

Annex 1 (part 2) – August 4th 2026 TSB Report no. 1

Mussel inspections – Morecambe Bay

Fleetwood Mussel Inspection 17-06-26

Officers: AP, JH, AB, MT

LW: 08:09 1.0m (Liverpool Tides)

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

Rossall Scar

The mussel on Rossall Scar was a mix of deadshell, and small, undersize, patchy mussel that was interspersed with cobble and live *Sabellaria alveolata* (Image 1 & 2).

Neckings Scar

This year, officers were able to survey the perimeter of the bed, and inspect the mussel within the centre. The mussel was fairly uniform in size, clean, and putting down mud. It was undersize, at around 25mm in length. Coverage was roughly 50%, and on the lower part of the bed towards the shoreline, mussel was present over dead *Sabellaria alveolata* (Image 3 & 4). Heading towards Kings Scar from Neckings, there was an additional patch of mussel (Figure 1) which was present, but inaccessible to officers. The approximate location and extent is presented in Figure 1. In between Neckings and Kings, there was a patch of *Sabellaria* (Image 5)

Kings Scar

Kings Scar has undergone significant sediment movement since previous inspection in 2025. Mussel was very patchy, varying in size and condition across the area (Image 6 & 7). There was some evidence of a 2026 seed settlement, >10mm in size, amongst the cobble area (Image 9). Towards the seaward side of the bed, old, barnacled mussel persisted, but was still mixed with cobble (Image 8). There was very little, to no, mud present.

Perch and Black Scar

Perch and Black Scar were observed to assess if their condition had changed since inspection on the 22nd of May. There was little, to no observable change on Perch Scar, the bed is still covered in thick mud that is slowly being scoured. No mussel is present, and no evidence of a seed settlement.

Black Scar was still covered in algae, with some exposed cobble, and remaining mud on the centre of the bed. There was some very small, ~5mm seed settlement on the exposed cobble. However, coverage was very low at >20%. Due to tide times, and deep mud limiting accessibility, the perimeter of the beds was not mapped at this time. However, it is not thought these have changed from the 22nd of May survey this year.

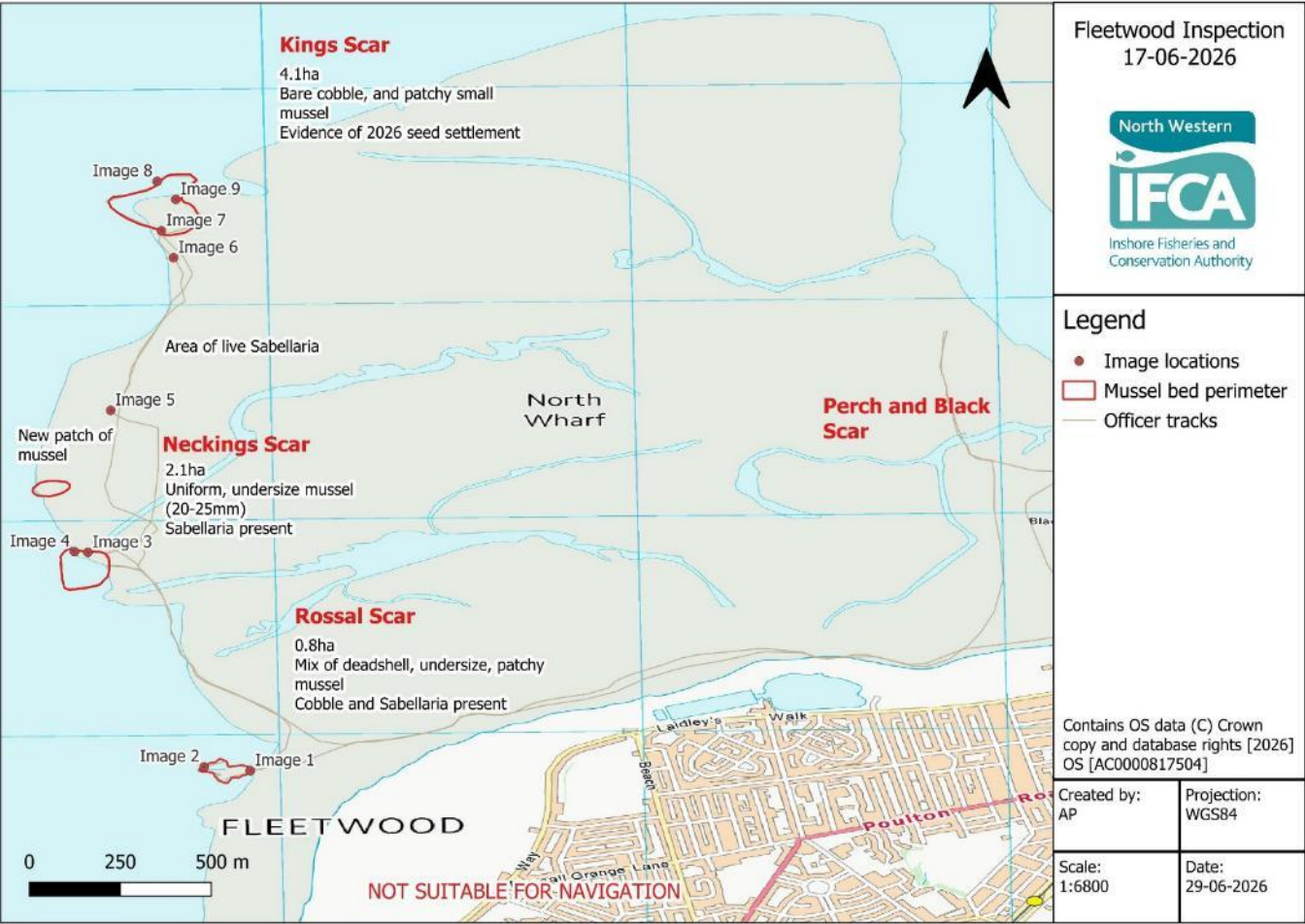


Figure 1. Overview of the mussel inspection 17-06-26.

West

☉ 289°W (T) ● 53.922016, -3.053399 ±3m ▲ 55m



Image 1. Rossal Scar 17-06-2026

North East

☉ 41°NE (T) ● 53.922176, -3.055329 ±8m ▲ 48m



Image 2. Patchy mussel and Sabellaria on Rossal Scar 17-06-2026



Image 3. New seed settlement on Neckings Scar 17-06-2026

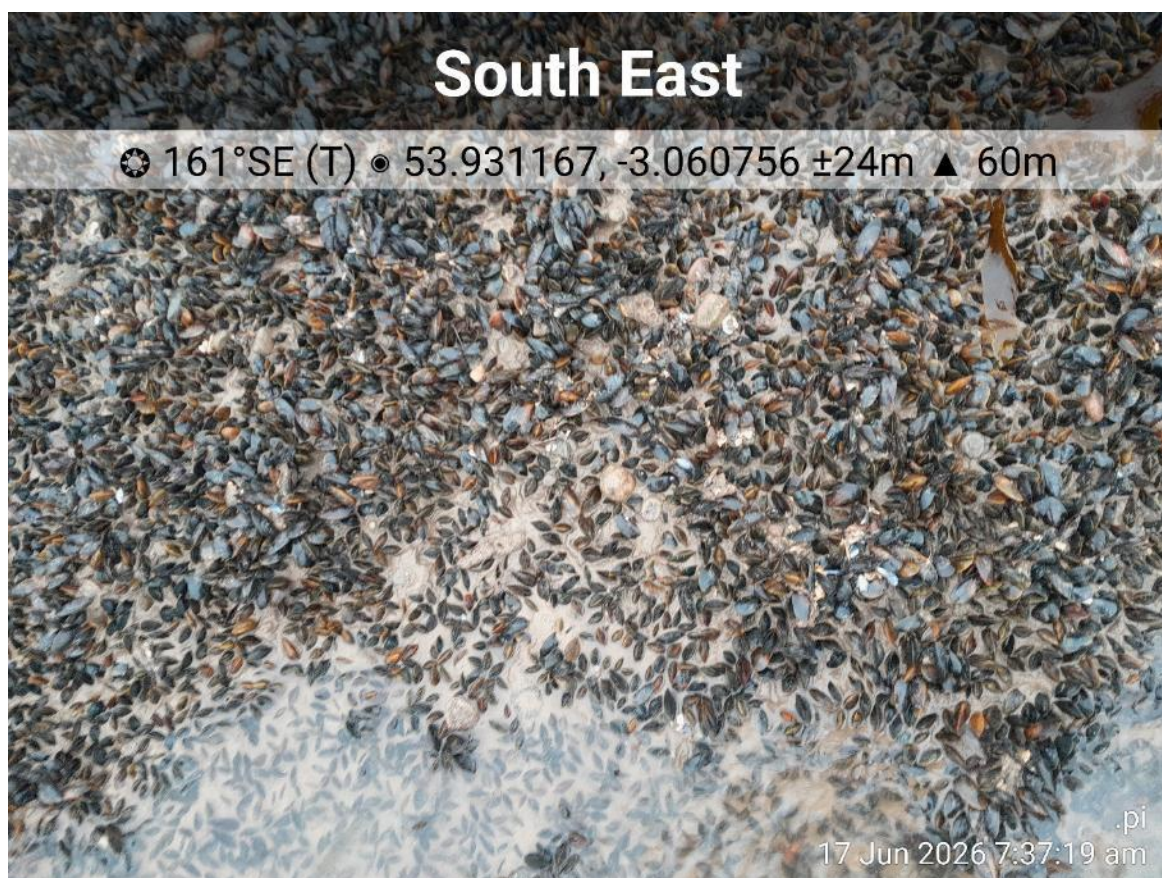


Image 4. Embedded seed on Neckings Scar 17-06-2026



Image 5. Area of Sabellaria between Neckings and Kings Scar 17-06-2026



Image 6. Mix size mussel between cobble and boulder on Kings Scar 17-06-2026

West

☼ 300°W (T) ● 53.944579, -3.057118 ±2m ▲ 56m



Image 7. Thin, patch mussel on cobble at Kings Scar 17-06-2026

South East

☼ 133°SE (T) ● 53.946646, -3.057293 ±7m ▲ 49m



Image 8. Thin, patch mussel on cobble at Kings Scar 17-06-2026

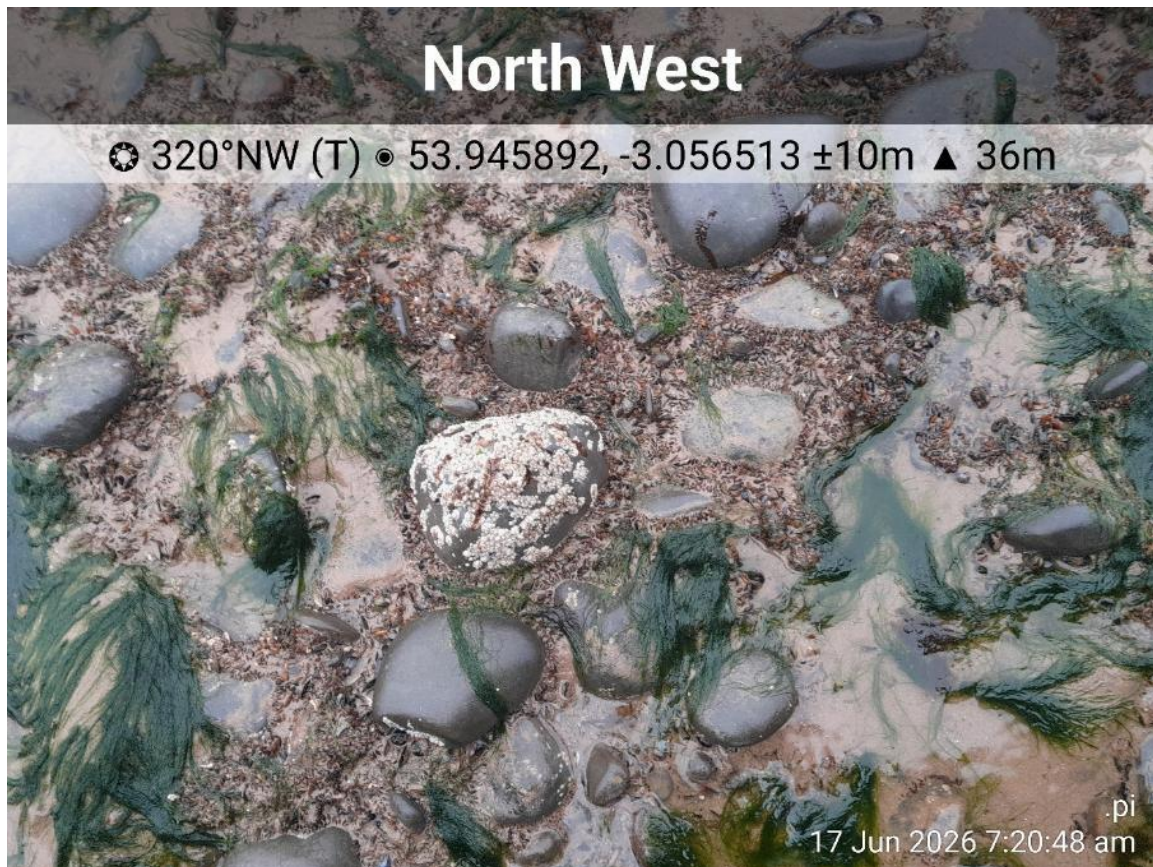


Image 9. Evidence of seed mussel on Kings Scar 17-06-2026

Crook Scar Mussel Inspection 02-06-2026

Officers present: AP, GG, ID, CT

Low Water: 07:30 2m (Liverpool Tides)

Officers carried out an inspection on foot of the Crook Scar mussel bed to assess the current mussel stock. Both the northern and southern mussel areas were inspected and a complete perimeter of the northern area was mapped during the survey (Figure 1). Several gulls were present during the inspection.

Northern Bed

The northern patch had a bed area of 5 ha and the mussel was uniform in size across the whole bed. In areas mussel coverage was 100% (Figure 2), with very thick mussel mud present across the whole bed (Figure 3). There was a clear distinction to the edge of the mussel bed as the edges showed evidence of scour (Figure 4). Overall the bed had a dense coverage ranging from 80-90%, substantial mussel mud, much of the mussel had formed deep mud hillocks, and a consistent mussel size of 45mm or just under throughout (Figure 5). At the northern tip of the bed mussel density reduced to 40% coverage, as there was less mussel extending onto cobble and shell substrate (Figure 6 and 7). Beyond the northern edge of the perimeter the bed was barren, consisting of cobble and shingle. The centre of the bed had thick, clean mussel with no fouling or barnacles and > 90% coverage. The mussel was clumping in places (Figure 8). This area hasn't been fished due to presence of pearl.

Southern Bed

The southern patch has noticeably thinned since the previous inspection due to fishing activity. The mussel has remained predominantly size, as observed in the northern bed, but large barnacled mussel was present along with dead shell and exposed cobble (Figure 9). Mussel coverage was very low in areas nearest the slipway. Overall coverage of mussel was estimated 20% or less (Figure 10) with sparse coverage of mussels on shell and cobble hillocks (Figure 11), and little mussel mud present compared to the northern area.

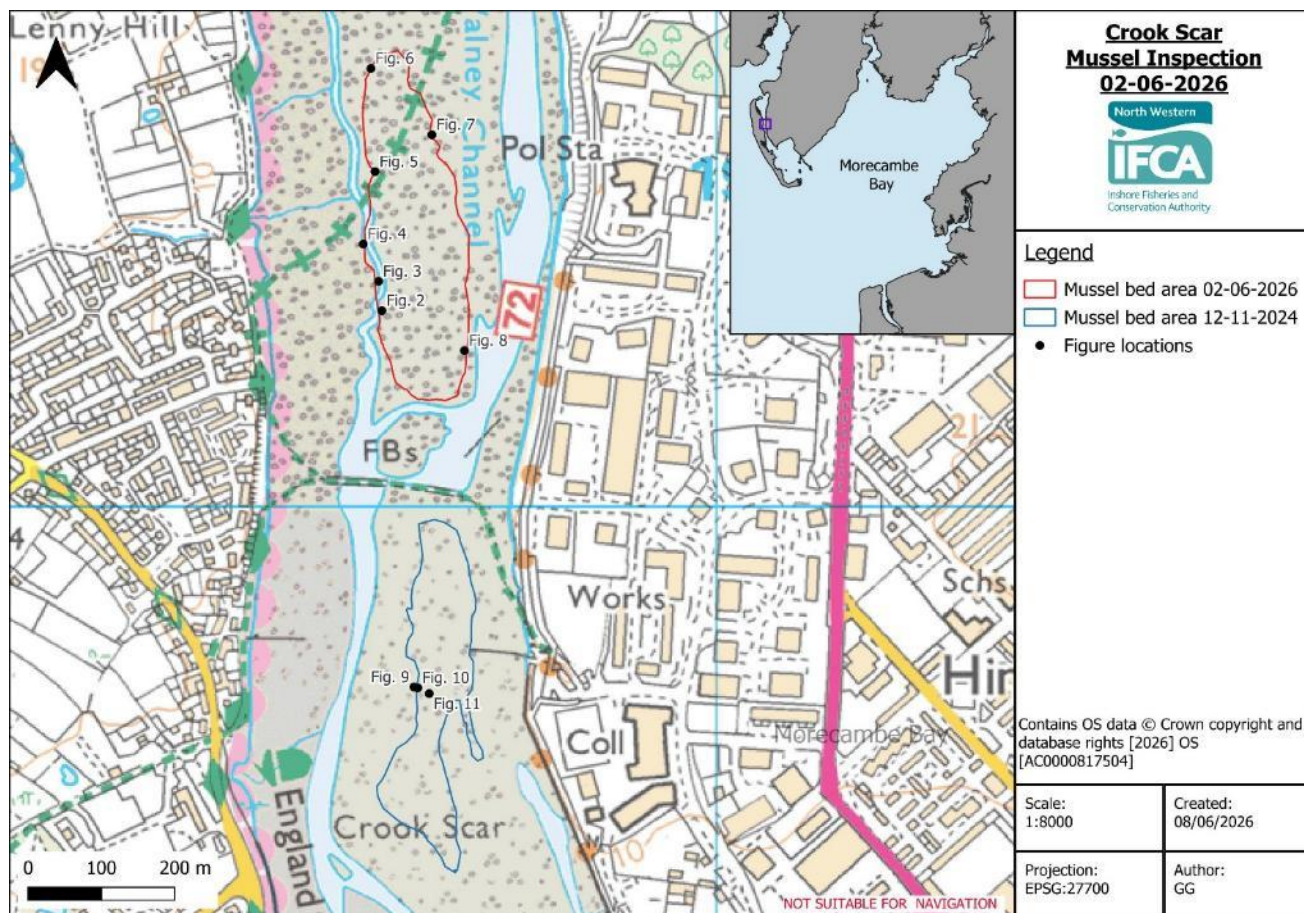


Figure 1. Map of bed areas and image locations from the Crook Scar mussel inspection 02-06-2026.



Figure 2. Dense coverage of uniform mussel.

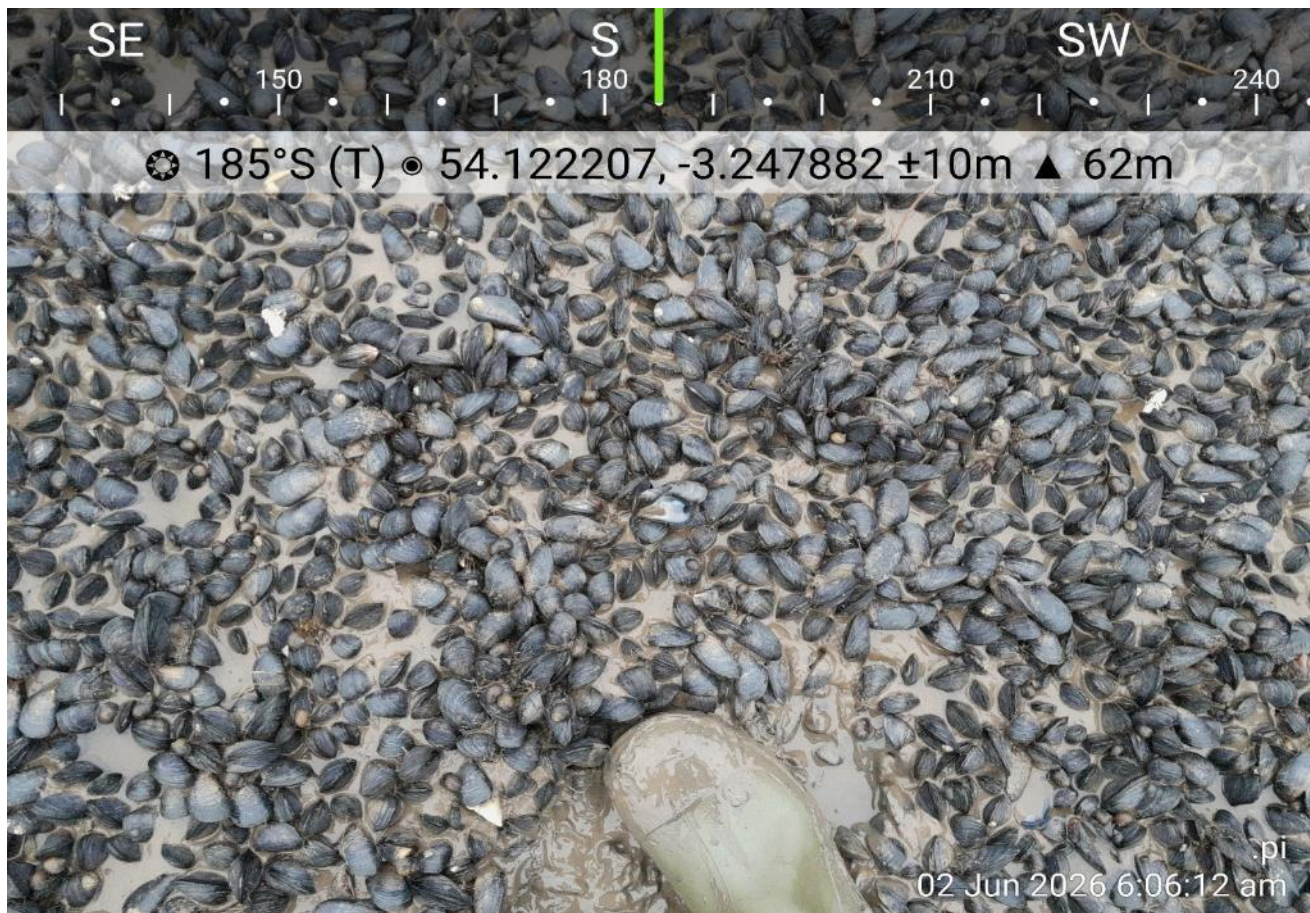


Figure 3. Uniform 45mm mussel on thick mussel mud.



Figure 4. Evidence of scour at the edge of the mussel bed.



Figure 5. Size mussel.



Figure 6. Patchier mussel coverage at the northern tip of the bed.

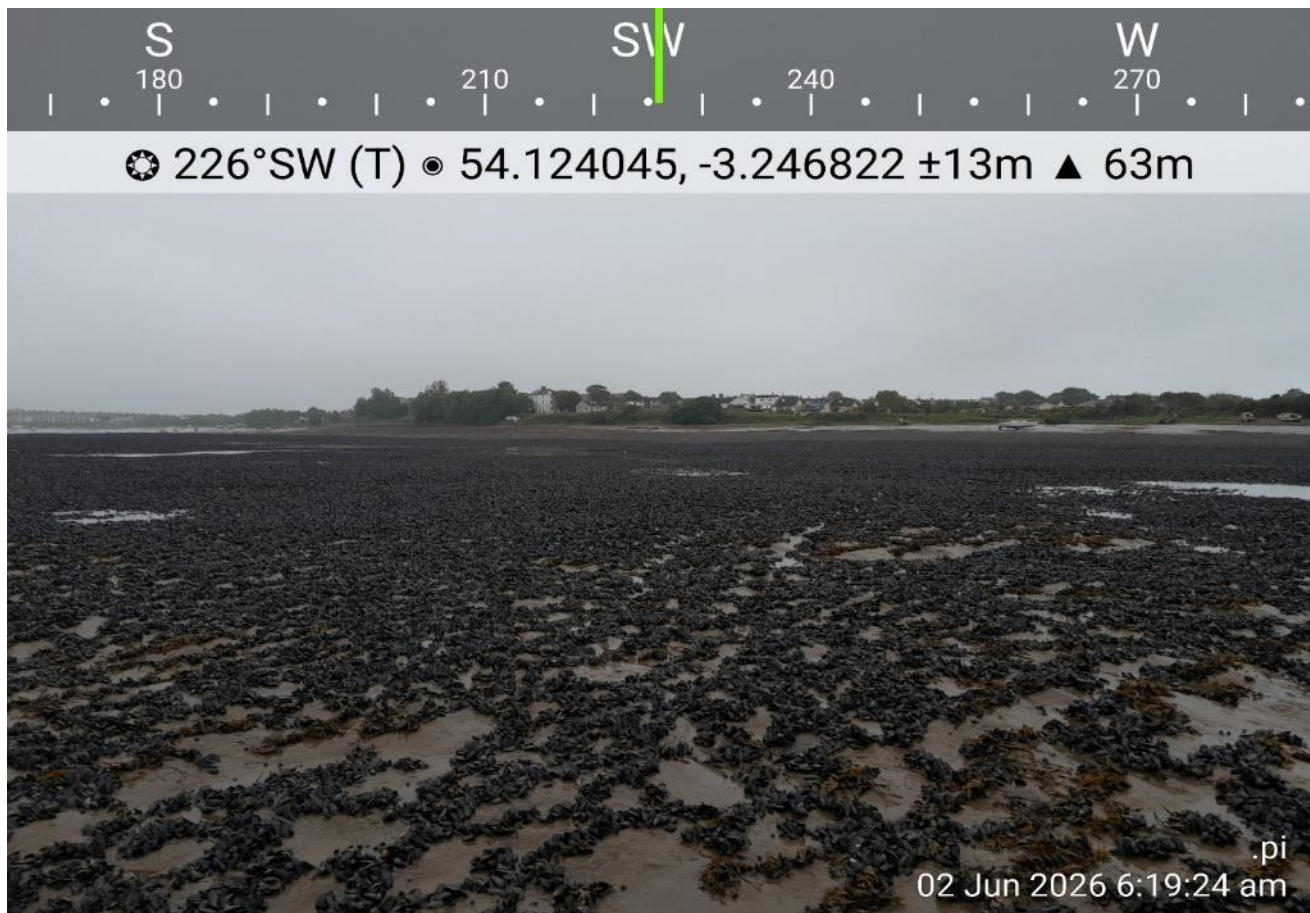


Figure 7. Patchier mussel coverage on the edge of the mussel bed.

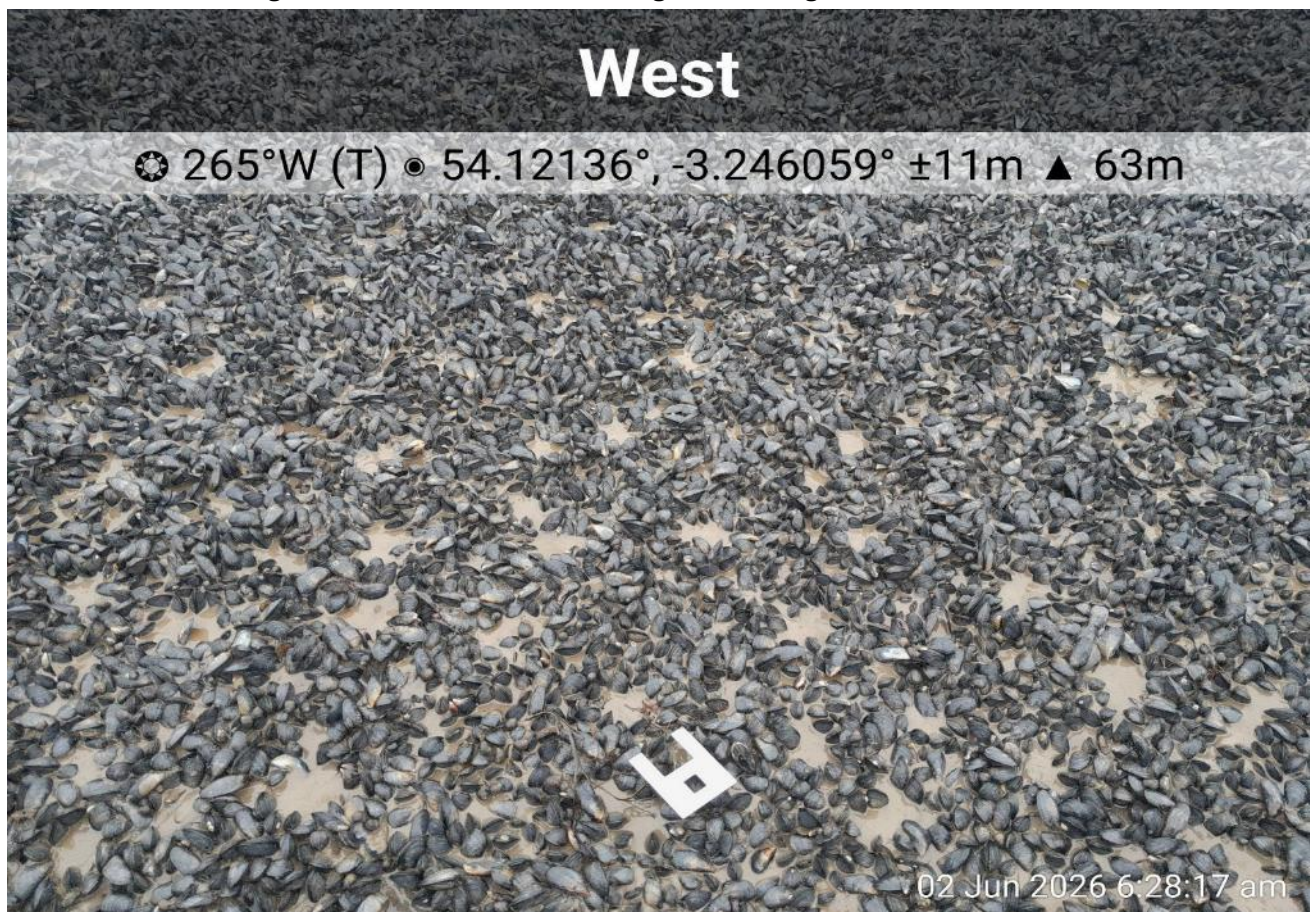


Figure 8. Thick clean mussel on mussel mud, with evidence of clumping.



Figure 9. Barnacled mussel mixed in with dead shell and cobble.



Figure 10. Overview of southern bed area.

South

☀ 194°S (T) ● 54.117076°, -3.246669° ±9m ▲ 61m



Figure 11. Patchier coverage on southern bed with shell and cobble hillocks.

Wyre End Mussel Inspection 19-06-2026

Officers present: RL, LL, JH, GG
Tides: LW 09:52 (1.4m) (Liverpool tides)

An inspection of Wyre End and channel areas of mussel was completed. The area of the main skear was mapped to determine the area shown in Figure 1. Officer tracks were overlayed on the drone imagery taken by officers that day. The total area of the bed was 17 hectares. The patches of mud on the channel edge had been heavily scoured, leaving very patchy seed mussel of low coverage. The eastern edge of the bed has a prominent sand bar with exposed cobble and seed mussel in low levels.

On the main area, there has been a 2026 settlement of seed mussel, varying in density across the main skear. Most of the seed mussel is present at the Northern end of the bed towards the outer edges (Fig 4, 8 & 11). An inspection through the middle of the bed revealed large areas of exposed cobble and significant hair algae growth (Fig 7 & 12). Sized mussel present towards the western edge of the bed from last year has scoured off. Only small patches of size mussel (>45mm) were found at the Northern edge of the main skear (Fig 12). The largest areas of scour were present at Figure 2 and 3.

Eiders and gulls were present on the bed.

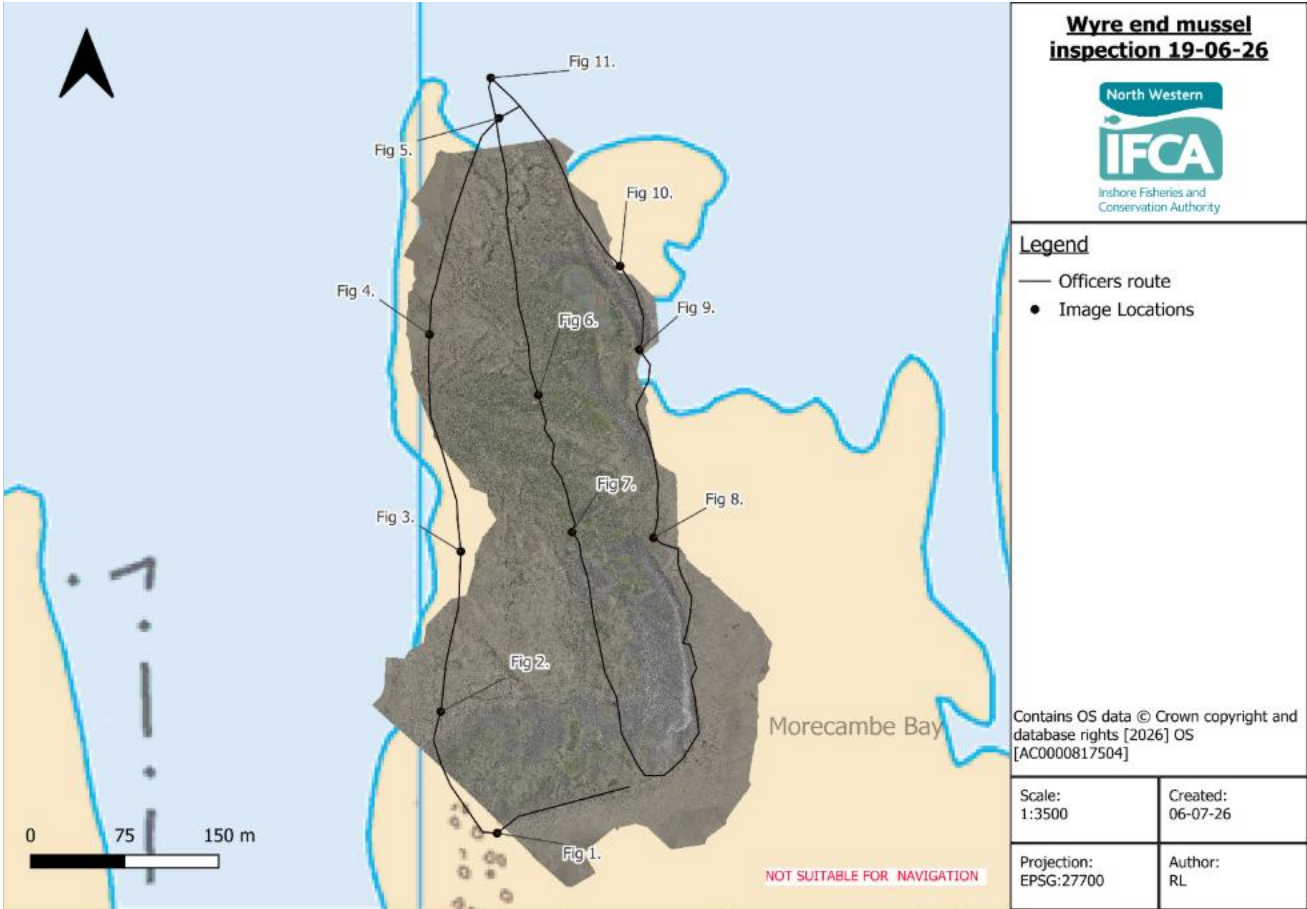


Figure 1. Approximate Wyre End bed area boundary and officer notes 19-06-2026

North West

☼ 333°NW (T) ● 53.95138°, -3.021519° ±3m ▲ 55m



Figure 2. Soft, thin layer of mud and low level undersized mussel (20-25mm)

North

☼ 13°N (T) ● 53.951536°, -3.020881° ±3m ▲ 53m



Figure 3. Large area of scoured mud interspersed with undersized mussel



Figure 4. Seed mussel and hair algae coverage on loose sand



Figure 5. Cobble and exposed mud with low levels of dead shell

South West

☉ 228°SW (T) ● 53.95334°, -3.020465° ±7m ▲ 56m



Figure 6. 10-15% seed mussel coverage. Hair algae increasing further north

North East

☉ 51°NE (T) ● 53.954141°, -3.022187° ±6m ▲ 55m



Figure 7. Large area of exposed cobble across the middle of the bed

North

☀ 348°N (T) ● 53.95482° N, 3.019843° W ±7m ▲ 50m



Figure 8. Seed and dead shell on firm sand.

North West

☀ 314°NW (T) ● 53.953219° N, 3.019174° W ±5m ▲ 56m



Figure 9. Patches of scour and a cobble sand bar with seed.

South East

☀ 149°SE (T) ● 53.956159° N, 3.021476° W ±3m ▲ 54m



19 Jun 2026 9:01:57 am

Figure 10. Exposed cobble running down the west side of bed.

North West

☀ 306°NW (T) ● 53.955525° N, 3.020218° W ±3m ▲ 47m



19 Jun 2026 8:52:12 am

Figure 11. Dense patches of seed mussel 20% coverage.

North West

☼ 306°NW (T) ● 53.956867° N, 3.021664° W ±3m ▲ 55m



Figure 12. Seed mussel decreasing and hair algae coverage increasing over firm sand.

South East

☼ 135°SE (T) ● 53.955086° N, 3.021224° W ±4m ▲ 56m

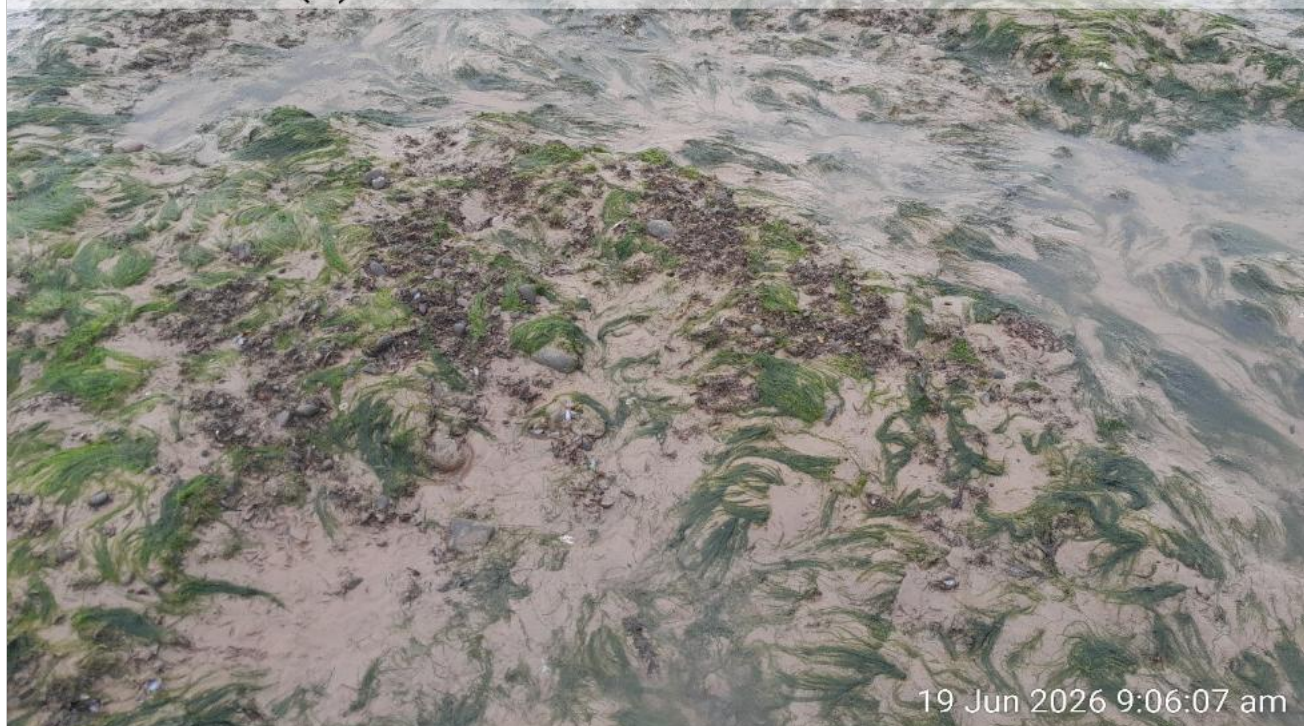


Figure 13. Small patch of sized mussel on the tide line.

Mussel Surveys – Morecambe Bay

Foulney Dutch Wand Mussel Survey Spring 2026

Officers present: AP, JH, GG, LL, ID, CT, AS

Low water: 31/03/26 18:05 1.2m (Liverpool Tides)

19/04/26 07:43 0.9m (Liverpool Tides)

Survey method: Dutch Wand

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 and tide restraints.

A mussel sample was taken every 25 hits using a 10 cm diameter corer. 11 transects were completed and 34 samples collected. The total weight of live undersize and size mussel was recorded as well as the size frequency of each sample.

From the transect and sample data the total mussel bed surveyed was **43 hectares**, 35 hectares for the main bed and 8 hectares for the Foulney Island. There is still a bare area between the main bed and the island with no mussel present, as such two transects were omitted from the survey.

Note, not all size mussel is fishable due to the presence of fouling species on slower growing individuals or the mixing of undersize and size in close proximity that prevents the removal of sizeable mussel without removing undersize. Algae growth with present across a portion of the mussel bed.

Biomass

1601 tonnes size mussel (230 tonnes for the Island) and **974 tonnes undersize mussel**.

Length Frequencies

The total length frequency for the surveyed bed is provided in Figure 3. From the length frequency data the majority of mussel present on Foulney Skear is currently a mix of size and undersize with a wide spread of mussel from 11mm to 79mm.

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.

It can be seen in Figures 4 and 5 that the size mussel >45 mm is predominantly on the lower half of the main skear and on the island. Undersize mussels were mainly congregated higher up the main skear with some mixed in with size mussel in the middle of the skear.

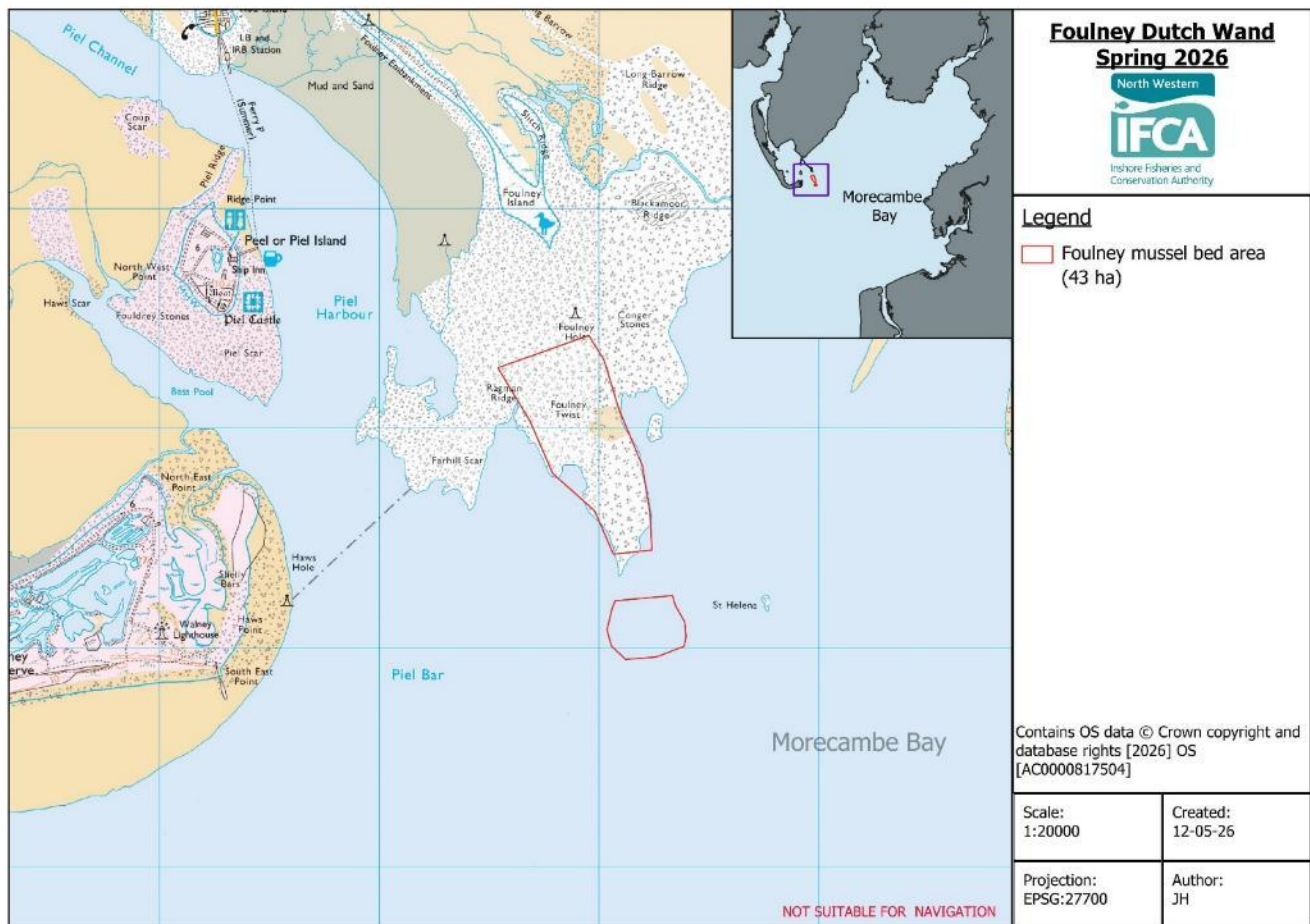


Figure 1: Location of Foulney mussel bed spring 2026

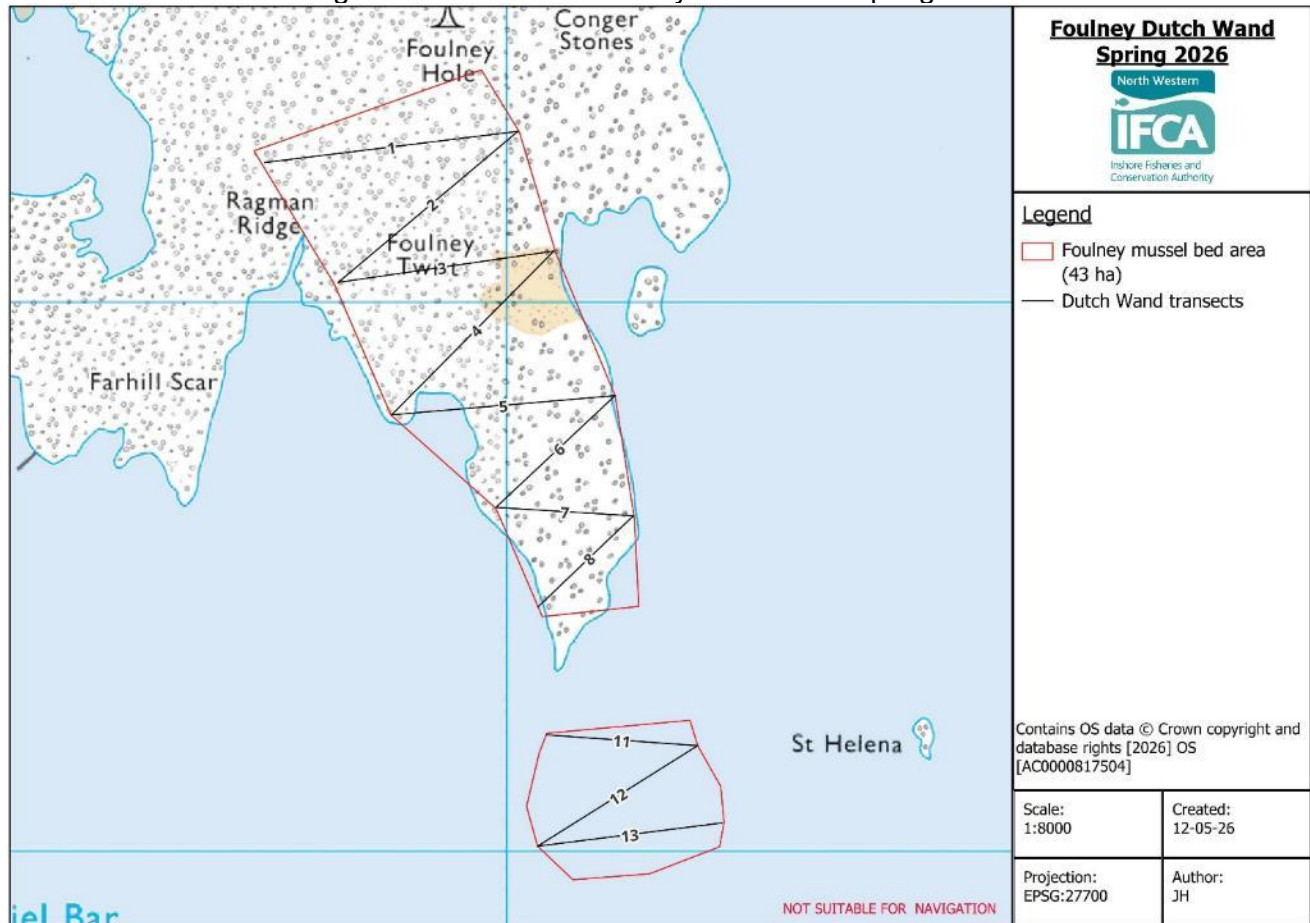


Figure 2: Foulney Dutch Wand survey transects and estimated bed area

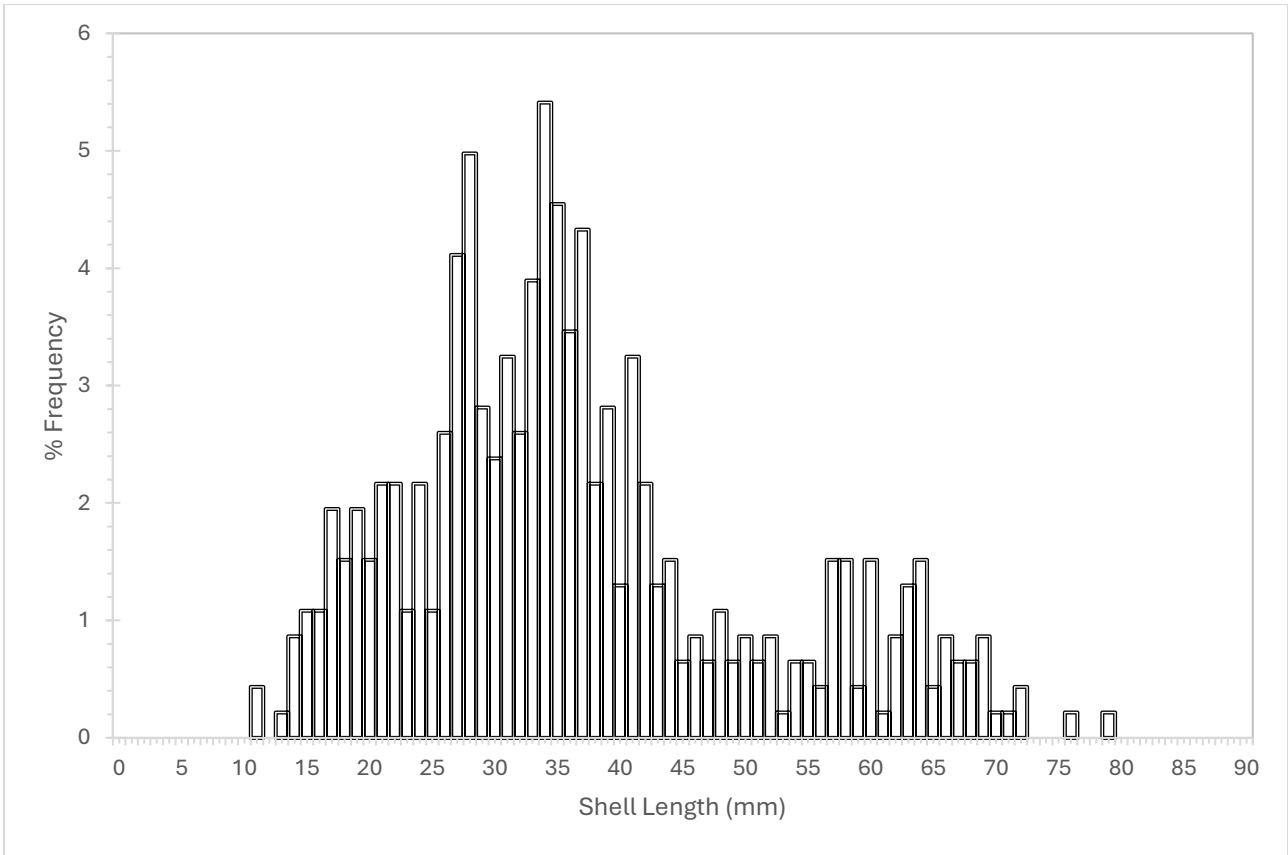


Figure 3: Histogram showing size frequency of mussels from all samples on Foulney

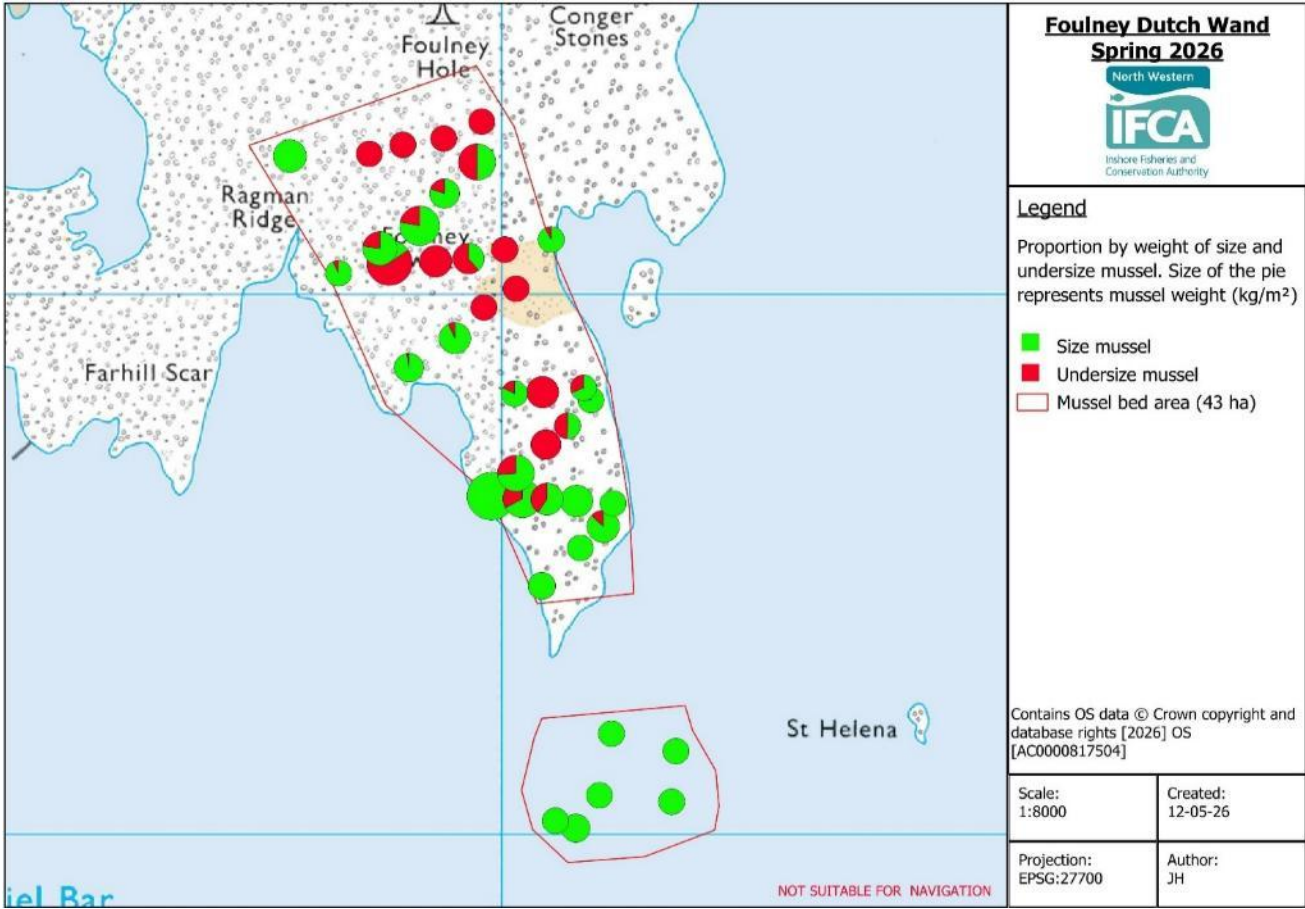


Figure 4: Frequency of mussel by size class

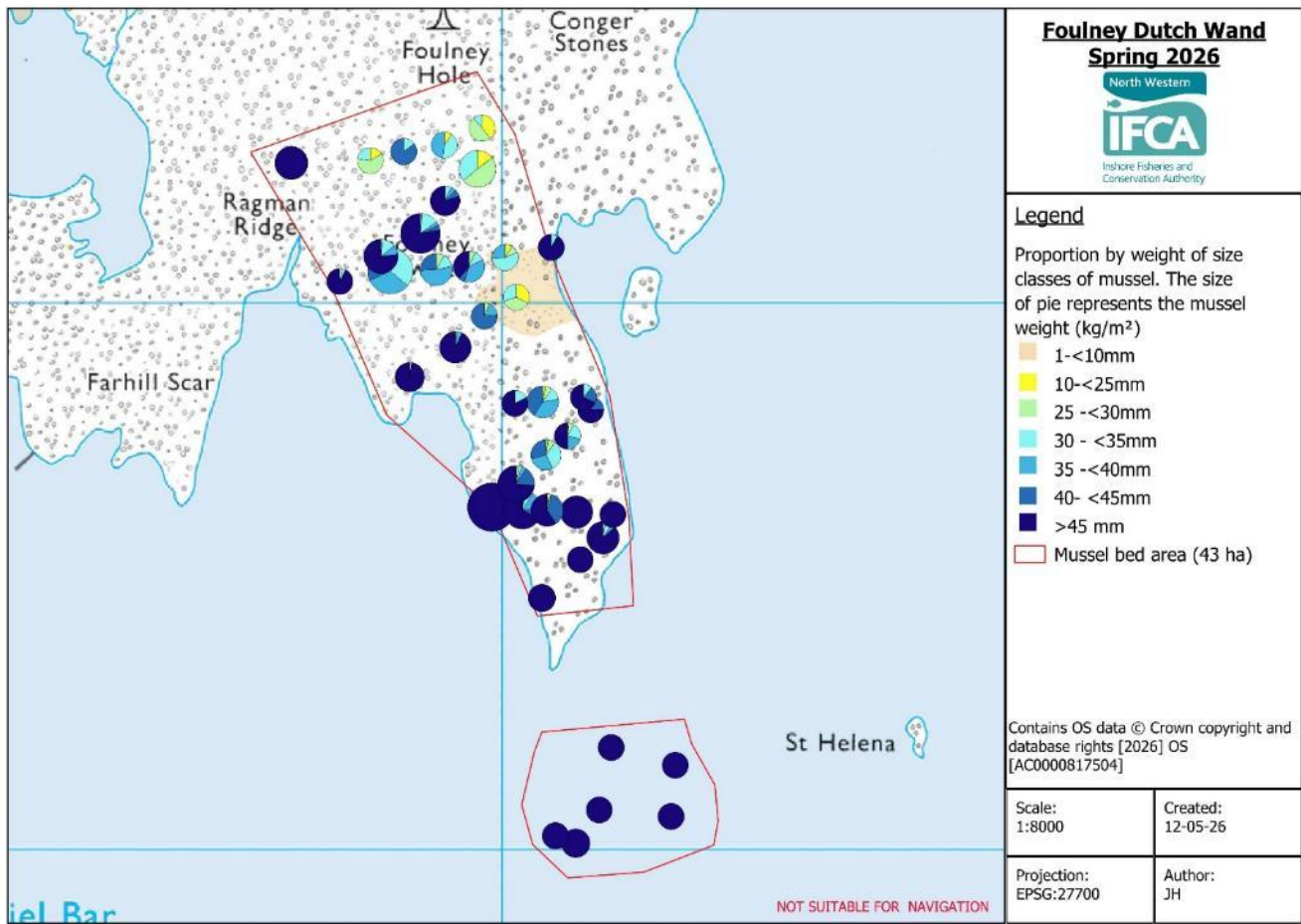


Figure 5: Proportion of size and undersize mussel by weight represented as kg/m²

Low Bottom Dutch Wand Mussel Survey 23-03-26

Officers present: GG, RL

Low water: 08:16 1.3m (Liverpool Tides)

Survey method: Dutch Wand

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 and tide restraints. A mussel sample was taken every 25 hits using a 10 cm diameter corer. 6 transects were completed and 28 samples collected. The total weight of live undersize and size mussel was recorded as well as the weight for each size category of each sample. Note, not all size mussel is fishable due to the presence of fouling species on slower growing individuals or the mixing of undersize and size in proximity that prevents the removal of sizeable mussel without removing undersize. Some size mussel on this bed were fouled with barnacle.

From the transect and sample data the total mussel bed surveyed was **30.5 hectares**.

Biomass

1500 tonnes size mussel and **107 tonnes undersize mussel**.

Length Frequencies

The total length frequency for the surveyed bed is provided in Figure 3. From the length frequency data the majority of mussel present are grouped between approximately 45-60mm, peaking at 50mm and a smaller cohort between 10-20mm. There is a relatively low number of mussels in the intermediate size range, potentially reflecting variable recruitment or survival from previous years.

Maps

The proportion by weight of each size class of mussels per sample has been mapped in figure 4 with the size of pie representing mussel weight standardised to kg/m^2 . The weight of the size and undersize mussel has been mapped and represented in figure 5.

It can be seen in figure 4 and figure 5 that size mussel >45mm mussel is found across the entire survey area, with smaller size classes reducing further south on the bed. A small amount of 10-30mm mussel present across the middle and northern extents of the bed area.

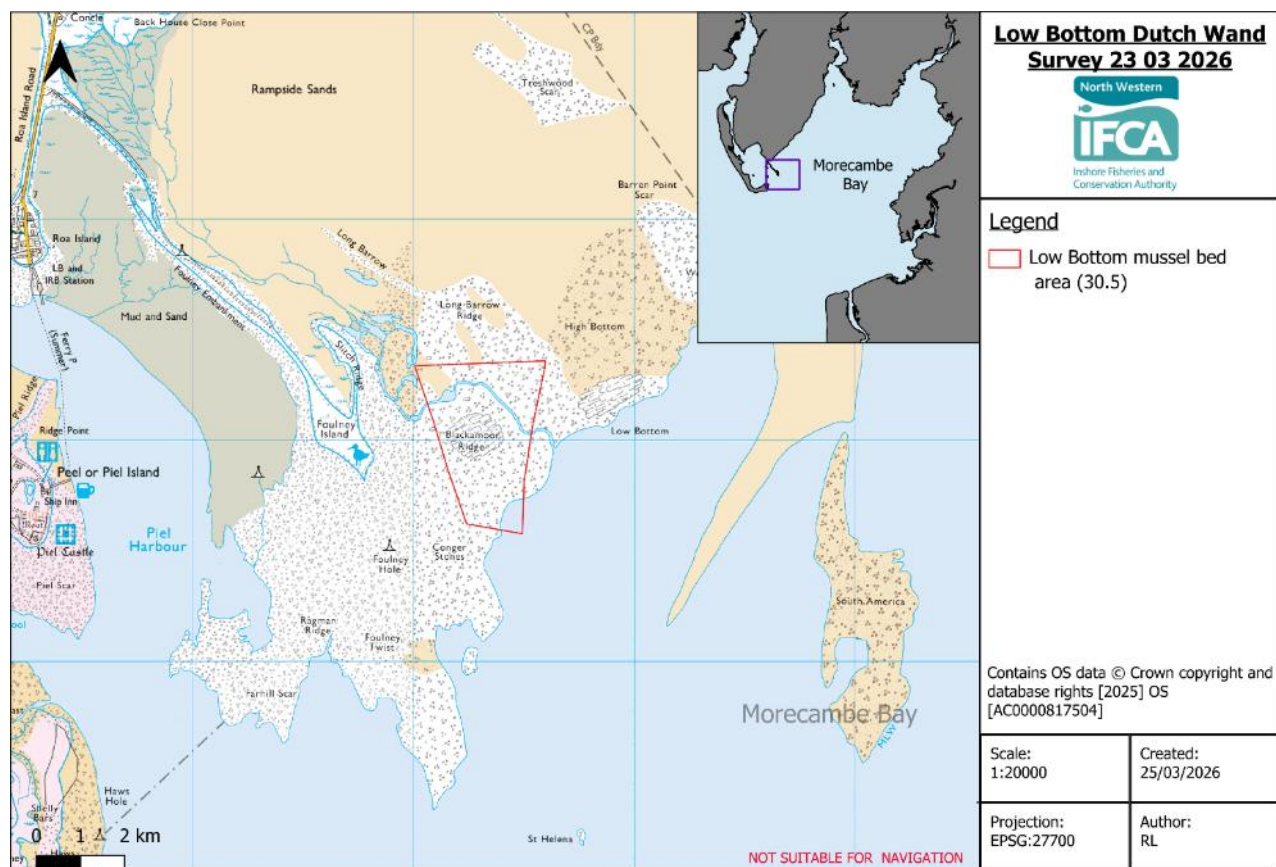


Figure 1: Location of Low Bottom Mussel Bed surveyed 23-03-2026

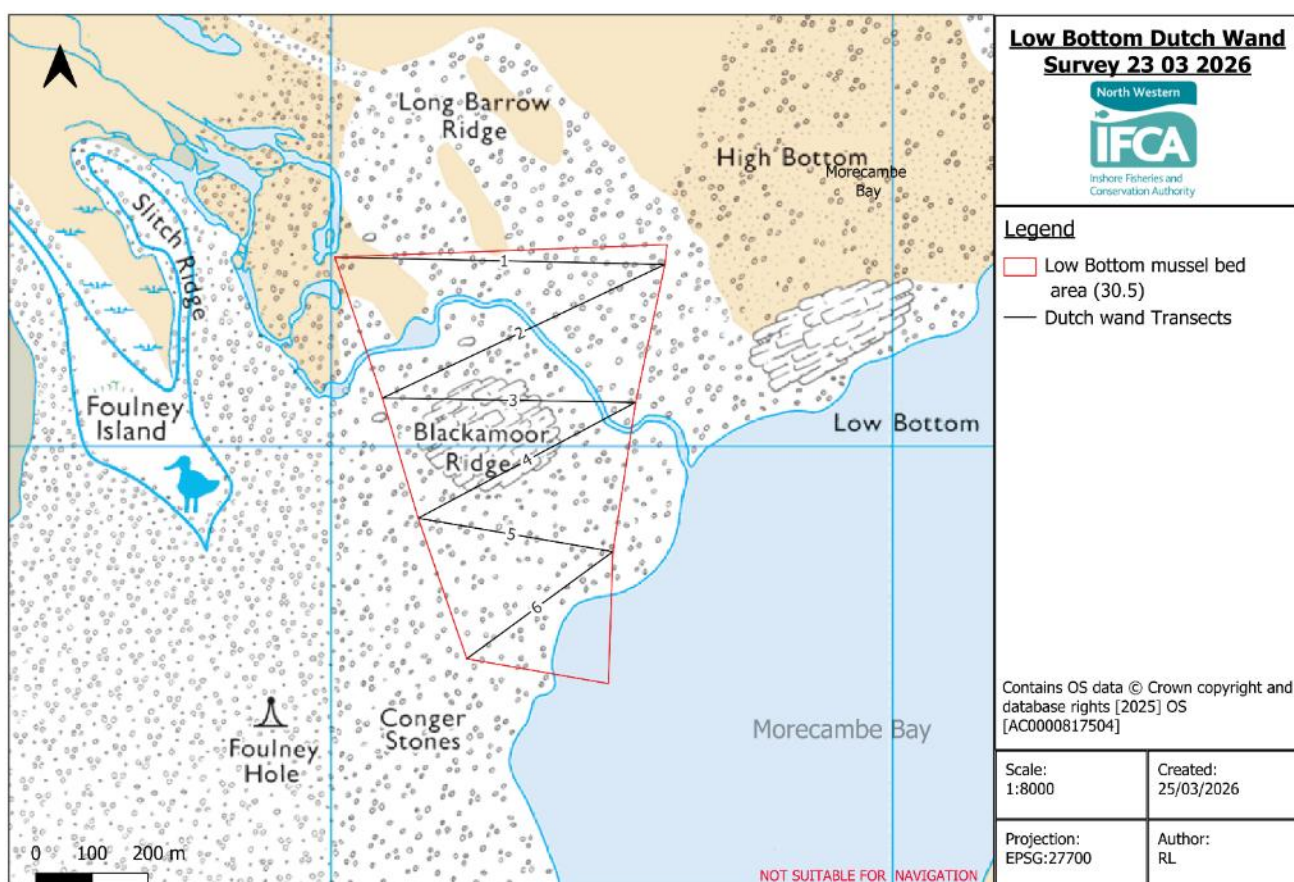


Figure 2: Low Bottom Dutch Wand survey transects 23-03-2026

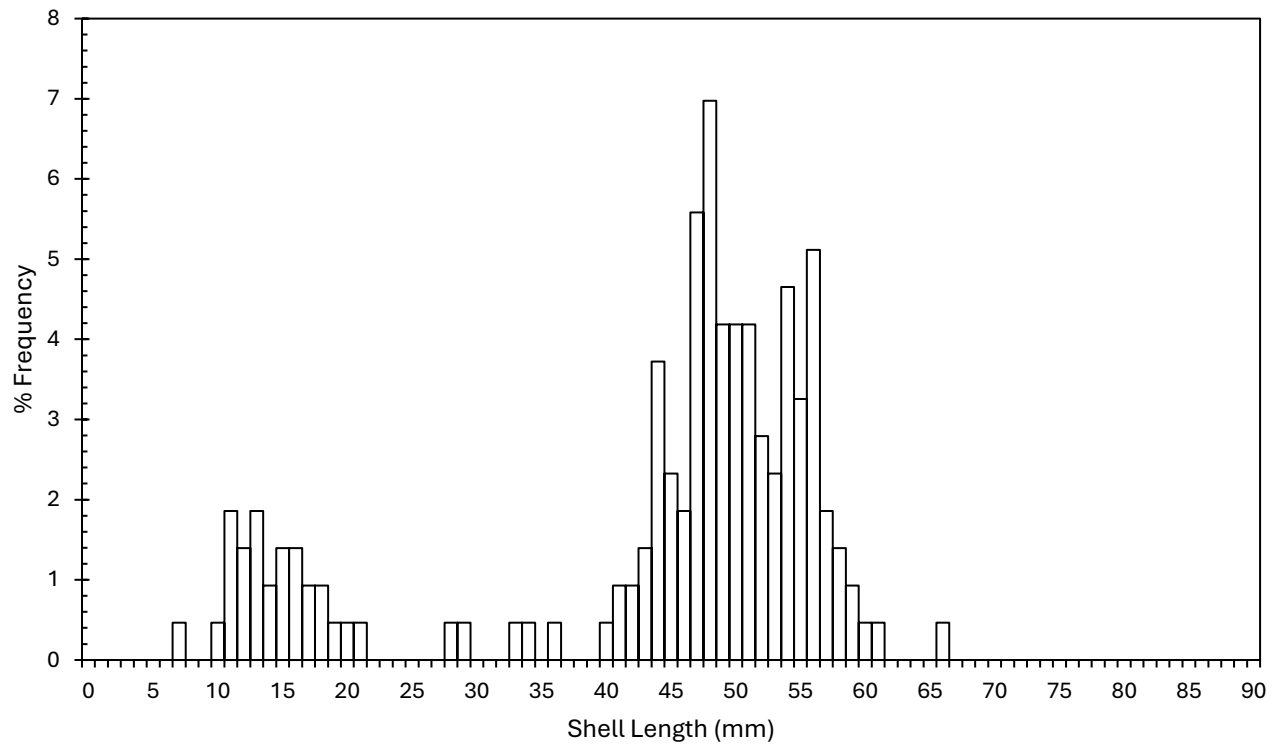


Figure 3: Histogram showing size frequency of mussels from all samples on Low Bottom 2026

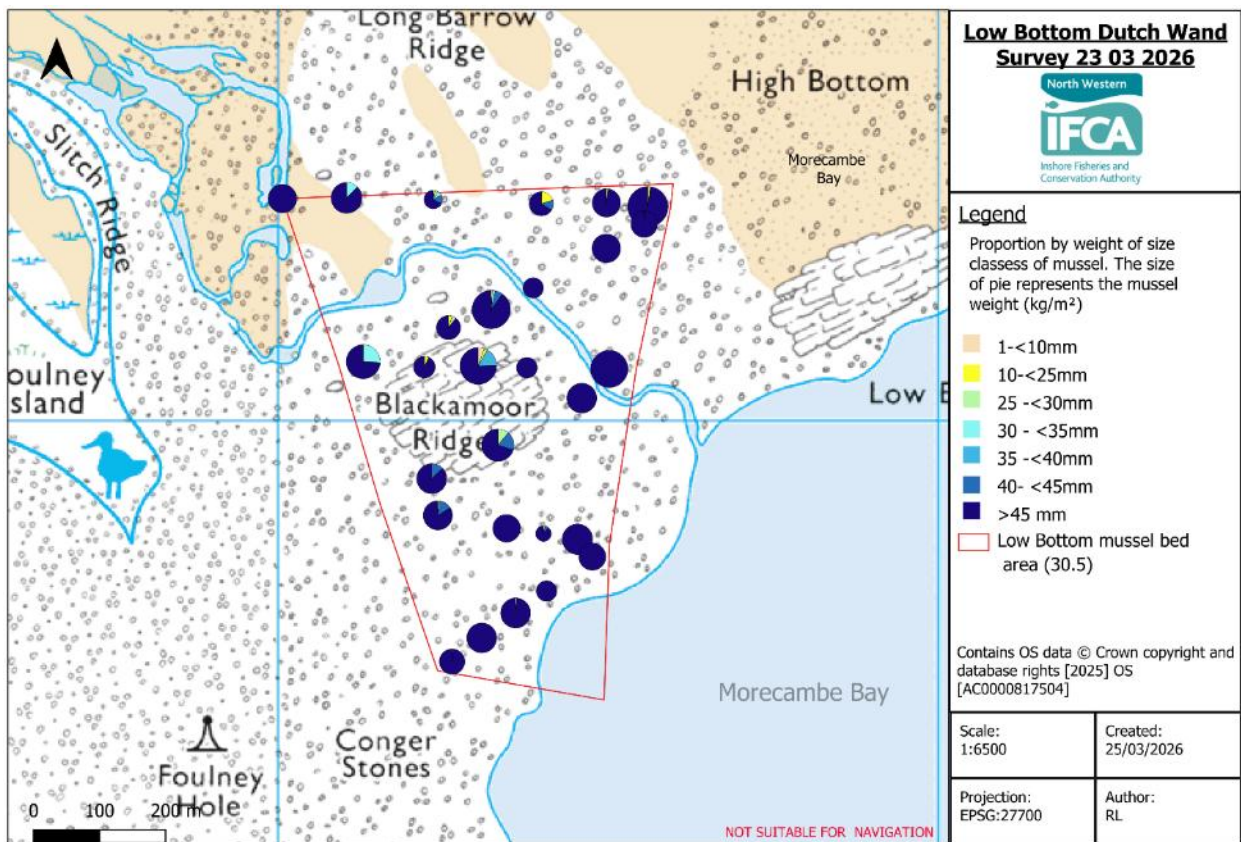


Figure 4: Proportion by weight of size classes of mussel

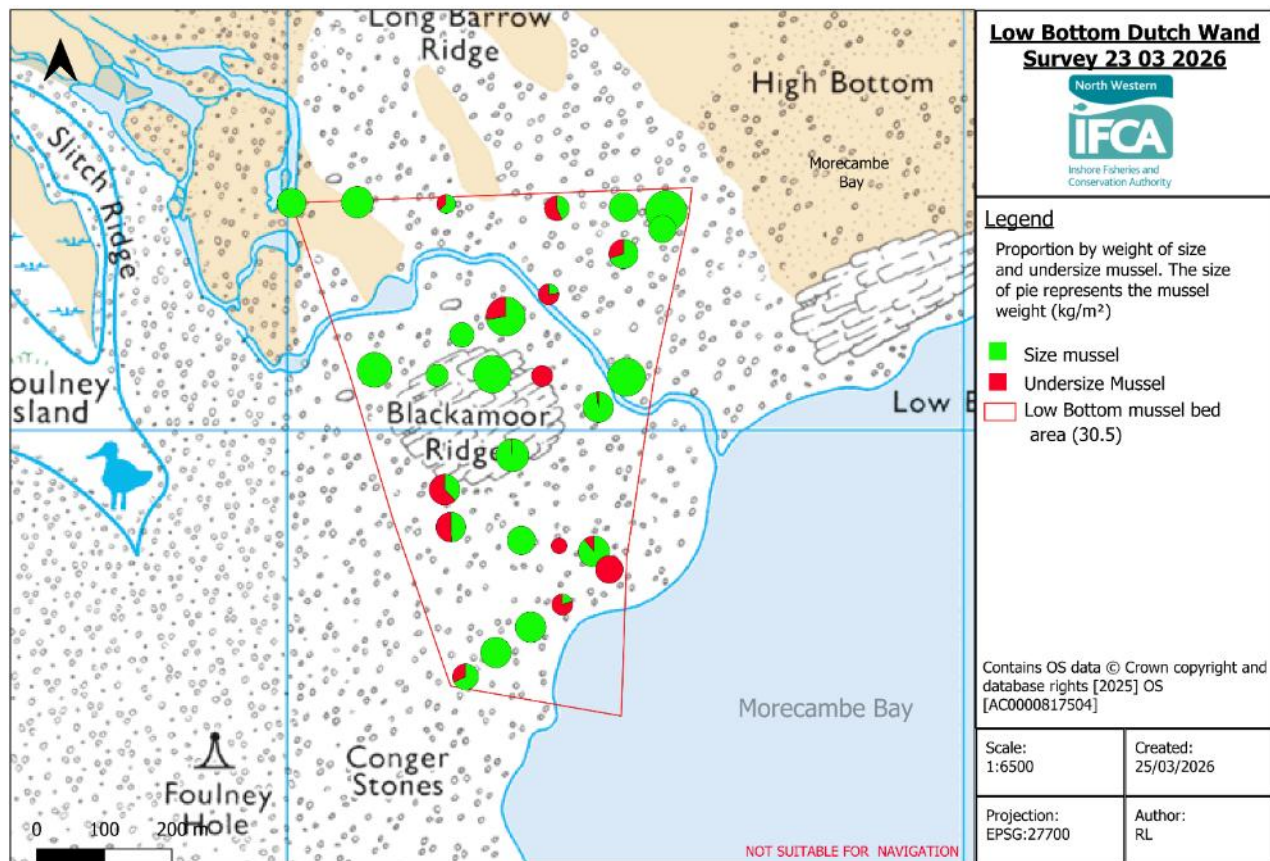


Figure 5: Proportion by weight of size and undersize mussel represented as kg/m²

Walney Channel Mussel Inspection Note 24-03-26

Officers present: JH, GG

Low water: 08:55 1.8m (Liverpool Tides)

Survey method: Inspection

Officers planned to complete a Dutch Wand survey on the mussel bed. Over recent years the mussel bed has been decreasing in size and density, September 2025 survey estimated 193 tonnes of mussel on the bed. On arrival it was evident that size and density of the mussel bed had decreased further. Due to the likely inaccuracy of completing a Dutch Wand mussel survey, low number of samples with a large percentage of the transects void of mussel, officers carried out an inspection of the bed. The 2025 mussel bed area and Dutch Wand transects have been provided in Figure 1 with GPS track data from the inspection.

Officers walked around the bed, most of the higher elevation areas are flat and consisting of old shell with a very occasionally 60mm barnacled mussel present (Figures 3 and 4). The bed has been reduced to a small strip of mussel along East side of the inspected area (Figure 4). The strip consist of 50-60mm barnacled mussel (Figure 5).

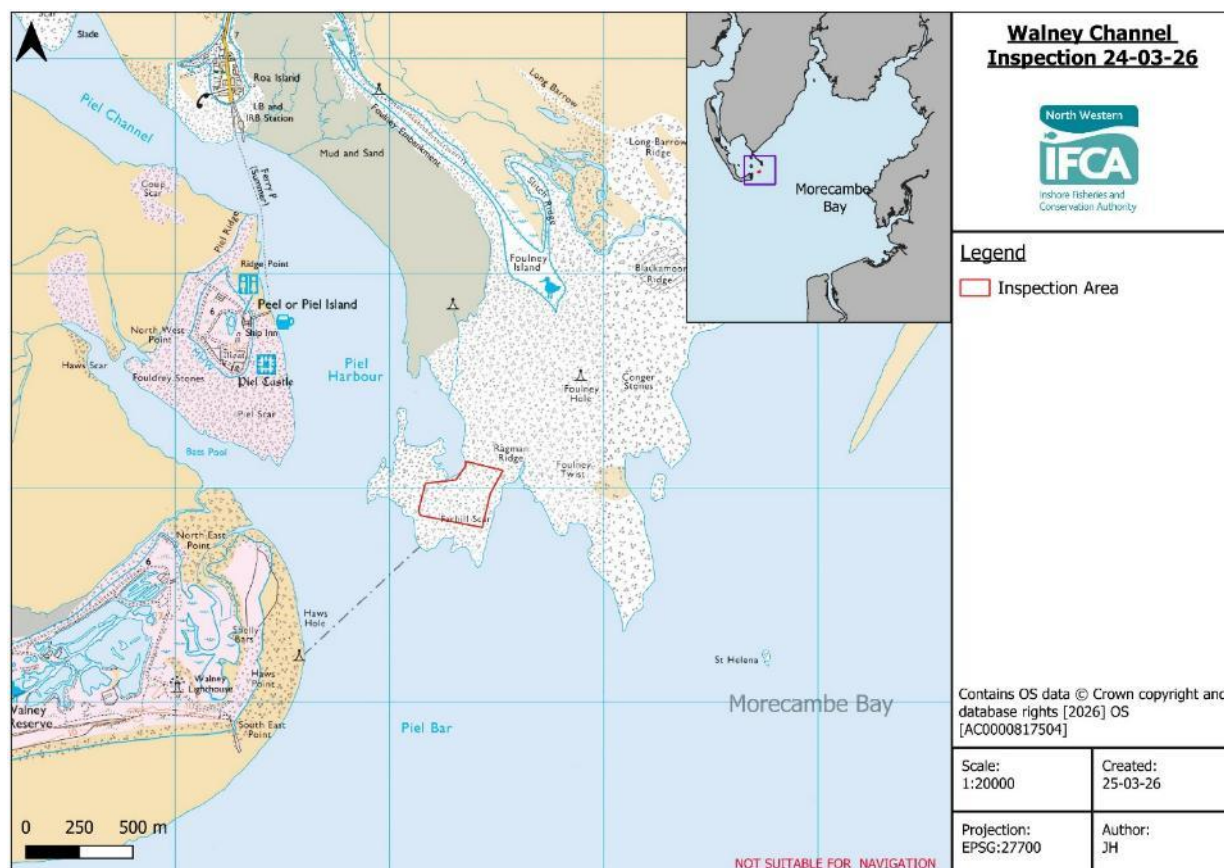


Figure 1 - Location of Walney Channel mussel bed 24-03-26.

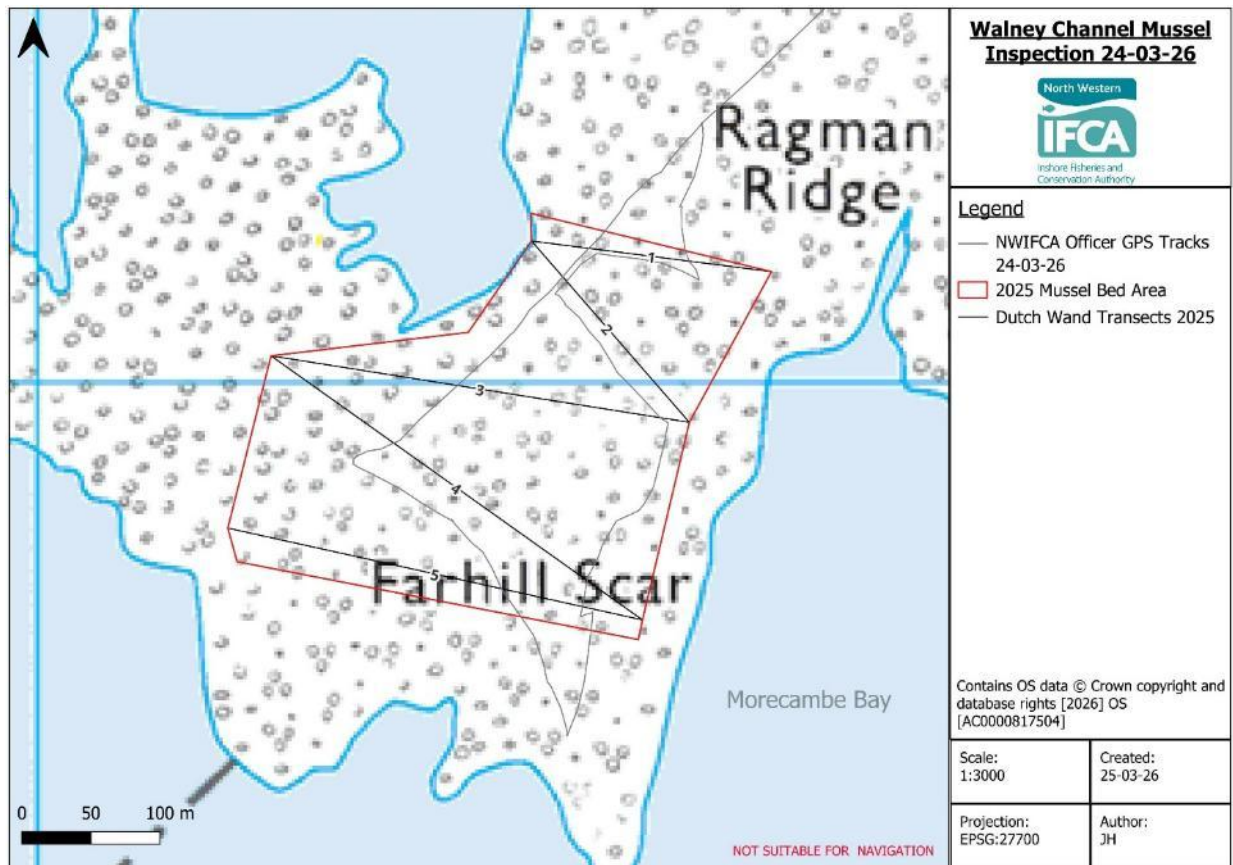


Figure 2 - Walney Channel Dutch wand survey transects and Officer GPS tracks 24-03-26.



Figure 3 – Large area void of mussel with only a thin strip along the waterline 24-03-2026

West

☉ 266°W (T) ● 54.0574, -3.155991 ±4m ▲ 49m



Figure 4 – Large area void of mussel 24-03-2026

North

☉ 33°N (T) ● 54.056554, -3.15589 ±3m ▲ 46m



Figure 5 – Small patches of large barnacled mussel along the waterline 24-03-2026

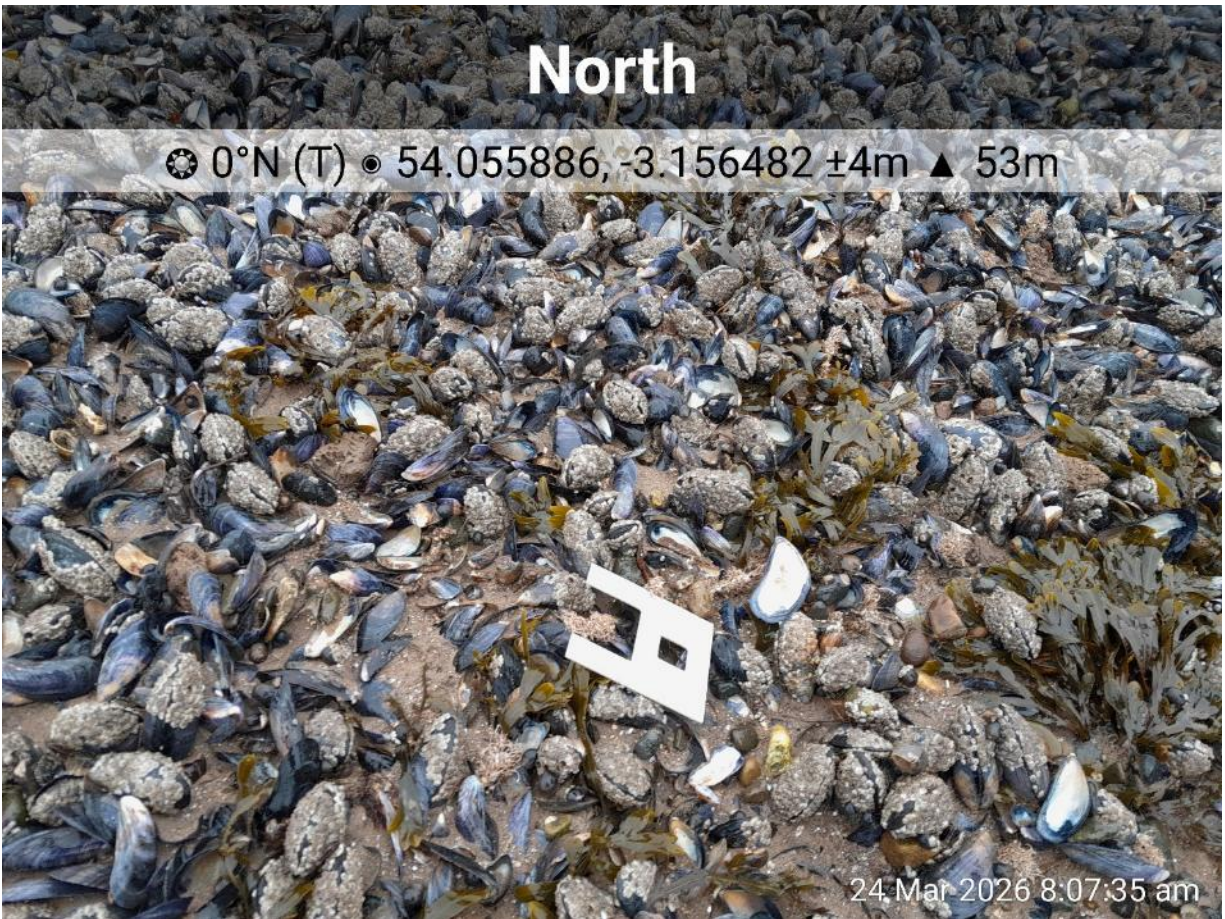


Figure 6 – Small patches of I