## NWIFCA Technical, Science and Byelaw Committee

## Agenda Item 10

2<sup>nd</sup> of August 2022: 10:00 a.m.

## SURVEY AND INSPECTION REPORT 10<sup>TH</sup> MAY – 2<sup>ND</sup> AUGUST 2022

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) Cockle fishery: Agree that, on completion of our surveys, the recommendation for this year's Morecambe Bay cockle fisheries is submitted to TSB members via email for consideration.
- c) Mussel fishery: Agree that we inform TSB of the results of our final inspections, and they consider a proposal on the opening of the fishery via email, subject to HRA.

## 1. MUSSELS

Inspections and surveys completed since the last report:

- 1) **Heysham** inspection x 3 (16-05-22, 27-05-22 and 16-07-22)
- 2) Wyre End inspection (18-05-22)
- 3) **Fleetwood** inspection x2 (19-05-22 and 15-07-22)
- 4) South America inspection x 2 (19-04-22, 17-06-22, 17-07-22)

Inspection and survey notes are provided in the Annex to this report. The following sections provide a summary of our findings and details of further relevant work.

## a) Morecambe Bay mussel beds:

## 1) Heysham:

Officers accessed Heysham Flat mussel bed on the 16th and 27th of May and most recently on the 16<sup>th</sup> of July.

## 16-05-2022 inspection:

Dallam Dyke was not crossed due to water depth and tide. The Sabellaria alveolata reef that has been seen distributed across much of the skear was less obvious. It is likely that the majority was covered by substrate of mud and sand with mussel seed coverage high. Some areas, particularly on the Southern extent of the skear, were covered by reef, some living and some deteriorated with thin mud/sand on top.

Mussel had persisted over the winter, with large areas of 30-40mm mussel, particularly in the area before Dallam Dyke. Much of the live mussel was mixed in with seed settlement. There was the occasional size mussel present across the bed. The cleaner and more consistent mussel was found before reaching and along Dallam Dyke, with some areas of 80-90% coverage. Some areas of bare cobble and dead shell were also present on the skear, particularly on the boundary with Sabellaria reef on the Southern edge of the skear.

Oystercatcher and gulls were present in large numbers feeding on the Southern edge of Heysham Flat skear.

## 27-05-2022 inspection:

This inspection was carried out as a follow up to the previous inspection, where it was reported that there were areas of 30-40mm mussel remaining from 2021 that were free of the 2022 seed settlement. In previous years any remaining mussel is usually smothered by the following year settlement, but as there were areas of seed free 2021 mussel, officers wanted to complete a follow up inspection to monitor the situation. The other consideration was that these areas were present on Sabellaria alveolata reef which had been smothered.

The inspection focussed on the areas where 2021 mussel remained. Some areas of clean 2021 persisted closer to Dallam Dyke. The areas of 2021 mussel which were free from seed has reduced with more 2022 seed persistently mixed in. The mussel present from Conger Rock to Dallam Dyke is likely present on 2021 Sabellaria alveolata.

## 16-07-2022 inspection:

The area on the higher shore to conger rock consisted of mussel 15 to 20mm with ~ 90-95% coverage. The mussel was hard in a layer of sandy mud.

The area from conger rock to Dallam dyke had changed considerably since the last inspection with a significant layer of sediment under the mussel. The underlying substrate was a mix of sand and mud and was firm unlike the usual mussel mud present on Heysham. The layer of sediment was ~1m in depth with no visible presence of Sabellaria alveolata other than on the North and South of the skear away from the main mussel bed. There was a range of size classes of mussel across the area from 15-50mm in length and a few areas where there was one size class of mussel. There were no signs of scouring although the mussel was loose in some areas.

## 2) Wyre end

Wyre end was inspected by officers on the 18<sup>th</sup> of May 2022.

There had been a 2022 settlement of seed mussel, varying in density across the main skear, with the northern edge of the bed having received no settlement. A large 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 mussel and seed. The Northern section of the surveyed area had no mussel present and contained remnant Sabellaria sp. reef.

Towards the South of the bed a large area of 20-35mm mussel was present. This mussel had a coverage of 50-60% with dense seed cover and occasional size mussel mixed in. An area of >45mm mussel present on the north eastern side of the skear in 2021 was no longer present. The western edge of the bed contained patches of 25-35mm mussel hard in the substrate with seed mixed in, with a coverage of 40-50%. This mussel was located close to the channel and

was spreading onto the interior of the main skear. A large flock of oystercatchers and other bird species were observed feeding on the South Western edge.

The two channel edge areas had small clumps of 45-60mm mussel covered in barnacles present along the western edge of the both areas. The majority of each area consisted of cobble and dead shell with no seed mussel settlement.

## 3) Fleetwood

Officers accessed Fleetwood mussel beds on the 19<sup>th</sup> of May and again on the 15<sup>th</sup> of July.

## 19-05-2022 inspection:

## Black Scar

Black Scar has had a 2022 mussel settlement of approximately 60% coverage. The mussel was approximately 5mm and had settled on the hard substrate / shell debris. The settlement was absent along the Eastern edge of the scar which was different from previous years. There were small areas of size mussel along the channel edge. The approximate area of the mussel was 4.6 hectares.

## Perch Scar

Perch Scar can be split into two areas, the Northern area consisted of mussel mud from 2021 with no observed 2022 mussel settlement, and the Southern area which had a 2022 mussel settlement of approximately 40% coverage. This is significantly reduced from previous years. The mussel was approximately 5mm in size. There were occasional small areas of 40-50mm mussel along the channel edge. The approximate area of the mussel was 4 hectares.

## Kings Scar

Kings Scar consisted of patches of mussel 10-20mm long which is likely to be a settlement from late 2021 or early 2022. There were no signs of a recent settlement. The area of mussel was 2.4 hectares and had 40-60% coverage. Kings Scar has a number of structures such as wrecks which have larger mussel which has persisted through the winter.

#### Neckings Scar

The tide did not ebb as usually expected for the size of tide and therefore access was limited to the higher reaches of the bed. There was 20-30mm mussel which had persisted through the winter on the scar. In the denser areas the mussel was had 60% coverage. There was no observed 2022 mussel settlement. There was *Saccharina sp.* present on some of the hard substrate.

## Rossall Scar

The mussel on Rossall Scar was very patchy and interspersed with cobble and live Sabellaria alveolata.

## 15-07-2022 inspection:

The inspection concentrated on the main beds of Black Scar and Perch Scar as from the previous inspection these showed the larger areas of settlement and potential for a fishery.

## Black Scar

Black Scar was a mix of sandy, algal hummocks with 2022 seed mixed in on the lower ground apart from a strip of mussel along the channel edge which persists throughout the year. The mussel on Black Scar was ~10mm. Percentage cover was difficult to estimate due to the sand and algal covering. It was also not possible to clearly define a bed area due to the patchy nature of the mussel. This is a change from previous years when the skear typically receives a dense settlement.

## Perch Scar

There was no algal growth on Perch Scar. There was an area of 2022 seed mussel approximately 2.5ha in size with a 60-70% coverage. The mussel was ~10mm in size. The mussel has started to put down some mud (~5cm). Large area along the Wyre channel edge and to the North of the skear have minimal seed mussel. There is a strip of mussel along the channel edge which persists throughout the year. This is a change from previous years when the skear typically receives a dense settlement across the entire area.

## 4) South America

Over the past 3 months, South America has been inspected three times, on the 19<sup>th</sup> of April, 17<sup>th</sup> of June and the 17<sup>th</sup> of July.

## 19-04-22 inspection

Officers inspected South America on the 19<sup>th</sup> of April to assess if any mussel had persisted from 2021 and if there were signs of a 2022 settlement.

The area consisted of exposed hard substrate (mix of pebbles and small cobbles), sand and shell debris. There was the very occasional live mussel in the areas of shell debris. The mussel was 30-35mm in length. The area which dried out was walked but no 2022 mussel settlement was observed.

## 17-06-22 inspection:

Officers inspected the bed again on the 17th of June, to assess if the bed had received a 2022 mussel settlement, and assess the condition of the remaining mussel from 2021 since the inspection in April. There has been a change to the channel South America is located in with the shoreward side becoming deeper and returning back to hard substrate meaning that access was reduced to half an hour over low water.

The area inspected was a mix of 2022 seed and 2021 mussel. The seed was approximately 10mm and the 2021 mussel 35-45mm. The seed was at a higher density (40% - 50% coverage) to the North of the inspected area and became less dense to the South.

## 17-07-22 inspection:

An inspection of South America was completed to assess the condition of the mussel previously inspected in June. Access had changed further with much of the sand being washed down to stony substrate to the west of the skear with a 500m channel needing to be crossed to access the bed. Due to the depth of the channel the bed was accessed on foot. Access for officers was approximately half an hour over low tide.

The size of the bed is considerably smaller than the previous year. The Northern end of the skear had sparse mussel with exposed stony substrate. The mussel increased in density towards the middle of the bed, the seed mussel was 15-25mm in length with the occasional size mussel mixed in. In the middle of the bed the mussel was on a muddy substrate and was relatively loose. On the Eastern side of the bed the mussel thin moving South with the layer of sediment over the stony substrate reducing until the mussel was on the stony substrate. There was a patchy ~10m<sup>2</sup> consisting of barnacled size mussel. The end of the skear went to bare cobble. The Western side of the bed mainly consisted of loose 2022 seed, with occasional size mussel present on a muddy substrate

## 5) Falklands

NWIFCA have received industry information provided on the 18<sup>th</sup> of July and are currently in the process of assessing.

## b) Seed mussel fishery

Given the current information it appears further inspection is required before we can determine whether a hand gathered seed, and/or dredge fishery can take place this year on the beds. The conditions which we normally look for to allow a seed fishery to take place (loose mussel, single size class of seed with dense settlement, large amount of sediment, high probability of washing away) are as yet not clear. Currently, there is considerable patchiness of settlement, with differing ground conditions over much of the mussel beds and mussels of mixed size. The spat settlement appears to be later this year than previous, and therefore, we consider it necessary to wait on further inspection to see if conditions improve enough to allow a viable fishery to take place.

Further surveys of South America, Heysham, Fallklands and Perch Scar and Black Scar have been planned for mid-August.

Regarding Heysham, officers have contacted cefas and FSA to discuss classification of the Heysham mussel beds, and determine whether an unclassified bed can be opened to seed fishing given the large proportion of size mussel currently on the bed. Once this information has been received, it will determine whether a hand gathered seed mussel fishery can take place on Heysham, and if classification of the bed can be initiated. The bed needs to be closely monitored for signs of change.

# We therefore propose that <u>we inform TSB of the results of inspection of these sites</u> before the beginning of September, and members consider a proposal on the fishery, subject to HRA, via email.

## 2. COCKLES

Inspections and surveys completed since the last report:

- 1) **Southport** survey (30-05-22)
- 2) **Pilling** survey x 2 (04-05-22 and 20-07-22\* currently in draft)
- 3) Warton inspection (15-06-22)
- 4) Aldingham and Newbiggin inspection (01-07-22\* currently in draft)
- 5) **Flookburgh and Leven** survey (12-07-22\* currently in draft)
- 6) Middleton survey (22-07-22\* currently in draft)

## a) Ribble cockle beds:

## 1) Southport

During the survey, 83 stations were sampled from a 350 m grid. There was very little size cockle present on the bed. There was a band of undersize cockle running through South Penfold toward the river Ribble, approximately 3km long and between 0.5 and 1km wide. The cockle had grown since the last inspection with the majority of the cockle between 18-22mm in length. An area to the North of the survey grid which previously had high densities of cockle was not surveyed due to the ground being too soft to safely access. Overall the area is approximately 841 ha, with 50 to 60 tonne of size cockle and 1400 to 1600 tonne of undersize. Figures are provided in the survey report in Annex 2.

A further survey is planned for early August, to allow the cockle time to grow on and identify how much of the stock has reached size. The fishery will be subject to HRA before a decision is made regarding its opening. A provisional date of the early August has been proposed for the next survey. Leasowe cockle beds will also be surveyed during this time.

## Update on Southport classification:

NWIFCA have been in communication with Environmental Health officers for both West Lancs and Mersey Port, and with individuals from the Food Standards Agency (FSA) to organize sampling and to be updated on their progress with classification.

The current bed falls across two previous classification zones, managed by two different councils. Both the sands and cockle bed have moved since previous sampling, requiring agreement on new recommended monitoring points (RMPs) for classification sampling.

Coordinates for new RMPs have been agreed with the FSA, who are awaiting confirmation from EH officers to submit these to cefas. Once Cefas agree, they will send a RMP ID, and sampling can commence. NWIFCA officers have already liaised with local EH officers to organize appropriate dates for consecutive, weekly sample runs so this can commence as soon as an ID has been provided.

The sanitary survey to determine the boundaries of classification zones has already begun. There is the possibility of the area being merged into one classification zone and therefore requiring only a single RMP – but this is at the discretion of the FSA and subject to their assessment. NWIFCA have provided our survey data to assist with this.

Correspondence from the FSA on the 11th of July, confirmed that due to the time-limited nature of cockle stocks, the availability of historical data and requests from industry to progress the application – the FSA have agreed to consider a preliminary class C for the stock subject to 6 parallel samples taken at least one week apart. The standard sampling regime is for 10 samples to be taken a week apart to provide provisional classification.

Once they have received the parallel monitoring data, they can review the results to see if a preliminary class C can be awarded. However please note the following:

- Sampling does not guarantee a classification. If there are any prohibited level results in this period of sampling, classification will not be awarded.
- If the 6 parallel results return lower E.coli results (i.e. below the limits for class A or B), the area will still be awarded preliminary class C, due to less than 10 results collected and the limited available historical information.

- 10 results will still be required to award a provisional classification. Once 10 results are available, we will evaluate compliance with the classification thresholds and award a classification accordingly.
- The area will remain unclassified until the FSA updates the classification list.

## b) Morecambe cockle beds:

## 1) Pilling

The survey at pilling was done early to determine a biomass of cockles post winter and after the fishery had ceased. There was a relatively low density of size cockle across much of the bed with an area of slightly higher density size cockle (max 36) in the centre of the bed. There were low densities of undersize cockle across the majority of the centre of the bed, and areas without undersize cockle in the North-West and South-East sections of the surveyed area. There were no signs of a 2022 cockle spat which is likely due to the timing of the survey. Across an area of 1642 ha, there were approximately 950-1100 tonnes of size cockle and 350 - 475 tonnes of undersize.

Pilling is due to be surveyed again on the 20<sup>th</sup> of July.

## 2) Warton

Warton Sands was inspected on the 15<sup>th</sup> of June. An inspection of the cockle bed at Warton Sands was undertaken to monitor presence and density of cockle in the area to see if a full survey is required. Much of the area is inaccessible due to a change in the Keer channel. The bed was walked and areas where cockle were previously dense were inspected. The cockle is patchy with the majority of the cockle in a 400m x 100m area. Size cockle ranged between 0 and 40 per m<sup>2</sup> with undersize cockle ranging between 0 and 20 per m<sup>2</sup>. There is a range of cockle size from 5 to 35mm in length. Due to the small area, limited access to areas, patchy distribution, and density of the cockle a return survey is not planned in 2022.

## a) Morecambe Bay Cockle fishery

We are unable to provide recommendation for the cockle fishery this year in time for the current TSB meeting. Due to the meeting being slightly earlier than usual and availability of suitable tides for surveys, the final Morecambe Bay cockle surveys take place post the deadline for TSB papers to be submitted.

# We therefore propose that <u>we inform TSB of the results of our surveys as soon as they</u> are complete, and make our recommendation for this year's fishery to members via <u>email.</u>

NWIFCA, 20<sup>th</sup> of July 2022

## Annex 1

## Mussel Inspections and surveys:

## Heysham Flat Mussel and Sabellaria alveolata Inspection 16-05-22

Officers present:MC, APTidesLW 06:29 1.1m (Liverpool tides)

Officers accessed the skear on foot to inspect the mussel on Heysham Flat. Dallam Dyke was not crossed due to water depth and tide.

The Sabellaria alveolata reef that has been seen distributed across much of the skear is now less obvious. It is likely that the majority is now covered and smothered by substrate of mud and sand with mussel seed coverage high. Some areas, particularly on the Southern extent of the skear, are covered by reef, some living and some deteriorated with thin mud/sand on top. Accessing the skear was easier due to the lower extent of reef. The extensive areas of reef present on the North and South of the Skear were as seen it previous years but it no longer extends across the skear from Conger Rock to Dallam Dyke as seen on the March inspection.

Mussel has persisted over the winter, with large areas of 30-40mm mussel, particularly in the area before Dallam Dyke. Much of the live mussel was mixed in with seed settlement. There was the occasional size mussel present across the bed. The cleaner and more consistent mussel was found before reaching and along Dallam Dyke, with some areas of 80-90% coverage. Some areas of bare cobble and dead shell were also present on the skear, particularly on the boundary with Sabellaria reef on the Southern edge of the skear.

Knott End Skear appeared dark in colour, similar to the main skear so it is presumed that there is mussel present but this cannot be confirmed as access was not possible by foot. There are a number of skear present beyond Knott End skear.

Oystercatcher and gulls were present in large numbers feeding on the Southern edge of Heysham Flat skear.



Fig.1 Sabellaria alveolata approximate extent 16-05-22.



Fig.2 Sabellaria sp. covered by mud/sand and seed mussel 16-05-22.



Fig.3 30-40mm mussel 16-05-22.



Fig.4 Band of potentially old Sabellaria sp. majority smothered by mud/sand and seed mussel 16-05-22.



Fig. 5 High density 30-40mm mussel towards Dallam Dyke.



Fig. 6 Large area of Mussel 30-40mm towards Dallam Dyke.



Fig 5 16-05-22.

## Heysham Flat Mussel Follow Up Inspection 27-05-22

Officers present: JH, AP Tides LW 16:51 1.9m (Liverpool tides)

An inspection was carried out on 16<sup>th</sup> May where it was reported that there were areas of 30-40mm mussel remaining from 2021 which were free of the 2022 seed settlement. In previous years any remaining mussel is usually smothered by the following year settlement, but as there were areas of seed free 2021 mussel, officers wanted to complete a follow up inspection to monitor the situation. The other consideration were that these areas were present on *Sabellaria alveolata* reef which had been smothered.

The inspection focussed on the areas where 2021 mussel remained. Some areas of clean 2021 persisted closer to Dallam Dyke (Figure 1 and 2). The areas of 2021 mussel which were free from seed has reduced with more 2022 seed persistently mixed in (Figure 3 and 4). The mussel present from Conger Rock to Dallam Dyke is likely present on 2021 *Sabellaria alveolata* which is evident in areas (Figure 5 and 6).

A further inspection will be planned to monitor the development of the areas of mixed 2021 / 2022 seed.



Fig 1. Area of 2021 30-40mm mussel which is free of 2022 seed 27-05-22



Fig 2 – Area of 2021 30-40mm mussel which is free of 2022 seed with evidence of sand on top of mussel 27-05-22



Fig 3 – Area of 2021 30-40mm mussel mixed with 2022 seed 27-05-22



Fig 4 – Overview of skear, 2021 30-40mm mussel mixed with 2022 seed 27-05-22



Fig 5 – Evidence of mussel present on 2021 Sabellaria alveolata 27-05-22

## Heysham Flat Mussel Inspection 16-07-22

Officers present: JH, AG Tides LW 08:351 0.7m (Liverpool tides)

The area on the higher shore to conger rock consisted of mussel 15 to 20mm with ~ 90-95% coverage (Figure 1). The mussel was hard in a layer of sandy mud (Figure 2).

The area from conger rock to Dallam dyke has changed considerably since the last inspection with a significant layer of sediment under the mussel. The underlying substrate is a mix of sand and mud and is firm unlike the usual mussel mud present on heysham. The layer of sediment is ~1m in depth with no visable presence of *Sabellaria alveolata* other than on the North and South of the skear away from the main mussel bed. There is a range of size classes of mussel across the area from 15-50mm in length (Figures 5 and 7). There are very few areas where there is one size class of mussel. Figure 6 shows a small are ~2m<sup>2</sup> of size mussel free of 2022 seed. There are no signs of scouring although the mussel is loose in some areas (Figures 7 and 8).

Access to the outer skears was not possible across Dallam dyke although anglers had accessed the outer skear using a sandbank to the North of Heysham Flat. It is possible that there would be access to the outer skear via quad bike on spring tides.



Fig 1. Dense 2022 seed mussel higher up the shore 16-07-22



Fig 2 – Dense 2022 seed mussel on a sandy mud substrate and relatively hard in 16-07-22



Fig 3 – Channel through the mussel bed showing the depth of sediment above hard substrate 16-07-22



Fig 4 - Channel through the mussel bed showing the depth of sediment above hard substrate 16-07-22



Fig 5 – Mix size classes of mussel present on most of the skear between Conger rock and Dallam Dyke 16-07-22



Fig 6 - Small area of size mussel present ~2m<sup>2</sup> 16-07-22



Fig 7 – Area of loose mussel and mixed size classes 15-50mm 16-07-22



Fig 8 – Area between Conger rock and Dallam Dyke with no signs of scouring 16-07-22

## Wyre End Mussel Inspection 18-05-22

Officers present: MC, AG, MB Tides LW 07:57 (0.9m) (Liverpool tides)

An inspection of Wyre End and 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. There has been a 2022 settlement of seed mussel, varying in density across the main skear, with the northern edge of the bed having received no settlement. A large 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 mussel and seed (Figure 2). The Northern section of the surveyed area had no mussel present and contained remnant Sabellaria sp. reef (Figure 6).

Towards the South of the bed a large area of 20-35mm mussel was present (Figure 1 and 5). This mussel had a coverage of 50-60% with dense seed cover and occasional size mussel mixed in (Figure 4). An area of >45mm mussel present on the north eastern side of the skear in 2021 was no longer present. The western edge of the bed contained patches of 25-35mm mussel hard in the substrate with seed mixed in, with a coverage of 40-50% (Figure 3). This mussel was located close to the channel and was spreading onto the interior of the main skear. A large flock of oystercatchers and other bird species were observed feeding on the South Western edge.

The two channel edge areas had small clumps of 45-60mm mussel covered in barnacles present along the western edge of the both areas and is shown in figure 7. The majority of each area consisted of cobble and dead shell with no seed mussel settlement.



Figure 1. Approximate bed area boundaries and observations of the bed made by officers.



Figure 2. Raised cobble/pebble area at Wyre End 18-05-22.



Figure 3. 25-35mm mussel and seed hard in on the North Western edge of the skear.



Figure 4. 25-35mm mussel with dense seed coverage in Southern area of Wyre End skear 18-05-22.



Figure 5. Large area of 20-35mm mussel.



Figure 6. Remnants of Sabellaria sp.on the northern edge of the bed with no mussel present.



Figure 7. Clumps of barnacle covered size mussel on the channel edge of seperate areas.

## Fleetwood Mussel Inspection 19-05-22

Officers: AP, JH, MB, AG

LW: 08:42 1.1m (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 2022 mussel settlement of approximately 60% coverage. The mussel was approximately 5mm and had settled on the hard substrate / shell debris (Figure 2). The settlement was absent along the Eastern edge of the scar which was different from previous years. There were small areas of size mussel along the channel edge. The approximate area of the mussel was 4.6 hectares.

## Perch Scar

Perch Scar can be split into two areas, the Northern area consisted of mussel mud from 2021 with no observed 2022 mussel settlement (Figure 3), and the Southern area which has had a 2022 mussel settlement of approximately 40% coverage. This is significantly reduced from previous years. The mussel was approximately 5mm in size (Figure 4). There were occasional small areas of 40-50mm mussel along the channel edge. The approximate area of the mussel was 4 hectares.

## Kings Scar

Kings Scar consisted of area of mussel 10-20mm long which is likely to be a settlement from late 2021 or early 2022. There were no signs of a recent settlement. The area of mussel was 2.4 hectares and had 40-60% coverage (Figure 5). Kings Scar has a number of structures such as wrecks which have larger mussel which has persisted through the winter (Figure 6).

## Neckings Scar

The tide did not ebb as usually expected for the size of tide and therefore access was limited to the higher reaches of the bed (Figure 6). There was 20-30mm mussel which had persisted through the winter on the scar. In the denser areas the mussel was had 60% coverage (Figure 7). No observed 2022 mussel settlement. There was *Saccharina sp.* present on some of the hard substrate.

## Rossall Scar

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



Figure 1. Overview of the mussel inspection 19-05-22.



Figure 2. Black scar 2022 mussel 19-05-2022.



Figure 3. Perch Scar 2021 mussel mud 19-05-2021.



Figure 4. Perch Scar 2022 mussel settlement 19-05-2022.



Figure 5. Kings Scar 2021 mussel 19-05-2022.



Figure 6. Kings Scar Mussel on Cobble / Wreck 19-05-2022.



Figure 6: Neckings Scar Mussel 19-05-22.



Figure 7. Neckings Scar mussel 19-05-2022.



Figure 8. Rossall Scar mussel 19-05-2022.

## Perch and Black Scar Mussel Inspection 15-07-22

Officers: JH, MB

LW: 07:43 0.8m (Liverpool Tides)

## Black Scar

Black Scar is a mix of sandy, algal hummocks with 2022 seed mixed in (Figure 2) on the lower ground apart from a strip of mussel along the channel edge which persists throughout the year. The mussel on Black Scar was ~10mm (Figure 3). Percentage cover was difficult to estimate due to the sand and algal covering. It was also not possible to clearly define a bed area due to the patchy nature of the mussel. This is a change from previous years when the skear typically receives a dense settlement.

## Perch Scar

There was no algal growth on Perch Scar. There was an area of 2022 seed mussel approximately 2.5ha in size (Figure 1) with a 60-70% coverage (Figure 4 and 5). The mussel was ~10mm in size (Figure 6). The mussel has started to put down some mud (~5cm). Large area along the Wyre channel edge and to the North of the skear have minimal seed mussel. There is a strip of mussel along the channel edge which persists throughout the year. This is a change from previous years when the skear typically receives a dense settlement across the entire area.



Fig. 1 – NWIFCA GPS Track Data and Area of 2022 Seed Mussel on Perch Scar 15-07-22.



Fig 2 – Black Scar, sandy, algal hummocks interspersed with 2022 seed mussel 15-07-22



Fig. 3 – Black Scar, patch of 10mm 2022 seed mussel 15-07-22.



Fig. 4 – Perch Scar overview of 2022 seed mussel 15-07-22



Fig. 5 - Perch Scar overview of 2022 seed mussel 15-07-22



Fig. 6 – Perch Scar, 2022 seed mussel 15-07-22



Fig 7 – Perch Scar, area of very sparse seed mussel near the Wyre channel edge 15-07-22

## South America Mussel Inspection (Quad) 17-06-22

## LW: 08:39 1.0m (Liverpool tides)

An inspection of South America was completed to assess if the bed had received a 2022 mussel settlement, and assess the condition of the remaining mussel from 2021 since the inspection in April. There has been a change to the channel South America is located in with the shoreward side becoming deeper and returning back to hard substrate meaning that access was reduced to half an hour over low water.

NWIFCA track data has been provided in Figure 1 with the bed area mapped for reference from 2021. The area inspected was a mix of 2022 seed and 2021 mussel. The seed was approximately 10mm and the 2021 mussel 35-45mm. The seed was at a higher density (40% - 50% coverage) to the North (Figure 2 and 3) of the inspected area and became less dense to the South (Figure 4). Where the mussel is present it is on a very thin sand veneer, between the mussel there is a lot of exposed hard substrate (Figure 5).



Fig 1. NWIFCA Track Data with 2021 Bed Area for Reference 17-06-22



Fig 2. Area of denser 2022 seed and 2021 mussel 17-06-22



Fig 3. Overview of the North End of the Skear 17-06-22



Fig 4. Southern extent of the inspected area consisting of shell debris, 2021 mussel and occasional patches of 2022 seed.



Fig 5. Exposed hard substrate present in between the areas of mussel 17-06-22

## South America Mussel Inspection (Quad) 17-07-22

## LW: 09:23 0.8m (Liverpool tides)

An inspection of South America was completed to assess the condition of the mussel previously inspected in June. Access has changed further with much of the sand being washed down to stony substrate to the west of the skear with a 500m channel needing to be crossed to access the bed (Figure 1 and 2). Due to the depth of the channel the bed was accessed on foot. Access for officers was approximately half an hour over low tide.

NWIFCA track data has been provided in Figure 1 with the bed area mapped for reference from 2021. The Northern end of the skear had sparse mussel with exposed stony substrate (Figure 3). The mussel increased in density towards the middle of the bed, the seed mussel was 15-25mm in length with the occasional size mussel mixed in Figure 4. In the middle of the bed the mussel was on a muddy substrate and was relatively loose. On the Eastern side of the bed, the mussel reduced in density moving South with the layer of sediment over the stony substrate reducing in depth until there was no mud/sand between the mussel and the stony substrate (Figures 7, 9, 10 and 11). There was a patchy ~10m<sup>2</sup> consisting of barnacled size mussel (Figure 8). The end of the skear went to bare cobble (Figure 12). The Western side of the bed mainly consisted of loose 2022 seed, with occasional size mussel present on a muddy substrate (Figure 13 to 15).



Fig 1. NWIFCA Track Data with Figure Number and 2021 Bed Area for Reference 17-07-22



Fig 2. Large area of bare ground exposed by changing channels with South America mussel bed in the background 17-07-22



Fig 3. Sparse 2022 seed mussel on the edge of the bed with exposed stony substrate



Fig 4. 15-25mm 2022 seed mussel with occasional size (+45mm) mussel present 17-07-22



Fig 5. Loose 2022 seed mussel with some size mussel present on a muddy substrate 17-07-22



Fig 6. Overview of loose 2022 seed mussel with some size mussel present on a muddy substrate 17-07-22



Fig 7. Mussel thinning out in density with some areas of exposed stony ground present 17-07-22



Fig 8. Area of barnacle mussel on stony substrate 17-07-22



Fig 9. Sparse mussel on stony substrate 17-07-22



Fig 10. Sparse mussel on stony substrate looking South down the skear 17-07-22



Fig 11. Sparse mussel on thin sandy layer 17-07-22



Fig 12. Bare stony substrate to the South of the skear 17-07-22



Fig 13. Mussel becoming denser on a muddy substrate 17-07-22



Fig 14. Overview of denser mussel on a muddy substrate 17-07-22



Fig 15. Overview of denser mussel on a muddy substrate 17-07-22

## Annex 2

## Cockle surveys:

## Southport Cockle 30-05-22

Officers present:	AB, MT, JH, MC
Tides:	LW 18:39 1.8m (Liverpool tides)

Survey method - Jumbo and 0.5m<sup>2</sup> quadrat

83 stations were sampled from a 350m grid. The survey grid location was based on the inspection carried out by NWIFCA in April. There was very little size cockle present on the bed. There is a band of undersize cockle running through South Penfold toward the river Ribble, approximately 3km long and between 0.5 and 1km wide. The cockle has grown since the last inspection with the majority of the cockle between 18-22mm in length. An area to the North of the survey grid which previously had high densities of cockle was not surveyed due to the ground being too soft to safely access.

## 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 Mean number of undersize cockle Mean number of 0-5mm cockle 1 per m<sup>2</sup> (min 0, max 6) 67 per m<sup>2</sup> (min 0, max 728) none recorded

## 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), 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).

## Biomass

	Area (ha)	Size Cockle (tonnes) <sup>1</sup>	Undersize Cockle (tonnes) <sup>2</sup>
Southport	841	~50-60	~1400-1600

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

<sup>2</sup>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 Southport Survey Area May 2022.



Density of size cockle per m<sup>2</sup> at Southport May 2022.



Density of undersize cockle per m<sup>2</sup> at Southport May 2022.



Frequency of size classes of cockle per m<sup>2</sup> at Southport May 2022.

## Pilling Sands Cockle Survey 04/05-05-21

Officers present:	MC, AP, AG, MB
Tides:	04/05/22 LW 08:29 1.8m (Liverpool tides)
	05/05/22 LW 08:59 2.1m (Liverpool tides)

Survey method - Jumbo and 0.5m<sup>2</sup> quadrat

82 stations were sampled from a 500m grid. There was a relatively low density of size cockle across much of the bed with an area of slightly higher density size cockle (max 36) in the centre of the bed. There were low densities of undersize cockle across the majority of the centre of the bed, and areas without undersize cockle in the North-West and South-East sections of the surveyed area. There were no signs of a 2022 cockle spat which is likely due to the timing of the survey.

## 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 <sup>2</sup>	(min 0, max 36)
Mean number of undersize cockle	14 per m <sup>2</sup>	(min 0, max 84)
Mean number of 0-5mm cockle	0 per m <sup>2</sup>	(min 0, max 4)

## 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), 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).

## Biomass

	Area (ha)	Size Cockle (tonnes) <sup>1</sup>	Undersize Cockle (tonnes) <sup>2</sup>
Pilling Sands	1642	~950-1100	~350-475

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

<sup>2</sup>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 m<sup>2</sup> at Pilling Sands May 2022.



Density of undersize cockle per m<sup>2</sup> at Pilling Sands May 2022.



Frequency of size classes of cockle per m<sup>2</sup>

## Warton Sands Cockle Inspection 15-06-22

Officers Present: AP, JH

Tides: LW 06:57 1.1m (Liverpool Tides)

An inspection of the cockle bed at Warton Sands was undertaken to monitor presence and density of cockle in the area which had previously been surveyed and assess if a full survey is required. Much of the area is inaccessible due to a change in the Keer channel. The bed was walked and areas where cockle were previously dense were inspected. The cockle is patchy with the majority of the cockle in a 400m x 100m area. Size cockle ranged between 0 and 40 per m<sup>2</sup> with undersize cockle ranging between 0 and 20 per m<sup>2</sup>. There is a range of cockle size from 5 to 35mm in length. Due to the small area, limited access to areas, patchy distribution, and density of the cockle a return survey is not planned in 2022.



Fig 1 - Frequency of size classes of cockle per m<sup>2</sup> Warton Sands 15-06-22