

NWIFCA Technical, Science and Byelaw Committee

11th August 2020: 10:00 a.m.

**AGENDA
ITEM NO.
10b**

SURVEY AND INSPECTION REPORT MUSSELS

Purpose: To provide an update to members on the survey and inspections of the mussel stocks by the Science Team in the last quarter

Recommendation: That Members approve the report that is provided for information only.

i. MORECAMBE BAY

Foulney Dutch Wand Mussel Survey 06-05-20

Low water: 18:03 0.7m (Liverpool Tides)

Line transects were completed across the mussel bed using a Dutch Wand, transects start and finish at the edge of the bed as shown in Figure 2. The number of hits and misses of live mussel were recorded to give percentage cover. The bed area was calculated from the start and end of transects and from observations of officers whilst surveying. It was not possible to walk the perimeter of the bed due to time restraints. A mussel sample was taken every 50 hits using a 10 cm diameter corer. 29 transects were completed and 40 samples collected. The total weight of live undersize and size mussel was recorded as well as the size frequency of each sample. Due to the amount of time required to sort the relatively mixed samples, the mussel under 10mm was excluded from all calculations and maps except the seed map (Fig. 6). Rather than count the seed individually amounts in each sample were assessed as high, medium, low or none.

From the transect and sample data the total mussel bed surveyed was **53.7 hectares**. There was no separation made between the main Foulney bed and Foulney Island as the mussel had spread between the two and the channel had filled in (Fig. 1). There was an abundance of large starfish observed at the far low water line of the Island area (Fig. 8).

Biomass

Foulney total area surveyed **765 tonnes undersize mussel and 6006 tonnes size mussel**

Length Frequencies

The total length frequency for the surveyed bed is provided in Figure 3. From the length frequency data the mussel present on Foulney Skear is varied with a wide spread of mussel from 15mm to 67mm.

Maps

The frequency of each size class of mussels per sample has been mapped in Figure 4 with the size of the pie adjusted for sample weight standardised to kg/m². The weight of the size and undersize mussel has been mapped and represented in Figure 5. (NB neither of these maps include spat).

It can be seen in Figure 4 that the most abundant size class is the >45 mm which is present across most of the bed with areas of 25- 45mm mussels mixed in.

Figure 6 illustrates the settlement of 2020 mussel spat which extends across the majority of the skear and is heavily mixed in with the size mussel. Photographs are provided for further evidence of this in Figures 7

and 10. Figure 9 is provided to show Trailer Bank in the distance from the bottom edge of Foulney Island.

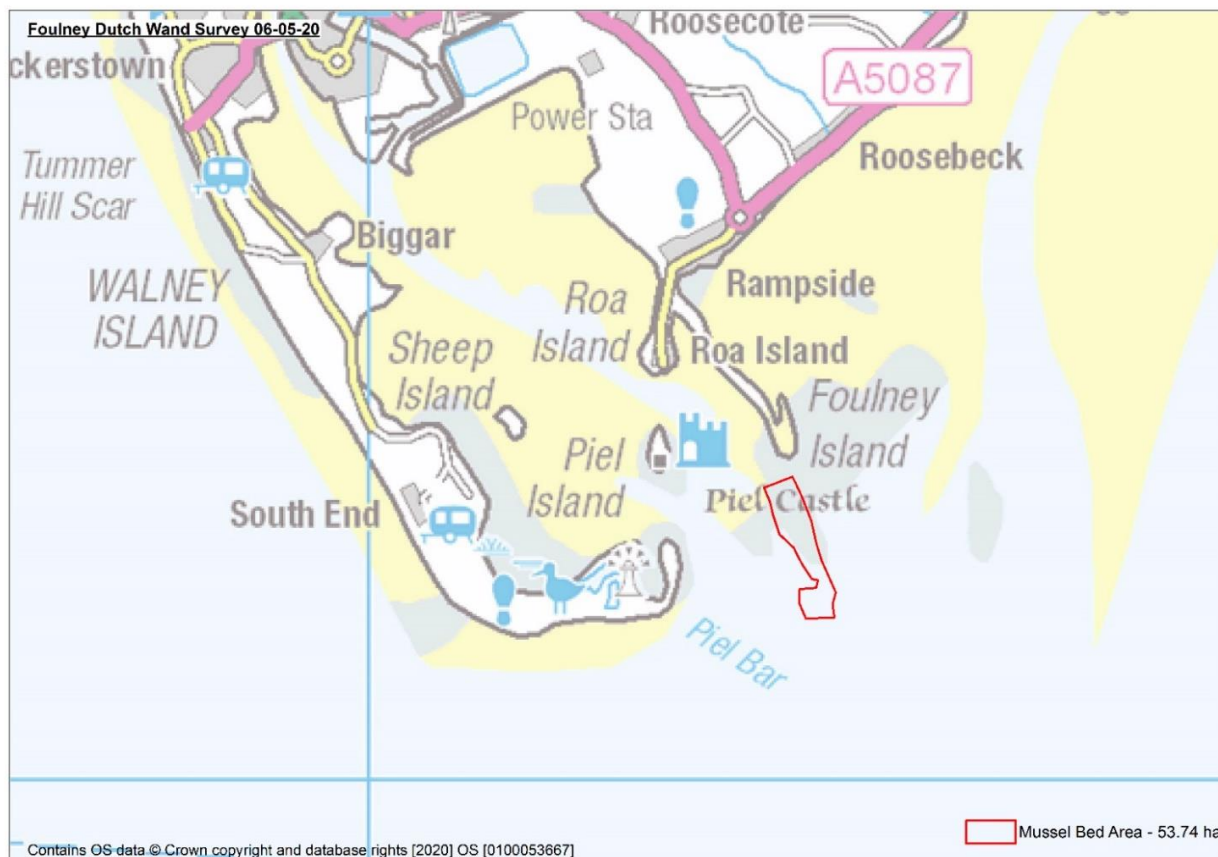


Fig. 1 - Location of Foulney Mussel Bed surveyed 06-05-20

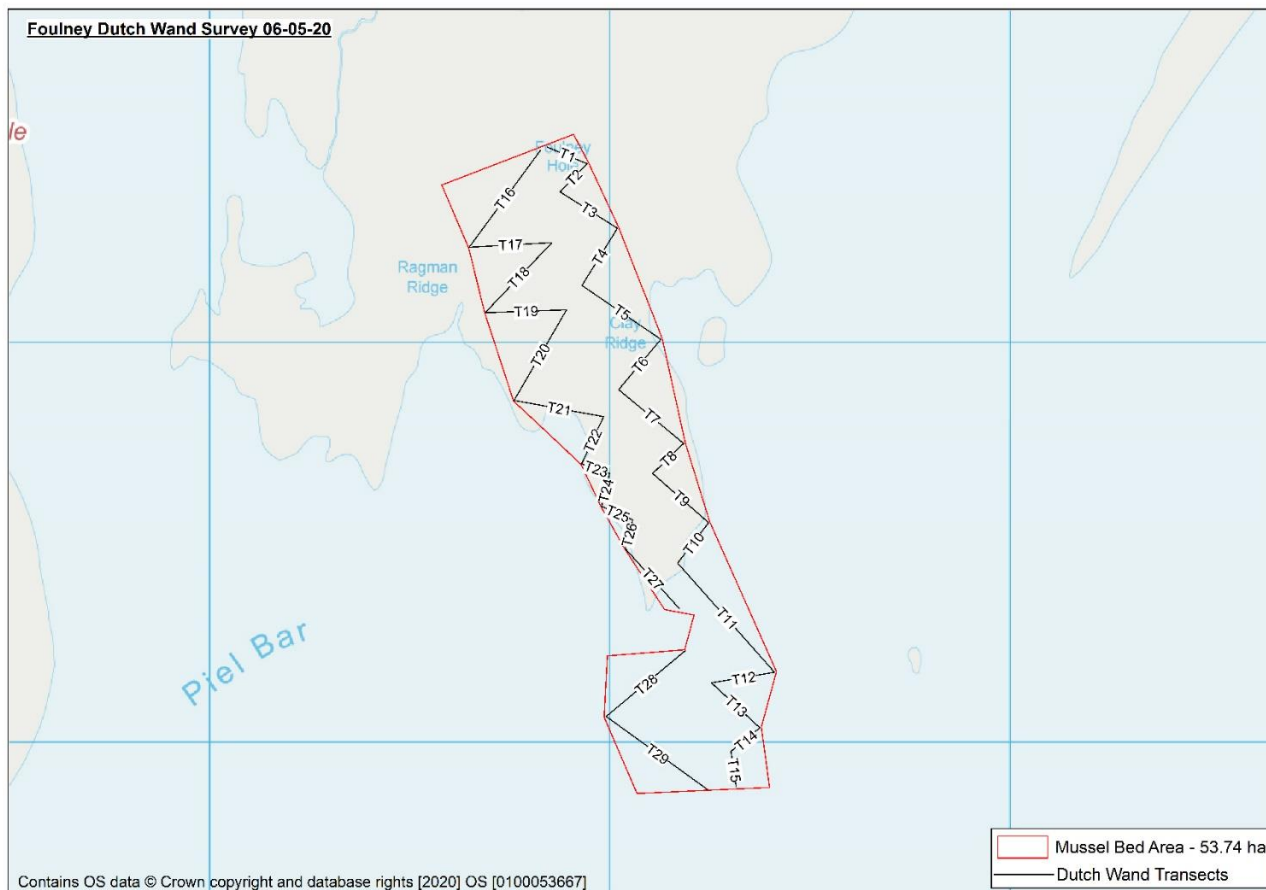


Fig. 2 - Foulney Dutch Wand survey transects and estimated bed area 06-05-20

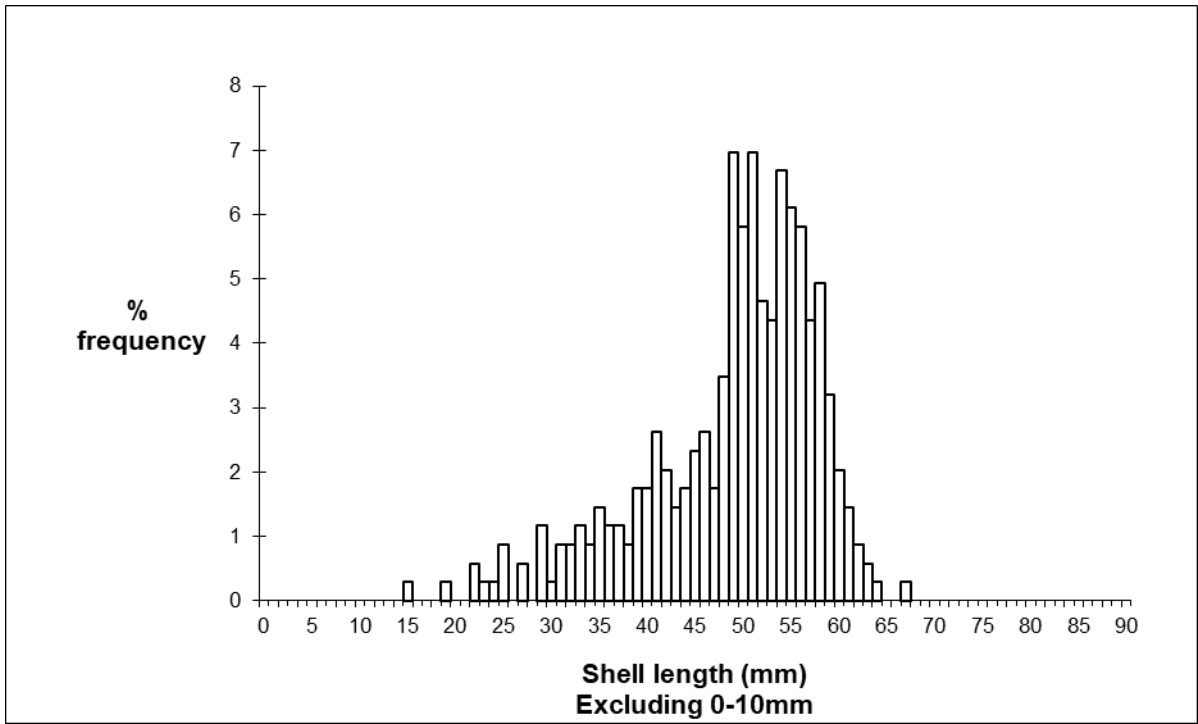


Fig. 3 - Histogram showing size frequency of mussels from all samples on Foulney main skewer 06-05-20

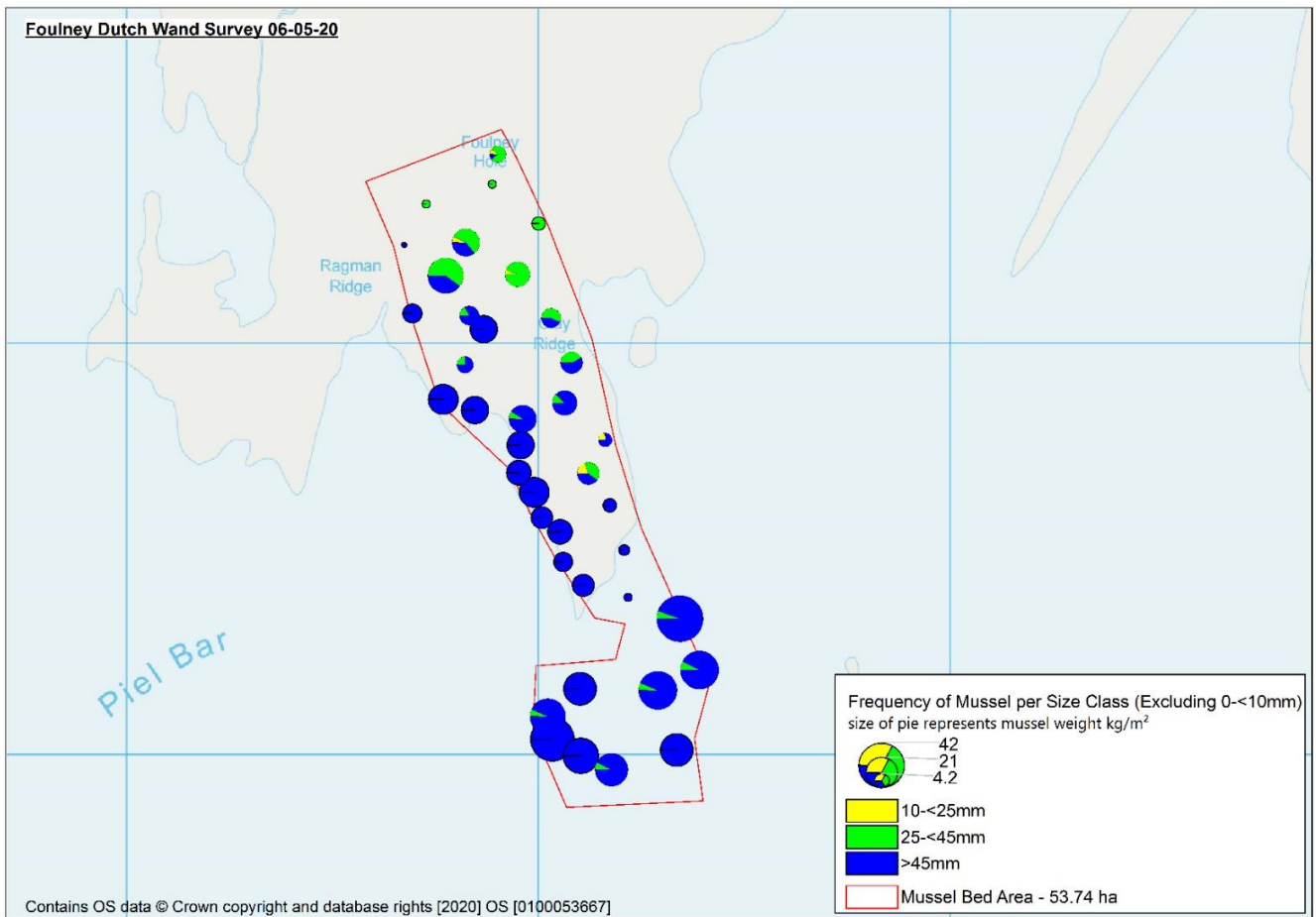


Fig. 4 - Frequency of mussel by size class 06-05-20

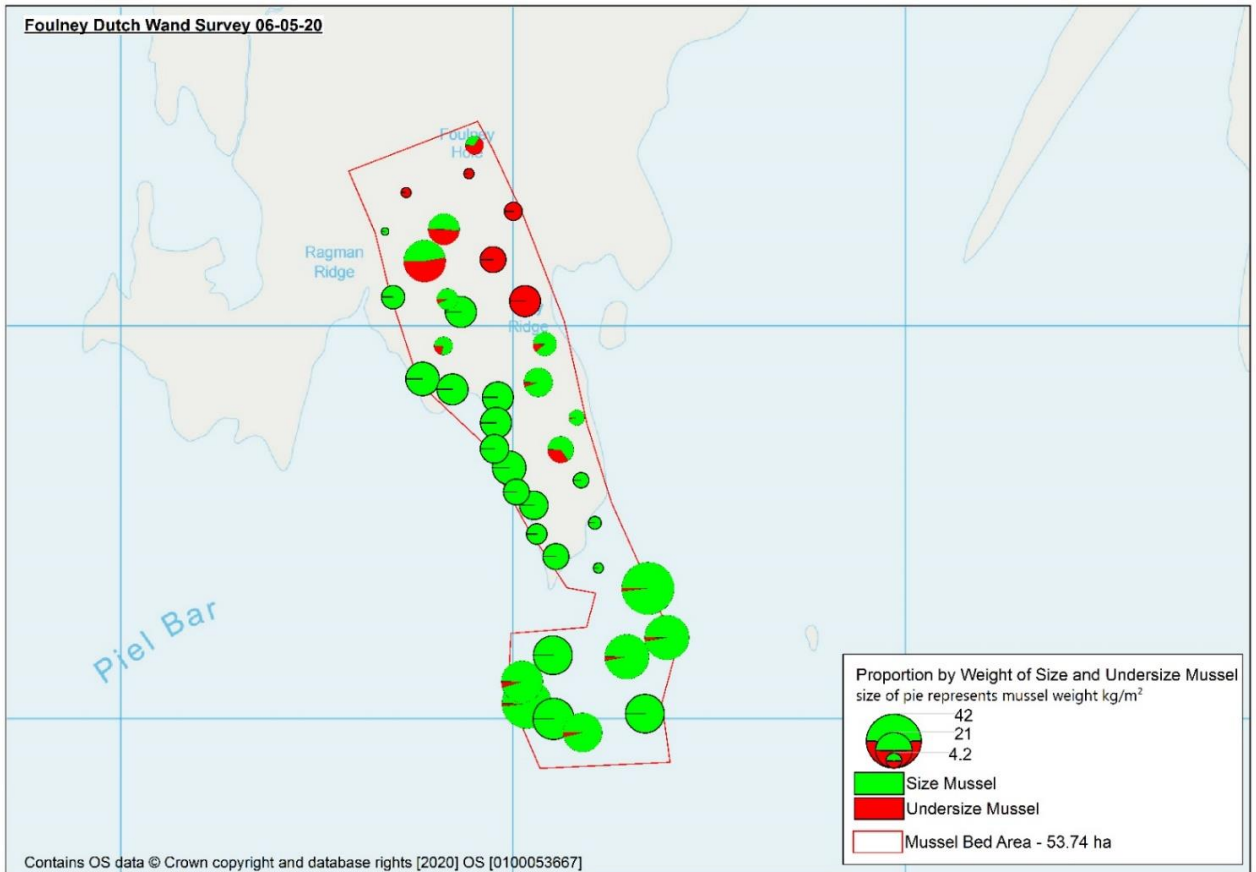


Fig. 5 - Proportion of size and undersize mussel by weight represented as kg/m² 06-05-20

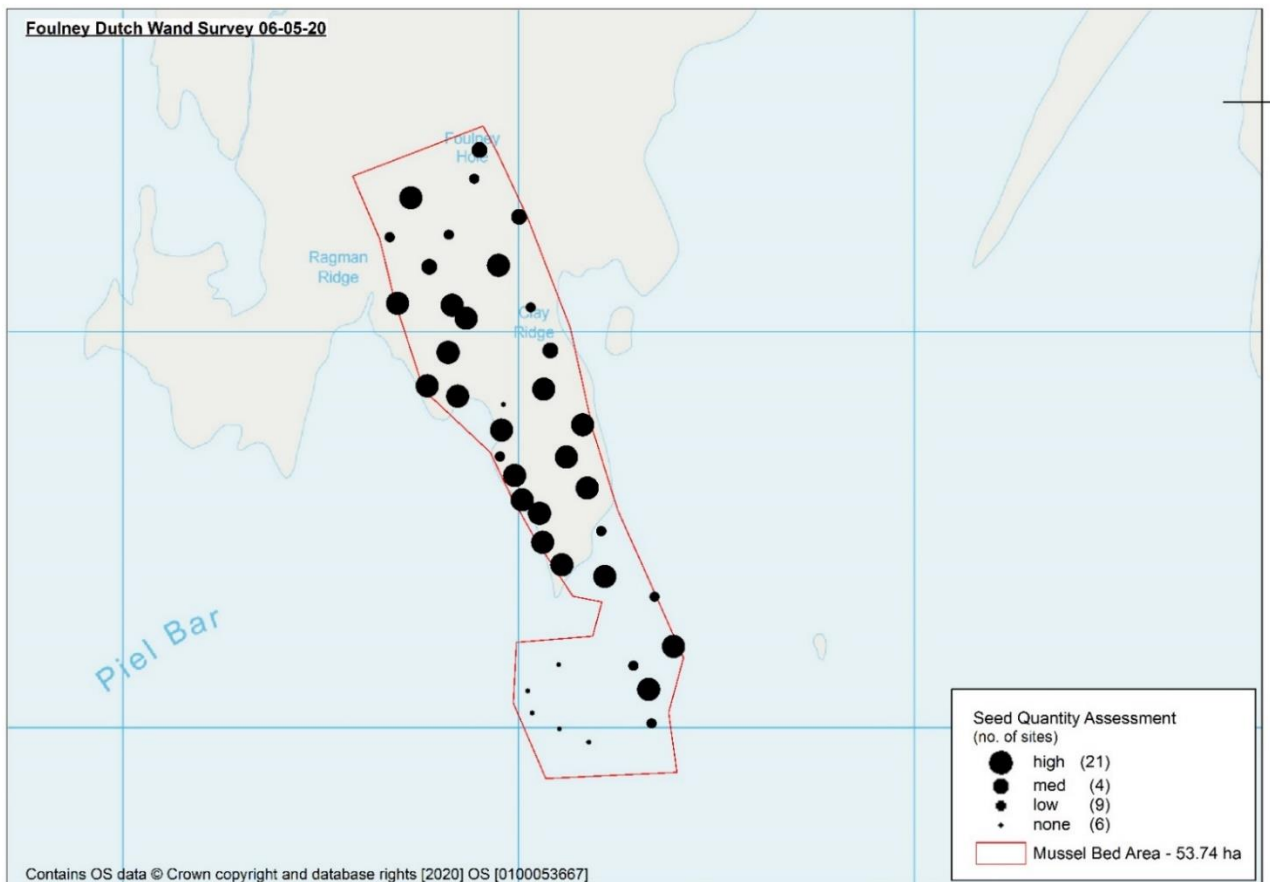


Fig. 6 - Estimated assessment of seed quantity categorised as high, medium, low and none 06-05-20



Fig. 7 illustration of the density of 2020 mussel settlement across Foulney skear 06-05-20



Fig. 8 abundance of large starfish feeding on mussel along the bottom edge of Foulney (Island) 06-05-20

Walney Channel Dutch Wand Mussel Survey 07-05-20

Low water: 18:48 0.5m (Liverpool Tides)

Line transects were completed across the mussel bed using a Dutch Wand; transects start and finish at the edge of the bed as shown in Figure 10. The number of hits and misses of live mussel were recorded to give percentage cover. The bed area was calculated from the start and end of transects and from observations of officers whilst surveying. It was not possible to walk the perimeter of the bed due to time restraints. A mussel sample was taken every 50 hits using a 10 cm diameter corer. Eight transects were completed and 13 samples collected. The total weight of live undersize and size mussel was recorded as well as the size frequency of each sample.

The cobble bank that had developed along the channel edge appeared to have spread wider, and it is hypothesised that this could offer some protection against scour. The mussel along the channel edge was present in large ridges, approximately 0.3 to 0.6m high with the mussel on the top of the ridges and bare cobble in between. This area had an abundance of brittle stars on it that were out of the water.

There were two areas that held just seed. One was tracked around allowing GIS mapping and the boundary of the other was estimated. These are illustrated in Figure 10.

Due to the amount of time required to sort the relatively mixed samples, the mussel under 10mm was excluded from all calculations and maps except the seed map (Fig. 6). Rather than count the seed individually amounts in each sample were assessed as high, medium, low or none.

From transect and sample data the total mussel bed surveyed was **18.41 hectares**.

Biomass

1596 tonnes of size mussel and 27 tonnes of undersize mussel

Length Frequencies

The total length frequency for the surveyed bed is provided in Figure 11 below. From the length frequency data the mussel present on the Walney Channel bed ranged from 41 – 67mm with the highest frequency of mussel at 52mm.

Maps

The mussel frequency of each size class of mussels per sample has been mapped in Figure 12 with the size of the pie adjusted for sample weight standardised to kg/m². The weight of the size and undersize mussel has been mapped and represented in Figure 13.

It can be seen from the map that the most abundant size class is greater than 45 mm which is present across most of the bed.

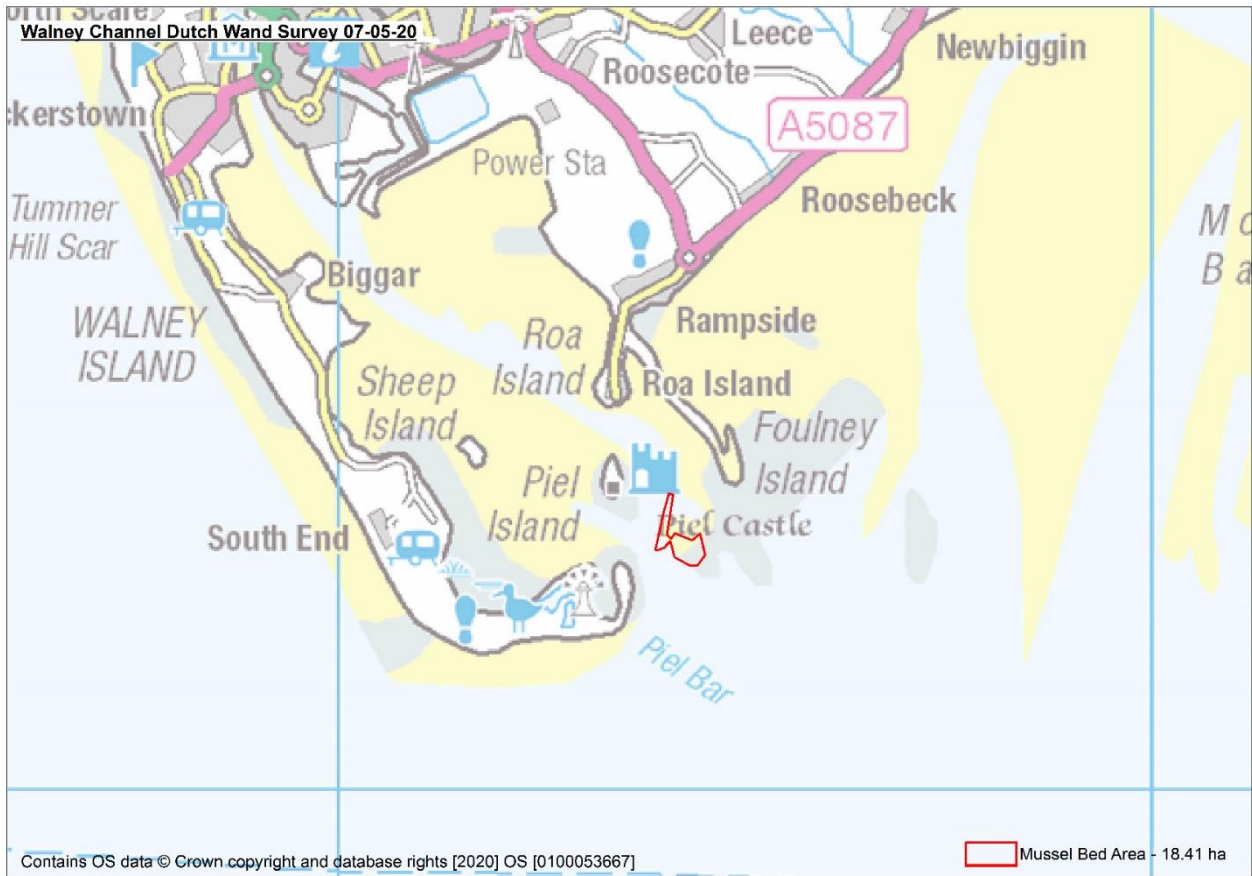


Fig. 9 – Location of Walney Channel Mussel Bed 07-05-20

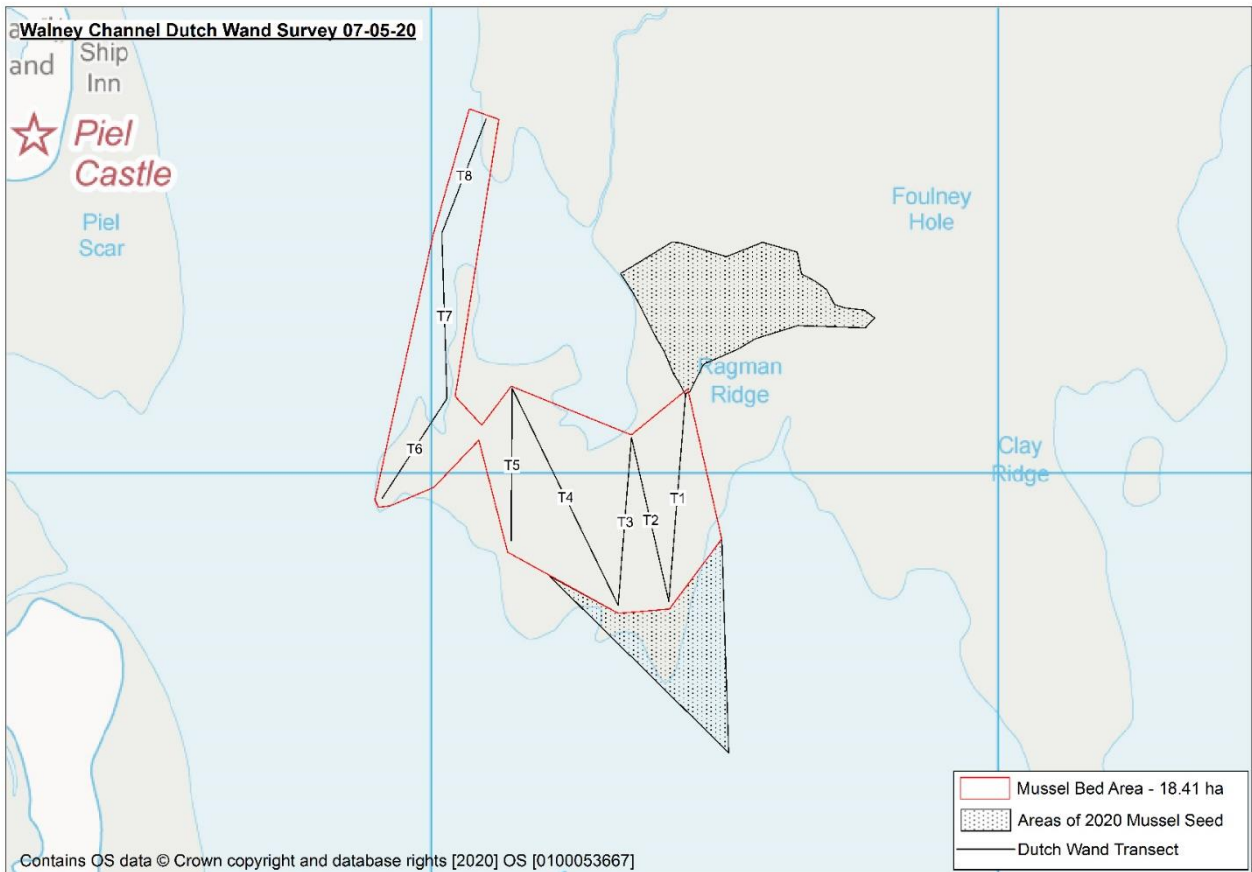


Fig. 10 – Walney Channel Dutch Wand survey transects and estimated bed area 07-05-20

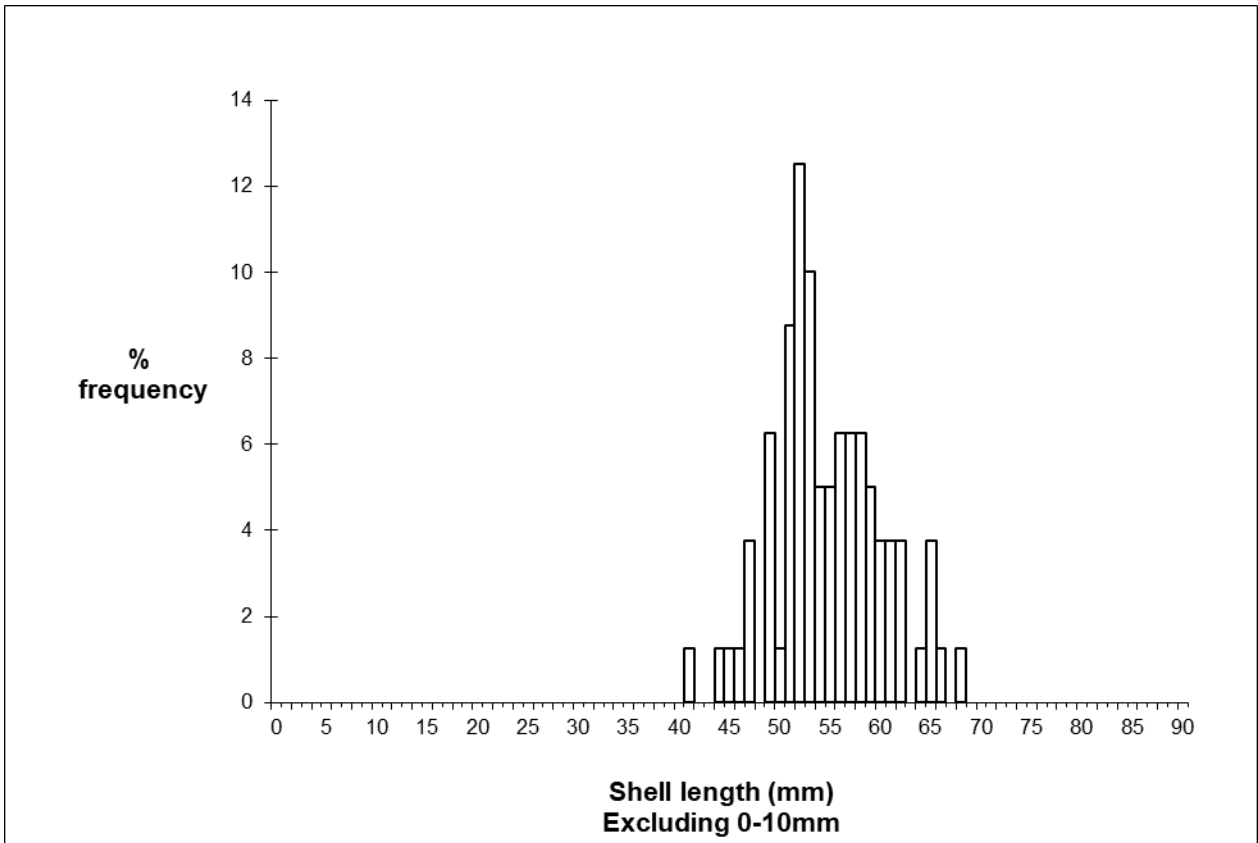


Fig. 11 - Histogram showing size frequency of mussels from all samples on Walney Channel mussel bed

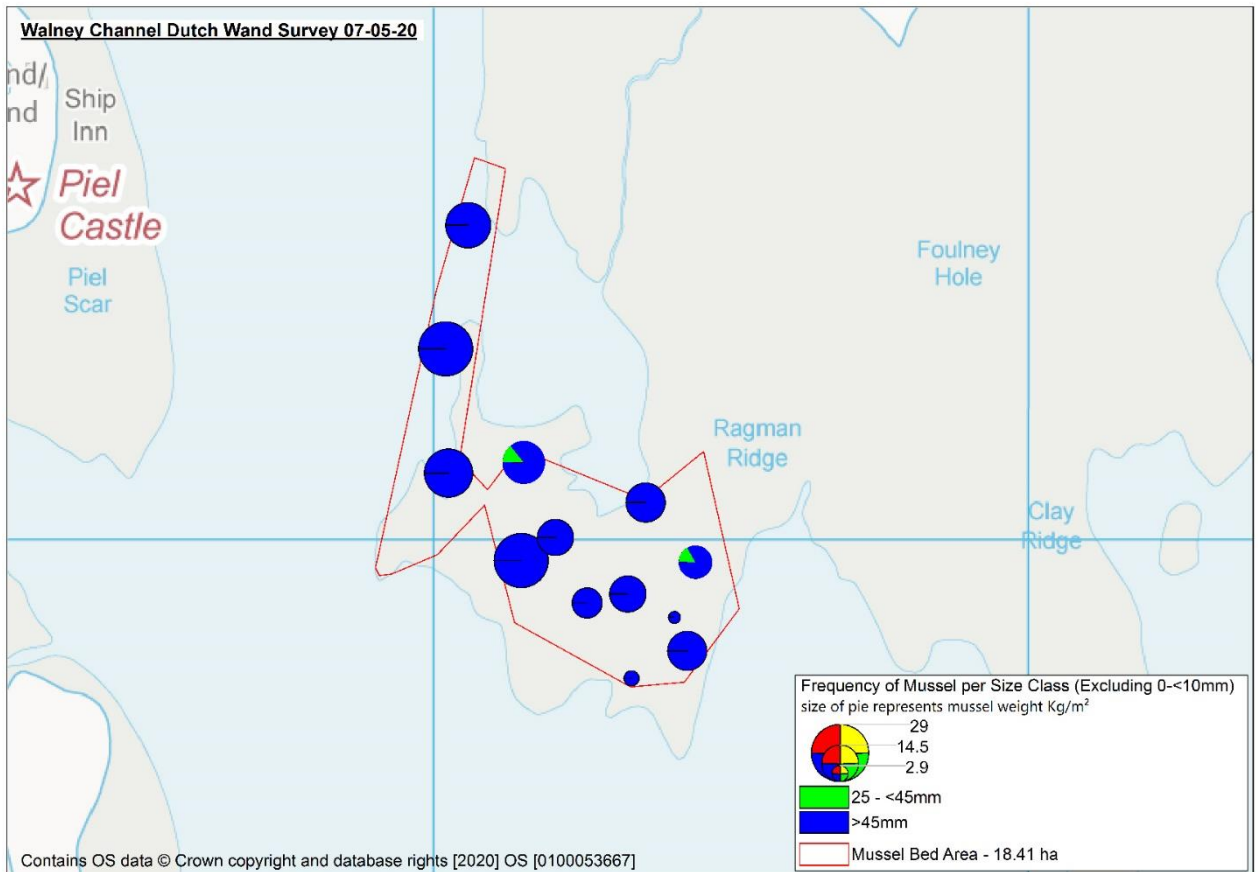


Fig. 12 - Frequency of mussel by size class 07-05-20

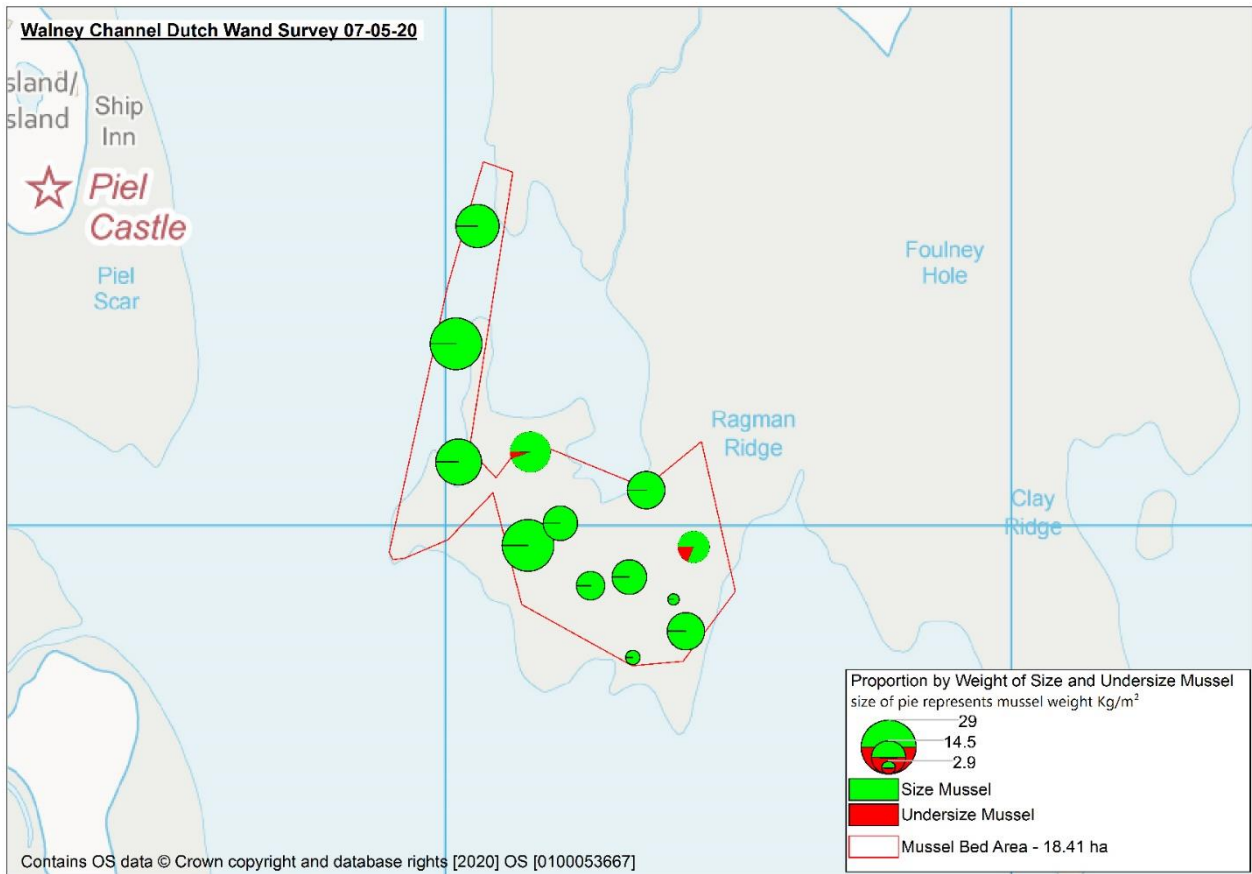


Fig. 13 - Proportion of size and undersize mussel by weight represented as kg/m² 07-05-20

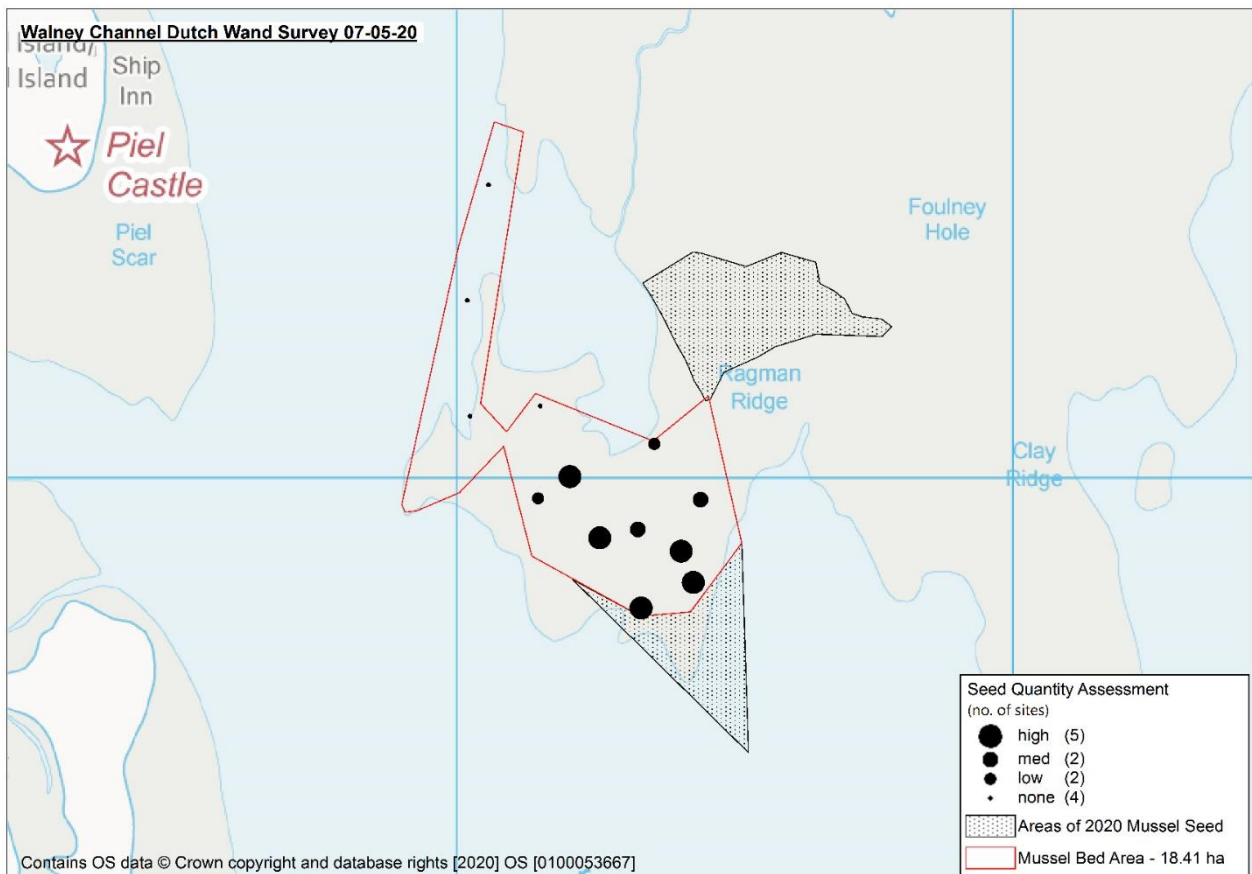


Fig. 14 - Estimated assessment of seed quantity categorised as high, medium, low and none 07-05-20

Low Bottom Mussel Inspection 08/05/20

Low water 1932 0.5m (Liverpool tides)

Method:

The area was accessed by quad bike starting at the oyster frames and working along the low water line as the tide ebbed off (Fig. 1). Officers went as far as the Foulney Ditch area then attempted to return across the Low Bottom bed in an effort to track the edge of new settlement. This was aborted as the ground was so mixed and it was not possible to track this. As an alternative a line was drawn in mapping software across to give an estimate of the area that held the dense 2020 settlement. This was estimated at 41.6 hectares (Fig. 11). Geo-referenced photographs were taken to provide representative images of the low water area. A video was taken as the Senior Scientist waded into the shallow water to show mussel extending far out from the low water edge.

Observations:

From the bottom edge of the oyster frames, mussel was observed to have settled in huge abundance. In some areas mussel was raised from the underlying sandy substrate as it had covered size mussel remaining from previous year classes (Figs. 9 & 10). Areas that looked like bare sand were found on closer inspection to hold mussel nestled into the sand (Fig. 3). A large number of gulls was observed in the shallow water (Fig. 4), and as the tide receded it was clear they had been on the mussel: however they were not observed feeding on it and it was very small. There was only very rare occurrence of starfish. Percentage cover along the low water line was up to 100% (Figs. 5, 6 & 8). On wading into the shallows density reduced to around 50% (Fig. 7).

The upper area of the bed held older mussel which had become characteristically rounded and barnacle covered. There was a range of densities of new mussel spat in amongst this mussel. The majority of the spat across the whole of Low Bottom was in the same size class of 4 - 10mm (Fig. 2).

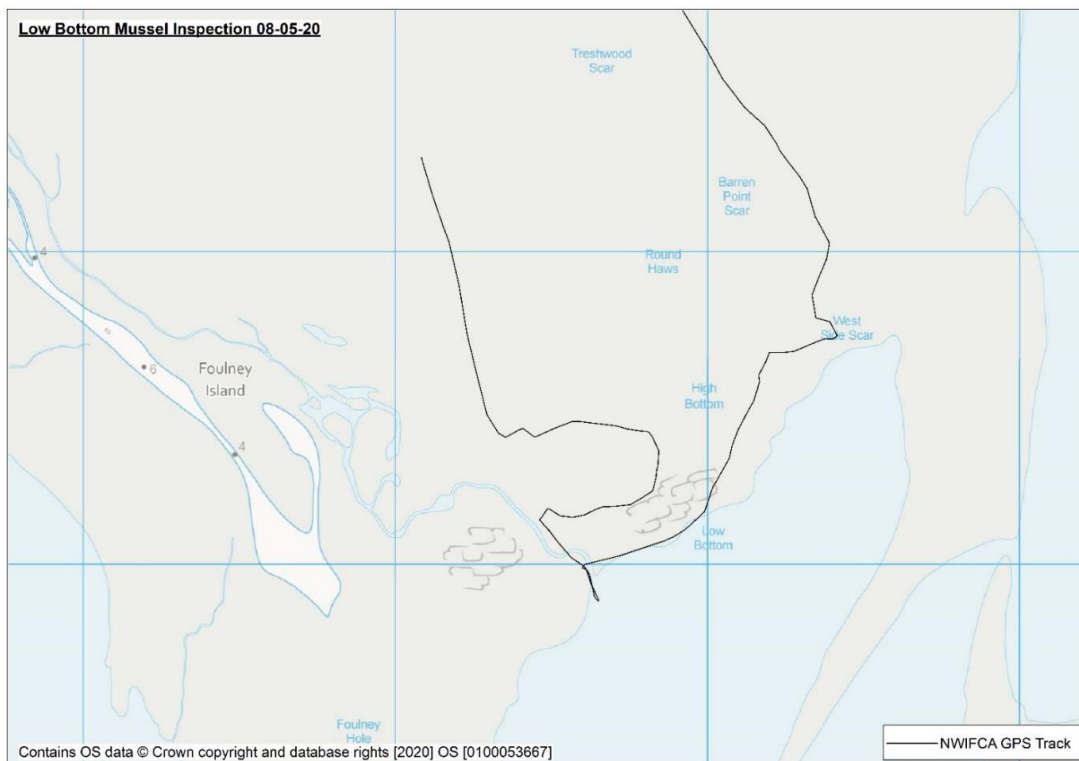


Fig. 15 Map to show track taken on Low Bottom inspection 08-05-20

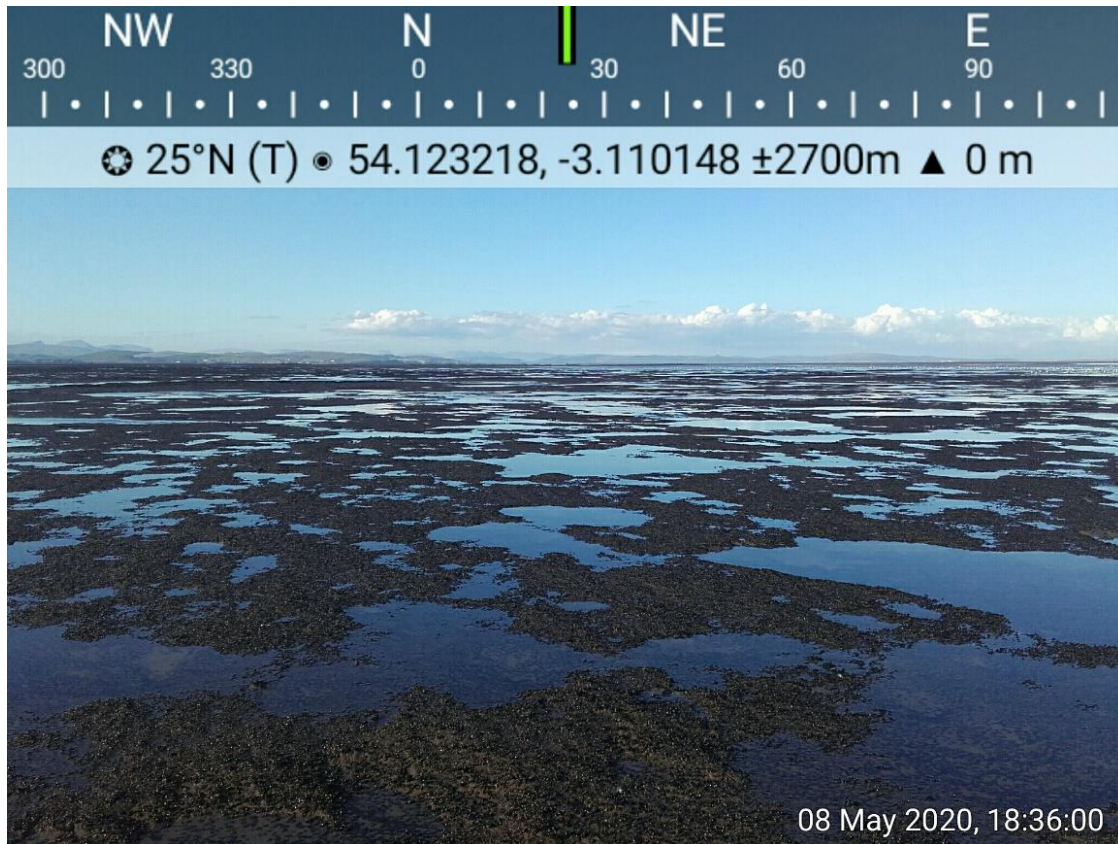


Fig. 16 Illustration of the size of area with high percentage cover of spat Low Bottom 08-05-20

Heysham Flat Mussel and *Sabellaria alveolata* Inspection 09-05-20

Tides LW 20:12 0.7m (Liverpool tides)

Officers accessed the skear on foot. Dallam Dyke was passable by wading waist high at the north end about 45 minutes before low water, and easily on the return at the southern end by ten minutes before low. Efforts made to wade across from the western edge of Knott End Skear to the Outer Skear were abandoned as the water was too deep. However looking across it appeared that the southern side of the Outer Skear was covered in sand (Figs.1-2). The track of the foot inspection is shown in Fig. 13.

The sandbanks that had been surrounding the southern part of the skears for the past few years did not dry out but remained submerged (Fig. 3). Effort was concentrated on inspecting the honeycomb worm reef on the southern side and the northern area was not inspected.

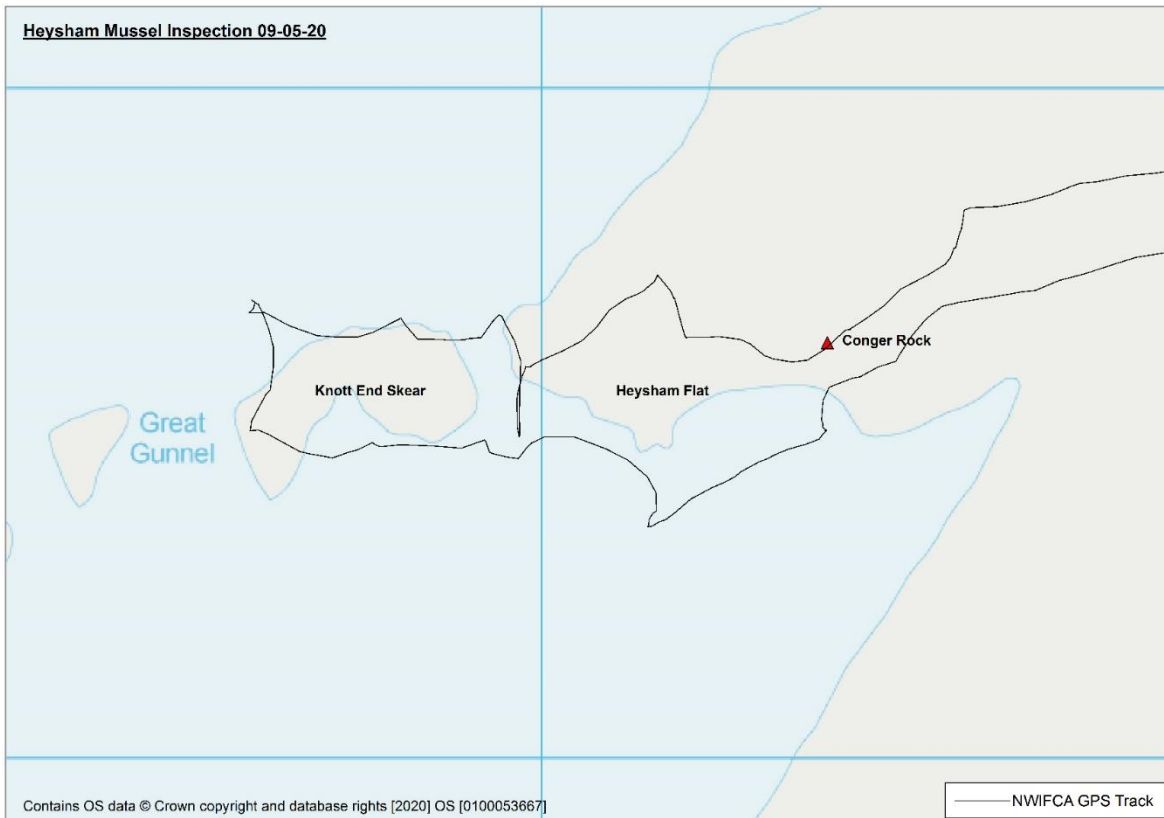


Fig. 17 - map illustrating track from foot inspection 09-05-20

Heysham Flat main skear:

There was a minor level of mussel recruitment in comparison with previous years only over parts of the main skear. This was mainly on the upper skear and patchy (Figs. 4 - 5). A central band across the main skear was barren of mussel and down to bare cobble (Fig. 6). There was also some hard-in larger mussel with spat mixed in towards the western end near to Dallam Dyke (Fig. 7) - this often persists when the rest of the skear is heavily scoured as occurred in 2019. Other areas were covered in old mussel shell.

In view of the reduction in the often seen 'mono-culture' of seed mussel on the main skear, there were rock pools appearing with aggregations of low lying flora (unidentified brown algae), dahlia anemones, a commonly found nudibranch with egg masses (thought to be the grey sea slug *Aeolidia papillosa*), and numerous shore crab moults.



Fig. 18 - main skear with patchy mussel recruitment 09-10-20



Fig. 19 - close up of patchy recruitment on main skear Heysham Flat 09-05-20

Knott End Skear:

Heading across Dallam Dyke there was substantially more mussel settlement on Knott End skear, mixed in with a significant amount of size mussel, some sitting proud and some hard in to the ground (Figs. 8 - 9). There were expanses of this skear bare of mussel and down to cobble and pebble, which is the norm for the past few years at least.



Fig. 20 - mussel spat mixed with size mussel on Knott End skear 09-05-20

Sabellaria alveolata Distribution:

A significant observation was the recovery of the *Sabellaria alveolata* reef forms away from the main skear. This was found in the water off of the north edge of Knott End skear and a vast expanse running south just off of the main skear. The outer edge of this area looked as if it was heavily eroded (Fig. 10): presumably a winter settlement had built up colonies which were then hit by the earlier storms experienced along this coastline. Some of this degraded reef had mussel settlement on it. However there was an extensive area of healthy living reef continuing back towards the main skear (Fig. 11). Northeast of Conger Rock there were some isolated mounds of worm colonies as seen in Fig. 12.



Fig. 21 - healthy honeycomb worm reef on south eastern edge of main skear Heysham Flat 09-05-20

Heysham Flat Mussel and *Sabellaria alveolata* Inspection 09-06-20

Tides LW 09:00 1.4m (Liverpool tides)

Officers accessed the skear on foot to inspect the mussel on Heysham Flat only. No attempt was made to cross Dallam Dyke due to the size of the tide. There had been an increase in mussel settlement since the May survey although there were areas on the skear which were devoid of 2020 mussel. There was significant mussel higher up the skear to Conger Rock (Figure 23). Some areas had significant algae growth but the seed was still present. Between Conger Rock and Dallam Dyke the mussel was patchy and was in large bands across the skear with areas of bare substrate. There was a large area on the south of the skear that had no 2020 mussel present. The 2020 mussel ranged from 4-5mm higher up the skear to 8-10mm lower down. There were areas which had some 2019 mussel present, mixed in with seed.

The majority of the *Sabellaria alveolata* was to the north and south of the main skear apart from a wedge shaped area which protrudes from the south of the skear to the middle of the skear as shown in Figure 22. The northern area was not mapped and is therefore not shown. The edges of the *Sabellaria alveolata* had a significant mussel settlement covering it (Figure 24).

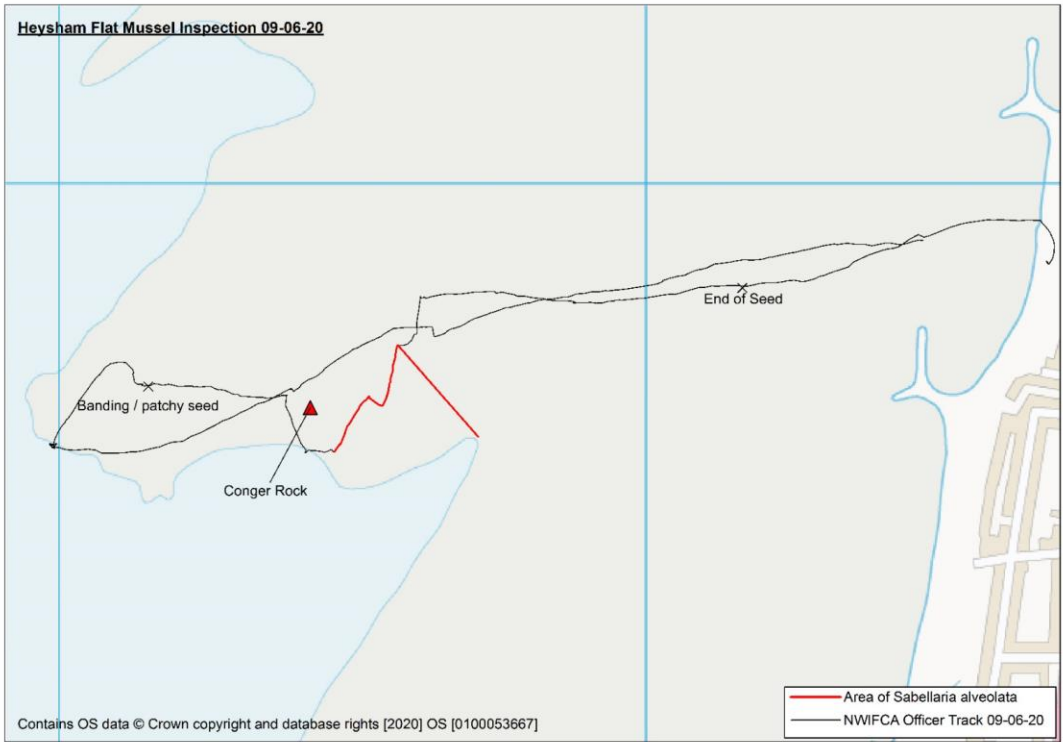


Fig. 22. Overview of inspection including an area of *Sabellaria alveolata* on Heysham Flat 09-06-20



Fig. 23 Area of dense seed Heysham Flat 09-06-20

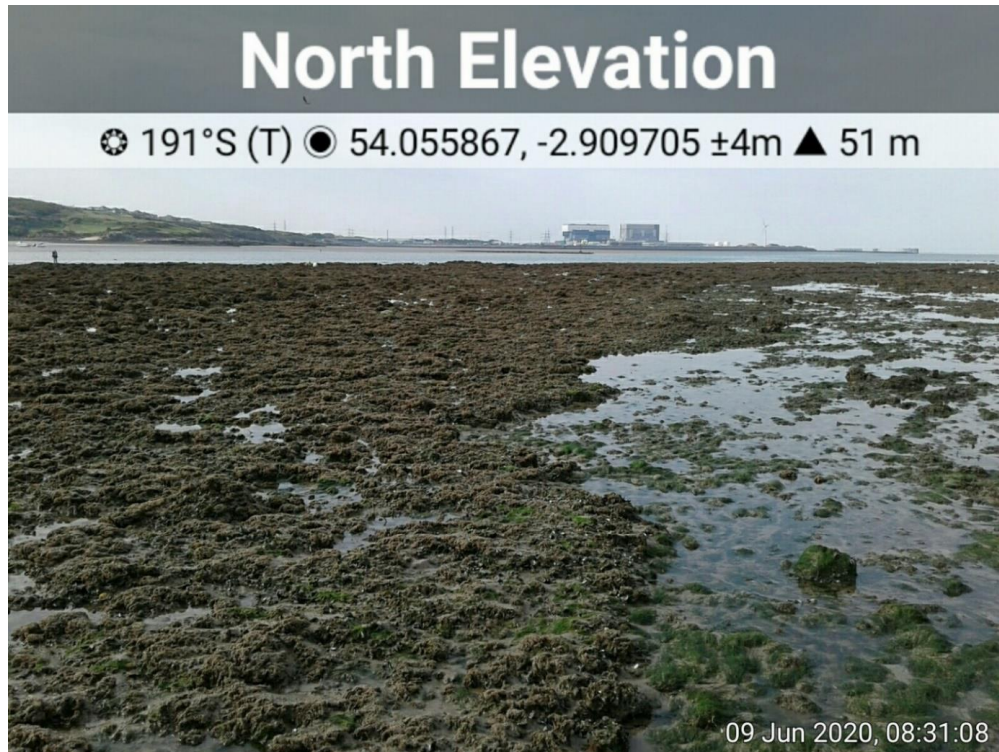


Fig. 24 – Area of *Sabellaria alveolata* on the south side extending on to the main skear Heysham Flat 09-06-20

Heysham Flat Mussel and *Sabellaria alveolata* Inspection 03-07-20

Tides LW 17:12 1.7m (Liverpool tides)

Conditions were difficult for surveying but as the forecast for the whole weekend was poor and the volume of work to be covered on these tides and the staff available, the inspection went ahead.

South westerly gales were blowing with driving rain and the skear beyond Conger Rock did not ebb off. Some areas could be seen rising above the water suggesting dense mussel, so there is no reason to think it may have gone from previous inspection. The phone / smart screen for camera malfunctioned with wet hands so only a limited number of photos were taken.

There was seed mussel across the upper skear all the way down. Initially hard in and at around 5 - 10mm. The mussel became more consistent the further down the skear, with mussel increasing in size to around 15-20mm. The two photographs shown are from this middle of upper skear, central band, before reaching Conger Rock. All the mussel was soft shelled, and on sandy rather than muddy substrate.

There was an area of healthy *Sabellaria alveolata* in a wedge shape consistent with the June inspection and this area was tracked in order to provide co-ordinates for an exclusion zone for the fishery to protect this *Sabellaria alveolata*. There was no other *Sabellaria alveolata* witnessed on the area that was inspected on this tide.

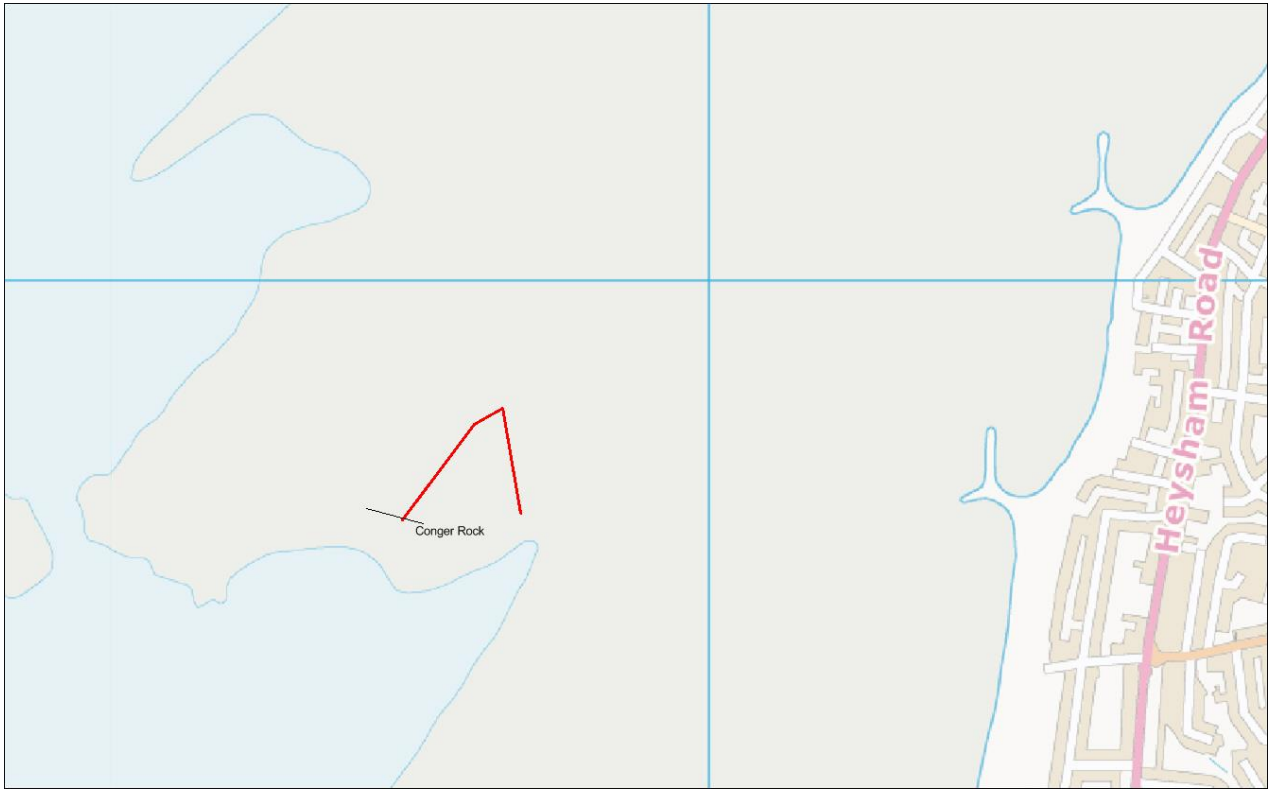


Fig. 25 - illustration of the area of healthy *Sabellaria alveolata* which was positioned south of the red line



Fig. 26 - indication of the density of mussel on the upper skear. Heysham Flat. 3rd July 2020



Fig. 27 - view across the skear showing consistency of mussel on the upper skear. Heysham Flat. 3rd July 2020

Heysham Flat Mussel and *Sabellaria alveolata* Inspection 21-07-20

Tides LW 07:01 1.5m (Liverpool tides)

Perfect conditions were encountered for inspection and putting in of posts to demarcate the exclusion zone around the live *Sabellaria alveolata*.

The mussel was coming on and still very dense across much of the skear, particularly on the upper skear around Conger Rock, although the mussel here was smaller (20mm) than further out. There were bands of bare cobble - the bottom end near Dallam Dyke had been washed clear of mussel, presumably from the last set of storms. Then there was a wide band of denes mussel still end on and not risen yet but with soft sandy mud beneath. Another bare strip of only cobble and boulder, and then heading back up the skear the densest and muddiest area.

11 scaffolding poles with illuminous green painted ends were posted successfully around the live honeycomb worms with a buffer.

No attempt was made at crossing Dallam Dyke due to time and tide height, but the skear had a multitude of oystercatcher and gulls on it and looked very black so presumably still held a good amount of mussel. The skears beyond appeared smaller than in recent years with sandbanks around. Judging from last year's condition and what has been observed this year it might be assumed that they are sanding over.

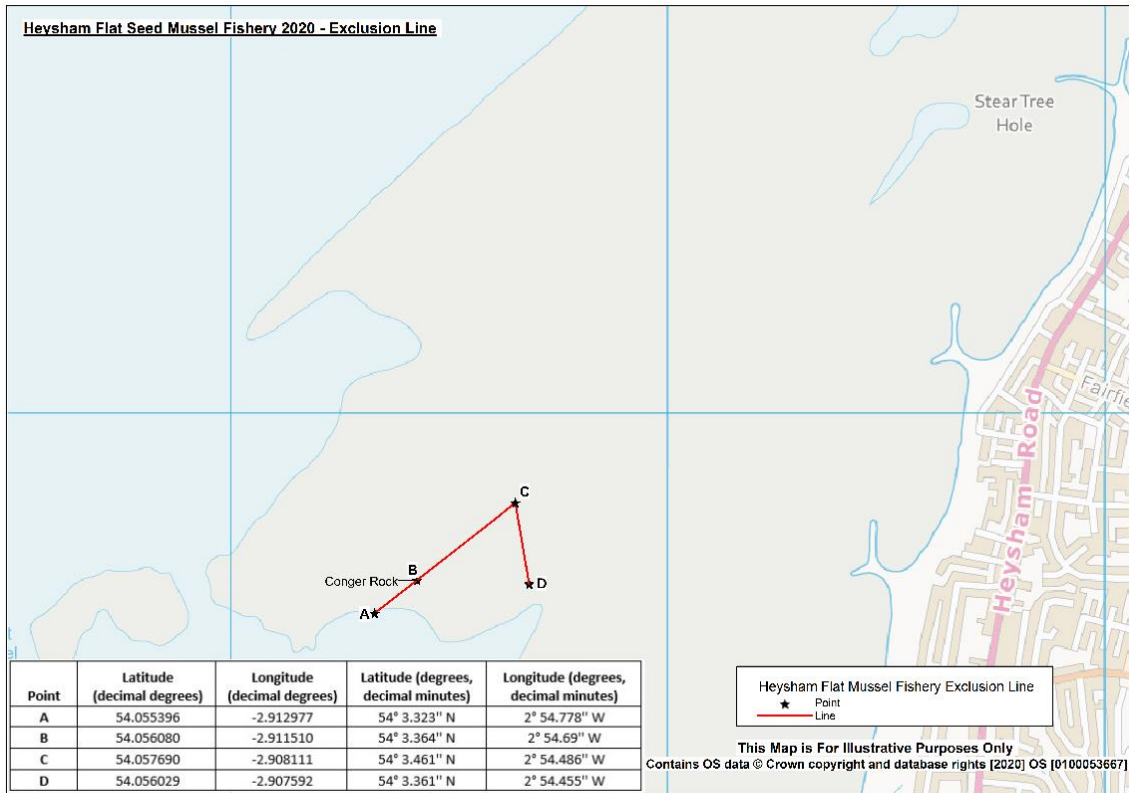


Fig. 28 - position of the poles posted in to protect the area of healthy *Sabellaria alveolata* 21-07-20



Fig. 29 - indication of the density of mussel on the upper skewer approaching Conger Rock. 21st July 2020



Fig. 30 - bare cobble area just beyond Conger Rock. 21st July 2020



Fig. 31 - Density of mussel beyond Conger Rock 21st July 2020

South America Mussel Inspection (Quad) 07/06/20

LW: 07:30 1.0m (Liverpool tides)

Falklands (Small Island and Trailer Bank)

An attempt to access the mussel beds previously mapped by hovercraft (May 2020) was made but no access was possible. The area of Small Island and Trailer Bank were only just visible with a small area exposed with lots of gull activity. There was a channel between the end of the sandbank and the drying areas.

South America

An inspection on the area of mussel that was previously reported in March 2020 that had received a significant settlement was completed. The area was of a similar size, estimated at 5.9 hectares (Fig. 32) and the mussel had grown and was approximately 10mm. The mussel is sat on a layer of muddy sand with very little exposed hard substrate other than where no mussel is present at the northern end. The mussel extended into the water to the south and southwest of the area mapped. Due to time limitation and the tidal height the full extent of the mussel could not be mapped. To the north and east the mussel did not extend into the water and to the west there was a sand bank present. Figures 33 to 35 show the extent and condition of the mussel. An area to the south of the area which had live *Sabellaria alveolata* present which was now covered by seed mussel.

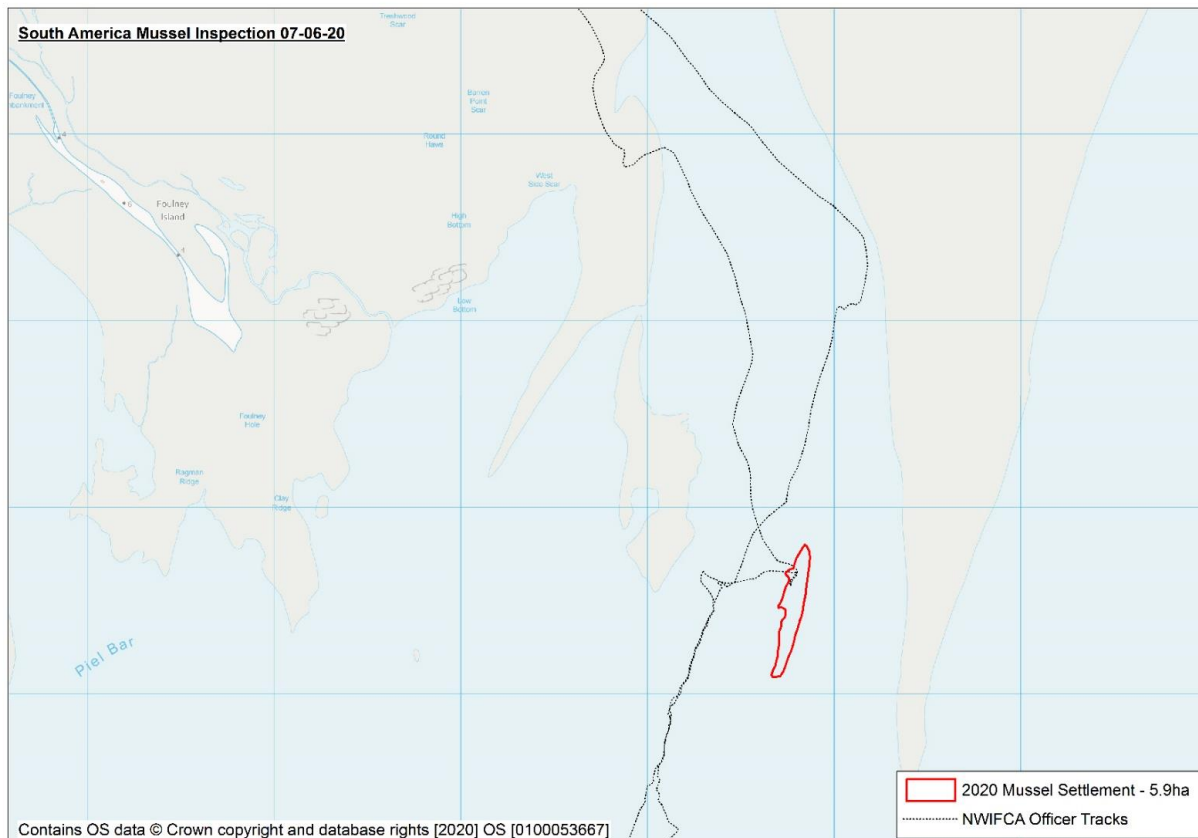


Fig. 32 – Extent of mussel on S. America and NWIFCA officers tracks 07-06-20



Fig. 33 – Overview of the area of mussel on South America looking north 07-06-20

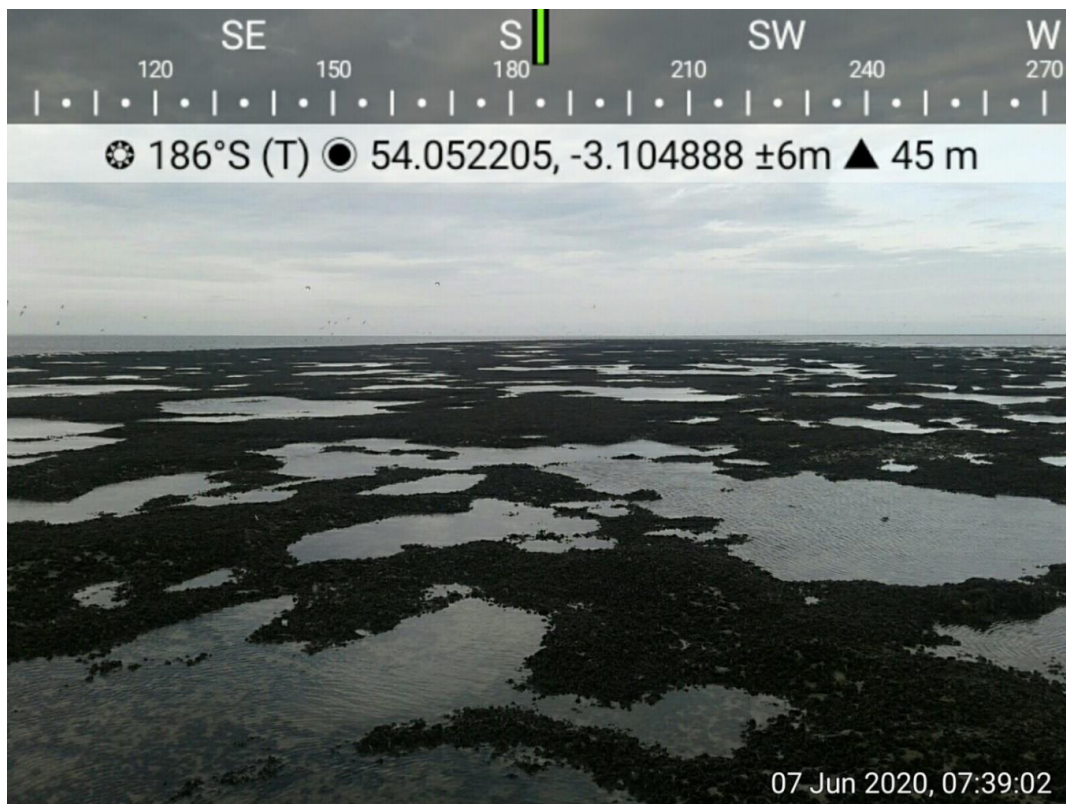


Fig. 34 – Overview of the area of mussel on South America looking south 07-06-20



Fig. 35 – South America Seed Mussel 07-06-20

South America Mussel Inspection (Quad) 24/07/20

LW: 10:15 1.1m (Liverpool tides)

Officers successfully accessed the South America mussel area indicated in the mapping below by quad bike, and carried out a foot inspection. The ground was too soft to put the quad bikes on due to the layer of mud beneath the mussel. One officer tracked round the outer perimeter of the mussel area while the other inspected the stock. The stock area was estimated at 9.5ha.

Initial observations were that the area was larger than in the June inspection. The mussel area lay in a horseshoe shape with the middle section devoid of mussel and showing bare cobble. Due to time constraints of the tide only the outer fringe of the mussel area was tracked - the inner bare area, and therefore the total area holding mussel, has been estimated from observations and in mapping software.

The mussel was consistent in size across the whole area - around 25mm. This mussel was sitting on a layer of mud ranging from around 25cm to 50 cm deep. The mud was generally loose and difficult to walk over.

There was no size mussel evident. Starfish were rare. There was some evidence of scour in the northern area and the bed appeared to extend into the water to the east. As the tide ebbed off and revealed the western edge, this consisted of occasional mussel and mainly sand. One small clump of *Sabellaria alveolata* was observed which was struggling to compete with the surrounding mussel and mud. The mussel was becoming loose and unstable.



Fig. 35 – Estimated extent and position of seed mussel on South America 24-07-20

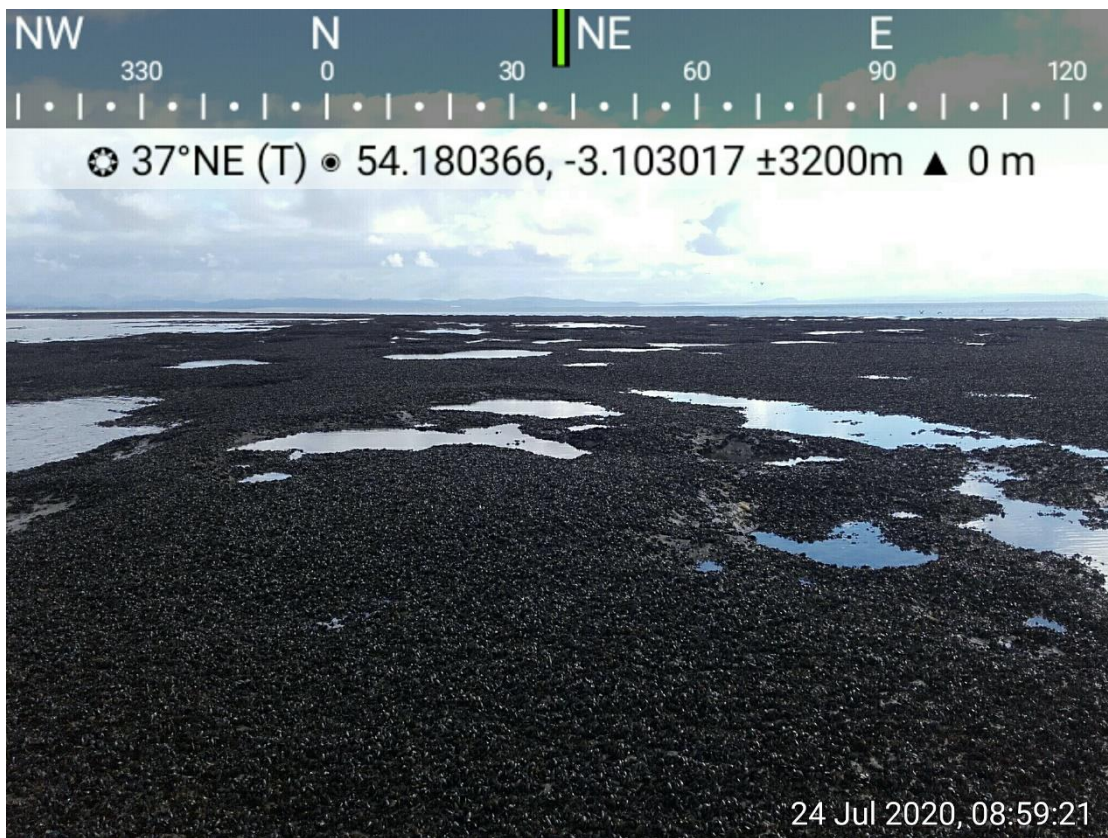


Fig. 37 – Illustration of density and consistency of seed mussel 24-07-20



Fig. 38 – Bare area in centre - officer can be seen in the distance tracking round the southern edge 24-07-20



Fig. 39 – Bare cobble showing in the gap between the two sides of mussel area 24-07-20



Fig. 40 – Evidence of thickness of mud layer beneath the mussel 24-07-20



Fig. 41 – Evidence of scour 24-07-20

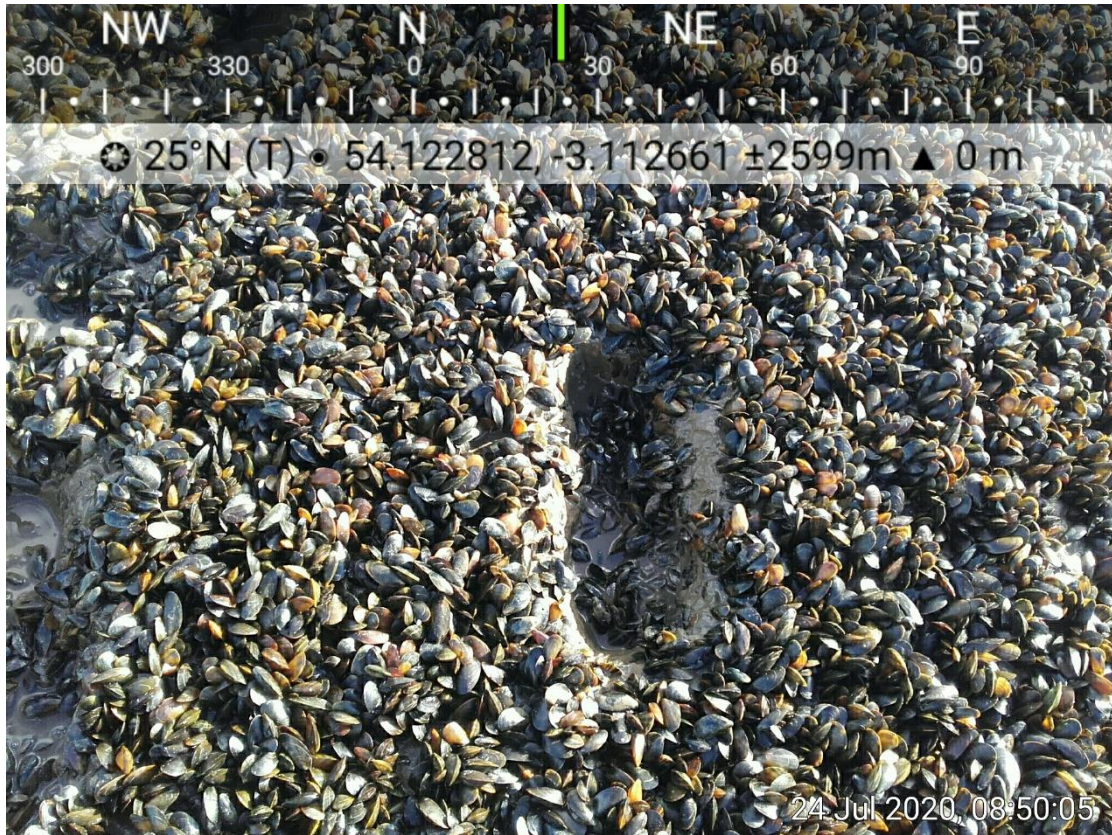


Fig. 42 – evidence of typical looseness of mussel 24-07-20

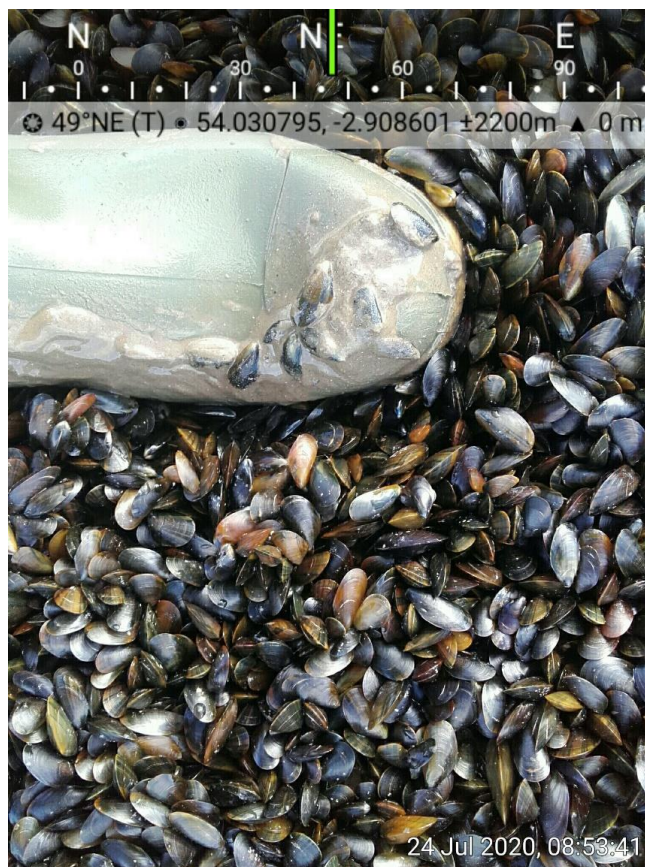


Fig 43 - illustration of size of the mussel against size 7 boot. 24-07-20

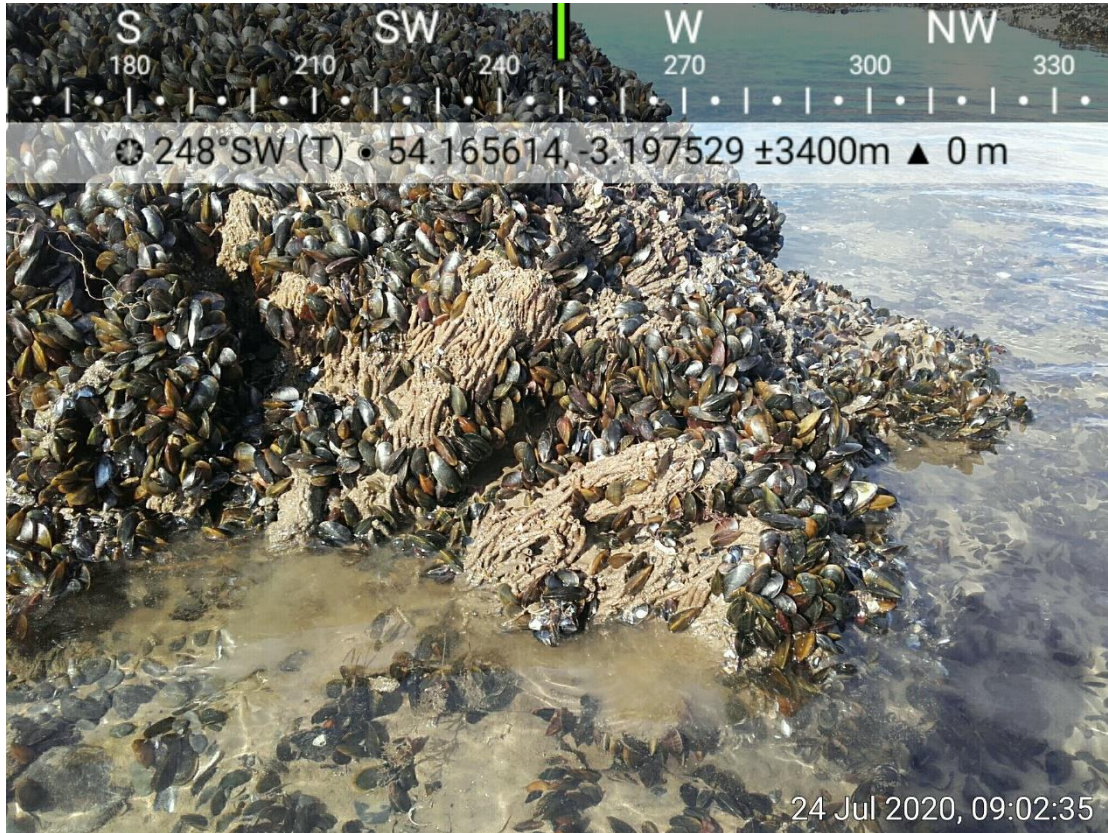


Fig. 44 - one clump of *Sabellaria alveolata* observed,
showing the competition between it and the mussel 24-07-20

Falklands (Small Island and Trailer Bank)

No attempt was made to access these two beds in view of the experience from June and earlier attempts. Trevor Jones did access them by hovercraft and verbally reported that both areas held size mussel. Should Mr Jones provide tracking and photographic evidence of his inspection, this will be added at a later date.

Low Bottom

On the way back to shore a quick inspection was made of the outer edges of the Low Bottom area which was shown to still hold a vast area of seed mussel and no immediate signs of scour.



Fig. 45 - bottom edge of Low Bottom looking towards Foulney showing seed mussel persisting 24-07-20

Wyre End Mussel Inspection 08-06-20

Tides LW 08:16 (1.1m) (Liverpool tides)

Officers tracked around the main skear and a patch of mussel on the channel edge to determine areas. Observations of mussel and substrate were made across the skear and channel edge areas. There has been a thick settlement of spat across around two thirds of the main skear, with the northern third of the bed having received no settlement. A raised cobble area was bare of mussel and is indicated Figure 46. The channel edge area had also received a settlement of 2020 spat. Distribution of mussel and spat ranged from areas of 80% coverage to around 50% coverage, and some scouring was observed on the northern area of the skear.

Larger mussel was hard in to the sandy substrate, and where settlement had occurred had spat mixed in. Most of the larger mussel across the skear was around 30mm although a small area of 45mm mussel was present in the north eastern area, right on the low tide line. Barnacled mussel was present at the northern edge of the bed at the channel edge. Much of the spat present was around 5 mm with some patches starting to grow on and clump at around 10mm.

Remnants of *Sabellaria alveolata* were observed on the northern edge of the bed and had deteriorated further from observations made in 2019. A small flock of around 10 oystercatchers were observed feeding during the survey.

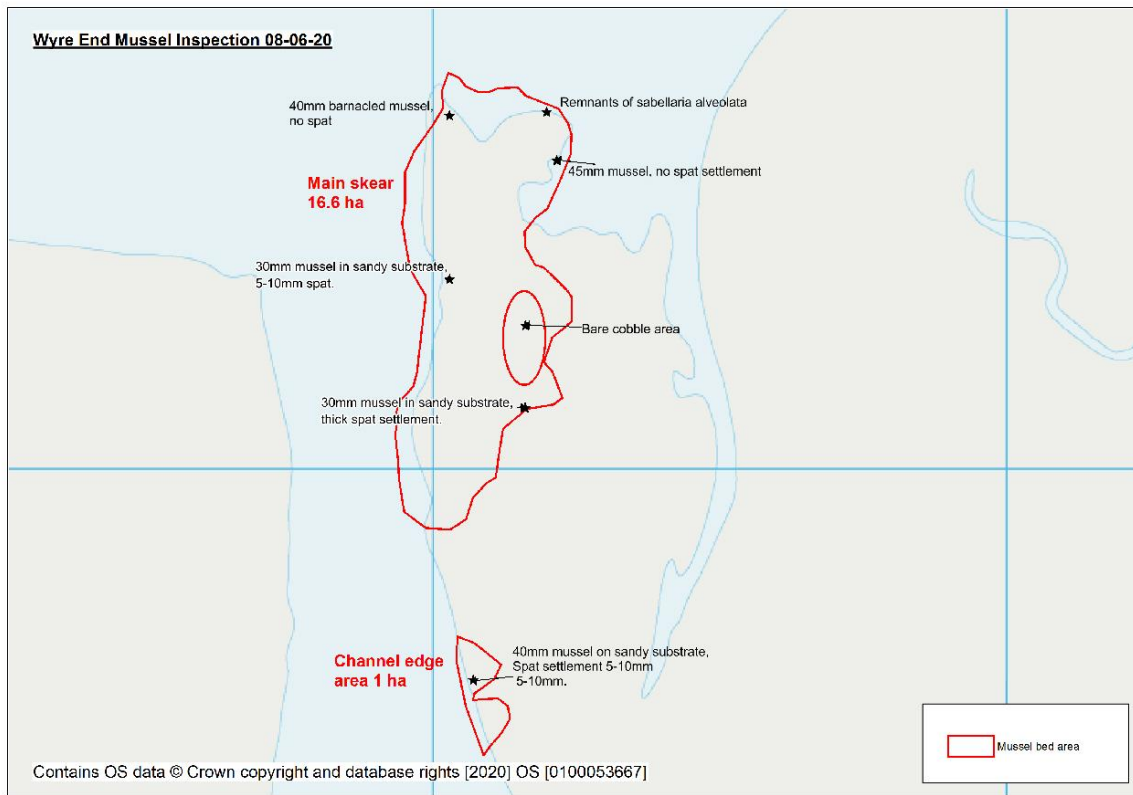


Fig. 46 - Approximate bed area boundaries and observations of the bed made by officers



Fig. 47 - Larger mussel with spat settlement in sandy mud substrate Wyre End 08-06-20

Duddon Channel Mussel Inspection 04-06-20

LW: 17:35 1.1m (Liverpool Tides)

The skear was mainly covered in sand, and what substrate could be seen in the channel was old mussel shell. An area of bare cobble was visible on the northern edge of the channel around low water but there was no indication of mussel. Large numbers of gulls were observed feeding, although as the tide ebbed off only large areas of sandmason worms were present. Whilst on transit back to Sandscale Haws officers checked around for presence of cockle; areas checked were chosen by eye or previous presence of cockle. Only low densities of cockle were observed in some patches and ranged from 15-30mm. None were observed near to the shore.

ii. MUSSELS - FLEETWOOD

Fleetwood Mussel Inspection 04-06-20

LW: 17:35 1.1m (Liverpool Tides)

Black Scar

Black Scar has had a 2020 mussel settlement which had a density of approximately 90% coverage (Figure 49). The mussel was 8-10mm and had settled on the hard substrate (Figure 50). There were small areas of 2019 mussel mixed in with the seed. The approximate area of the mussel bed was 6.1 hectares.

Perch Scar

Perch Scar has had a 2020 mussel settlement which had a density of approximately 60-70% coverage (Figure 51). The mussel was 8-10mm and had settled on the hard substrate (Figure 52). There were small areas of 2019 mussel mixed in with the seed. The approximate area of the mussel was 8.9 hectares.

King Scar

The mussel on King Scar was patchier with areas of bare cobble. The 2020 spat settlement had grown larger in places ranging from 5-15mm and was mixed in with small areas of 20-40mm mussel. There was a strip of bare cobble running across the middle of the mussel which had not received a settlement of mussel. There were some small areas of *Sabellaria alveolata* on the northern edge of the mussel but they have had a settlement of 2020 mussel on them. There were some larger rocks which had larger, barnacled mussel on them. The approximate area of the mussel was 5.6 hectares.

Rossall Scar

Rossall Scar had a settlement of 2020 mussel which was mixed in with 20-30mm 2019 mussel. There mussel had a 50% coverage. The full extent of the mussel was not mapped due to inspecting Rossall Scar first prior to the tide fully ebbing to ensure Perch and Black Scar were inspected at low water and so assess their full extent.

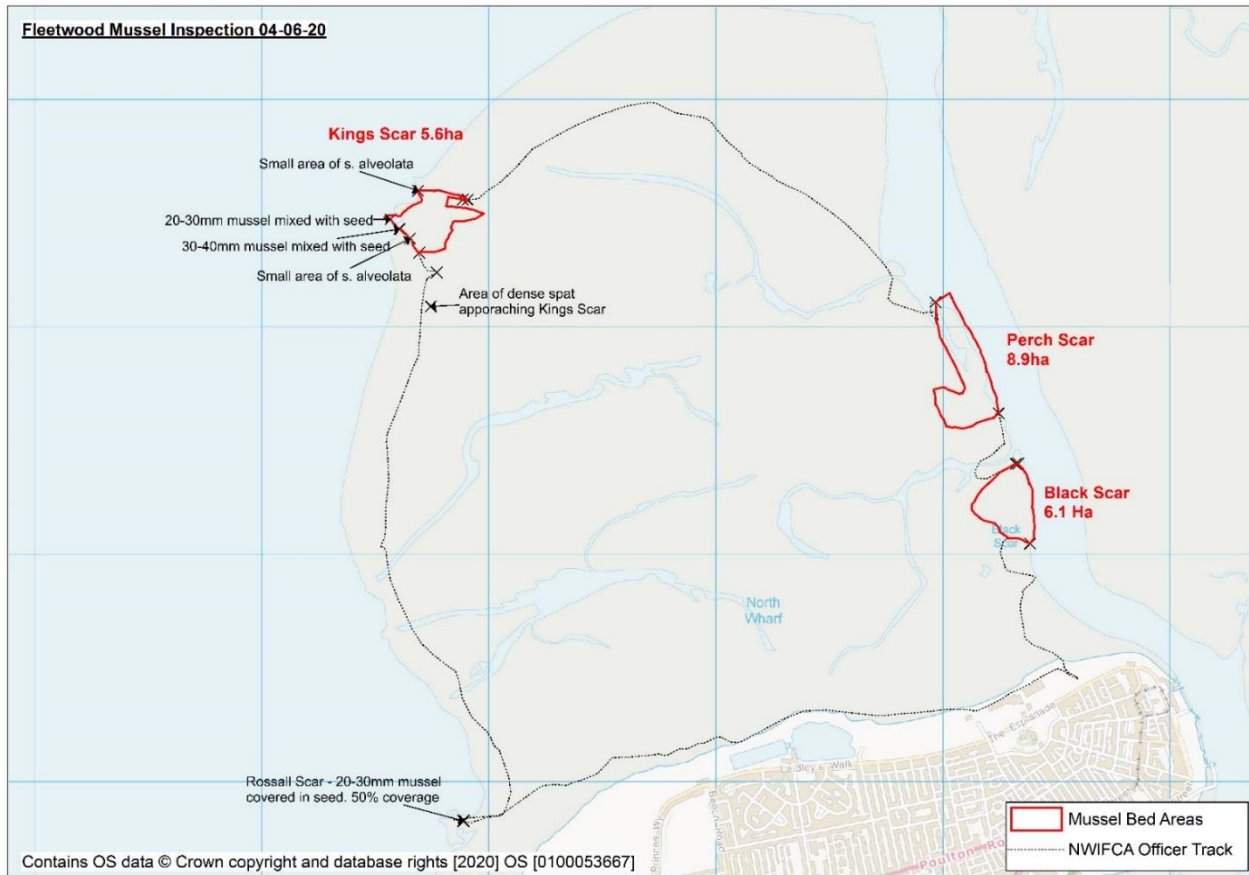


Fig. 48. Overview of the mussel inspection Fleetwood beds 04-06-20



Fig. 49. Black Scar 2020 mussel settlement 4th June 2020



Fig. 50. Black Scar 2020 mussel settlement 4th June 2020

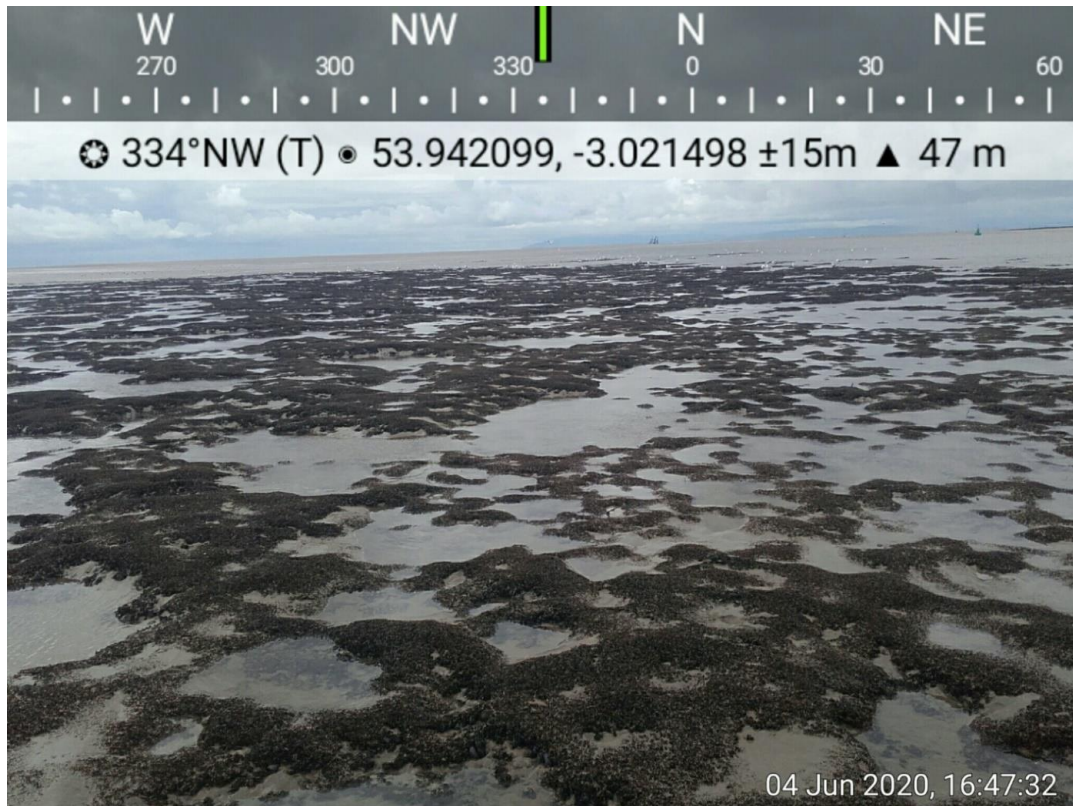


Fig. 51. Perch Scar 2020 mussel settlement 4th June 2020



Fig. 52. Perch Scar 2020 mussel settlement 4th June 2020

Perch Scar and Black Scar Mussel Inspection 05-07-20

LW - 1851 1.5m (Liverpool tides)

A rapid visual inspection was carried out to assess the condition of the mussel. Weather was poor with gale force winds; however the sandbanks protected the estuary mussels from the south westerly blow, and the tide ebbed sufficiently for assessment to be carried out.

As can be seen from the photographs below, the mussel had become significantly looser than in the June inspection, with dense but small mussel persisting in dense aggregations on both scars.



Fig. 53 - Perch Scar mussel with loose muddy sand 05-07-20



Fig. 54 - Extent of dense mussel Perch Scar 05-07-20



Fig. 55 - Black Scar mussel with thick muddy sand 05-07-20



Fig. 56 - Extent of dense mussel Black Scar 05-07-20

Perch and Black Scar Mussel Inspection 25-07-20

LW: 09:58 1.2m (Liverpool Tides)

Officers accessed the two scars that have been authorised for seed mussel dredge by foot.

Black Scar

The mussel on Black Scar showed signs of roping up (Fig. 58) and clear indications of scour occurring. Figure 59 illustrates well what occurs with these ephemeral beds, whereby the unembysed mussel becoming loose puts out byssus threads in an effort to attach to conspecifics for security. The tide and wave action rolls this layer of embysed mussel like a carpet until the weight of it and the looseness of the underlying mud renders it too unstable to hold on and it gets washed away.

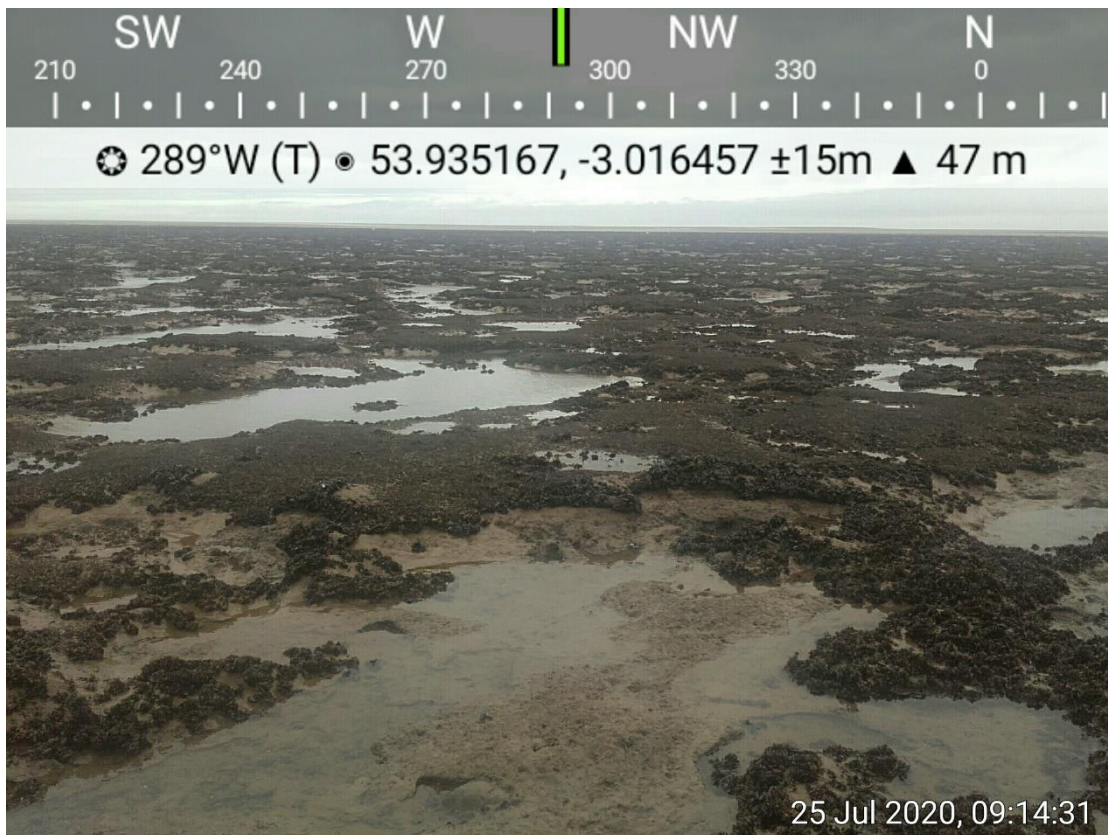


Fig. 57 - Extent of seed mussel on Black Scar 25-07-20



Fig. 58 - Roping up of seed mussel on Black Scar 25-07-20



Fig. 59 - rolling up and scour of the embysseed seed mussel on Black Scar 25-07-20

Perch Scar

Perch Scar was distinctly difficult to walk over due to the deep soft mud. A large stock of mussel remained (Fig. 60), and there were signs of three dredge tracks over the mud (Fig. 61). It is known that at the time of the inspection one vessel had fished it over two tides and removed 100 tonnes. It is interesting to see this appeared to have little consequence to the bed and the rest of the mussel. Attempts to cover the whole bed were aborted due to constant sinking into the mud. The extent of the stock could be seen from the areas that were accessed.



Fig. 60 - Extent of seed mussel on Perch Scar Scar 25-07-20



Fig. 61 - Evidence of dredge tracks on Perch Scar 25-07-20

MUSSELS - REST OF DISTRICT

Thurstaston Mussel Inspection 03-06-20

Low Water: 16:41 1.3m (Liverpool Tides)

Due to the depth of mud and time constraints it was not possible to walk the full perimeter of the Thurstaston mussel beds. Bed areas are estimated from officers' GPS tracks and observations during survey.

Thurstaston 1 and 2 were observed to be present; however Thurstaston 3 was not visible during this survey or on the last survey indicating the mussel is either covered in mud or no longer present. Another small area of mussel could be seen by officers but conditions did not allow this to be inspected.

The estimated areas of Thurstaston 1 and 2 mussel beds covered a reduced area to when last inspected in April 2019, but the overall density of mussel was observed to be similarly patchy. The substrate was thick mud with dead mussel and cockle shell.

Thurstaston 1 was estimated to be 7.4 ha; the bed had areas of very patchy mussel ranging from <10% coverage to 35-40% coverage. Mussel was recorded as 20-40mm with occasional size mussel; no spat settlement was observed. Thurstaston 2 was estimated to be 3 ha. Mussel was patchily distributed across the whole area; however a channel that was too soft for officers to cross prevented examination of the sizes of mussel present.

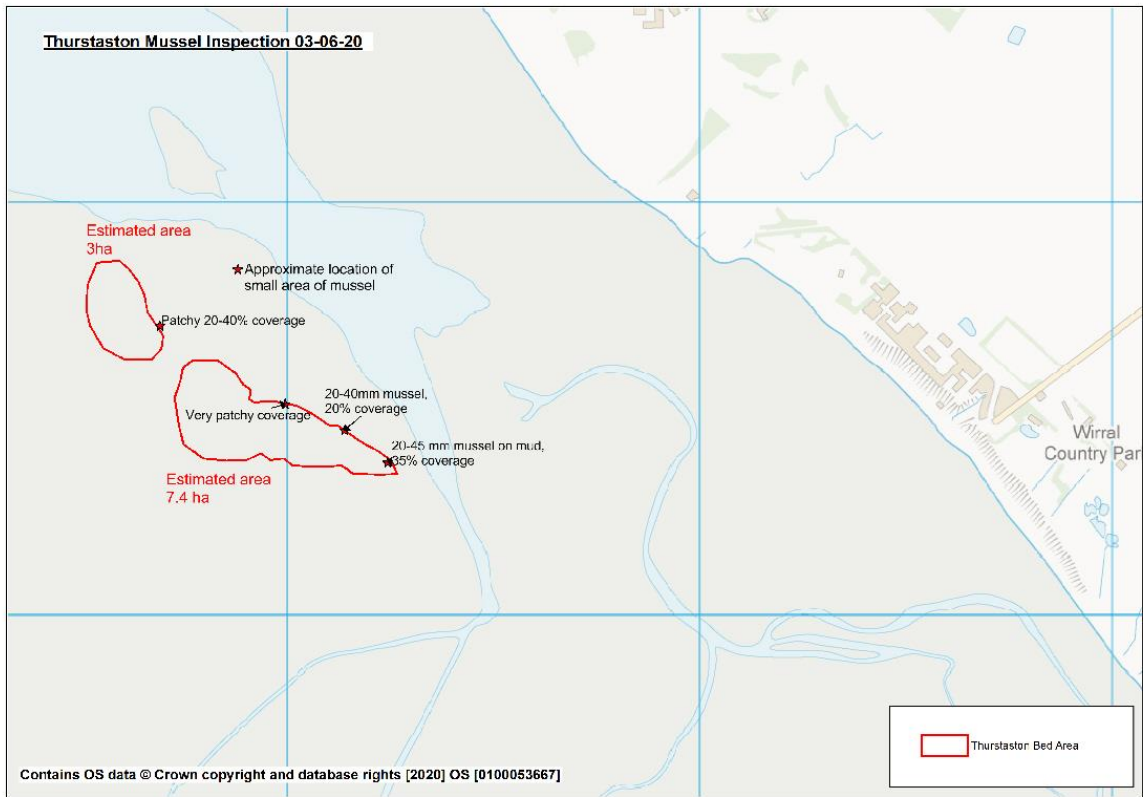


Fig. 62 Map showing the area of Thurstaston mussel beds and observations of officers 03-06-20



Fig. 63 - Patchy mussel on Thurstaston 1 mussel bed 03-06-20



Fig. 64 - Mixed size class mussel on Thurstaston 1 bed 03-06-20

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27th July 2020