NWIFCA Technical, Science and Byelaw Committee

2nd August 2022: 10:00 a.m.

Agenda Item

10a

MORECAMBE BAY COCKLE FISHERY REPORT 2022

Purpose: **To report on the cockle survey and inspections that inform the decision on Morecambe Bay cockle fisheries.**

Recommendation:

1. **To accept the conclusions of this report.**
2. **To approve that the cockle beds in Morecambe Bay remain closed for the rest of the closed season, and that from the 1st of September they remain closed under Byelaw 3 paragraph 15.**

1. Morecambe Bay Cockle 2022 Results

Outstanding survey reports for all surveyed Morecambe Bay cockle beds were finalised on the 28th of July and are provided in Annex 1 of this report. A summary of this year's survey results are provided in table 1.

Table 1. Biomass calculations of size, undersize and combined biomass of cockles on Morecambe Bay cockle beds 2022. *figures represent the max cockle biomass

Cockle bed	Date survey	Area	Size cockle (tonnes)	Undersize cockle (tonnes)	Total cockle biomass (tonnes)
Aldingham and Newbiggin	1st of July 2022	1063	1050	315	1365
Leven	13th of July 2022	1047	500	225	725
Flookburgh	12th of July 2022	2240	850	600	1450
Warton Sands	15th of June 2022	na	na	na	Na
Middleton	25th July 2022	771	350	450	800
Pilling	20th of July 2022	1461	1200	400	1600

Table 2 provides yearly maximum cockle biomass figures from 2017 to 2022. This year, there is an estimated and 3950 tonnes of size cockle and 1990 tonne of undersize over 6582 hectares surveyed across Morecambe Bay. Compared to last year this shows a decrease in total max cockle biomass from 7415 tonnes to 5940 tonnes.

Table 2. The yearly biomass of figures for size, undersize and total biomass of cockles on Morecambe Bay cockle beds from 2017 to 2022. *figures represent the max cockle biomass

Year	All surveyed Morecambe Bay cockle beds				Beds opened
	Area (ha)	**Size cockle (tonne)**	**Undersize cockle (tonne)**	**Total cockle (tonne)**	
2017	5177	4230	6980	11210	Flookburgh Leven Pilling
2018	6088	7000	12140	19140	Flookburgh Leven Pilling Newbigging
2019	6705	4635	12900	17535	Flookburgh Leven Pilling Newbigging
2020	8085	12580	3975	16555	Flookburgh Leven Pilling Newbigging
2021	7089	6450	955	7415	Pilling
2022	6582	3950	1990	5940	TBC

Figure 1 shows the data from table 1 in graphical form. Both the overall biomass and size cockle biomass is lower this year than the previous, there is a slight increase in undersize, though this is still low in comparison to previous years. There are significantly low levels of undersize cockle across all beds, which will make the basis for the following years size fishery once it has grown on.

There has been a 13,200 tonne decrease in the total biomass of all cockles since the peak in 2018. 2018 and 2019 looks like a good settlement year, which then grew to size to become available to the fishery in 2019 and 2020. Both the average density and total number of undersize since decreased each year, indicative of low levels of new settlement.

Figure 1. Annual Morecambe Bay cockle biomass calculations

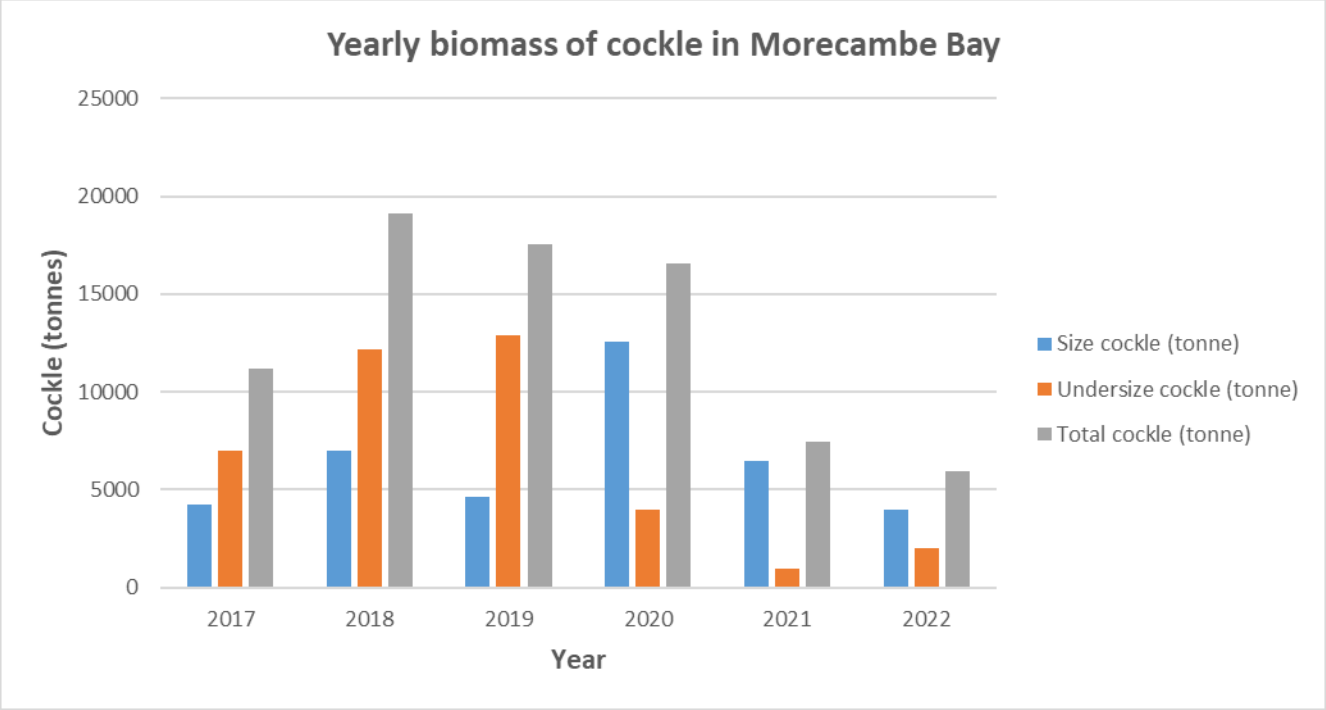


Figure 2 shows the trend in maximum total cockle biomass over Morecambe Bay cockle beds from 2017 to 2022.

Figure 2. Total cockle biomass in Morecambe Bay from 2017 to 2022.

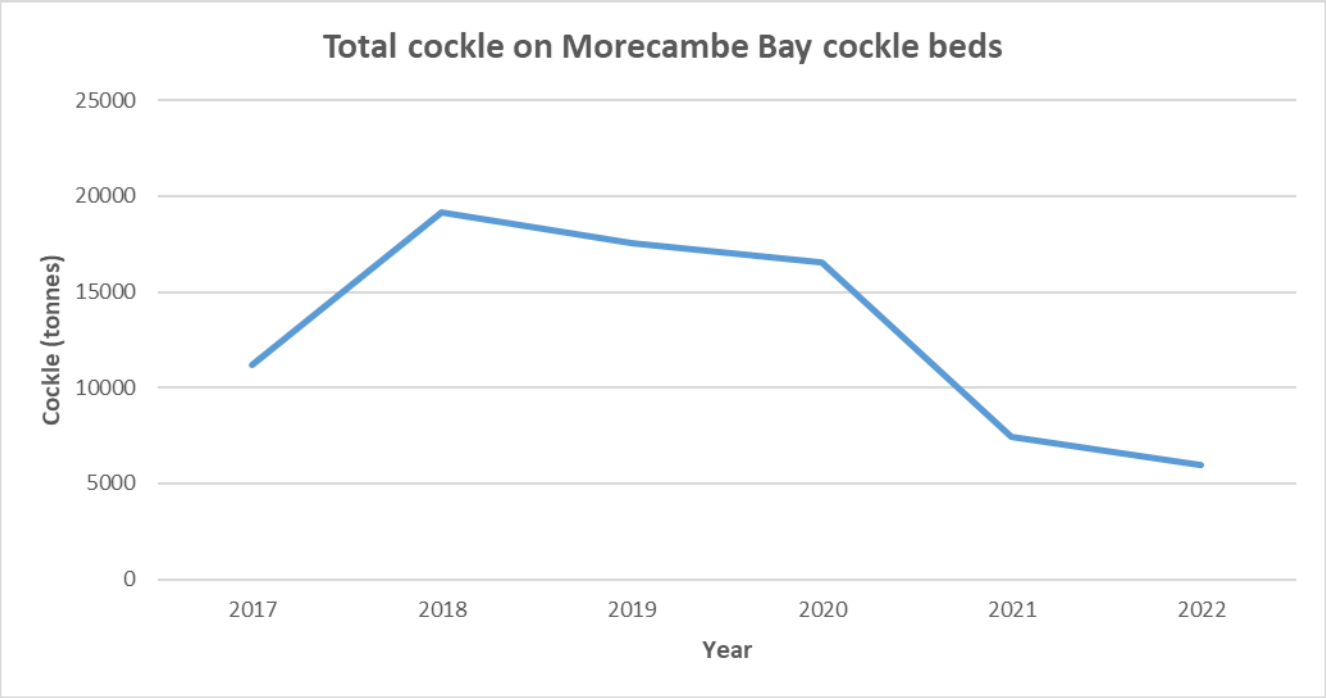


Figure 3 shows a breakdown of the total cockle biomass of each cockle bed in Morecambe Bay over the past 6 years. They all appear to show a general decreasing trend in total cockle biomass.

Figure 3. Trend in annual total cockle biomass for individual beds in Morecambe Bay since 2017.

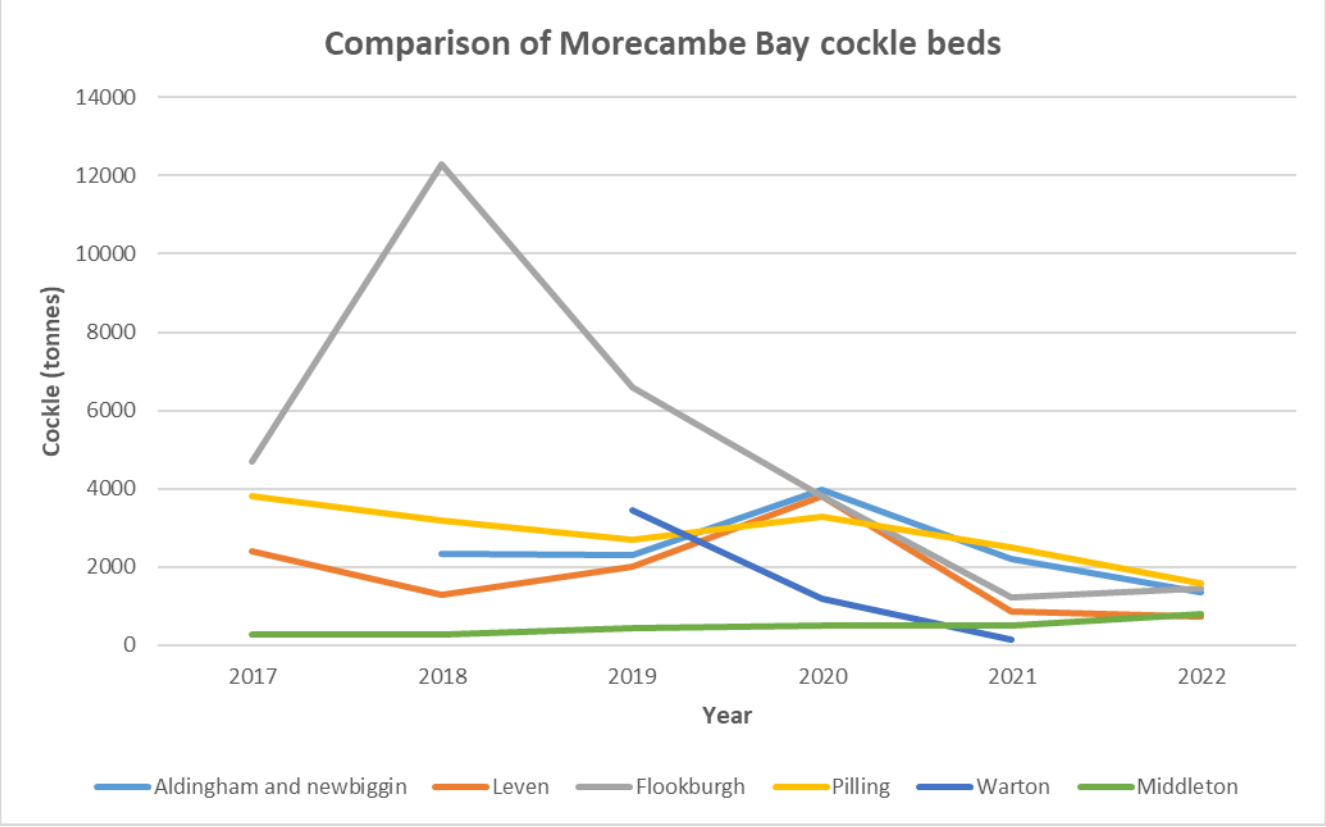


Figure 4. Annual maximum density of cockle per m2 across Morecambe Bay cockle beds.

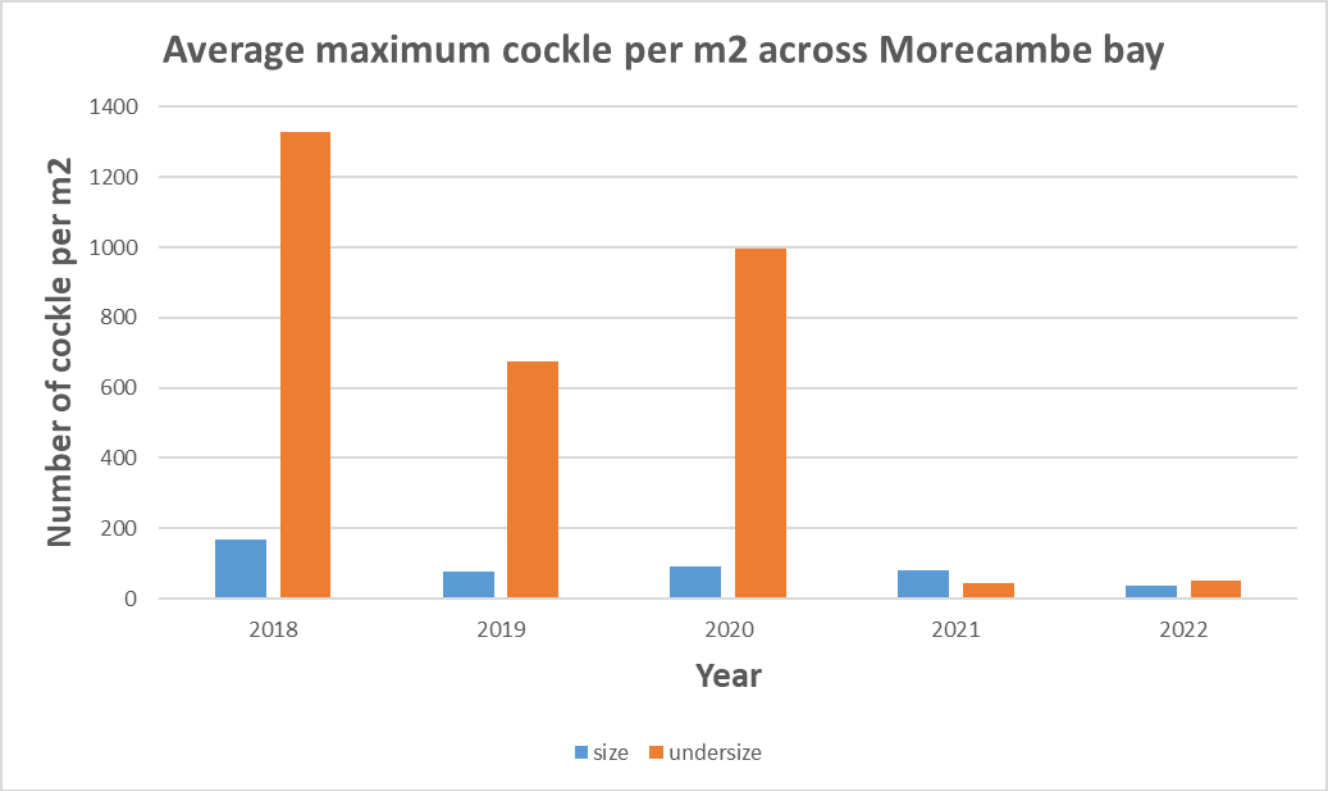


Figure 4 shows the maximum density of cockles per m2 across all Morecambe Bay cockle beds combined. The densities of individual beds are provided in Annex 2 of this report. This year, the maximum density of size is down from 81 per m^2 to 35 per m^2. Undersize, is slightly up this year from 43 per m^2 to 52 per m^2. There has been a significant decline in the density of both size and undersize cockles across the beds since the peak in 2018 and 2020. Less than 5mm cockle are not used in the undersize density or biomass figures due to the highly variable nature of survivability.

2. Morecambe Bay cockle fishery recommendation considerations

Last year, NWIFCA recommended that all cockle beds be closed due to concerns over the very low cockle biomass and, in particular, the low amount of undersize stock available to grow on and support a fishery in the following year. After discussion with the Authority, tt was subsequently agreed that Pilling Sands cockle bed be opened subject to HRA.

This year, there is again concern over the further decrease in overall cockle biomass and density across the Bay. It must be noted that all figures are maximum estimates, and the true value may fall lower than those presented here.

As has been previously discussed, there are several additional considerations when proposing the opening or closing of a fishery, which as yet do not have established parameters:

1) Bird food requirements for SPA designated species
2) Minimum cockle density spawning requirements
3) Location of cockle brood stock for re-seeding
4) An agreed threshold limit beyond which the fishery will remain closed
5) Criteria for selecting which beds should open in the event of low stock numbers.

NWIFCA does not have an agreed minimum total cockle biomass for Morecambe Bay from which to recommend the opening or closing of a fishery. There are outstanding questions on the requirements of birds for food, location of potential sources of cockle brood stock for Morecambe Bay and cockle survivability of juvenile cockle is highly reliant on environmental factors. Given these uncertainties and the low levels of juvenile stock across Morecambe Bay in comparison to previous years, the low total cockle biomass compared to previous years, and that there are very few areas with high densities of adult cockle stock, we cannot recommend that the Morecambe Bay cockle beds are opened on 1st September 2022. Closing the fishery would aim to allow adult cockles that survive the winter, the opportunity to spawn in 2023 and contribute to a following years fishery.

Annex 1.
Cockle survey results

Aldingham and Newbiggin Cockle Survey 01-07-22

Officers present: ID, MB, AP, JH
Tides: LW 07:53 2.0m (Liverpool Tides)

Survey method - Jumbo and 0.5m^2 quadrat

56 stations were sampled from a 500m grid. Most of the Aldingham survey location could not be accessed due to the Leven channel being closer to the shoreline. There was a wide range of cockle sizes across the bed from less than 5mm to greater than 35mm cockle. Cockle densities were relatively low across the bed. There were signs of a 2022 cockle settlement in some areas.

Means
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 but has been included as a separate figure.

Newbiggin:

Mean number of size cockle	8 per m^2	(min 0, max 58)
Mean number of undersize cockle	10 per m^2	(min 0, max 44)
Mean number of 0-5mm cockle	35 per m^2	(min 0, max 800)

Aldingham:

Mean number of size cockle	6 per m^2	(min 0, max 12)
Mean number of undersize cockle	9 per m^2	(min 0, max 62)
Mean number of 0-5mm cockle	2 per m^2	(min 0, max 6)

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

Biomass

	Area (ha)	**Size Cockle (tonnes)[1]**	**Undersize Cockle (tonnes)[2]**
Newbiggin	**990**	**800-1000**	**200-300**
Aldingham	**73**	**50**	**15**

[1]In regards to biomass size cockle defined as cockle which will not pass through a square gauge 20 x 20mm in size.
[2]The biomass of undersize cockle does not include any estimates of cockle less than 5mm due to the high variability of survival of this size class.

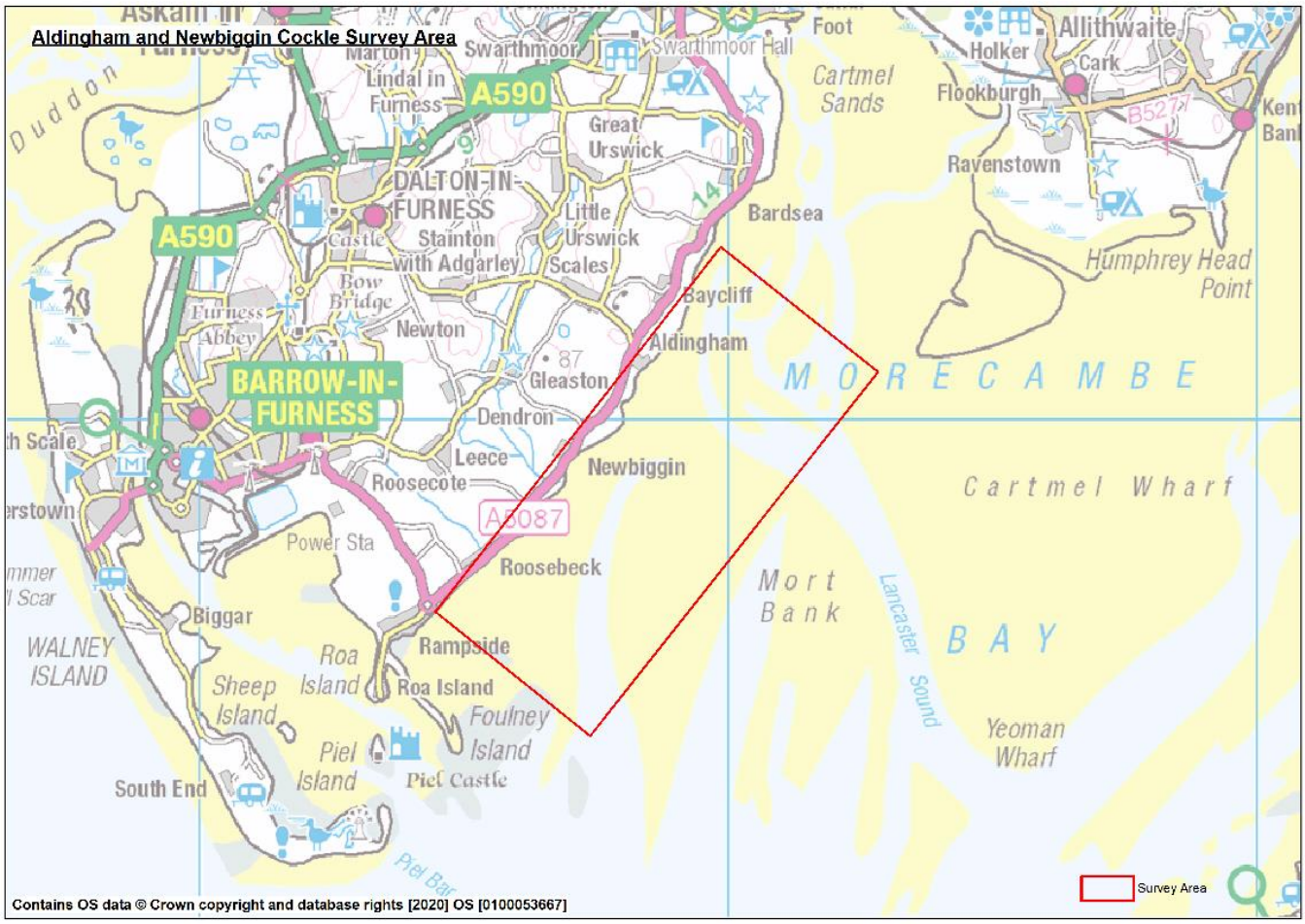
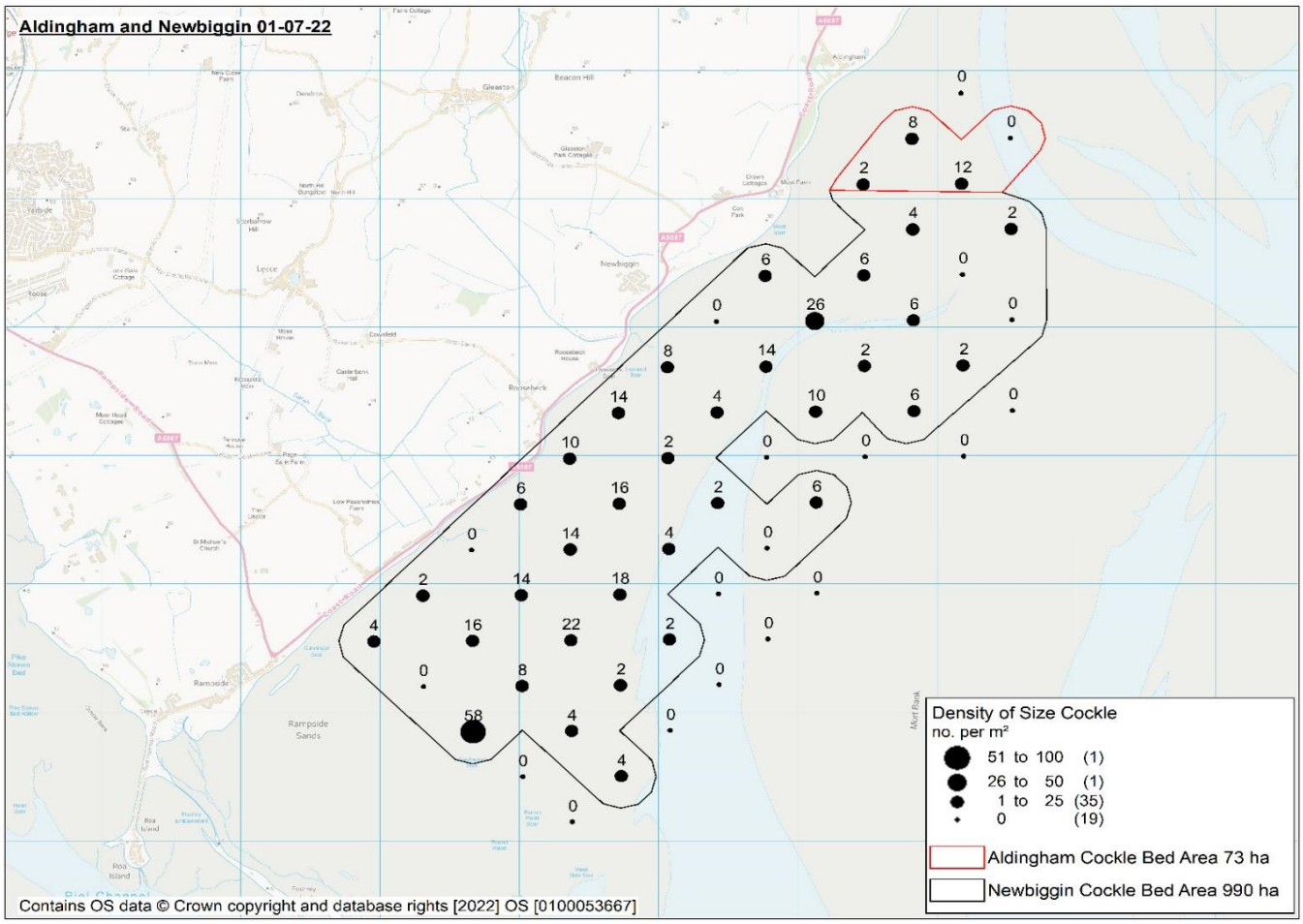
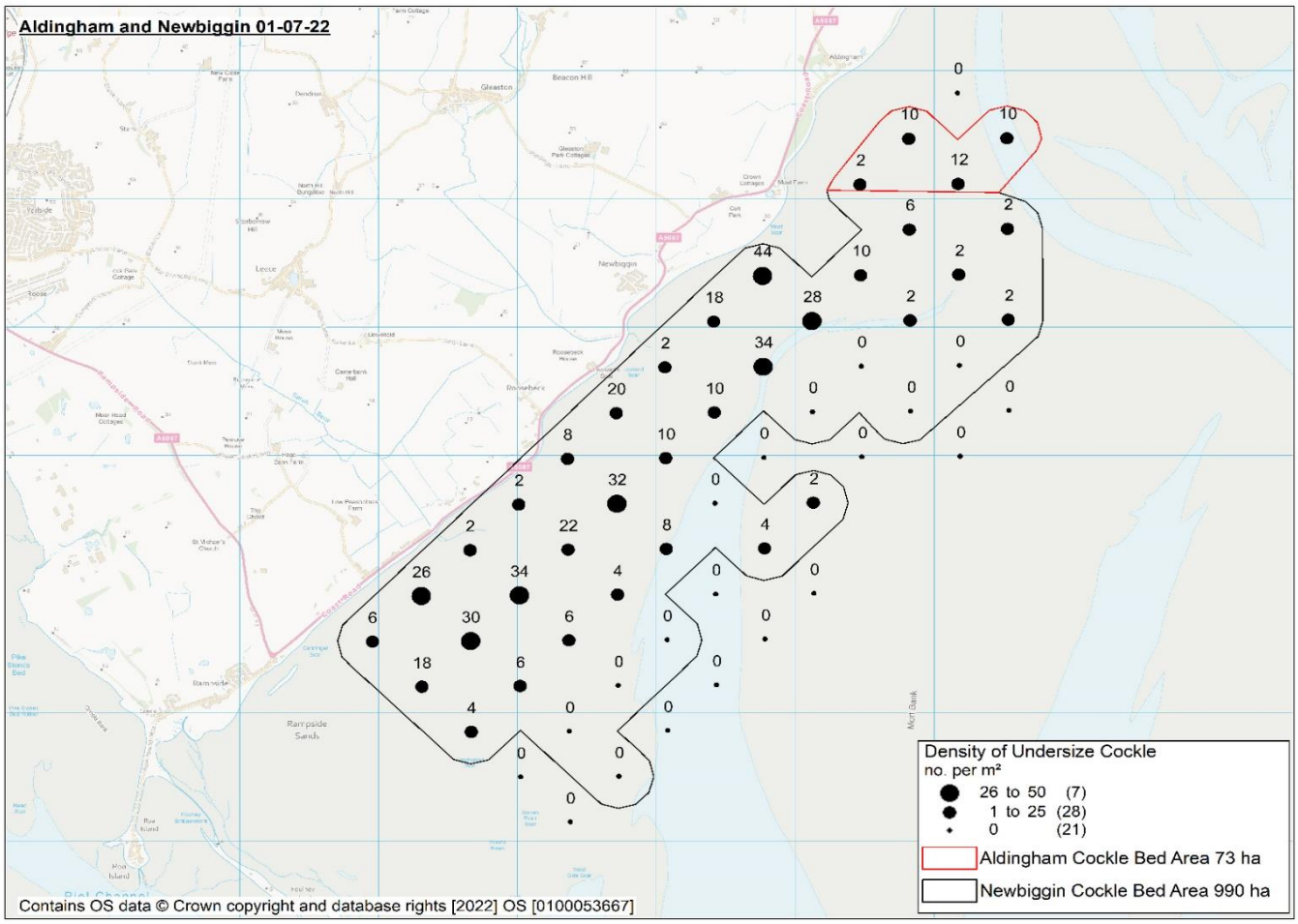


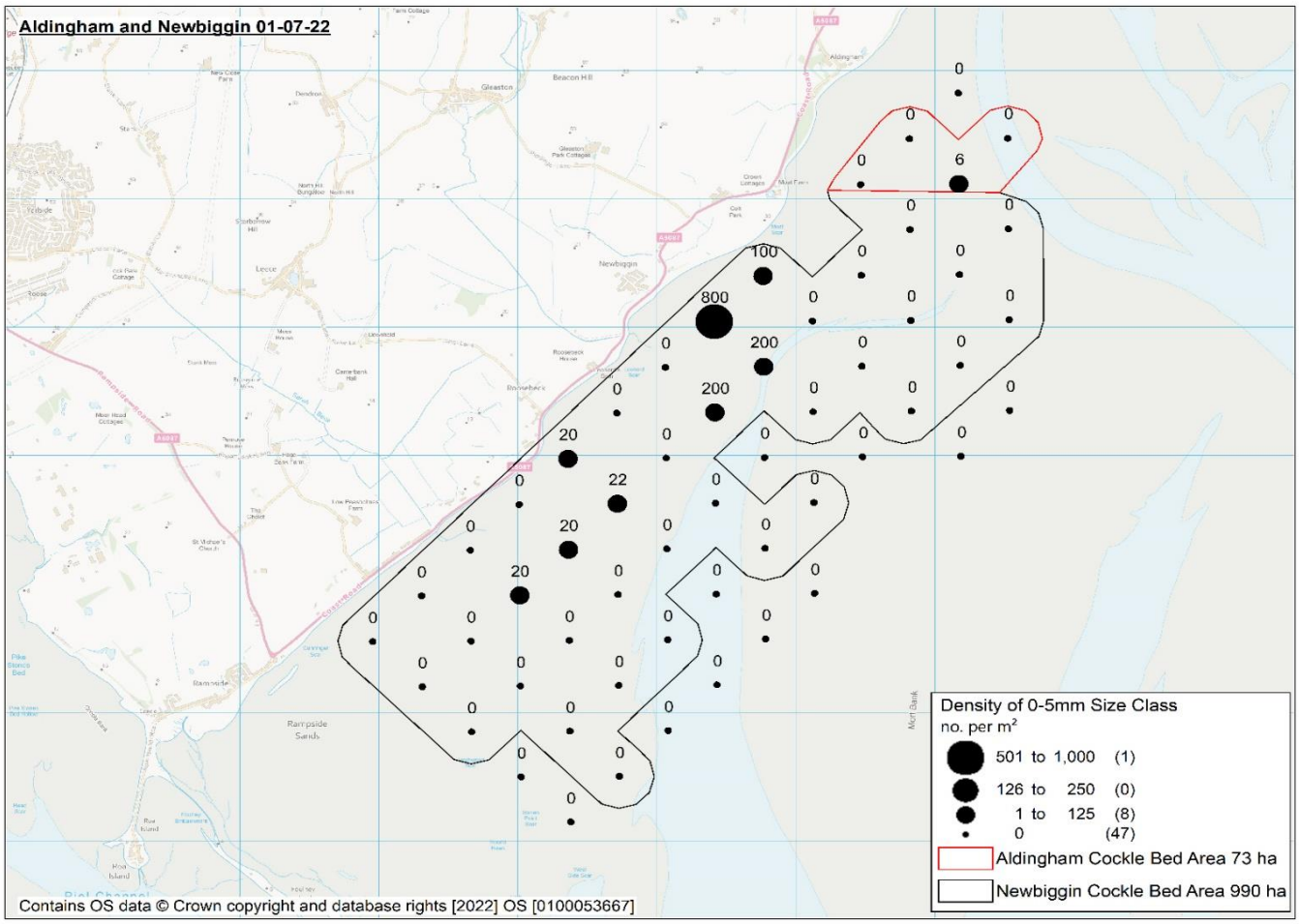
Illustration of position of Aldingham and Newbiggin Survey Area



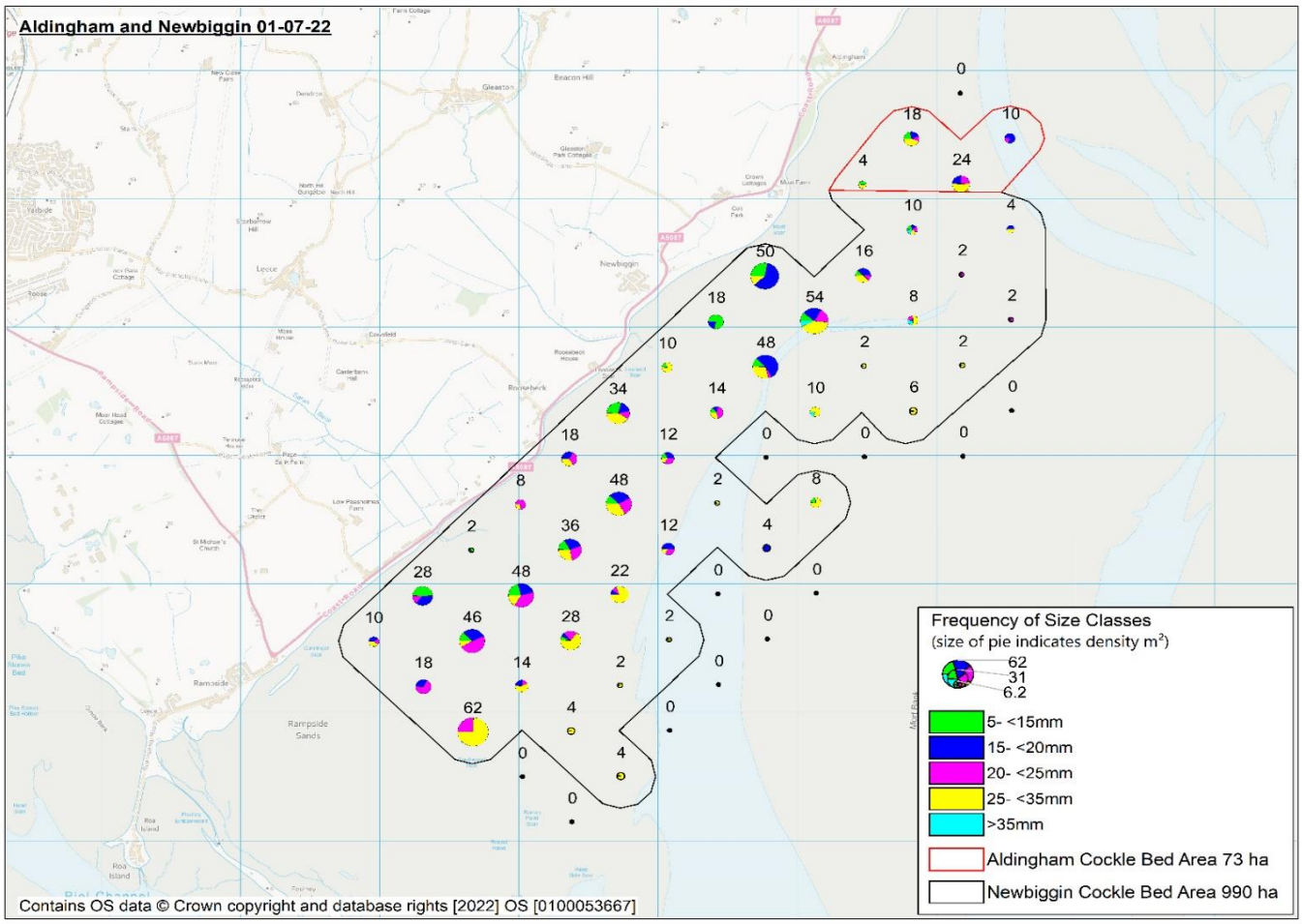
Density of size cockle per m² Aldingham and Newbiggin July 2022



Density of undersize cockle per m² Aldingham and Newbiggin July 2022



Density of 0-5mm cockle per m² Aldingham and Newbiggin July 2022


Aldingham and Newbiggin 01-07-22
Frequency of Size Classes
(size of pie indicates density m²)
62
31
6.2
5- <15mm
15- <20mm
20- <25mm
25- <35mm
>35mm
Aldingham Cockle Bed Area 73 ha
Newbiggin Cockle Bed Area 990 ha
Contains OS data © Crown copyright and database rights [2022] OS [0100053667]

Flookburgh Cockle Survey 12-07-22

Officers present: ID, MB, AG, AP, JH
Tides: LW 17:23 1.7m (Liverpool Tides)

Survey method - Jumbo and 0.5m^2 quadrat

139 stations were sampled from a 500m grid. There was a wide range of cockle sizes across the bed from < 5mm to > 35mm. There was a large area in the middle of the surveyed area where there were no cockles which has been removed from the bed area. There is evidence of a 2022 settlement, with some areas of high spat numbers. Where spat is present but no other year classes of cockle where recorded have been removed from the bed area. Cockle density is relatively low across the bed other than cockle spat.

Means

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 but has been included as a separate figure.

Mean number of size cockle	4 per m²	(min 0, max 46)
Mean number of undersize cockle	7 per m²	(min 0, max 60)
Mean number of 0-5mm cockle	185 per m²	(min 0, max 4000)

Maps

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

Biomass

	Area (ha)	Size Cockle (tonnes)[1]	Undersize Cockle (tonnes)[2]
Flookburgh	**2240**	**650-850**	**500-600**

[1]In regards to biomass size cockle defined as cockle which will not pass through a square gauge 20 x 20mm in size.
[2]The biomass of undersize cockle does not include any estimates of cockle less than 5mm due to the high variability of survival of this size class.

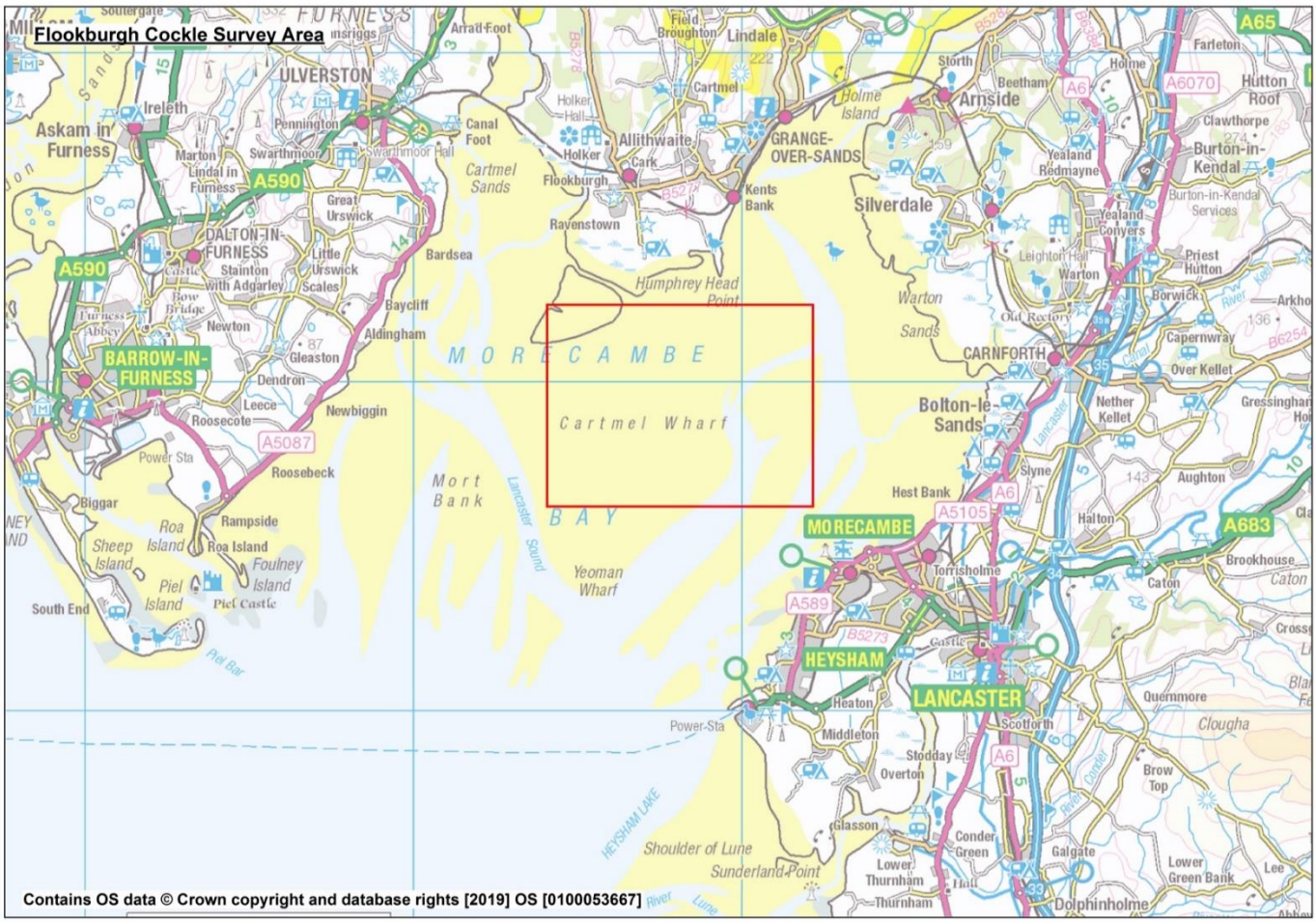
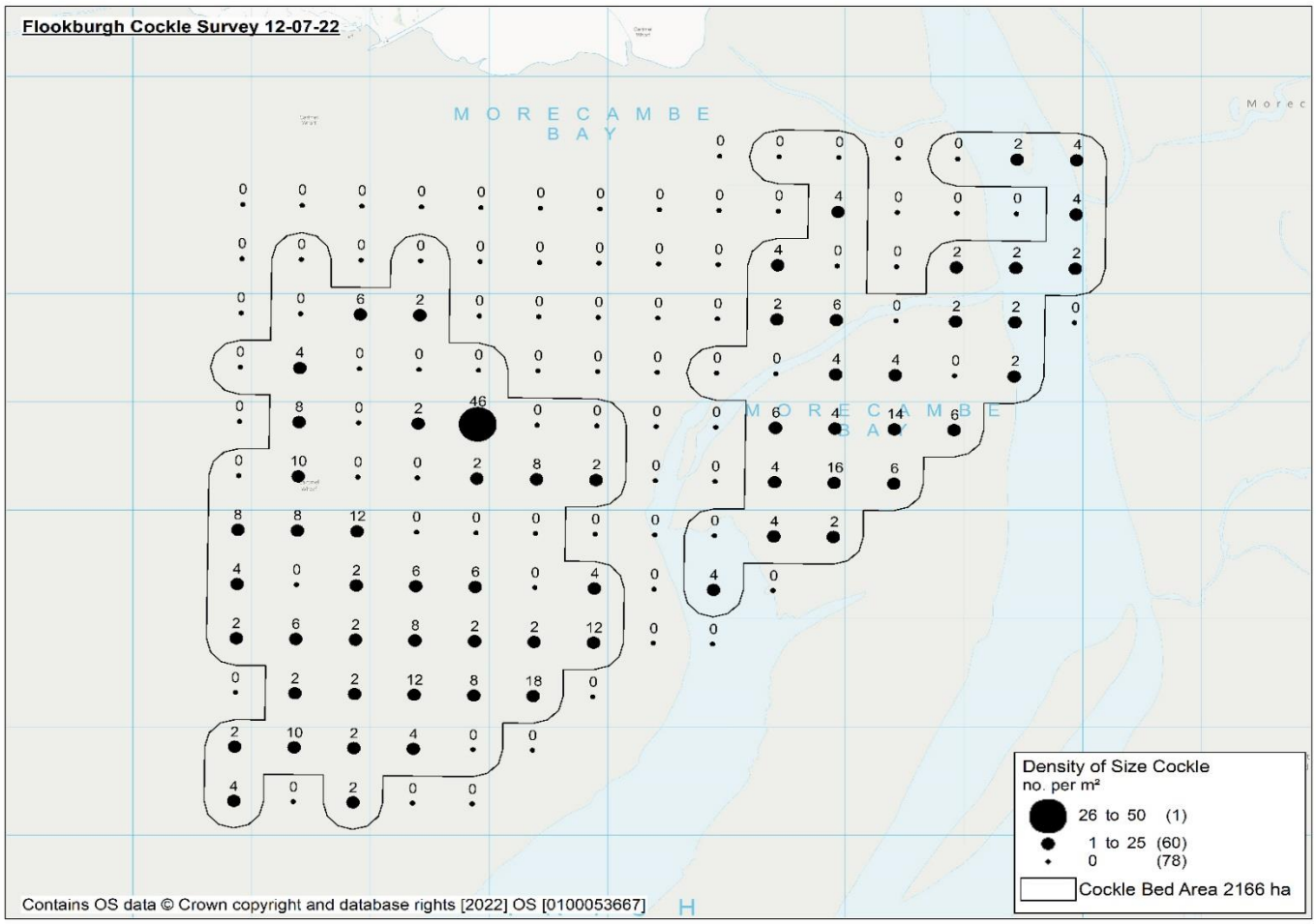
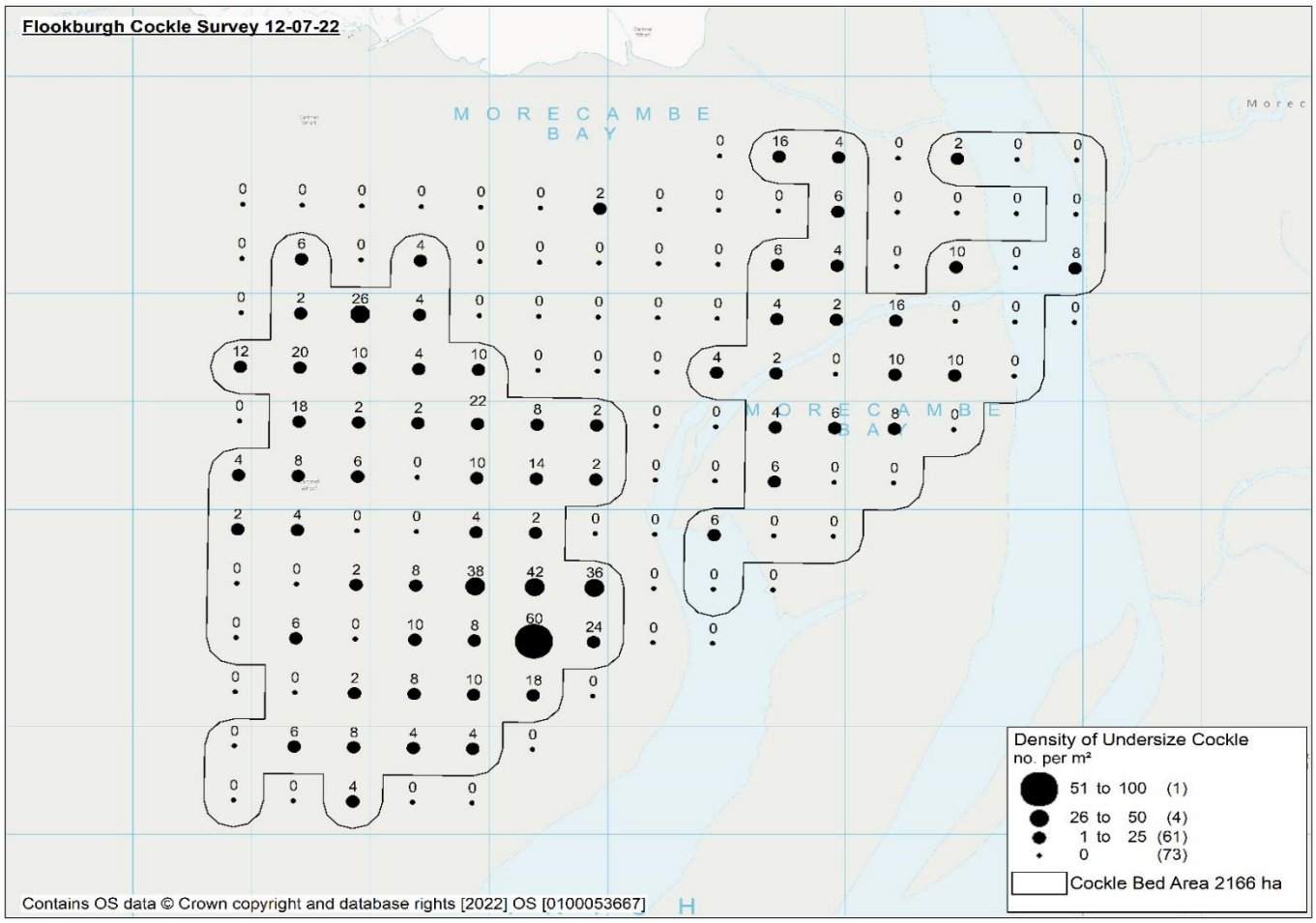


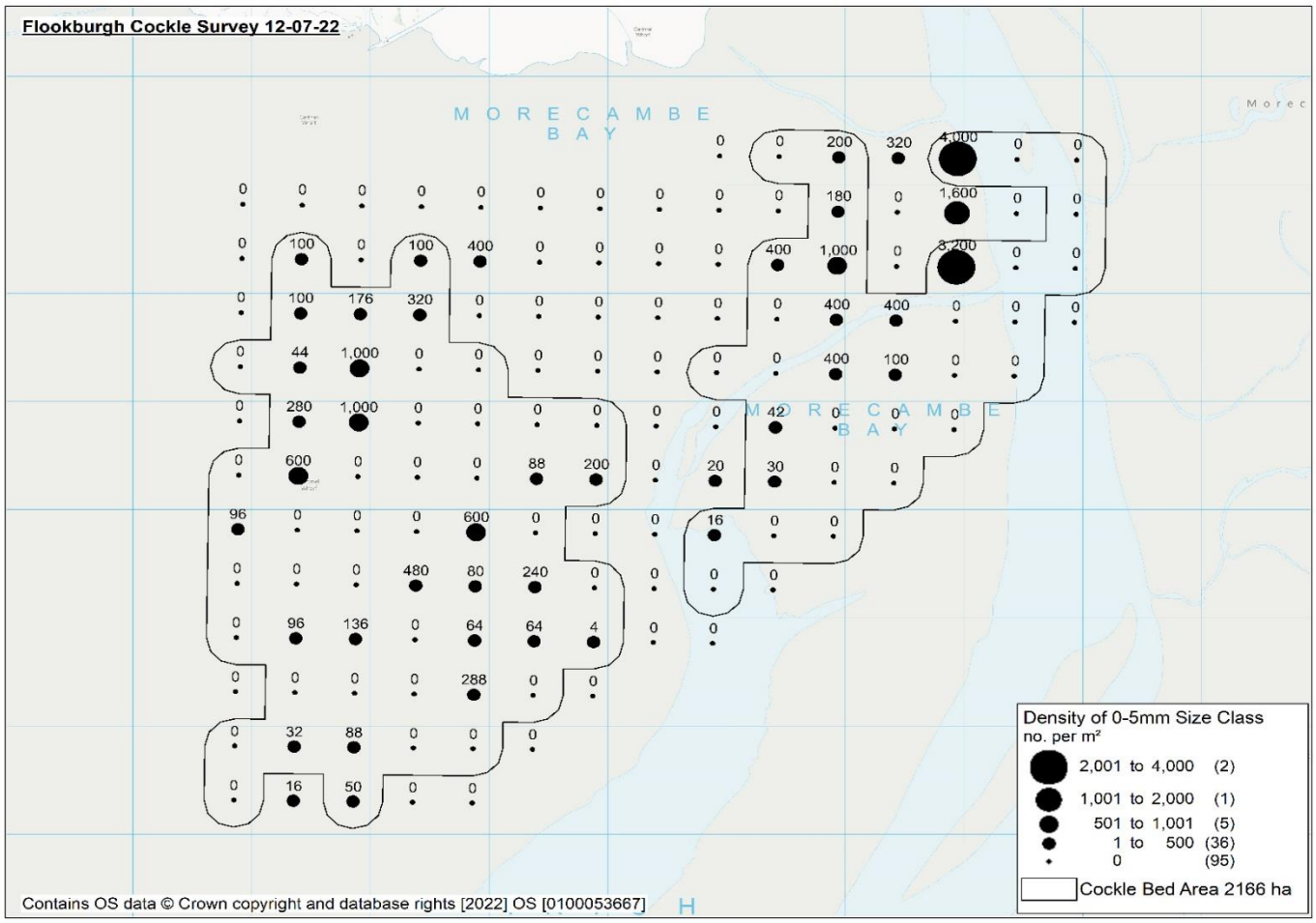
Illustration of position of Flookburgh Survey Area



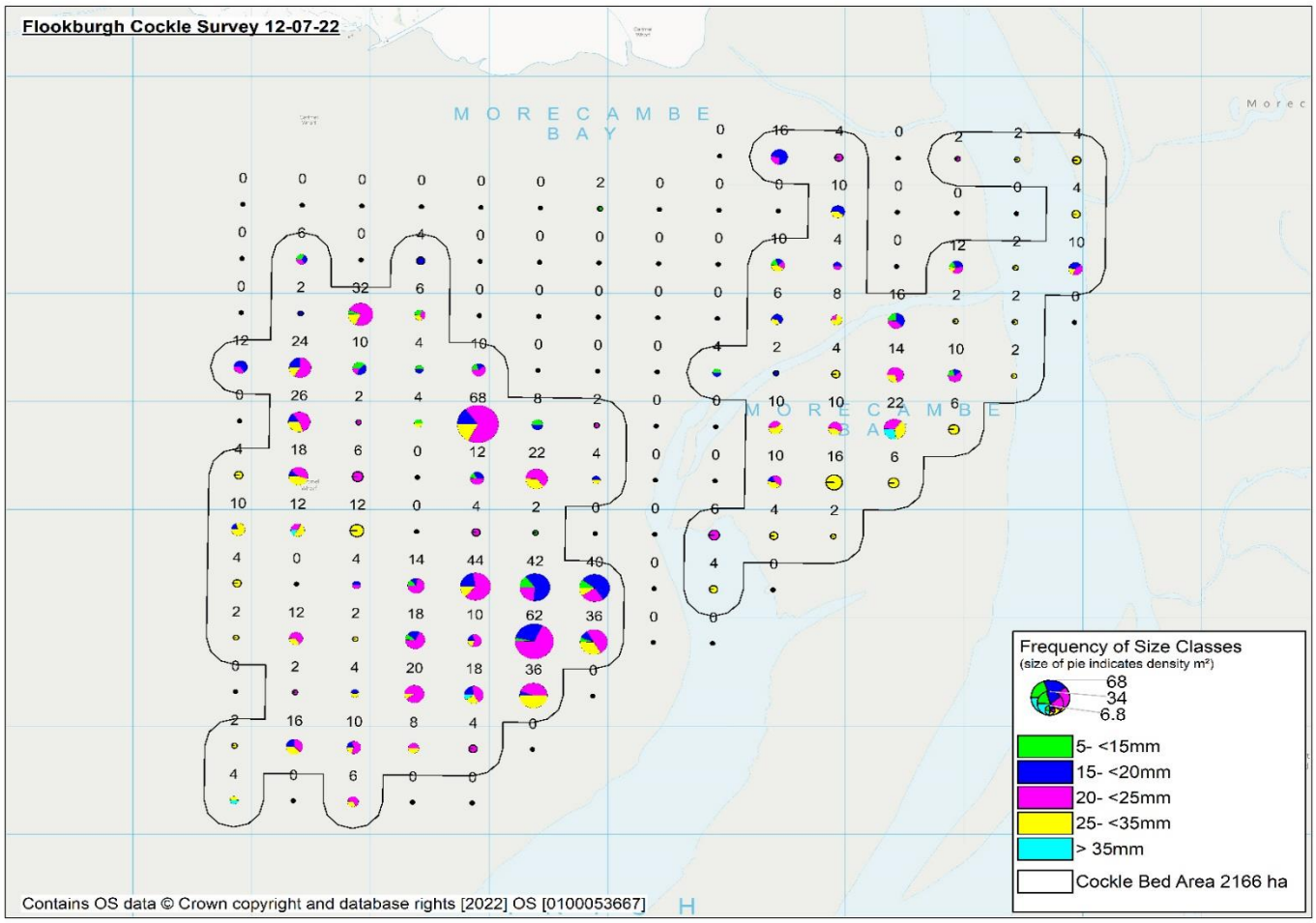
Density of size cockle per m² Flookburgh July 2022.



Density of undersize cockle per m² Flookburgh July 2022.



Density of 0-5mm cockle per m² Flookburgh July 2022.



Frequency of size classes of cockle per m² Flookburgh July 2022.

Leven Cockle Survey 13-07-22

Officers present: ID, MB, JH
Tides: LW 18:18 1.4m (Liverpool Tides)

76 stations were sampled from a 500m grid. here was a wide range of cockle sizes across the bed from < 5mm to > 35mm. The densities of both size and undersize cockle across the bed were relatively low. Size cockle were present across the surveyed area. There is evidence of a 2022 settlement, with some areas of high spat numbers. Where spat is present but no other year classes of cockle where recorded have been removed from the bed area. Cockle density is relatively low across the bed other than cockle spat.

Means

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 but has been included as a separate figure.

Mean number of size cockle	5 per m^2	(min 0, max 16)
Mean number of undersize cockle	6 per m^2	(min 0, max 28)
Mean number of 0-5mm cockle	131 per m^2	(min 0, max 2000)

Maps

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

Biomass

Due to the lack of cockles on Leven and that there is no clear boundary been Flookburgh and Leven cockle beds, length weight data has been combined and used for Leven.

	Area (ha)	**Size Cockle (tonnes)[1]**	**Undersize Cockle (tonnes)[2]**
Leven	**1047**	**400-500**	**200-225**

[1]In regards to biomass size cockle defined as cockle which will not pass through a square gauge 20 x 20mm in size.
[2]The biomass of undersize cockle does not include any estimates of cockle less than 5mm due to the high variability of survival of this size class.

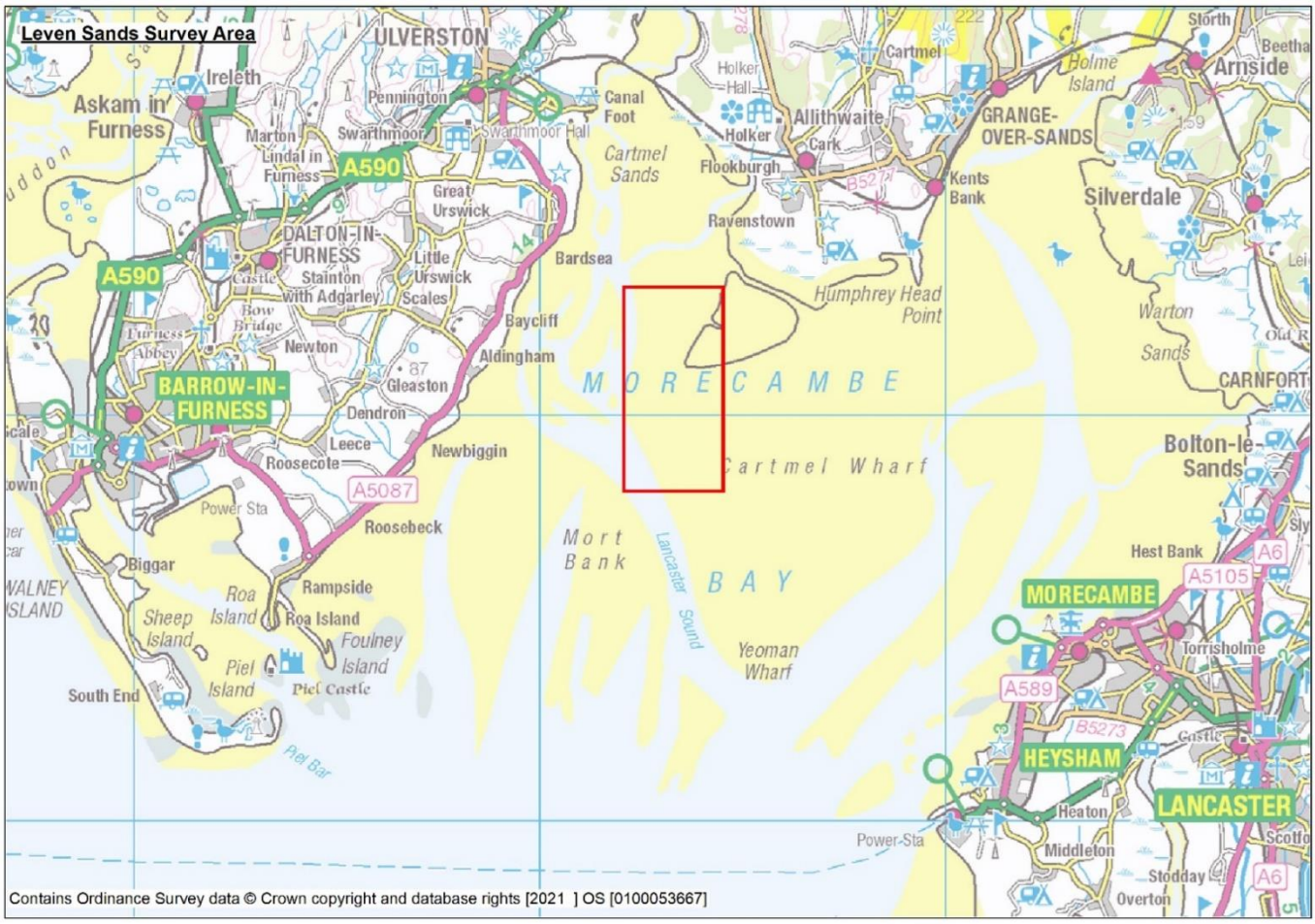
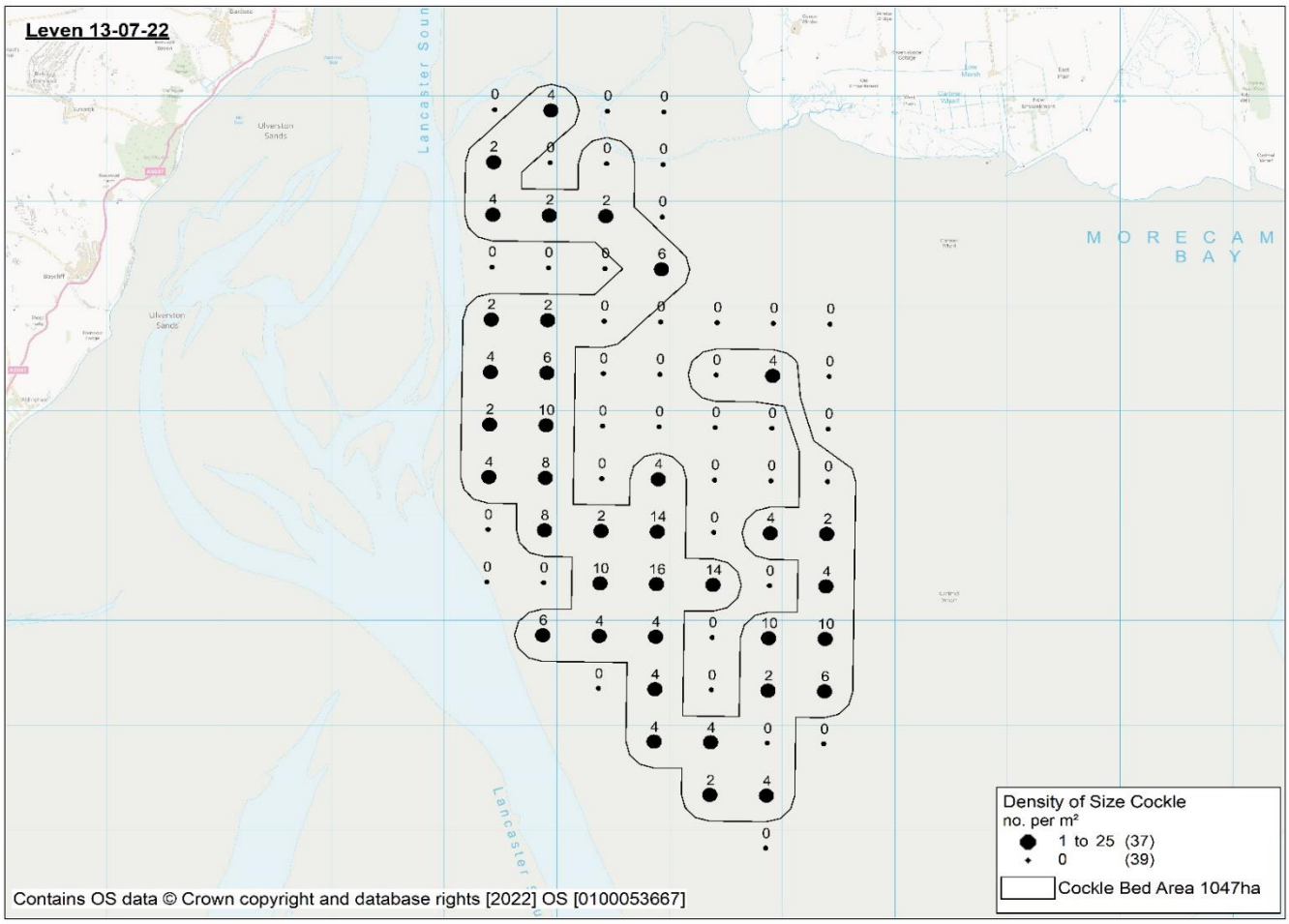
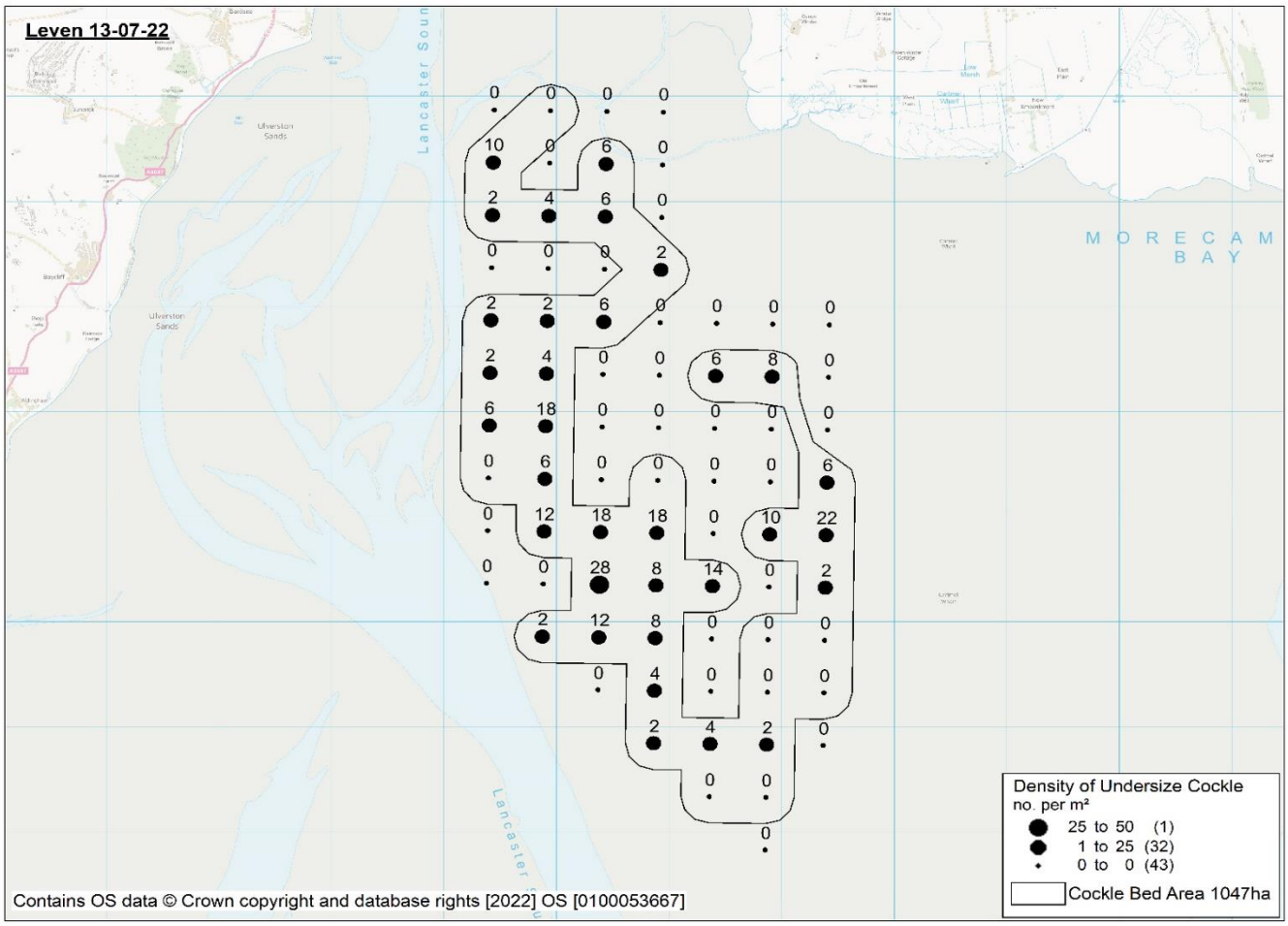


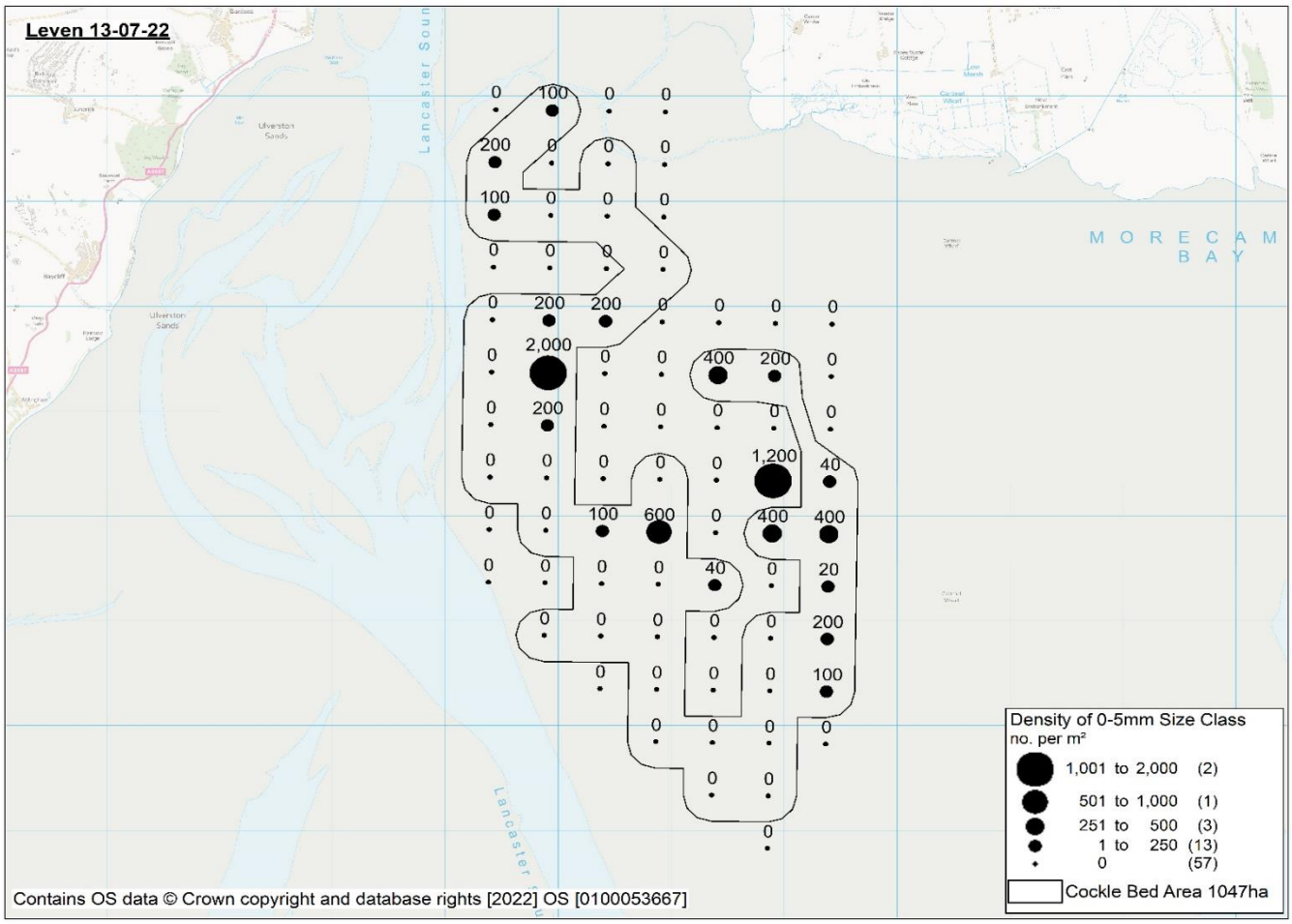
Illustration of position of Leven Survey Area



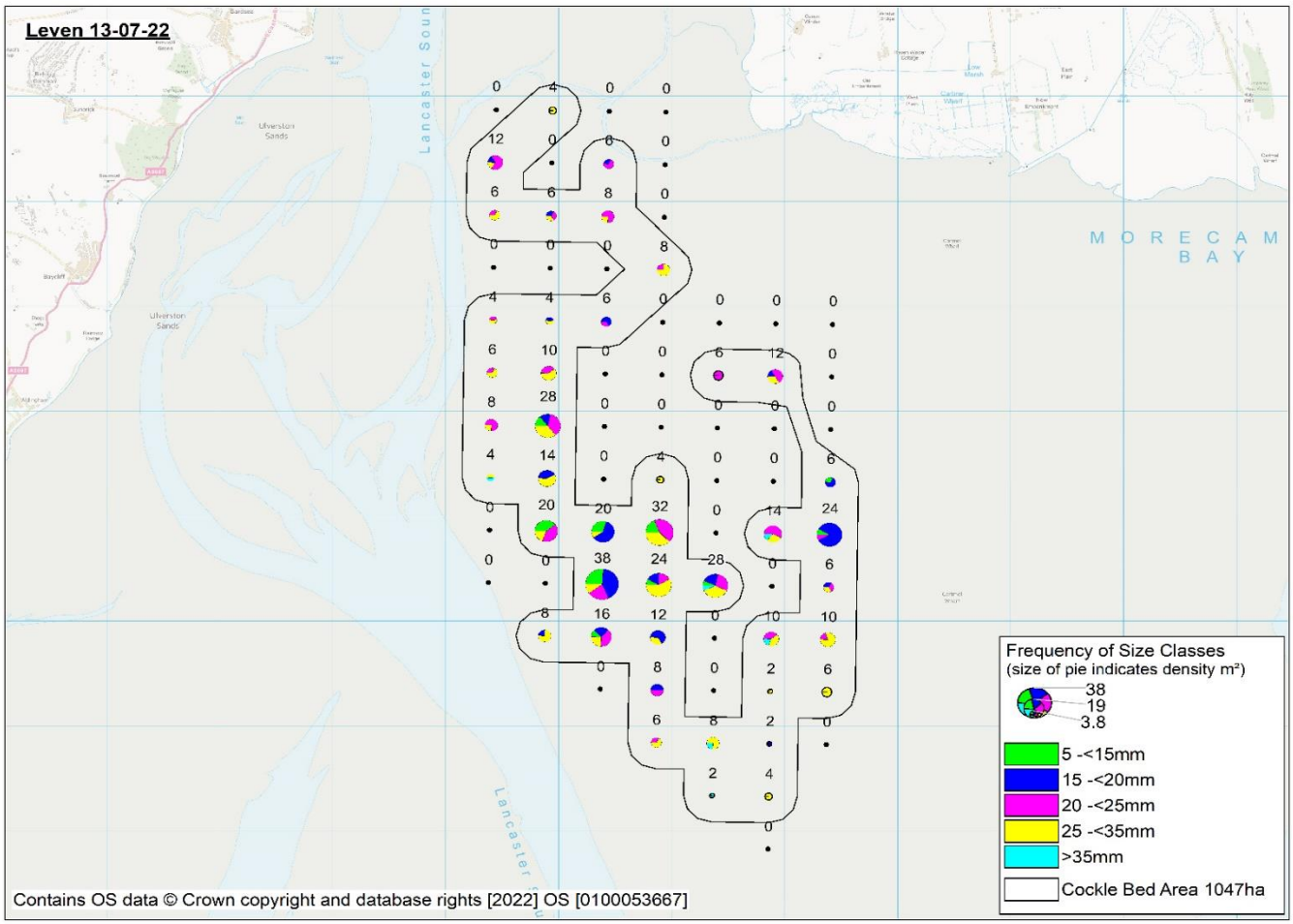
Density of size cockle per m² Leven July 2022



Density of undersize cockle per m² Leven July 2022



Density of 0-5mm cockle per m² Leven July 2022



Frequency of size classes of cockle per m² Leven July

Middleton Cockle Survey 25-07-22

Officers present: AP, AG, MB
Tides: LW 16:24 2.9m (Liverpool tides)

Survey method - Jumbo and 0.5m^2 quadrat

80 stations were sampled from a 350m grid. There was a wide range of cockle sizes across the bed from < 5mm to > 35mm. There is evidence of a 2022 settlement. Where spat is present but no other year classes of cockle where recorded have been removed from the bed area. Cockle density is relatively low across the bed**.**

Means

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 but has been included as a separate figure.

Mean number of size cockle	5 per m^2	(min 0, max 18)
Mean number of undersize cockle	14 per m^2	(min 0, max 86)
Mean number of 0-5mm cockle	7 per m^2	(min 0, max 120)

Maps

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

Biomass

	Area (ha)	**Size Cockle (tonnes)[1]**	**Undersize Cockle (tonnes)[2]**
Middleton Sands	**771**	**250-350**	**350-450**

[1]In regards to biomass size cockle defined as cockle which will not pass through a square gauge 20 x 20mm in size.
[2]The biomass of undersize cockle does not include any estimates of cockle less than 5mm due to the high variability of survival of this size class.

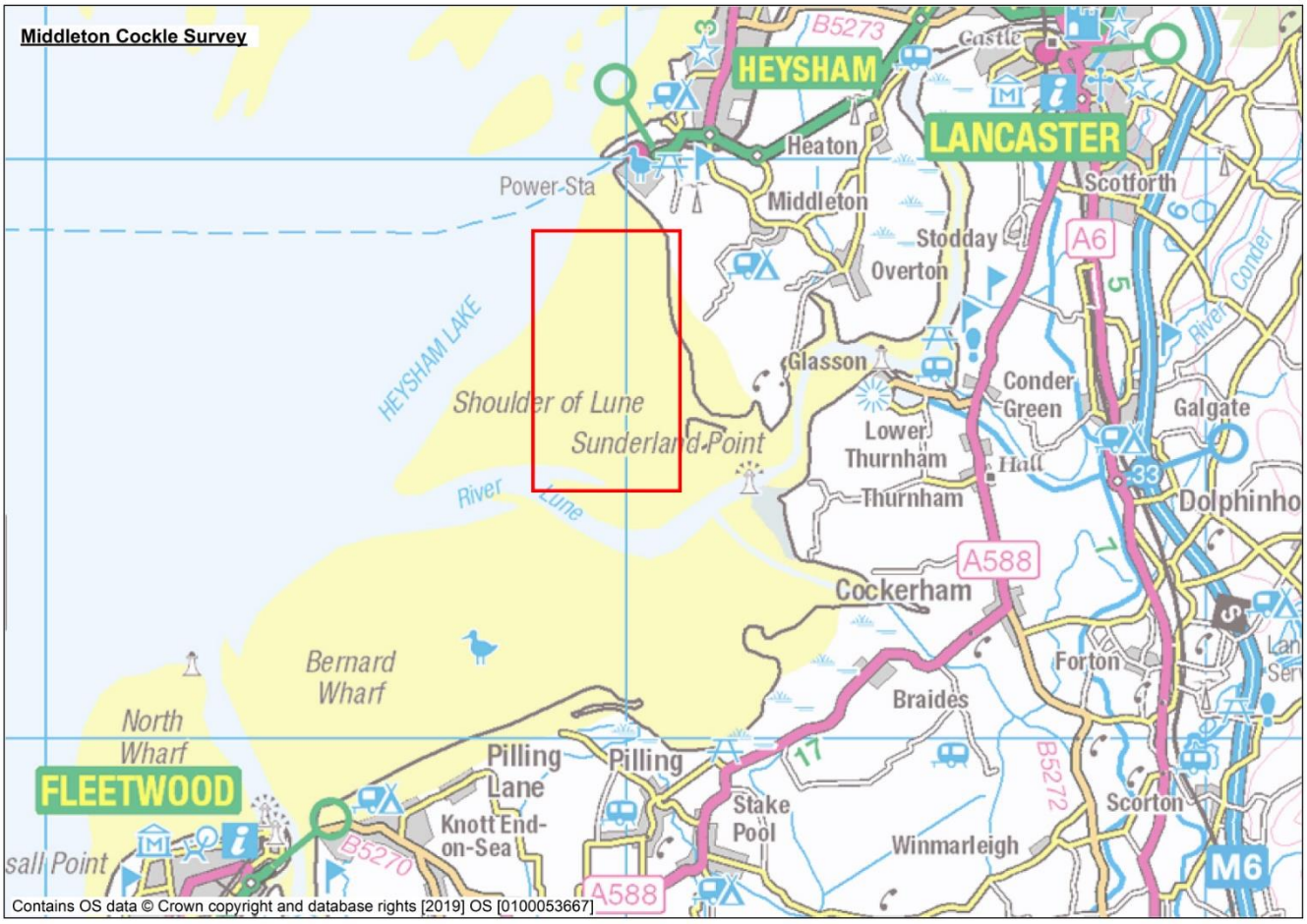
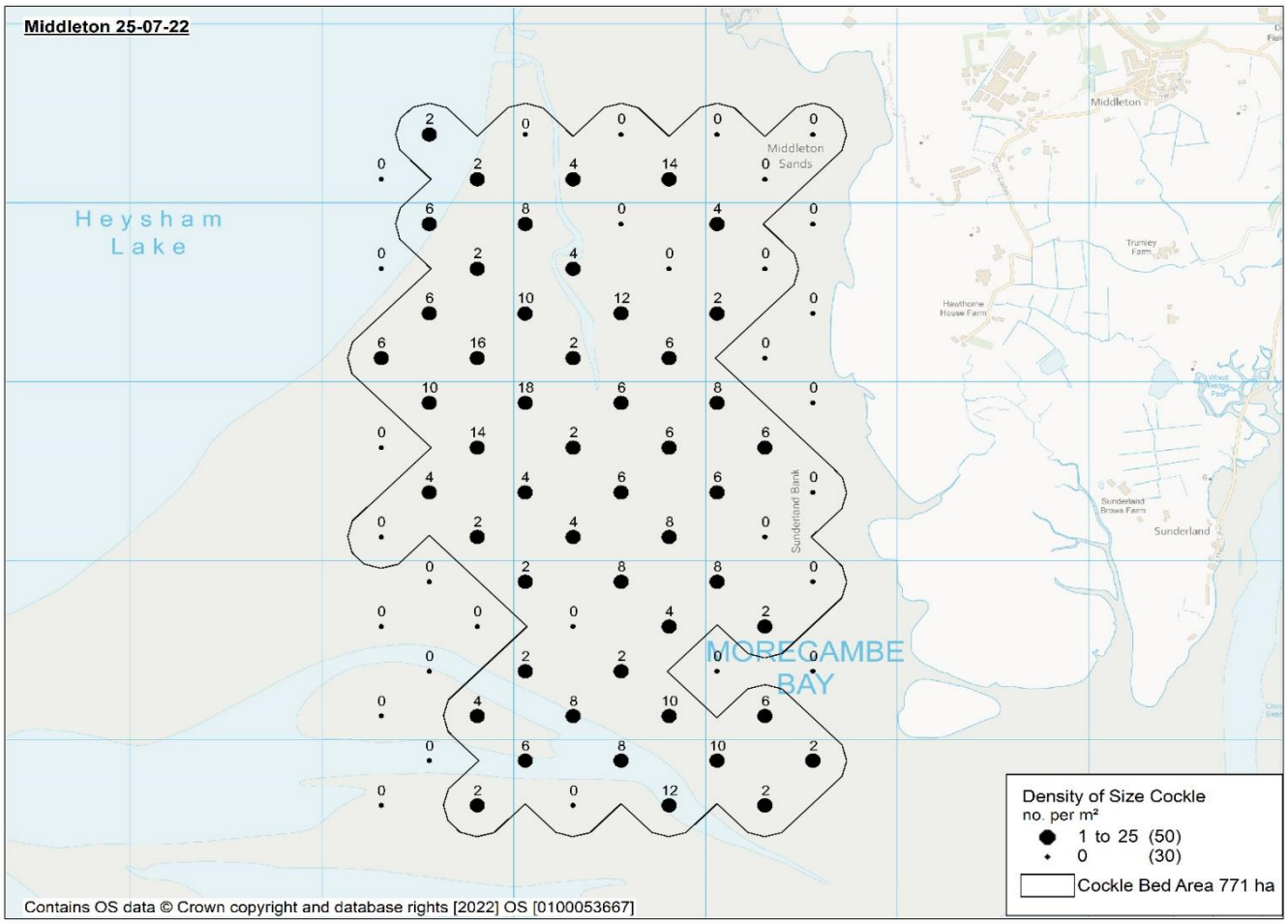
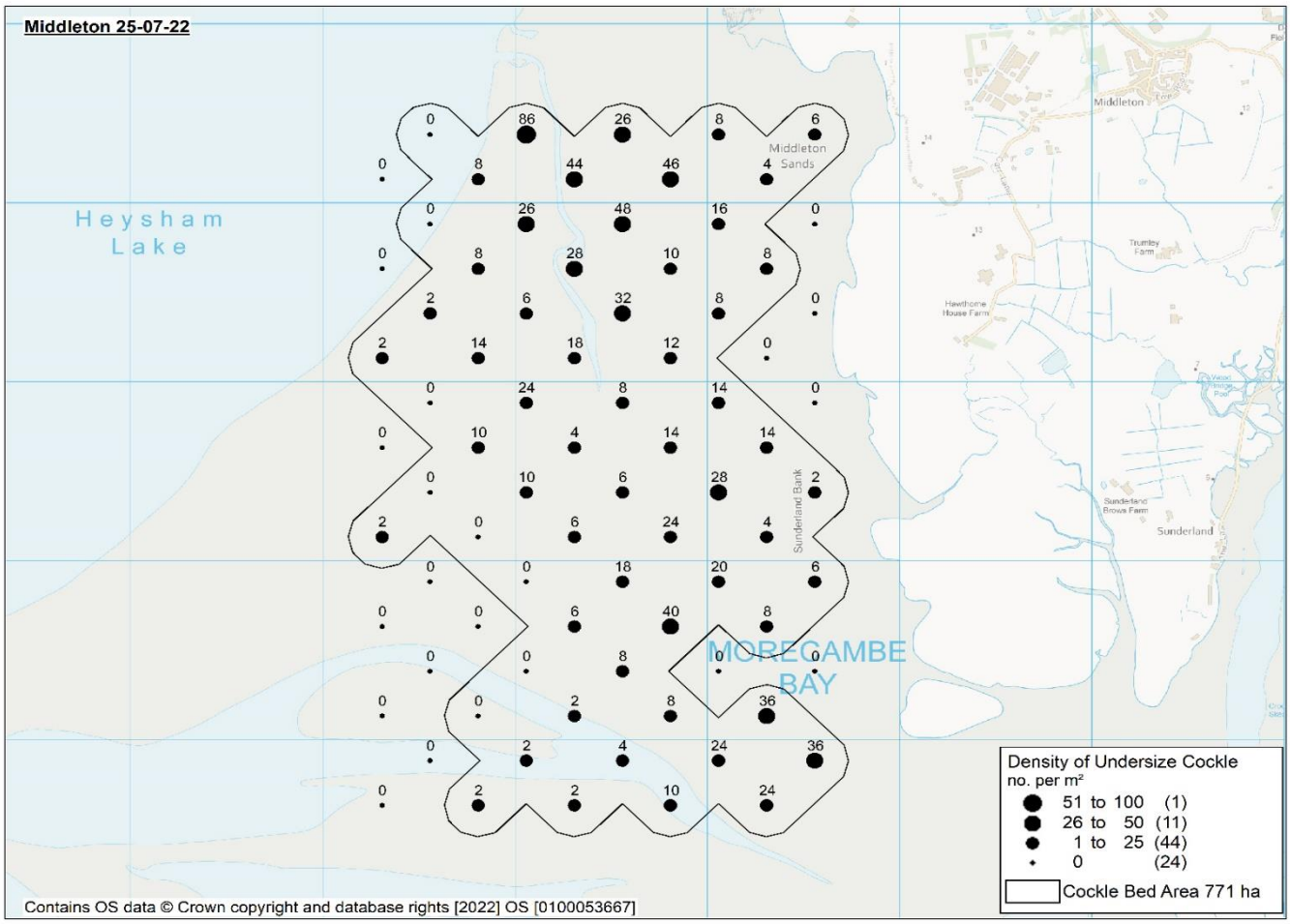


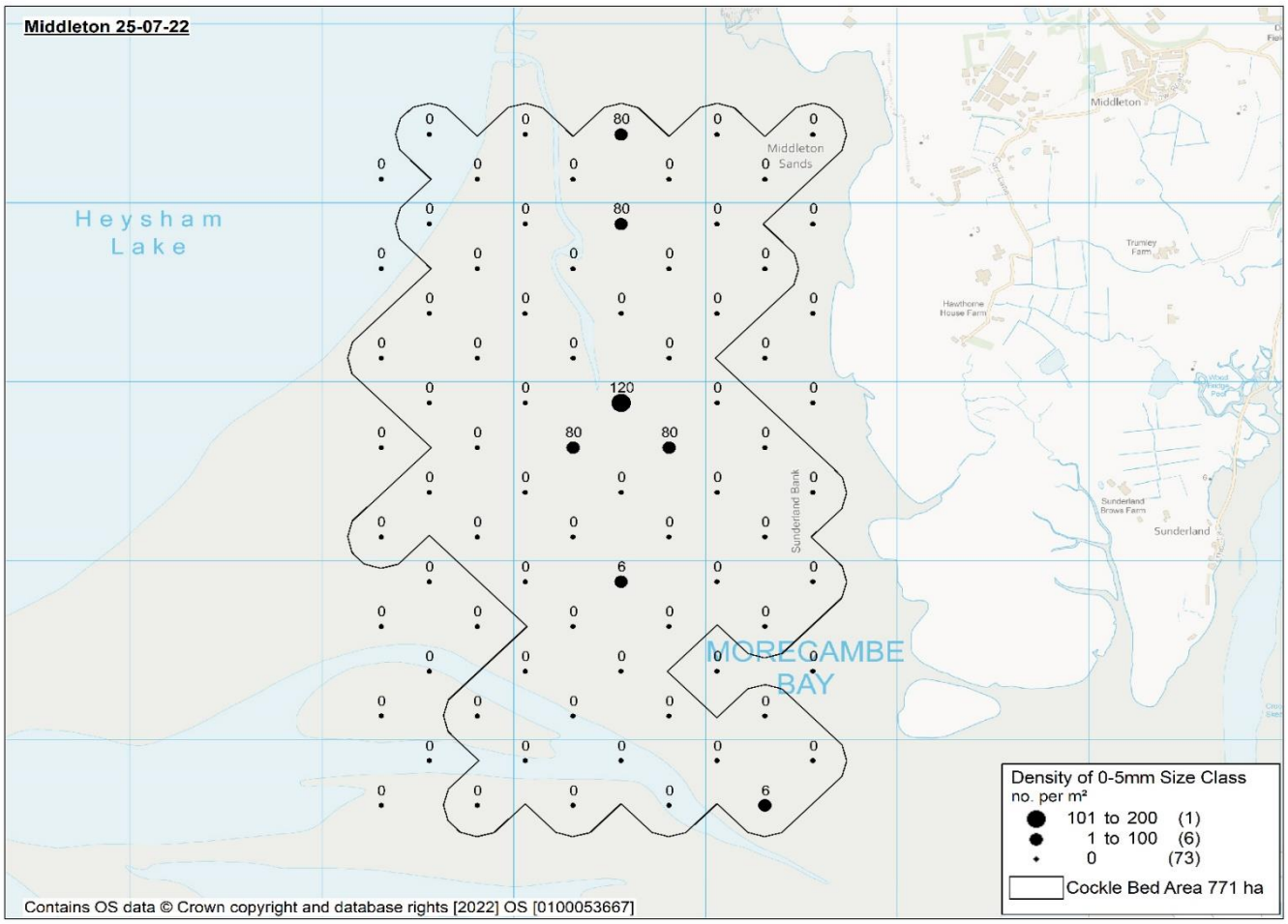
Illustration of position of Middleton Sands cockle bed



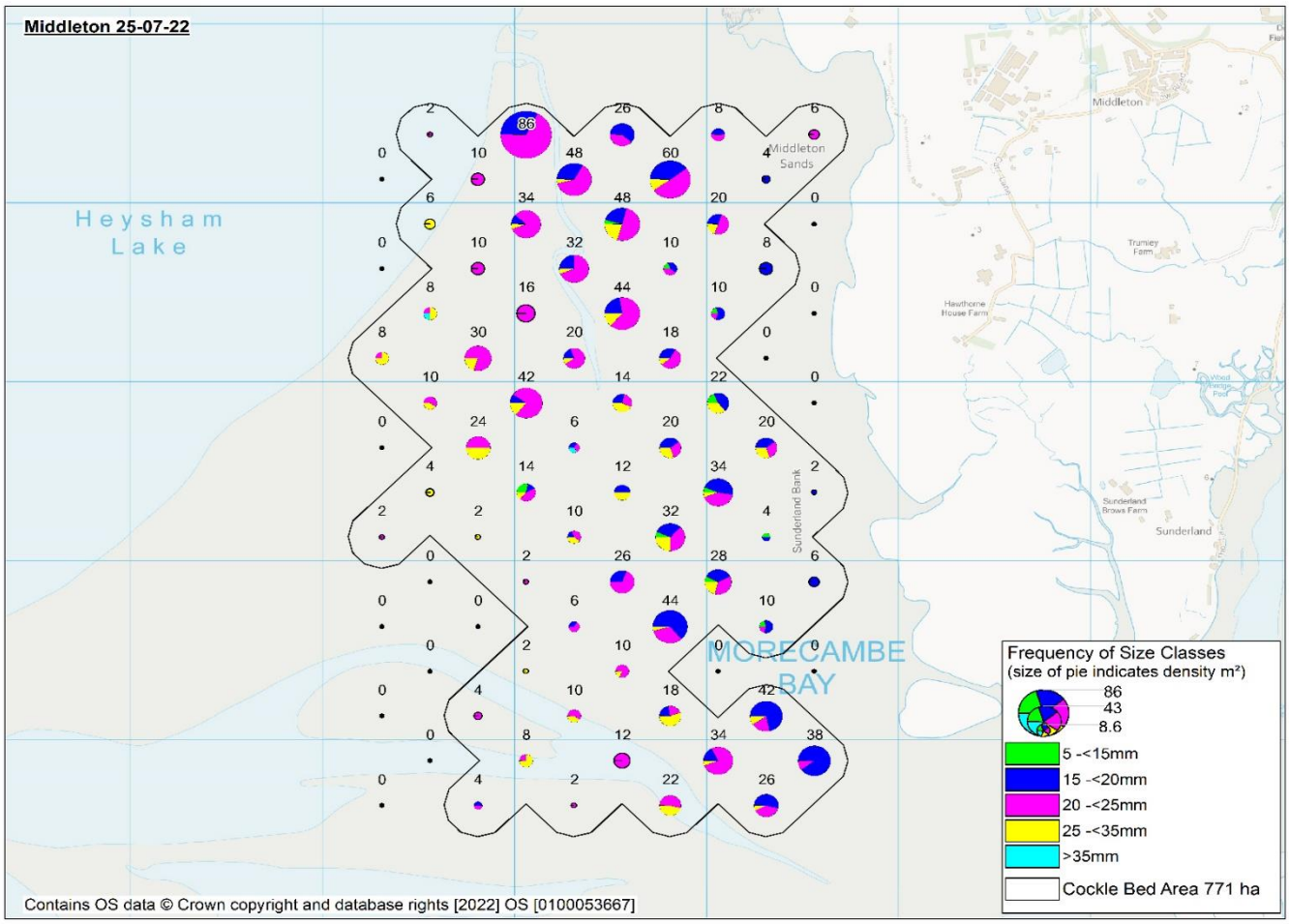
Density of size cockle per m² Middleton Sands July 2022



Density of undersize cockle per m² Middleton Sands July 2022



Density of 0-5mm cockle per m² on Middleton Sands July 2022



Frequency of size classes of cockle per m

Pilling Sands Cockle Survey 20-07-22

Officers present: AP, JH, AG
Tides: LW 11:38 2.0m (Liverpool tides)

Survey method - Jumbo and 0.5m^2 quadrat

80 stations were sampled from a 500m grid. Three additional stations was added to ensure full coverage of the cockle bed. There was a wide range of cockle sizes across the bed from < 5mm to > 35mm. There was a relatively low density of size cockle across much of the bed. There is evidence of a 2022 settlement, with some areas of high spat numbers. Where spat is present but no other year classes of cockle where recorded have been removed from the bed area. Cockle density is relatively low across the bed other than cockle spat.

Means

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 but has been included as a separate figure.

Mean number of size cockle	7 per m²	(min 0, max 28)
Mean number of undersize cockle	9 per m²	(min 0, max 42)
Mean number of 0-5mm cockle	76 per m²	(min 0, max 800)

Maps

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

Biomass

	Area (ha)	Size Cockle (tonnes)[1]	Undersize Cockle (tonnes)[2]
Pilling Sands	**1461**	**1000-1200**	**300-400**

[1]In regards to biomass size cockle defined as cockle which will not pass through a square gauge 20 x 20mm in size.
[2]The biomass of undersize cockle does not include any estimates of cockle less than 5mm due to the high variability of survival of this size class.

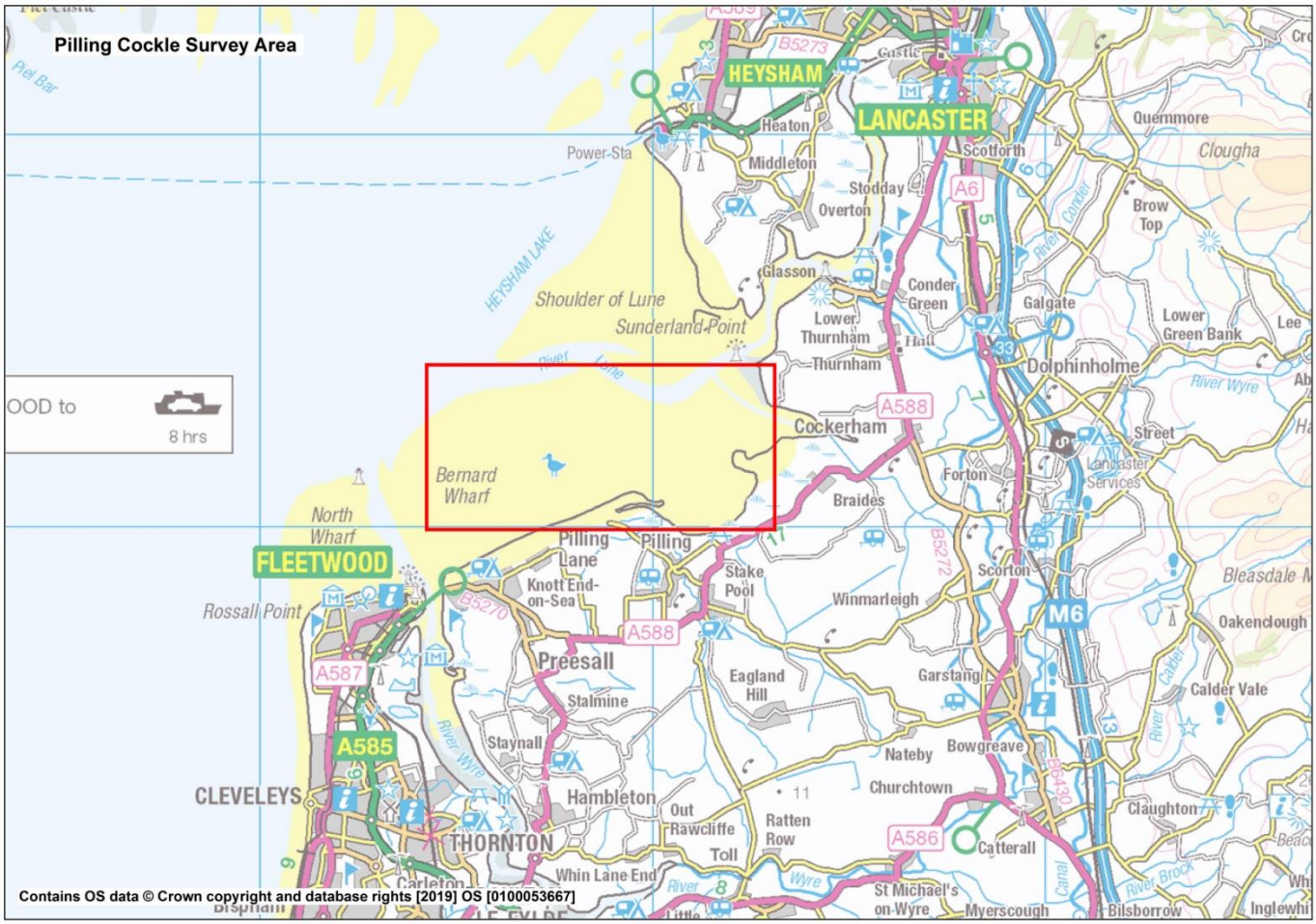
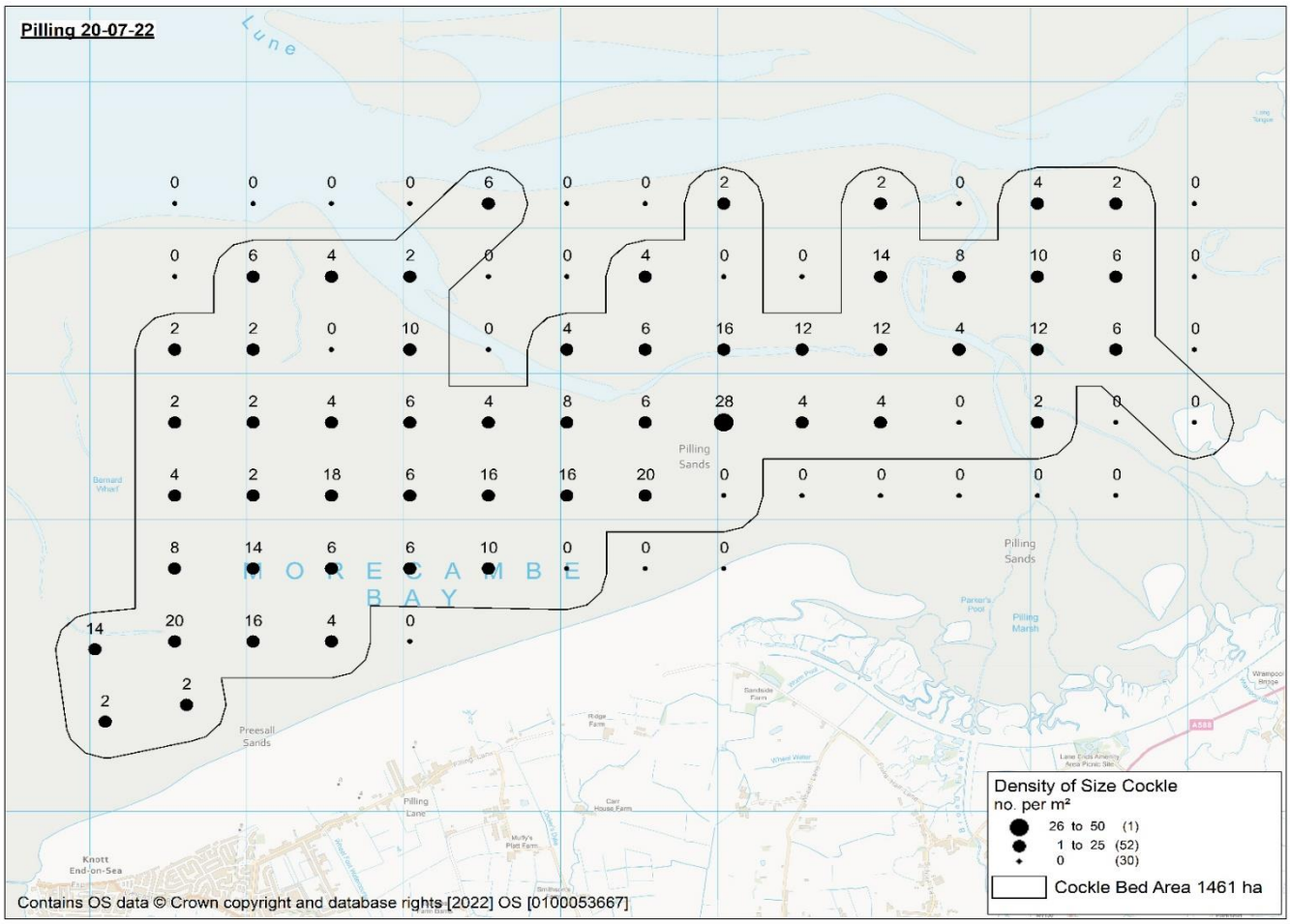
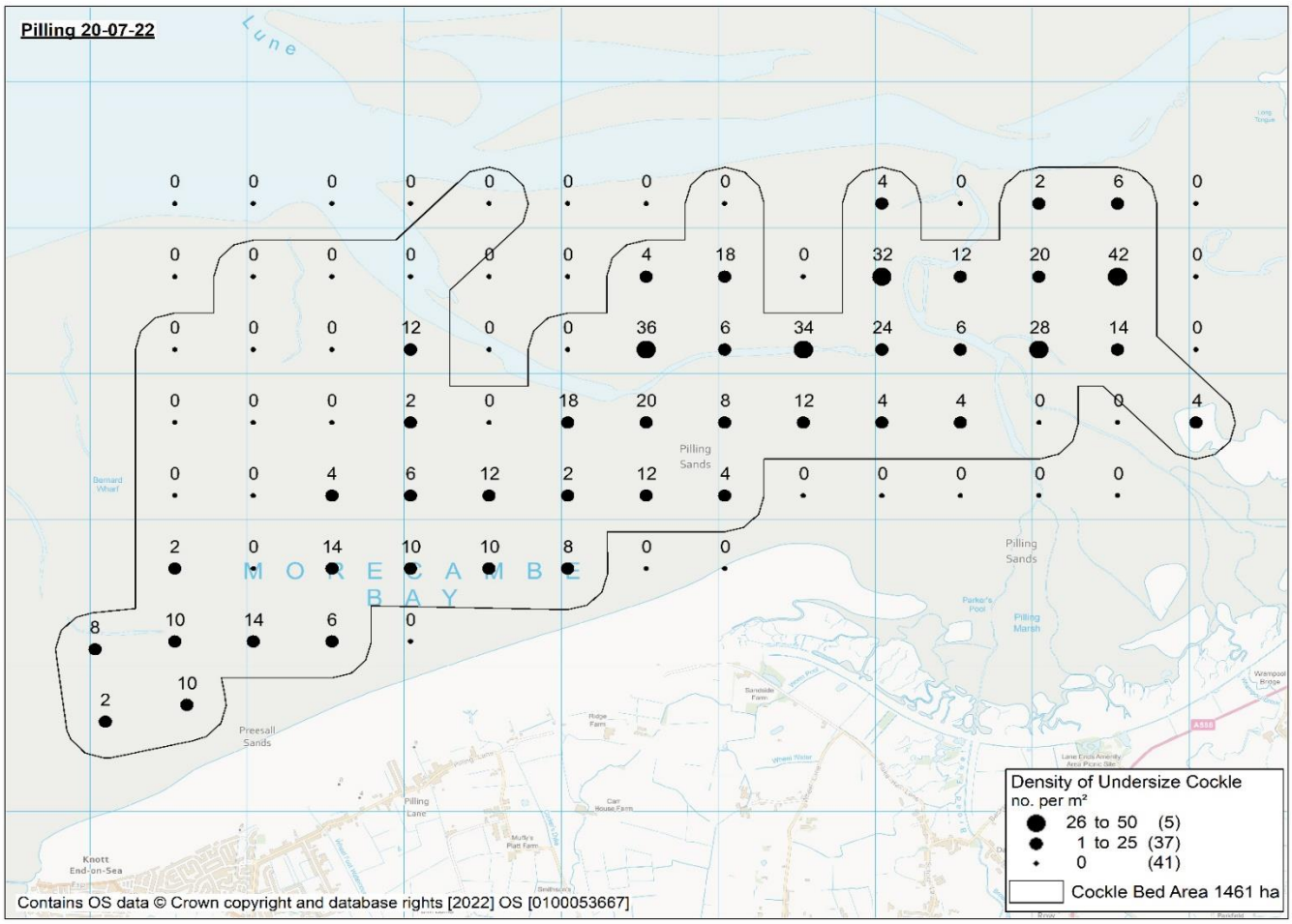


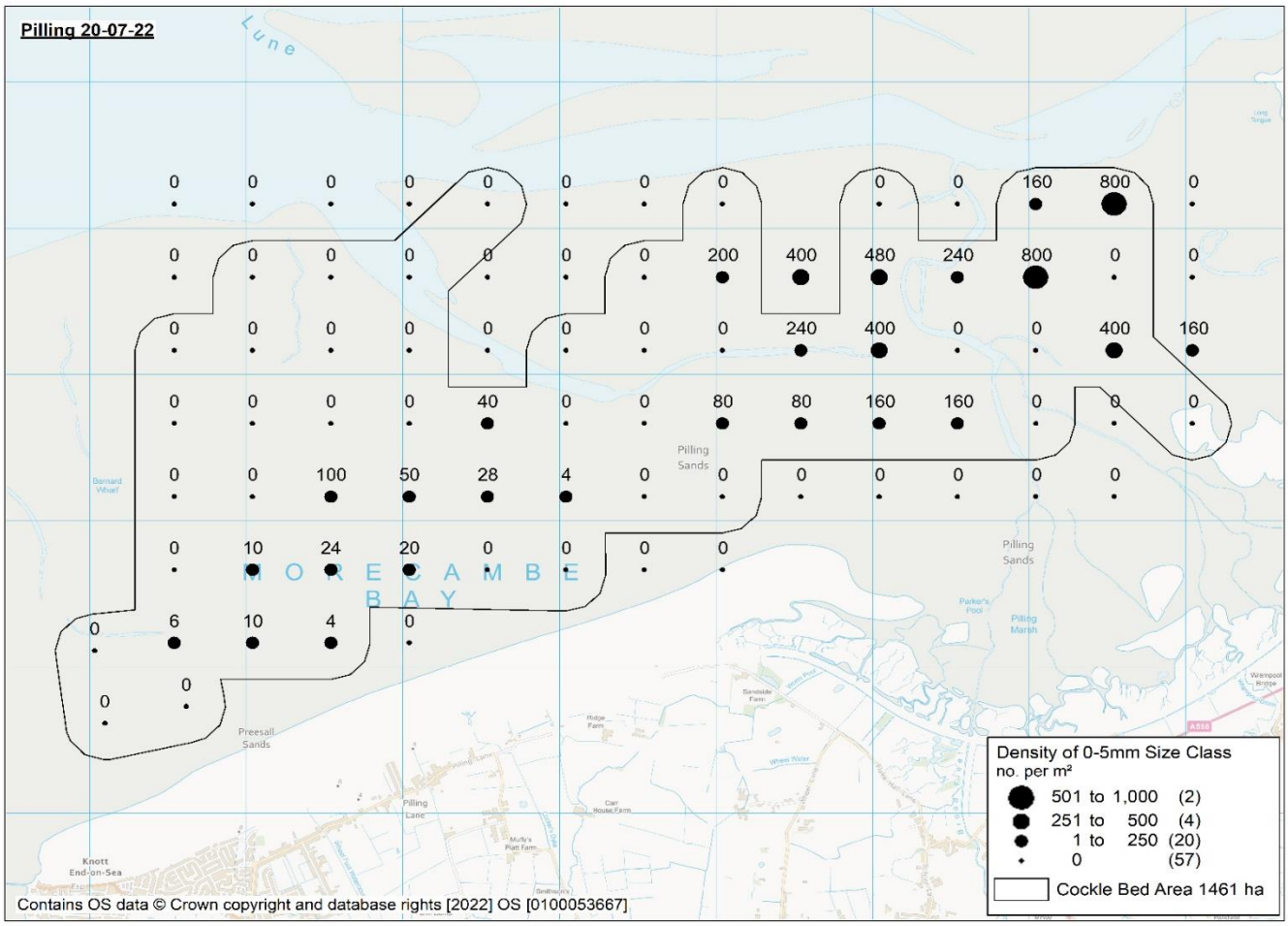
Illustration of position of Pilling Sands Survey Area



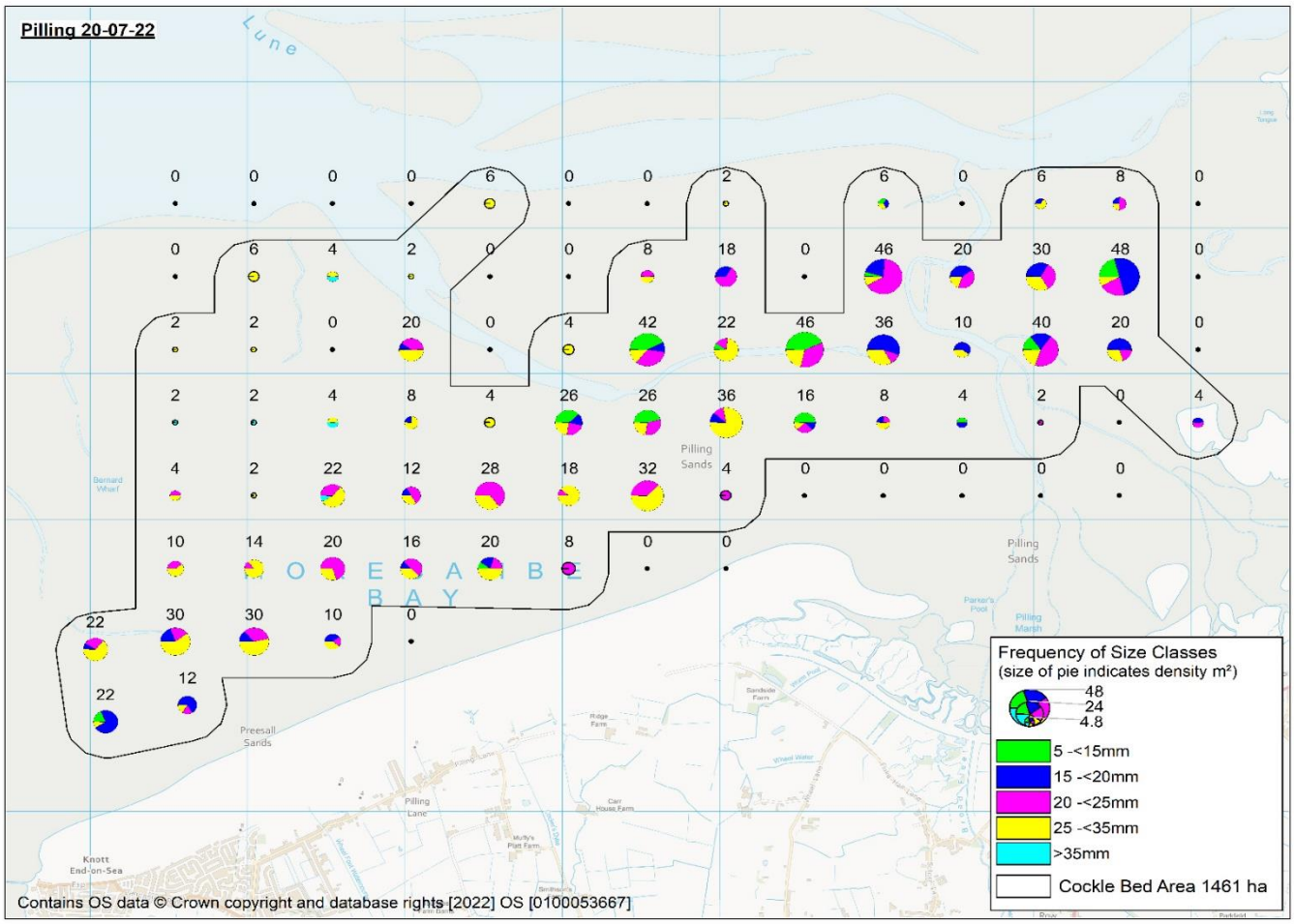
Density of size cockle per m² at Pilling Sands July 2022



Density of undersize cockle per m² at Pilling Sands July 2022



Density of 0-5mm cockle per m² at Pilling Sands July 2022



Frequency of size classes of cockle per m² at Pilling Sands July 2022

Annex 2.

Density per m^2

	Aldingham and newbiggn			mean		
		2018	2019	2020	2021	2022
	size	10	7	19	10	8
	undersize	200	46	19	7	10
	spat	14	117	131	1	35

	Aldingham Newbiggin max					
		2018	2019	2020	2021	2022
	size	44	32	84	42	58
	undersize	2238	404	194	62	44
	spat	14	1500	2000	4	800

	Flookburgh			mean		
		2018	2019	2020	2021	2022
	size	7	7	12	4	4
	undersize	267	61	28	7	7
	spat	50	0	29	2	185

	Flookburgh			max		
		2018	2019	2020	2021	2022
	size	70	156	76	28	46
	undersize	3600	990	894	36	60
	spat	600	8	624	40	4000

	Leven			mean		
		2018	2019	2020	2021	2022
	size	11	4	18	5	5
	undersize	5	50	21	11	6
	spat		0	46	3	131

	Leven			max		
		2018	2019	2020	2021	2022
	size	38	24	80	22	16
	undersize	13	172	576	58	28
	spat		0	1600	30	2000

	Pilling			Mean		
		2018	2019	2020	2021	2022
	size	21	8	17	17	7
	undersize	112	43	16	5	9
	spat		33	38	0	76

	Pilling			max		
		2018	2019	2020	2021	2022
	size	192	104	148	120	28
	undersize	762	308	140	44	42
	spat		480	2000	0	800

	Warton			mean		
			2019	2020	2021	2022
		size	13	100	74	
		undersize	720	1203	17	
		spat	22			

	Warton			max		
			2019	2020	2021	2022
		size	100	130	230	
		undersize	2030	4120	38	
		spat	200			

	Middleton			mean		
		2018	2019	2020	2021	2022
	size	473	7	5	7	5
	undersize	7	17	7	4	14
	spat	3	0	2	1	7

	Middleton			max		
		2018	2019	2020	2021	2022
	size	492	52	22	44	18
	undersize	32	142	58	22	86
	spat	16	0	100	4	120

Biomass of cockle

	2017	2018	2019	2020	2021	2022
Aldingham and newbiggin		2350	2320	3970	2200	1365
Leven	2415	1290	2000	3800	850	725
Flookburgh	4706	12300	6600	3800	1225	1450
Pilling	3821	3200	2700	3300	2500	1600
Warton			3465	1185	135	
Middleton	265	265	450	500	505	800
all beds	11207	19140	17535	16555	7415	5940

	Newbiggin and Aldingham		
Year	Size	undersize	total
2017	na	na	na
2018	900	1450	2350
2019	820	1500	2320
2020	3200	770	3970
2021	1900	300	2200
2022	1050	315	1365

	Flookburgh		
Year	Size	undersize	total
2017	4074	632	4706
2018	2700	9600	12300
2019	1700	4900	6600
2020	3300	500	3800
2021	1000	225	1225
2022	850	600	1450

	Leven		
Year	Size	undersize	total
2017	2202	215	2417
2018	1200	90	1290
2019	500	1500	2000
2020	3100	700	3800
2021	700	150	850
2022	500	225	725

	Pilling		
Year	Size	undersize	total
2017	571	3250	3821

2018	2200	1000	3200
2019	1200	1500	2700
2020	2400	900	3300
2021	2300	200	2500
2022	1200	400	1600

	Middleton		
Year	Size	undersize	total
2017	na	na	265
2018	na	na	0
2019	350	100	450
2020	300	200	500
2021	450	55	505
2022	350	450	800

	Warton		
Year	Size	undersize	total
2017	na	na	na
2018	na	na	na
2019	65	3400	3465
2020	280	905	1185
2021	110	25	135
2022	na	na	na