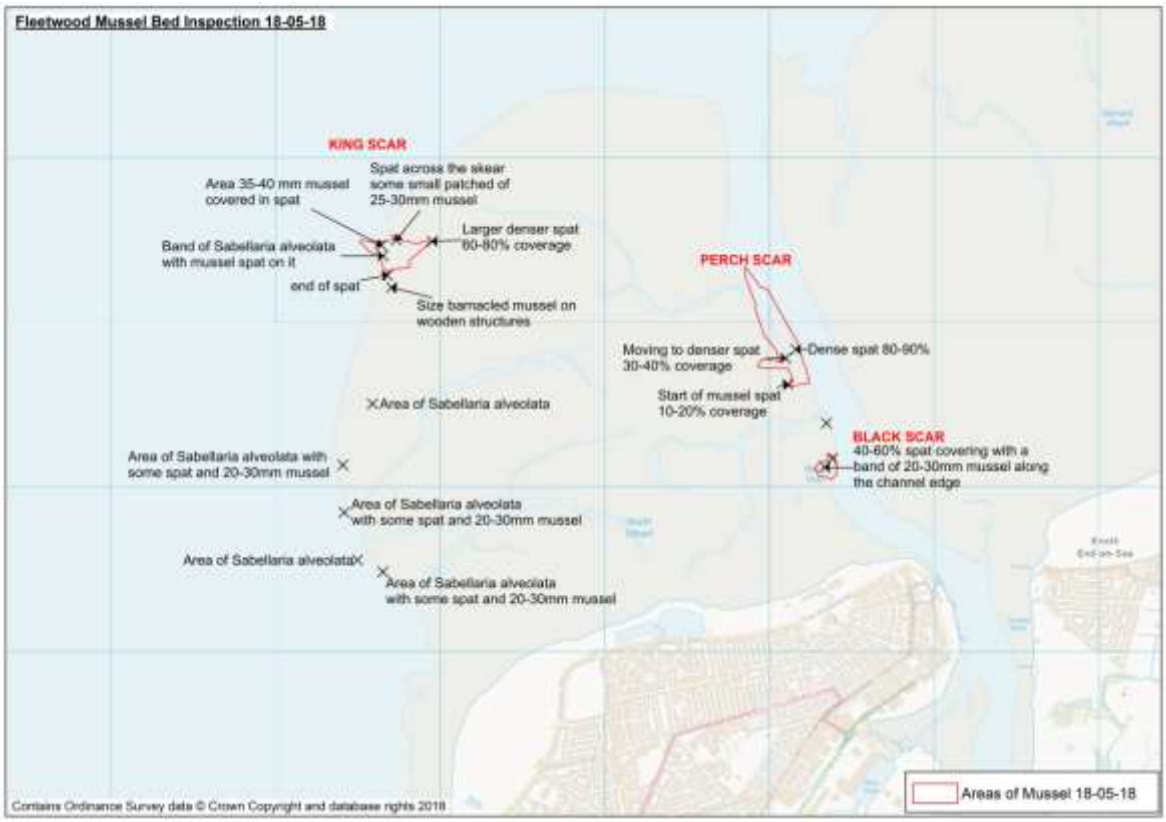


Illustration of the areas inspected at Fleetwood on 18th May 2018

37. From heliflight in July Perch Scar still had a good covering of spat, the mussel was still currently hard and industry reported little change from the last Heli flight one month ago.

38. BMWG agreed the possibility of a dredge fishery for the mussel at Perch Scar should the mussel reach the required dredgeable condition and NWIFCA could be confident of no risk to the bottom substrate features of the EMS. The skear is being monitored and officers will act to open this fishery, using the new administration under the 2017 Dredge Byelaw, should conditions allow.

Wyre End skear – Knott End

39. From heliflight in July Knott End on the eastern side of the Wyre Estuary, has a covering of seed, more patchy than Perch Scar with areas that are bare, especially around the stone ridge which runs through the centre of the skear.

Seafield Road, Lytham

40. Following industry reports of a good spat settlement officers inspected the area on 15th July. There is a significant settlement all along the low water edge of small (2-4mm) spat up to the training wall 'V'. Officers will continue to monitor its growth and this could provide a fishery in coming months

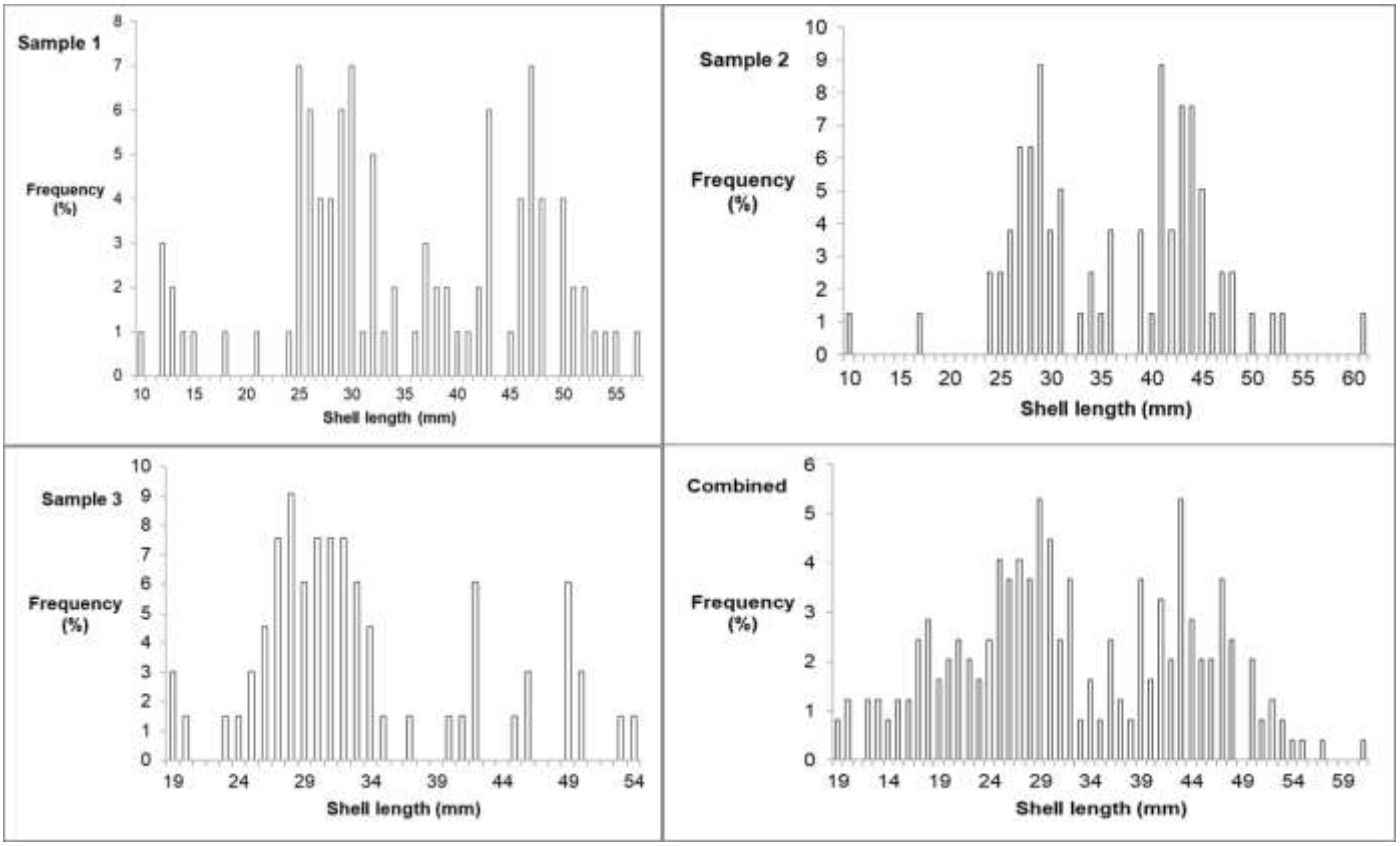
Dee mussels

West Kirby mussel inspected on foot 14th June.

41. Officers tracked around the bed to evaluate the area, which was estimated to be 9.52ha. Large portions of the mussels were shown to be covered by mud and empty shell with the mussel cover ranging from an estimated 5-40%. Analysis demonstrated that spat was also present in all of the three samples that were retrieved from the bed; however, no spat was visible on the surface of the bed during the survey. For size frequency analysis, a total of 100, 79, and 66 individuals were measured for sample stations 1, 2, and 3 respectively (see figures below). Analysis demonstrated that 83.27% of the total mussels from the three sample stations were undersize and 16.73% were size. Meat content for the total sampled mussel was 19.21% for undersize and 16.34% for size mussel.

39. The secondary aim of the inspection was to assess for the presence of the invasive Chinese Mitten Crab (*Eriocheir sinensis*). During the inspection on the bed and the morphometric analysis in the laboratory, officers examined a number of crabs (approximately 50 individuals), which were all shown to be the common shore crab (*Carcinus maenas*).

Length frequency analysis for the 3 sample points of West Kirby mussels and the combined samples June 2018



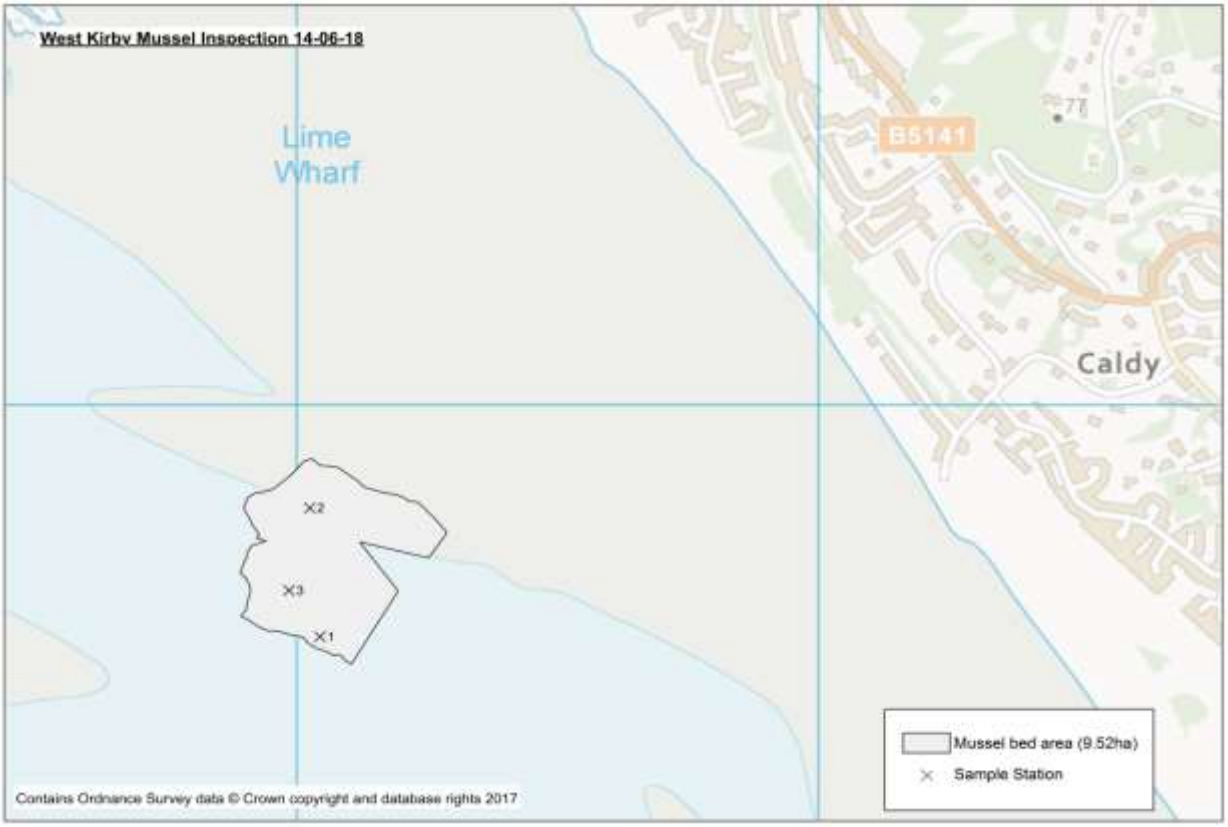


Illustration of position and area of mussel bed at West Kirby June 2018

Thurstaton mussel was inspected on foot on 14th June

40. The three mussel beds from the previous inspection in January were inspected. The mussel is still present on dead cockle shell and in some places on deep mud. The mussel is present on both the surface of the mud and buried within it. Spat settlement was not noticeable on the bed surface but was present in all mussel samples.

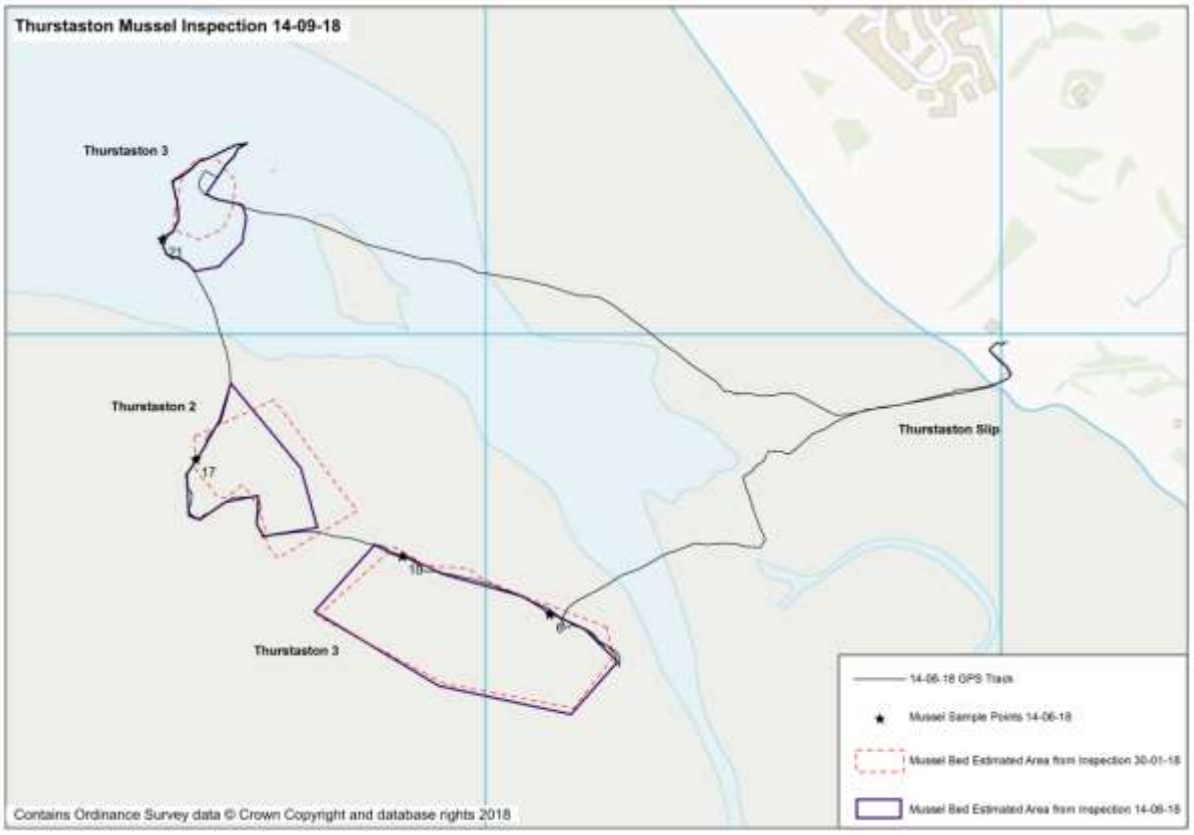
41. Due to the deep mud it was not possible to get to the middle of the mussel beds or, because of channels and time restraints, track around the entire extent of the mussel bed. The figure below shows the estimated extent of the beds, the map has been produced using tracks from the 14th June 2018 and the previously estimated bed extent from 30th January 2018. Mussel samples were collected a various points across the bed as indicated.

42. When comparing the estimated size of the beds from the inspection on the 30th January and the return inspection on 14th June Bed 1 has remained at a similar size (9.9ha) and in the same area, Bed 2 has reduced in size from an estimated 4.9ha to 3.8ha and Bed 3 has increased in size from an estimated 1.4ha to 2.2ha.

43. Mussel was patchy across all three beds, although with the presence of mussel within the mud it was hard to assess from distance. Bed 3 was the most patchy.

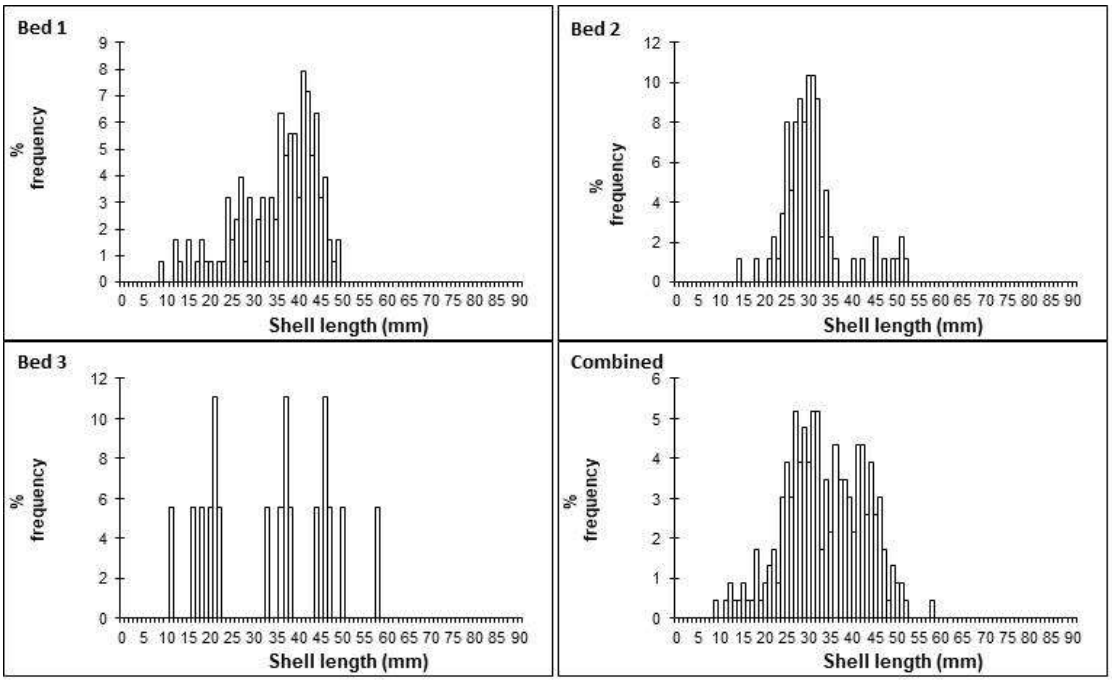
44. In total across the three beds 88.3% of the sampled mussels were undersized, equating in 11.7% being sized mussels. Bed 1 possessed a total of 88.9% undersized, Bed 2 equated to 90.8% undersized, and Bed 3 was 72.2% undersized.

45. Only one crab was present in the mussel sample from Bed 1 and was identified as shore crab.



Map of the estimated extent of mussel beds from the inspection on the (14/06/18) compared with the extent of mussel beds from the previous inspection (30/06/18) with the sample stations highlighted.

46. Post survey the shell length of individual mussels was measured from each sample station, Bed 1 = 126, Bed 2 = 87, Bed 3 = 18. The subsequent length frequency graphs are demonstrated in the figure below.



The length frequency graphs for each mussel bed (Bed 1 n=2, Bed 2 n=1, and Bed 3 n=1) as well as all of the site data combined.

COCKLES:

Summary

47. A limited commercial fishery is due to open on the North Penfold cockle bed, Southport on 30th July. In Morecambe Bay there does not appear to be substantial commercial quantities of size cockle at present; however there has been a noted spatfall which requires monitoring. Officers may consider the potential for a craam only fishery in North Morecambe Bay once Flookburgh survey results are obtained in August, and report back to TSB should this be the case.

Penfold North cockles, Southport

48. Following the approval by May's TSB to maintain the seasonal closure at North Penfold cockle bed, it became apparent that the unseasonal hot weather was causing die-off on the bed. Discussion at BMWG and with Natural England provided a consensus to allow a quad access only tidally restricted fishery during the seasonal closure to allow the removal of the mainly 2015 cockle from the muddy area. Officers are confident from inspections that there is no other significant cockle on the Southport beds.

49. Management incorporated timing to avoid unacceptable disturbance to nesting birds on the saltmarsh at Marshside. A full HRA was conducted and Science Officers were instrumental in providing information at the multi-agency planning meeting hosted by West Lancashire Borough Council on 9th July. The fishery is due to open on 30th July and is expected to be fished down within 3-4 weeks.

50. There were vociferous requests from some sectors of industry to allow a boat access fishery. Officers determined that risk of non-compliance with NWIFCA Byelaw 3 was too great and that controlled entry to the fishery via one access point at Marshside was the best management approach.

Lytham – Grannys Bay, North Run, Mousehole – 18th June

51. Officers used jumbos to randomly sample across the whole area – North Run, Grannys Bay and Mousehole cockle beds. Cockle was rare with a few of three year classes found near the shallow channel near to the prom by the Beach Terrace café (this is where the dense cockle was in 2011).

Pilling Sands – Morecambe Bay

52. This stock was surveyed prior to end of fishing in March and previously reported on. It will be re-surveyed in August when Officers will be focusing on spat recruitment. However it is unlikely here will be a commercial fishery there in September 2018 due to low size cockle abundance.

Middleton Sands – Morecambe Bay

53. 18th July - 53 stations were sampled from a grid 500m apart, two additional stations were added to assess a dense area identified in a previous survey and one additional station to assess the extent of observed spat.

54. The density of size cockle across the bed is relatively low with a small area (4.2ha) of dense cockle that was present last year. Spat was observed across approximately three quarters of the bed at varying densities from less than 10 per m² to approximately 400 per m².

55. Means were calculated from all stations with zero counts on the edge of the bed removed. Less than 5mm cockle was not used in the undersize figures due to the high variable survivability of cockle at this small size. The mean for size cockle has been split to show the density of the dense area and the rest of the bed.

Mean number of size cockle (dense area)	473 per m²	(min 454, max 492)
Mean number of size cockle (rest of the bed)	7 per m²	(min 0, max 32)
Mean number of undersize cockle:	3 per m²	(min 0, max 16)

56. Maps were created showing the overall survey area, density of size cockle, density of undersize cockle (excluding cockles in the 0-5mm size range) and the density of the 0-5mm size class. Biomass was not assessed

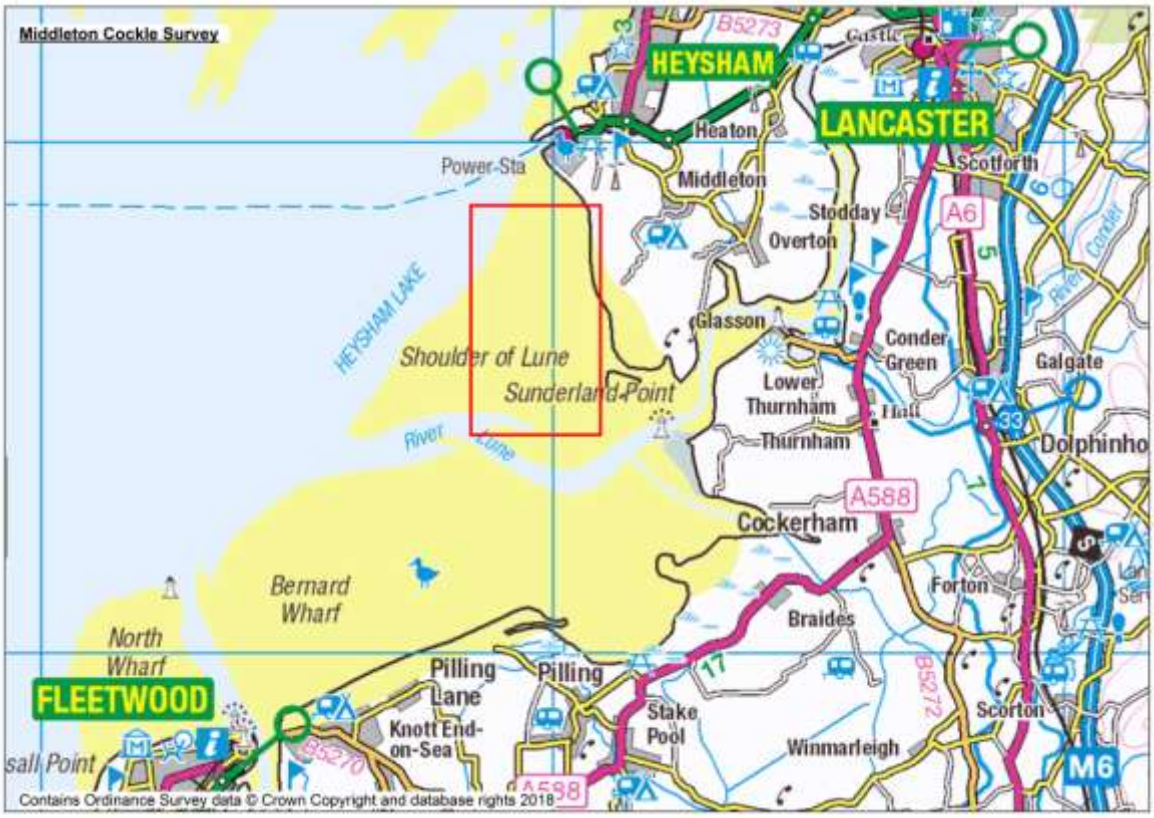
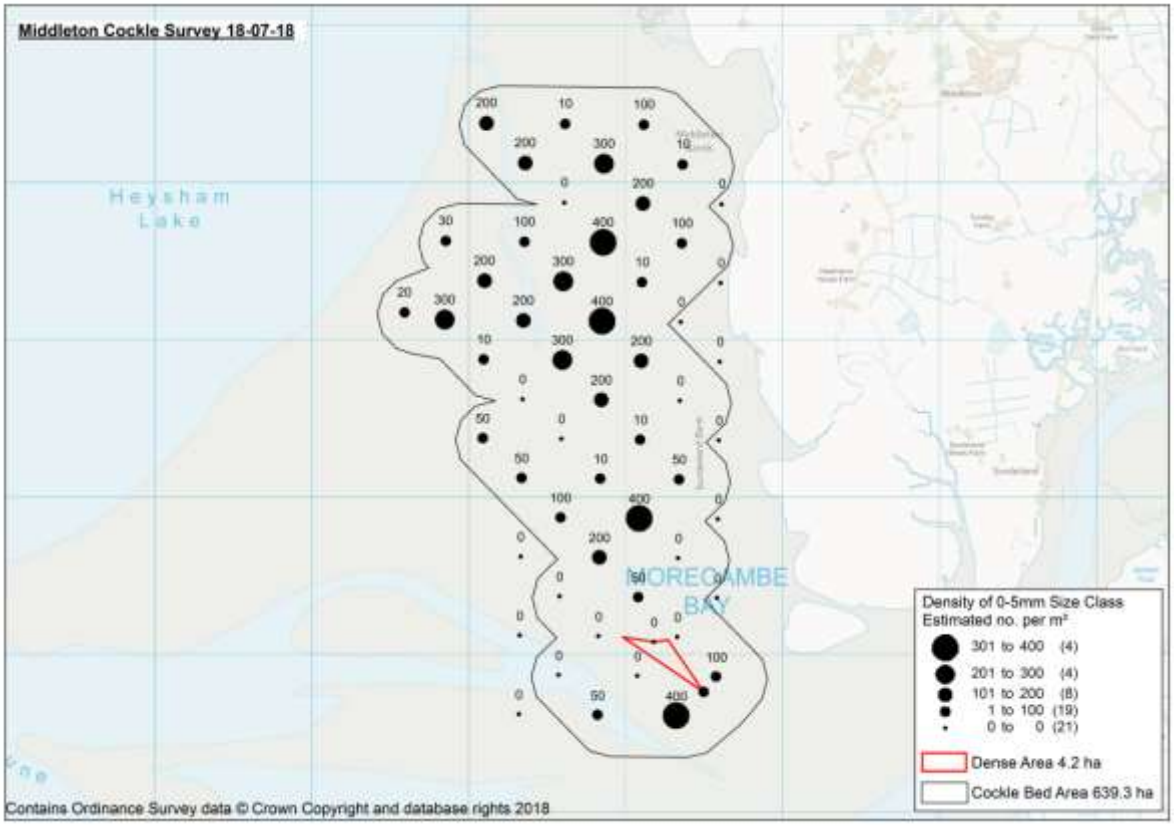
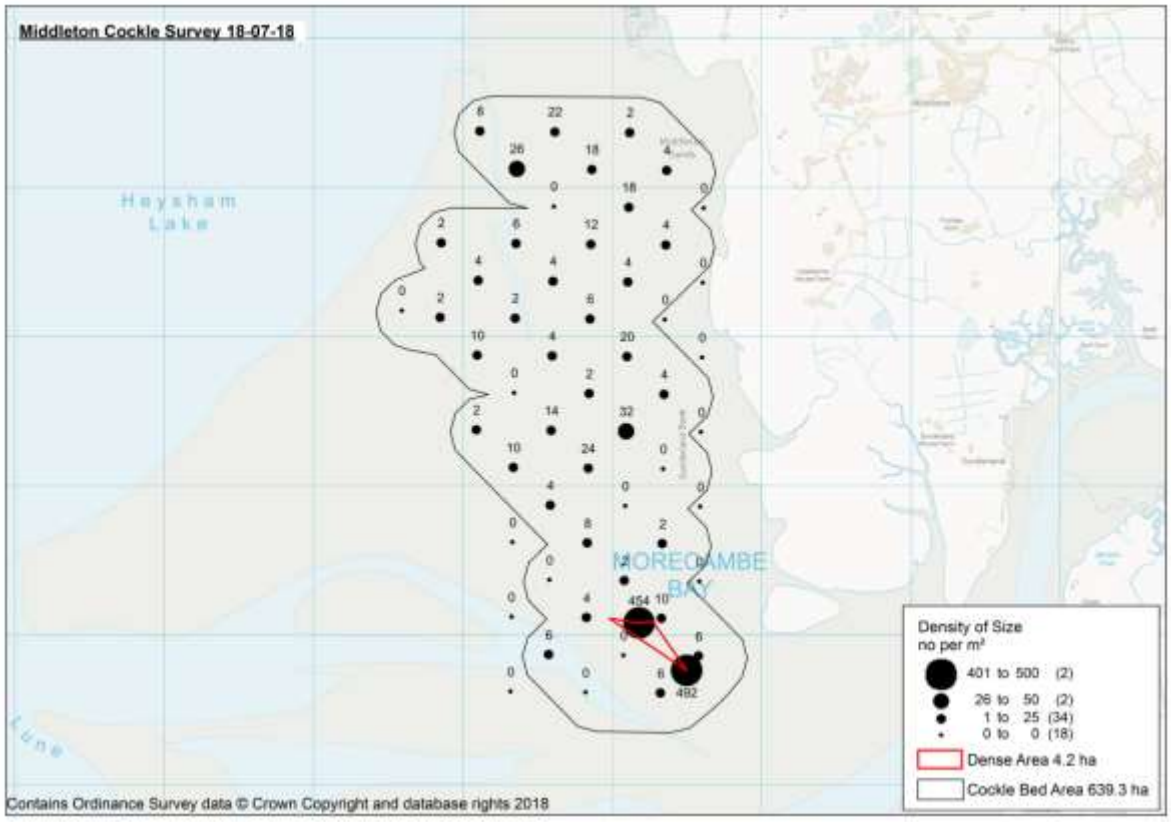


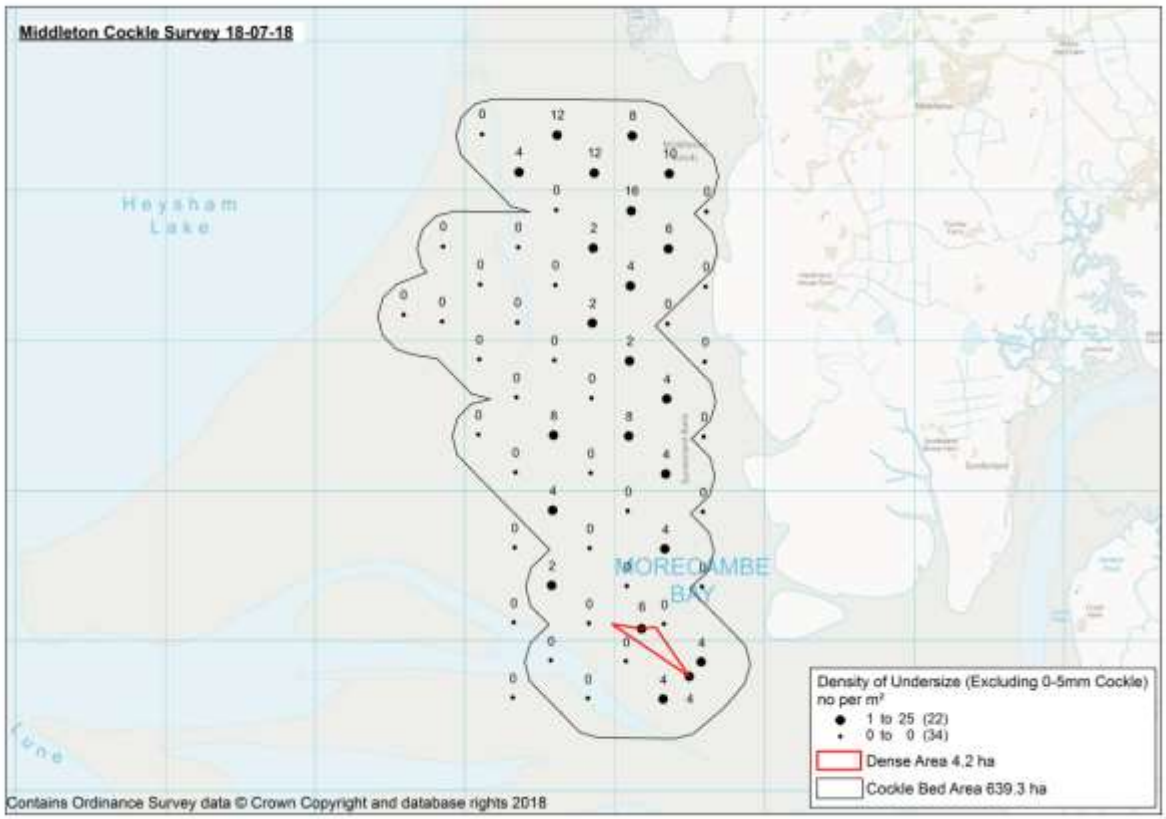
Illustration of position of Middleton Sands cockle bed



Density of spat cockle per m² Middleton Sands July 2018



Density of size cockle per m² Middleton Sands July 2018



Density of undersize cockle per m² Middleton Sands July 2018

Leven Sands – Morecambe Bay

57. 17th July - 74 stations were sampled from a grid 500m apart, six additional stations were added to assess the extent of observed spat.

58. The density of size cockle across the bed is relatively low with a slight increase of size cockle present in an area at the southern end of the bed. Spat was observed across approximately half of the bed at varying densities from less than 10 per m² to approximately 400 per m².

59. Means were calculated from all stations with zero counts on the edge of the bed removed. Less than 5mm cockle was not used in the undersize figures due to the high variable survivability of cockle at this small size.

Mean number of size cockle:	11 per m²	(min 0, max 38)
Mean number of undersize cockle:	5 per m²	(min 0, max 13)

60. Maps were created showing the overall survey area, density of size cockle, density of undersize cockle (excluding cockles in the 0-5mm size range) and density of the 0-5mm size class. Biomass was not assessed.

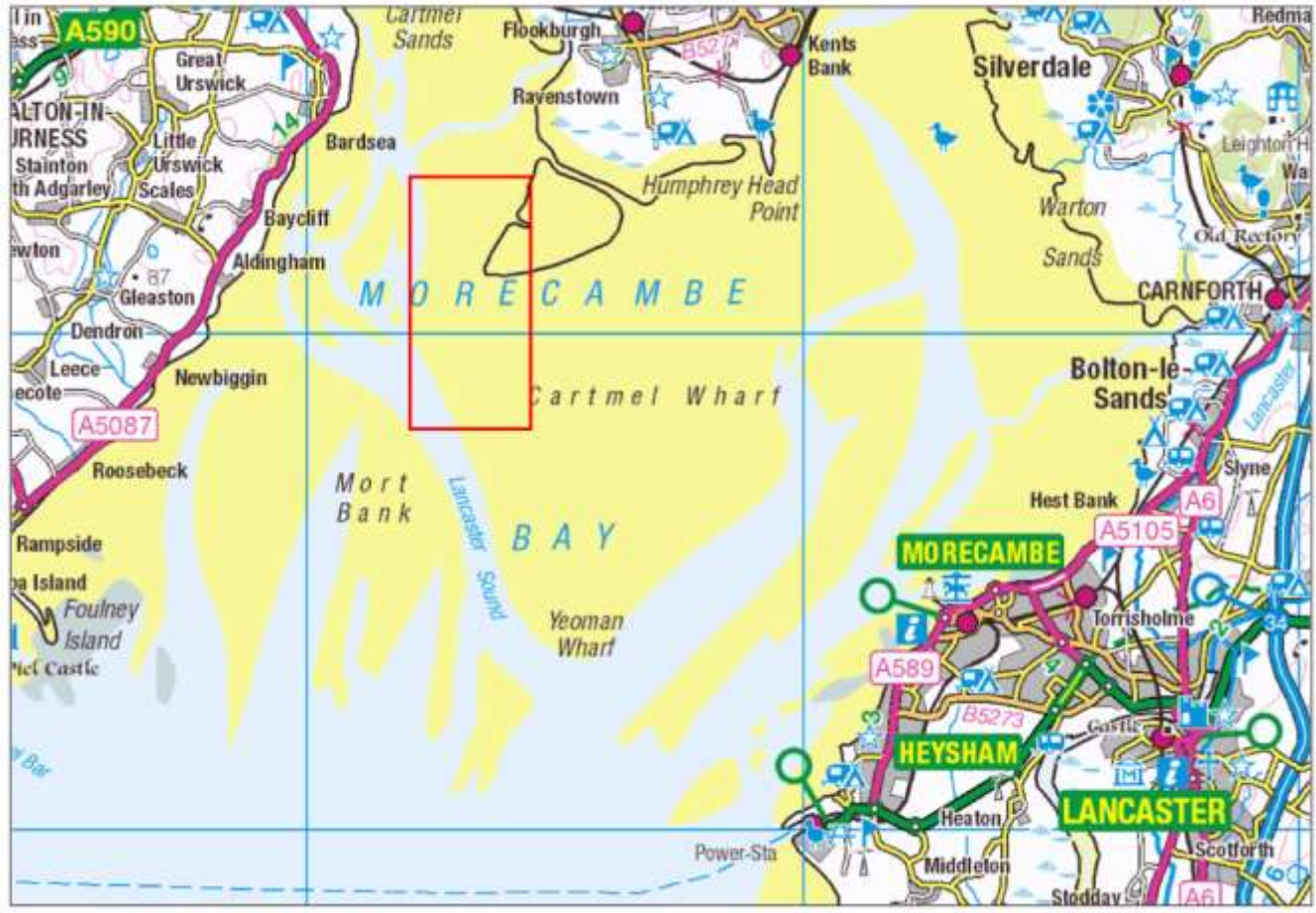
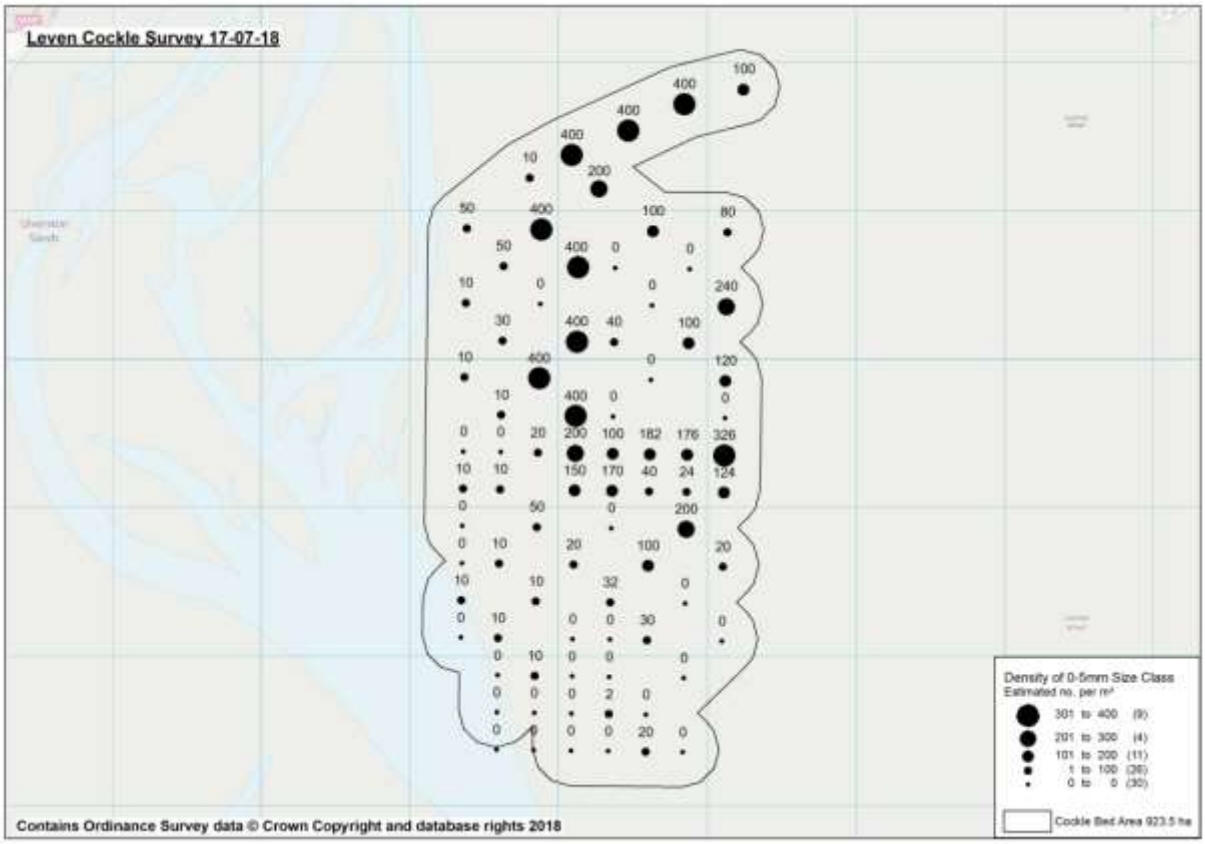
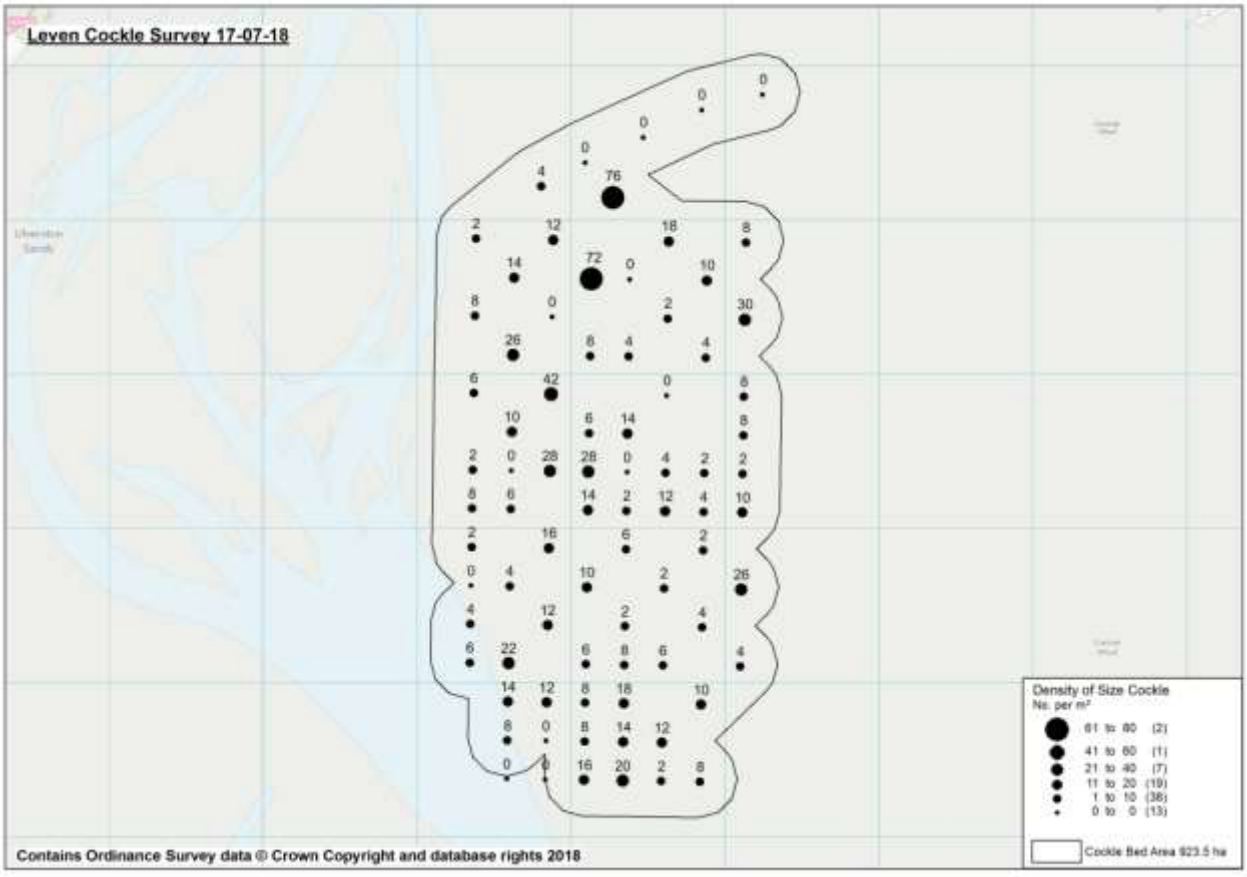


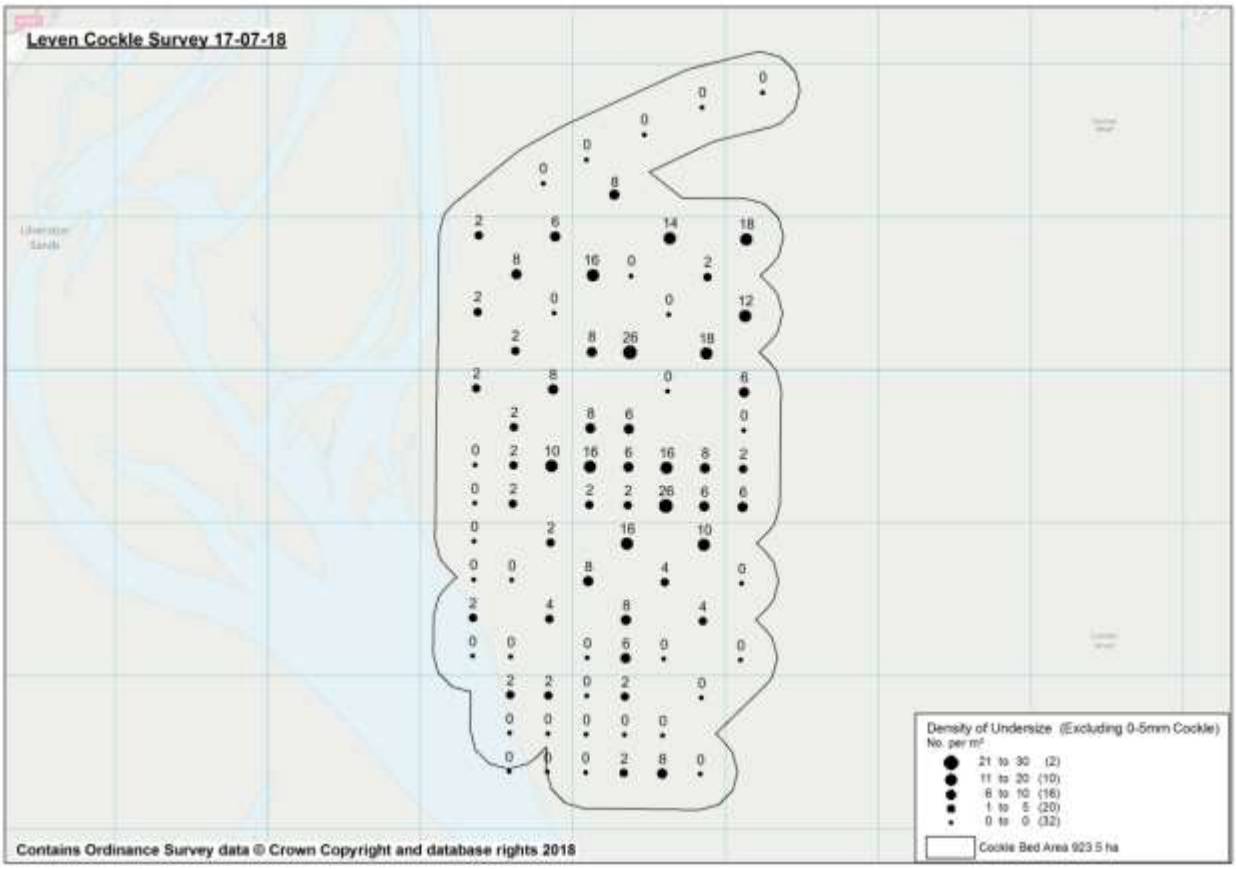
Illustration of position of Leven Sands cockle bed



Density of spat cockle per m² Leven Sands July 2018



Density of size cockle per m² Leven Sands July 2018



Density of undersize cockle per m² Leven Sands July 2018

Flookburgh – Morecambe Bay

61. The last survey was carried out during the fishery in February and previously reported. This large bed will be surveyed again in August, giving good opportunity for any settlement to become apparent. Should results indicate the possibility of a commercial fishery an interim report will be provided to TSB via email.

Newbiggin – Morecambe Bay

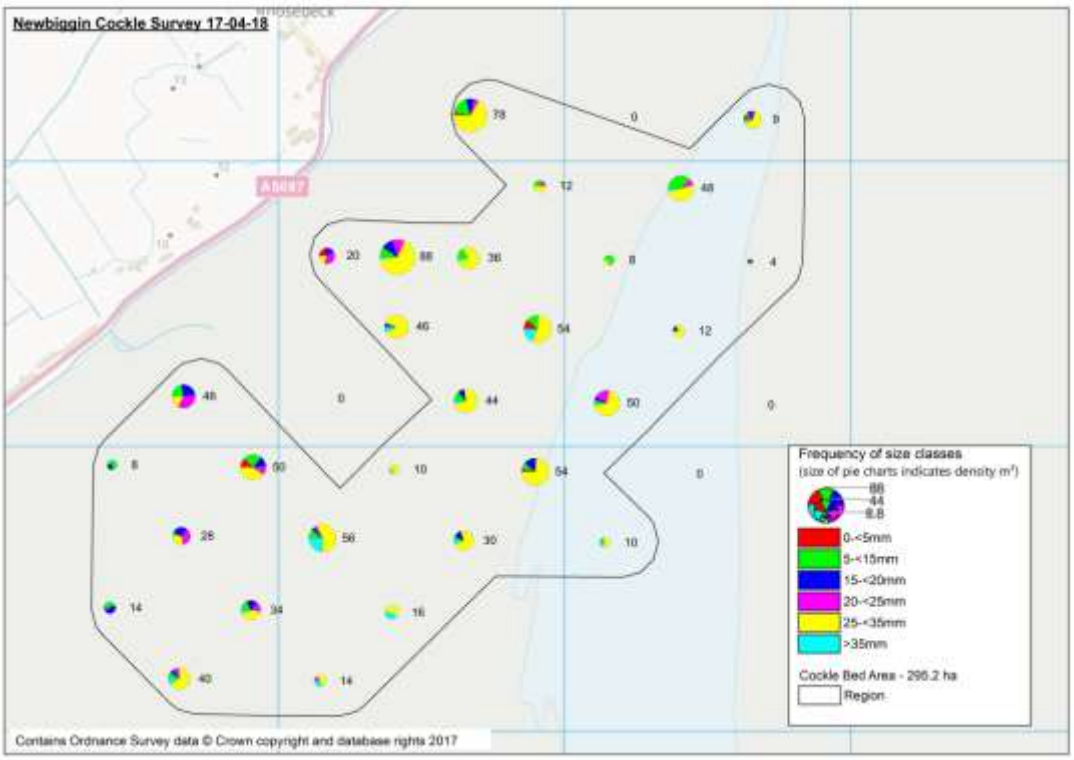
62. 17th April - 31 stations were sampled from the 500m grid with an extra station added between points where a high density of cockles was reported to officers. Size cockle was located throughout the bed, excluding 5 stations with no presence of size cockle, with 16 stations containing cockles in the size category of >35mm. Total bed area: 295.2 ha.

63. There was evidence of oystercatcher feeding on the cockles from the presence of opened cockle shell and seeing oystercatchers feeding at the tide line as the water ebbed. It was notable the large numbers of eider present on the sand in small groups of mixed males and females.

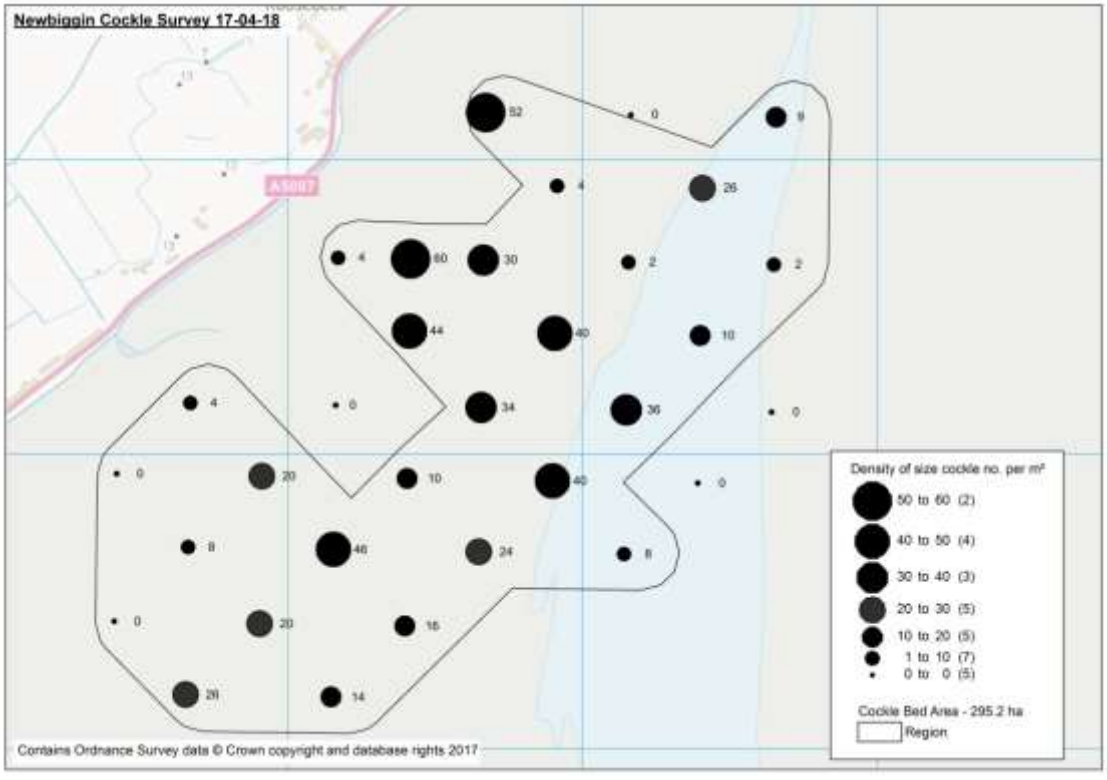
64. Means were calculated from all survey stations with zero counts on the edge of the bed being removed. Less than 5mm cockle has not been used in the undersize figures due to the high variable survivability of cockle at this small size.

Mean number of size cockle: 23 per m² (min. 0, max 60)
Mean number of undersize cockle: 13 per m² (min 0, max 42)

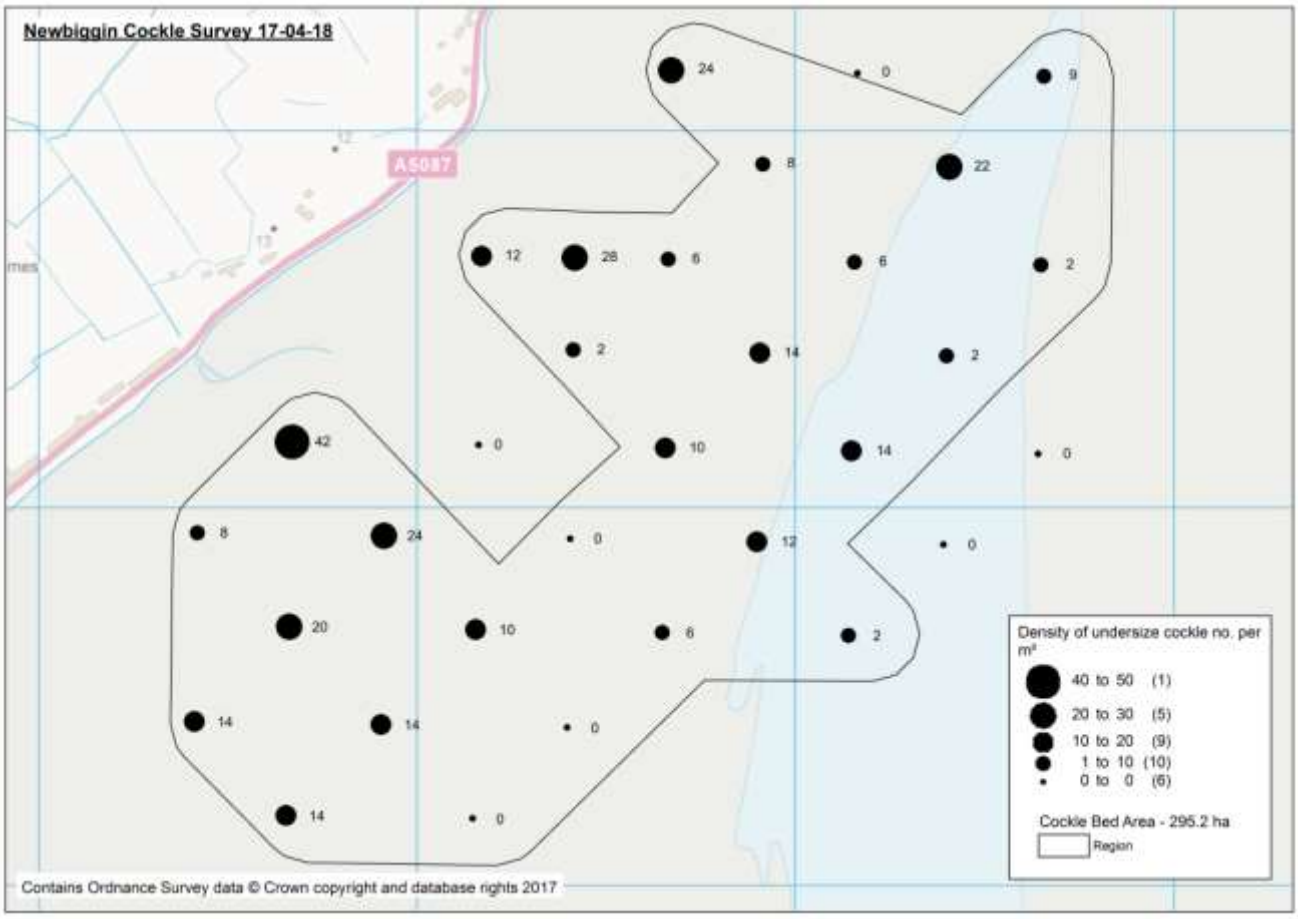
65. Maps were created showing the overall survey area, density of size cockle, density of undersize cockle (excluding cockles in the 0-5mm size range), and the frequency of size classes (pie charts show the frequency of different size classes and the size of the pie chart indicates the total density of cockles present).



Frequency of Size Classes Newbiggin cockles April 2018



Density of Size cockle Newbiggin April 2018



Density of Undersize cockle Newbiggin April 2018

Dee Estuary Cockle Fishery Advisory Group (DECFAG)

66. Officers attended the DECFAG meeting on the 31st May 2018, where Natural Resource Wales (NRW) provided information on the current cockle stock in the Dee Cockle Order fishery, the daily total allowable catch (TAC) and the use of the Bird Food Model (BFM) in the calculation of the TAC. The mussel stock at West Kirby and Thurstaston beds, which are managed by NWIFCA, have not been used this year in the BFM. There was discussion about the communication that would need to occur between NRW and NWIFCA if the mussel stocks were to be incorporated in the BFM in future years.

Mandy Knott
Senior Scientist
27th July 2018