Annex A Cockle Survey Report – TSB – 16th May 2017

For each survey, maps have been created showing the overall survey area, density of undersize cockle and the frequency of size classes (pie charts show the frequency of different size classes, the size of the pie chart indicates the total density of cockles present).

Means have been calculated from all survey stations within the defined bed area (zero counts on the edges of the beds have been removed).

Wirral - Leasowe (31-03-17)

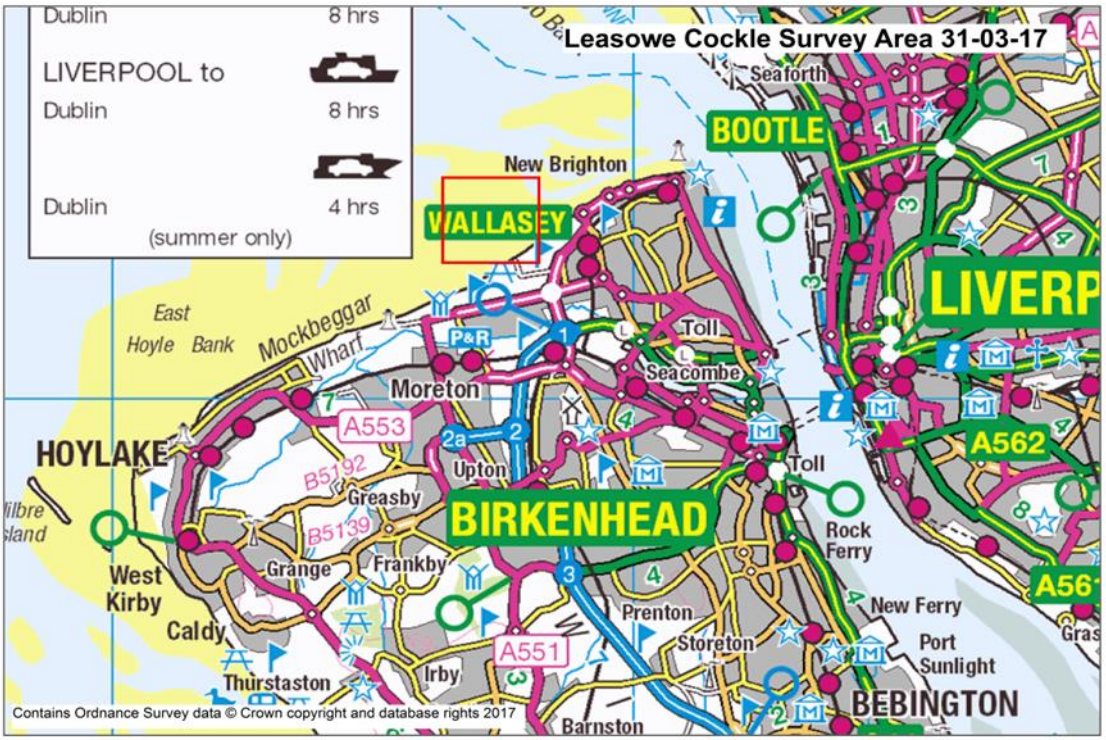
Survey method: Jumbo with 0.5 m^2 quadrat and 0.1 m^2 quadrat. 34 stations were sampled; extra stations were added outside of the survey grid in the dense muddy patch between the sea defence groynes to get a better representation of the extent and coverage of the cockles. Officers also surveyed stations further out towards the river channel. Size cockle was only found at four survey stations so the density of size cockle was not mapped.

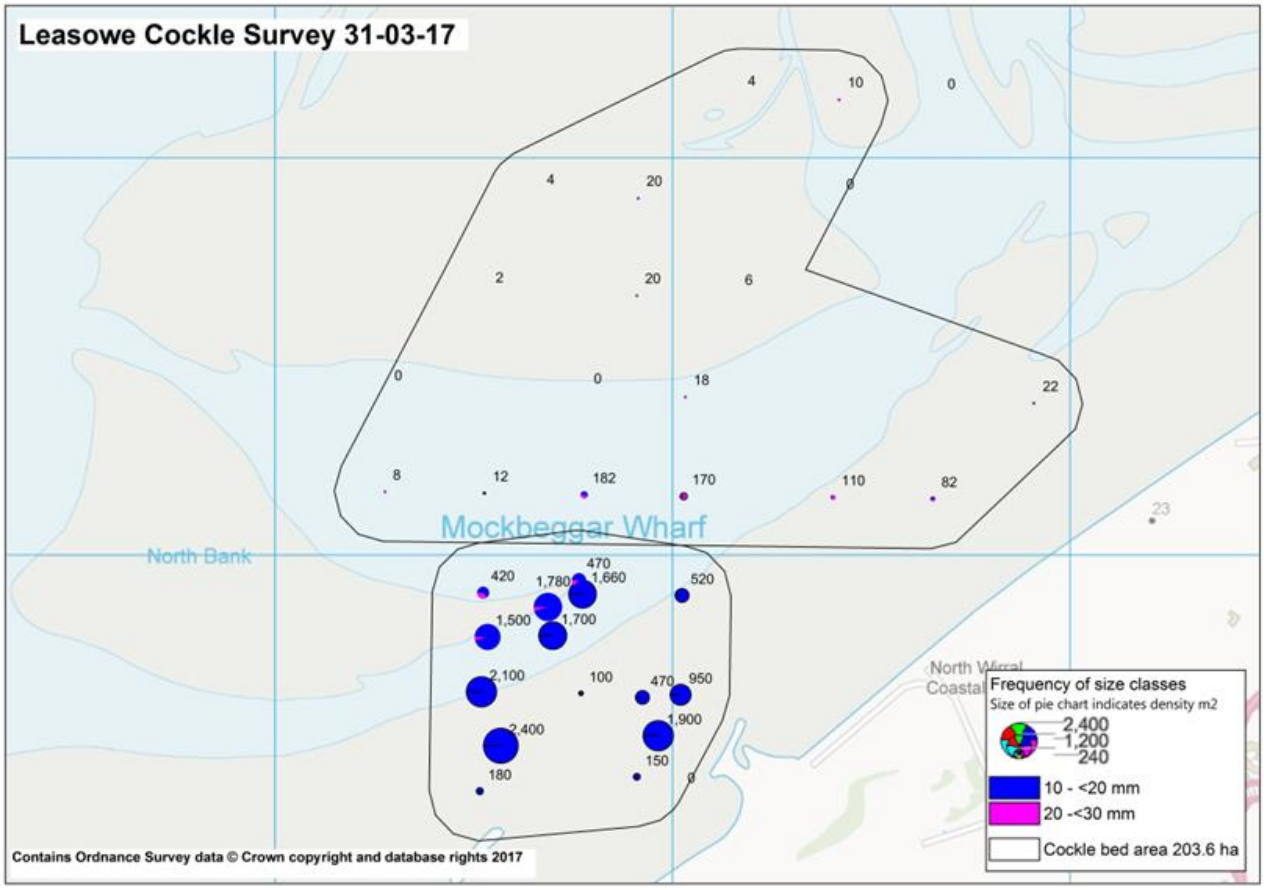
Mean number of size cockle = 1 per m^2 (min. 0, max 10)

Mean number of undersize cockle = 565 per m^2 (min. 0, max 2400)

The majority of the cockle was in the 10-20mm size class and generally 16-19mm. NB cockles reach legal MLS at around 26mm shell length.

Total Bed Area = 203.6 ha. Area of dense bed = 51.8ha




Leasowe Cockle Survey 31-03-17
Mockbeggar Wharf
North Bank
Frequency of size classes
Size of pie chart indicates density m2
2,400
1,200
240
10 - <20 mm
20 -<30 mm
Cockle bed area 203.6 ha
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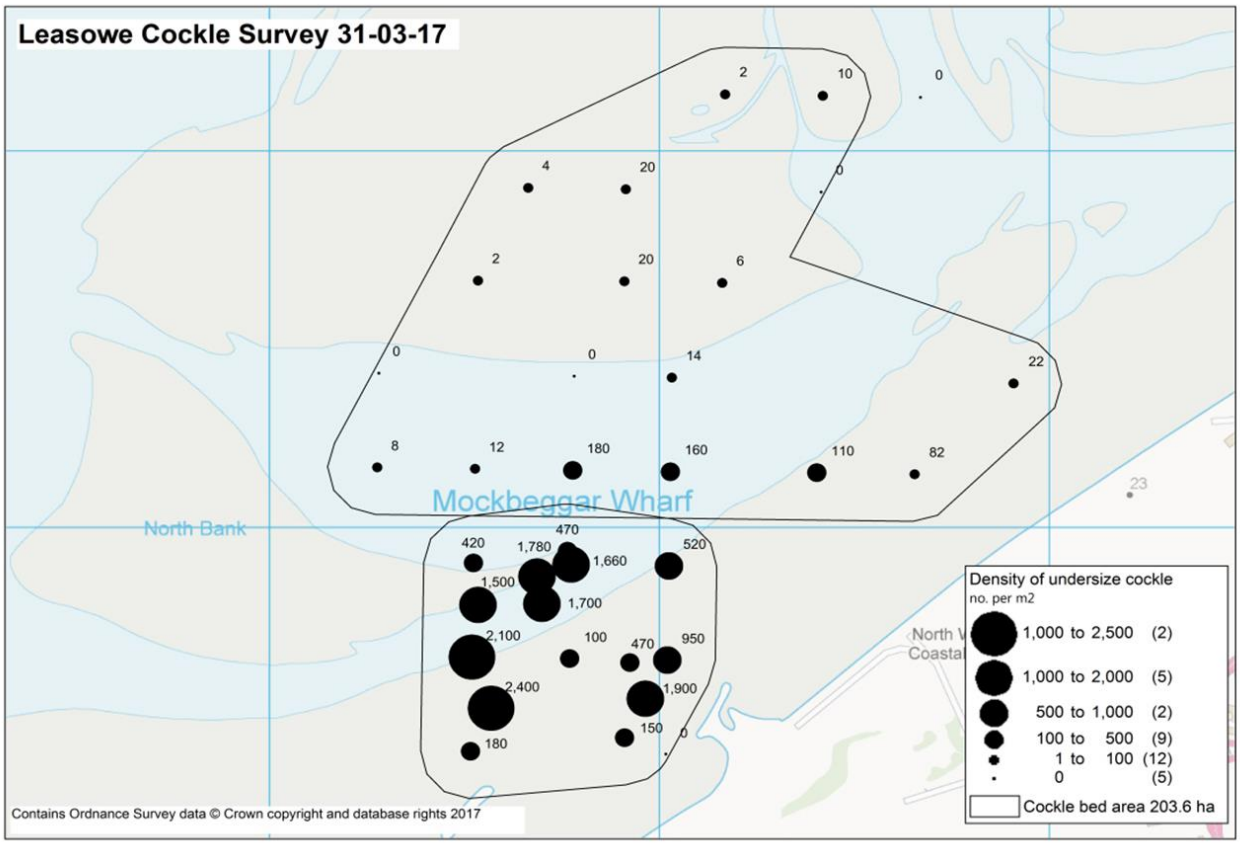
Leasowe Cockle Survey 31-03-17
Mockbeggar Wharf
North Bank
Density of undersize cockle
no. per m2
1,000 to 2,500 (2)
1,000 to 2,000 (5)
500 to 1,000 (2)
100 to 500 (9)
1 to 100 (12)
0 (5)
Cockle bed area 203.6 ha
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Ribble - Penfold North – (01-03-17)

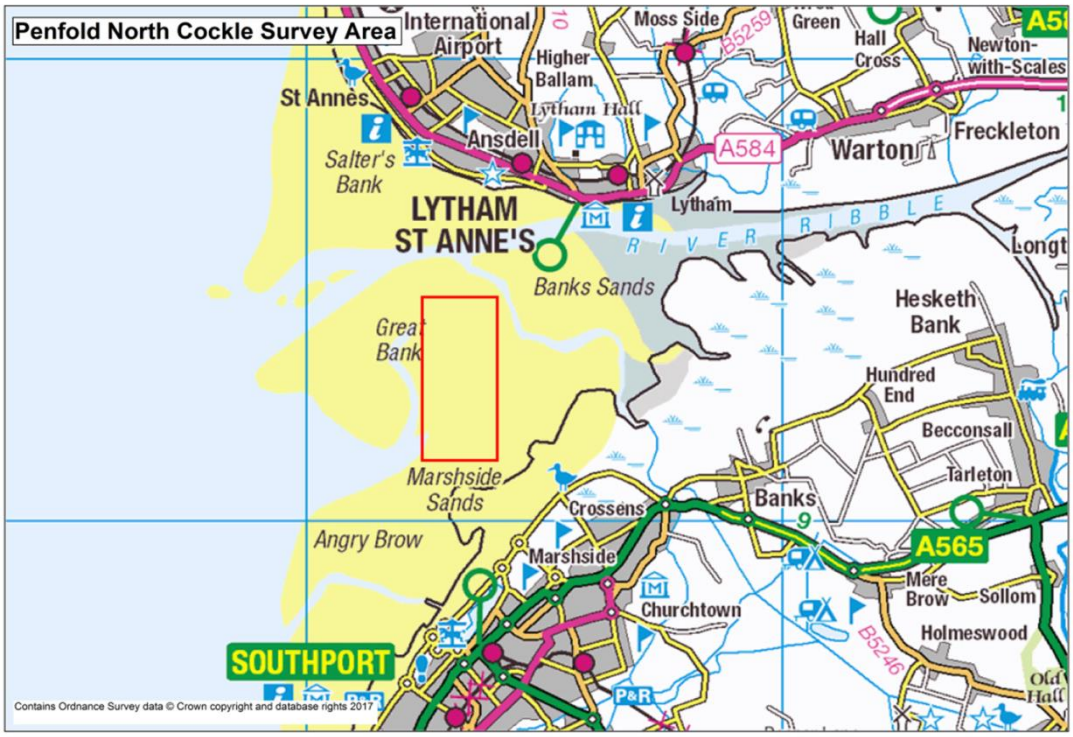
Survey method: Jumbo with 0.5m² quadrat and sieve with 0.1m² quadrat. 26 survey stations were sampled from a grid 150 m apart with two officers going further afield inputting random stations to see if cockles were spreading out, which did not prove to be the case.

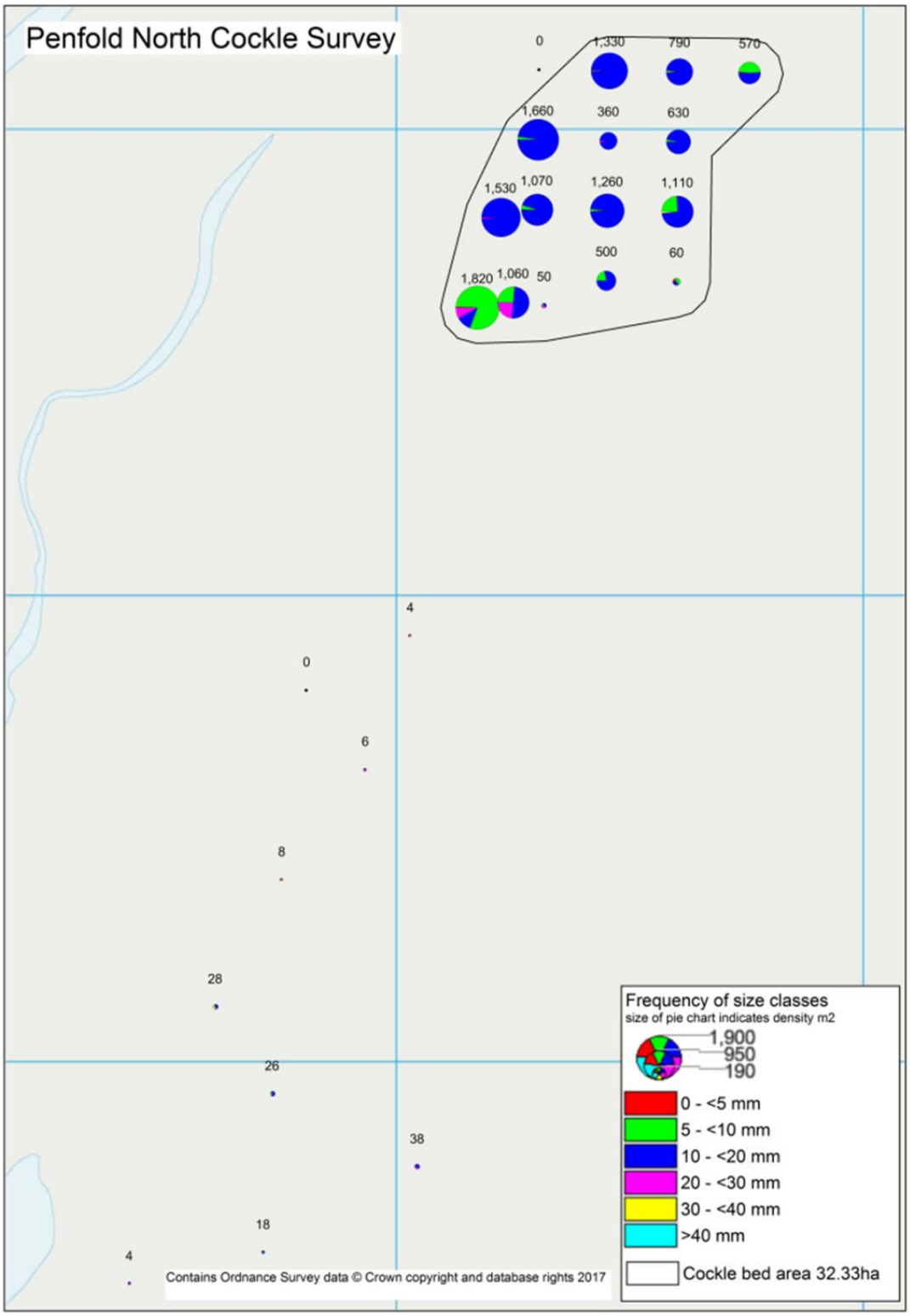
It is known that a further muddy area lies to the east of the area surveyed, which may well hold more cockle. Logistically it is not possible to access this area on quads due to risk of getting stuck.

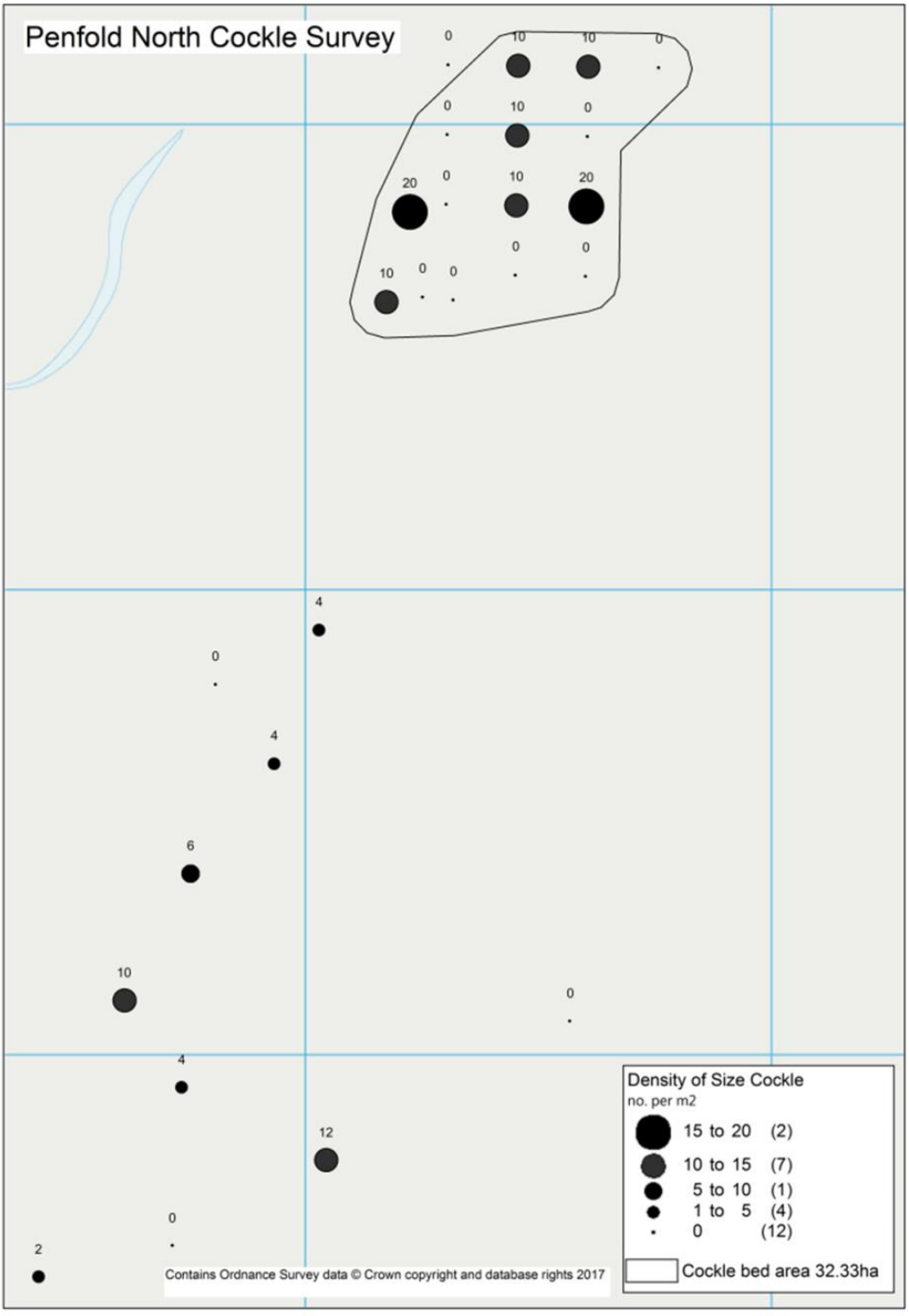
Mean number of size cockle = 6 per m² (min. 0, max 20)

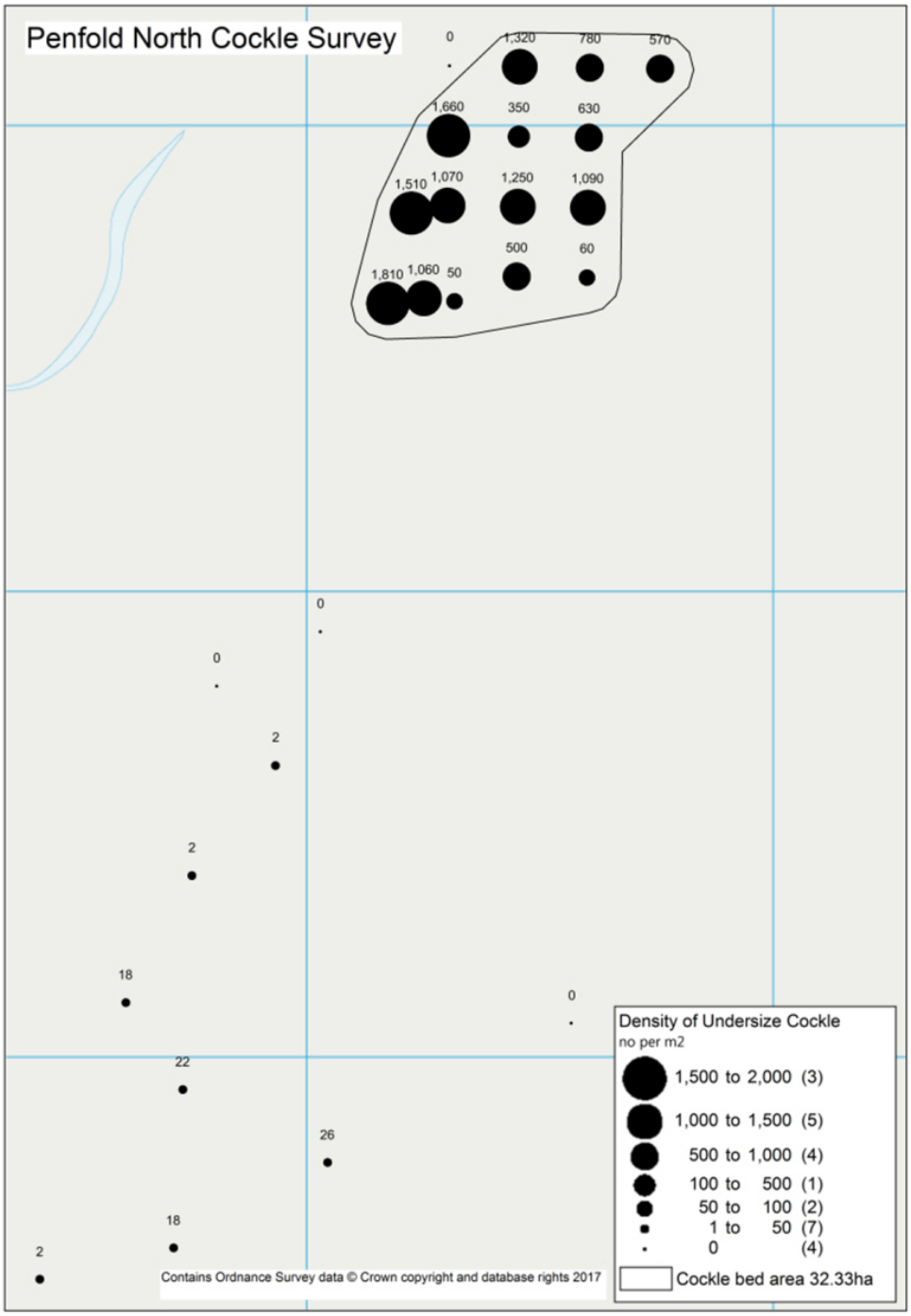
Mean number of undersize cockle = 575 per m² (min. 0, max 1810)

Total Bed Area = 32.33 ha




Penfold North Cockle Survey
0
1,330
790
570
1,660
360
630
1,530
1,070
1,260
1,110
500
60
1,820
1,060
50
4
0
6
8
28
26
38
18
4
Frequency of size classes
size of pie chart indicates density m2
1,900
950
190
0 - <5 mm
5 - <10 mm
10 - <20 mm
20 - <30 mm
30 - <40 mm
>40 mm
Cockle bed area 32.33ha
Contains Ordnance Survey data © Crown copyright and database rights 2017


Penfold North Cockle Survey
0
10
10
0
0
10
0
20
0
10
20
0
0
10
0
0
0
4
0
4
6
10
0
4
12
0
2
Density of Size Cockle
no. per m2
15 to 20 (2)
10 to 15 (7)
5 to 10 (1)
1 to 5 (4)
0 (12)
Cockle bed area 32.33ha
Contains Ordnance Survey data © Crown copyright and database rights 2017



Ribble - Lytham North Run (14-03-17)

Survey Method: 0.5m2 quadrat and jumbo. 35 stations were surveyed. 28 from a 500m grid and 7 extra were added.

Mean size cockles = <1 per m² (min. 0 max. 4)

Mean undersize cockles = 5 per m² (min. 0 max. 46)

Almost all cockle found was in the 5-10mm size class. Mapping has not been carried out due to the very low level of cockle.

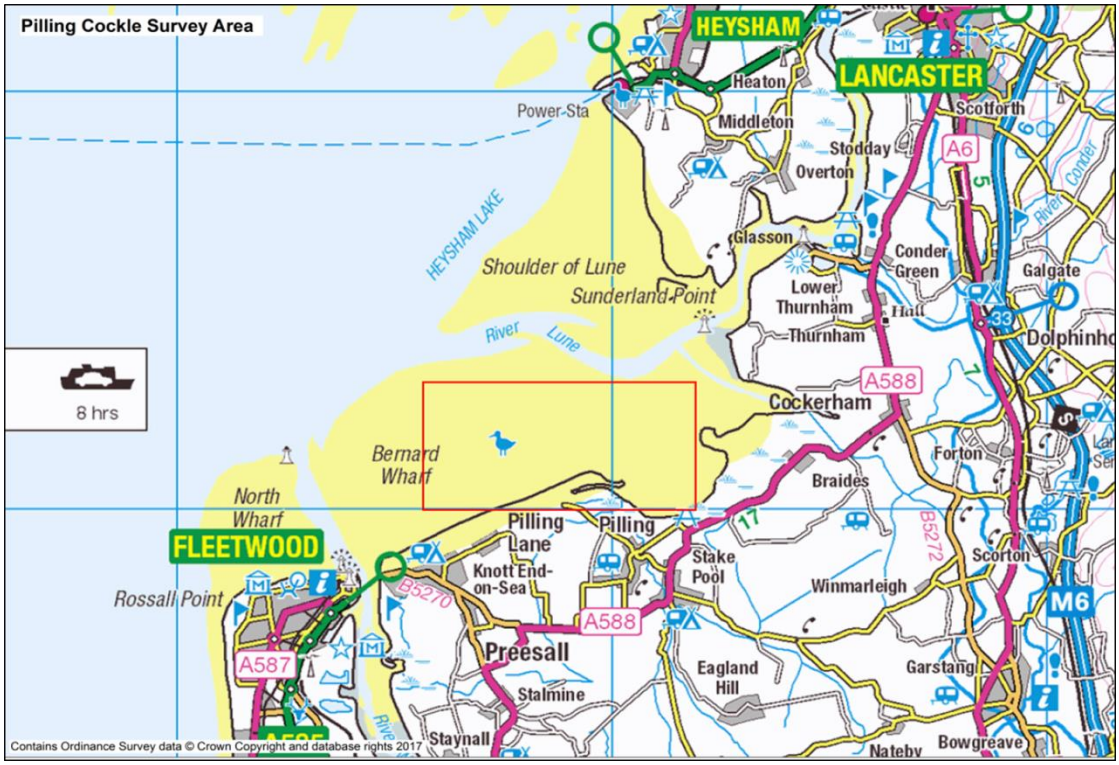
Morecambe Bay - Pilling (27-03-2017)

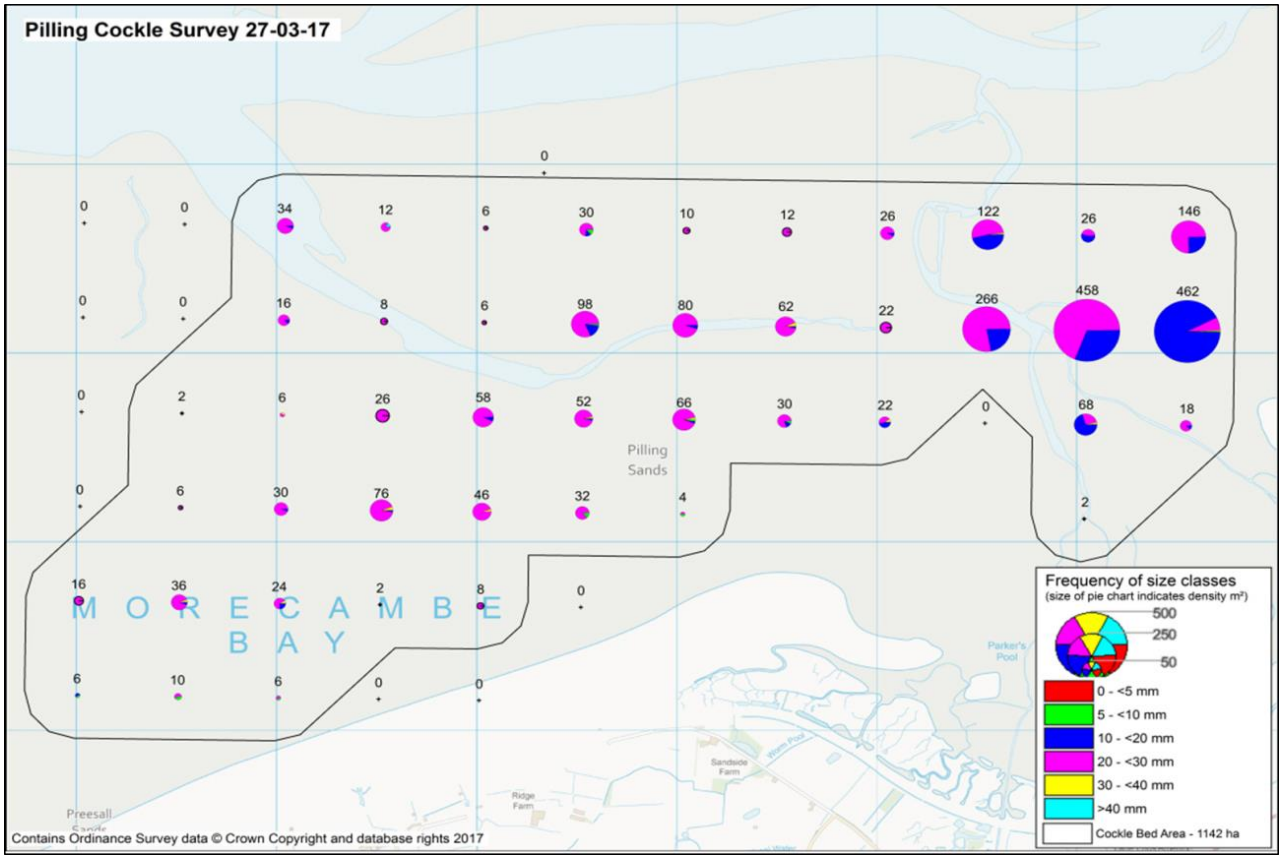
Survey – Jumbo and 0.5m² quadrat. 55 survey stations were sampled from a grid 500m apart with an extra point added outside of the grid area.

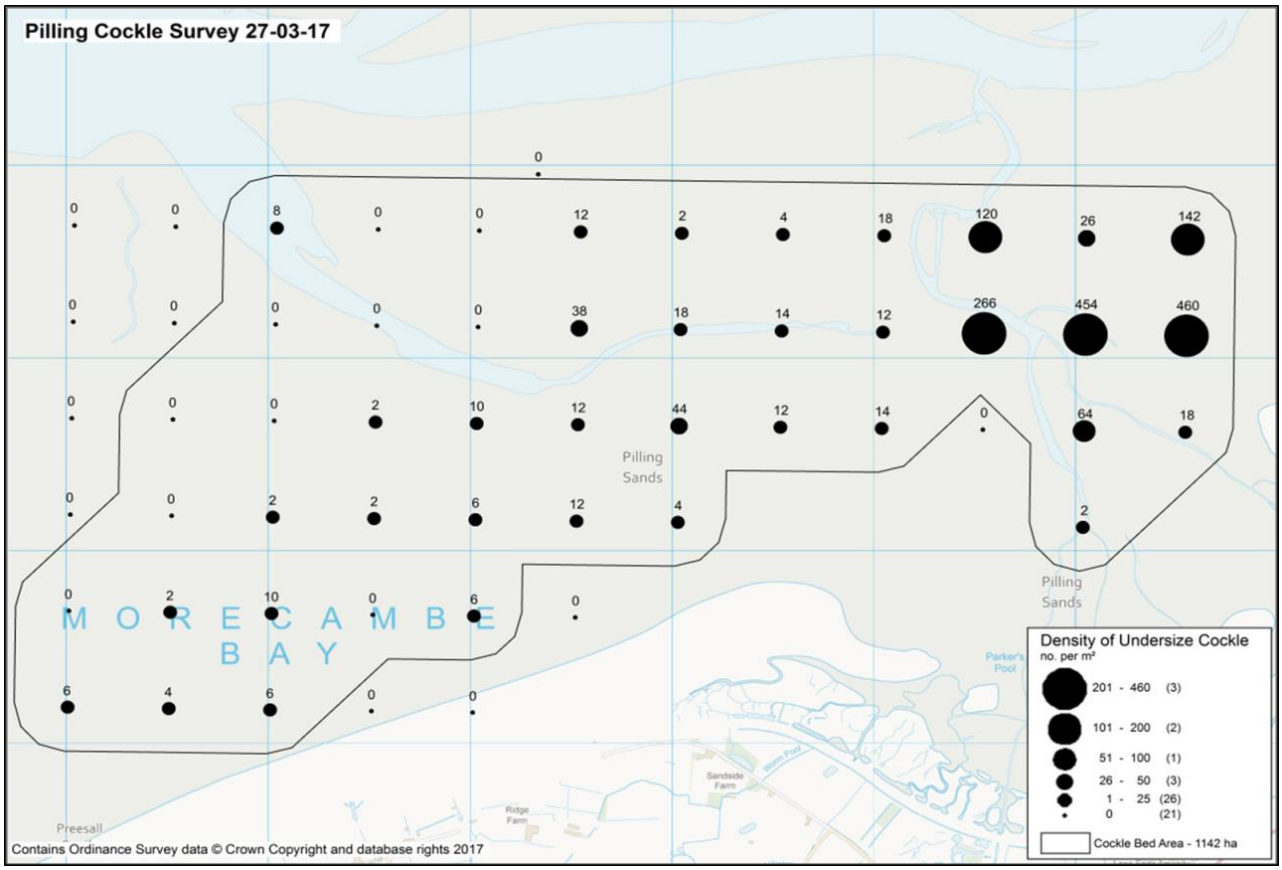
Mean number of size cockle = 16 per m² (min. 0, max 62)

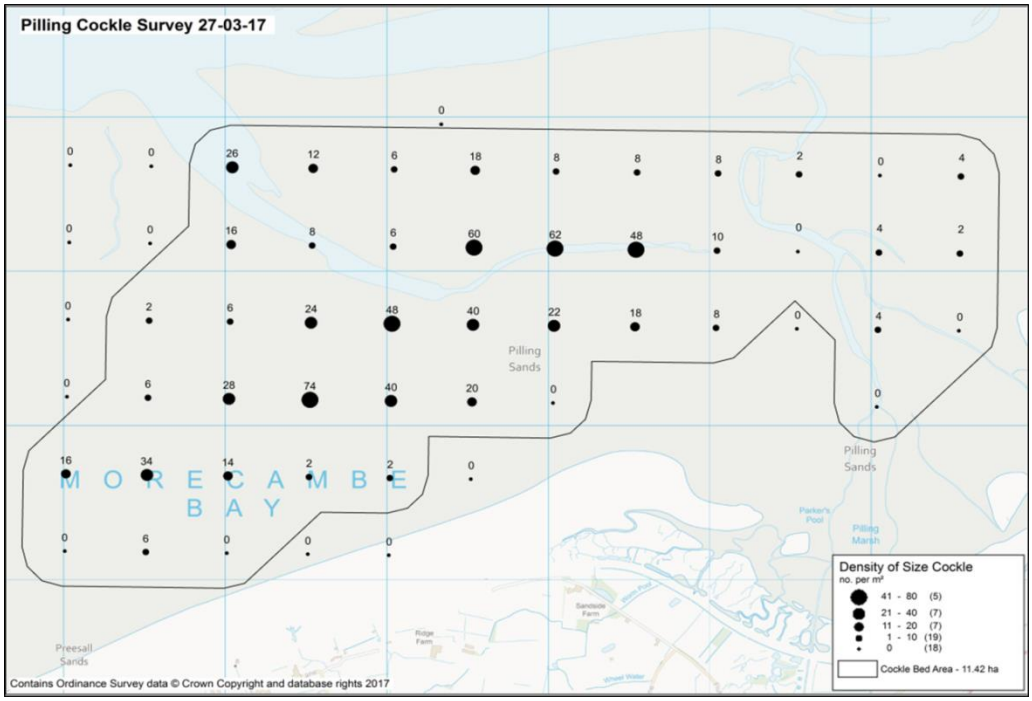
Mean number of undersize cockle = 41 per m² (min 0, max 460)

Total Bed Area = 1142 ha




Pilling Cockle Survey 27-03-17
Pilling Sands
MORECAMBE BAY
Frequency of size classes
(size of pie chart indicates density m²)
500
250
50
0 - <5 mm
5 - <10 mm
10 - <20 mm
20 - <30 mm
30 - <40 mm
>40 mm
Cockle Bed Area - 1142 ha
Contains Ordinance Survey data © Crown Copyright and database rights 2017


Pilling Cockle Survey 27-03-17
Pilling Sands
MORECAMBE BAY
Density of Undersize Cockle
no. per m²
201 - 460 (3)
101 - 200 (2)
51 - 100 (1)
26 - 50 (3)
1 - 25 (26)
0 (21)
Cockle Bed Area - 1142 ha
Contains Ordinance Survey data © Crown Copyright and database rights 2017



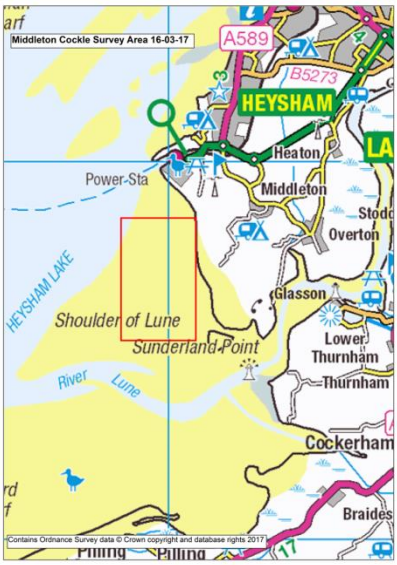
Middleton Sands (16-03-17)

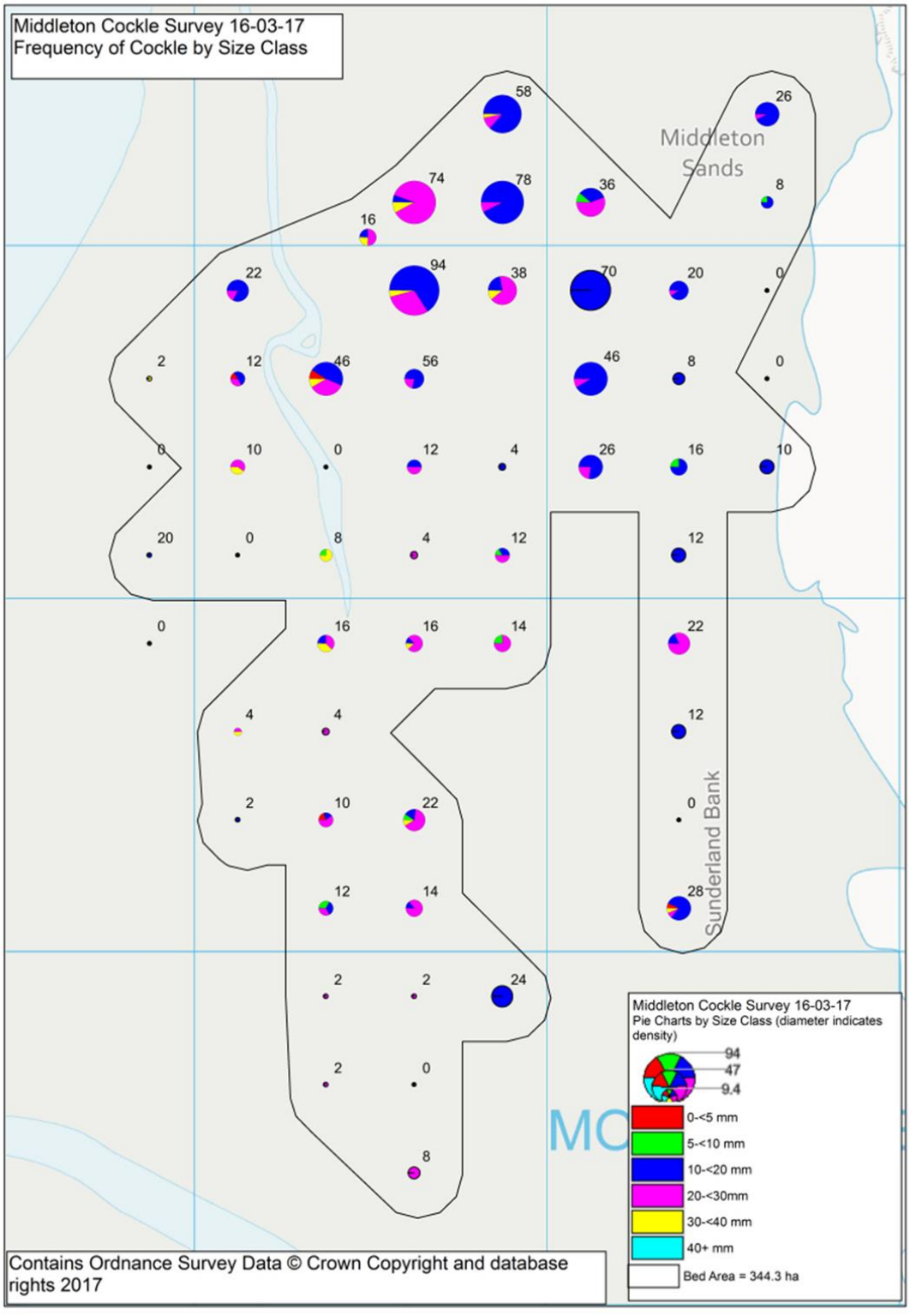
Survey method: 250m grid, 0.5m² quadrat. 55 survey stations were sampled from a grid of 102 points, 250 m apart. The stations nearest Heysham Power Station were not accessible due to the soft muddy sand near the pipeline. The top of the beach nearest the car par is buoyed off - this is a cable laying route marked out by Dong Energy for the landfall of the West of Walney windfarm cabling.

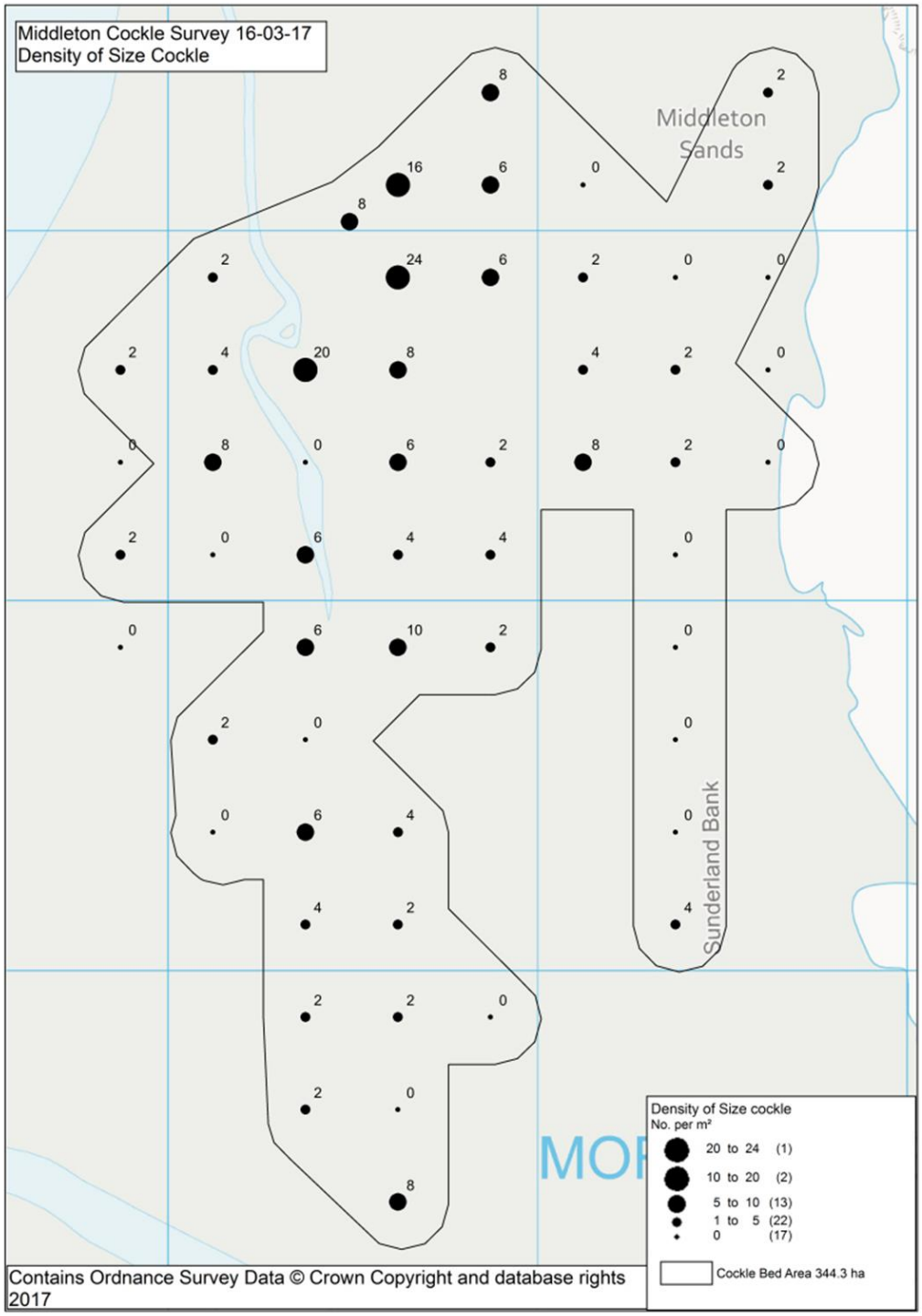
Mean number of size cockle = 4 per m² (min. 0, max 24)

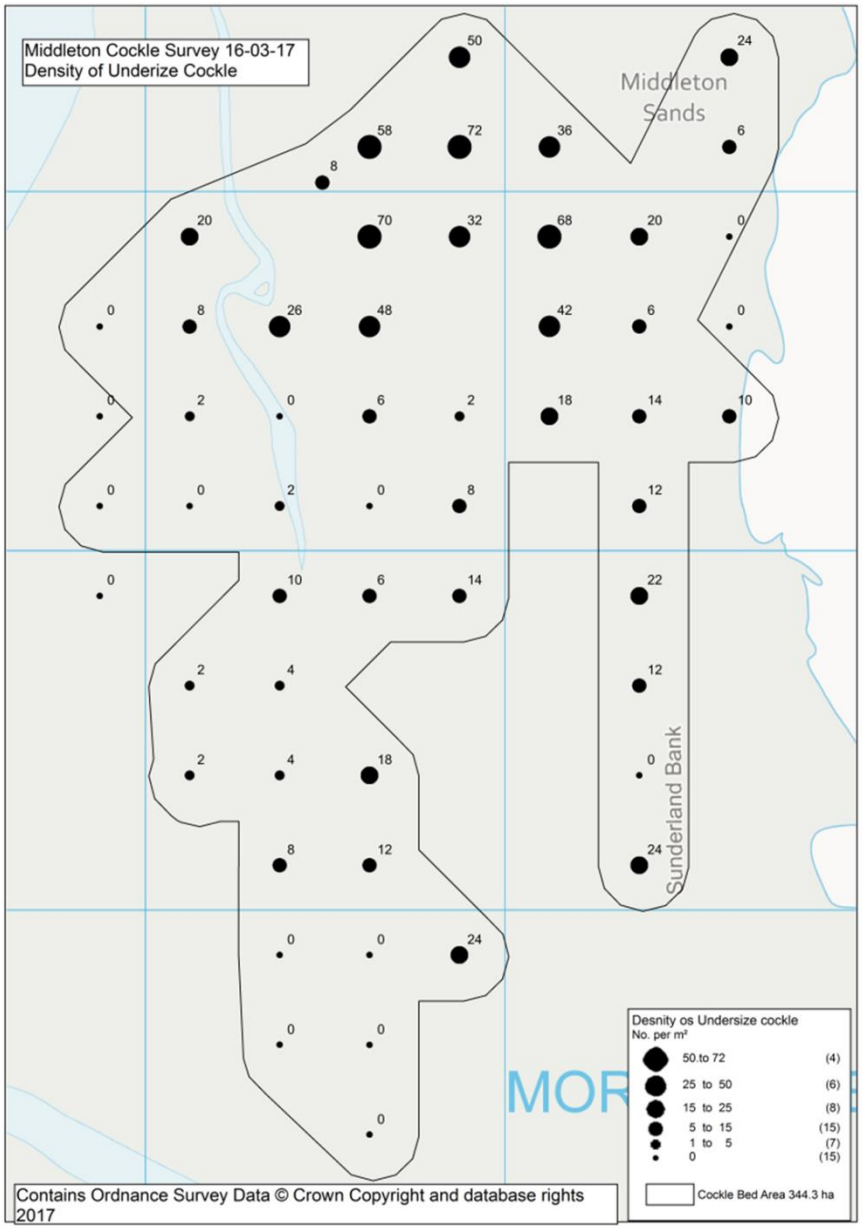
Mean number of undersize cockle = 16 per m² (min 0, max 72)

Total area: 344.3 ha




Middleton Cockle Survey 16-03-17
Frequency of Cockle by Size Class
Middleton Sands
Sunderland Bank
58
26
74
78
36
8
16
22
94
38
70
20
0
2
12
46
56
46
8
0
0
10
0
12
4
26
16
10
20
0
8
4
12
12
0
16
16
14
22
4
4
12
2
10
22
0
12
14
28
2
2
24
2
0
8
Middleton Cockle Survey 16-03-17
Pie Charts by Size Class (diameter indicates density)
94
47
9.4
0-<5 mm
5-<10 mm
10-<20 mm
20-<30mm
30-<40 mm
40+ mm
Bed Area = 344.3 ha
Contains Ordnance Survey Data © Crown Copyright and database rights 2017


Middleton Cockle Survey 16-03-17
Density of Size Cockle
Middleton Sands
Sunderland Bank
Density of Size cockle
No. per m²
20 to 24 (1)
10 to 20 (2)
5 to 10 (13)
1 to 5 (22)
0 (17)
Cockle Bed Area 344.3 ha
Contains Ordnance Survey Data © Crown Copyright and database rights 2017



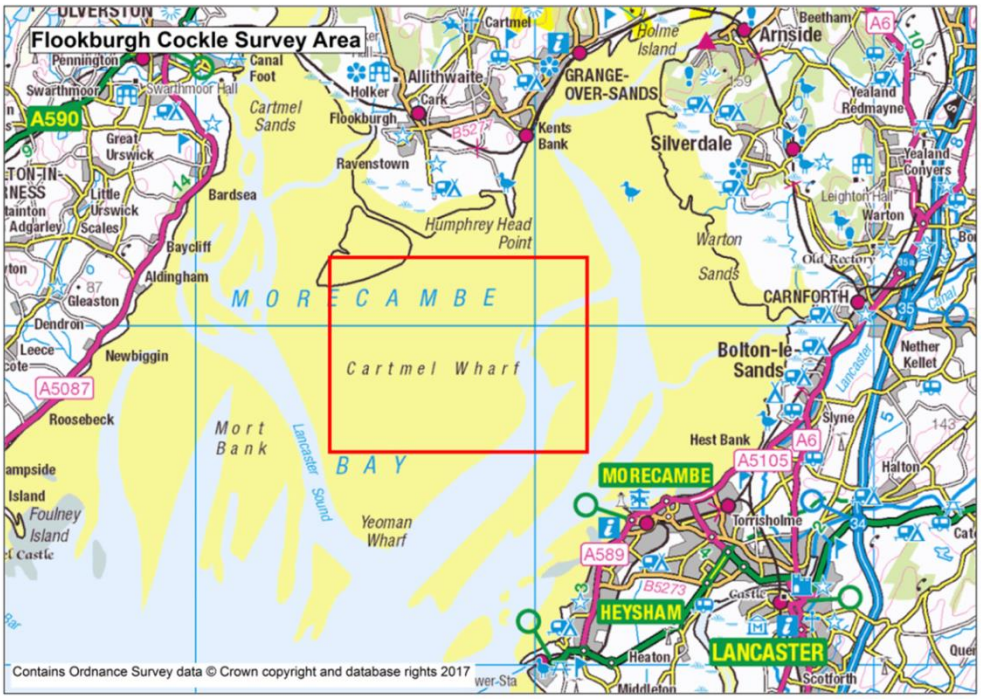
<u>Flookburgh 29-3-17(West) and 26-04-17 (East)</u>

Flookburgh survey grid was split into two (West and East), each area was surveyed on different days, using jumbo and 0.5m² quadrat. 117 stations were sampled from a grid with stations 500 m apart. The results from some days may need to be treated as an under-estimate due to high winds again preceding survey dates. It is becoming harder to avoid this weather influence.

Mean number of size cockle = 12 per m² (min. 0, max 138)

Mean number of undersize cockle = 22 per m² (min. 0, max 260)

Total Bed Area = 2608 ha


Flookburgh Cockle Survey Area
Cartmel
Holme Island
Beetham
Arnside
A6
Pennington
Canal Foot
Swarthmoor
Swarthmoor Hall
Cartmel Sands
Allithwaite
Holker
Cark
GRANGE-OVER-SANDS
A590
Flookburgh
B5277
Kents Bank
Silverdale
Yealand Redmayne
Great Urswick
Ravenstown
Yealand Conyers
Little Urswick
Bardsea
Leighton Hall
Warton
Humphrey Head Point
Warton Sands
Old Rectory
Baycliff
Aldingham
MORECAMBE BAY
CARNFORTH
Gleaston
Dendron
Newbiggin
Cartmel Wharf
Bolton-le-Sands
Nether Kellet
A5087
Roosebeck
Mort Bank
Lancaster Sound
Hest Bank
A5105
Slyne
Halton
Foulney Island
Yeoman Wharf
MORECAMBE
Torrisholme
A589
B5273
HEYSHAM
LANCASTER
Heaton
Scotforth
Middleton
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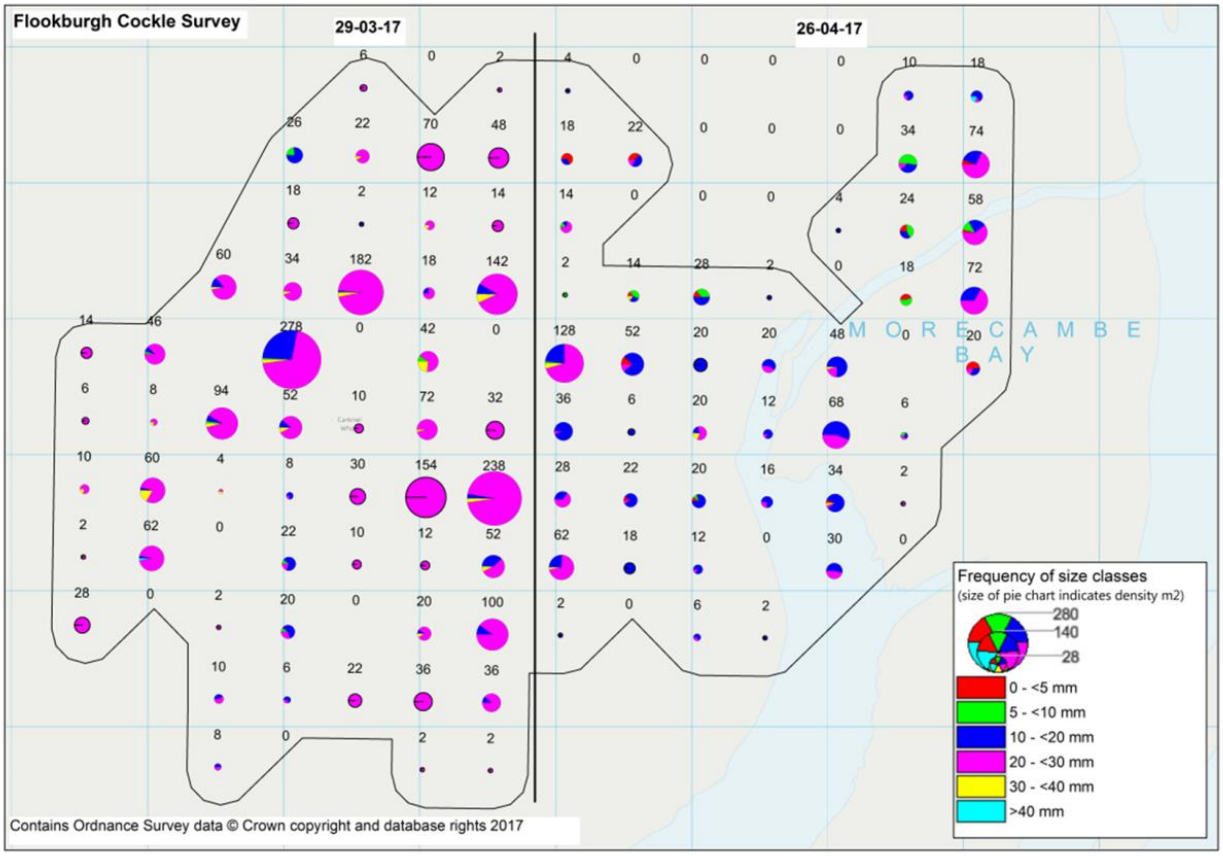
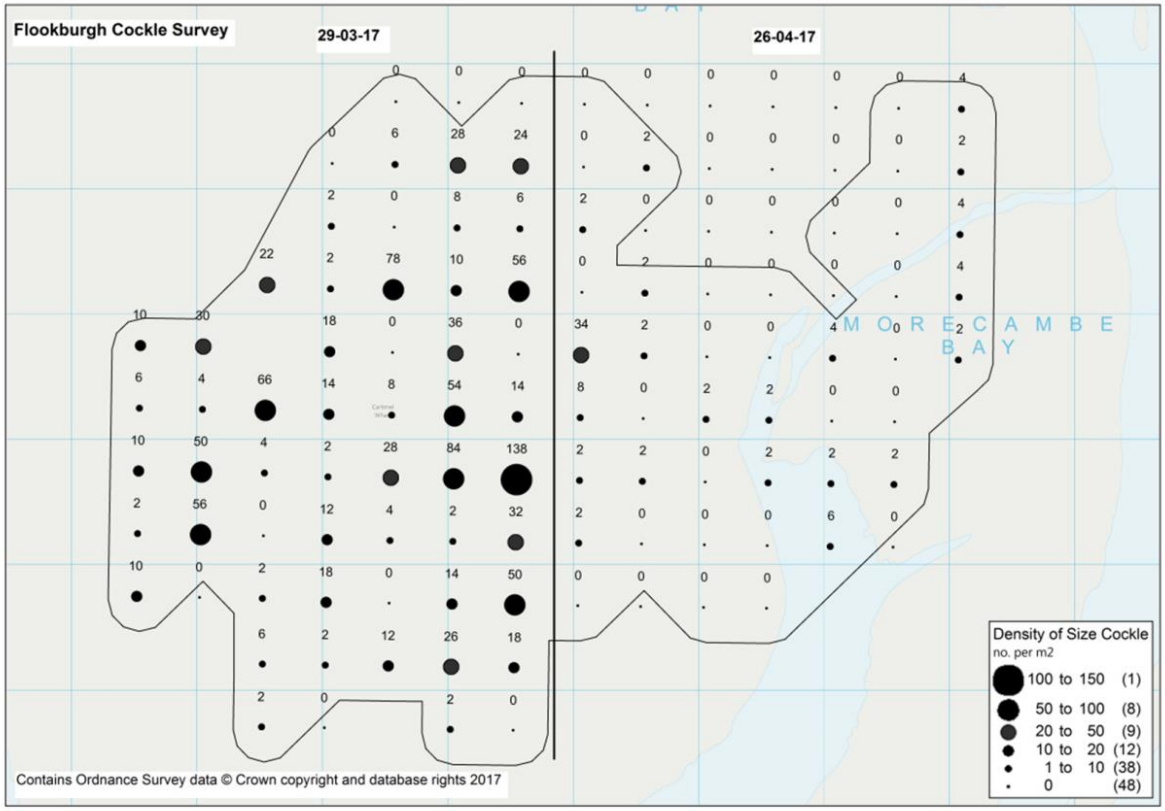

Flookburgh Cockle Survey
29-03-17
26-04-17
MORECAMBE BAY
Frequency of size classes
(size of pie chart indicates density m2)
280
140
28
0 - <5 mm
5 - <10 mm
10 - <20 mm
20 - <30 mm
30 - <40 mm
>40 mm
Contains Ordnance Survey data © Crown copyright and database rights 2017


Flookburgh Cockle Survey
29-03-17
26-04-17
MORECAMBE BAY
Density of Size Cockle
no. per m2
100 to 150 (1)
50 to 100 (8)
20 to 50 (9)
10 to 20 (12)
1 to 10 (38)
0 (48)
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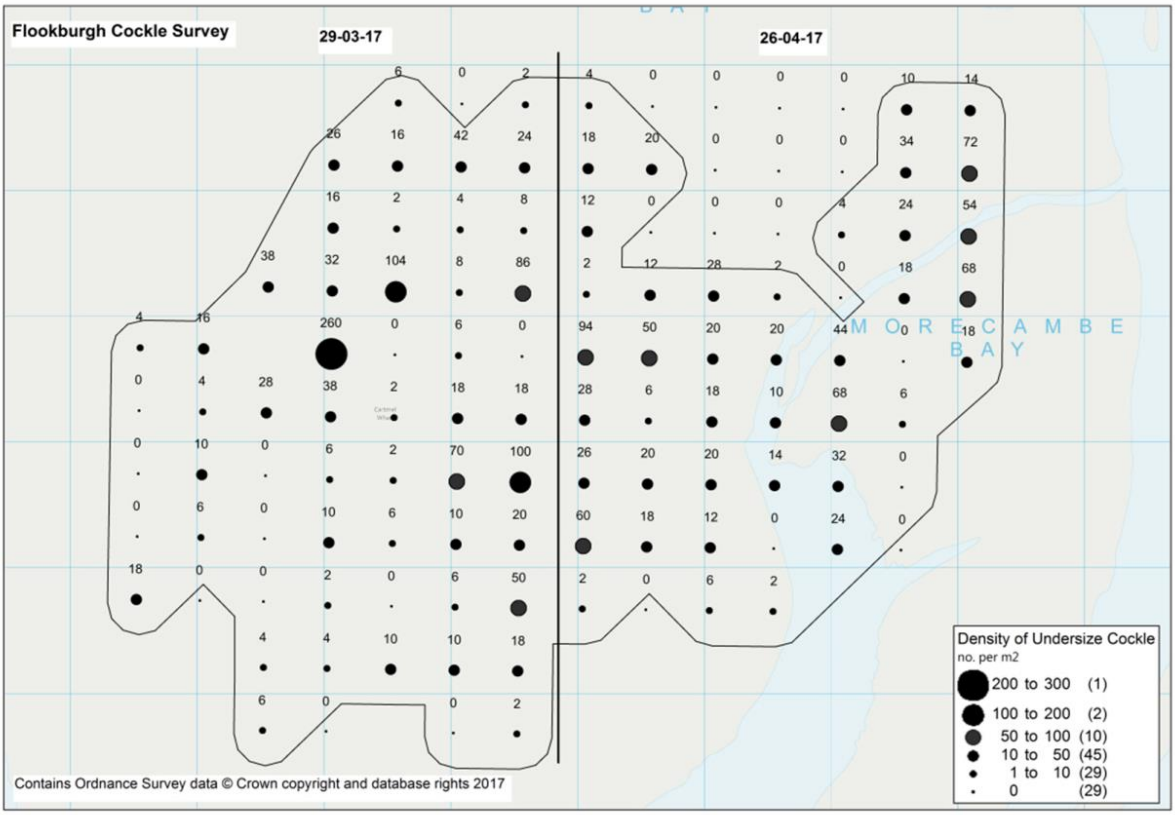
Flookburgh Cockle Survey
29-03-17
26-04-17
MORECAMBE BAY
Density of Undersize Cockle
no. per m2
200 to 300 (1)
100 to 200 (2)
50 to 100 (10)
10 to 50 (45)
1 to 10 (29)
0 (29)
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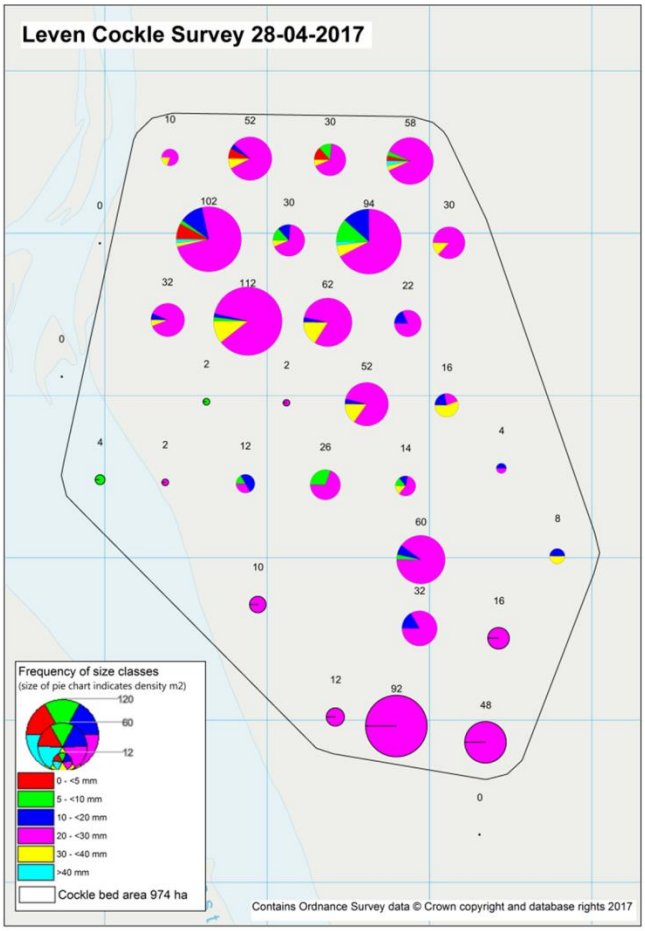
Leven Sands (28-04-17)

Survey method: Jumbo with 0.5m² quadrat. 33 survey stations were sampled from a grid 500m apart. 13 of the stations were randomly added around the grid (mainly to the south-east).

Mean number of size cockle = 20 per m² (min. 0, max 74)

Mean number of undersize cockle = 15 per m² (min. 0, max 66)

Total Bed Area = 974 ha


Leven Cockle Survey 28-04-2017
10
52
30
58
0
102
30
94
30
32
112
62
22
0
2
2
52
16
4
2
12
26
14
4
60
8
10
32
16
12
92
48
0
Frequency of size classes
(size of pie chart indicates density m2)
120
60
12
0 - <5 mm
5 - <10 mm
10 - <20 mm
20 - <30 mm
30 - <40 mm
>40 mm
Cockle bed area 974 ha
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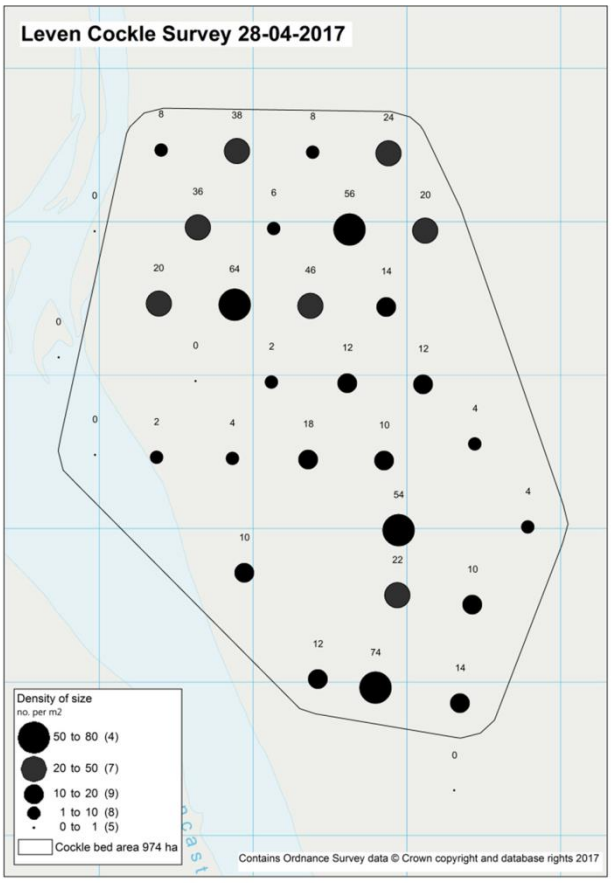
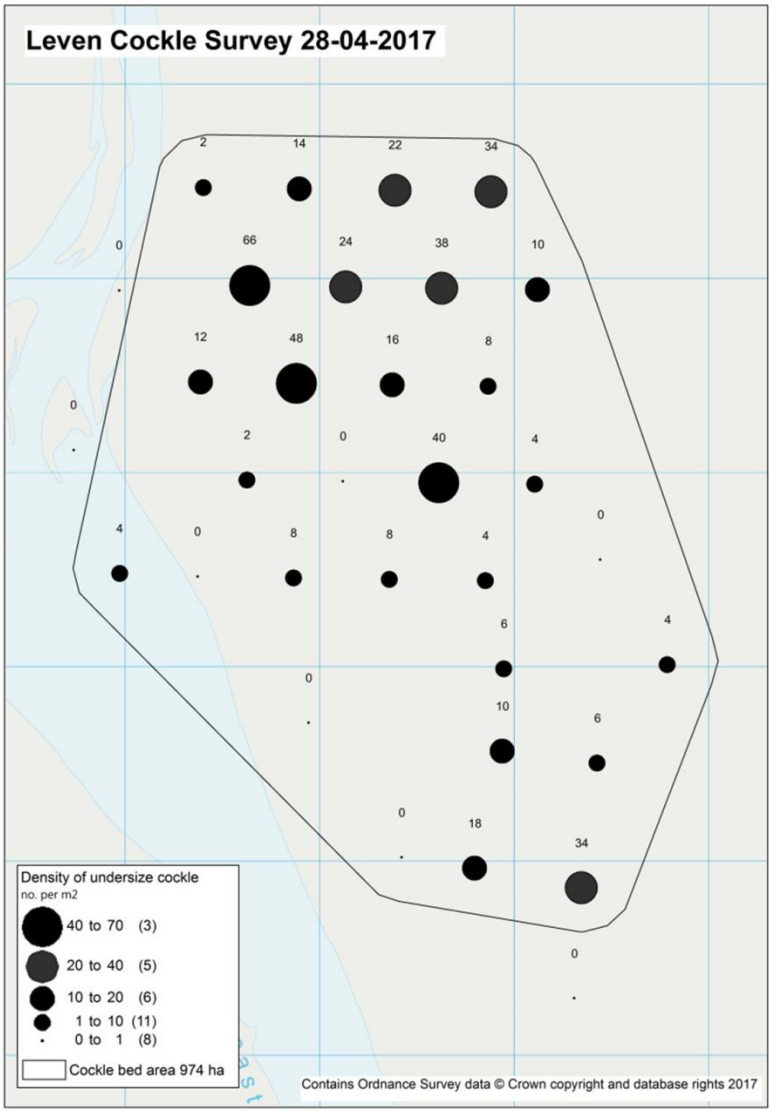

Leven Cockle Survey 28-04-2017
8
38
8
24
0
36
6
56
20
20
64
46
14
0
0
2
12
12
0
2
4
18
10
4
54
4
10
22
10
12
74
14
0
Density of size
no. per m2
50 to 80 (4)
20 to 50 (7)
10 to 20 (9)
1 to 10 (8)
0 to 1 (5)
Cockle bed area 974 ha
Contains Ordnance Survey data © Crown copyright and database rights 2017



<u>Duddon Estuary (01-03-17)</u>

Random points were surveyed from Hard Acre to Askam / Roanhead, and a few large cockles found 30-40mm in small densities < 3 per m². Mapping not carried out.

Science Team – 2nd May 2017