NWIFCA Technical, Science and Byelaw Committee



7

15th of August 2023: 10:00 a.m.

SURVEY AND INSPECTION REPORT 9^{TH} OF MAY – 15^{TH} OF AUGUST 2023

Purpose: To report on cockle and mussel surveys and inspections in the last quarter, and update members on the mussel and cockle fisheries in the district.

Recommendation: Approve the following:

- a) Receive the report and related survey and inspection notes
- b) To approve that the cockle beds at Southport and Leasowe remain closed for the rest of the closed season, and from the 1st of September under Byelaw 3 paragraph 15.

*A recommendation for Morecambe Bay is provided in Annex A to this Agenda item

BACKGROUND

Every year NWIFCA officers undertake extensive surveys and inspections of the cockle and mussel beds across the NWIFCA District. The aim of the surveys is to conduct stock assessments on each bed, and the aim of the inspections is to gather information in areas that either; a) do not have enough stock to warrant survey, and/or b) conditions of the bed preclude surveying – for example, large channels or short exposure times which limit the time officers can safely access. Inspections may also take place to see if a full stock assessment is needed.

Mussel bed surveys and inspections

Large, accessible mussel beds that are stable (large areas are not frequently washed away) are typically surveyed by the Dutch Wand method. This method allows officers to calculate an overall biomass of stock on the bed, identify the proportion of the population that is size, and map a perimeter. Beds that are typically surveyed by Dutch Wand include: Foulney mussel bed, Low Bottom, and Walney Channel. Mussel beds which are exposed for short amounts of time or are typically fished for seed mussel and are therefore liable to large changes over short periods are inspected visually, with reports presenting pictures and a description of the stock. Beds that are typically inspected using this approach include: Fleetwood, South America, Falklands, and Heysham.

Mussel inspection methodology overview

Inspections of mussel beds are undertaken by officers who will walk the perimeter of the mussel bed with GPS to map the location and extent. Officers will then access the middle of the bed and as much as can reasonably be accessed, taking notes on this size, coverage, presence of any important features (presence of sabellaria, exposed cobble and boulder substrate, depth of mud, indications of scour, looseness of mussel), and mussel size composition. Typically these surveys are limited by

tides and can only be conducted on spring tides. Inspections are undertaken to assess the suitability of a bed for either a seed or size fishery.

Cockle bed surveys

The purpose of cockle surveying is to establish data regarding the abundance, density and location of cockle stocks to inform fisheries management. Most cockle beds in the district are surveyed using the methodology outlined below.

Cockle survey methodology overview

Cockle surveys are undertaken by splitting each bed extent into a grid of sample points spaced between 250 to 500 m apart. Typically, each bed has between 40 and 140 sample points depending on its size. Each year, officers survey a minimum of approximately 750 sample points across the main beds from Morecambe Bay, the Ribble Estuary and Leasowe.

Sample locations are mapped on a GPS to ensure each year the same locations are surveyed. Officers access each sample location by quad, jumbo the sand to fluidise the sediment to cause cockles to rise to the surface and lay down a 0.5 m2 quadrat. Officers pick and rake the cockles within the quadrat and collect them for analysis in the lab. In the lab, cockles are separated into size cohorts (0.1-<5mm, 5-<15mm, 15-<20mm, 20-<25mm, 25-<35mm, +35mm) and record the number in each. A total of 200 cockles (100 undersize, 100 size) are taken from the bed as a whole, for analysis of weight and length. From this data, the overall proportion of size and undersize and total stock biomass is estimated.

1. MUSSELS

Between 9th of May and the 31st of July, NWIFCA science officers carried out nine mussel inspections across NWIFCA District. Full inspection reports are provided in Annex 1 of this report. The location and extent of the beds inspected are provided in Figures 1 to 3.

Table 1. Mussel survey and inspections this quarter.

Surveys and inspections this quarter	Date
Mussels	
Morecambe Bay (Figure 1): Heysham inspection x 2 Wyre End Fleetwood x 2 South America	09-05-23 & 19-06-23 06-06-23 07-06-23 & 11-07-23 07-07-23
Solway (Figure 2): Ellison Scar	18-05-23
Dee (Figure 3) : West Kirby Thurstaston	23-05-23 23-05-23

a) Morecambe Bay mussel beds overview:

The location and extent of mussel beds surveyed in Morecambe Bay from 9th of May to 31st of July 2023 is provided in Figure 1. An overview of the status of the bed is provided in the following section. Full inspection reports with images are provided in Annex 1.



Figure 1. Surveyed and inspected mussel beds in Morecambe Bay from 9th of May to 31st of July 2023.

1) Heysham:

Heysham mussel bed was inspected on the 9th of May and the 19th of June.

This year there is still a significant historic *Sabellaria alveolata* reef extending across the skear from Conger Rock to Dallam Dyke. The reef is a mixture of remnant, dead reef and new live reef structures.

There is very little mussel persisting from 2022, but there was an extensive seed settlement across the majority of the skear. The *Sabellaria* sp. has been completely smothered by seed mussel and mussel mud, with only a few small sections now visible.

The settlement has grown on in size, with the majority 10-15mm. The seed coverage over the entire skear is predominantly 70-80%, with areas over 90%. The seed is putting down mussel mud and in places is very loose. There was evidence of scour in places.

Numerous bird species were seen feeding in the area including oystercatchers and gulls.

Due to the presence of uniform, high density seed, mussel mud, no exposed cobble or boulder and no interaction with Sabellaria alveolata (as this has been excluded from the

2) Wyre end

Wyre end musel bed was inspected on the 6th of June.

There has been a 2023 settlement of seed mussel, varying in density across the main skear. Seed coverage over the majority of the bed was high, at approximately 80%, and in areas was beginning to put down mussel mud, however there were some areas with low, patchy density (40-50%). Seed was observed of two different size classes of 5-8mm and 8-12mm. No larger or size mussel had persisted from last year, with only occasional size mixed in with the seed on the channel edge. The two channel edge areas had seed coverage of 70-80% cover, but the channel edge was not fully visible due to tide constraints. Eider were observed on the bed.. Wyre end is not considered for a seed fishery.

3) Fleetwood

Officers accessed Fleetwood mussel beds on the 7th of June and again on the 11th of July. Fleetwood has four areas of seed – with Black Scar and Perch Scar having historically been suitable for seed fisheries.

Black Scar

Black Scar has had a 2023 mussel settlement of approximately 80-90% coverage, and as of the 1th of July, was approximately 15 mm in size, with 80-90% coverage of the bed. The mussel had put down mud, which covers the extent of the bed, and in the center had formed 'hillocks'. There is no evidence of scour currently, though the mussel was starting to loosen in patches. There was a small area on the south eastern side of the bed where there is exposed cobble, and a small area of historical size mussel along the channel edge. The approximate area of mussel is 5.4 ha.

Perch Scar

Perch Scar has had a 2023 mussel settlement that has grown on to approximately 15 mm. Coverage of mussel over the bed is 70-80%, with some of the mussel deeper in the mud likely due to strong winds during the survey. There was some evidence of scour near the lower end of the bed. Mussel mud has formed over the bed with hillocks forming and no exposed cobble or bare substrate. There were small patches of size mussel along the channel edge. The approximate area of the mussel was 4.1 hectares.

Kings Scar

Kings Scar had a 2023 mussel settlement of approximately 60-80% coverage. As of the 7th of June rhe mussel was less than 10mm and has started to put down mussel mud. There were small patches of 30-40mm mussel mixed in. The approximate area of the mussel was 6 hectares. This bed is not considered for a seed or size fishery.

Neckings Scar

As officers are restricted on tide this year, the inspection was carried out on a lesser spring tide and therefore the ebb was not a big as it would normally be, restricting the area of neckings scar which could be inspected. No new settlement was observed. Some 30-50mm

mussel persists and the area appears to be sanding over compared to previous years. This bed is not considered for a seed or size fishery.

Rossall Scar

The mussel on Rossall Scar was patchy and interspersed with cobble and live Sabellaria alveolate. This bed is not proposed for a seed fishery.

Due to the presence of uniform, high density seed, mussel mud, no exposed cobble or boulder and no interaction with *Sabellaria alveolata* - a seed fishery in the section of Perch Scar and Black Scar that covers the seed mussel and excludes both the bare cobble and strip of size mussel along the channel edge - was proposed as a seed dredge subject to final inspection on the 3rd of August and HRA.

4) South America

07-07-23 inspection

Due to the difficulties with tides this year, South America has only been accessed once, and the ebb was not sufficient to fully access the bed. Officers inspected a small area previously reported on the other side of the channel.

An inspection is proposed for the 4th or 5th of August.

5) Falklands

NWIFCA have received industry information provided on the 7th of July and officers will be inspecting the bed on the 4th or 5th of August.

b) Morecambe Bay Seed mussel fishery 2023

Mussel beds are assessed each year to see if they can be opened as hand gathered or seed dredge fisheries. The conditions which we look for to allow a seed fishery to take place are:

- loose mussel,
- a single size class of seed (<1yr old) of dense settlement, (not mixed)
- a large amount of mussel mud underneath with no exposed cobble/boulder substrate, and
- a high probability of washing away (evidence of scour or loose mussel and historical trends).

All these criteria must be met in order for a fishery to be considered for opening. This information is gathered through inspections (methodology detailed above) and presented in the Annex to this report and on the NWIFCA website here: www.nw-ifca.gov.uk/survey-and-inspection-reports/

This year, between May and July, there were no spring tides suitable to allow surveying of the South America and Falkland mussel beds which are situated further out in Morecambe Bay and often only become exposed on spring tides. The earliest officers will be able to access the beds are the 4th and 5th of August. Should an inspection identify that the conditions on these beds are suitable for a seed dredge fishery, the next tides suitable for the fishery to be opened would be the week following. In previous years, the earliest these beds have been opened is the 30th of July. NWIFCA therefore reported at the TSB meeting on the 9th of May that there was the possibility that the survey on the 4th/5th of August will require a decision to be made on the fishery for commencement on the 9th to 15th of August via email.

In order to prepare for this short turn around, a provisional HRA was developed and agreed with Natural England, subject to final inspections meeting the agreed criteria stipulated above. The draft HRA has undergone review by Natural England and received provisional agreement. All potential fisheries were included in the HRA as a precautionary approach.

Once the inspections are completed, the results will be discussed with Natural England and made available online.

c) Solway mussel beds

The location and extent of mussel beds surveyed in the Solway from 9th of May to 31st of July 2023 is provided in Figure 2. An overview of the status of the bed is provided in the following section. Full inspection reports with images are provided in Annex 1.



Figure 2. Surveyed and inspected mussel beds in the Solway from 9th of May to 31st of July 2023.

Officers assessed Ellison mussel beds on the 18th of May. Due to limitations with the tide and ground conditions, officers were unable to reach outer Ellison.

All beds had a sparse mussel settlement of >10mm seed between 40-50% coverage at the time of surveying. There was a large number of boulders within and amongst the beds, and an area of *Sabellaria* that extended from Inner Ellison to middle Ellison over 10 ha. Mussel mud was typically thin, and in areas of Middle Ellison the mussel sizes were mixed up to 30 mm. Stinking Crag had

some sizable (>45mm), clean mussel in areas close to the offshore portion of the bed. Mussel in most areas was hard in and there was not much mud. This area is not considered for a seed or size fishery.

d) Dee mussel beds

The location and extent of mussel beds surveyed in the Dee from 9th of May to 31st of July 2023 is provided in Figure 3. An overview of the status of the bed is provided in the following section. Full inspection reports with images are provided in Annex 1.



Figure 3. Surveyed and inspected mussel beds in the Dee from 9th of May to 31st of July 2023.

Officers inspected West Kirby and Thurstaston on the 23rd of May.

West Kirby

The bed area had 40-50% coverage of mussels across the main extent which were uniform in size with the majority of the mussel between 45-60mm meaning it had remained and grown on since the previous winter. No spat settlement was observed. The substrate of the bed was thick mud, over half a metre deep in the central part of the bed. The mussel remained in similar condition to the previous year. There were large areas of barnacled mussels.

Thurstaston

The Thurstaston bed is made of up one large bed area and a number of smaller areas separated by channels. The main bed area is similar to 2022, has approximately 20% coverage of patchy, barnacled mussel between 35-40mm, with some occasional size. To the

West of the main bed area a number of mussel patches were discovered along both sides of a channel edge. This bed is not considered for a seed or size fishery.

2. COCKLES

Between 9th of May and the 31st of July, NWIFCA science officers carried out nine cockle surveys across NWIFCA District. Full survey reports are provided in Annex 2 of this report. The location and extent of the beds inspected are provided in Figures 7 to 9.

Surveys and inspections this quarter	Date
Cockles	
Morecambe Bay (Figure 1): Warton (inspection) Flookburgh Pilling Newbiggin and Aldingham Leven Middleton	16-05-23 04-07-23 & 05-07-23 10-07-23 11-07-23 17-07-23 25-07-23
Ribble (Figure 2) : Southport Lytham	09-06-23 20-06-23
Wirral Coast (Figure 3): Leasowe	24-07-23

Table 2. Cockle survey and inspections this quarter.

e) Morecambe Bay Cockle beds overview:

The location and extent of surveyed cockle beds in Morecambe Bay is provided in Figure 4. Please refer to Agenda item 7a where full details of Morecambe Bay cockle surveys is provided in Agenda Item 7a. Data is presented alongside historical trends and data for each bed and the bay as a whole is disucssed. Therefore, only a short summary is provided here:

Surveys indicate that size cockle across all beds in Morecambe Bay have low levels of size cockle biomass and density, comparable with recent years (2022). However, there has been a singifcant increase in undersize cockle (15+) which has both high densities and biomass across many of the beds, notably Pilling, Flookbrugh and Aldingham and Newbiggin. Should this cockle survive the winter, it may grow on to provide a size fishery in following years, consistent with previous trends.



Figure 7. Surveyed and inspected cockle beds in Morecambe Bay from 9th of May to 31st of July 2023

f) Ribble cockle beds:

Southport (Penfold)

The location and extent of the Penfold cockle bed in the Ribble Estuary is provided in Figure 8. This year officers inspected the bed on the 9th of July.

67 stations were sampled from a 350m grid. The survey grid location was based on the 2022 cockle surveys and is provided in Annex 2. The cockle bed is in a similar location to 2022.

Table 2. The biomass of size, undersize and total biomass of cockles on Penfold cockle bed from 2022 and2023. *figures represent the max cockle biomass

Year	Area (ha)	Size cockle (tonne)	Undersize cockle (tonne)	Total cockle (tonne)
2022	877	1200	1300	2500
2023	637	800	120	920



Figure 8. Surveyed and inspected cockle beds in the Ribble from 9th of May to 31st of July 2023

This year there has been a significant decrease in the biomass of both size and undersize cockle across the bed. In addition, there has been a decrease in the density of cockle across the bed with the mean density of size and under size cockle being 17 per m^2 and 50 per m^2 respectively in 2022, decreasing to 14 per m^2 and 3 per m^2 in 2023. Maximum densities have also reduced from 2022, indicating that there are few dense areas on the bed. See Annex 2 of this report for full survey details of biomass and density distributions.

There has been a spat settlement this year, though this is not considered in biomass calculations due to its high variability, and survivability through the winter.

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

NWIFCA does not have an agreed minimum total cockle biomass for Ribble Estuary from which to recommend the opening or closing of a fishery. There are outstanding questions on the requirements of birds for food.

Therefore, due to the low biomass of cockle, in particular, the low biomass of undersize stock available to grow on to maintain stock, NWIFCA recommend that the Southport cockle bed remains closed as of 1st September 2023.

g) Wirral coast cockle beds:

Leasowe

The location and extent of the Leasowe cockle bed on the Wirral Coast is provided in Figure 9. This year officers inspected the bed on the 24th of July. The full survey report is detailed in Annex 2.

73 stations were sampled from a 250m grid. There was a wide range of cockle sizes across the bed from < 5mm to 35mm. Size cockle is low in density at only 6 per m^2 . However, undersize cockle was present in very high densities (863 per m^2) across the center of the bed.

Previous HRA agreements (2019) for the total wet biomass available for birds (dependent on bird numbers) is between 700 and 900 tonnes. This year the approximate total biomass on Leasowe is 770 tonnes.

Biomass of size cockle is low at 171 tonnes, particularly in regard to previous years when the fishery has been opened (1200 tonnes in 2019).

Due to the low density and biomass of size stock, NWIFCA recommend that the Leasowe cockle bed remains closed as of 1st September 2023.



Figure 9. Surveyed and inspected cockle beds on Wirral Coast from 9th of May to 31st of July 2023

NWIFCA, 1st of August 2023

Annex 1

Mussel Inspections and surveys:

Heysham Flat Mussel Inspection 09-05-23

Officers present:	MC, GG
Tides	LW 08:48 1.6m (Liverpool tides)

Officers inspected the mussel on Heysham Flat to assess if mussel was present and if seed settlement had occurred. Access to the outer skears was not possible across Dallam Dyke due to depth of water and timings.

There is a significant historic Sabellaria alveolata reef extending across the skear from close to Conger Rock to Dallam Dyke (Figure 2 and 3). The reef is a mixture of remnant, dead reef and new live reef structures. The reef is in a similar location to last year, and the extent of the Sabellaria alveolata has been mapped from this survey (Figure 1).

There was very little mussel persisting from last year, but there was an extensive seed settlement across the majority of the skear. The seed coverage over the entire skear was predominantly 70-80%. The seed ranged in size from 2-3mm to 10mm, and covered all substrates, including cobble, dead shell, remnant and live *Sabellaria* sp. Knott End skear also appeared to have a seed settlement.

Numerous bird species were present feeding in the area including oystercatchers and eiders.



Figure 1. Map showing the extent of Sabellaria sp. on Heysham Flat survey 09-05-23.



Figure 2: Remnant Sabellaria sp. covered in seed 09-05-23.



Figure 3: Seed settlement at Heysham 09-05-23.



Figure 4: Mixed seed, mussel and dead shell 09-05-23.



Figure 5: Live Sabellaria alveolata covered in dense seed settlement 09-05-23.

Heysham Flat Mussel Inspection 19-06-23

Officers present: MC, GG Tides LW 07:15 1.9m (Liverpool tides)

Officers inspected the mussel on Heysham Flat to assess if mussel was present and if seed mussel had grown on. Access to the outer skears was not possible across Dallam Dyke due to depth of water and timings.

The significant historic *Sabellaria alveolata* reef extending across the skear from close to Conger Rock to Dallam Dyke seen in the previous survey in May was no longer visible. The *Sabellaria sp.* has been completely smothered by seed mussel and mussel mud, with only a few small sections now visible. The extent of the *Sabellaria alveolata* has been mapped from the previous survey on the 9th May 2023.

The extensive seed settlement across the majority of the skear has grown on in size, with the majority 10-15mm. The seed coverage over the entire skear was predominantly 70-80%, with areas over 90%. The seed is putting down mussel mud and in places is very loose. There was evidence of scour in places.



Numerous bird species were present feeding in the area including oystercatchers and gulls.

Figure 1. Map showing the extent of Sabellaria sp. on Heysham Flat survey 09-05-23 and survey notes from 19-06-23.



Figure 3. Mussel Seed 10-15mm Heysham Flat 19-06-23.



Figure 5. High coverage of loose seed mussel 19-06-23.



Figure 6. Sabellaria sp. and seed mussel Heysham Flat 19-06-23.

Wyre End Mussel Inspection 06-06-23

Officers present:MC, JHTidesLW 07:59 (1.4m) (Liverpool tides)

An inspection of Wyre End and channel areas of mussel was completed. The area of the main skear and patches of mussel on the channel edge were mapped to determine areas shown in Figure 1. Observations of mussel and substrate were made across the skear and channel edge areas (Figure 2). There has been a 2023 settlement of seed mussel, varying in density across the main skear. An area of raised cobble/pebble was observed running along the Eastern section of the surveyed area, which was predominantly bare, with some small patches of seed. Eider were observed on the bed.

Seed coverage over the majority of the bed was high, at approximately 80%, and in areas was beginning to put down mussel mud. Some areas had lower patchy density of around 40-50% cover on the channel side. Seed was observed of two different size classes of 5-8mm and 8-12mm. No larger or size mussel had persisted from last year, with only occasional size mixed in with the seed on the channel edge.

Wyre End Inspection 06-06-23 W or E

The two channel edge areas had seed coverage of 70-80% cover, but the channel edge was not fully visible due to tide constraints.

Figure 1. Approximate bed area boundaries 06-06-23.

Contains OS data Crown copyright and database rights [2023] OS [0100053667])

End-

Wyre End Mussel Bed Area 2023

Channel edge 0.7 ha and 0.8 ha

Main Bed 11.16 ha



Figure 2. Approximate bed area boundaries and observations of the bed made by officers.



Figure 4: Seed settlement Wyre End 06-06-23.



Figure 6: Channel edge area with seed settlement 06-06-23.

Fleetwood Mussel Inspection 07-06-23

Officers: AP, JH, AG, GE

LW: 08:45 1.4m (Liverpool Tides)

The Fleetwood mussel beds were inspected starting at Rossall Scar, then proceeding to Necking, Kings and finishing on Perch and Black Scar as shown in Figure 1.

Black Scar

Black Scar has had a 2023 mussel settlement of approximately 80-90% coverage (Figure 2). The mussel was less than 10mm and has started to put down mussel mud. The settlement was absent along the Eastern edge of the scar (Figure 3). There were small areas of size mussel along the channel edge. The approximate area of the mussel was 4.5 hectares.

Perch Scar

Perch Scar has had a 2023 mussel settlement of approximately 80-90% coverage (Figure 4). The mussel was less than 12mm and has started to put down mussel mud (Figure 5). There were small patches of size mussel along the channel edge. The approximate area of the mussel was 8.4 hectares.

Kings Scar

Kings Scar has had a 2023 mussel settlement of approximately 60-80% coverage (Figure 6). The mussel was less than 10mm and has started to put down mussel mud. There were small patches of 30-40mm mussel mixed in. The approximate area of the mussel was 6 hectares.

Neckings Scar

As officers are restricted on tide this year the inspection was carried out on a lesser spring tide and therefore the ebb was not a big as it would normally be, restricting the area of neckings scar which could be inspected. No new settlement was observed. Some 30-50mm mussel persists and the area appears to be sanding over compared to previous years (Figure 7).

Rossall Scar

The mussel on Rossall Scar was patchy and interspersed with cobble and live *Sabellaria alveolata* (Figure 8).



Figure 1. Overview of the mussel inspection 07-06-23.



Figure 3. Eastern Edge of Black Scar 07-06-23.



Figure 5. Perch Scar 2023 mussel and mussel mud 07-06-23.



Figure 7: Neckings Scar 30-50mm, area sanding over 07-06-23.



Figure 8. Rossall Scar, mix of mussel and Sabellaria alveolata 07-06-23.

South America Mussel Inspection (Quad) 07-07-23

LW: 09:35 1.0m (Liverpool tides)

An inspection of South America was completed to assess the condition of the mussel previously inspected in April. This year there is a limited number of big spring tides with a sufficient ebb to access the bed, although a 1m tide is not ideal this was the biggest ebb. Due to the size of the tide and the weather it was not possible to cross the channel onto the main bed. An inspection was carried out on the new area of mussel as previously report and highlighted in Figure 1.

Only a small area of was inspected due to the tide. The density of mussel varies across the area as shown in figures 2 to 4. The mussel is approximately 15mm in length (figure 5). Most of the seed mussel is loose and on a soft muddy /sandy substrate. There was not visible hard substrate.

A further survey will need to be conducted on better tides to fully access the area and mussel.



Fig. 1 NWIFCA track data and an overview of South America from April 23



Fig. 2 Low density area of 2023 seed mussel - July 2023



Figure 3. Higher density area of 2023 seed mussel – July 2023



Figure 4. 2023 seed mussel – July 2023



Figure 5. 2023 seed mussel, ~15mm in length – July 2023

Ellison Scar Mussel Inspection 18-05-23

Officers: AP, JH, GG, MC, ET

LW: 17:54 1.4m (Liverpool Tides)

The Ellison Scar mussel beds were inspected starting at Inner Ellison, then proceeding to Middle Ellison and Stinking Crag as shown in Figure 1. Due to limitations with the tide and ground conditions, officers were unable to reach outer Ellison.

Inner Ellison

Inner Ellison has had a sparse mussel settlement of approximately 50% coverage (Figure 2). The mussel was less than >10mm and has put down shallow mussel mud (Figure 3). The area closer to shore and further south was flat with uniform undersize mussel (Figure 4), with large boulders in the northern portion (Figure 4). There is an area of Sabellaria extending in patches from the outer area of Inner Ellison (Figure 1) towards Middle Ellison. The approximate area of the mussel was 10 hectares.

Middle Ellison

Middle Ellison has had a sparse mussel settlement of approximately 40-50% coverage (Figure 8), closer to the centre of the bed this is mixed in with mussel approximately 30mm in length which is hard in sand substrate (Figure 7). The area has a large number of boulders (Figure 5 & 6), and some shallow mussel mud. There is a large strip of Sabellaria extending out 20 m from the shoreward side of the bed towards the south (Figure 9). The approximate area of the mussel was 6 hectares.

Stinking Crag

Stinking Crag also had a large number of boulders and had received a 2023 mussel settlement though with sparse coverage. Sizable (>45mm), clean mussel was present in areas close to the offshore portion of the bed (Figure 10). Mussel in most areas was hard in and there was not much mud (Figure 10). There was evidence of previous scouring and resettlement (Figure 11). The approximate area of the mussel was 2.6 hectares.



Figure 1. Overview of the mussel inspection 18-05-23

Inner Ellison:



Figure 2. Large area of boulder on Inner Ellison



Figure3. Undersize mussel on Inner Ellison



Figure 4. Flat area of mussel with some mussel mud to the north of Inner Ellison

Middle Ellison:



Figure 5. Boulders on Middle Ellison



Figure 6. Boulders and mix of mussel sizes with sparse coverage on Middle Ellison



Figure 7. Undersize mussel hard in



Figure 8. Mix of size classes on Middle Ellison and evidence of 2023 settlement



Figure 9. Extensive Sabellaria field on Middle Ellison

Stinking crag:



Figure 10. Clean size mussel on stinking crag



Figure 11. Evidence of scour and re-settlement on Stinking Crag

West Kirby Mussel Inspection 23-05-23

Officers present: GG, AP

Low Water: 08:44 2m (Liverpool Tides)

Officers were able to walk the permitter of the mussel bed which covered 6.8 hectares, this is 0.7 hectares smaller than when the perimeter was last walked in July 2021. Figure 1 shows the map of the bed.

The bed area had 40-50% coverage of mussels across the main extent (Figure 2). The mussel was uniform in size with the majority of the mussel between 45-60mm meaning it had remained and grown on since the previous winter (Figure 3). No spat settlement was observed. The substrate of the bed was thick mud, over half a metre deep in the central part of the bed, and the mussel present was partly buried (Figure 4). There was little evidence of scouring, and the mussel remained in similar condition to the previous year. There were large areas of barnacled mussels and a large presence of cockle shell amongst the mussel (Figure 5). A patch of sand mason worms was found on the bed (Figure 6).



Figure 1. Map showing the area of West Kirby mussel bed on 23-05-23.



Figure 2. west Kirby Mussel bed 23-05-23



Figure 3. Size Mussel patch West Kirby 23-05-23



Figure 4. Mussel patch West Kirby 23-05-23



Figure 5. Barnacled mussel West Kirby 23-05-23



Figure 6. Sand Mason worms at West Kirby 23-05-23

Thurstaston Mussel Inspection 23-05-23

Officers present: MC, JH

Low Water: 08:44 2m (Liverpool Tides)

Officers walked one side of the perimeter of the mussel, and bed extent was seen to be similar to the 2022 inspection and mapped as such. Soft ground prevented a full perimeter being taken. However, changes in ground conditions did allow officers to walk further along the bed at the Northern extent and identify patches of mussel not previously inspected. Bed Area from the 2022 inspection and notes from this inspection have been mapped in figure 1.

The Thurstaston bed is made of up one large bed area and a number of smaller areas separated by channels. The main bed area, of a similar size and shape to that shown in figure 1 from 2022, has approximately 20% coverage of patchy, barnacled mussel between 35-40mm, with some occasional size mixed in. To the West of the main bed area a number of mussel patches were discovered along both sides of a channel edge. These ranged in size as described in figure 1, with bare patches of substrate between them. These patches contained cleaner size mussel up to 60mm. Other mussel patches of undersize mussel were located to the North-East of the main bed area, at lower coverages. No other spat settlement was observed. Oystercatcher were present in large numbers.







Figure 2. Thurstaston Mussel Bed 23-05-23.



Figure 3. Mussel on Thurstaston bed 23-05-23.



Figure 4: Thurstaston Mussel Bed 23-05-23.



Figure 5: Mussel patch Thurstaston 23-05-23.



Figure 6: Mussel on other side of channel at Thurstaston 23-05-23.

Annex 2

Cockle Surveys

*results of the Morecambe Bay surveys are provided in Agenda Item 7a

Southport Cockle 09-06-23

Officers present:AB, AG, JH, GGTides:LW 10:30 1.8m (Liverpool tides)

Survey method - Jumbo and 0.5m² quadrat

67 stations were sampled from a 350m grid. The survey grid location was based on the 2022 cockle surveys. The cockle is in a similar location with and the bed running from NE to SW. There has been a significant decrease in density of across the bed which is expected due to fishery and natural mortality over winter.

Means

Means were calculated from all stations with zero counts on the edge of the bed removed. There were no less than 5mm cockle recorded in the survey.

Mean number of size cockle	14 per m ²	(min 0, max 78)
Mean number of undersize cockle	3 per m ²	(min 0, max 16)
Mean weight of size cockle kg/m ²	0.126 kg/m ²	(min 0, max 0.832)
Mean number of undersize cockle kg/m ²	0.019 kg/m ²	(min 0, max 0.232)

Maps

Maps were created showing the overall survey area, density of size cockle, 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), and the weight of undersize and size cockle.

Biomass

	Area (ha)	Size Cockle (tonnes) ¹	Undersize Cockle (tonnes) ²
Southport	637	800	120

¹In regards to biomass size cockle defined as cockle which will not pass through a square gauge 20 x 20mm in size.

²The 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.



Figure 1. Density of size cockle per m² at Southport June 2023.



Figure 2. Density of undersize cockle per m² at Southport June 2023.



Figure 3. Frequency of size classes of cockle per m² at Southport June 2023.



Figure 4. Weight of size and undersize cockle $\mbox{kg/m}^2$ at Southport June 2023.

Lytham Cockle Inspection 20-06-23

Officers present: MC, AG Tides: LW 07:53 2.0m (Liverpool tides)

Areas where historically there have been cockle beds were inspected using a jumbo and rake to see if there was significant cockle present to require a full survey. North Run, Mouse Hole and Grannys Bank were inspected as well as the surrounding areas. The majority of the area had no cockle present. There was an area on North Run that contained a mix of undersize and size cockle. Cockle density for surveyed sites ranged from 6 per m² to 44 per m² in this area. No 0-5mm cockle were found at the sites surveyed.

Maps

A Map was created showing total number of cockle per m². No maps were created for density of size/undersize cockle or spat (0-5mm size range) as very few cockle were found during the survey.



Figure 1: Total cockle per m² Lytham 20-06-23.

Leasowe Cockle Survey 24th July 2023

Officers present:MC, AP, AB, MTTides:24-07-23LW 10:262.4m (Liverpool tides)

Survey method - Jumbo and 0.5m² quadrat

73 stations were sampled from a 250m grid. There was a wide range of cockle sizes across the bed from < 5mm to 35mm. Size cockle is low in density. Undersize cockle is present in high densities across sites at the centre of the bed. There is evidence of a 2023 cockle settlement across a number of survey stations.

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	6 per m ²	(min 0, max 40)
Mean number of undersize cockle	863 per m ²	(min 0, max 5952)
Mean number of 0-5mm cockle	5 per m²	(min 0, max 100)
Mean weight of size cockle kg/m ²	0.073 kg/m²	(min 0, max 0.482)
Mean weight of undersize cockle kg/m ²	0.257 kg/m²	(min 0, max 1.880)

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, the frequency of size classes, the size of the pie chart indicates the total density of cockles present, and the weight of undersize and size cockle.

Biomass

	Area (ha)	Size Cockle (tonnes) ¹	Undersize Cockle (tonnes) ²
Leasowe	234.7	171	604

¹In regards to biomass size cockle defined as cockle which will not pass through a square gauge 20 x 20mm in size.

²The 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.



Figure 1. Illustration of position of Leasowe cockle bed.



Figure 2. Density of size cockle per m² Leasowe July 2023.



Figure 3. Density of undersize cockle per m² Leasowe July 2023.



Figure 4. Density of 0-5mm cockle per m² on Leasowe July 2023.



Figure 5. Frequency of size classes of cockle per m² Leasowe July 2023.



Figure 6. Weight of size and undersize cockle kg/m² at Leasowe July 2023.