

NORTH WESTERN INSHORE FISHERIES AND CONSERVATION AUTHORITY

SIZE MUSSEL REMOVAL FROM HEYSHAM FLAT MUSSEL SKEAR APPROPRIATE ASSESSMENT DECEMBER 2016

Background

- 1.1 Heysham Flat skear is subject to regular foot inspections by NWIFCA Science Officers due to its locality to the NWIFCA office, the relative ease of access, subject to tides, and the dual responsibilities of managing the mussel fishery and protection of the *Sabellaria alveolata* reef, an Annex 1 habitat qualifying feature of the Morecambe Bay and Duddon Estuary European Marine Site.

During 2016, inspections and surveys have been undertaken on:
11th March (0.4m tide), 5th May (0.5m tide), 23rd May (1.5m tide), 6th June (0.6m tide), 19th September (0.5m tide).

The area in question is shown in Figure 1 below.

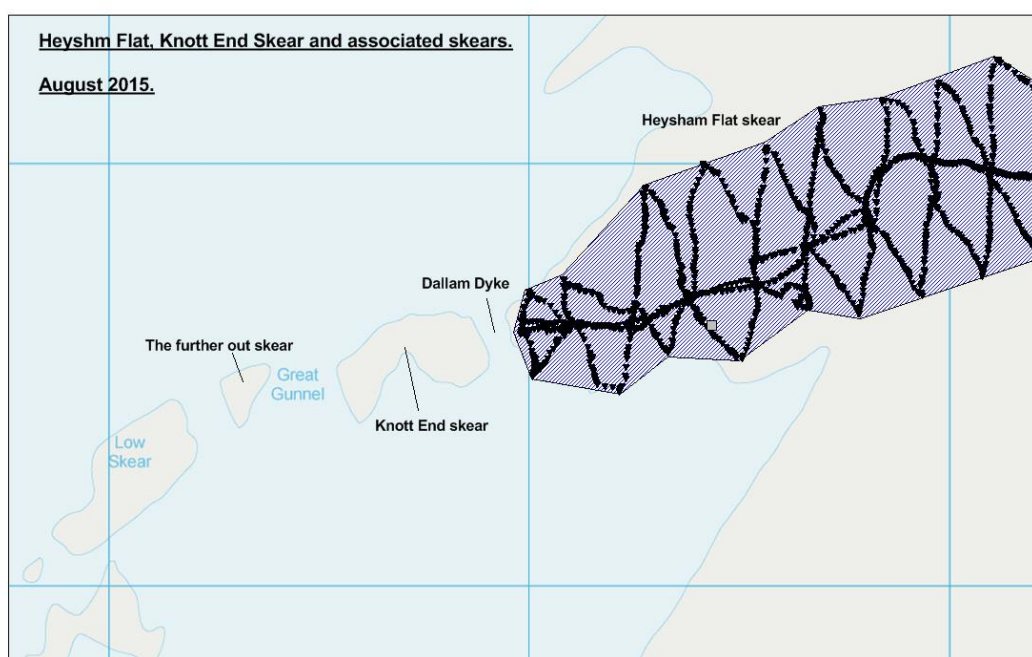


Fig. 1. Illustrative map of Heysham Flat and associated skears 2015.

- 1.2 The early inspections revealed that in March the main skear was devoid of any mussel other than fresh spat (pin prick size). All the bottom skears had size mussel on, of up to 65-70mm length. In May a vast seed mussel settlement had occurred from high up on the skear to the bottom of Knott End skear, covering the *Sabellaria alveolata* reef area which is in really bad condition, having been buried under mussel and mussel mud almost continuously for two years. This is the worst the NWIFCA Senior Scientist has seen it since her visits began in 2008 (pers comm. Knott. M). The only vaguely healthy-looking area of reef was very small and on the northern extent of the skear next to the channel, although there was mussel spat all around it on other clumps and it may not survive smothering.

There was an expanse of bare cobble and stone on Knott End skear. The best area for seed was nearest to Dallam Dyke, while the bottom end held some size mussel around 55mm. Some samples were taken to check for pea crab. None were found in any of

samples taken, which had good meat content in some, looked in spawning condition in others, and some looked spent.

Officers did not attempt to get over to Out Skears due to tidal constraints. However gulls could be seen on them and they looked black so it could be assumed that they still held size mussel. A small flock of dunlins was seen feeding on the sand, and a number of small green polychaetes on the mud around the mussels.

- 1.3 A full survey was carried out on 23rd May when the main skear was surveyed by zig zag transects from a centre line defined by GPS. Fifty paces were taken between quadrats, and percentage cover of the two main mussel types per station recorded (Fig. 2).

The main mussel type was spat higher up on the shore, transitioning into seed (only just 10mm) lower down where the skear remains under water for longer (Fig. 3). As the tide ebbed off the lower end of the skear, gulls were seen feeding on the mussels on the bottom skears across Dallam Dyke, along with some oystercatchers and knot observed in the area.

There was very little *Sabellaria alveolata*; some very small patches were alive, though much was covered in mussel mud and spat/seed (Fig. 4).

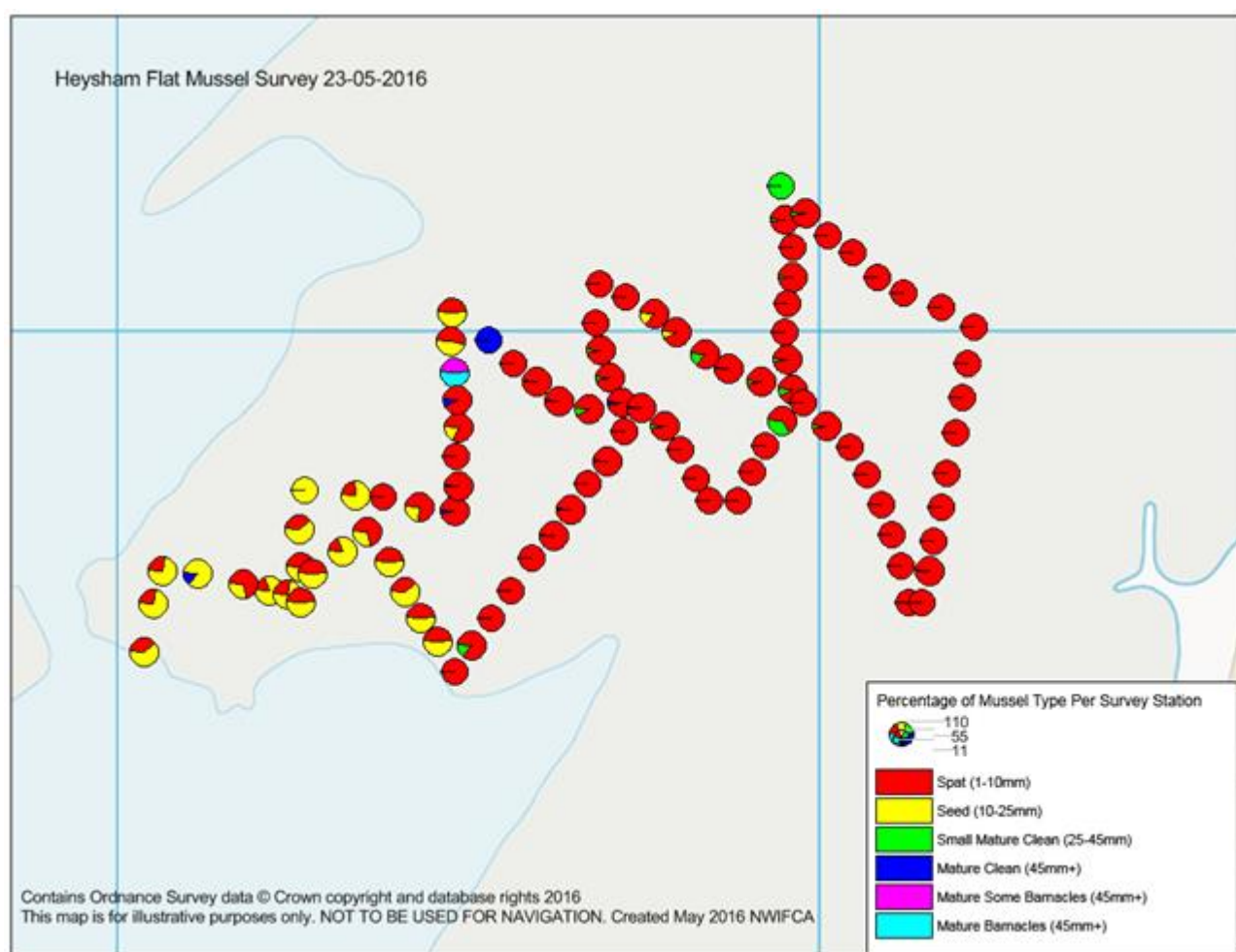


Fig. 2. Thematic map of transect and percentage cover mussel survey. Heysham Flat. 23rd May 2016.



Fig. 3. Dense mussel seed cover. Heysham Flat. 23-05-16



Fig. 4. Sparse *Sabellaria alveolata* covered in mussel seed. Heysham Flat. 23-05-16

- 1.4 There has been a long history of the NWIFCA (and previously the NW&NWSFC) authorising a hand-gathered seed mussel fishery on Heysham Flat skear. Management has shown that when mussels in concentrated aggregations such as these put down mussel mud beds in this condition, unless in very sheltered areas, will quickly show catastrophic losses through erosion.
- 1.5 NWIFCA Officers have records of the spatfall and survival of mussels in this area in recent years. This bed has been classed as an ephemeral bed (Dare. 1976). Annual spatfalls have been regular and heavy over the eastern half of Heysham Flat. Records show that mortality of the first-year mussels has generally been very high. In many years, virtually the entire stock of mussels has been lost in the autumn and winter of their first year. Even when a proportion of the stock has survived this winter period, the relatively high tidal level has resulted in poor growth and continued high mortality.
- 1.6 The past two years has seen a period of dramatic change at Heysham Flat and other areas of the Bay. The sand that had previously covered the bottom skears washed off revealing bare substrate on which mussels settled. Although the mussel mud under on these skears was over a metre deep and very soft, not all of it washed out as predicted, and some of the stock remained and grew on to size, as it did on the *Sabellaria alveolata* reef towards the bottom end of the main skear. This was all subsequently buried under a mass settlement in spring 2015 and the larger mussel was killed off. A seed mussel hand-gathering fishery was authorised in 2015, with an exclusion zone around the main reef area as has been practiced over most years in recent history, and 700 tonnes were reported as having been removed.
- 1.7 Over the winter 2015-16 the mussel on the main skear and parts of Knott End skear were washed out, with some 2014 and 2015 mussel persisting on the outer skears (only accessible on the biggest of tides for short periods of time). The spring settlement then covered the majority of the main skear and parts of Knott End skear.
- 1.8 It has therefore become difficult to predict which areas and to what extent will erode and scour out during the autumn and winter. The recent monitoring provides evidence that what mussel does persist is on the lower reaches of the skears.
- 1.9 The mussel that grows to size (>45mm) supports a small number of hand-gatherers (Byelaw 3 permit holders) who prosecute the fishery on the large spring tides throughout the autumn and winter months when the mussel persists.
- 2.0 There is always a small window of opportunity for opening a seed mussel fishery once the mussel and mud has reached a very loose stage and prior to it getting scoured out by storms, which due to climatic changes are occurring earlier in the year than the previous and expected autumn storms. A seed mussel hand-gathered fishery was authorised under derogation from the minimum landing size and opened on 17th July 2016, with an exclusion zone to protect the *Sabellaria alveolata* main reef area and live colonies.
- 2.1 To date 97,225kg have been harvested by a maximum of eleven Byelaw 3 permit holders on any one tide.
- 2.2 A foot inspection on 19th September 2016 provided information on the extent and size of the mussel on the main skear and on the first half of Knott End skear, the level of scouring and a rapid assessment of the current state of the main *Sabellaria alveolata* reef. Mussel extended all across the main skear from upper reaches, where it was of around 10mm sitting on a layer of thick loose mud, to Dallam Dyke where again it was very loose and of around 35mm length. There were two bands running across the centre of the main skear –

one where the mussel was much harder in to the mud and not readily fishable, and another where a swathe of scouring was evident (Fig. 4a). A quick visit to the middle of Knott End skear revealed more undersize mussel sitting on loose mud there (Fig. 4b). No attempt was made to reach the lower extent of Knott End skear or the other skears due to tidal constraints. However other than the middle of Knott End skear, which from a distance appeared devoid of mussel and consisting of a bare cobble and pebble substrate, the remaining areas looked very black suggesting a large volume of mussel, which due to its position and increased immersion times, is likely to be of a larger size, possibly approaching minimum landings size of 45mm.



Fig. 4a. Evidence of scour removing seed mussel from the centre of Heysham Flat skear. 19-09-16



Fig. 4b. Knott End skear – band of loose mussel around 35mm. 19-09-16

Extent and Condition of the *Sabellaria alveolata* reef at Heysham Flat:

There is evidence of a cyclical competitive relationship occurring between the *Sabellaria alveolata* and the mussel on this skear (Knott. 2009). An extensive and healthy looking worm reef was totally inundated with mussel settlement and a build-up of over 1m deep mussel mud during 2008, smothering the worm tubes and causing the reef to crack and crumble under the weight of mud. The NW&NWSFC authorised a hand-gathering fishery for seed mussel that autumn. Following winter storms, the mussel was washed out and the reef looked almost totally destroyed.

A time series of surveys into the distribution and condition of the reef were started in 2011 in partnership with Cumbria Wildlife Trust, which have shown the variability but robustness of the reef. The annual reports (2011-15) can be found on the NWIFCA and Wildlife Trust websites:

[http://www.nw-ifca.gov.uk/contents/images/File/2013%20Sabellaria%20Report_SEgerton%20\(3\).pdf](http://www.nw-ifca.gov.uk/contents/images/File/2013%20Sabellaria%20Report_SEgerton%20(3).pdf)

and

http://www.cumbriawildlifetrust.org.uk/sites/default/files/distribution_mapping_and_health_assessment_of_honeycomb_worm_sabellaria_alveolata_reefs_on_heysham_flat_lancashire_-_vicki_foster_2015.pdf

In summary, inspections and surveys carried out by the NWIFCA in 2011 showed that in the period between 16th June and 30th August 2011 the reef grew from being patchy and low lying, to fully formed large hummocks with evidence of fresh settlement. Interestingly that year, mussel recruitment was relatively slight.

Inspections and surveys during 2012 show that the reef was in a healthy state, having been subjected to a mosaic of mussel settlement, and showing evidence of new worm settlement.

Inspections in spring of 2013 showed that the worm colonies were spreading across the skear and in a very healthy state. However early summer saw at least one spatfall of mussel covering the reef and smaller colony outcrops over the whole skear. The August survey revealed that the reef was covered in mussel and mussel mud, other than the peripheral areas on the western extent where some reef remained intact. Past observations have shown that this level of survival of the *Sabellaria alveolata* is generally sufficient to repopulate the reef again once the mussel mud has been washed off.

Inspections in spring 2014 showed that the reef was again in a healthy state, now colonising areas to the north of the skear that had previously been large tracts of old broken mussel shell. There had been a mussel spat settlement on the skear, and the July survey showed the *Sabellaria alveolata* was now totally covered in mussel and mussel mud. This cycle of events again confirms the competitive relationship between the mussels and the worms on Heysham Flat skear – that in summer and autumn the worms can be virtually wipe out by the mussel and mussel mud, but during winter and spring they repopulate the skear to a healthy state.

Details are given above of the observed state of the skear during 2015 and up to July 2016.

During the foot inspection on 19th September 2016 it was evident that substantial areas of mussel had been lost from the *Sabellaria alveolata*, particularly on the main reef area and to the south of this (Fig. 4c). The skear usually sits in an elevated position above the surrounding sand: however the southern edge is now sitting level with the sand in that vicinity. It was not possible to assess whether the worms were live or not. However

research evidence (Wilson. 1968) suggests and conservation advice provided by Natural England enforces that the tubes from old formations provide the chemical cues (understood to be old adult cement) for new settlement. Wilson (1974) also asserted that the presence of a single worm could lead to the establishment or rebuilding of a colony.



Fig. 4c. Substantial areas of mussel has been removed from the *Sabellaria alveolata* on Heysham Flat skear. 19-09-16

Assessment of Mussel Biomass

Although the NWIFCA utilises survey methodologies such as the 'Dutch Wand' methodology, at certain times to assess mussel biomass, enormous questions remain over the validity of such data for more than a few days after the survey time in an area such as Morecambe Bay, and its application to management decisions over mussel resource.

Mussel can and does recruit to skears in the Bay (Fig. 5) in extraordinarily dense aggregations, and depending on tidal height and period of inundation, as well as sea temperature and chlorophyll levels, can put on growth exceedingly fast, thus increasing biomass equally rapidly. On the contrary, the highly dynamic environment and the process of mussel putting down deep levels of soft mud in pseudofaeces, can also lead to rapid erosion and wash out so that biomass can be diminished overnight. Dense recruitment also results in high levels of competition for food and space, and the act of fishing can have a 'thinning' effect which can actually lead to an increase in biomass.

The resource requirement on the NWIFCA to provide biomass data in which a satisfactory level of confidence could be placed is not realistic or achievable in a constantly changing environment like the Bay.

Other mussel beds within Morecambe Bay

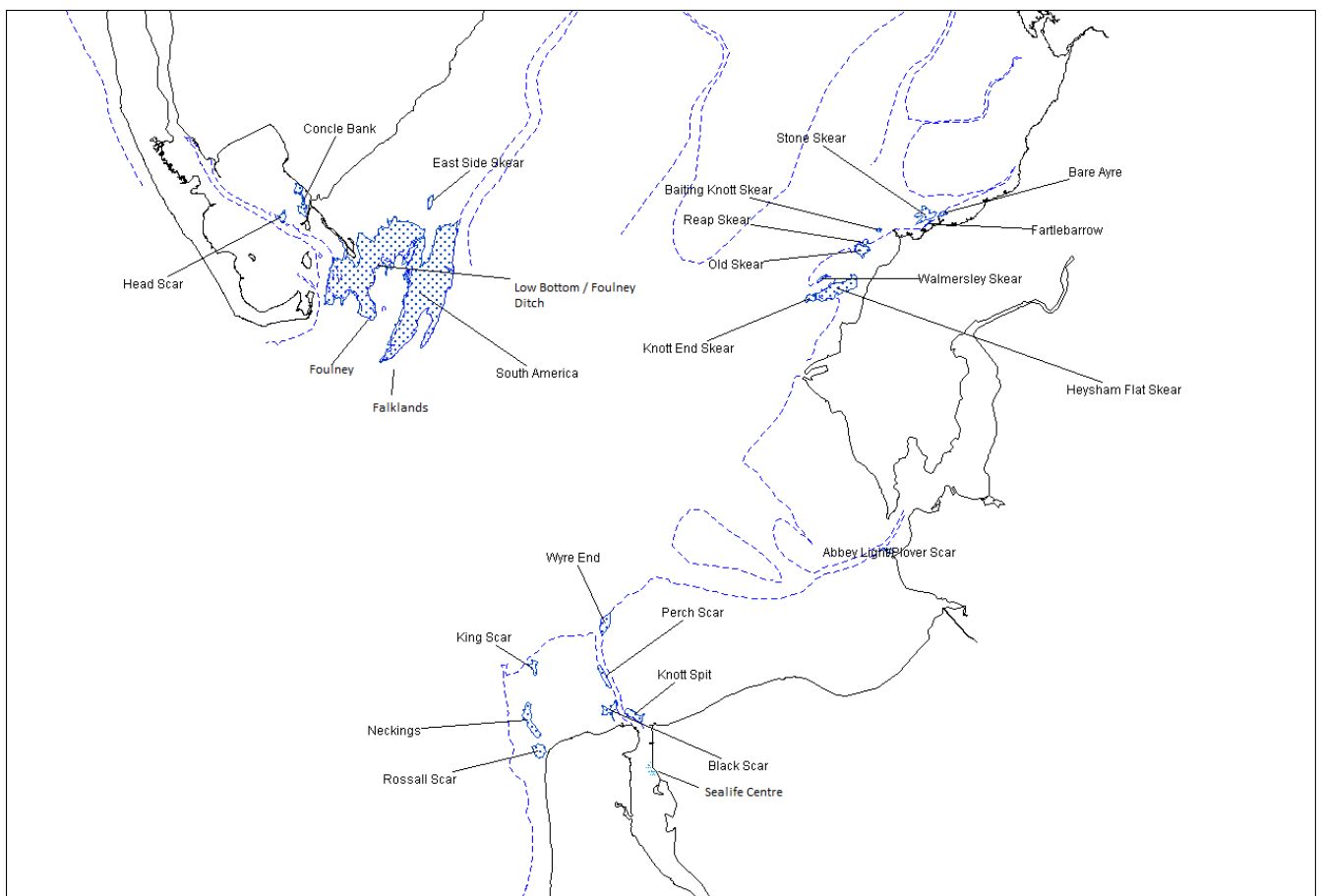


Fig. 5. Illustration of the position of mussel beds in Morecambe Bay and Fleetwood.

Duddon Estuary – Hardacre:

A survey was due to be carried out on the mussel bed at Hardacre on 7th June 2016 (0.6m tide). IFCOs had reported a spat settlement there earlier in the spring. However when officers arrived they found the sandbanks had shifted and the cobble skears holding mussel were now covered over. Subsequently there is no mussel resource of any note in the Duddon in 2016.

North Morecambe Bay – there are a number of mussel beds in North Morecambe Bay. The map in Figure 6 illustrates their positions in relation to one another.

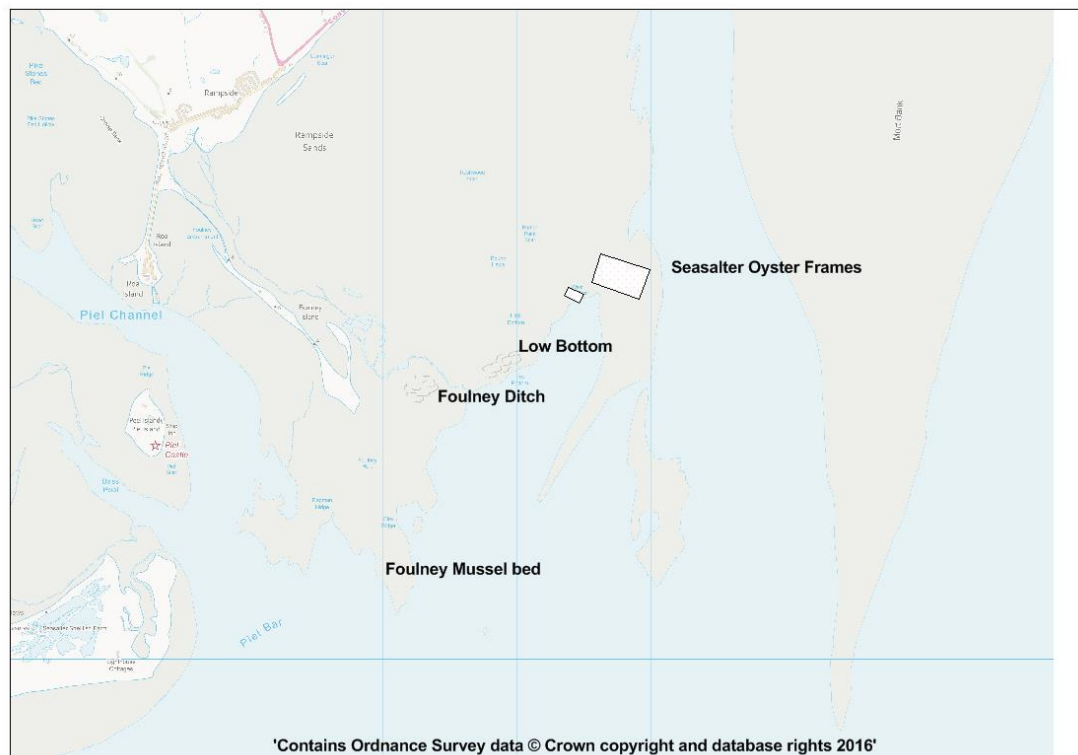


Fig.6. Illustration of position of mussel beds and oyster frames in North Morecambe Bay.

Foulney:

A survey was carried out on 10th May 2016 (0.8m tide) with transects taken across the survey area, with 0.5m² quadrat every 50m recording percentage of mussel type.

The target area of the survey was the main area on Foulney. The area surveyed has a covering of spat which was seen in most survey stations. At the bottom of Foulney (known as the Island) there is an area of mature clean mussel (45+mm) which has a covering of 2016 settlement. Higher up the main skewer the mussel is smaller and undersize, and shown on the map as small mature clean which has a settlement of this year's spat on it. Moving to the top of the skewer the mussel becomes much more mixed and barnacled mussel starts to appear (Fig. 7).

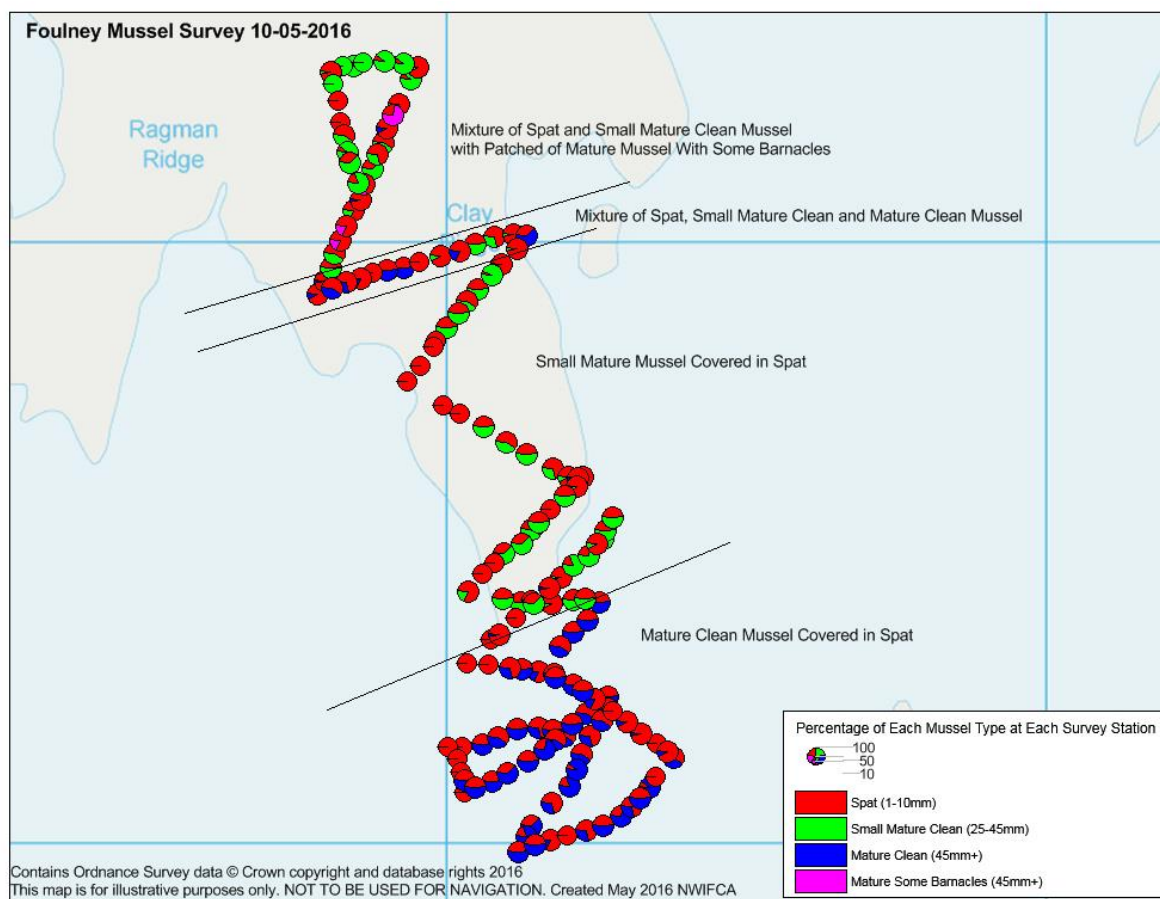


Fig. 7. Thematic map of Foulney Mussel Survey results (10th May 2016)

Foulney has been inspected and surveyed for many years by the NW&NWSFC and NWIFCA. The main skew area has stayed relatively constant and it is reasonable to make an estimate of the area covered in mussel from previous years mapping as being around 41ha holding around 5000 tonnes of mussel.

Latest evidence on 17th September is that starfish are heavily preying on the mussel on the bottom end of Foulney.

Foulney Ditch:

A survey was carried out on the Foulney Ditch area on 5th June 2016 (0.8m tide) with transects taken across the survey area, with 0.5m² quadrat every 50m recording percentage of mussel type.

The survey target area was between the 'Ditch' (see Fig. 6) and the previously surveyed area on Foulney (surveyed 10-05-16). The aim was to find the area of stunted mussels which is reported never to reach size before the next years spat covering. The mussel below MLS is reported to get choked out by the new settlement.

The surveyed area has a good covering of newly settled spat which ranged from 2-8mm with the larger spat nearer the low water mark and near to the channel known as the 'Ditch'. There are clear zones with the mussel higher up the shore being older and covered in barnacles (Fig. 8), moving to mussel with a few barnacles mid shore (Fig. 9), to mature clean and small mature clean (40mm size class) at the low water mark. At the bottom of the Ditch there was an area of clean mussel which was a mixture of between 40 and 50 mm. Both of the latter areas were covered in 2016 spat (Fig. 10).



Fig.8. Old barnacled mussel forming a large part of the bed on the upper reaches of the 'Ditch' area at Foulney. (5th June 2016).



Fig. 9. Mature barnacled mussel with spat covering on the mid shore of the 'Ditch' area at Foulney. (5th June 2016).

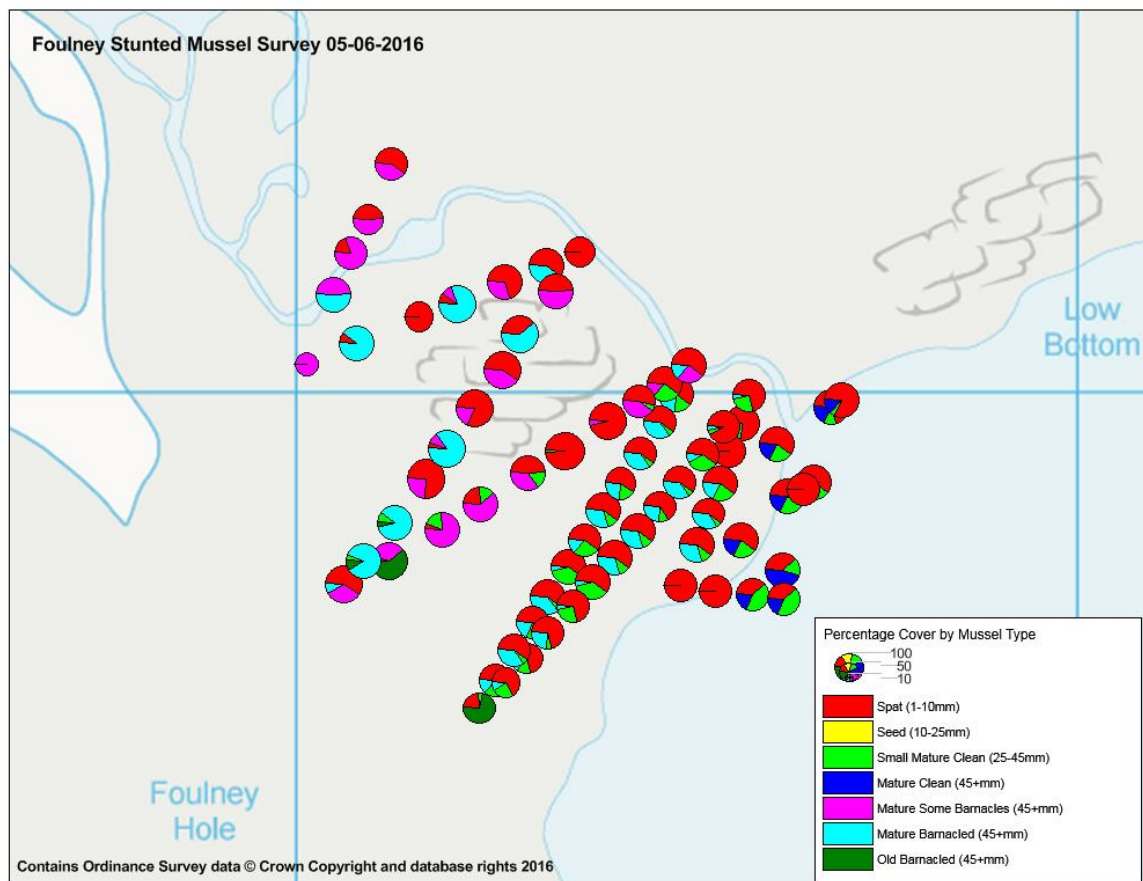


Fig.10. Thematic map of Foulney Ditch mussel survey results (5th June 2016).

Low Bottom – area between Foulney Ditch and the Seasalter Oyster Farm:

An inspection was carried out on 6th May 2016 (0.8m tide) when GPS positions and the type of mussel found at each location was recorded. From this rough polygons were mapped recording the areas of change in mussel types. A large part of the intertidal area had received a very dense covering of 2016 mussel, estimated at 1.2 km² which is growing on at different rates. An indication of the size of spat was given. It was seen that the larger spat was closer to the low water mark (Fig.11).

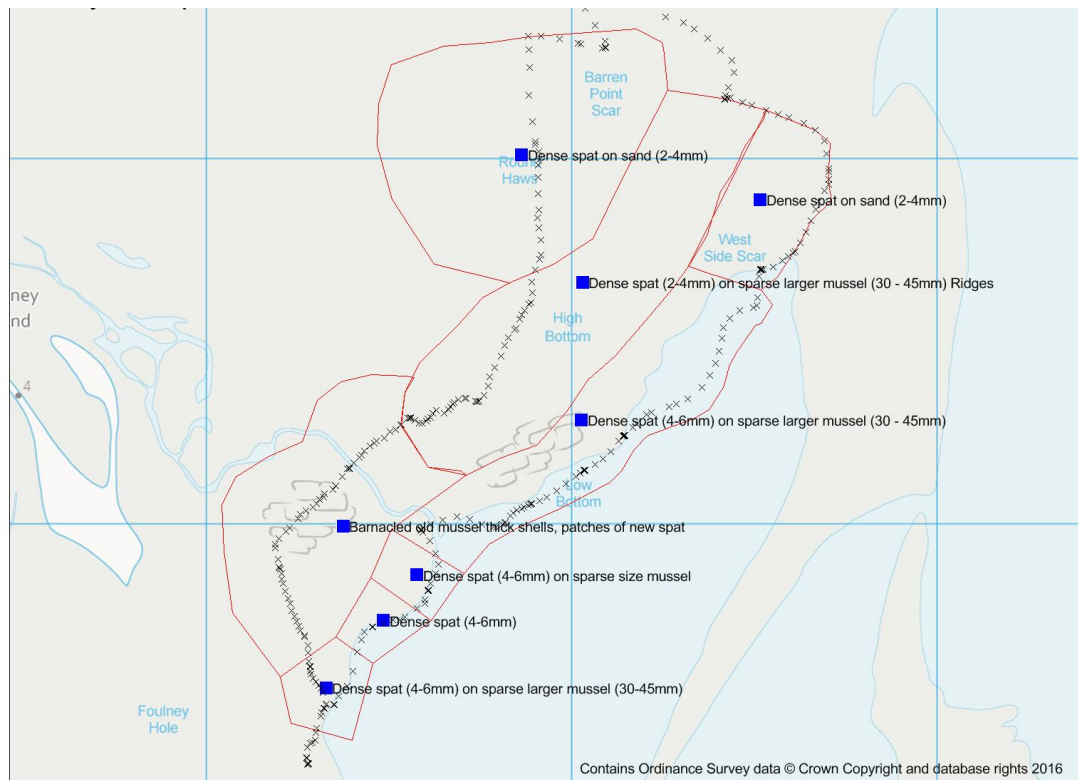


Fig. 11. Mapping to show area of mussel settlement and different size zones between Foulney Ditch and the oyster frames. 6th May 2016.

Fleetwood Beds:

the mussel beds at Fleetwood were inspected on 6th June 2016 (0.6m tide). Positions of these beds are shown in Figure 12. The mussel resource on each bed is described below:

GPS tracks were recorded of the edge of the mussel beds (Black Scar, Perch Scar, Kings Scar and Neckings) and notes were taken to describe the cover and size of the mussel. This information was made into maps using MapInfo: see figures below for detail of the mussel beds. It was not possible to map Rossall Scar as two ATVs got stuck in the soft mud just before the Scar at low tide, so the team had to leave the beach.

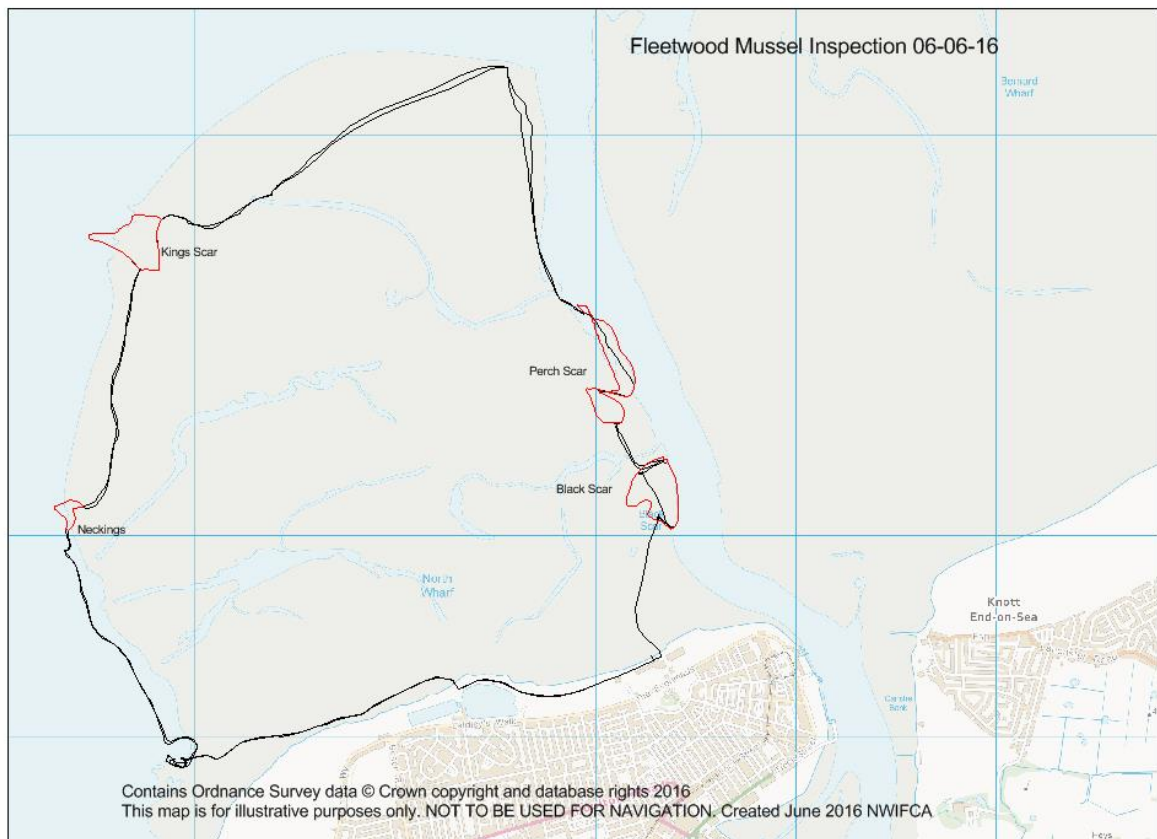


Fig.12 Illustrative map of the positions of the Fleetwood skears. 6th June 2016.

Black Scar: an estimated area of 5.8 ha had 80% cover of 5-8mm mussel, with size mussel along the channel edge (Fig. 13).

Perch Scar: an estimated area of 5.3 ha had a main area 80 – 100% cover of 5-8mm mussel, with a further area having 50% cover of 5-8mm mussel (Fig. 13).

King Scar: only around 0.1ha of the 5.3ha skear had mussel cover, of around 5-8mm. There was a small patch of remaining size mussel.

Neckings: minor spat settlement on this skear.

Rossall Scar: a visual from the heliflight that took place on the same day reported minor spat settlement on this skear.

A dredge fishery was authorised on Perch and Black Scar opening on 27th August 2016 after a full HRA was completed. Two authorisations were issued and to date (19th September 2016) 60 tonnes has been harvested by one vessel over one tide. The recent high winds are expected to have had an impact on this resource which may have scoured out as predicted once stormy weather arrives.

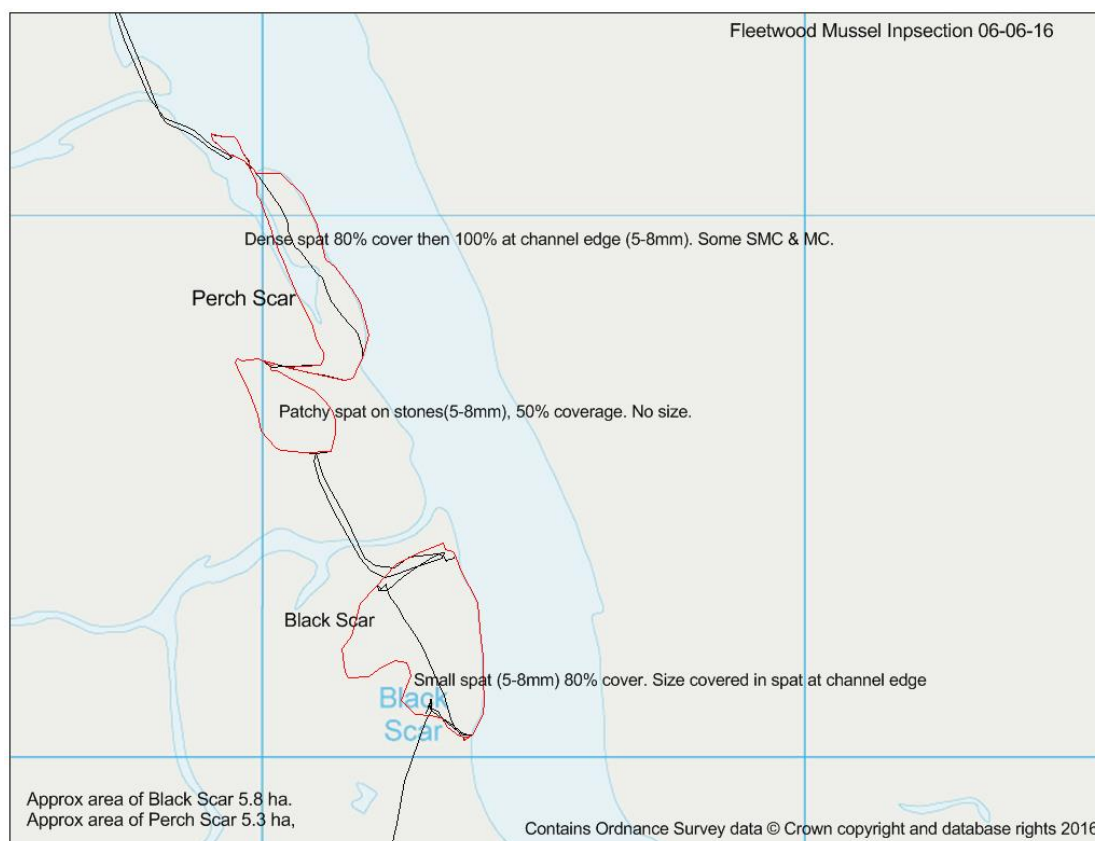


Fig.13. Illustrative mapping of the seed mussel at Perch Scar and Black Scar, Fleetwood, 6th June 2016

Wyre End Skear:

the Wyre End skear and Knott Spit mussel beds (Knott End) was inspected on 8th June (0.8m tide). The bed boundaries were tracked on foot with a GPS. One transect was taken through the middle of the bed and the mussel type was recorded.

There has been a new settlement of mussel which was found on Wyre End skear itself and on patches of mud and sand to the east of the skear. The spat has settled on most surfaces, sand, mud, cobble, live size mussel and dead shell. The spat ranges from 1-2mm to 5mm with the smaller spat being higher above the low water mark. There is a shingle / cobble area in the middle of the skear with a raised elevation. No mussel was found directly on top of this feature but there was pinprick spat down the sides of it (1-2mm). Running south from the main Wyre End skear there is a long thin strip of hard substrate that has had a new settlement of spat (1-2mm). The combined area of these two skears was estimated as 21.7ha (Fig. 14).

Knott spit which is located just off of Knott End-On-Sea has had a good covering of spat in the 4-6mm range, with around 70% - 80% cover. There was an area of size mussel running along the edge of the Wyre. From previous years' mapping Knott Spit totals an area of 16.4ha. Due to the tide a full inspection of the area was not completed. There is another area of mussel further up the Wyre from where the hygiene samples are collected which is estimated to be 100m by 20m running along the edge of the Wyre which is a mixture of size and spat, and known as the Sealife Centre.

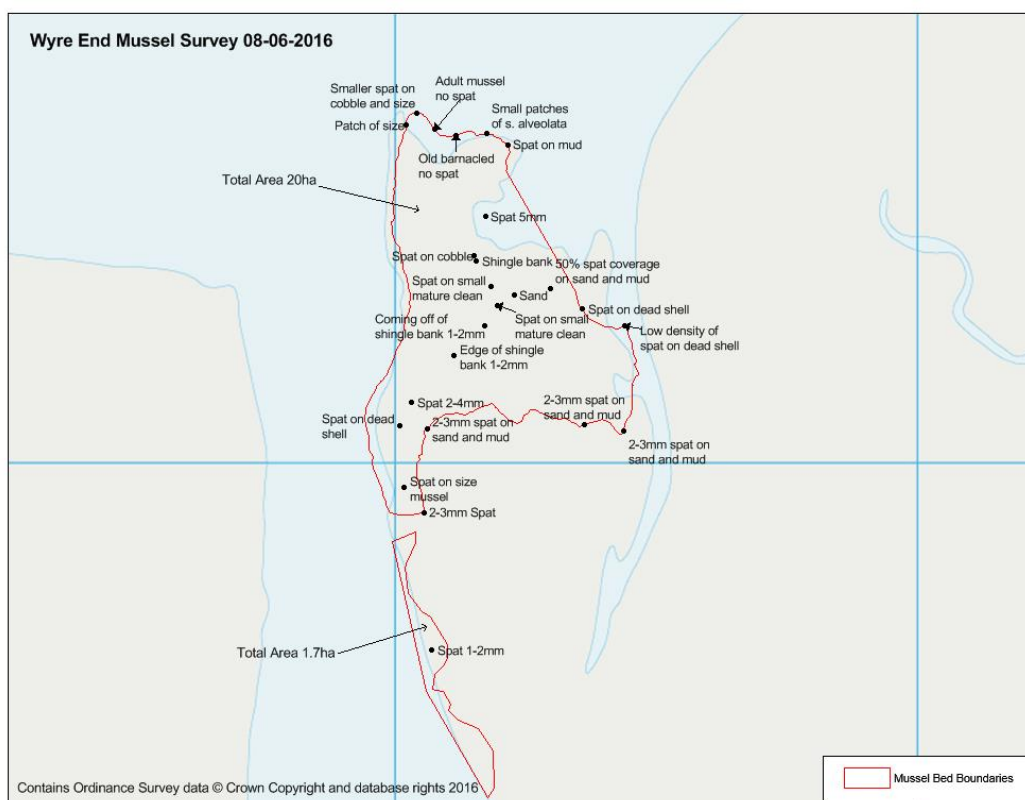


Fig. 14. Illustrative mapping of Wyre End skear and Knott Spit. 8th June 2016.

South America / Falklands

An inspection was made by quad bike on 9th May 2016 (0.5m tide) accessing the beds in question from the shore. It was only possible to reach the Falklands bed on the hour around low water due to water still covering the sandbanks until then. The South America area was passed on the way to the Falklands.

South America – there was a limited area of skear exposed which was covered in mussel spat and gulls. It was problematic to track the bed and obtain an estimate of the size of the area due to time and tide constraints. However a very rough estimate from mapping software is given as 19 ha (probably under-estimate). (See Fig. 15).

Falklands – the northern half was devoid of mussel (had previously had 2014 mussel cover). The southern half of the bed had some remaining size which was being devoured by starfish, which in turn were being predated on by gulls. There was evidence of pinprick mussel spat settlement on top of the larger mussel and in amongst the cobbles. A GPS track round the exposed bed was taken and estimated as 3.8 ha. The mussel appeared to continue out into submerged areas that could not be accessed.

An industry heliflight was attended by a NWIFCA Science Officer on 6th June 2016. This provided visual evidence that the size mussel had gone along with the larger starfish. The new spat also appeared to have gone but this needs to be verified by a further flight / inspection as it may have been too small to be seen from the air. It could be seen that mussel extended out into sub-tidal areas. A new area to the west that had not been known to hold mussel before was also found and from very rough mapping was estimated at being around 115 ha in size (Fig. 15).

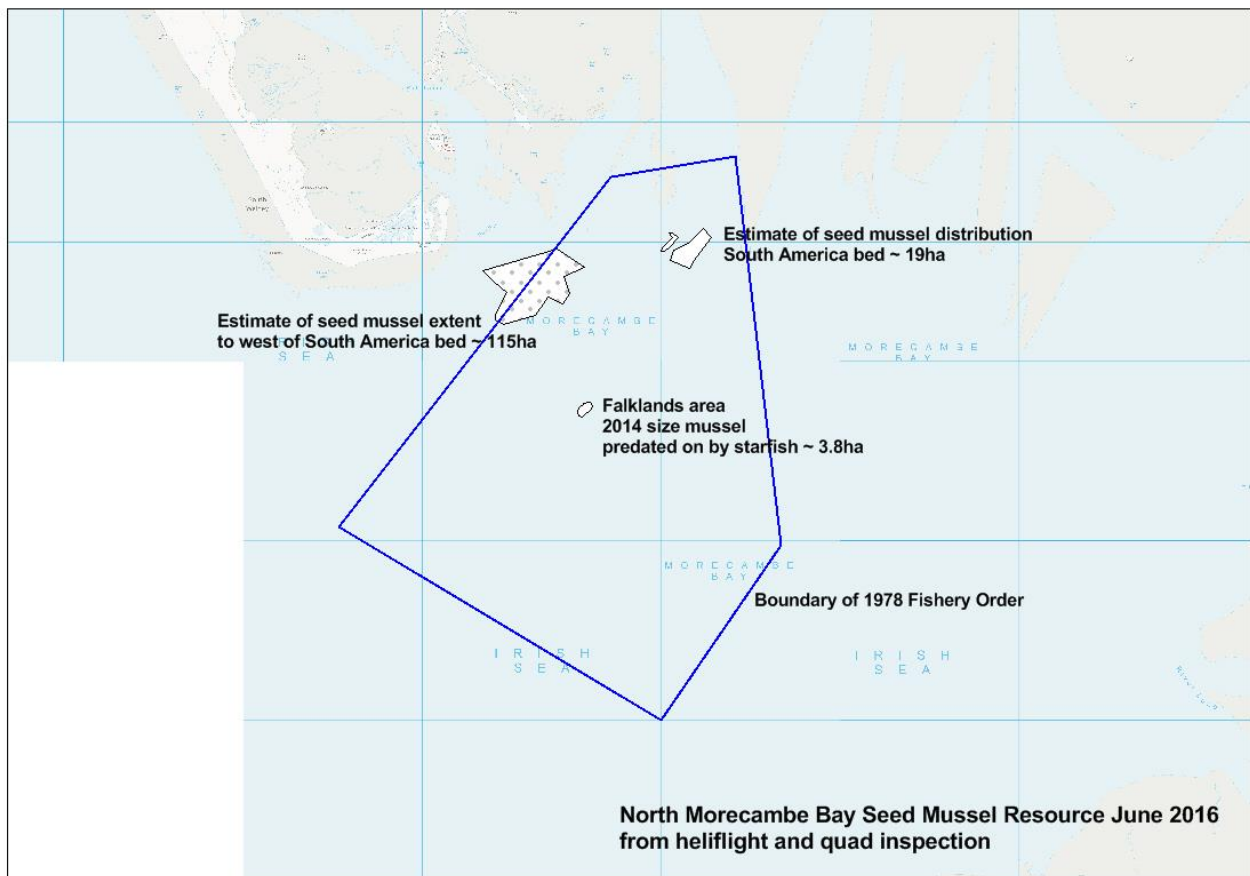


Fig. 15. Morecambe Bay Seed Mussel – Falklands and South America seed mussel resource from quad and heliflight inspections May and June 2016. Blue polygon show boundary of old 1978 Fishery Order.

A dredge fishery for seed mussel was opened on 8th July 2016 following full HRA, and three authorisations issued. The vessels fished the area shown in Fig. 15a below and a subsequent extension to the area with Natural England observers on board was opened with one other vessel issued with an authorisation. The seed mussel was being rapidly consumed by the starfish and would not have persisted had it not been fished. A total of 2700.9 tonnes was fished over nine days.

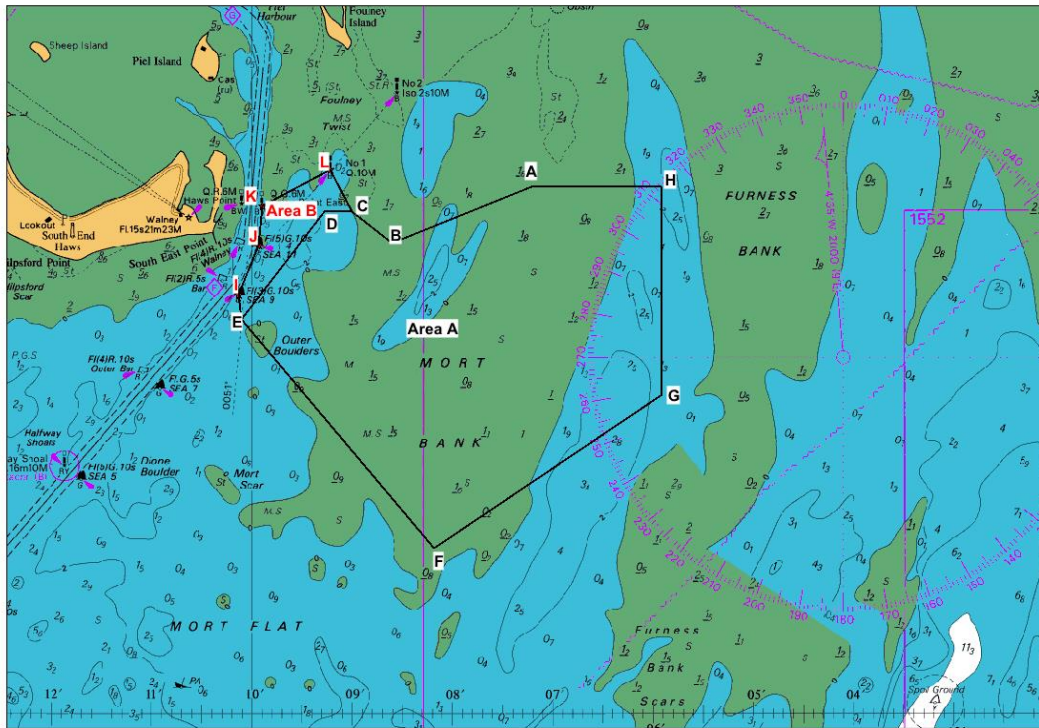


Fig. 15a. Area authorised for seed mussel dredging in north Morecambe Bay July – August 2016

2 On-going fishing activity – size mussel hand-gathering by permit holders

- 2.1 The main areas of spat and seed mussel are shown in Figure 2 above. There is also undersize mussel on Knott End skear across Dallam Dyke. When seed persists to grown through to size throughout the autumn and winter, size mussel occurs around the edges of the main skear, and on Knott End skear and the Outer skears, all of which require the larger spring tides to access. It is very rare for size mussel to occur over much of the main skear due to tidal exposure. Until the past three years no size mussel had been found at Heysham Flat since the early 2000s, and this change is another indication of the dynamic nature of the Bay.
- 2.2 Size mussel harvesting occurs from time to time by low numbers of Byelaw 3 permit holders (maximum of ten at any one time) from these areas over the large spring tides (generally 1m or greater).
- 2.3 In order to access these lower reaches there is a risk of trampling damage from quad bikes over the main *Sabellaria alveolata* reef area, and any live colonies. There is also a risk of fishing occurring on this reef area should size mussel be present there.
- 2.4 The area on Knott End skear is estimated at around 5 ha. The further out skears, which are only accessible for short periods of time on the largest spring tides and therefore temporally restricted and unlikely to be fished by more than maximum ten permit holders, have been estimated at 7 ha (all estimates taken from MapInfo software).
- 2.5 Access to and from the skears, and some transport of mussels from the bed will be by quad bike from the Battery car park in Morecambe. Only NWIFCA Byelaw 3 permit holders are legally able to fish size mussel commercially. Currently around 150 permits have been issued. However recent mussel fisheries in Morecambe Bay (Heysham Flat, Foulney and the Duddon Estuary) have shown only around 40 fishers maximum are active in the fisheries.
- 2.6 There is no restriction on hours of fishing. Spring low waters generally occur in the early hours or later evening and during the late autumn / winter / early spring are normally during the hours of darkness. Only the most experienced gatherers tend to fish this mussel on these tides due to the inherent risks, which is the reason for the numbers predicted to prosecute the size mussel to be so low.

European site name(s) and status

- 3.1 Heysham Flat Skear lies within the Morecambe Bay and Duddon Estuary EMS, which has been designated as both a Special Protection Area (SPA), Special Area of Conservation (SAC) and as a Ramsar site. The NWIFCA is required, under the Habitats Regulations 2010 to consider the effects of permitting seed mussel harvesting on the features of the SPA and SAC.
- 3.2 Heysham Flat Skear contains biogenic reefs formed by the Honeycomb Worm, *Sabellaria alveolata*. This is an Annex I habitat that is present as a qualifying feature of the Morecambe Bay and Duddon Estuary SAC. The main areas of *Sabellaria* reef are depicted on the accompanying map (Annex A).
- 3.3 The mussels on Heysham Flat Skear form a potential food resource for birds, particularly the oystercatcher, *Haematopus ostralegus*. Oystercatchers are a qualifying species of the Morecambe Bay and Duddon Estuary SPA under Article 4.1 of the EC Directive on the conservation of wild birds (79/409/EEC). During the winter season Morecambe Bay holds populations of oystercatchers of European importance.

3.4 List of interest features

Large shallow inlets and bays:

intertidal boulder and cobble skear communities (including mussel and *Sabellaria* communities)

subtidal boulder and cobble skear communities

brittlestar bed communities

intertidal boulder clay communities

coastal lagoon communities

Mudflats and sandflats that are not covered by seawater at low tide:

mud communities

sand communities

eelgrass beds

Estuaries

Reefs

Perennial vegetation of stony banks (vegetated shingle)

Atlantic salt meadows (saltmarsh)

Salicornia and other annuals colonising mud and sand (pioneer saltmarsh)

Sandbanks, which are slightly covered by seawater at all times

Sand dune Communities

Coastal Lagoons

Great crested Newt

Annex 1 species: Little Tern, Sandwich Tern, Common Tern, Arctic Tern, Bar-tailed Godwit, Golden Plover

Migratory species: Herring Gull, Lesser Black-backed Gull, Pink-footed Goose, Shelduck, Oystercatcher, Grey Plover, Knot, Dunlin, Pintail, Curlew, Redshank, Turnstone, Ringed Plover, Sanderling

Nationally important aggregations: Great-crested Grebe, Cormorant, Wigeon, Teal, Eider, Goldeneye, Red-breasted Merganser, Lapwing, Black-tailed Godwit

Qualifying Assemblages: Seabirds; Waterfowl

4.0 Is the proposal directly connected with or necessary to the management of the site for nature conservation?

No.

5.0 What potential hazards are likely to affect the interest features?

Refer to matrix below and only include those to which the interest features are sensitive

Are the interest features potentially exposed to the hazard?				
Site & designation	Interest feature	Interest sub-features	Potential hazard	Potential exposure to hazard and mechanism of effect/impact if known
Morecambe Bay and Duddon Estuary SAC	Large shallow inlets and bays	Intertidal boulder and cobble skewer communities (including mussel and <i>Sabellaria alveolata</i> communities)	Vehicular/ trampling damage	Although dominated by mussel cover and in very bad condition this year, the intertidal skewer contains the most extensive <i>Sabellaria alveolata</i> reefs in the SAC. <i>Sabellaria</i> reefs are vulnerable to physical damage from vehicular activity and trampling. Mussels are a characteristic community of the intertidal skewers. Access over mussel beds to access the mussels to be fished may result in loss, damage or dislodgement of mussels. Likely significant effect
		Intertidal boulder and cobble skewer communities (including mussel and <i>Sabellaria</i> communities)	Physical removal of size mussels	The fishery removes size mussel from the intertidal skewer. Mussel beds are a characteristic and fluctuating community of the intertidal boulder and cobble skewer interest sub-feature. Likely significant effect
		Subtidal boulder and cobble skewer communities	Vehicular / trampling damage	Interest feature is adjacent to intertidal areas to be fished. Mussel fishers do not require access to the subtidal areas and there is no potential exposure to hazard from hand-gatherers. Not significant
		Brittlestar bed communities	Vehicular/trampling damage Bycatch	Interest feature not located close to fishery or access routes
		intertidal boulder clay communities		Not significant
	coastal lagoon			

	communities		
<p>Perennial vegetation of stony banks (vegetated shingle)</p> <p>Atlantic salt meadows (saltmarsh)</p> <p>Salicornia and other annuals colonising mud and sand (pioneer saltmarsh)</p> <p>Sandbanks, which are slightly covered by seawater at all times</p> <p>Various Sand dune Communities</p> <p>Great crested newt</p> <p>Coastal Lagoons</p>		Vehicular/trampling damage	<p>Interest feature not located close to fishery or access routes</p> <p>Not significant</p>
Mudflats and sandflats that are not covered by seawater at low tide	Mud communities	Vehicular/trampling damage	<p>Traditional access route to fishery crosses firm sand. Little or no exposure of mud communities to vehicular damage.</p> <p>Not significant</p>
	Sand communities	Vehicular/ trampling damage	<p>Traditional access route to fishery crosses firm sand. Potential for local compaction or rutting of sand by vehicular use but unlikely to be extensive or other than short term.</p> <p>Not significant</p>
	Eelgrass beds	Vehicular/trampling damage	<p>Interest feature not located close to fishery or access routes</p> <p>Not significant</p>

	Estuaries		None additional to above	
	Reefs		None additional to intertidal cobble and boulder skears above	
Morecambe Bay and Duddon Estuary SPA	Annex 1 species: Little Tern, Sandwich Tern, Common Tern, Arctic Tern, Bar-tailed Godwit, Golden Plover		Vehicular/human disturbance	<p>Bar-tailed Godwit feed on muddy intertidal areas and are particularly vulnerable to disturbance. Any Bar-tailed Godwit feeding in proximity to the mussel skears may be subject to increased disturbance as a consequence of the mussel harvesting and access to the beds.</p> <p>Disturbance may increase the energy consumption of migrating or wintering birds and reduce the feeding areas and food resource available to birds, affecting the condition of the birds and the condition of the site to support birds.</p> <p>Likely significant effect</p>
	<p>Migratory species: Herring Gull, Lesser Black-backed Gull, Pink-footed Goose, Shelduck, Oystercatcher, Grey Plover, Knot, Dunlin, Pintail, Curlew, Redshank, Turnstone, Ringed Plover, Sanderling</p> <p>Migratory species: Herring Gull, Lesser Black-backed Gull, Pink-footed Goose, Shelduck, Oystercatcher, Grey Plover, Knot, Dunlin, Pintail, Curlew, Redshank, Turnstone, Ringed Plover, Sanderling</p>		<p>Vehicular/human disturbance</p> <p>Physical removal of mussels</p>	<p>Birds feeding on the mussel beds, on the intertidal skear in the vicinity of these beds and along the access route to and from the mussel beds are likely to be exposed to disturbing activity. Disturbance may increase the energy consumption of migrating or wintering birds and reduce the feeding areas and food resource available to birds, affecting the condition of the birds and the condition of the site to support birds</p> <p>Likely significant effect</p> <p>The mussels on Heysham Flat and associated skears form a potential food resource for birds, particularly the oystercatcher, knot and herring gull.</p> <p>Likely significant effect</p>

<p>Nationally important aggregations: Great - crested grebe, cormorant, wigeon, teal, eider, goldeneye, red-breasted merganser, lapwing, black-tailed godwit</p> <p>Qualifying Assemblages: Seabirds; Waterfowl</p>	<p>Physical removal of mussels</p> <p>None additional to above</p>	<p>The mussels may be a potential food resource for eider, although the importance of this has yet to be established. A reduction in the availability of mussel could have an impact on the species.</p> <p>Likely significant effect</p>
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6.0 Is the potential scale or magnitude of any effect likely to be significant?

a) Alone? Yes.

b) In combination with other plans or projects? Yes

The NWIFCA authorised a seed mussel dredge fishery in north Morecambe Bay in July, a seed mussel dredge fishery at Fleetwood in August, a seed mussel hand-gathered fishery on Heysham Flat in July and there is on-going hand-gathering of size mussel at Foulney, Morecambe Bay on low water tides. The in-combination effects need to be assessed on the SPA bird features identified.

Conclusion: Is the proposal likely to have a significant effect alone or in combination on a European site?

It is considered that the removal of size mussel has the potential to have a significant effect on the Natura 2000 features noted above. An Appropriate Assessment of the proposal is therefore necessary before the proposed seed mussel harvesting can be permitted.

The assessment of likely significant effect of this proposal concluded a likely significant effect on the following features of interest in the Morecambe Bay and Duddon Estuary SAC, SPA and Ramsar Site. These features will be the subject of this appropriate assessment.

Intertidal boulder and cobble skear communities (including mussel and *Sabellaria* communities)

Annex 1 species: Bar-tailed Godwit

Migratory species: Herring Gull, Lesser Black-backed Gull, Pink-footed Goose, Shelduck, Oystercatcher, Grey Plover, Knot, Dunlin, Pintail, Curlew, Redshank, Turnstone, Ringed Plover, Sanderling

Nationally important aggregations: Eider

Qualifying Assemblages: Seabirds; Waterfowl

Appropriate Assessment

The scope of the appropriate assessment was the following:

- Vehicular, trampling and fishing damage to:
 - *Sabellaria alveolata* reefs
- Vehicular/human disturbance to birds
- Physical removal of size mussel

a) Vehicular, trampling and fishing damage to:

- *Sabellaria alveolata* reefs

Heysham Flat Skear contains biogenic reefs formed by the Honeycomb Worm, *Sabellaria alveolata*. This is an Annex I habitat that is present as a qualifying feature of the Morecambe Bay and Duddon Estuary SAC. The main historic areas of *Sabellaria alveolata* reef are depicted on the accompanying map (Annex A), and in some years have been in healthy condition. This year however they are in a very poor and damaged state, due to mussel having persisted on them throughout the winter of 2014-15, subsequent heavy settlement of newly recruited mussel

in spring 2015 and its associated dense layer of mussel mud, scouring over winter 2015-16, and another dense settlement in spring 2016.

Harvesting on the main reef area clearly has the potential to damage the reef and reef structure below the surface layer.

Exclusion zone

In order to prevent damage to the main reef area an exclusion zone (Annex A) has been incorporated into management of this fishery, through a NWSFC Byelaw 13A closure. An exclusion zone has been an accepted principal for many years of seed mussel hand-gathering and is communicated to hand-gatherers with maps and co-ordinates via the Bivalve Mollusc Working Group, the NWIFCA website, text messaging service and notices posted at access points.

On the beach IFCOs direct fishermen as to which areas to avoid and where the exclusion zone lies, and includes both fishing from within and transit over the zone. If possible it will also be physically pegged out on the beach.

The exclusion zone covers the main historical reef area that has been established from years of survey, and has been agreed with Natural England. Efforts will be made via BMWG to agree with industry each year a Voluntary Agreement / Code of Conduct to protect 'outlying' colonies of healthy worms, dependent on regular monitoring of where these occur.

From 2017, this exclusion zone will be incorporated into the management of both the seed mussel and size mussel fisheries.

b) Vehicular/human disturbance to birds

The harvesting of mussels and the access to and from the mussel beds has the potential to affect birds feeding on the mussel beds themselves, on other parts of Heysham Flat Skear, and on the intertidal sediments adjacent to the skear or access route.

Mussels are a key food resource for oystercatchers and knot for which Heysham Flat is considered an important area. The harvesting operation has the potential to disturb birds feeding on the skear and to impair their feeding over fishable periods of low water. There is also potential for disturbance to other feeding wading birds.

The whole of the main skear has been mapped from previous surveys and has an area at 62.2 hectares. Estimates of biomass have been made over the years and when mussel is abundant is accepted as being around 4000 tonnes prior to any mass wash-out occurring. Estimates of the area of Knott End skear and the next skear out have been made using MapInfo, resulting in 4.81 ha and 0.90 ha respectively.

Implementation of the exclusion zone for the fishery results in the main *Sabellaria alveolata* reef area remaining unfished and therefore acting as an undisturbed resource for feeding birds, with an estimated area of 14.63 hectares. Levels of effort are low with a maximum of 40 gatherers in recent years, and more likely to be around ten, who generally congregate in the 'best' areas for easy fishing, and so the fishery is spatially restricted on any tide, leaving the majority of the exposed skear undisturbed to the birds.

The harvesting and access operations may result in disturbance to bird species feeding on intertidal sediments. The sediments in this area are relatively sandy and observed to be of lower

value to birds than muddy sediments elsewhere in the Bay, and therefore the likely effects are considered not significant. The location of the fishery centrally in the skear and the direct access route between the skear and shore access will maximise the distance between sources of disturbance and the low water mark where potentially vulnerable birds such as bar-tailed godwit and curlew are most likely to be feeding. Activity levels are low and disturbance to these species in these areas is very limited, and no more than background levels of dog-walkers and bait collectors.

Consequently the NWIFCA considers that the harvesting of size mussel from the Heysham Flat skears will not have an adverse effect on the integrity of the bird features of the EMS.

c) Physical removal of size mussel

Mussel communities

This assessment is of hand-gathering of size mussels from a skear which has been described as an ephemeral bed (Dare. 1976) that is habitually subject to extensive mussel settlement that is unstable, lying on soft mud and which recurrently gets scoured out by autumn / winter storms. This description has been borne out through a time series of survey work (MAFF and NW&NWSFC Surveys. 1968 – 2001. NWIFCA 2011 - 13). Experience over many years suggests that if left un-fished, some areas of the skear may be subject to rapid loss through erosion.

Site inspections and surveys have shown that across the whole main skear, and lower skears, seed mussel builds up a considerable quantity of mussel mud, which de-stabilises the bed. Some losses through erosion have been apparent from these areas, with the mussels being stripped away, exposing the soft sediment beneath. In the denser areas, the mussels were loose, with no byssus. This is an indicator of stress and is frequently followed by high mortality.

NWIFCA Officers have records of the spatfall, growth and survival of mussels in this area in recent years. Annual spatfalls have regularly been heavy over the eastern half of Heysham Flat. Mortality of first-year mussels is usually very high. In many years, virtually the entire stock of mussels has been lost in the autumn and winter of their first year. Over the past three years a proportion of the stock has survived this winter period and grown through to size (>45mm) by around February / March, but in 2015 and 2016 was totally inundated by a new settlement occurring from April onwards.

It is considered that low levels of fishing over the few large tides that will provide access to the lower reaches will have minimal impact on the mussel communities compared to the natural processes occurring over this skear. The exclusion zone also provides an area of over 14 hectares of mussel that will not be fished.

Consequently the NWIFCA considers that the harvesting of size mussel from the Heysham Flat skears will not have an adverse effect on the integrity of the mussel feature of the EMS.

Birds – oystercatcher, knot, herring gull, eider

Size mussels are a key food resource for oystercatchers and to a lesser extent knot (not of preferred size range) and herring gull, and therefore the impact of removal of this food resource has been assessed.

There are substantial areas of mussel on Heysham Flat Skear which will not be harvested and if natural events allow will remain as a potential food resource for these birds. The extent of the coverage of this resource changes from year to year, with smaller seed occurring higher on the skear and increasing in size dependent on position on the skear and immersion times, with the size mussel on the lower reaches only. Knott End skear and the further out skear will only see a limited amount of effort due to tidal restrictions and therefore the majority of this stock is likely to remain unfished and available as prey resource.

Hand-gathering is not 100% efficient and may even serve to thin out the mussel on the rest of the skear, improve the bed's stability and allow it to grow on. The level of activity predicted (based on recent years fishing) indicates that only a proportion of this mussel will actually be fished. An illustration of an area immediately post hand-raking for seed mussel is shown in Fig. 15b, where it can be seen that some mussel remains and that the act of hand-raking can help to stabilise the bed and thin out over-crowded mussel. The exclusion zone also provides an area of over 14 hectares of mussel that will not be fished.

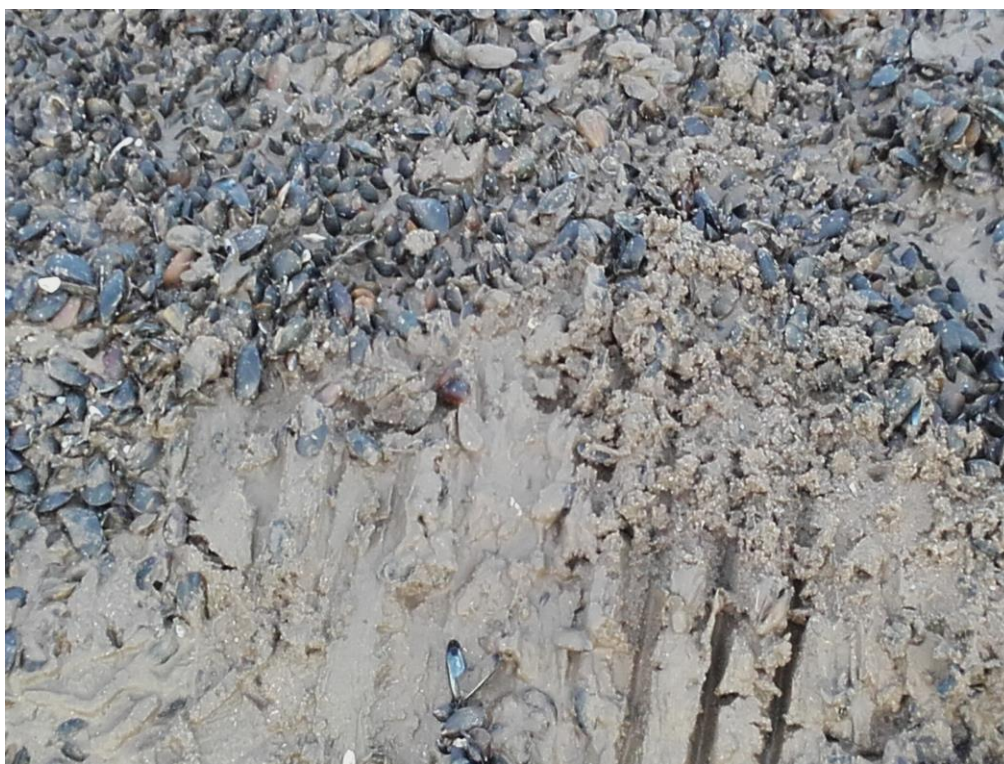


Fig. 15b. Illustration of thinning effect and remaining mussel post hand-raking for seed mussel.
Heysham Flat. 19th Sept. 2016

Assessments of all the mussel beds within Morecambe Bay have been made to inform this HRA, and the likely impacts on bird prey resource. Details are given in section 1 above. The main alternative bed is Foulney, and the area from Foulney to the oyster frames, estimated at 1.2km². Foulney is open as a size mussel fishery at the present time, but is unlikely to see much activity

other than on the largest spring tides (for access to the mussel on the 'Island') as the majority of the mussel on the bed is undersize. The area between Foulney and the oyster frames sees a very low level of size mussel fishing throughout the year, particularly in the winter, with up to (the same) six hand-gatherers fishing it on the largest tides. The impact they have on the stock is minimal. Mussel settlement generally occurs all along the low water line and up on the higher shore. The low water line is likely to see scouring and natural erosion.

Although limited additional mussel resource is situated at Wyre End, and the Fleetwood beds of Neckings, Kings Scar and Rossall skears.

Consequently it is not considered that the harvesting of the size mussels will affect the oystercatchers, knot or herring gull by reducing their food supply.

The extent to which eider feed on Heysham Flat Skear is unclear. There have been concerns about the eider population and its breeding success in Morecambe Bay, and in particular those nesting on Walney Island, although investigations into reasons for lack of breeding success are inconclusive. There are many potential contributory factors suggested for this decline including and significantly predation by land mammals. However, one factor identified by Natural England may be the removal of mussel, and this factor has been fully considered in undertaking this Appropriate Assessment.

Size mussel will be a food resource for eider: Goss-Custard *et al.* (2004) report that eiders mainly eat larger size mussels. The Heysham Flat mussel may be of lower value than the mussel beds around South Walney and Foulney Islands, which are the centre of the breeding colonies. The importance of Heysham may increase in winter, when the eider population in the Bay increases, although regular visits to the bed during the 2007/8 winter showed that oystercatchers and knot were utilising the area, but not so eider.

The Eider Risk Review was carried out by a joint agency working party. In her draft report Dr Liz Bailey from Natural England put forward the recommendation that the annual requirement of mussels for a population of 6000 eiders in Morecambe Bay is estimated at 657 tonnes as an absolute minimum, with an 8 fold multiplication as a precautionary measure to take other bivalve feeding species into account, giving a total of 5256 tonnes. The Risk Review highlighted that feeding eiders have been observed around the Bay, particularly near Fleetwood and regularly travel many kilometres to feed, with a hotspot around the north Morecambe Bay beds.

Recent estimates of biomass of mussel in the Bay and Fleetwood beds far exceed the recommendation of resource that should be left unfished. The exclusion zone also provides an area of over 14 hectares of mussel that will not be fished.

Consequently it is considered that harvesting of size mussel from the Heysham Flat skears will not adversely affect the eider interest feature by reducing their food supply.

In-combination effects with seed mussel dredge fishery in north Morecambe Bay:

i) Removal of bird feeding resource:

A seed mussel dredge fishery has been authorised in north Morecambe Bay and has undergone a separate Habitats Regulations Assessment. The seed mussel there was being heavily predated on by starfish. Historical records and more recent observations confirm that vast swathes of seed mussel are wiped out by immense numbers of starfish in short periods of time.

This mussel supply would be lost to the birds as a feeding resource by natural processes were it not to be fished.

Large areas of mussel resource in Morecambe Bay will remain for the birds, especially the areas on Foulney, where only a low level of size mussel fishing occurs, between Foulney and the oyster frames (around 1.2km²) and the majority of the stock at Heysham Flat, where only a maximum of 700 tonnes of seed mussel and around 100 tonnes maximum of size mussel is anticipated to be removed by hand-gathering. This seed mussel is likely to be lost to natural erosion by autumn / winter storms if not fished.

Recent estimates of biomass of mussel in the Bay and Fleetwood beds far exceed the recommendation of resource that should be left unfished.

ii) Disturbance to mussel feeding birds – knot, oystercatcher, herring gull and eider.

Heysham Flat is not considered a prime area for eider and therefore the likelihood of disturbance is very low.

Other mussel areas in Morecambe Bay will be available and not be fished and provide non-disturbed areas for knot, oystercatcher and herring gull.

Consequently it is considered that harvesting of size mussel from the Heysham Flat skears in combination with other fisheries in Morecambe Bay will not adversely affect the bird conservation interest features by reducing their food supply or through disturbance.

Management:

Hand-gatherers will be required to submit monthly catch returns and fishing will be monitored and policed by NWIFCA officers to ensure compliance with the exclusion zone.

NWIFCA officers will consult with Natural England throughout the duration of the fishery, and should there be concerns that losses of mussel around Morecambe Bay is occurring which will impact on the available bird feeding resource, and that the size mussel on the Heysham Flat skears provides a resource that needs to be left for the birds, the NWIFCA will seek to close the fishery on environmental grounds.

NWIFCA believes that the fishing that takes place is of a low level of effort and spatially and temporally (tidally) restricted. In view of this and the exclusion zone over the *Sabellaria alveolata* reef implemented, we conclude that there will be no risk of adverse effect on the integrity or conservation status of the SAC or SPA features of Morecambe Bay and the Duddon Estuary.

Appropriate assessment – summary table

Hazard	Interest feature	Favourable condition target for relevant attribute (including range of natural variation) based on conservation objectives	Adverse effect of proposal alone on attribute and/or feature	Adverse effect of proposal in combination with other plans or projects, on attribute and /or feature	Can adverse effects be avoided?	Adverse effect on integrity; (yes, no or uncertain)
Vehicle & trampling damage	Intertidal boulder and cobble skear communities (including mussel and <i>Sabellaria alveolata</i> communities)	No decrease in extent, distribution and quality of <i>Sabellaria alveolata</i> reefs from established baseline (Woombs 1997), subject to natural change.	Fishers take direct route to fishery. Limited number of fishers and quad bikes. Area is highly dynamic and is fished most years. Unlikely risk to cobble and boulder skear communities covered in dense mud. Risk to trampling damage on underlying 3D structures of <i>Sabellaria alveolata</i> reef from access or fishing.	No other activity anticipated to cause in-combination effect.	Implementation of an exclusion zone over the main reef area.	No

Physical removal of size mussels	Intertidal boulder and cobble skewer communities (including mussel and <i>Sabellaria alveolata</i> communities)	Mussels are subject to potentially catastrophic loss by tidal scour or inundation by subsequent settlement. Harvesting of mussels is therefore similar to natural processes.	A proportion of the mussel may be lost by end of winter through natural processes, or the following spring through smothering by the next years settlement. Fishery is restricted in terms of numbers and tides. Harvesting it will not have an adverse effect on the mussel beds.	No other activity anticipated to cause in-combination effect.	The exclusion zone provides an area of over 14 hectares of mussel that will not be fished. No mitigation required	No
Disturbance	Annex 1 species: Little Tern, Sandwich Tern, Common Tern, Arctic Tern, Bar-tailed Godwit, Golden Plover	No decrease in extent of skears (as important feeding areas) from established baseline, subject to natural change.	Potential risk of disturbance to bar tailed godwit and golden plover. Risk is reduced to negligible or very slight by the limitations of the area exposed to disturbance at Heysham Skewer, within the context of a very large SPA. Disturbance is temporally restricted and reversible.	No other activity anticipated to cause in-combination effect.	The implementation of the exclusion zone will restrict the access routes for fishers to get to the lower skewer areas of size mussel, and therefore restrict the potential for disturbance to these species.	No
Disturbance	Migratory species: Herring Gull,	No decrease in extent of skears (as important	Potential risk of disturbance to several wader	Large proportions of the skewer will not be fished and	The implementation of the exclusion zone will restrict the access routes for fishers to get	No

	<p>Lesser Black-backed Gull, Pink-footed Goose, Shelduck, Oystercatcher, Grey Plover, Knot, Dunlin, Pintail, Curlew, Redshank, Turnstone, Ringed Plover, Sanderling</p>	<p>feeding areas) from established baseline, subject to natural change.</p>	<p>species. Risk is reduced to negligible or very slight by the limitations of the area exposed to disturbance at Heysham Skear, within the context of a very large SPA. Disturbance is temporally restricted and reversible.</p>	<p>provide non-disturbed areas for knot, oystercatcher and herring gull. Other mussel beds around the Bay provide alternative undisturbed feeding areas for these waders.</p>	<p>to the lower skear areas of size mussel, and therefore restrict the potential for disturbance to these species. The exclusion zone itself provides an undisturbed feeding area.</p>	
Disturbance	<p>Nationally important aggregations: Great -crested grebe, cormorant, wigeon, teal, eider, goldeneye, red-breasted merganser, lapwing, black-tailed godwit</p>	<p>No decrease in extent of skears (as important feeding areas) from established baseline, subject to natural change.</p>	<p>Heysham Flat is not considered an important site for eiders. Potential risk of disturbance to these species. Risk is reduced to negligible or very slight by the limitations of the area exposed to disturbance at Heysham Skear, within the context of a very large SPA. Disturbance is temporally restricted and reversible.</p>	<p>Large proportions of the skear will not be fished and provide non-disturbed areas for knot, oystercatcher and herring gull. Other mussel beds around the Bay provide alternative undisturbed feeding areas for these waders.</p>	<p>The implementation of the exclusion zone will restrict the access routes for fishers to get to the lower skear areas of size mussel, and therefore restrict the potential for disturbance to these species. The exclusion zone itself provides an undisturbed feeding area.</p>	No

Physical removal of size mussels	Migratory species: Herring Gull, Lesser Black-backed Gull, Pink-footed Goose, Shelduck, Oystercatcher, Grey Plover, Knot, Dunlin, Pintail, Curlew, Redshank, Turnstone, Ringed Plover, Sanderling	Presence and abundance of prey species (including mussels) should not deviate from an established baseline, subject to natural change.	It is possible that a proportion of the mussels harvested are likely to be lost to birds over the winter. .	Foulney size mussel fishery - in-combination effects have been assessed. Plentiful resource remains throughout the Bay as fishing effort is low and spatially and temporally restricted.	Area of size mussel fishery is limited, and access to it is restricted to only the largest tides. Effort levels will be low. The implementation of the exclusion zone provides a non-fished resource for these birds. Other mussel areas in Morecambe Bay will be available and not be fished and sufficient resource will still be available.	No
Physical removal of size mussels	Nationally important aggregations: Great -crested grebe, cormorant, wigeon, teal, eider, goldeneye, red-breasted merganser, lapwing, black-tailed godwit	Presence and abundance of prey species (including mussels) should not deviate from an established baseline, subject to natural change.	It is possible that a proportion of the mussels harvested are likely to be lost to birds over the winter.	Foulney size mussel fishery - in-combination effects have been assessed. Plentiful resource remains throughout the Bay as fishing effort is low and spatially and temporally restricted. Heysham Flat is not considered to be a prime area for eiders.	Area of size mussel fishery is limited, and access to it is restricted to only the largest tides. Effort levels will be low. The implementation of the exclusion zone provides a non-fished resource for these birds. Other mussel areas in Morecambe Bay will be available and not be fished and sufficient resource will still be available.	No

Can it be ascertained that the fishery will not adversely affect the integrity of the European Site?

Yes.

The NWIFCA considers that the harvesting of size mussel from Heysham Flat Skears has the potential for a likely significant effect on the conservation features and associated habitats of the Morecambe Bay and Duddon Estuary SAC, SPA and Ramsar Site.

However, the NWIFCA concludes that with the low level of effort, tidal restrictions, and the exclusion zone to fishing and access to protect the *Sabellaria alveolata* main reef and live colonies, there will be no adverse effect on the integrity of the Morecambe Bay and Duddon Estuary SAC, SPA and Ramsar site. An exclusion zone has been implemented over many years for seed mussel gathering and has proved to be successful in permitting the fishery.

MANDY KNOTT
NWIFCA Senior Scientist

13th December 2016

Additional Note: despite the excellent work carried out during the Eider Risk Review many questions still remain around the eider population of Morecambe Bay, reasons for the apparent decline in its breeding success, predation pressures, feeding preferences and relation to the mussel fisheries. Shellfish harvesting is an important economic activity in the Bay and many of these questions have been circulating around the fisheries for many years. The NWIFCA fully supports the proposals for a full-time 3 year PhD studentship as a cost-effective way to attaining a more in-depth understanding of these issues and ideally to provide some conclusive research so that a consensus can be reached. This would facilitate a faster, more efficient Appropriate Assessment for each year's fishery.

Final Appropriate Assessment Record

This is a record of the appropriate assessment required by Regulation 61 of the Conservation of Habitats and Species Regulations 2010, undertaken by the NWIFCA in respect of the above application, in accordance with the Habitats Directive (Council Directive 92/43/EEC).

Having considered that the fishery would be likely to have a significant effect on the Morecambe Bay and Duddon Estuary SAC, SPA and Ramsar Site, an Appropriate Assessment has been undertaken of the implications of the fishery in view of the site's conservation objectives.

Natural England was consulted under Regulation 61. The conclusions of this appropriate assessment are in accordance with the advice and recommendations of NE.

The assessment has concluded that the fishery has the potential for a likely significant effect on the conservation features and associated habitats of the Morecambe Bay and Duddon Estuary SAC, SPA and Ramsar Site. Considering the low levels of effort, tidal restrictions and imposition of an exclusion zone to protect the *Sabellaria alveolata* reef there will be no adverse effects on the integrity of the site

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Natural England Formal Conservation Advice

Date: 19 December 2016
Our ref: 203869
Your ref:



North Western Inshore Fisheries and Conservation Authority (NWIFCA)
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BY EMAIL ONLY

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Dear Mandy

HRA for Heysham Flat Size Mussel Fishery

Thank you for your consultation on the above which was received by Natural England on 13 December 2016.

Natural England is a non-departmental public body. Our statutory purpose is to ensure that the natural environment is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

THE CONSERVATION OF HABITATS AND SPECIES REGULATIONS 2010 (AS AMENDED)

The application site is within a European designated site (also commonly referred to as Natura 2000 sites), and therefore has the potential to affect its interest features. European sites are afforded protection under the Conservation of Habitats and Species Regulations 2010, as amended (the 'Habitats Regulations'). The application site is within the Morecambe Bay Special Protection Area (SPA), Morecambe Bay and Duddon Estuary potential SPA (pSPA) and the Morecambe Bay Special Area of Conservation (SAC) which are European sites. The site is also listed as Morecambe Bay Ramsar site¹ and also notified at a national level as Morecambe Bay Site of Special Scientific Interest (SSSI). Please see the subsequent sections of this letter for our advice relating to SSSI features.

In considering the European site interest, Natural England advises that you, as a competent authority under the provisions of the Habitats Regulations, should have regard for any potential impacts that a plan or project may have². The [Conservation objectives](#) for each European site explain how the site should be restored and/or maintained and may be helpful in assessing what, if any, potential impacts a plan or project may have.

¹ Listed or proposed Wetlands of International Importance under the Ramsar Convention (Ramsar) sites are protected as a matter of Government policy. Paragraph 118 of the National Planning Policy Framework applies the same protection measures as those in place for European sites.

² Requirements are set out within Regulations 61 and 62 of the Habitats Regulations, where a series of steps and tests are followed for plans or projects that could potentially affect a European site. The steps and tests set out within Regulations 61 and 62 are commonly referred to as the 'Habitats Regulations Assessment' process. The Government has produced core guidance for competent authorities and developers to assist with the Habitats Regulations Assessment process. This can be found on the Defra website.

<http://www.defra.gov.uk/habitats-review/implementation/process-guidance/guidance/sites/>



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No objection

Natural England notes that your authority, as competent authority under the provisions of the Habitats Regulations, has undertaken an Appropriate Assessment of the proposal, in accordance with Regulation 61 of the Regulations. Natural England is a statutory consultee on the Appropriate Assessment stage of the Habitats Regulations Assessment process.

Your appropriate assessment concludes that your authority is able to ascertain that the proposal will not result in adverse effects on the integrity of any of the sites in question. Having considered the assessment, and the measures proposed to mitigate for all identified adverse effects that could potentially occur as a result of the proposal, including the proposed exclusion zone, Natural England advises that we concur with the assessment conclusions, providing that all mitigation measures are appropriately secured in any permission given.

WILDLIFE AND COUNTRYSIDE ACT 1981 (AS AMENDED)

No objection – no conditions requested

This application is within Morecambe Bay Site of Special Scientific Interest (SSSI). Natural England is satisfied that the proposed development being carried out in strict accordance with the details of the application, as submitted, will not damage or destroy the interest features for which the site has been notified. We therefore advise your authority that this SSSI does not represent a constraint in determining this application. Should the details of this application change, Natural England draws your attention to Section 28(1) of the *Wildlife and Countryside Act 1981* (as amended), requiring your authority to re-consult Natural England.

Yours sincerely



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Annex A – Illustrative map of the Heysham Flat Mussel Fishery Exclusion Zone – incorporating the main *Sabellaria alveolata* reef (from historical mapping). Additional areas may be subject to a Voluntary Agreement / Code of Conduct annually dependent on positions of outlying live worm colonies.

