

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

Mussel inspections – Morecambe Bay

Hard Acre (Duddon) Mussel Inspection 18-05-26

Officers: ID, LL, RL, CT

LW: 07:26 1m (Liverpool tides)

Officers inspected Hard Acre mussel bed in the Duddon Estuary. The area was accessed by quadbike, and an inspection was carried out on foot. Due to soft mud officers were unable to map the complete perimeter of the bed however, estimates were made from what they could access and see. The estimated bed size has decreased since the inspection on March 6th from 20 ha to approximately 7 ha (Figure 1). The mussel bed is in the main channel and, even on a low water spring tide, some of the area remained underwater (Figure 2).

Mussel size across the bed was uniform at 25-35mm and was mainly on hard-in on sand (Figure 3). There were large areas of scour present leaving areas of thick mussel mud (Figure 4). Overall coverage of the bed was ~ 20% however there were dense patches of undersize mussel along the North and West edges of the bed with coverage up to 70% in areas (Figures 5 and 6).

There were a large number gulls, eiders and oystercatchers present on the bed.

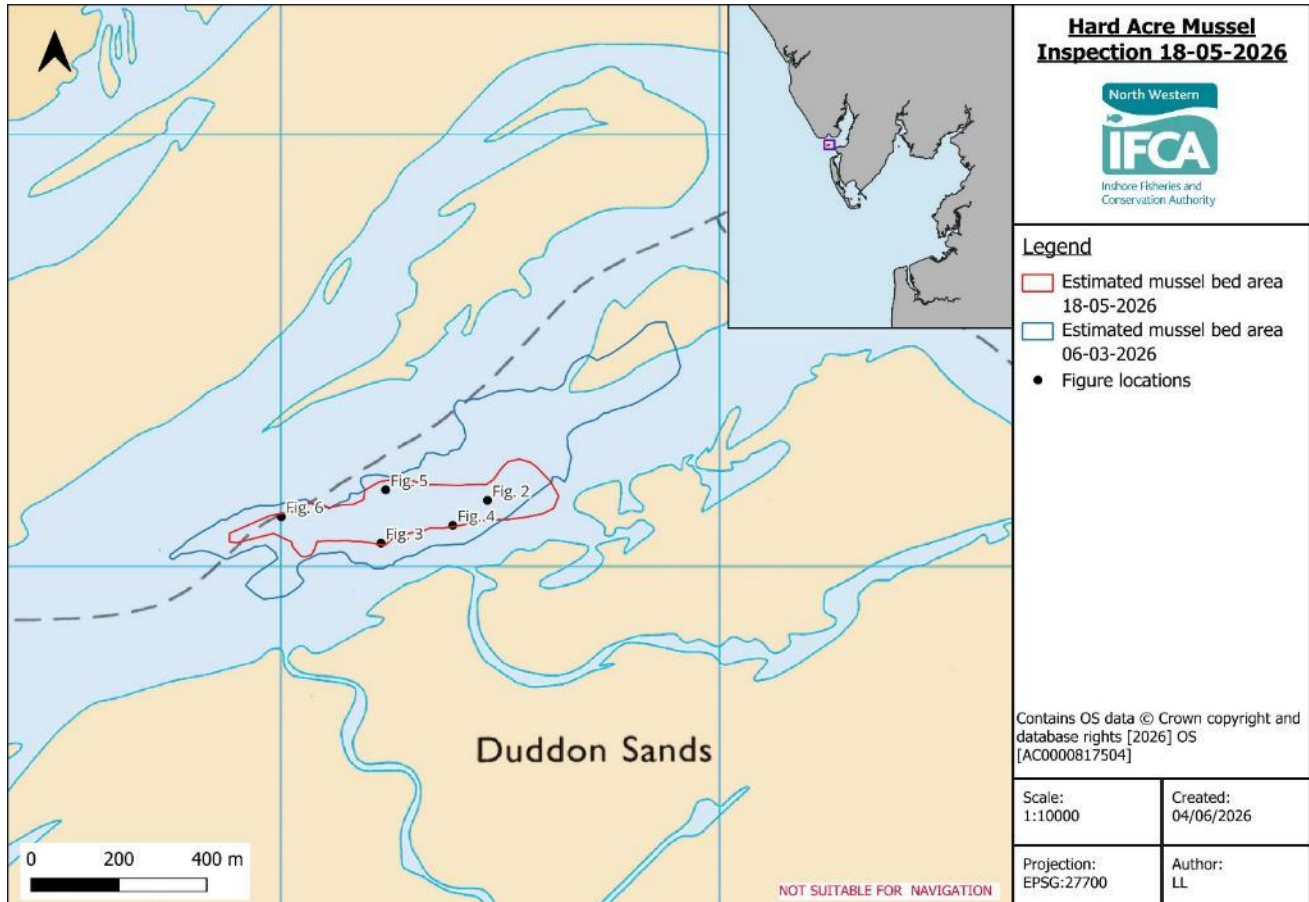


Figure 1. Estimated bed area and image locations from the Hard Acre mussel inspection 18-05-2026

South East

☀ 145°SE (T) ● 54.174383° N, 3.281119° W ±3m ▲ 50m



Figure 2. Unexposed mussel

South West

☀ 229°SW (T) ● 54.173434° N, 3.284876° W ±4m ▲ 52m



Figure 3. Uniform 25-35mm mussel on sand

South

☀ 189°S (T) ● 54.17381° N, 3.282749° W ±5m ▲ 49m



Figure 4. Evidence of scour

South West

☀ 216°SW (T) ● 54.174544° N, 3.284909° W ±3m ▲ 53m



Figure 5. Patches of very dense mussel

South West

☀ 234°SW (T) ● 54.173973° N, 3.288315° W ±3m ▲ 51m



Figure 6. Approximately 70% coverage of live mussel at the West edge

Hard Acre Mussel Inspection 16-06-26

Officers: AP, GG, ID, CT

LW: 07:16 1.1m (Liverpool tides)

Officers inspected Hard Acre mussel bed in the Duddon Estuary. The area was accessed by quadbike, and an inspection was carried out on foot. Officers mapped the perimeter of the main bed and secondary area to determine the estimated bed area. The estimated bed size has increased since the inspection in May from 7 ha to approximately 11 ha (Figure 1).

Overall coverage could not be accurately assessed overall due to the mussel bed being in the main channel and even on a low water spring tide some of the area remained underwater during the inspection (Figure 7). There were localised patches of denser mussel >50% coverage, and areas in the northern part of the bed with thin coverage <20% (Figure 3 and 10). Mussels appeared clean (Figure 5) and mussel size across the bed ranged from 25-40mm (Figure 2), with the majority of the mussels uniform at 30-35mm, larger than the previous inspection.

There were areas where mussel was hard-in on sand and large areas of exposed cobble and sand (Figure 4 and 6). Areas of dead shell were present and evidence of scour in places leaving areas of thick mussel mud (Figure 8 and 9). A secondary area of mussel was mapped further up the channel to the north east. Coverage of mussel in this area was 50% and on hard sand and cobble, Mussel size ranged from 20-40mm (Figure 11). There were a large number of gulls present on the bed during the inspection.

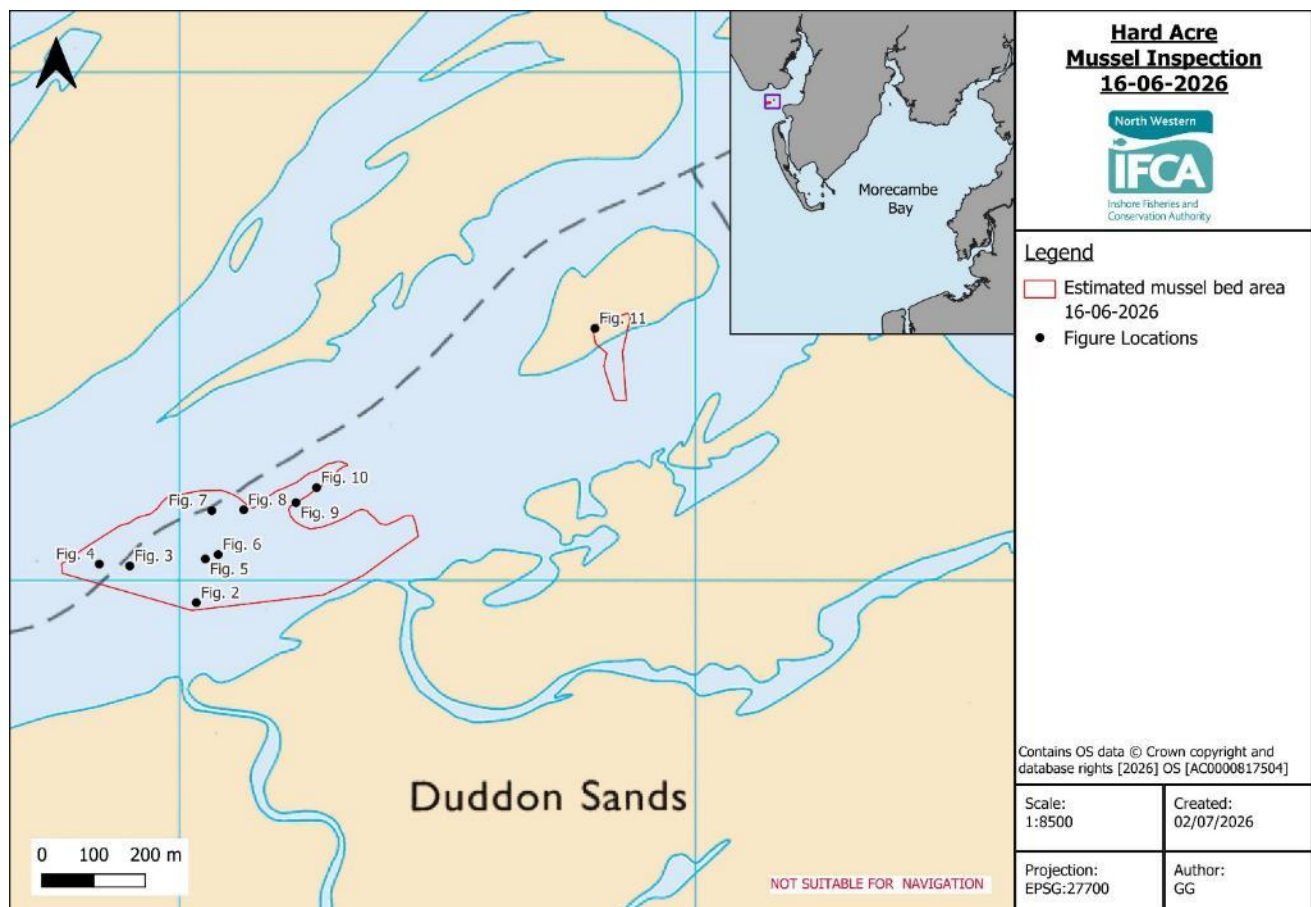


Figure 1. Estimated bed area and image locations from the Hard Acre mussel inspection 16-06-2026

North West

☼ 307°NW (T) ● 54.172511°, -3.287765° ±7m ▲ 58m



Figure 2. 40mm mussel, just under size.

West

☼ 258°W (T) ● 54.173138°, -3.289758° ±9ft ▲ 5ft



Figure 3. Patches of dense mussel.

South

☀ 191°S (T) ● 54.173161°, -3.290663° ±9ft ▲ 2ft



16 Jun 2026, 07:01:22

Figure 4. Areas of cobble.

South East

☀ 163°SE (T) ● 54.173286°, -3.287524° ±2m ▲ 55m



16 Jun 2026 6:37:47 am

Figure 5. Clean mussel, uniform in size (30-35mm).



Figure 6. Mussel hard-in on sand.



Figure 7. Exposed mussel with a ~ 40% coverage, and unexposed mussel still under water.

West

☉ 257°W (T) ● 54.174167°, -3.286412° ±6929ft ▲ -8ft



Figure 8. Area of dead shell, algae, and cobble present on bed.

South East

☉ 129°SE (T) ● 54.17431, -3.284868 ±7m ▲ 52m



Figure 9. Evidence of scour.

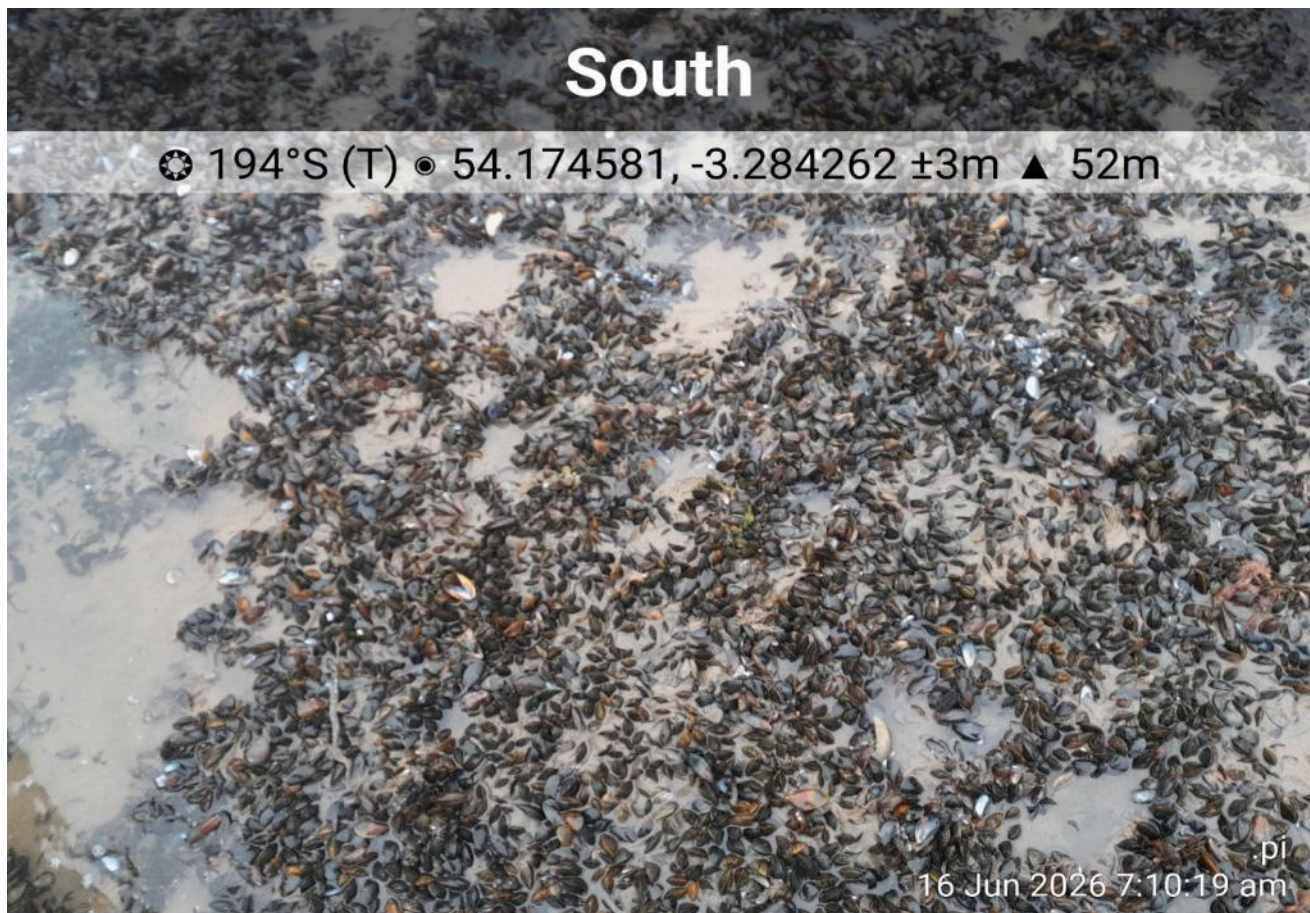


Figure 10. Patchier coverage, beginning to be smothered.



Figure 11. Northern bed. 50% coverage and hard on sand and cobble.

Heysham Flat Mussel Inspection 30-04-2026

Officers present: RL, LL

Tides: LW 18:08 1.5m (Liverpool tides)

Officers inspected the mussel on Heysham Flat to assess if any mussel had persisted over the winter. Access to the outer skears was not possible across Dallam Dyke due to the depth of water and timings. Officer tracks are mapped in Figure A.

The previous historic *Sabellaria alveolata* reef that extended across the skewer from Conger rock to Dallam Dyke has continued to decrease in size from the previous inspection. Most of the reef is dead with only small areas of live *Sabellaria alveolata* present on the bed (Figure 1). North of the reef were low density undersized mussel buried in soft sand, extending towards Conger rock (Figure 2).

Spat was present across small areas of the upper bed in small concentrations. Dead shell and dead *Sabellaria* reef were the preferred substrate for settlement, small dense patches were found settling into sand however; coverage was low (Figure 3 & 4). Exposed cobble (Figure 5) and dead shell increased towards the outer edge of the bed area, with small patches of sized mussels present near Dallams Dyke. Toward the northern edge of the bed lies the densest coverage of undersized mussel (25-35mm), buried in firm mud (Figure 6). The previous years scouring is still present in the immediate area.

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

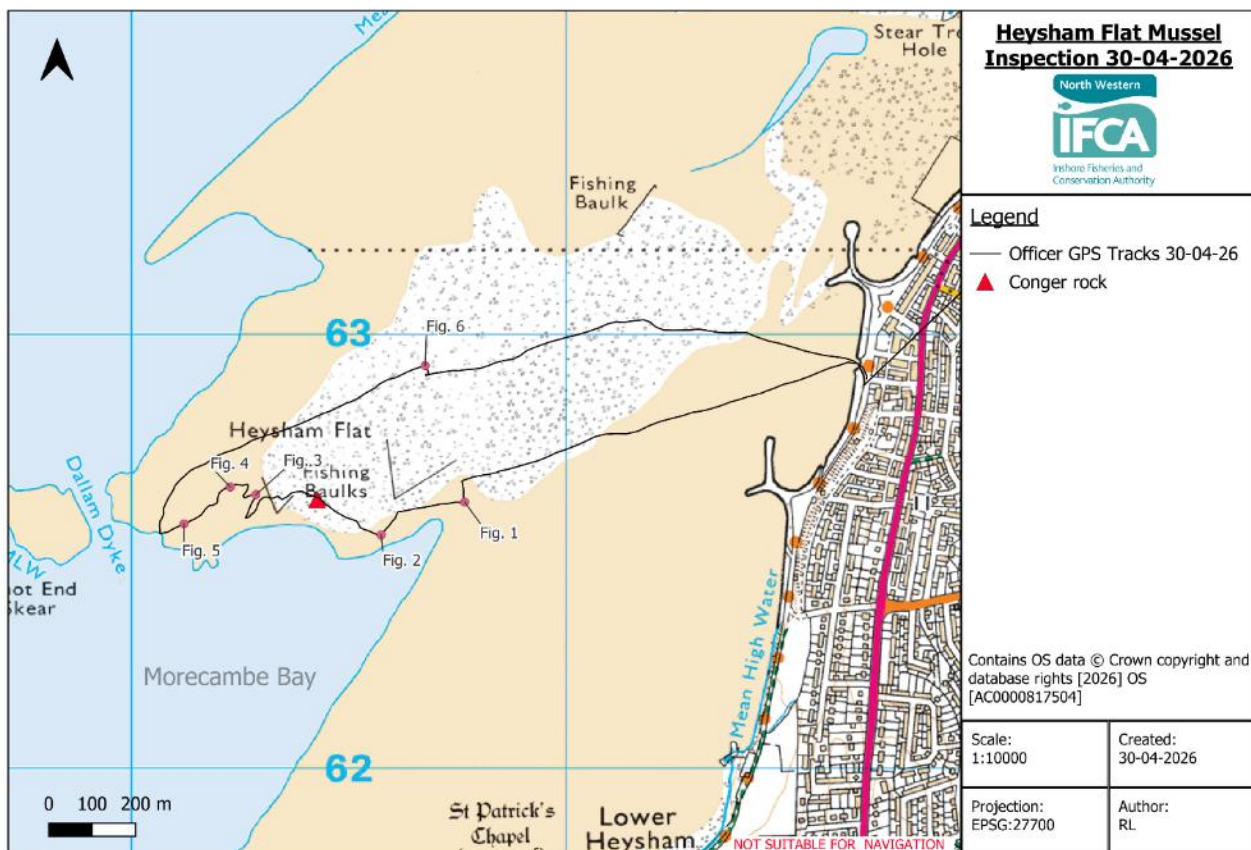


Figure A. Tracks taken from GPS of the officer's inspection 30/4/26

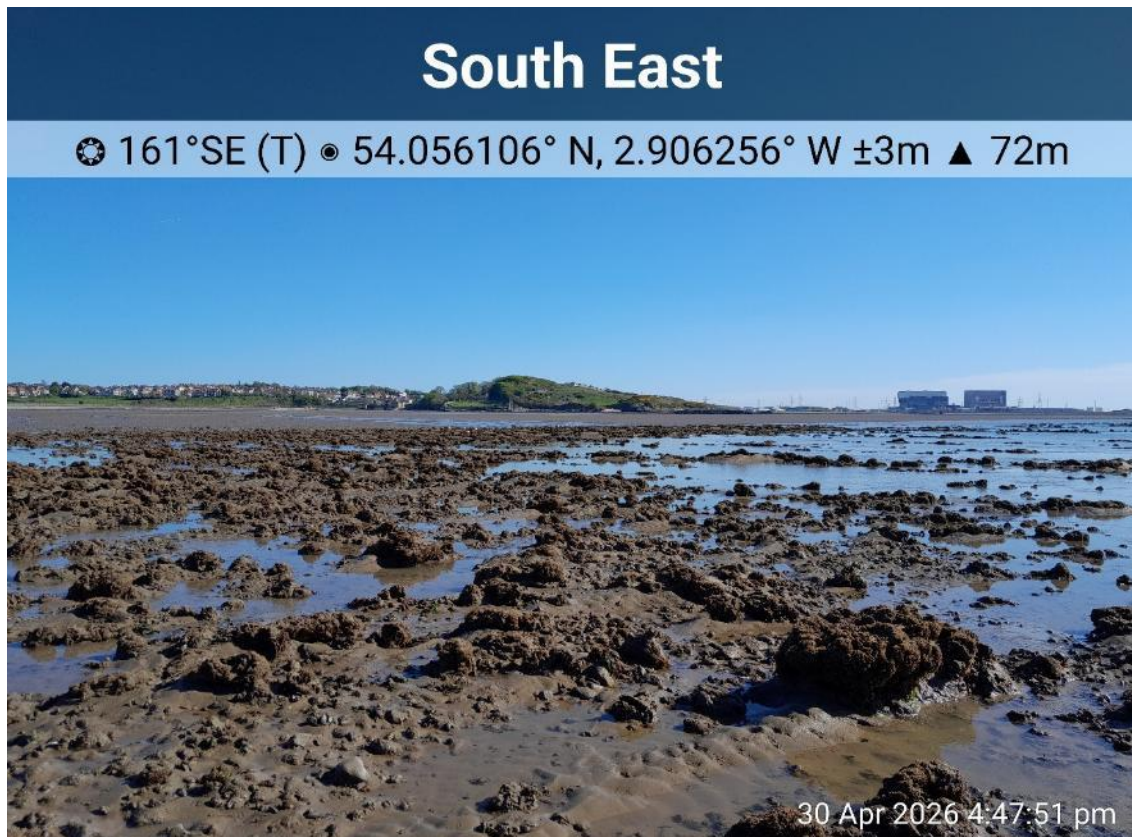


Figure 1. Dead *Sabellaria alveolata* towards the Southern area of the bed

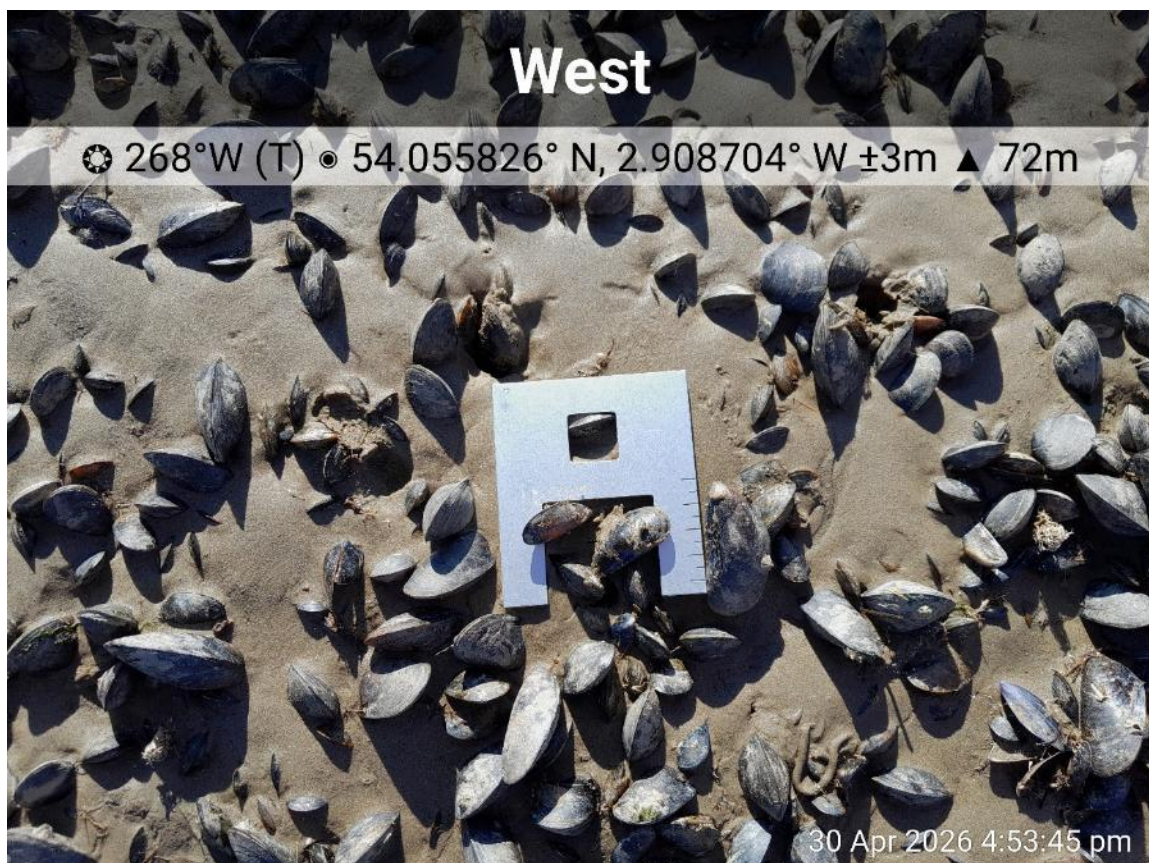


Figure 2. Mixed Size of 25-35mm mussel buried in firm sand, roughly 50% density on a thin layer of mud



Figure 3. Presence of spat found on dead shell and dead *S. alveolata*.



Figure 4. Patchy distribution of low density spat found on dead shell and sand

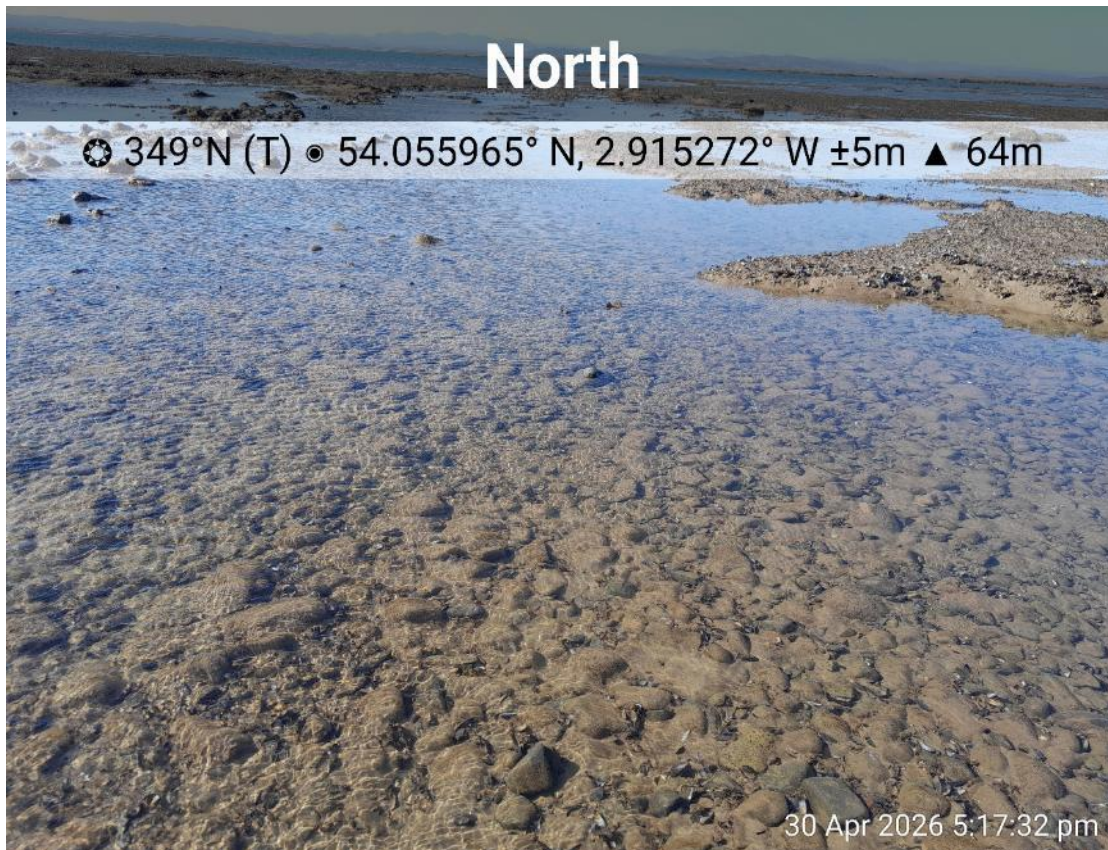


Figure 5. Exposed cobble and dead shell expending north towards the edge of the bed

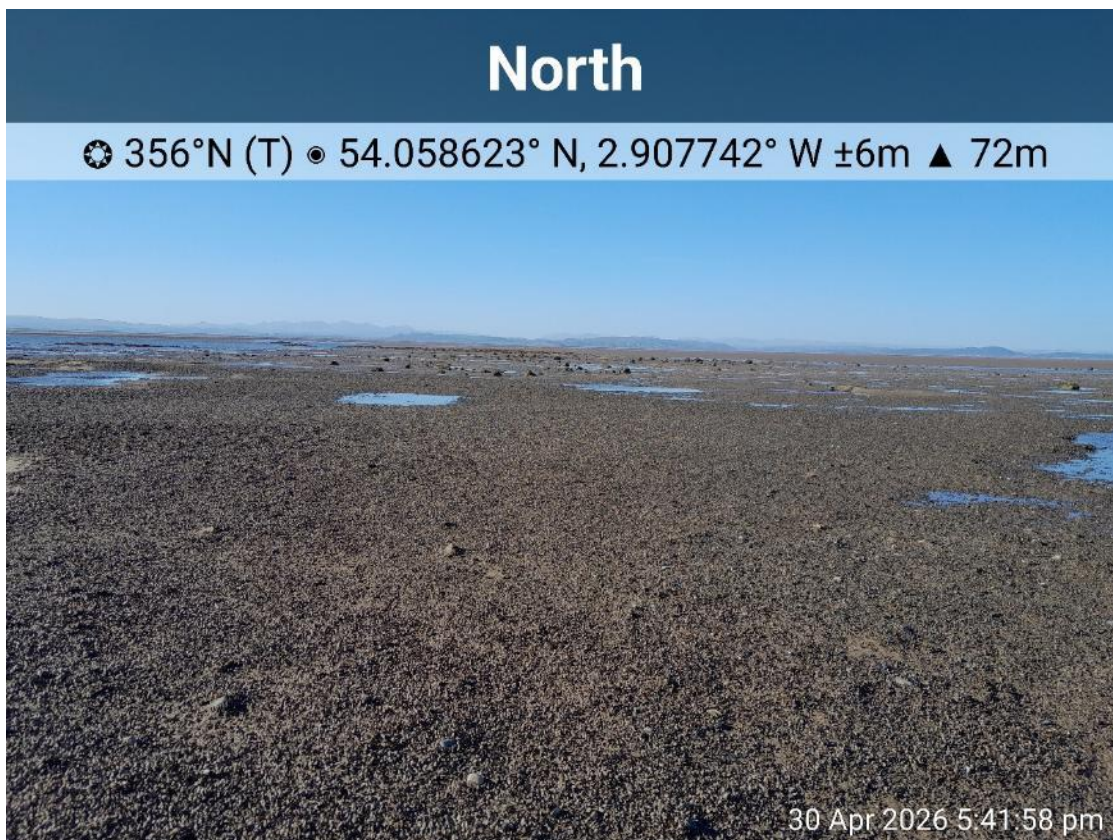


Figure 6. Previously scoured mussel bed covered in 25-35mm mussel at 70% density. Most dense region of mussel on the bed at the time of the inspection

Heysham Flat Mussel Inspection 18-06-2026

Officers present: LL, GE

Tides: LW 09:01 1m (Liverpool tides)

Officers inspected the mussel on Heysham Flat to assess if there had been a settlement and growth since the previous inspection. Access to the outer skears was not possible across Dallam Dyke due to the depth of water and timings. Officer tracks are mapped in Figure 1.

At the East of the bed there was a low coverage (10-20%) of seed mussel on hard mud (Figure 2). There were large areas of dead shell and exposed cobble with a small number of live undersize mussel (Figure 3). A patchy band of mixed size and undersize mussel (30mm- 50mm) extended across the bed from North to South (Figure 4 and Figure 5).

A dense settlement of seed mussel was observed west of Conger Rock, extending towards Dallam Dyke and along the North edge of the skewer (Figure 6). Adjacent to Dallam Dyke the coverage was low and exposed cobble was present (Figure 7).

Live *Sabellaria alveolata* reef was present along the North and South of the skewer (Figure 8). There were also small patches of dead *S. alveolata* throughout the skewer with mussel growing on it.

Gulls were present on the mussel bed.

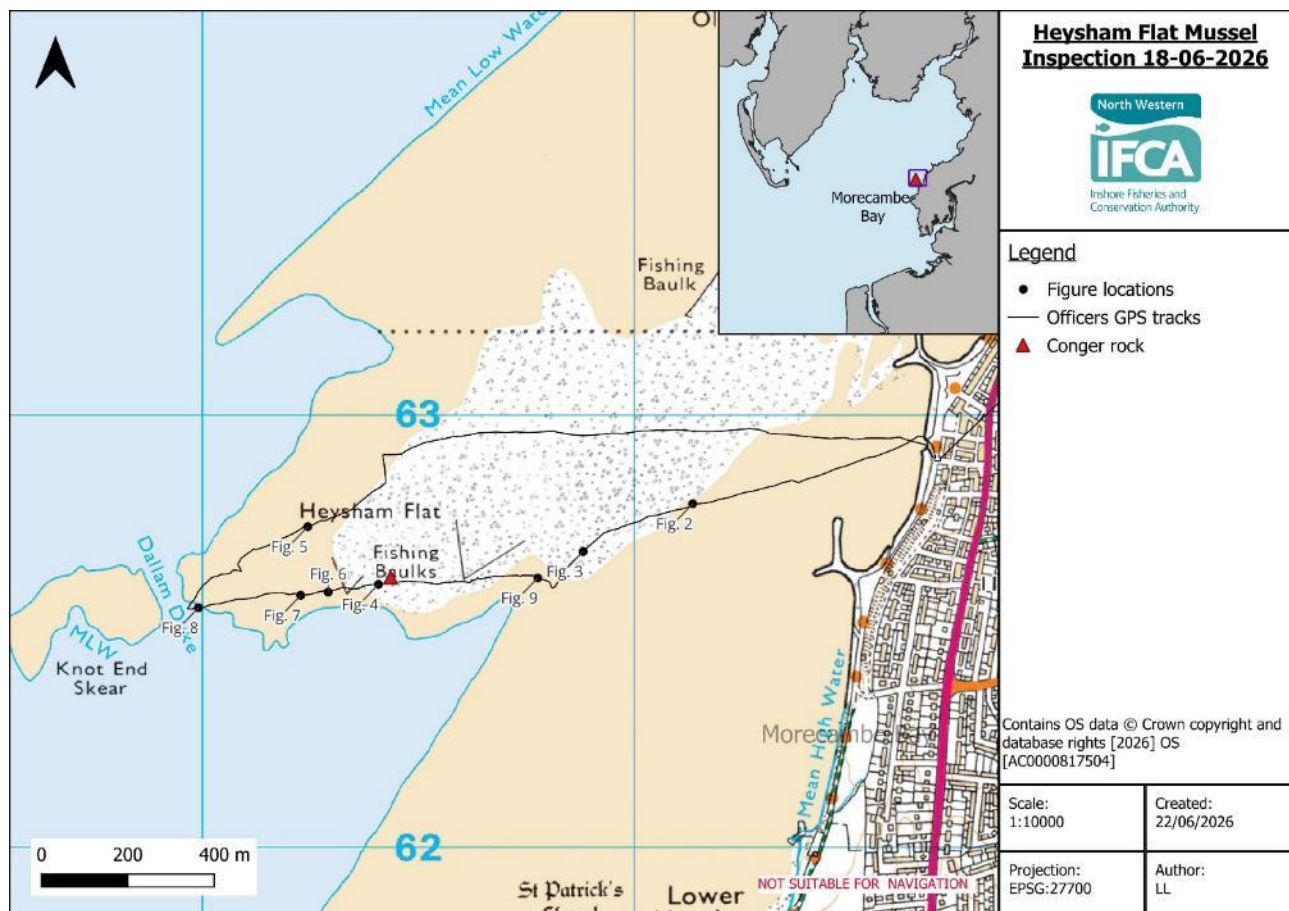


Figure 1: Map

West

☉ 260°W (T) ● 54.057185° N, 2.903305° W ±3m ▲ 61m



Figure 2: 20% coverage of seed mussel on hard sand

South West

☉ 236°SW (T) ● 54.055988° N, 2.911785° W ±3m ▲ 72m



Figure 3: Dead shell and cobble

South East

☀ 164°SE (T) ● 54.057151° N, 2.914363° W ±8m ▲ 62m



Figure 4: A band of size and undersize mussel across the bed

North West

☀ 318°NW (T) ● 54.055813° N, 2.913578° W ±3m ▲ 54m



Figure 5: Patches of size and undersize mussel (30 – 50mm)

South West

☉ 248°SW (T) ● 54.055735° N, 2.914551° W ±5m ▲ 70m



Figure 6: Dense seed mussel settlement West of Conger rock towards Dallam dyke

West

☉ 289°W (T) ● 54.055651° N, 2.916427° W ±4m ▲ 66m



Figure 7: Patches of seed with cobble and dead shell

South West

☀ 218°SW (T) ● 54.055965° N, 2.905575° W ±3m ▲ 50m



Figure 8: Live *Sabellaria alveolata* reef and cobble

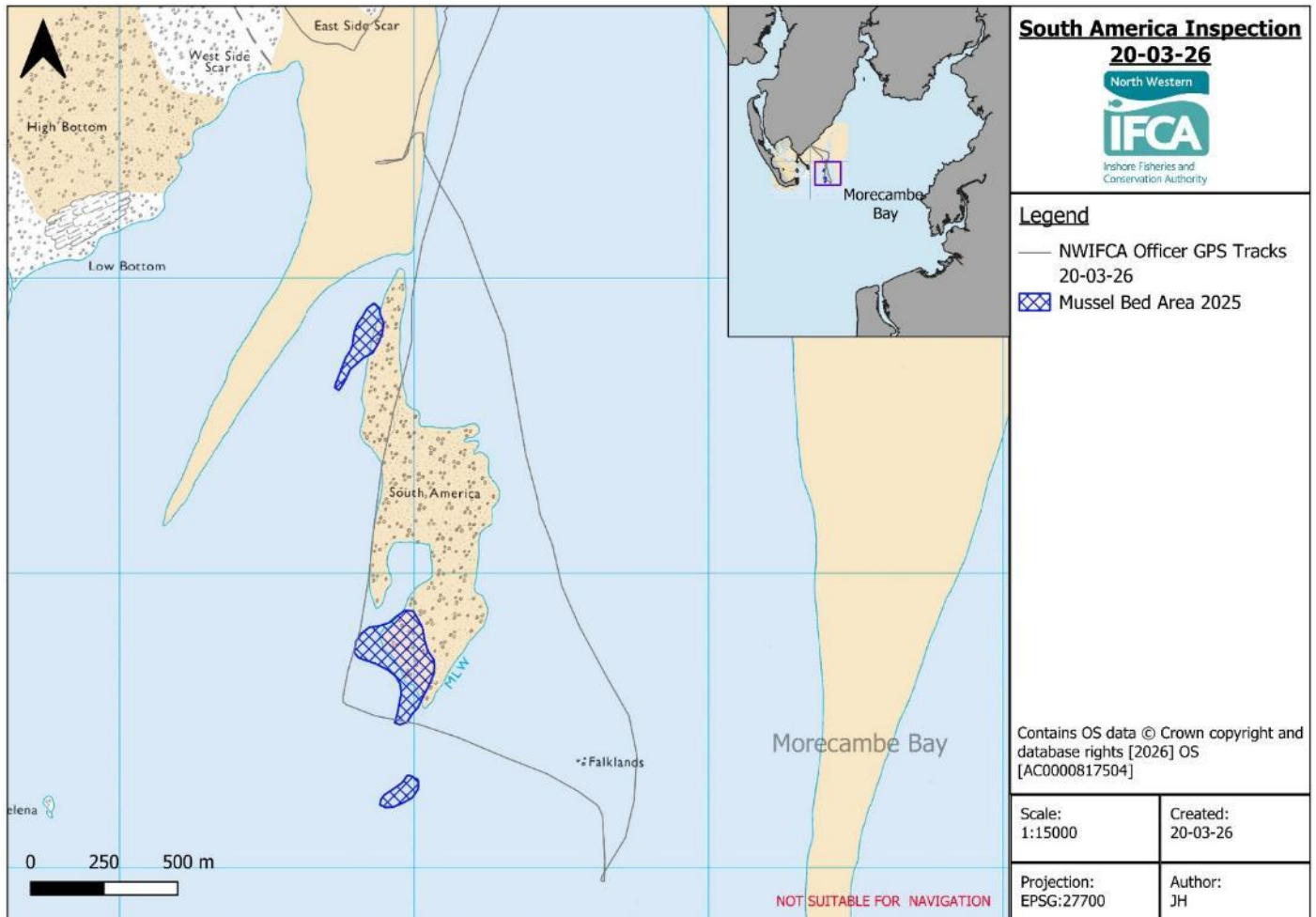
South America Mussel Inspection (Quad) 20-03-26

LW: 06:27 1m (Liverpool tides)

An inspection of South America was completed to assess the access by quadbike, if any mussel has persisted from 2025, and if there is suitable hard substrate for a potential 2026.

Access was easier than previous years with shallow channel crossings. Map 1 show officer tracks overlaid onto mapping of mussel beds from 2025. All areas that previously held mussel have sanded over with no mussel or exposed hard substrate present.

A follow up inspection will be completed in the summer to monitor if the situation has changed.



Map 1. Officer's tracks (20-03-26) overlaid onto mapping of mussel from 2025

Perch Scar and Black Scar Mussel Inspection 22-05-2026

Officers: RL, AP, LL, JH, GG

LW: 10:54 1.9m (Liverpool Tides)

Black Scar

The area had not yet received any settlement. The previous year's settlement had been scoured off, and large tracts of mud and hillocks still remained at around 30+cm in height, however, these were also eroding (Image 1). Around 60% of the area was exposed cobble and dead mussel (Image 2 and 4). Algae was present on much of the bare cobble and in the pools (Image 3). Along the channel edge to the east, there was the main strip of dead shell and cobble. Given the tide height, it was hard to identify if the size mussel previously located in that area was present. No size, nor seed mussel was present. Only very small, insubstantial areas of dead or buried seed from the previous year was noted.

Figure 2 of Black Scar, overlaid with drone imagery of the mussel bed. It is clear to see the remaining extent of the mud still present, and the process of scour taking place.

Perch Scar

The area was similar in condition to Black Scar, with no seed mussel settlement as yet, and large areas of mud remaining where previous mussel had scoured off (Image 5). Approximately 60% of the bed was exposed cobble, the rest was covered in thick mud which was in the process of eroding. It was not possible to walk the perimeter along the channel edge due to soft mussel mud and the extent of the tide, therefore, perimeters from previous years were used to estimate the boundary. The north end of the bed extended into the channel; due to the depth of the water, officers could not access this so have estimated the area. No size mussel was present.

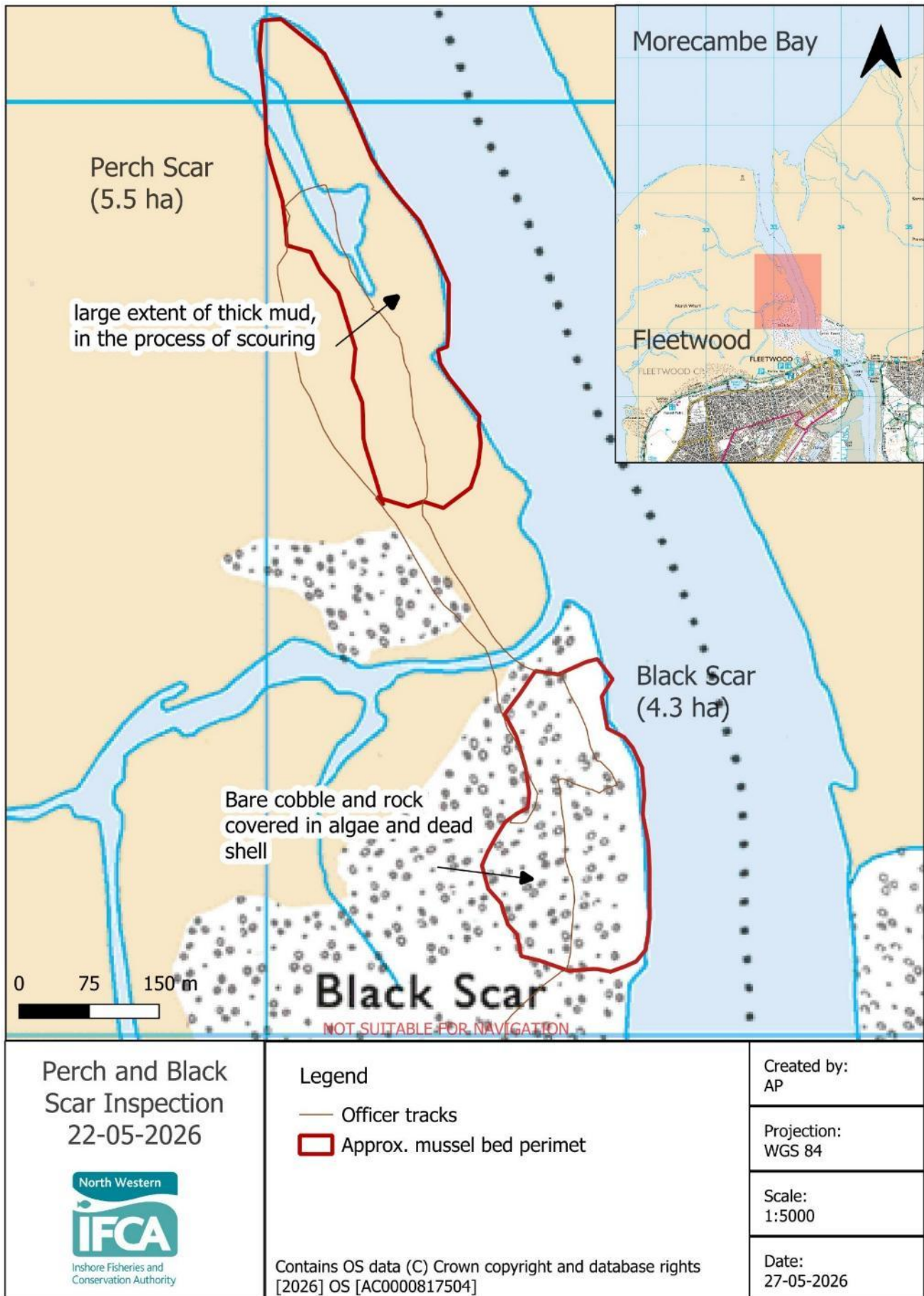


Figure 1: Map of Perch Scar and Black Scar with officer GPS tracks and figure locations May 2026



Figure 2: Map of Black Scar with drone imagery overlay.

Unnamed Road, Fleetwood FY7 6HF, UK

☉ 29°N (T) ☉ 53.934342, -3.017039 ±4m ▲ 64m



Image 1. Scoured mussel mud left on Black Scar.

Unnamed Road, Fleetwood FY7 6HF, UK

☉ 348°N (T) ☉ 53.935205, -3.017253 ±4m ▲ 59m



Image 2. Bare cobble covered in algae to the west of the bed.



Image 3. Exposed cobble beneath mud at the end of Black Scar.



Image 4. Large extent of exposed cobble at the end of the Black Scar bed.



Image 5. Large extent of scoured mud on the centre of Perch Scar.