Bivalve Mollusc Working Group Meeting – 3rd May 2018

Cockle and Mussel Update

COCKLES:

For all cockle survey results:

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.

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).

1. Leasowe Cockle Fishery

Due to the timing of the survey, results will be given verbally at the meeting.

2. North Penfold Cockle Survey 20-03-18

Survey method – 0.1m² quadrat and sieve or 0.5m² quadrat and jumbo depending on location and substrate.

Some areas of the bed have hardened considerably since the last survey in November with the majority of the bed, minus the red area on the maps below, being more accessible by foot. Quad access remains difficult as some areas are still too soft. The bed appears to have spread out, mainly heading east / north east. This has meant that some areas of cockles have grown and reached size while other areas have shown little change in the size of the cockle and remain small (19-21mm in shell length).

In the mapping the areas have been defined as:

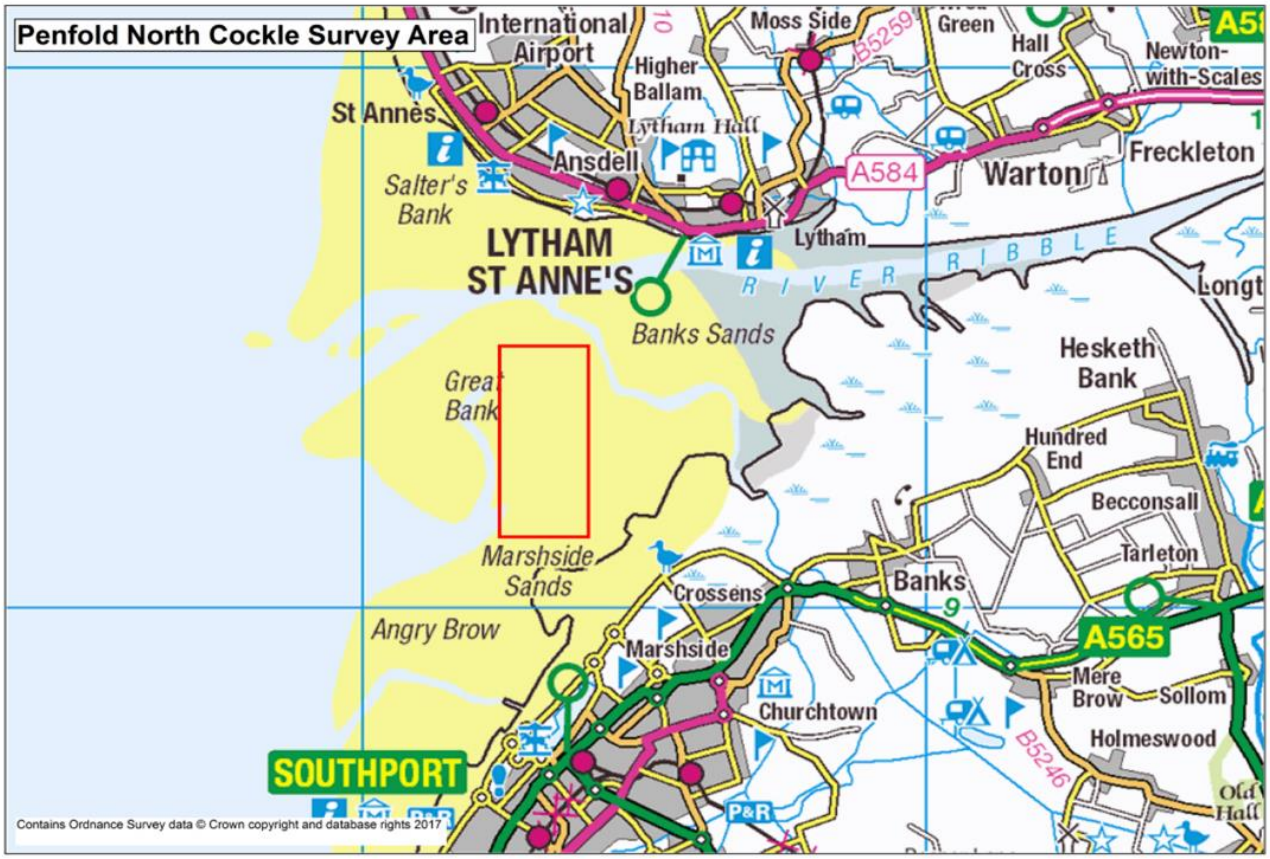
- the total bed area taken from the survey points (Black);
- an area which is dominated by small cockle (19-21mm) (Blue);
- an area which is more mixed (outer boundary has been mapped from judgment and sediment type whilst officers were on the bed due to the soft nature of the sediment and difficulty covering it) (Red);
- an area which has a greater percentage of size cockle (Yellow).

It should be noted that there has been a small settlement of 2017 cockle in some of the locations which can be seen on the size frequency map. There is evidence (numerous wader footprints over most of the bed and broken shells) that there has been a lot of bird feeding occurring on the area (images below) which has not been witnessed in the most recent surveys.

Mean number of size cockle: 123 per m² (min. 0, max 700)

Mean number of undersize cockle: 209 per m² (min 0, max 1790)

No estimates of biomass have been calculated.


Penfold North Cockle Survey Area
International Airport
Moss Side
Green
Hall Cross
Newton-with-Scales
St Annes
Higher Ballam
Lytham Hall
Ansdell
Salter's Bank
A584
Warton
Freckleton
LYTHAM ST ANNE'S
Lytham
RIBBLE RIVER
Banks Sands
Great Bank
Hesketh Bank
Hundred End
Becconsall
Tarleton
Marshside Sands
Crossens
Banks
Angry Brow
Marshside
A565
Mere Brow
Sollom
Churchtown
Holmeswood
SOUTHPORT
B5246
P&R
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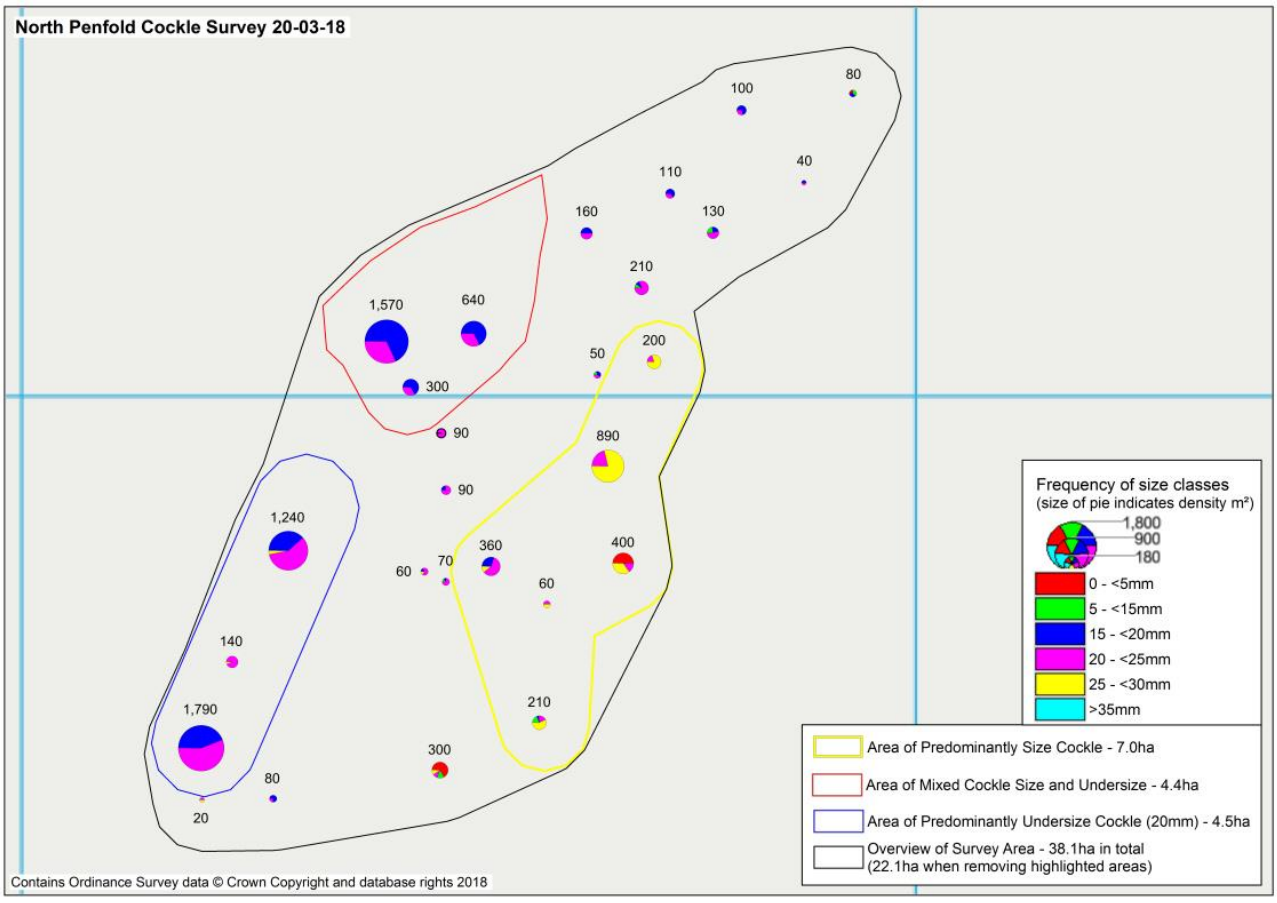
North Penfold Cockle Survey 20-03-18
80
100
40
110
160
130
210
1,570
640
200
50
300
90
890
90
1,240
360
400
60
70
60
140
210
1,790
300
80
20
Frequency of size classes
(size of pie indicates density m²)
1,800
900
180
0 - <5mm
5 - <15mm
15 - <20mm
20 - <25mm
25 - <30mm
>35mm
Area of Predominantly Size Cockle - 7.0ha
Area of Mixed Cockle Size and Undersize - 4.4ha
Area of Predominantly Undersize Cockle (20mm) - 4.5ha
Overview of Survey Area - 38.1ha in total
(22.1ha when removing highlighted areas)
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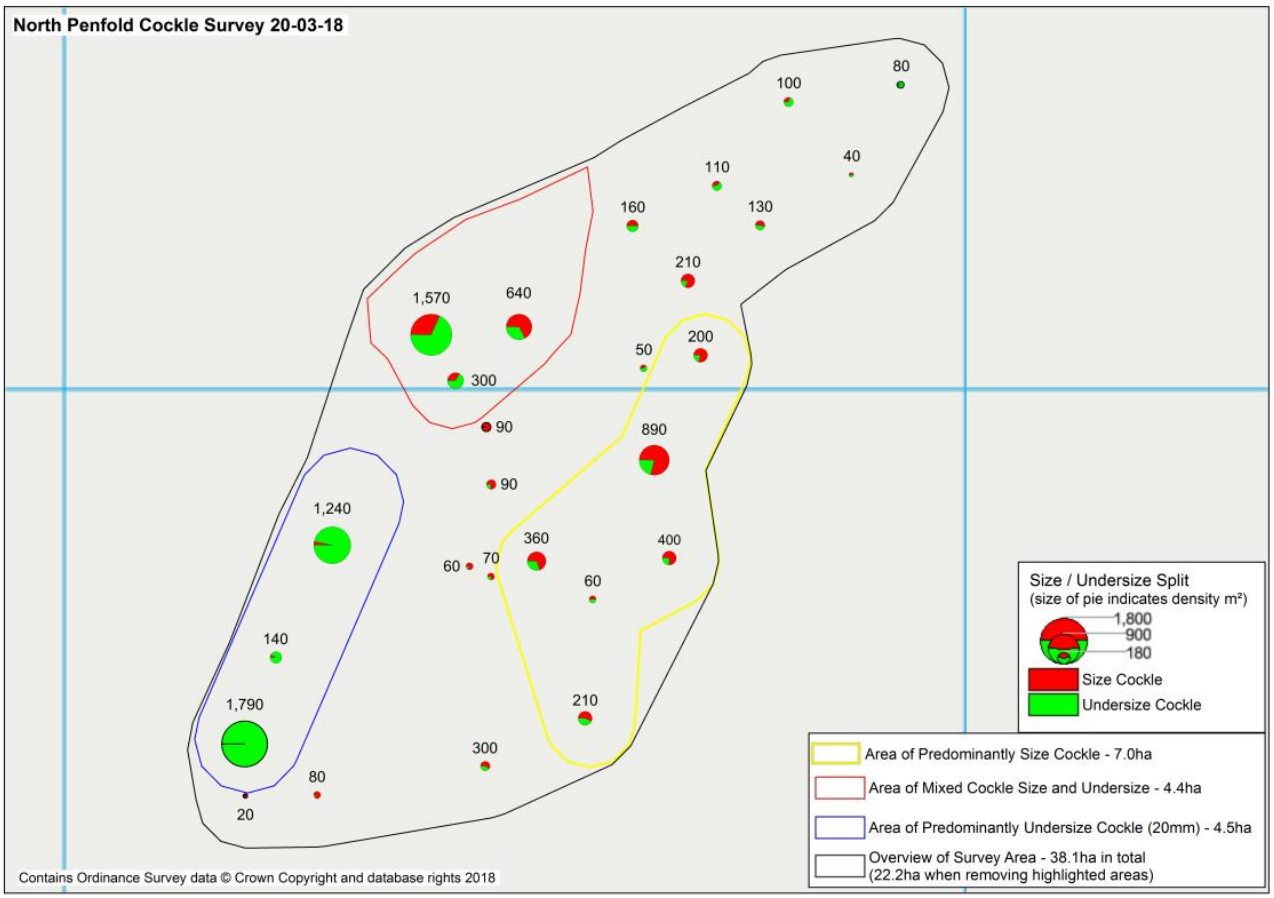
North Penfold Cockle Survey 20-03-18
80
100
40
110
160
130
210
1,570
640
50
200
300
90
890
90
1,240
360
400
60
70
60
140
210
1,790
300
80
20
Size / Undersize Split
(size of pie indicates density m²)
1,800
900
180
Size Cockle
Undersize Cockle
Area of Predominantly Size Cockle - 7.0ha
Area of Mixed Cockle Size and Undersize - 4.4ha
Area of Predominantly Undersize Cockle (20mm) - 4.5ha
Overview of Survey Area - 38.1ha in total
(22.2ha when removing highlighted areas)
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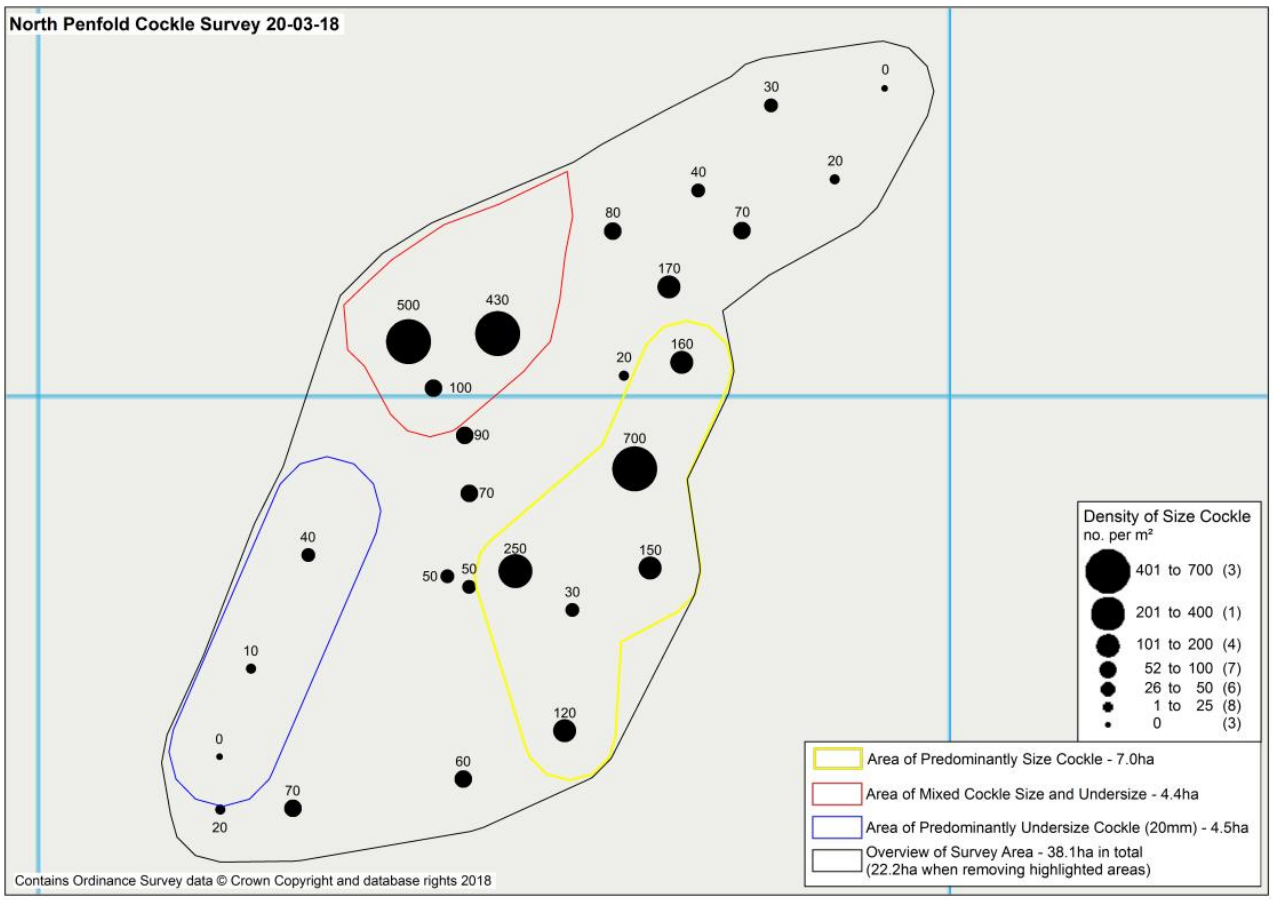
North Penfold Cockle Survey 20-03-18
0
30
20
40
80
70
170
500
430
160
20
100
90
700
70
40
250
150
50
50
30
10
120
0
60
70
20
Density of Size Cockle
no. per m²
401 to 700 (3)
201 to 400 (1)
101 to 200 (4)
52 to 100 (7)
26 to 50 (6)
1 to 25 (8)
0 (3)
Area of Predominantly Size Cockle - 7.0ha
Area of Mixed Cockle Size and Undersize - 4.4ha
Area of Predominantly Undersize Cockle (20mm) - 4.5ha
Overview of Survey Area - 38.1ha in total
(22.2ha when removing highlighted areas)
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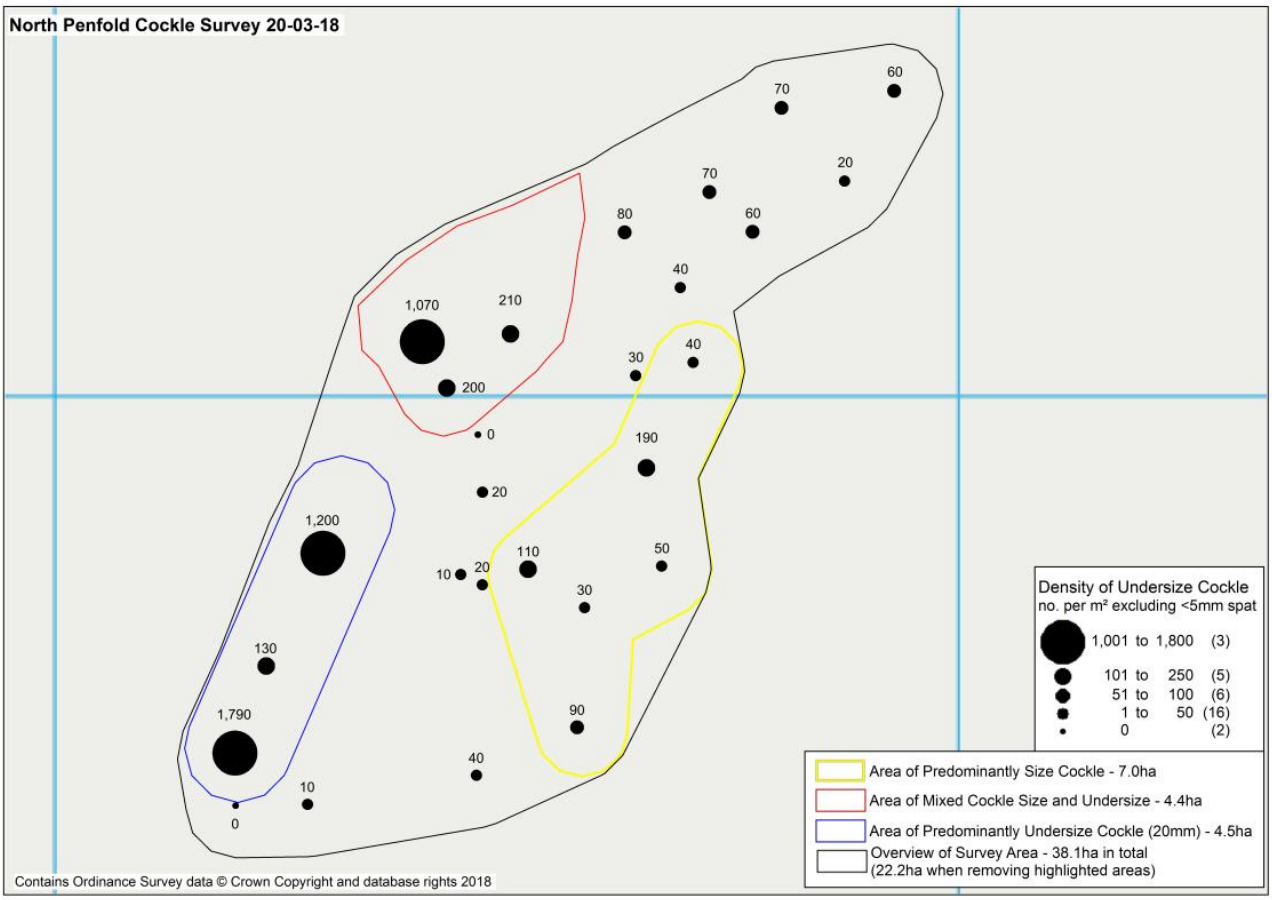
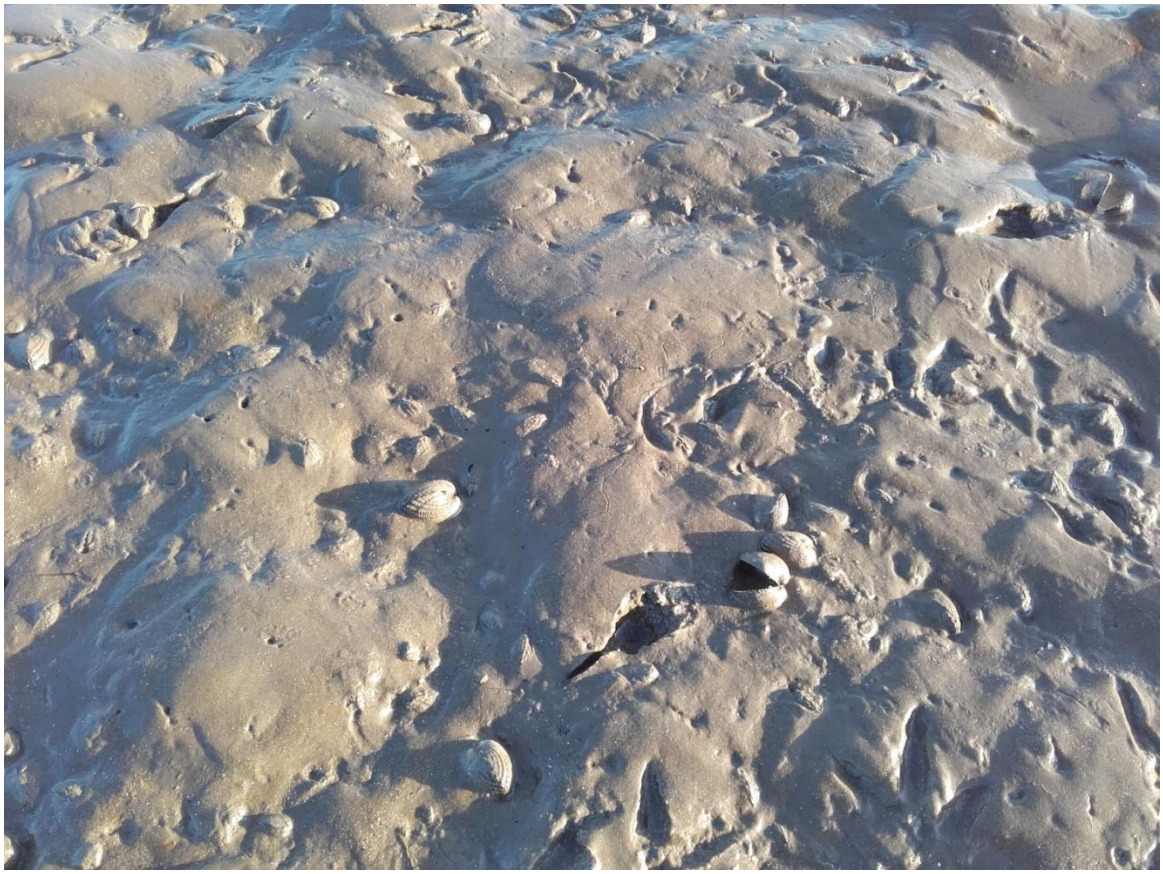


Evidence of birds feeding on the cockle bed and on the cockles



3. Pilling Cockle Survey 21/03/18

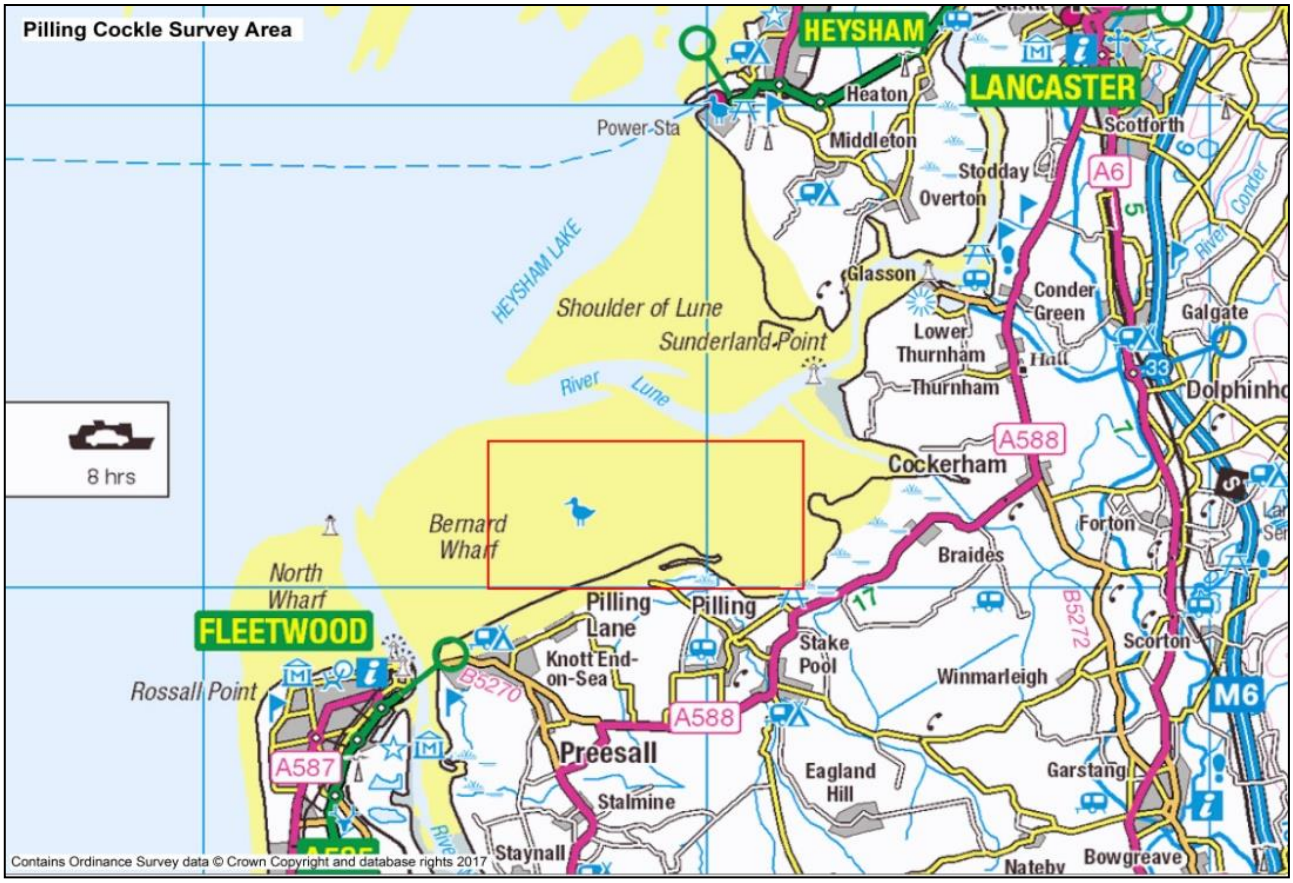
Tides: LW 8:00 1.2m (Liverpool tides). Survey method - Jumbo and 0.5m^2 quadrat.

45 stations (out of a possible 78) were sampled from the 500m grid. Six extra stations were added outside of the grid in order to estimate the northward extent of the bed. Patches of size cockle were located closer to the main channel on some stretches of the beach. Stations furthest to the east were in accessible. Samples to the west of the bed demonstrated a lower density of cockle in comparison to central areas. A sample was taken for the continued monitoring of cockle biometrics.

Mean number of size cockle: 25 per m² (min. 0, max 180)

Mean number of undersize cockle: ~ 19 per m² (min 0, max 234)

Total Bed Area = 1154 ha.


Pilling Cockle Survey Area
HEYSHAM
LANCASTER
Heaton
Middleton
Power-Sta
Scotforth
Stodday
Overton
A6
HEYSHAM LAKE
Shoulder of Lune
Sunderland Point
Glasson
Conder Green
Galgate
Lower Thurnham
Thurnham
River Lune
8 hrs
A588
Cockerham
Bernard Wharf
Forton
Braides
North Wharf
FLEETWOOD
Pilling Lane
Pilling
Stake Pool
Knott End-on-Sea
Scorton
Rossall Point
B5270
Winmarleigh
M6
A588
Preesall
A587
Eagland Hill
Garstang
Stalmine
Staynall
Nateby
Bowgreave
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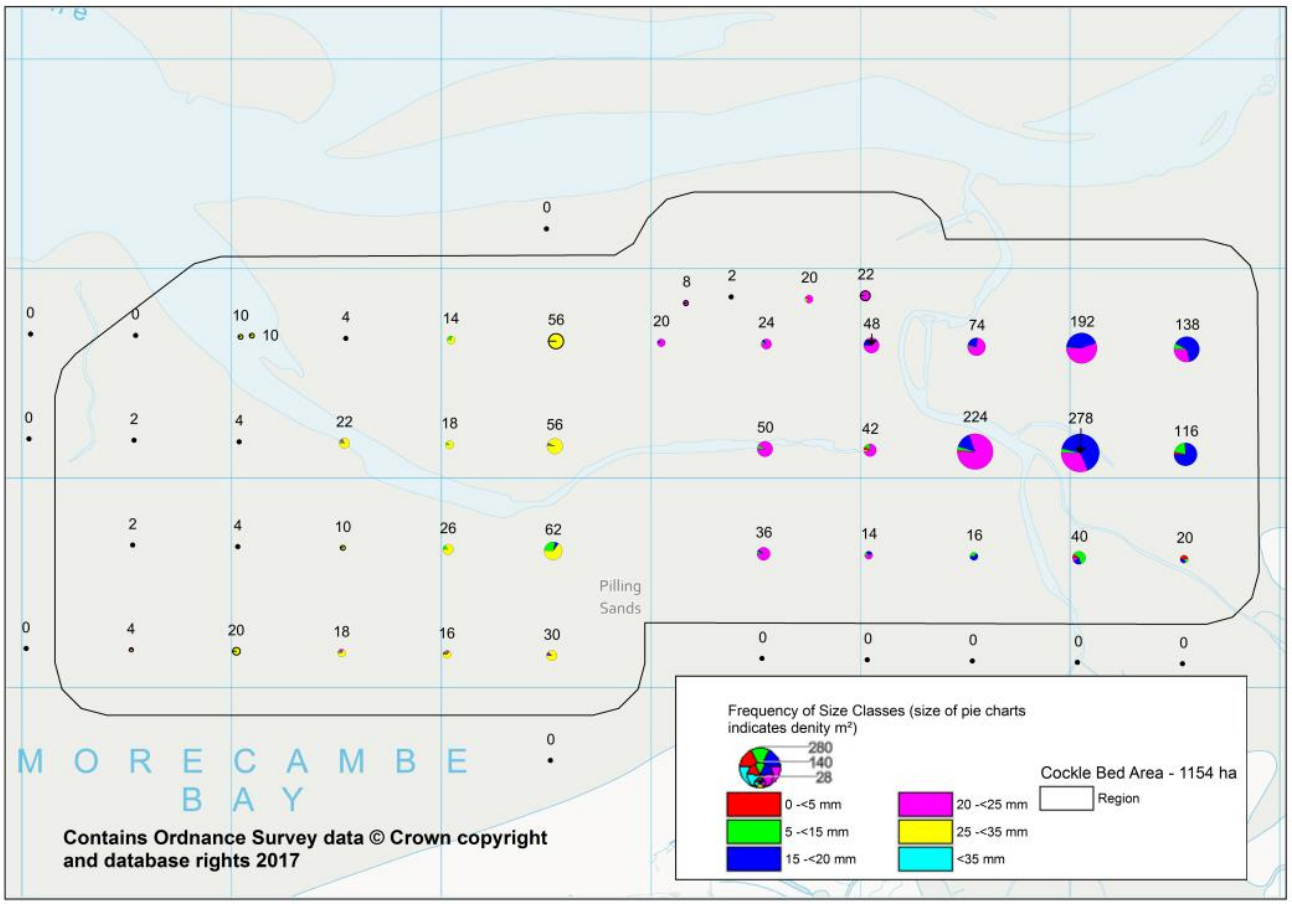
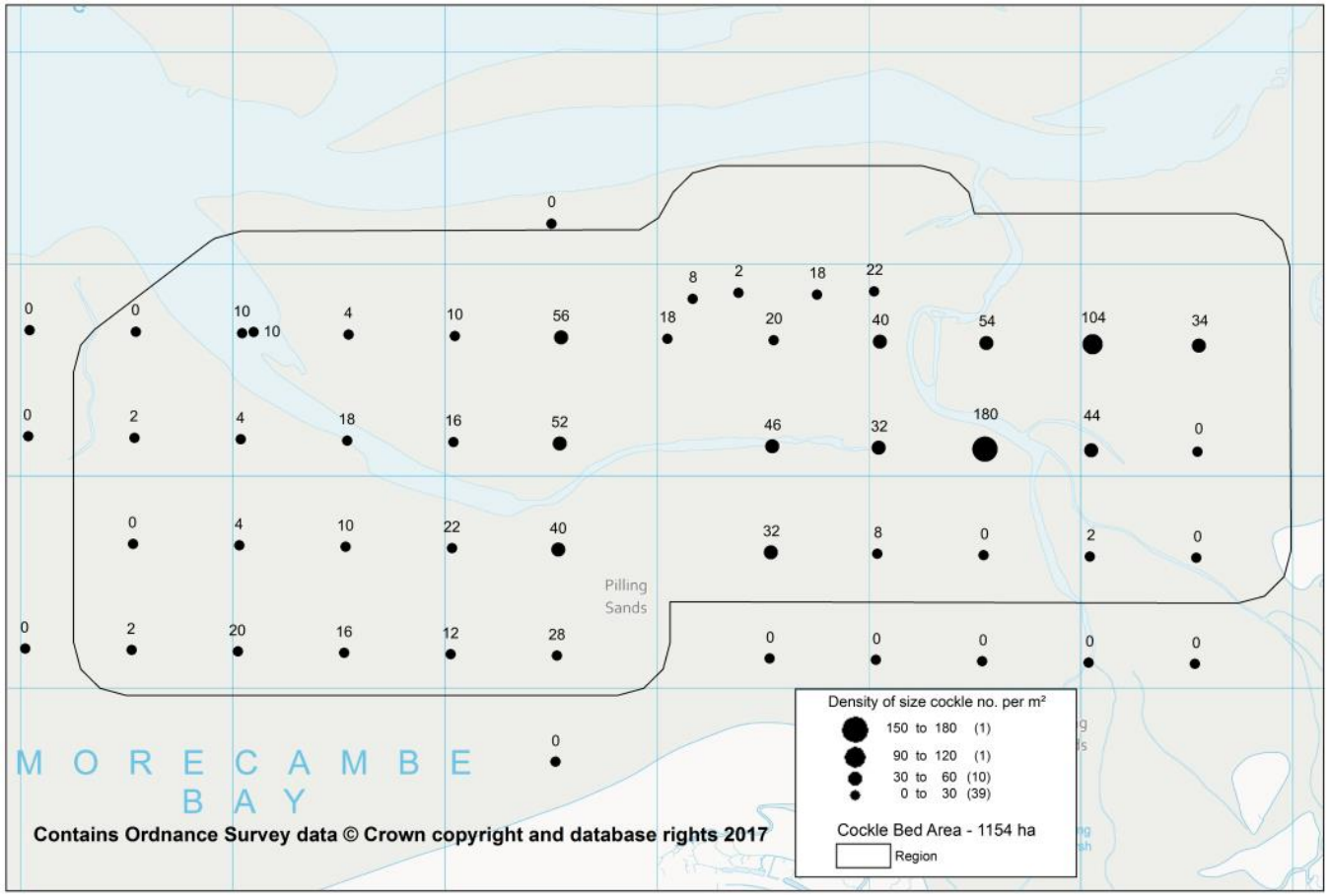

0
0 0 10 10 4 14 56
8 2 20 22
20 24 48 74 192 138
0 2 4 22 18 56
50 42 224 278 116
2 4 10 26 62
36 14 16 40 20
Pilling Sands
0 4 20 18 16 30
0 0 0 0 0
0
M O R E C A M B E B A Y
Contains Ordnance Survey data © Crown copyright and database rights 2017
Frequency of Size Classes (size of pie charts indicates denity m²)
280
140
28
0 -<5 mm
5 -<15 mm
15 -<20 mm
20 -<25 mm
25 -<35 mm
<35 mm
Cockle Bed Area - 1154 ha
Region


Pilling Sands
MORECAMBE BAY
Density of size cockle no. per m²
150 to 180 (1)
90 to 120 (1)
30 to 60 (10)
0 to 30 (39)
Cockle Bed Area - 1154 ha
Region
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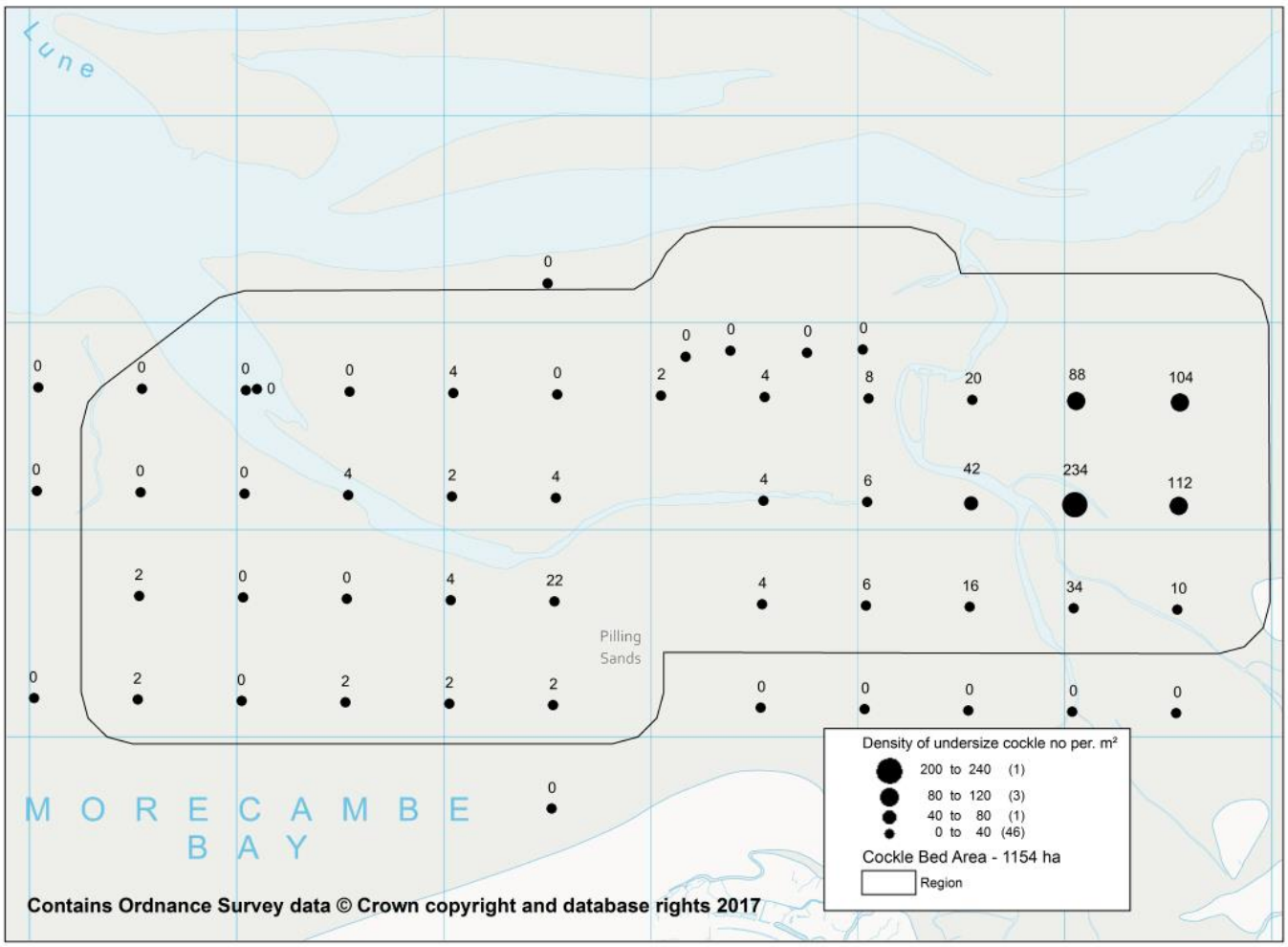
Lune
Pilling Sands
MORECAMBE BAY
Density of undersize cockle no per. m²
200 to 240 (1)
80 to 120 (3)
40 to 80 (1)
0 to 40 (46)
Cockle Bed Area - 1154 ha
Region
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4. Warton Sands Cockle Survey 22-03-18 - 1.5m tide

48 survey stations we sampled using a jumbo and 0.5m² quadrat. Very little stock present on Warton Sands with 26 station with no cockle present and only 9 stations with size cockle ranging between 2 -10m². Most stations had a small amount of 4-8mm spat present but not in any significant density.

Across the bed there was a notable density of Macoma and small polychaete worms present when jumbo-ing.

Priest skear was inspected and very little other than barnacled covered rocks were observed, no mussel was observed and very few periwinkles.

5. Flookburgh Cockle Survey 21-02-18

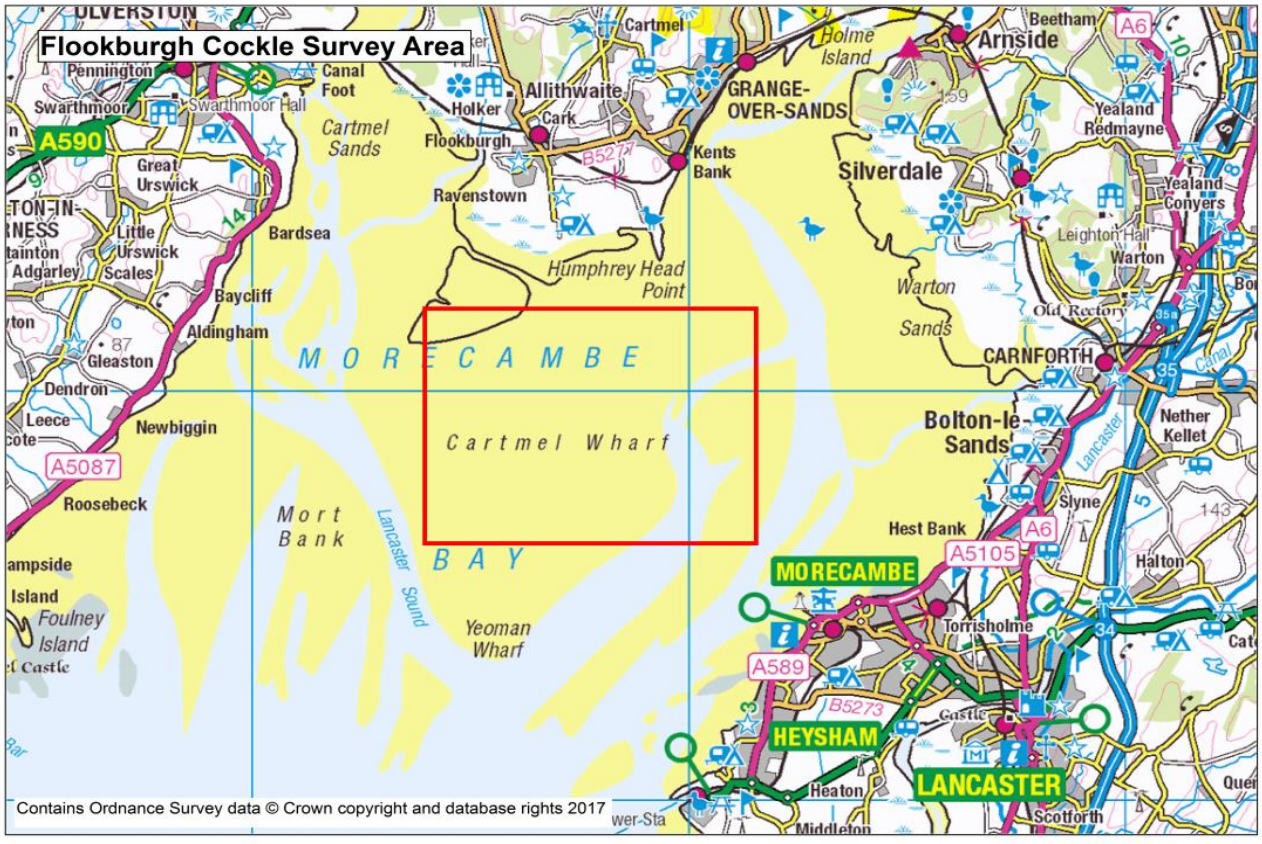
Tides - LW 08:53 1.9m (Liverpool tides). Survey method – Jumbo and 0.5m^2 quadrat

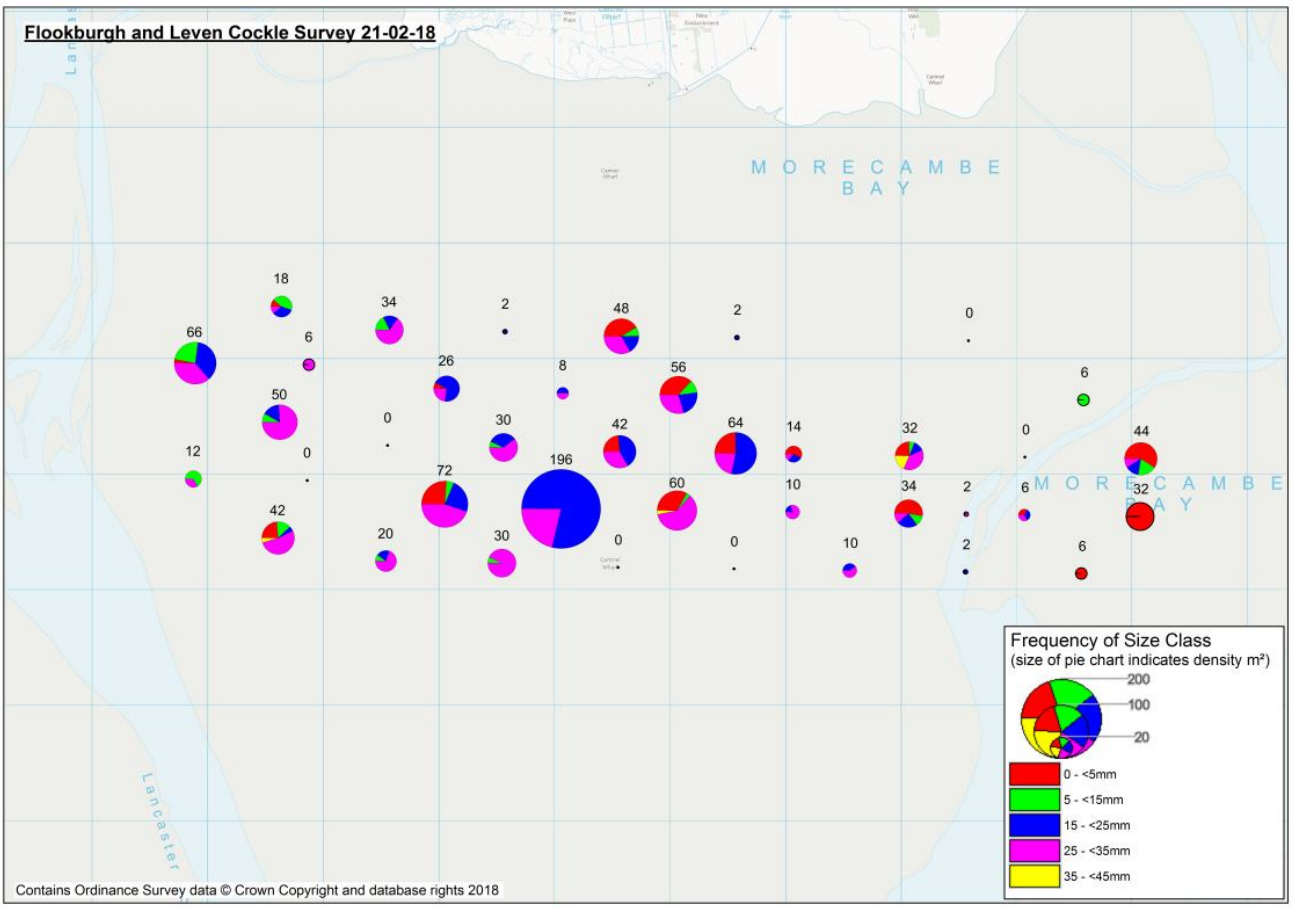
The survey area was defined as the general location of the majority of fishing since the bed opened in September with the purpose of checking the density of cockles following the highest intensity of fishing. 39 stations were sampled from a 500m grid. It was clear that there is still a concentration of cockle where the permit holders are working, with cockles being in a small band where they are highly concentrated (200m² plus). Stations covered by the survey sampling were not representative of this area but results show the densities remaining in the areas outside the band.

Mean number of size cockle: 15 per m² (min. 0, max 104)

Mean number of undersize cockle: 16 per m² (min 0, max 92)

No estimates of biomass have been calculated as only part of the bed has been surveyed.




Flookburgh and Leven Cockle Survey 21-02-18
MORECAMBE BAY
Frequency of Size Class
(size of pie chart indicates density m²)
200
100
20
0 - <5mm
5 - <15mm
15 - <25mm
25 - <35mm
35 - <45mm
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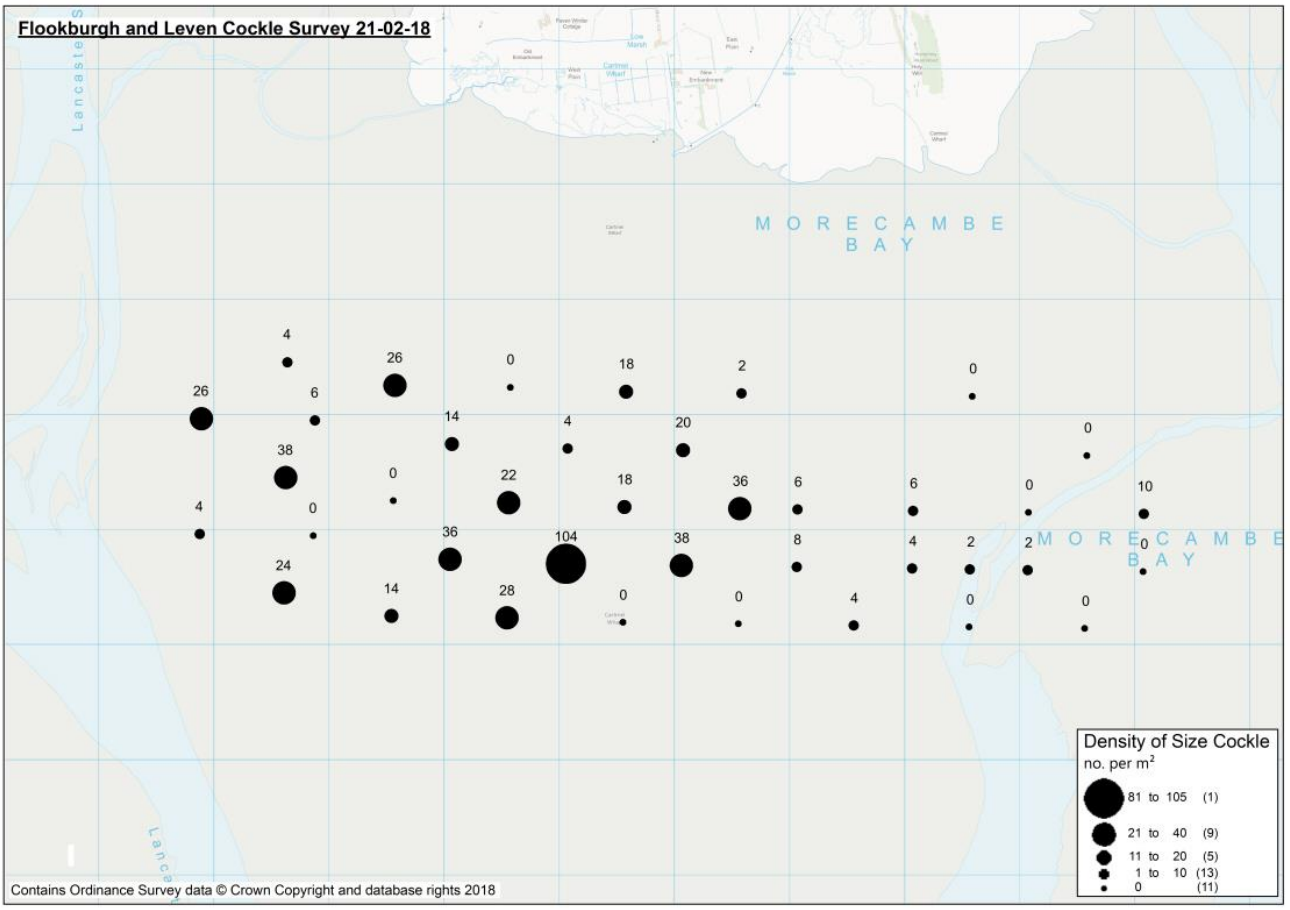
Flookburgh and Leven Cockle Survey 21-02-18
MORECAMBE BAY
Density of Size Cockle
no. per m²
81 to 105 (1)
21 to 40 (9)
11 to 20 (5)
1 to 10 (13)
0 (11)
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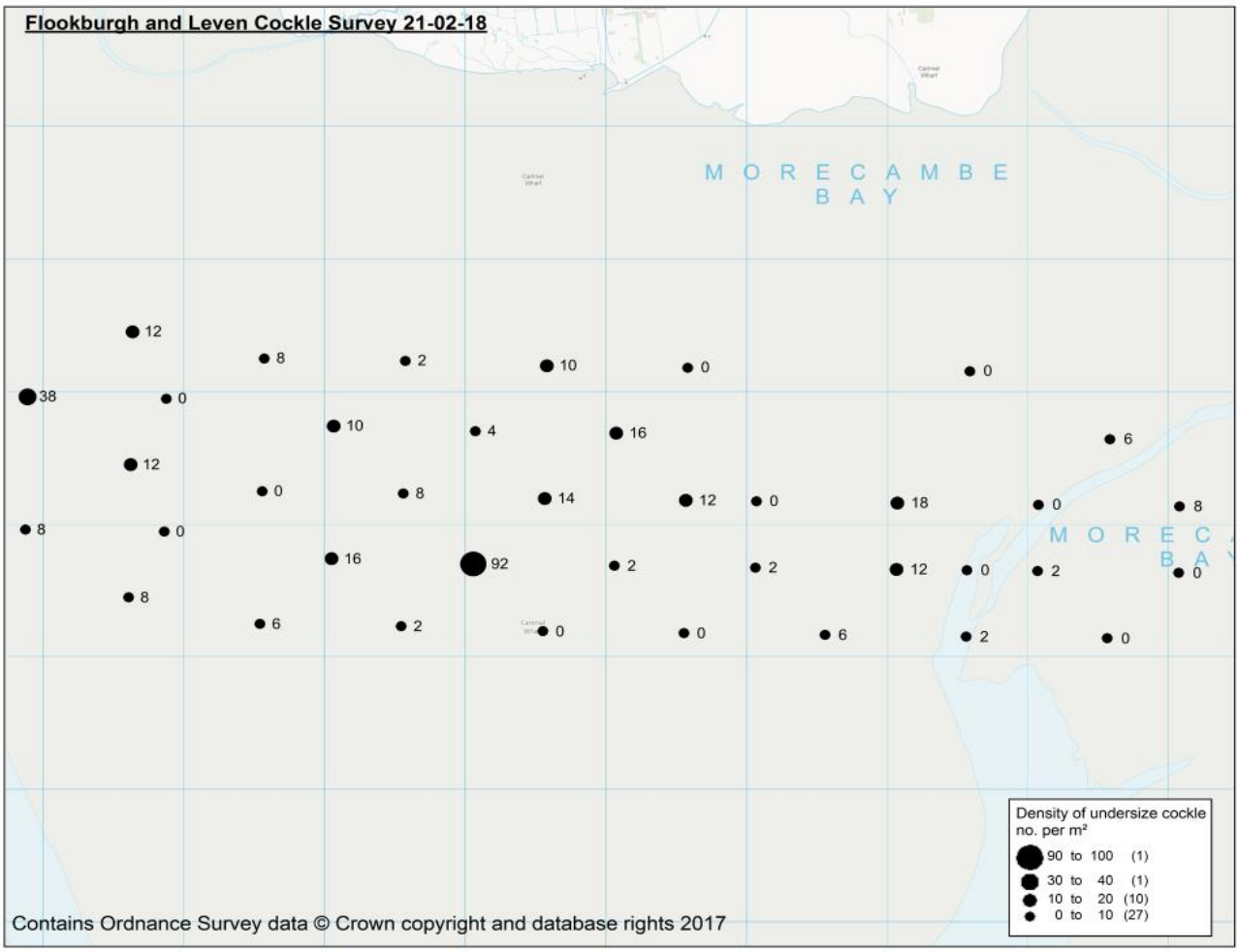


6. Newbiggin Cockle Survey 17/04/18 0.9m (Liverpool Tides).

Survey method - Jumbo and 0.5m^2 quadrat.

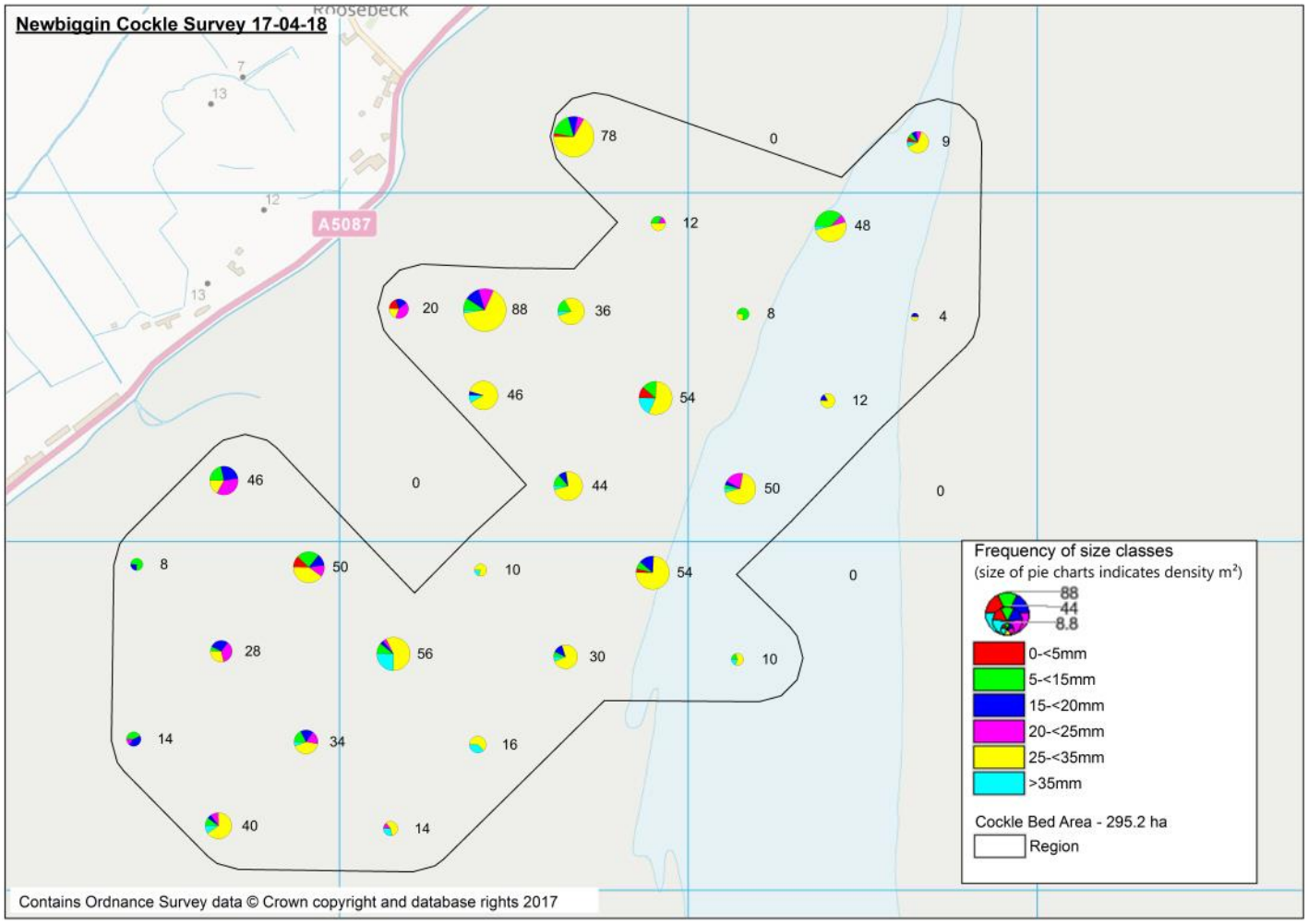
31 stations were sampled from the 500m grid with an extra station added between points where a high density of cockles was reported to officers. Size cockle were located throughout the bed, excluding 5 stations with no presence of sized cockle, with 16 stations containing cockles in the size category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

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.

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

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

Total bed area: 295.2 ha.


Newbiggin Cockle Survey 17-04-18
A5087
78
0
9
12
48
20
88
36
8
4
46
54
12
46
0
44
50
0
8
50
10
54
0
28
56
30
10
14
34
16
40
14
Frequency of size classes
(size of pie charts indicates density m²)
88
44
8.8
0-<5mm
5-<15mm
15-<20mm
20-<25mm
25-<35mm
>35mm
Cockle Bed Area - 295.2 ha
Region
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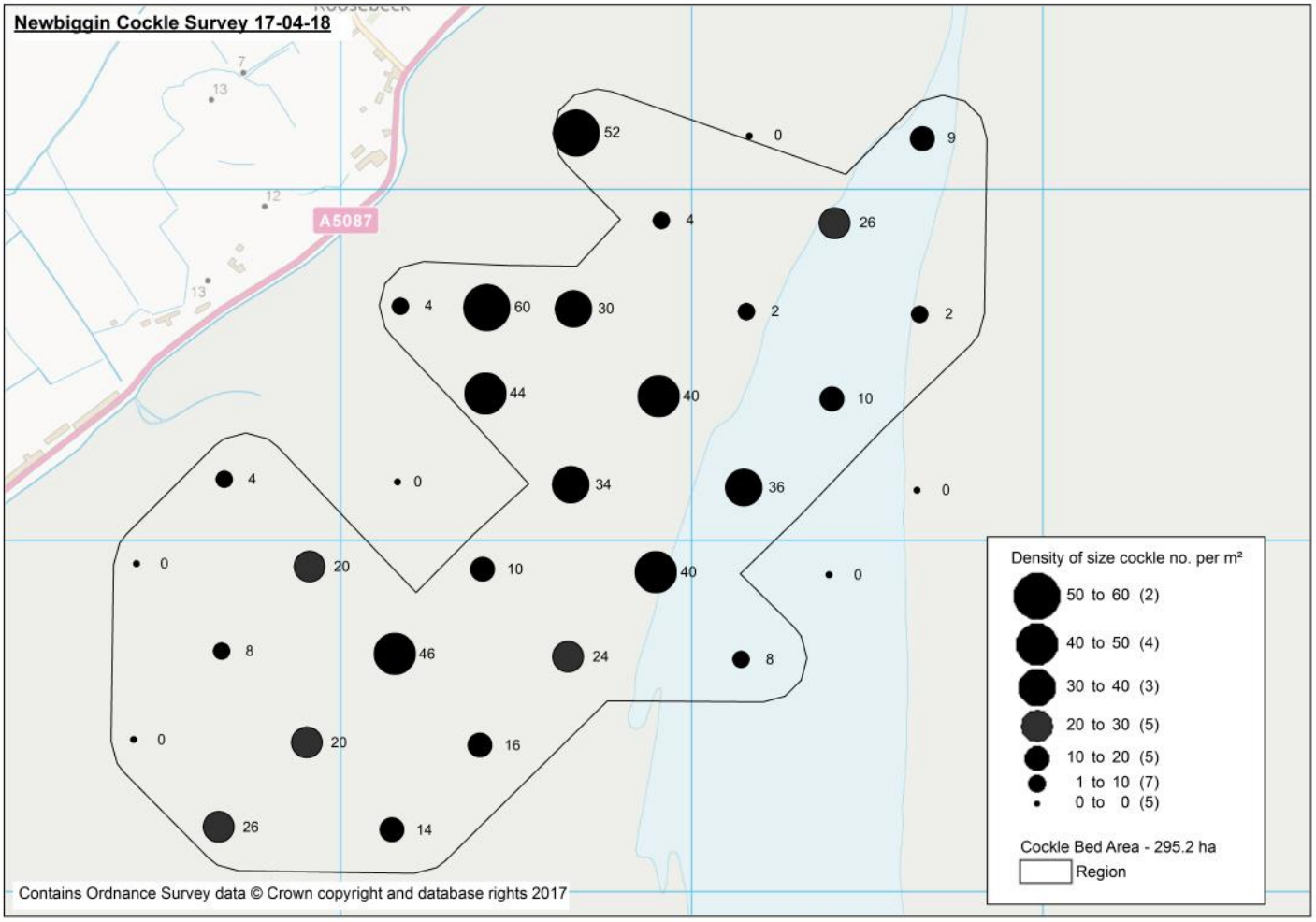
Newbiggin Cockle Survey 17-04-18
A5087
52
0
9
4
26
4
60
30
2
2
44
40
10
4
0
34
36
0
0
20
10
40
0
8
46
24
8
0
20
16
26
14
Density of size cockle no. per m²
50 to 60 (2)
40 to 50 (4)
30 to 40 (3)
20 to 30 (5)
10 to 20 (5)
1 to 10 (7)
0 to 0 (5)
Cockle Bed Area - 295.2 ha
Region
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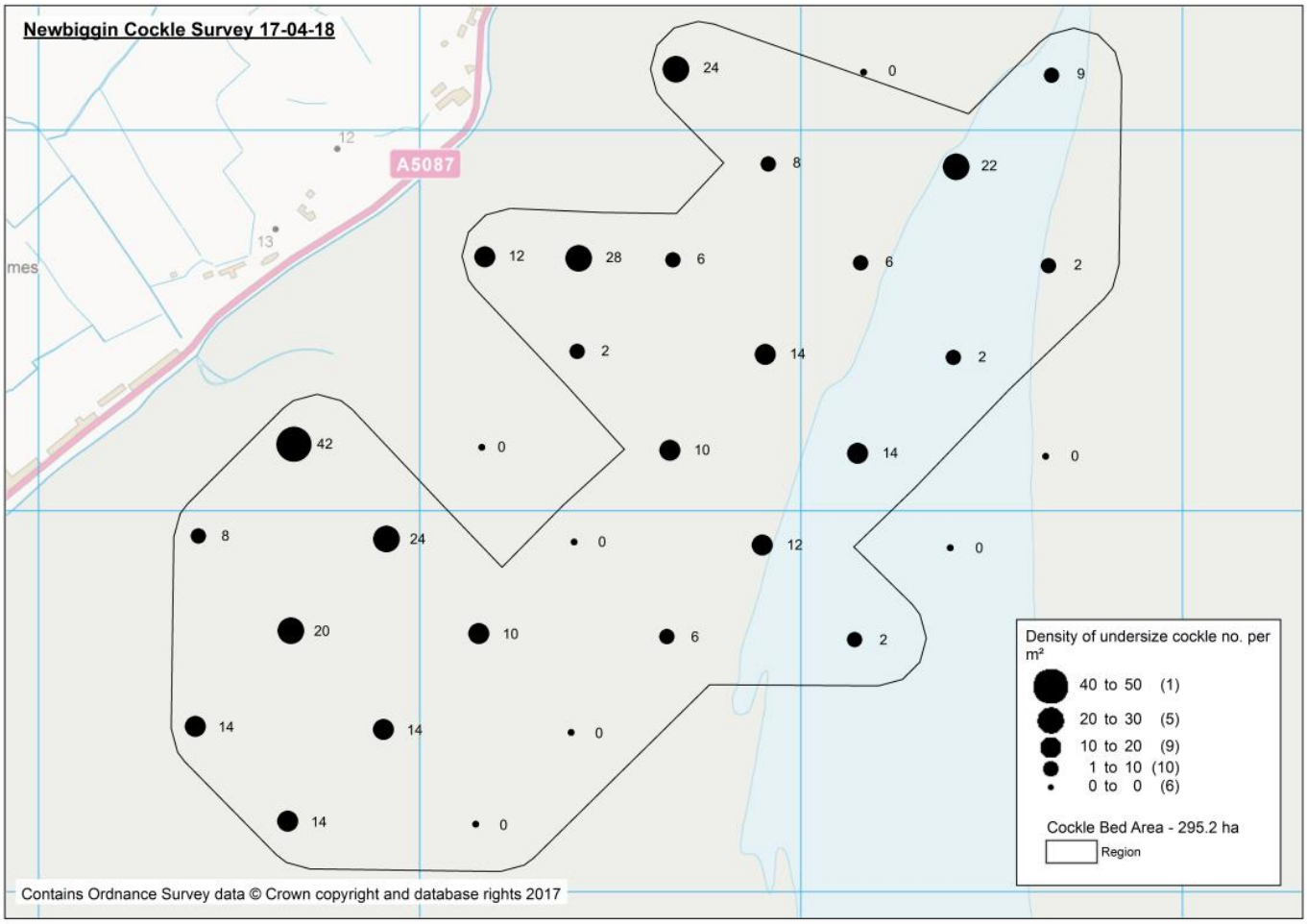
Newbiggin Cockle Survey 17-04-18
A5087
12
13
mes
24
0
9
8
22
12
28
6
6
2
2
14
2
42
0
10
14
0
8
24
0
12
0
20
10
6
2
14
14
0
14
0
Density of undersize cockle no. per m²
40 to 50 (1)
20 to 30 (5)
10 to 20 (9)
1 to 10 (10)
0 to 0 (6)
Cockle Bed Area - 295.2 ha
Region
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MUSSELS:

1. **Heysham Flat Mussel Inspection 03-04-18**

Inspections have been carried out on 5th January, 6th March and 3rd April. The most recent is reported.

Tides: LW 08:26 1m (BST) (Liverpool tides).

There is now evidence of a settlement of mussel spat from midway down the skear to Dallam Dyke on most of the substrates. Some live mussel around 30mm was observed from the previous year's settlement in small bands towards the end of the skear.

There was very little *Sabellaria alveolata* live or dead present on the main skear, the only areas are to the north of the main skear and along the edge of Dallam Dyke. Where the Sabellaria is present on the main skear there is evidence it has had a covering of mussel spat. The main area of live Sabellaria is off the main skear to the north as mapped in previous surveys. It is in good condition and with little to no mussel spat currently present.

Groups of oystercatchers and herring gulls were observed throughout the skear and it is believed that they are feeding on last year's mussels as there is evidence of broken shell. As a point of interest an individual plumose anemone (subtidal anemone) was found in a pool and has been photographed.

It was not possible to cross Dallam Dyke as the water did not ebb off enough, and it seems as if the channel has deepened in the middle making Knott End skear less accessible.

Evidence of pinprick mussel spat settlement can be seen in the above image on the remaining *S. alevolata*.

S. alveolata in the northern parts of the bed (with little to no mussel spat settlement present).

The extent of the *S. alveolata* in the northern region with little to no mussel spat.

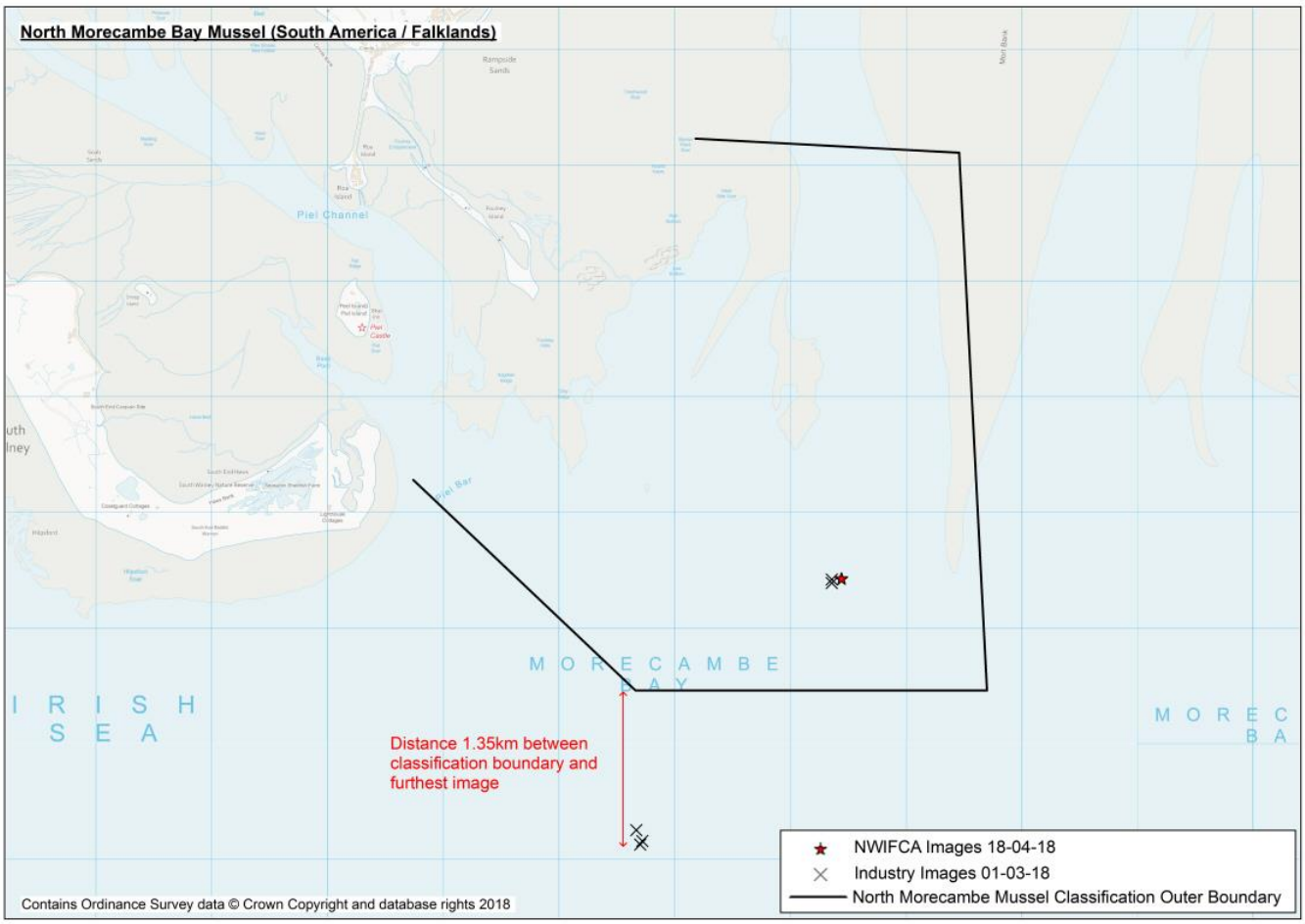
Plumose anemone located to the north eastern edge of the flat (Waypoint 5).

2. South America Mussel Inspection (Quad) 18/04/18 (0.9m tide). Plus images provided by Industry of Falklands and South America on the 01/03/18

Officers inspected South America by quad on the 18/04/18. Although officers got on to the area of mussel on the South America bed, there was only a limited amount of time due to the tide and the area did not uncover completely. Georeferenced images from industry have been included in the report below from South America and the Falklands.

The main area of mussel on South America mussel bed is 35-45mm with some size mussel present. The mussels are on a sandy substrate and appear to be in bands forming ridges. In between some of the ridges, the underlying hard substrate (cobbles) is exposed. The sand ridges with mussel on top are approximately 0.5m high. The mussel on the ridges is relatively loose but has persisted through the winter. There are small quantities of spat mixed in with this mussel on the sand ridges. Around the northern edge of the bed the mussel appears to be more stable using dead cockle shell to bind together with byssus threads (images below). Moving off of the main areas of 35-45mm mussel the spat becomes more abundant and persistent with some evidence of *Sabellaria alveolata* tubes (image below). The *Sabellaria alveolata* tubes are unlikely to persist due to the high volume of mussel spat on them. It was notable that there was a lack of starfish on the bed.

For information images from the Falklands are provided below and a map which indicates the locations of where NWIFCA images and georeferenced industry images have been taken from. The maps also show the outer boundary of the North Morecambe Bay mussel classification zone for shellfish hygiene purposes.



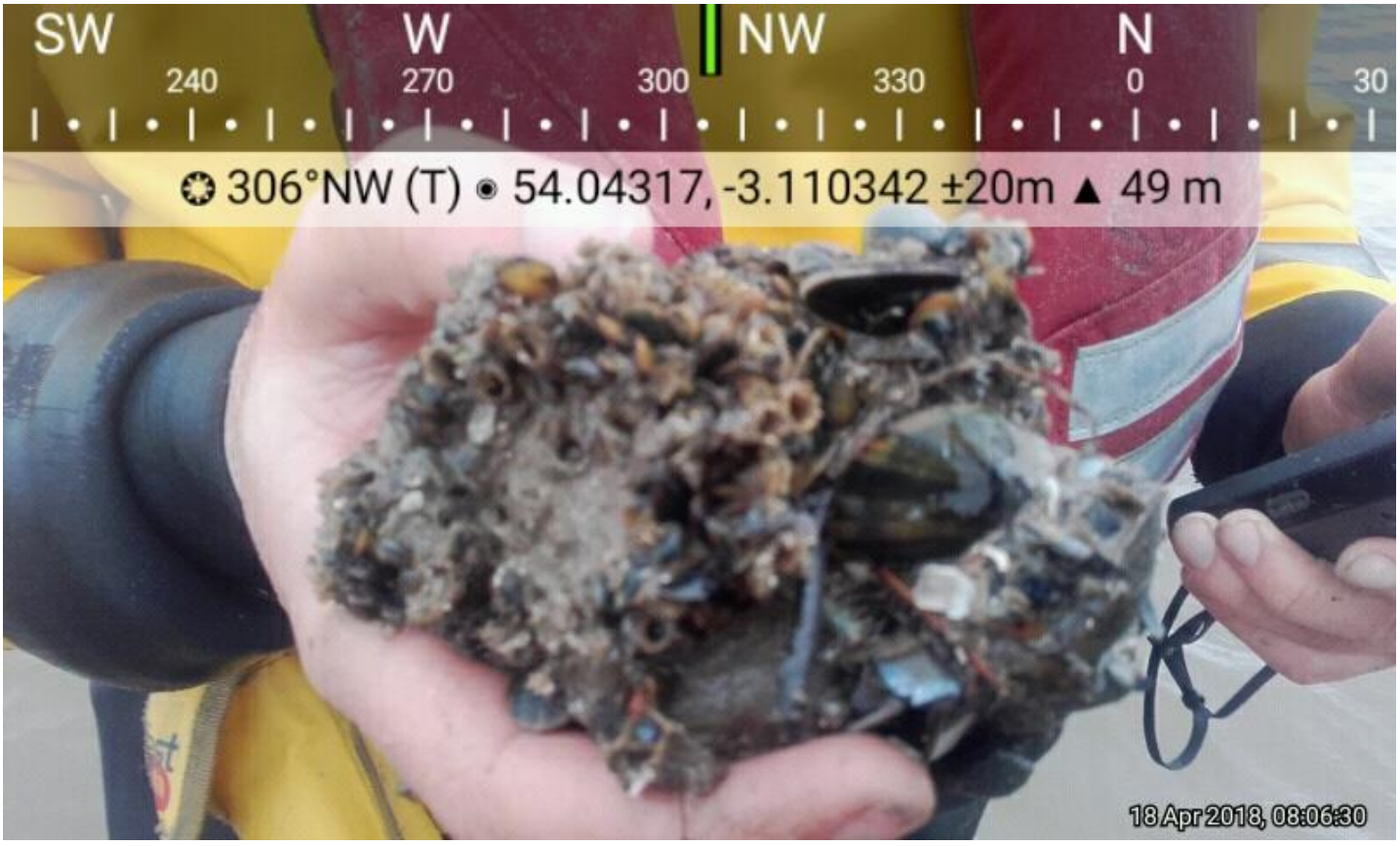
NWIFCA Image of South America 18.04.18

NWIFCA Image of South America 18.04.18

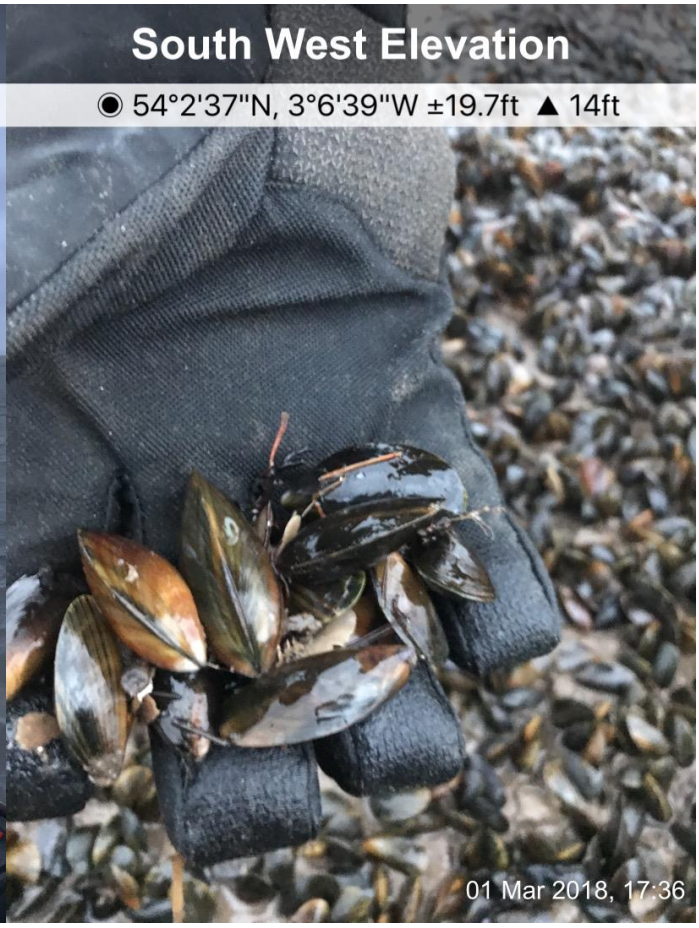
NWIFCA Image of South America 18.04.18. 35-45mm mussel mixed with spat

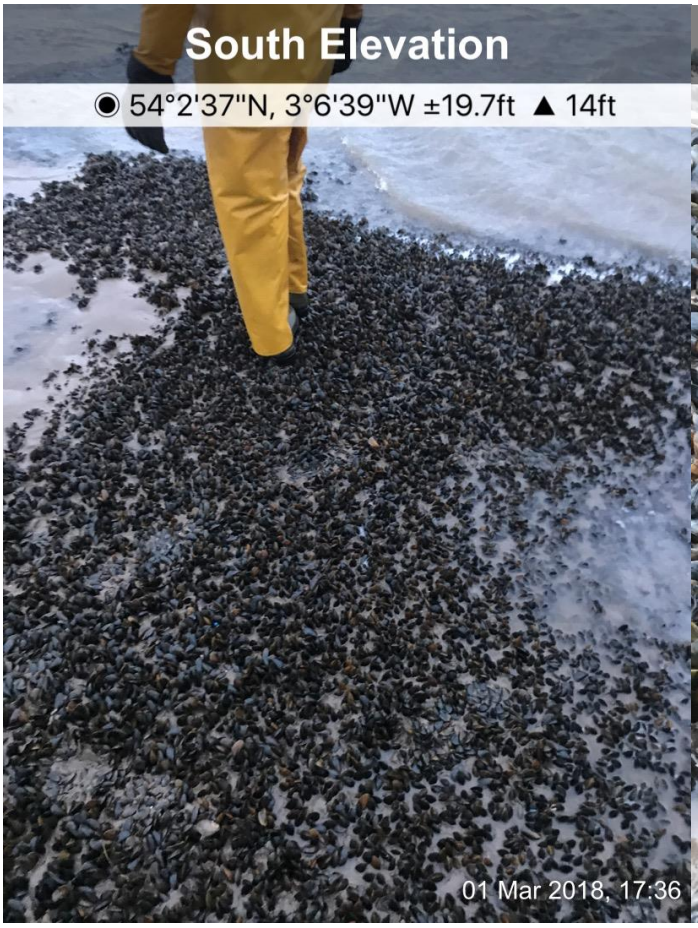
NWIFCA Image of South America 18.04.18. Northern area of mussel attached to cockle shell

NWIFCA Image of South America 18.04.18. Area of spat (mixed sizes) off of the main mussel area

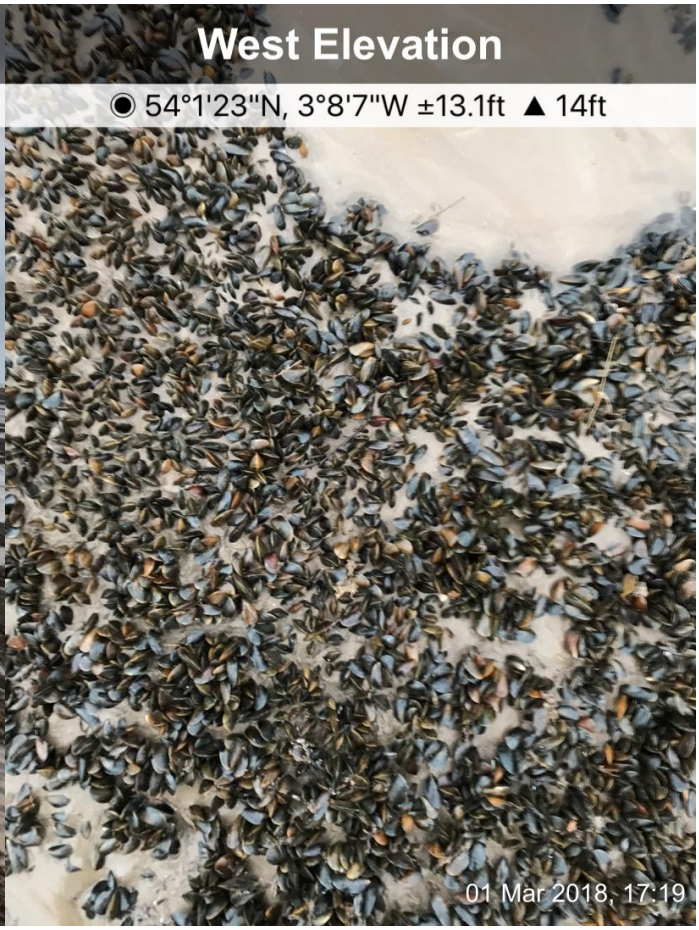


NWIFCA Image of South America 18.04.18. Presence of *Sabellaria alveolata* tubes and spat





Images Provided by Industry 01-03-18 of South America



Images Provided by Industry 01-03-18 of the Falklands

3. Low Bottom Mussel Inspection 19/04/18 - 1.0m (Liverpool Tides).

Officers split into two groups and walked transects across the bed covering the full extent of the bed area between the main Foulney Skear 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.

Much of the area towards the oyster frames has had a good settlement of mussel spat, with it being present on most cobble, dead shell and mixed in with the remaining live mussels. Moving south west towards the main Foulney skear the amount of spat decreases 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 is typical 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 are small patchy areas of size mussel surrounded by scoured / bare areas. Moving along the low water line north east towards the oyster frames, there is an area of bare ground around 200m wide running along the water line which is very sparse of mussel moving back to the area of spat near the oyster frames.

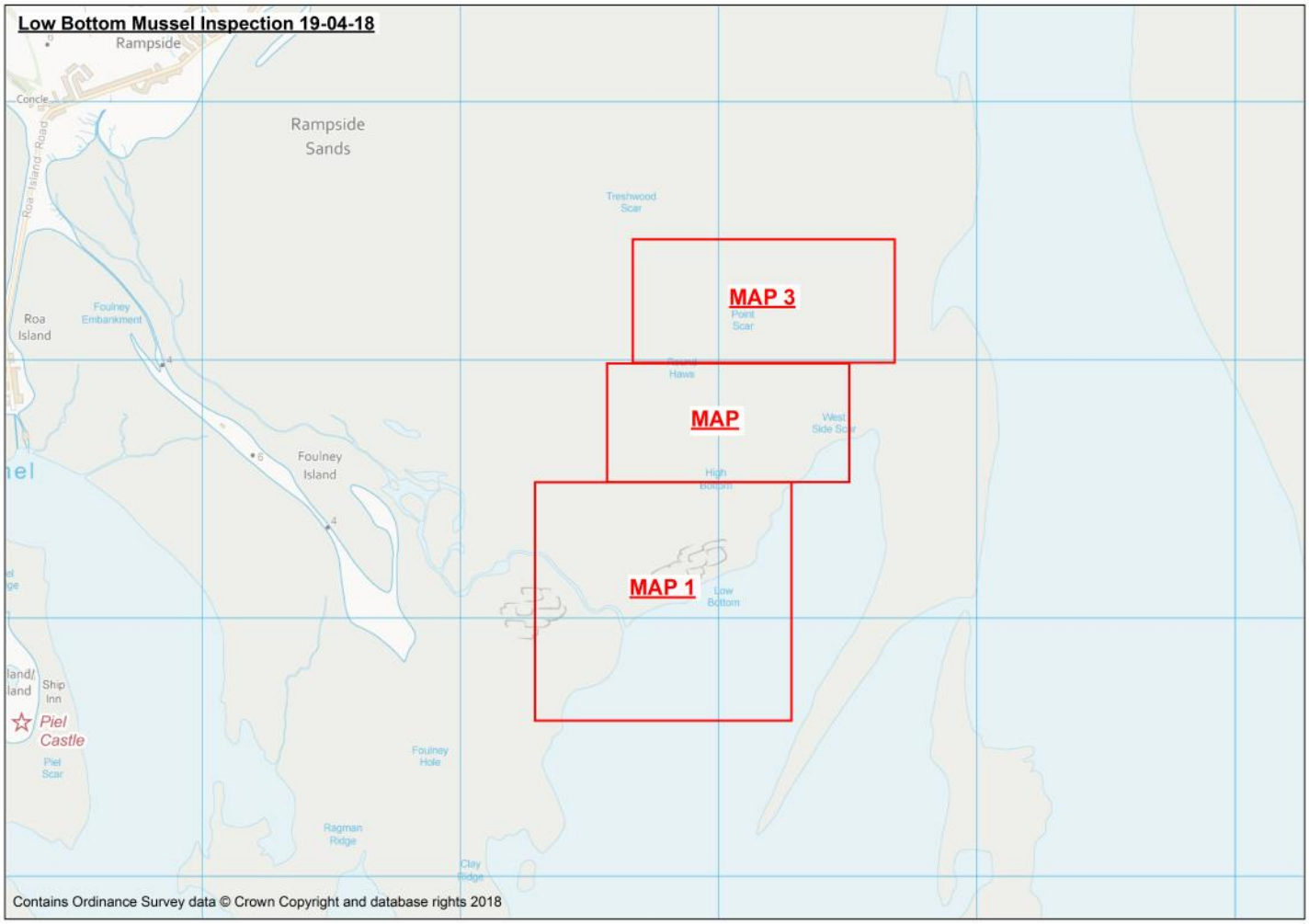
Three samples of mussels were collected: one from an area that does not normally reach size higher up the shore, one from an area where the mussel looks older, more rounded and potentially stunted, and one from an area of larger size mussel in the hollow at the bottom of the Ditch area (sample sites 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 as shown in the images below.

Sample 3: consists of large mussel 55-60mm which had very little fouling from barnacles.

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 19-04-18
Rampside
Rampside Sands
Roa Island
Foulney Island
Piel Castle
Ship Inn
Treshwood Scar
Point Scar
West Side Scar
High Bottom
Low Bottom
Foulney Hole
Ragman Ridge
Clay Ridge
MAP 3
MAP
MAP 1
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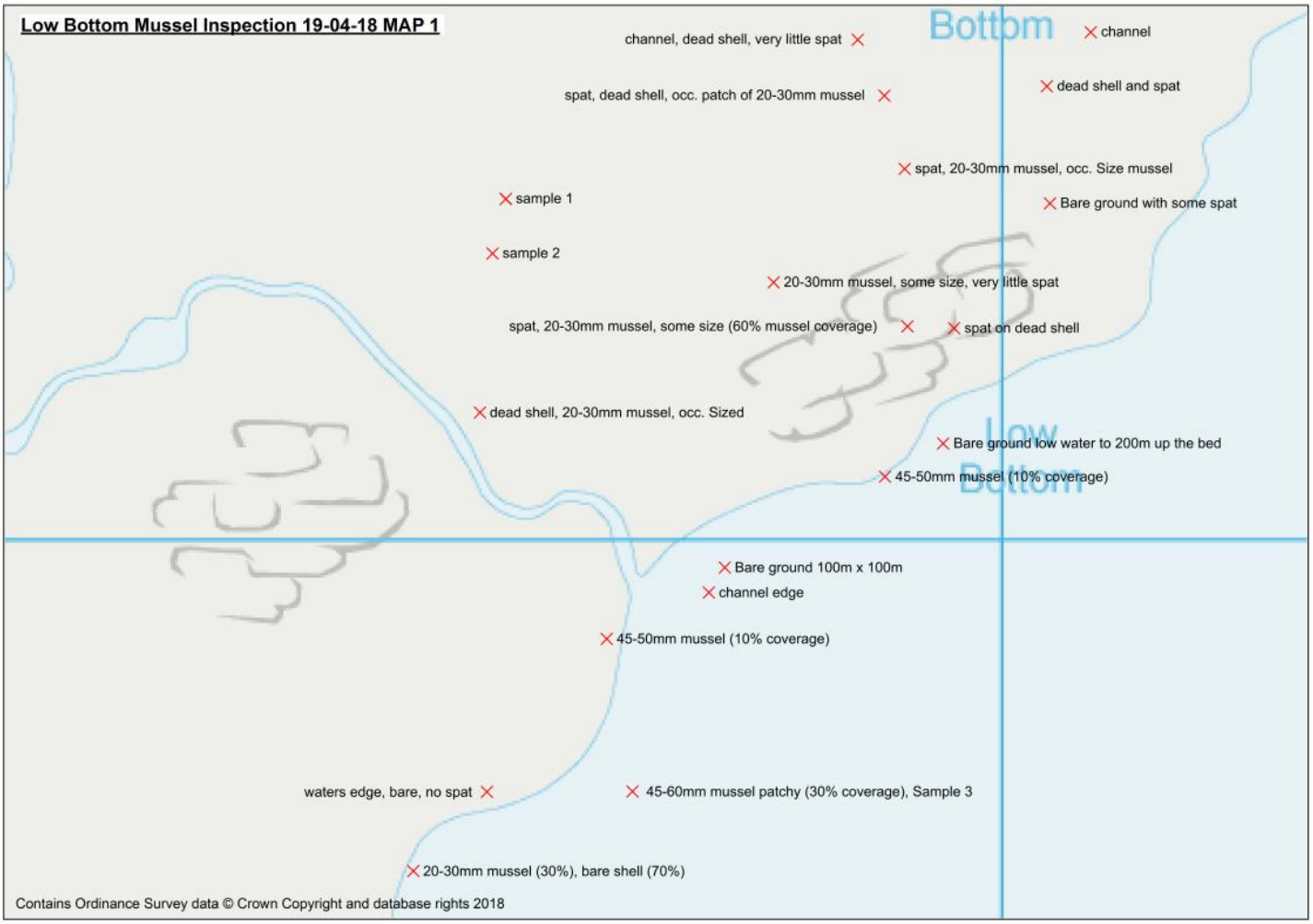
Low Bottom Mussel Inspection 19-04-18 MAP 1
channel, dead shell, very little spat
channel
spat, dead shell, occ. patch of 20-30mm mussel
dead shell and spat
spat, 20-30mm mussel, occ. Size mussel
sample 1
Bare ground with some spat
sample 2
20-30mm mussel, some size, very little spat
spat, 20-30mm mussel, some size (60% mussel coverage)
spat on dead shell
dead shell, 20-30mm mussel, occ. Sized
Bare ground low water to 200m up the bed
45-50mm mussel (10% coverage)
Bare ground 100m x 100m
channel edge
45-50mm mussel (10% coverage)
waters edge, bare, no spat
45-60mm mussel patchy (30% coverage), Sample 3
20-30mm mussel (30%), bare shell (70%)
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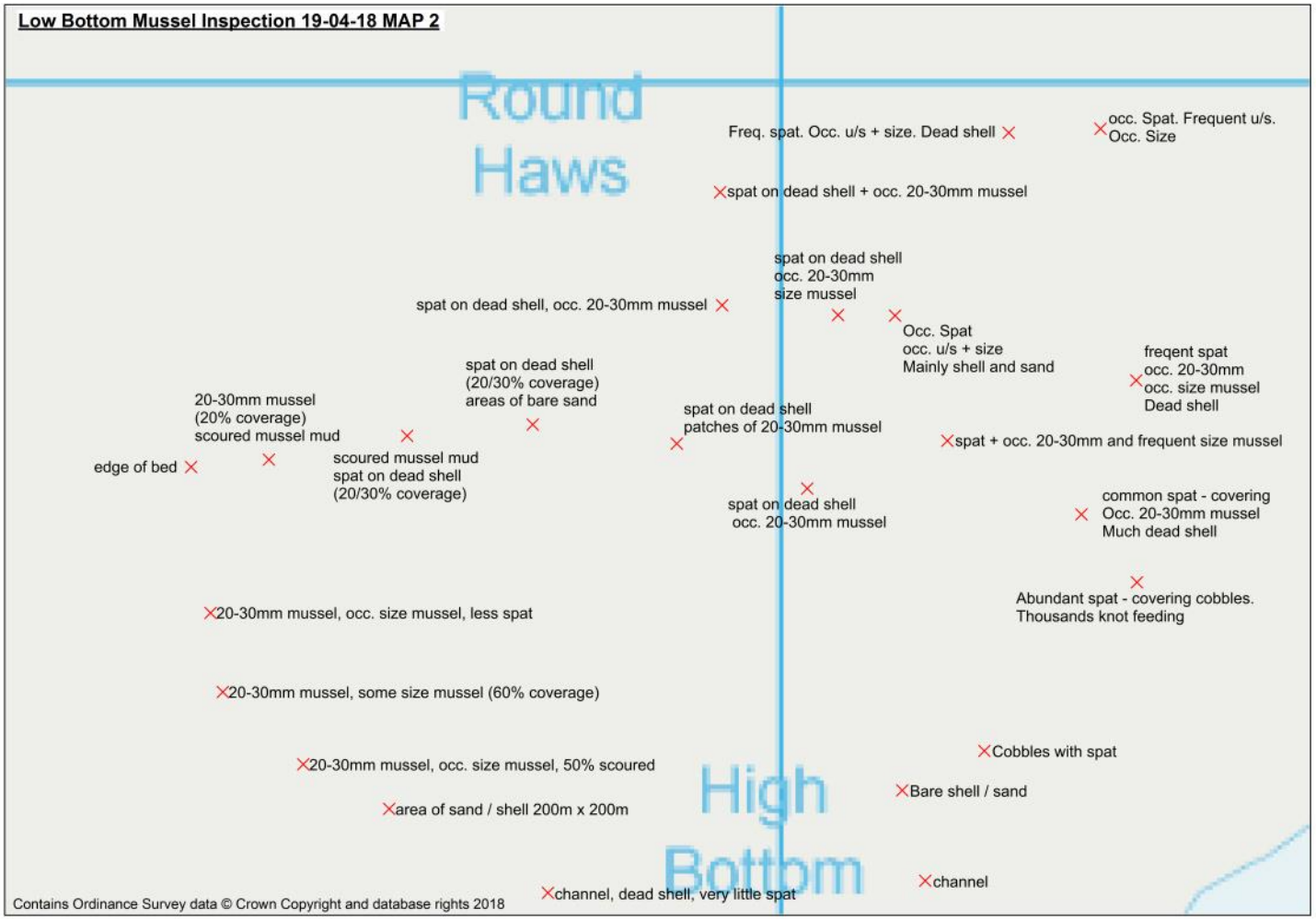
Low Bottom Mussel Inspection 19-04-18 MAP 2
Round
Haws
Freq. spat. Occ. u/s + size. Dead shell
occ. Spat. Frequent u/s.
Occ. Size
spat on dead shell + occ. 20-30mm mussel
spat on dead shell
occ. 20-30mm
size mussel
spat on dead shell, occ. 20-30mm mussel
Occ. Spat
occ. u/s + size
Mainly shell and sand
freqent spat
occ. 20-30mm
occ. size mussel
Dead shell
spat on dead shell
(20/30% coverage)
areas of bare sand
20-30mm mussel
(20% coverage)
scoured mussel mud
spat on dead shell
patches of 20-30mm mussel
spat + occ. 20-30mm and frequent size mussel
edge of bed
scoured mussel mud
spat on dead shell
(20/30% coverage)
spat on dead shell
occ. 20-30mm mussel
common spat - covering
Occ. 20-30mm mussel
Much dead shell
Abundant spat - covering cobbles.
Thousands knot feeding
20-30mm mussel, occ. size mussel, less spat
20-30mm mussel, some size mussel (60% coverage)
Cobbles with spat
20-30mm mussel, occ. size mussel, 50% scoured
Bare shell / sand
area of sand / shell 200m x 200m
High
Bottom
channel
channel, dead shell, very little spat
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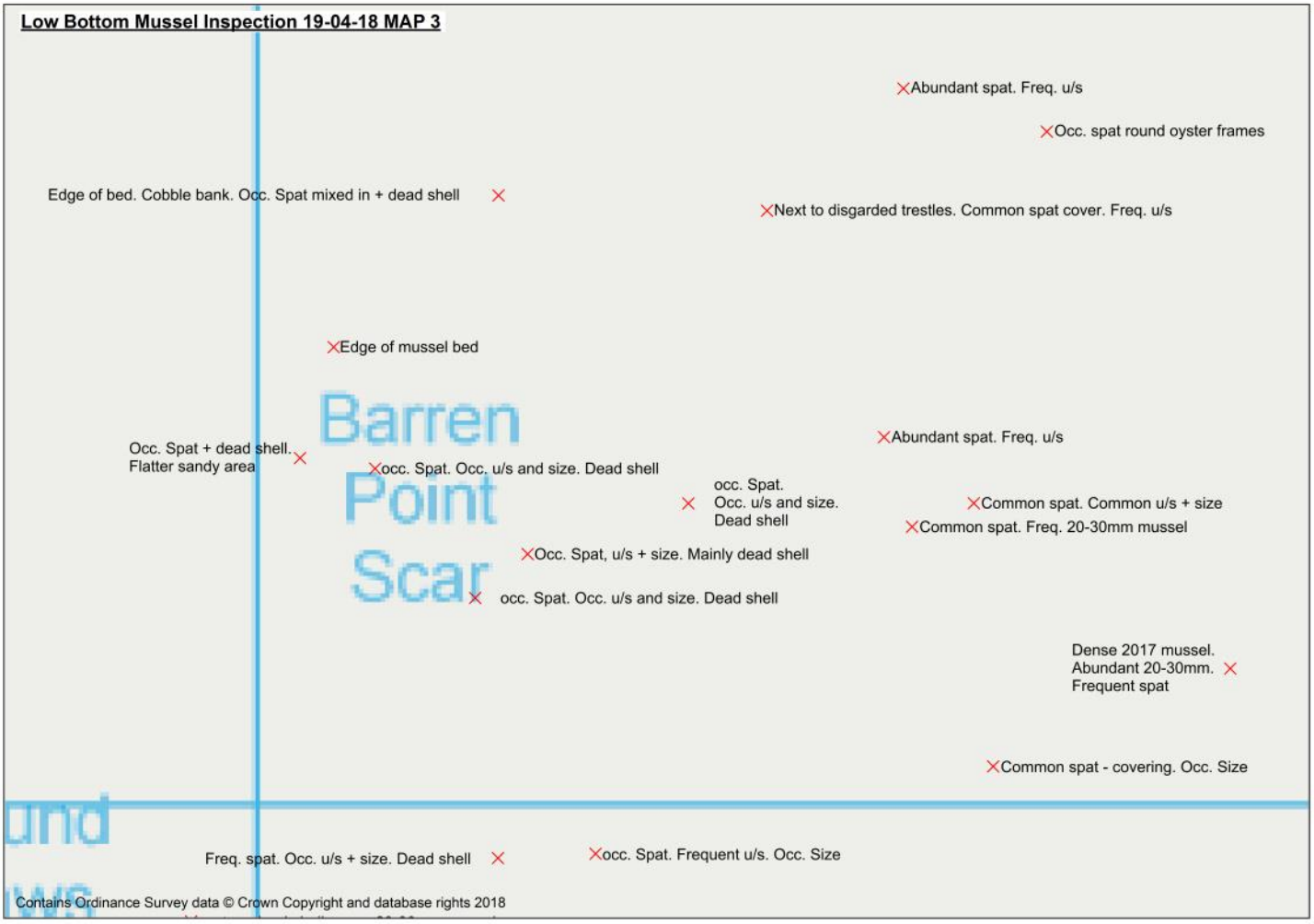
Low Bottom Mussel Inspection 19-04-18 MAP 3
Abundant spat. Freq. u/s
Occ. spat round oyster frames
Edge of bed. Cobble bank. Occ. Spat mixed in + dead shell
Next to disgarded trestles. Common spat cover. Freq. u/s
Edge of mussel bed
Barren
Point
Scar
Occ. Spat + dead shell.
Flatter sandy area
occ. Spat. Occ. u/s and size. Dead shell
Abundant spat. Freq. u/s
occ. Spat.
Occ. u/s and size.
Dead shell
Common spat. Common u/s + size
Common spat. Freq. 20-30mm mussel
Occ. Spat, u/s + size. Mainly dead shell
occ. Spat. Occ. u/s and size. Dead shell
Dense 2017 mussel.
Abundant 20-30mm.
Frequent spat
Common spat - covering. Occ. Size
Freq. spat. Occ. u/s + size. Dead shell
occ. Spat. Frequent u/s. Occ. Size
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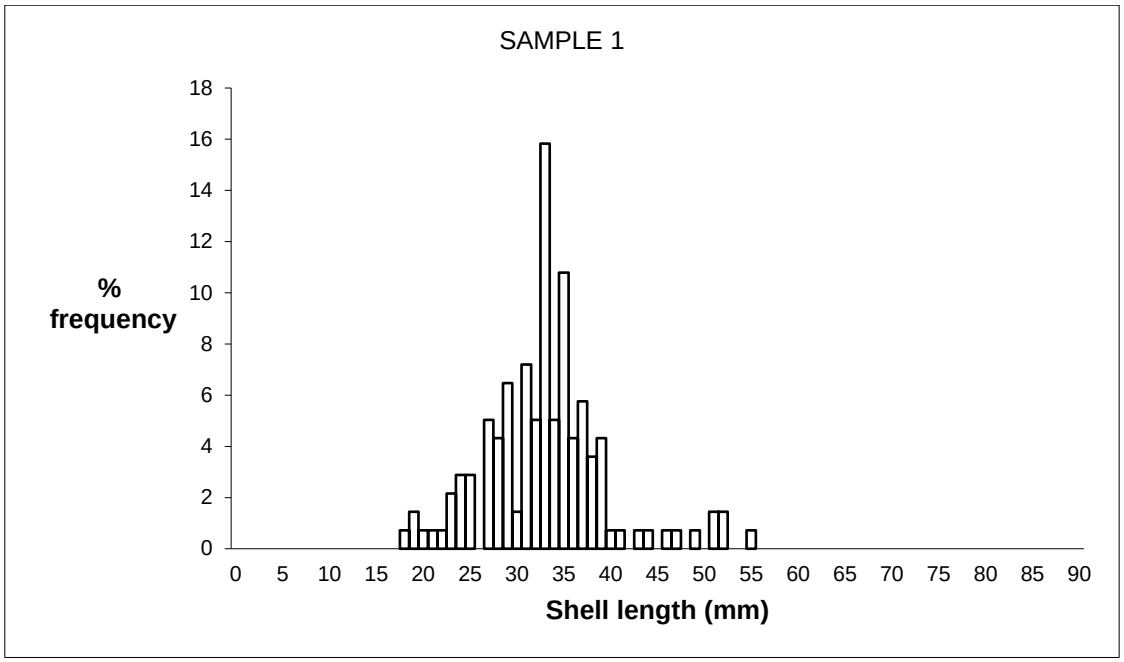
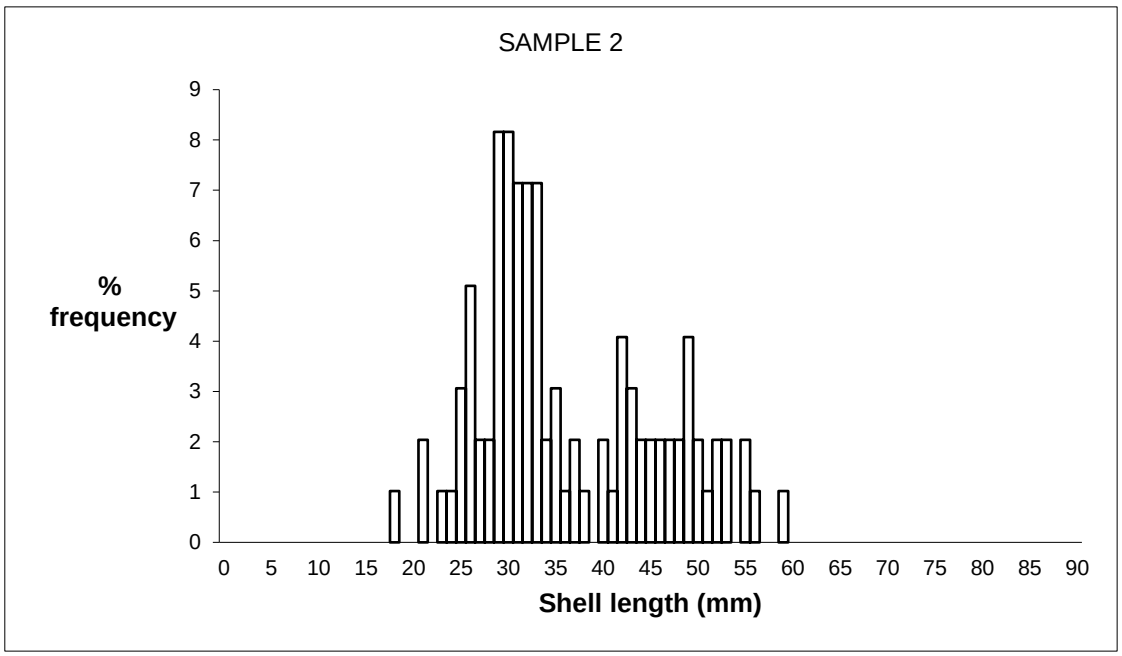
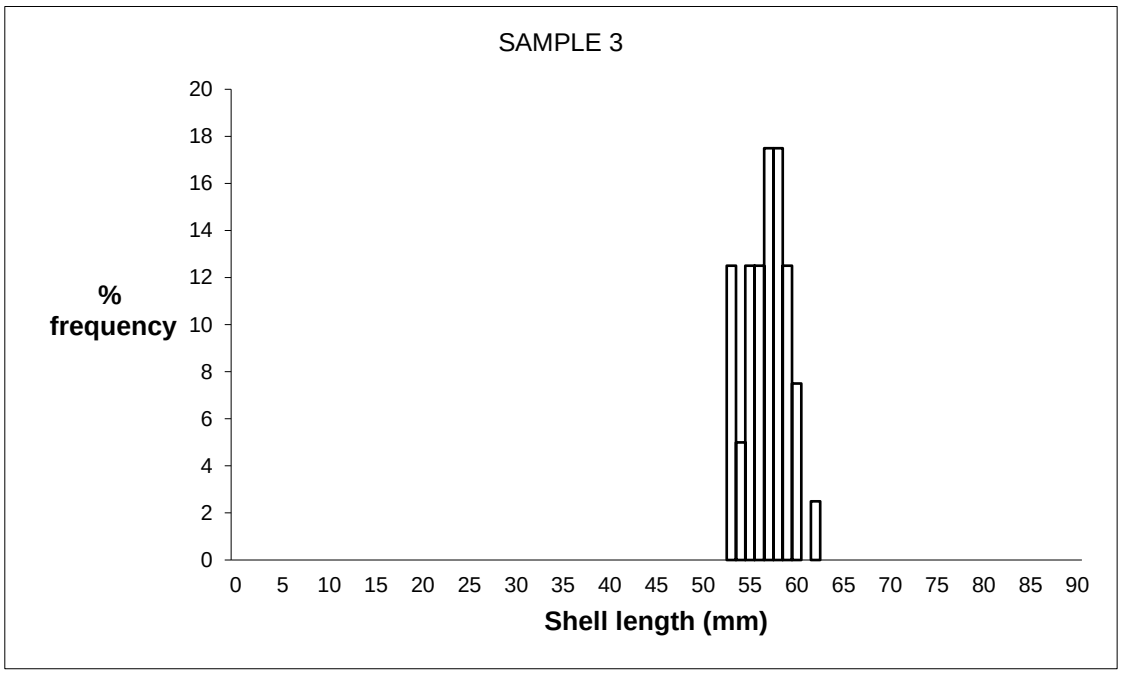
Mussel Shell Length Percentage Frequency for Sample Collected and Processed





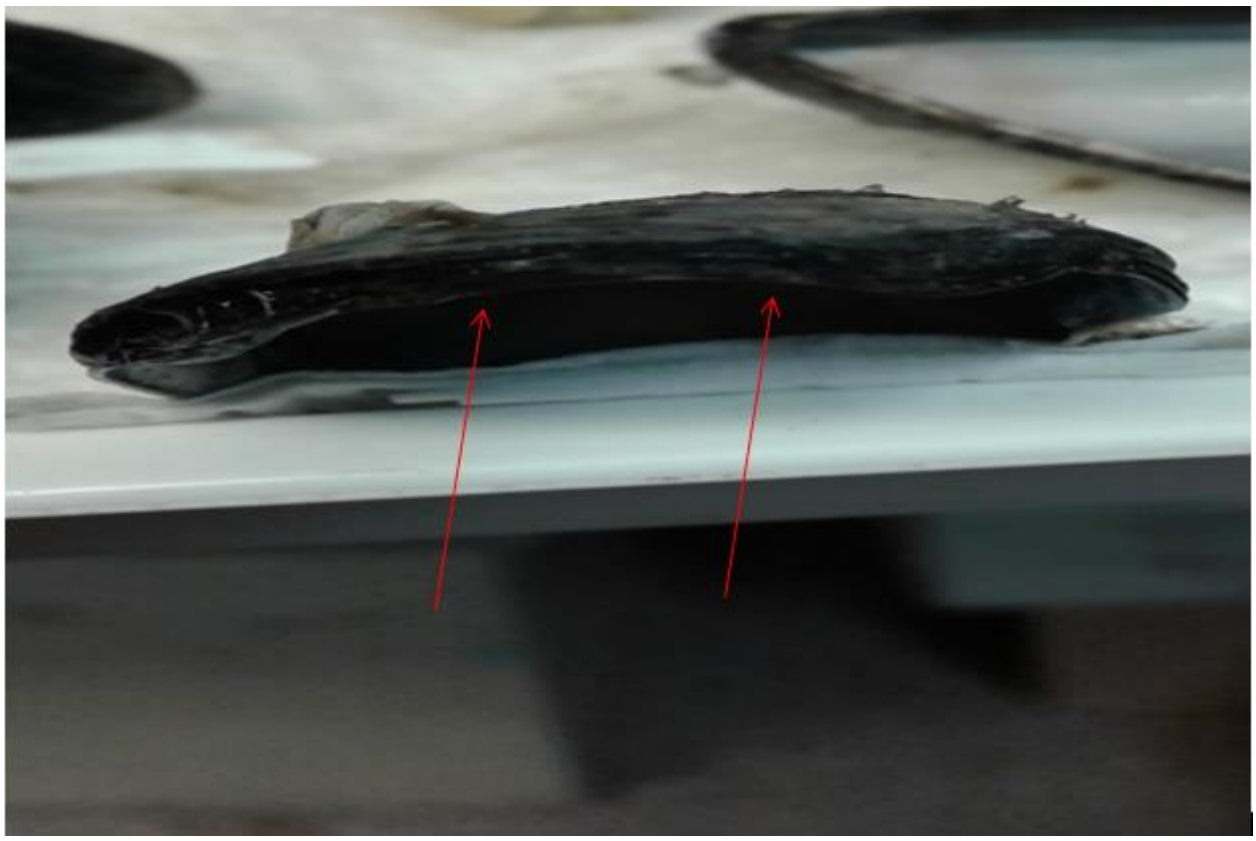


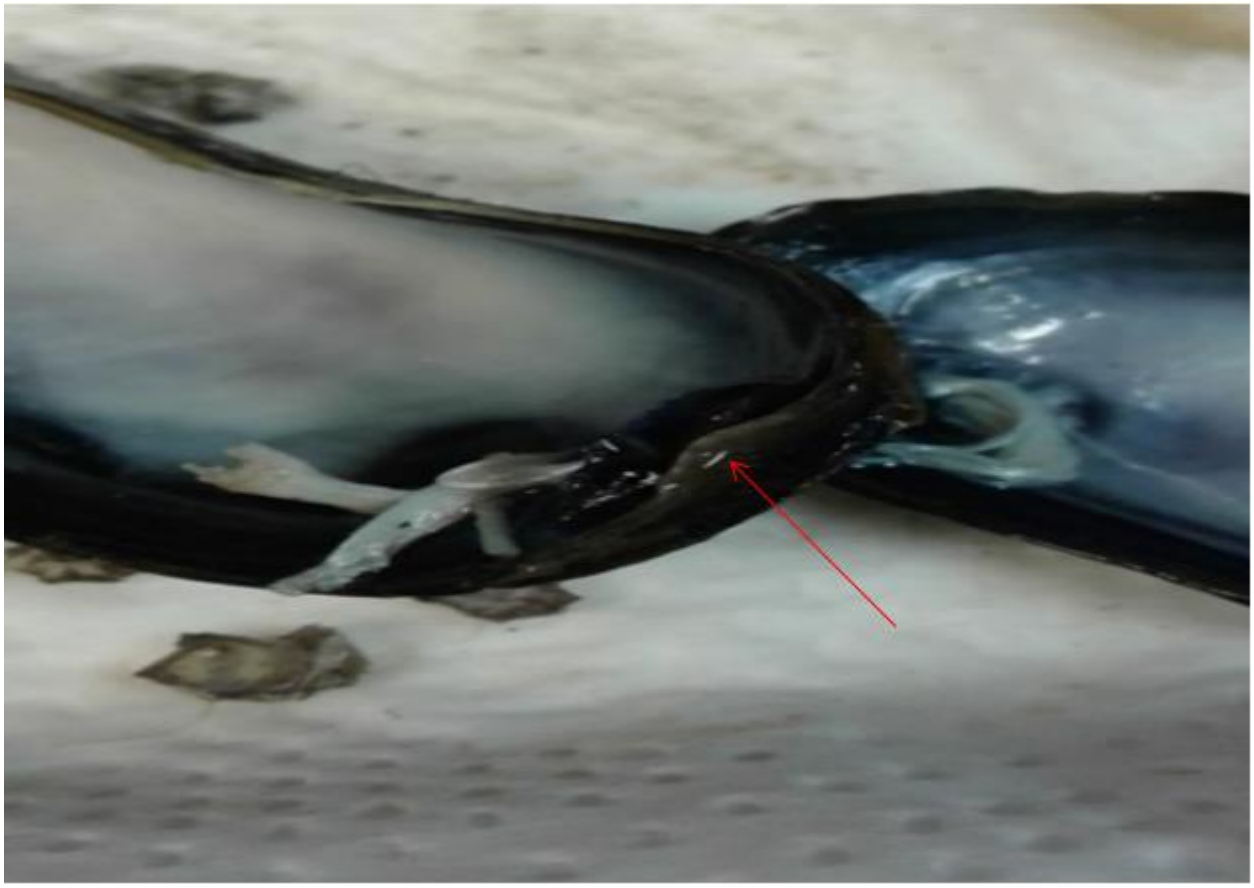
Sample 1 Images

Sample 2 Images

Sample 3 Images

Evidence of Stunted Growth – Taken from sample 2, some signs of distorted growth and increase in shell wall thickness





Area of new spat settlement towards the oyster frames

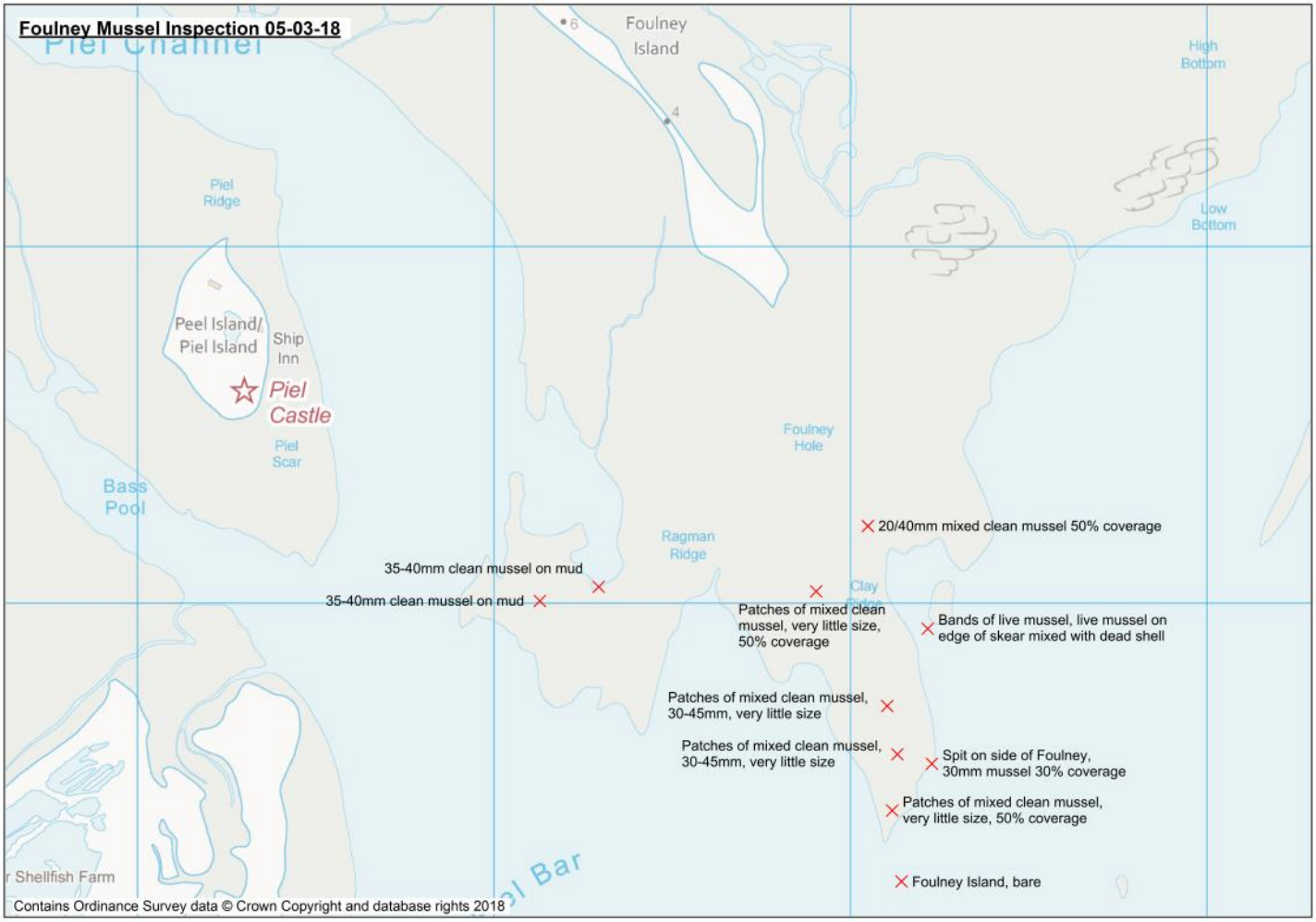
4. **Foulney Mussel Inspection 05/03/18 – 0.9m tide.**

Officers drove out on to the mussel beds to various points along the shoreline to examine the percentage cover of mussel, whether it was alive or dead, the size range of mussels, and whether the mussels were clean (absence of encrusting species, such as barnacles) or not.

Area to the south of the main skear towards Low Bottom had bands of live mussel approximately 20-30mm in shell length at an estimated coverage of 30%. On the main skear the cover of mussels varied across the bed with a mix of live mussel with dead shell, with the highest live coverage reaching 50%. The size of the live mussel ranged from 30-45mm across the bed, with very few size mussels sighted. The mussels were predominantly clean with very little fouling from encrusting organisms. The very end of the skear and Foulney Island had no mussel present. The area towards Walney Channel near the green marker buoy consisted of clean mussel just under size (35-40mm) on mud. There was no presence of 2018 spat evident on any of the areas.

When comparing the inspection with the survey in September there appears to be little difference to the areas of mussel apart from some loss of mussel from the end of the main skear. There is still very little size mussel on Foulney, with the majority being in the 30-40mm size range.

Points of interest included the relatively small number of oystercatchers (less than 100) that were present along the skear. A large flock of knot were present.



Area of mussel to the south of the main skear towards Low Bottom

Overview of main skear

Overview of main skear

Mussel near Walney Channel

Mussel near Walney Channel