

Annex A - NWIFCA Mussel Inspections and Surveys June-July 2021

a) Duddon Estuary Mussel Inspection 09/09/21

LW: 08:12 0.8m (Liverpool tides)

The area of mussel identified in June was inspected to assess the growth, condition and coverage of the mussel. The area was accessed by quad bike, and an inspection was carried out on foot. The area is in a main channel and even on a low water spring tide some of the area remains under water.

There was an area of mussel present in the channel. The extent of the bed has been mapped below showing the boundary that was walked by officers (Figures 1 and 2). The majority of the area was exposed however a proportion of the bed remained under water during the inspection and an area on the Northern boundary could not be mapped due to depth of water. However, the water was very clear which enabled officers to assess where the edge of the bed was.

A large proportion of the mussel across the bed ranged in size from 35-45mm (Figure 3) at an overall coverage of approximately 75% bed area. Mixed in were patches of both size (45-55mm) and undersize (30-40mm) mussel. In the central area of the bed the mussels were on mussel mud to a depth of 20-30cm. Some areas of mussel were loose and some areas were hard into the sand substrate. Sand Mason were also prevalent on the bed, varying in density. At the South Western area of the bed, the mussel was patchy and less dense than other areas of the bed, with larger patches of bare sand in between patches of mussel. High bird feeding activity was noticed, with Oystercatchers and Gulls in high numbers feeding in the area.

15 mussel samples were taken across the bed using a 10cm diameter corer. The total weight of size and undersize mussel was recorded as well as the size frequency of each sample. No mussel under 10mm was found to be present.

The mussel bed surveyed was approximately **8.27 hectares**.

Biomass

512 tonnes size mussel and 1374 tonnes undersize mussel. Total mussel 1886 tonnes.

Length Frequencies

The total length frequency for the surveyed bed is provided in Figure 3. From the length frequency data the mussel present on the Duddon bed ranged between 16-57mm, with the majority of mussel between 30-45mm.

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 class is similar across the bed, with the size mussel >45 mm predominantly on the Eastern half of the bed area and 25-45mm mussels widespread.

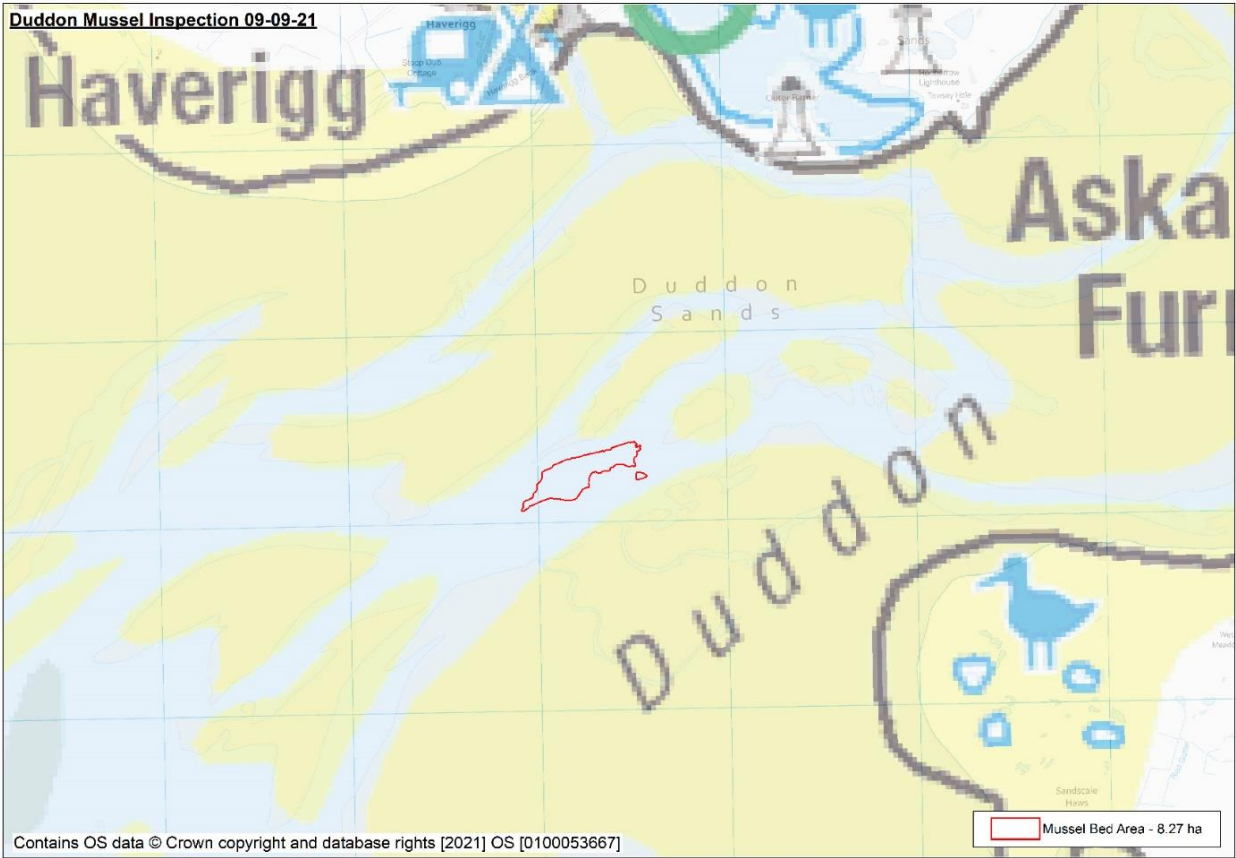


Fig 1 – Outline of mussel in the Duddon Channel 09-09-21.

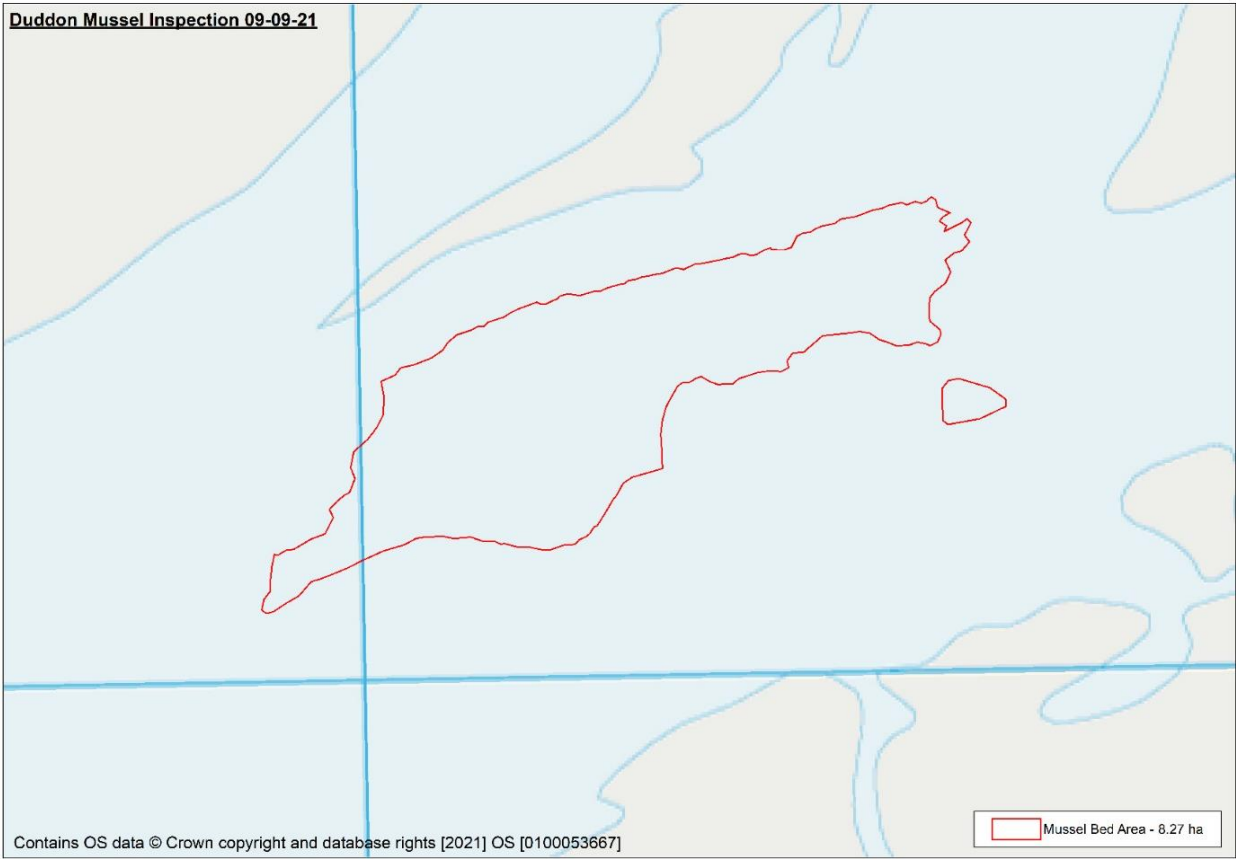


Fig 2 – Outline of bed Area for Duddon mussel inspection 09-09-21.

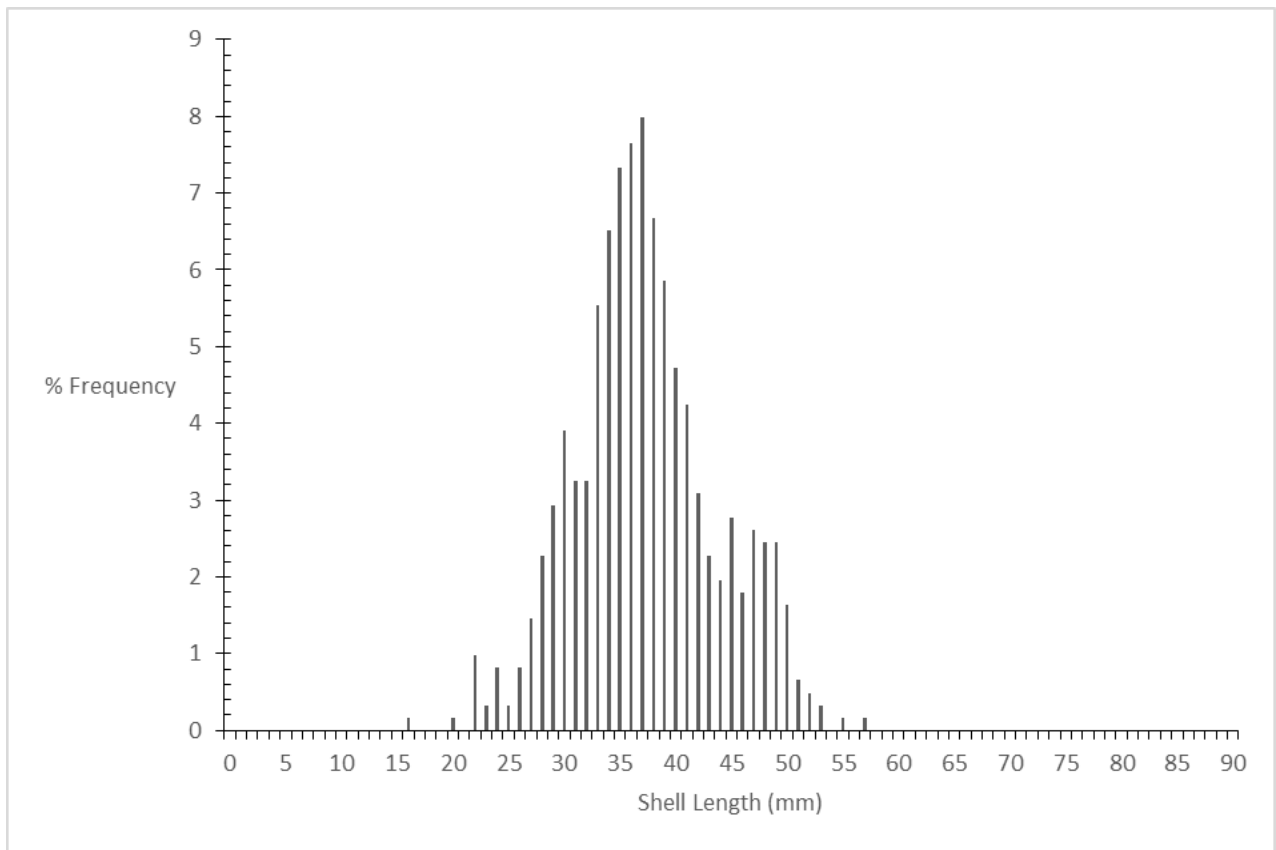


Fig 3 – Histogram showing size frequency of mussels from all samples from the Duddon 09-09-21.

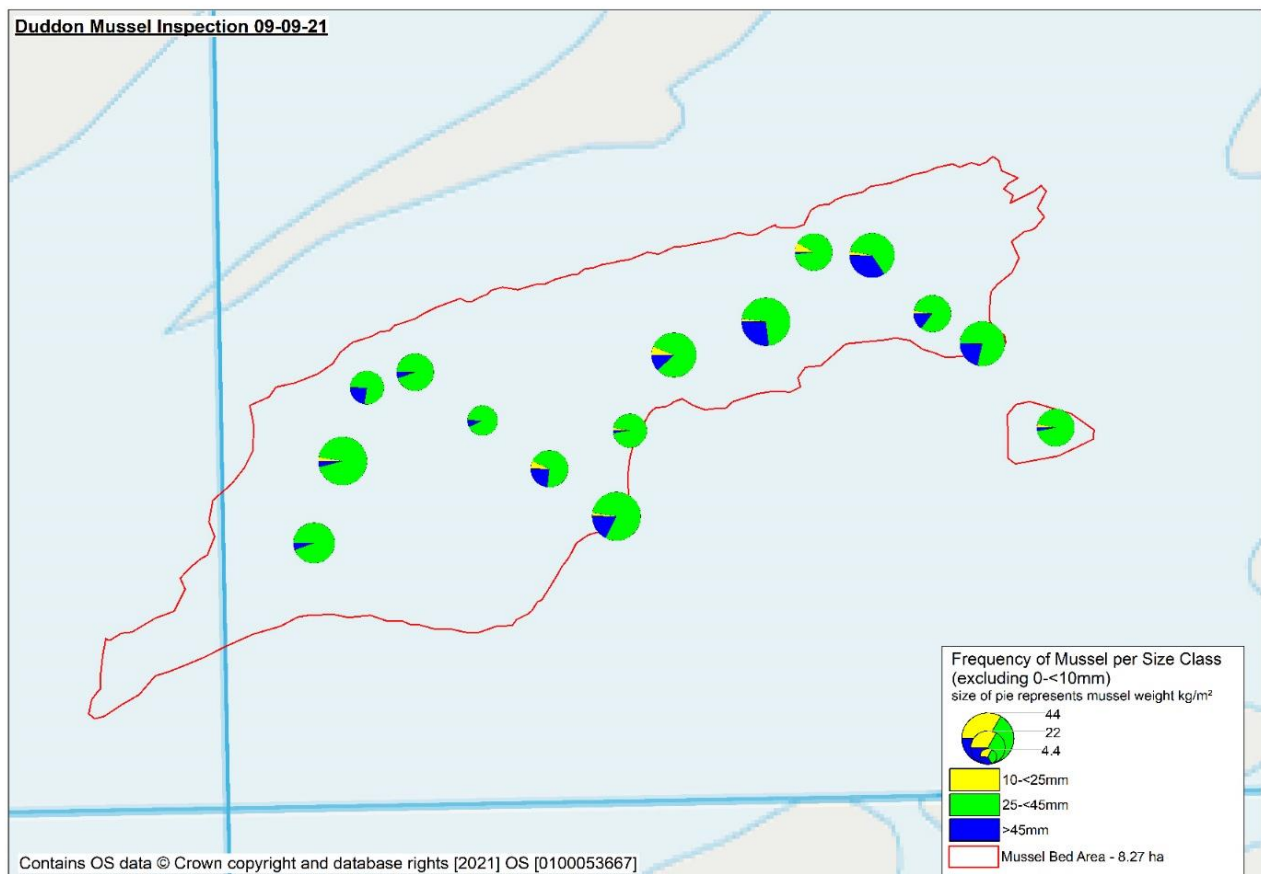


Fig 4 – Frequency of mussel by size class.

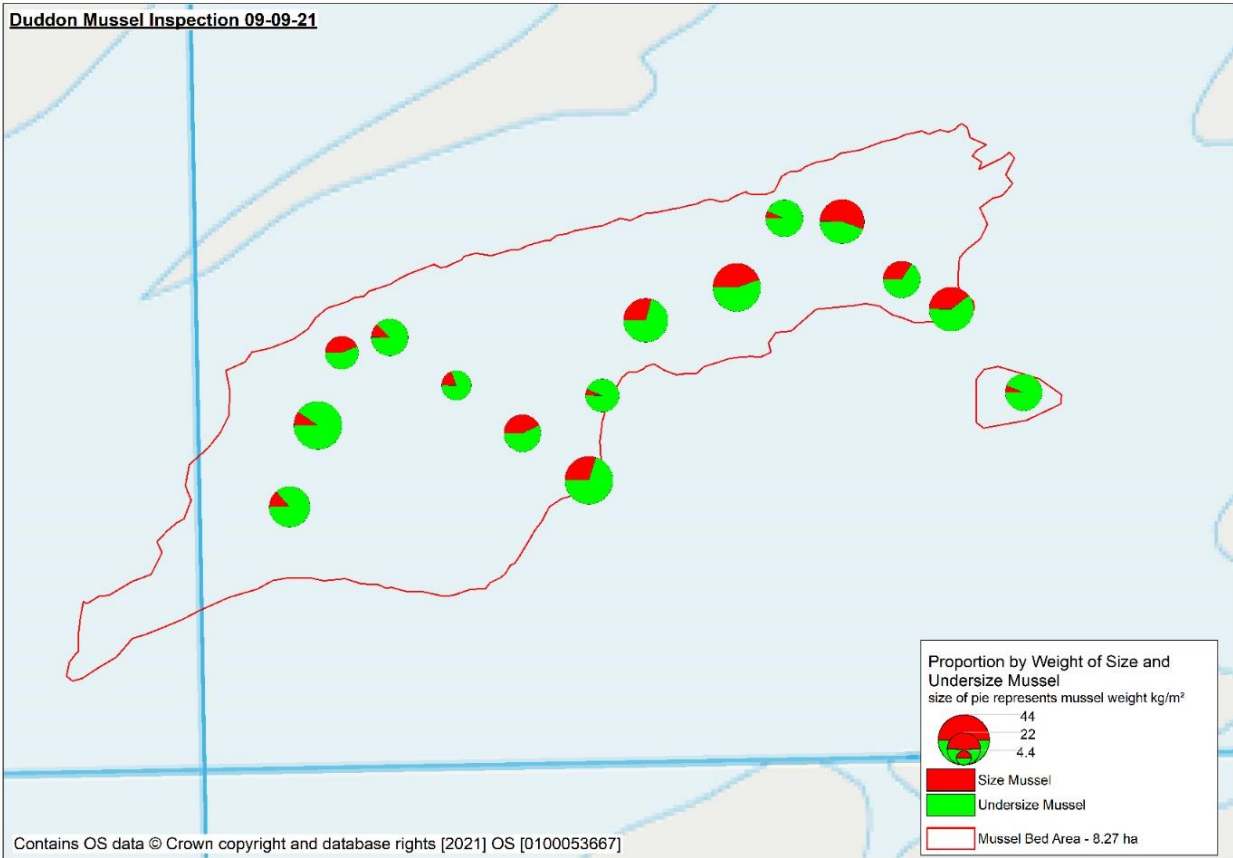


Fig 5 – Proportion of size and undersize mussel by weight kg/m².



Fig 6 – Mussel on sand substrate 09-09-21.



Fig 7 – Mussel on mussel mud 09-09-21.

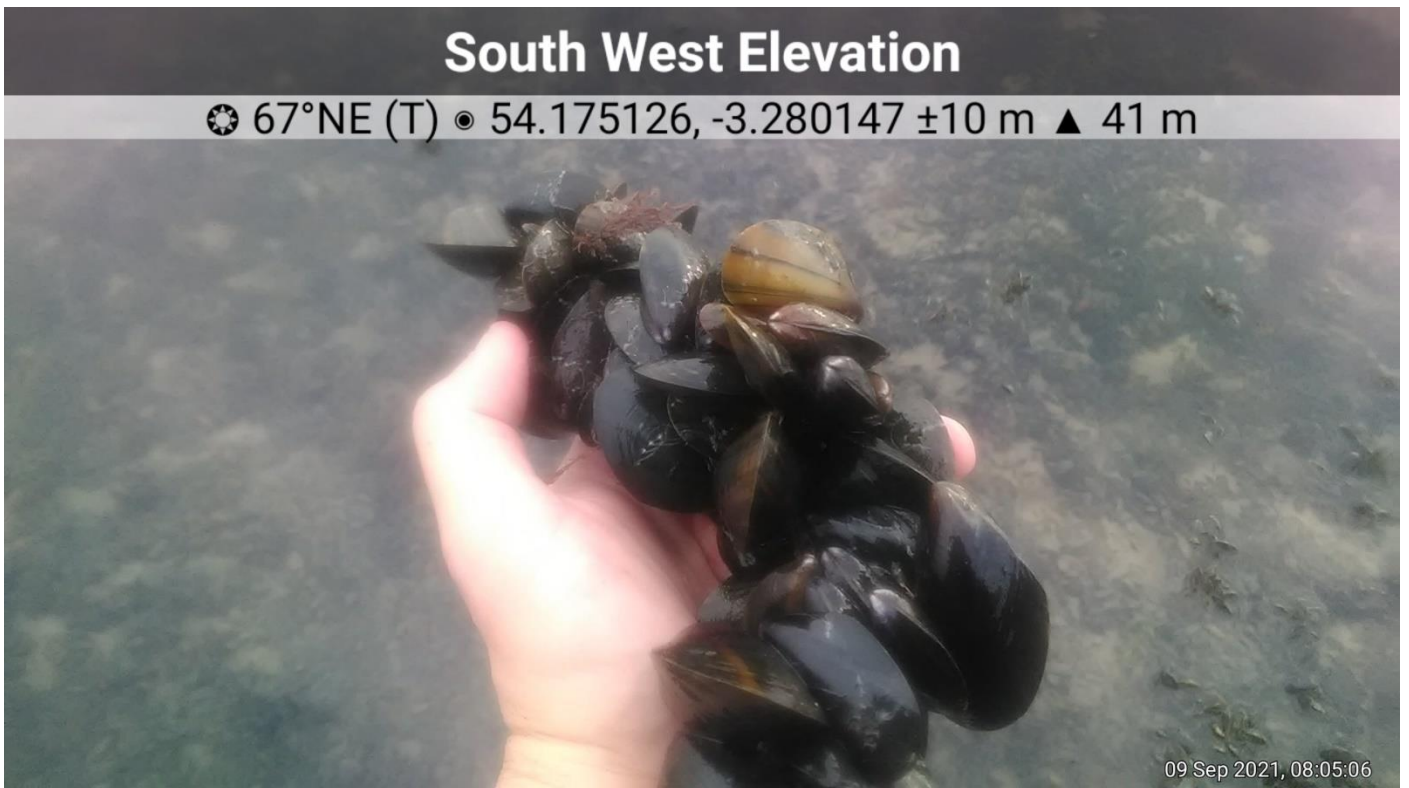


Fig 8 – 30-45mm mussel from the Duddon channel 09-09-21.



Fig 9 – Duddon Mussel Bed 09-09-21.

Fig 10 – Patchy mussel at furthest point down the channel 09-09-21.



Fig 11 – Mussel mixed in with Sand Mason on a separate island in the Duddon channel 09-09-21.

Morecambe Bay Mussels

I. South America Mussel Inspection (Quad) 24/08/21

LW: 08:00 1.0m (Liverpool tides)

A further inspection of South America was completed to assess and monitor the condition of the mussel. Figure 1 provides NWIFCA GPS track data and the estimated mussel bed taken from May (quad inspection) and June (heliflight).

The bed has changed since the last inspection, the coverage of mussel has decreased (Figure 2 and 3) and it is inconsistent across the bed, with some areas of denser mussel and other areas that are bare. Where the mussel is present it is on the higher areas of sediment. The layer of sediment under the mussel has decreased across the bed and in most of the pools of water between the remaining mussel there is exposed hard substrate (cobble). The sediment under the mussel is relatively firm and sandy, with most of the softer muddy sediment no longer present. The remaining mussel is between 15-30mm with the occasional size mussel present. Figure 6 and 7 show mussel that is hard in and relatively stable.

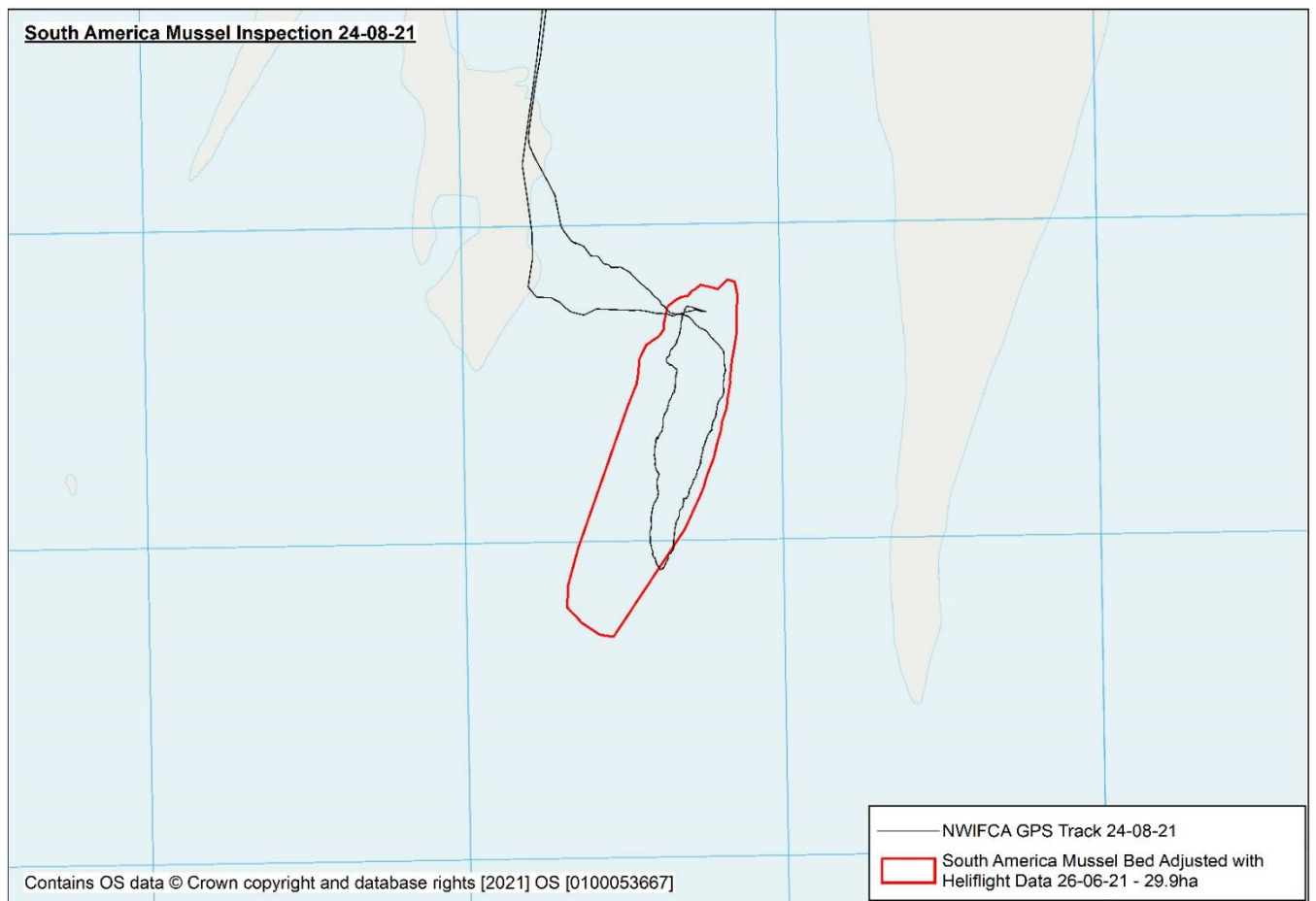


Fig 1. Overview of size of the South America from 2021 Inspections and NWIFCA Track Data



Fig 2. Overview of mussel on South America 24-08-21

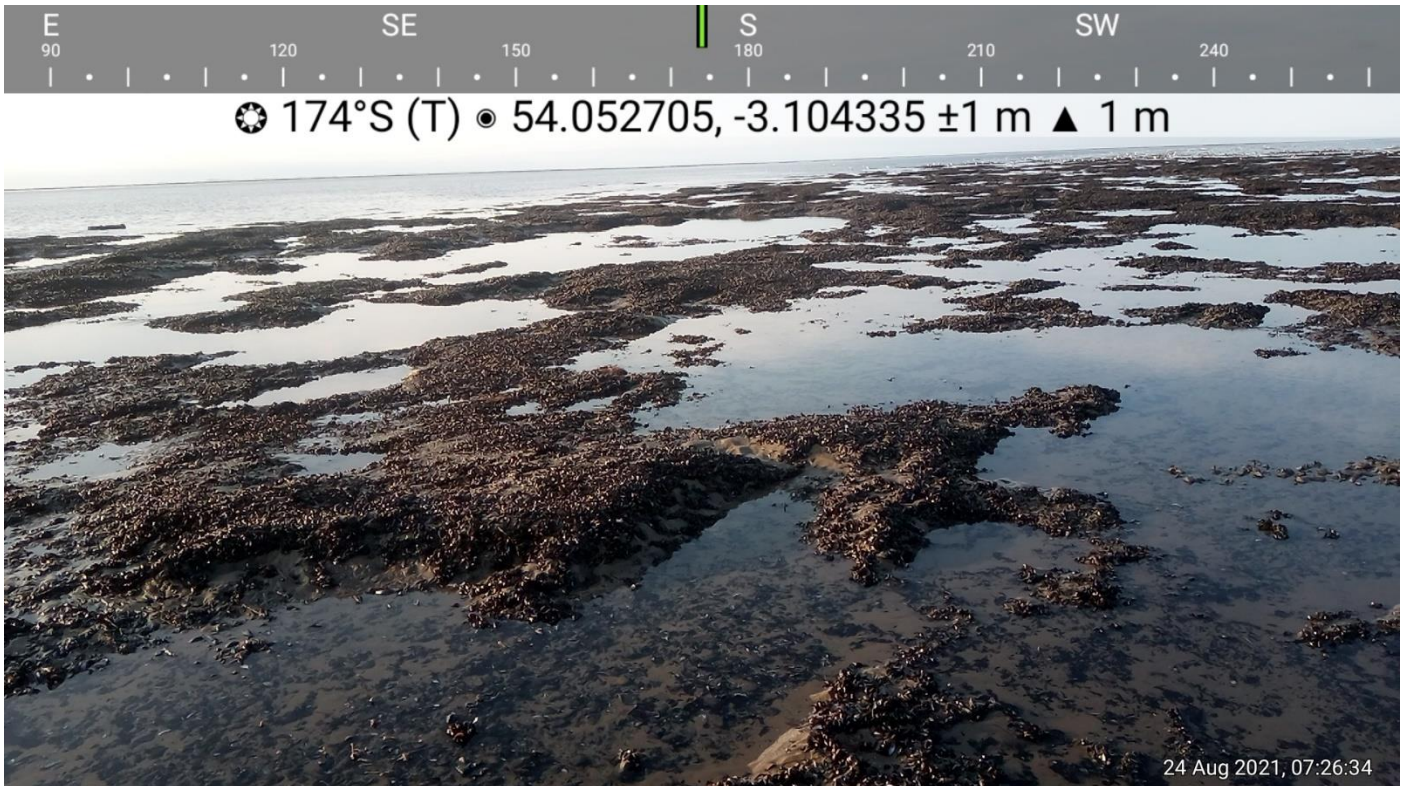


Fig 3. Overview of mussel on South America 24-08-21



Fig 4. Area of hard substrate and thin layer of sediment on South America 24-08-21

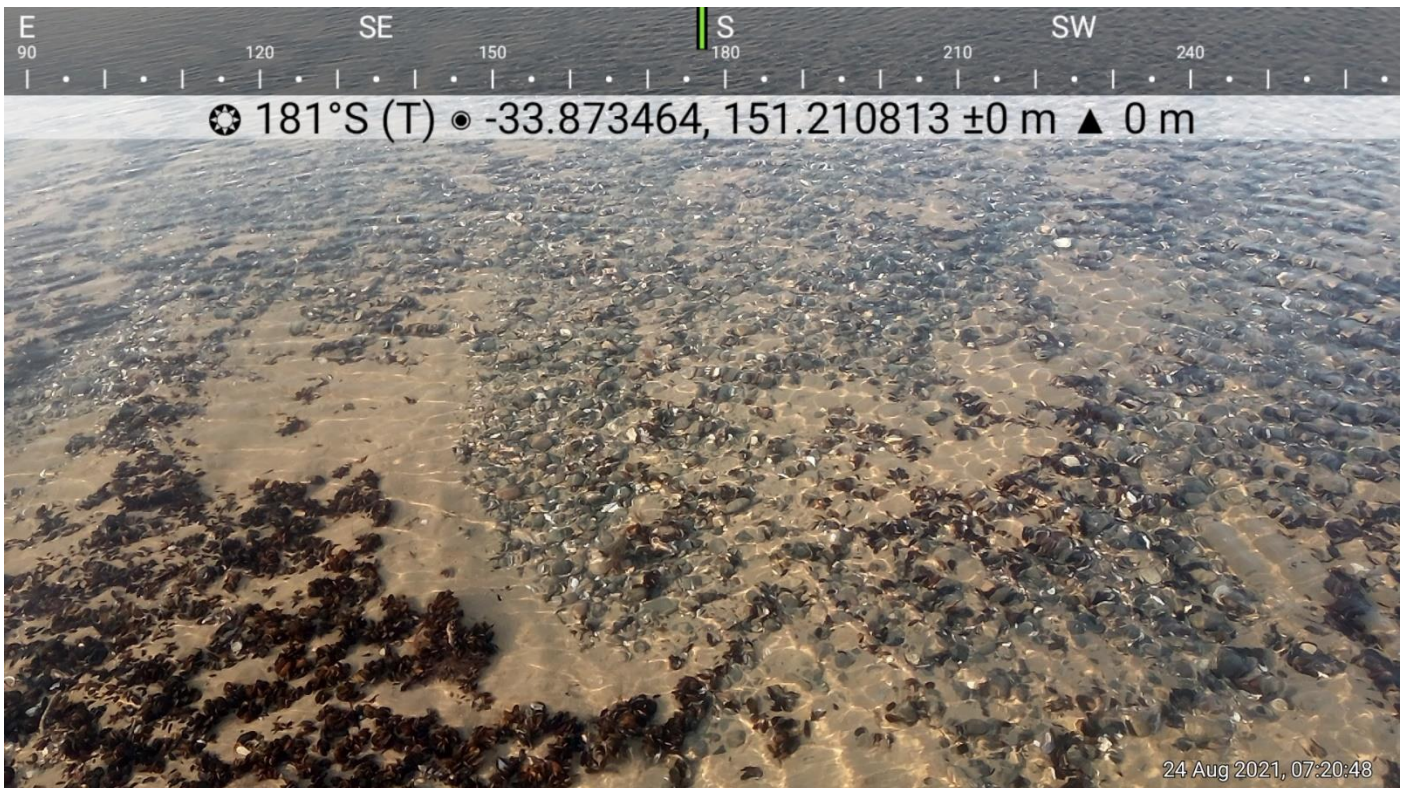


Fig 5. Area of hard substrate and thin layer of sediment on South America 24-08-21



Fig 6. Area of hard in mussel on sandy substrate on South America 24-08-21

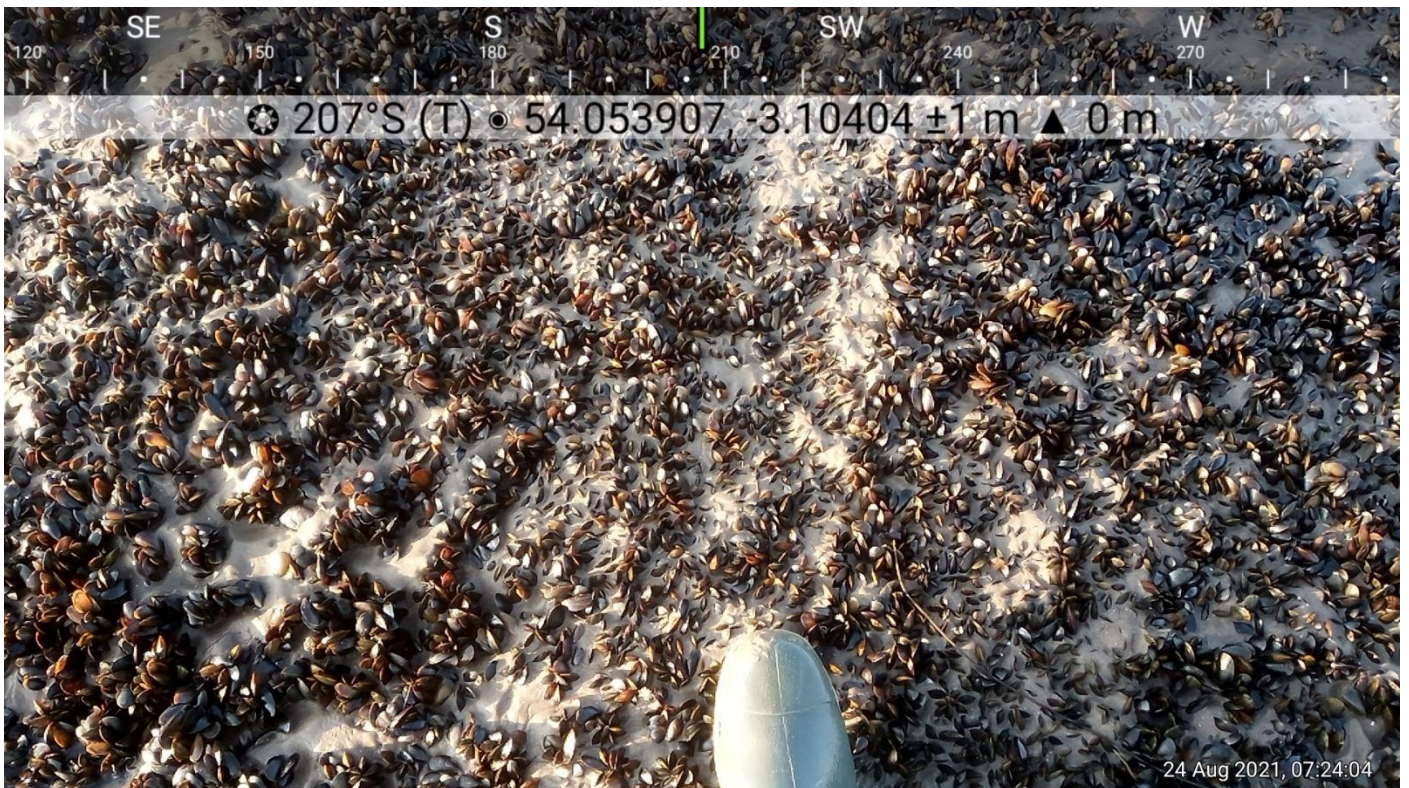


Fig 7. Area of denser mussel on South America 24-08-21

II. Heliflight Mussel Inspection, South America and Falklands 09-09-21

Low water: 08:12, 0.8m (Liverpool Tides)

Survey method: Heliflight Visual Inspection

This inspection report outlines the observations of mussel stock on South America and the Falklands obtained from an industry heliflight with NWIFCA present. The map in figure 1 contains the heliflight track, the location of the images in figures 2 to 12 and the last estimated perimeter of the mussel bed for reference.

Figure 2 to 4 provide an aerial overview of South America and are provided as additional information to the inspection carried out 24th August.

The drying area of Falklands (figures 5 to 7) showed little change from the previous inspection on 25th July when NWIFCA dried a RHIB out on the bed. The areas between the drying bed and Foulney varied in mussel density with bare areas, low density mussel and patches of dense mussel as shown in figures 8-12. Unfortunately due to the light conditions and glare on the water some of the images are of lower quality. Figures 8 and 12 show areas of significant starfish.

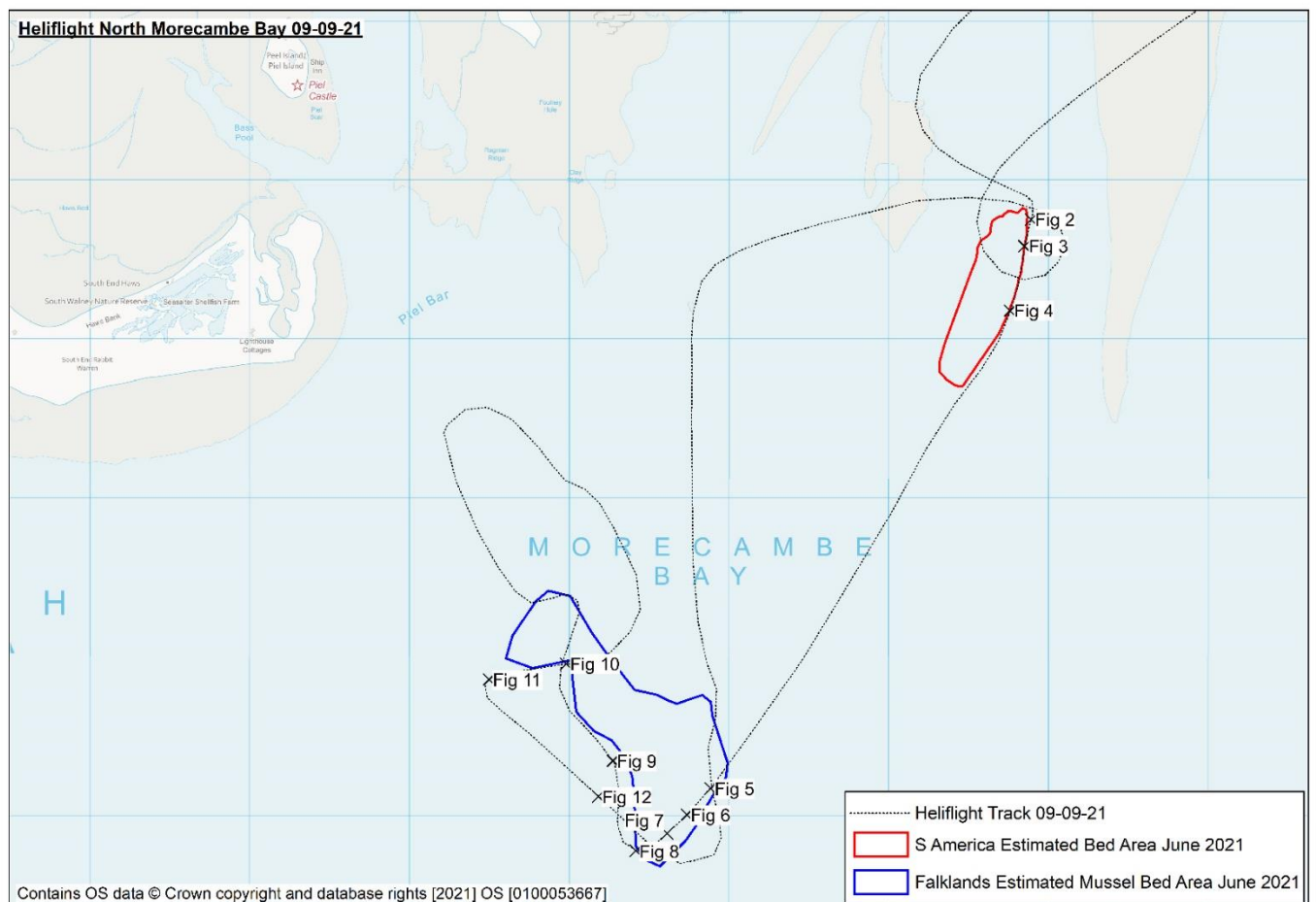


Fig 1 - Map of Heliflight, estimated mussel bed areas from June 2021 and figure locations 09-09-21

North West Elevation

☀ 143°SE (T) ● 54.055655, -3.103 ±1 m ▲ -2 m



Fig 2 – South America 09-09-21 north part of the bed

East Elevation

☀ 281°W (T) ● 54.054135, -3.1036 ±1 m ▲ -1 m



Fig 3 – South America 09-09-21 middle part of the bed

East Elevation

☀ 292°W (T) ● 54.050473, -3.104878 ±1 m ▲ 1 m



09 Sep 2021, 08:20:57

Fig 4 – South America 09-09-21, Southern part of the drying area

East Elevation

☀ 293°W (T) ● 54.023187, -3.132753 ±2 m ▲ -3 m



09 Sep 2021, 08:23:01

Fig 5 - Falklands 09-09-21, sparse mussel on leading edge of drying area

East Elevation

☉ 290°W (T) ● 54.021673, -3.134993 ±1 m ▲ -1 m



09 Sep 2021, 08:23:14

Fig 6 - Falklands 09-09-21, drying area

East Elevation

☉ 291°W (T) ● 54.020602, -3.136887 ±1 m ▲ -3 m



09 Sep 2021, 08:23:31

Fig 7 - Falklands 09-09-21, drying area

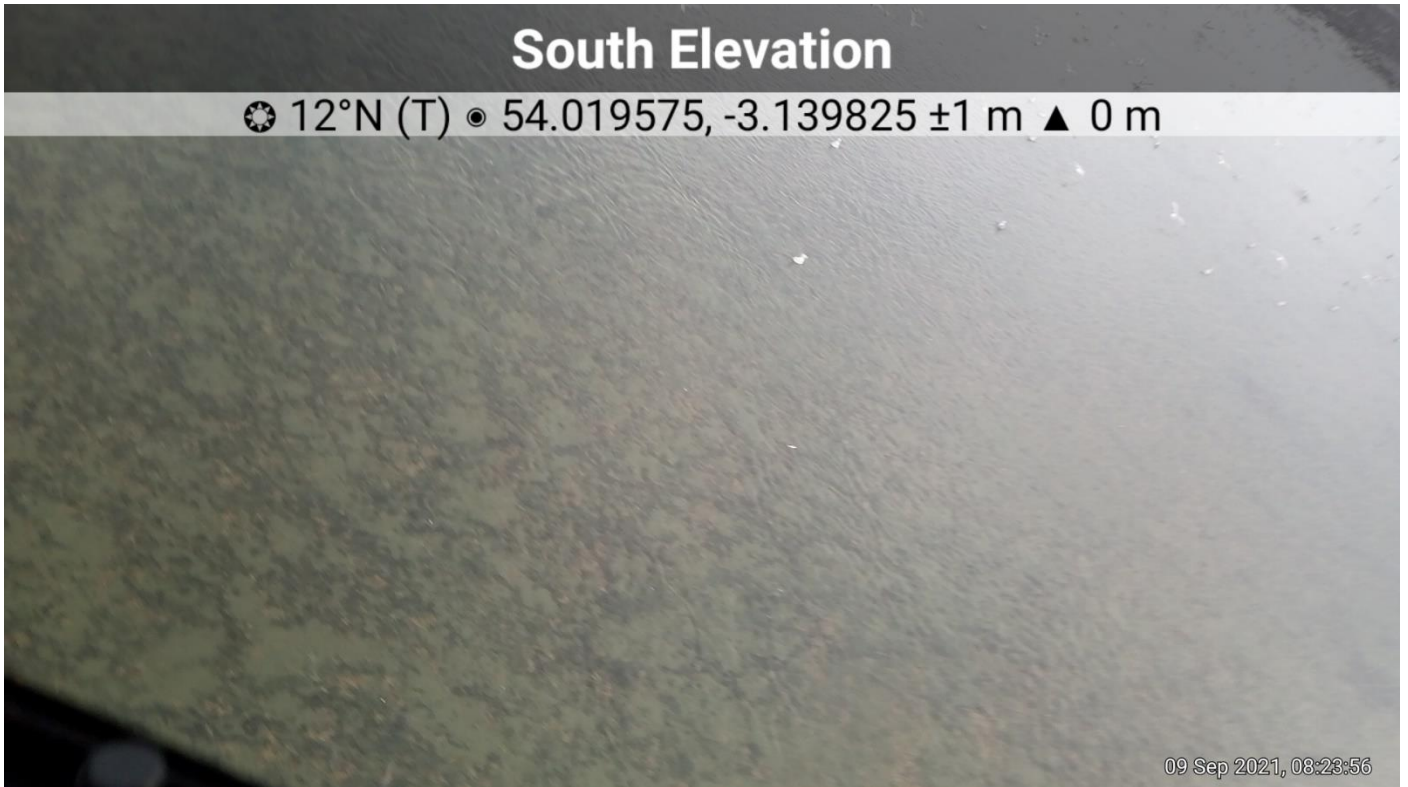


Fig 8 - Falklands 09-09-21, patchy mussel with the presence of starfish

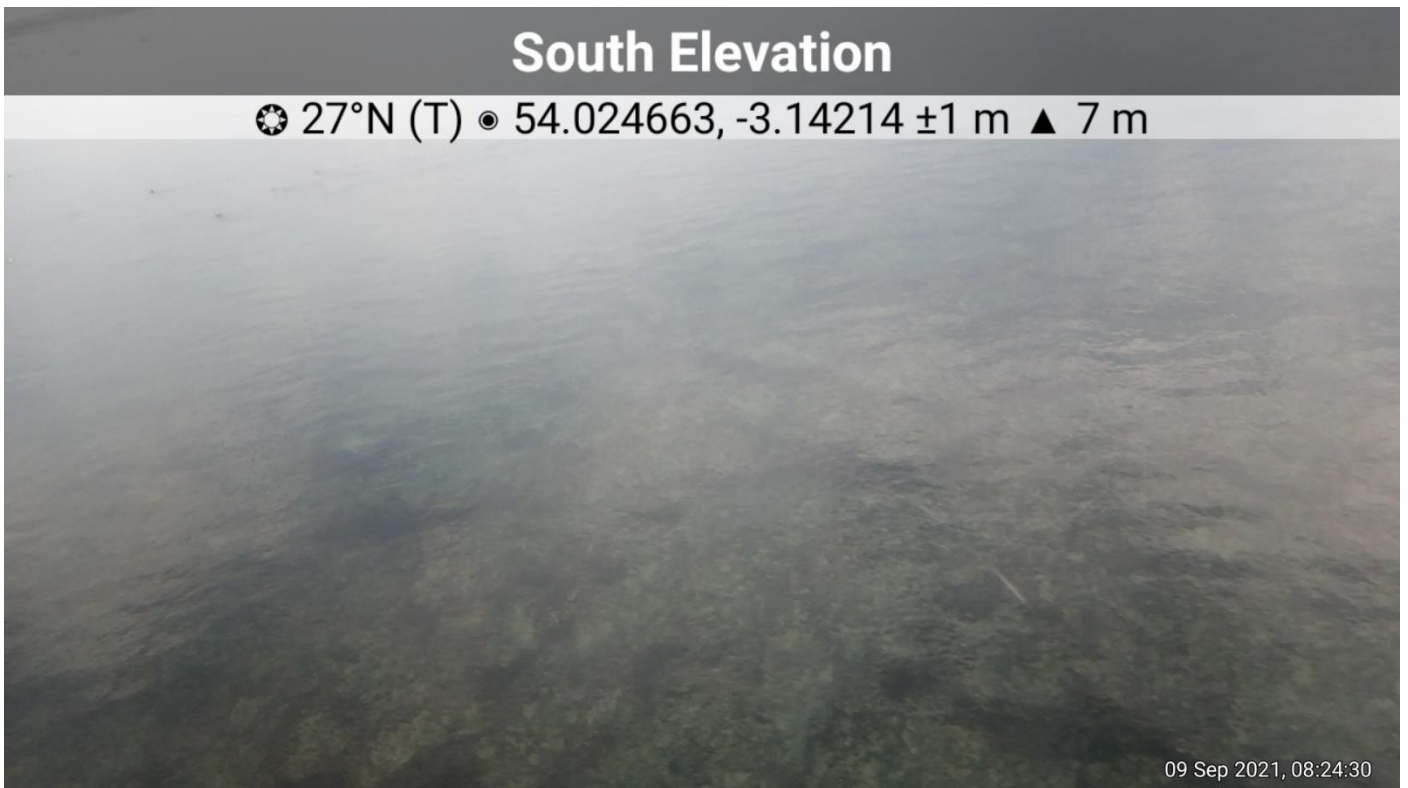


Fig 9 - Falklands 09-09-21, patchy mussel with some denser areas

South Elevation

☀ 16°N (T) ● 54.03011, -3.146753 ±1 m ▲ 15 m



09 Sep 2021, 08:29:35

Fig 10 - Falklands 09-09-21, mussel at varying densities

North Elevation

☀ 184°S (T) ● 54.022613, -3.143492 ±1 m ▲ 2 m



09 Sep 2021, 08:30:51

Fig 11 - Falklands 09-09-21

North Elevation

☉ 192°S (T) ● 54.020853, -3.140055 ±1 m ▲ 5 m



Fig 12 - Falklands 09-09-21, mussel with significant numbers starfish present

NWIFCA, 15th October 2021