Fisheries in EMS Habitats Regulations Assessment for Amber and Green risk categories

NWIFCA-MB-EMS-UNDERSIZE MUSSEL MORECAMBE BAY HANDGATHERING AND DREDGE FISHERY

19th August 2022

Site: Morecambe Bay and Duddon Estuary

European Designated Sites:
UK0013027 Morecambe Bay Special Area of Conservation (SAC)
UK9020326 Morecambe Bay and Duddon Estuary SPA
UK11045 Morecambe Bay Ramsar
UK11022 Duddon Estuary Ramsar

European Marine Site: Morecambe Bay and Duddon Estuary

Qualifying Feature(s):

SAC and Ramsar

H1110. Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks
H1130. Estuaries

H1140. Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats
H1150. Coastal lagoons
H1160. Large shallow inlets and bays
H1170. Reefs
H1220. Perennial vegetation of stony banks; Coastal shingle vegetation outside the reach of waves (NON MARINE)
H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand; Pioneer saltmarsh
H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)*
H2110. Embryonic shifting dunes (NON MARINE)
H2120. Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); Shifting dunes with marram (NON MARINE)
H2130. Fixed dunes with herbaceous vegetation ("grey dunes"); Dune grassland (NON MARINE)
H2150. Atlantic decalcified fixed dunes (*Calluno-Ulicetea*); Coastal dune heathland (NON MARINE)
H2170. Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*); Dunes with creeping willow (NON MARINE)
H2190. Humid dune slacks (NON MARINE)
S1166. *Triturus cristatus*; Great crested newt (NON MARINE)
Natterjack Toad (NON MARINE)

SPA and Ramsar

A026 Egretta garzetta; Little egret (non-breeding)
A038 *Cygnus Cygnus*; Whooper swan (non-breeding)
A040 *Anser brachyrhynchus*; Pink-footed goose (non-breeding)
A048 *Tadorna tadorna*; Common shelduck (non-breeding)
A050 Anas Penelope; Wigeon - (non-breeding – Ramsar only)
A054 *Anas acuta*; Northern pintail (non-breeding)
A063 *Somateria mollissima*; Common eider (non-breeding – Ramsar only)
A067 Bucephala clangula; Goldeneye - (non-breeding – Ramsar only)
A069 Mergus serrator; Red-breasted merganser - (non-breeding – Ramsar only)
A130 *Haematopus ostralegus*; Eurasian oystercatcher (non-breeding)
A137 *Charadrius hiaticula*; Ringed plover (non-breeding)
A140 *Pluvialis apricaria*; European golden plover (non-breeding)
A141 *Pluvialis squatarola*; Grey plover (non-breeding)
A142 *Vanellus vanellus;* Lapwing - (non-breeding – Ramsar only)
A143 *Calidris canutus*; Red knot (non-breeding)
A144 *Calidris alba*; Sanderling (non-breeding)
A149 *Calidris alpina alpina*; Dunlin (non-breeding)
A151 *Calidris pugnax;* Ruff (non-breeding)
A156 *Limosa limosa;* Black-tailed godwit (non-breeding)
A157 *Limosa lapponica*; Bar-tailed godwit (non-breeding)
A160 *Numenius arquata*; Eurasian curlew (non-breeding)
A162 *Tringa totanus*; Common redshank (non-breeding)
A169 *Arenaria interpres*; Ruddy turnstone (non-breeding)
A176 Larus melancephalus; Mediterranean gull (non-breeding)
A183 *Larus fuscus*; Lesser black-backed gull (Breeding, non-breeding)
A184 *Larus argentatus*; Herring gull (Breeding)
A191 *Sterna sandvicensis*; Sandwich tern (Breeding)
A193 *Sterna hirundo*; Common tern (Breeding)
A195 *Sterna albifrons*; Little tern (Breeding)
Phalacrocorax carbo; Cormorant – (non-breeding – Ramsar only)
Podiceps cristatus; Great crested grebe - (non-breeding – Ramsar only)
Seabird assemblage
Waterbird assemblage

Site sub-feature(s)/Notable Communites:

SAC and Ramsar

Sandbanks which are slightly covered by sea water all the time – Subtidal coarse sediment, subtidal mixed sediments, subtidal sand, subtidal mud.

Estuaries - Intertidal mud, intertidal sand and muddy sand, intertidal mixed sediments, intertidal coarse sediment, intertidal rock, intertidal stony reef, intertidal biogenic reef: mussel beds, subtidal coarse sediment, subtidal mixed sediments, subtidal sand, subtidal mud, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows (Glauco-Puccinellietalia maritimae).

Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats – Intertidal mud, intertidal sand and muddy sand, intertidal mixed sediments, intertidal seagrass beds, intertidal coarse sediment.

Coastal lagoons

Large shallow inlets and bays – Intertidal mud, intertidal sand and muddy sand, intertidal mixed sediments, intertidal seagrass beds, intertidal coarse sediment, intertidal rock, intertidal stony reef, intertidal biogenic reef: mussel beds, intertidal biogenic reef: Sabellaria spp., subtidal stony reef, circalittoral rock, subtidal coarse sediment, subtidal mixed sediments, subtidal sand, subtidal mud, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows (Glauco-Puccinellietalia maritimae).

Reefs – Circalittoral rock, intertidal biogenic reef: mussel beds, intertidal biogenic reef: Sabellaria spp., intertidal rock, intertidal stony reef, subtidal stony reef.

Perennial vegetation of stony banks: Coastal shingle vegetation outside the reach of waves

***Salicornia* and other annuals colonising mud and sand: Glasswort and other annuals colonising mud and sand; Pioneer saltmarsh**

Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (referred to as Saltmarsh)

Embryonic shifting dunes

Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); Shifting dunes with marram

Fixed dunes with herbaceous vegetation ("grey dunes"); Dune grassland

Atlantic decalcified fixed dunes (*Calluno-Ulicetea*); Coastal dune heathland

Dunes with *Salix repens spp. Argentea* (*Salicion arenariae*); dunes with creeping willow

Humid dune slacks

Great crested newt (*Triturus cristatus*)

Supporting habitat: Great crested newt (NON MARINE) – coastal sand dunes
Natterjack Toad (NON MARINE)- coastal sand dunes

SPA and Ramsar

Annual vegetation of drift lines, Atlantic salt meadows (Glauco-puccinellietalia maritimae), coastal lagoons, freshwater and coastal grazing marsh, intertidal biogenic reef: mussel beds, intertidal coarse sediment, intertidal mud, intertidal rock, intertidal sand and muddy sand, intertidal seagrass beds, intertidal stony reef, Salicornia and other annuals colonising mud and sand, water column.

Generic sub-feature(s):

Intertidal mud and sand, Intertidal mud, Seagrass, Saltmarsh spp., Brittlestar beds, Subtidal muddy sand, Intertidal boulder and cobble reef, Subtidal boulder and cobble reef, *Sabellaria* spp. reef, Intertidal boulder and cobble reef, Surface feeding birds, Estuarine birds, Intertidal mud and sand, Intertidal boulder and cobble reef, Saltmarsh spp., Coastal lagoons.

High Level Conservation Objectives:

Morecambe Bay SAC

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed above), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species
- The structure and function (including typical species) of qualifying natural habitats
- The structure and function of the habitats of qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

Morecambe Bay SPA

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified and the Ramsar Site and the wetland habitats and/or species for which the site has been listed (the 'Qualifying Features' listed above), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive and ensure that the site contributes to achieving the wise use of wetlands across the UK, by maintaining or restoring:

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Duddon Estuary SPA

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified and the Ramsar Site and the wetland habitats and/or species for which the site has been listed (the 'Qualifying Features' listed above), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive and ensure that the site contributes to achieving the wise use of wetlands across the UK, by maintaining or restoring:

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Lune Marine Conservation Zone (MCZ)

The site is designated for smelt (*Osmerus eperlanus*) with a recover objective.

Updated conservation advice for Morecambe Bay and Duddon Estuary SPA.

Changes specific to this HRA;-

- Grey plover, dunlin, sanderling and turnstone have a restore target for population due to declines in population exceeding regional and national trends.

Fishing activities assessed:

Gear type(s):

Hand-gathered – Undersize Mussel (*Mytilus edulis*)
Vessel dredge - Undersize Mussel (*Mytilus edulis*)

1. Introduction

1.1 Need for an HRA assessment

The NWIFCA proposes to authorise a number of undersize (less than 45mm) mussel hand-gathered and vessel dredge fishery within the site.

The proposed opened fisheries will be by permits issued under NWIFCA Restrictions on the Use of a Dredge 2017, and by authorisation issued under NWIFCA Byelaw 3, Permit to Fish Cockles and Mussels by derogating against the minimum landing size for mussel for the hand gathered fishery. After 1st of September 2022, permits to fish undersize mussel will be issued under the flexible conditions of the new Byelaw 3 cockle and mussel hand fishing permit 2019.

This proposal is classed as a plan or project and the area lies within a European designated site (also commonly referred to as Natura 2000 sites), and therefore has the potential to affect the designated features. European sites are protected under the Conservation of Habitats and Species Regulations 2017. The proposal site is within the Morecambe Bay and Duddon Estuary SPA and the Morecambe Bay Special Area of Conservation (SAC). The site is designated as Morecambe Bay Ramsar site, and Morecambe Bay, Site of Special Scientific Interest (SSSI).

As a competent authority under the provisions of the Habitats Regulations, the NWIFCA should have regard for any potential impacts that a plan or project may have. Under the provisions of the Habitats Regulations, NWIFCA has undertaken an Appropriate Assessment of the proposal, in accordance with Regulation 61. Natural England is a statutory consultee on the Appropriate Assessment stage of the Habitats Regulations Assessment process, and their advice is incorporated into this document.

1.2 Proposal

The NWIFCA proposes to authorise a number of undersize (less than 45mm) mussel hand-gathered and vessel dredge fisheries, these are:

- An authorised hand gathered seed mussel fishery on a section of Heysham Flat to open in August/September 2022.
- A permitted dredge seed mussel fishery on a section of South America (North Morecambe Bay) to open August / September 2022.
- A permitted dredge, seed mussel fishery on Perch Scar (Fleetwood, North Morecambe Bay) to open August/September 2022.

The proposed opened fisheries will be by permits issued under NWIFCA Restrictions on the Use of a Dredge 2017, and by authorisation issued under NWIFCA Byelaw 3, Permit to Fish Cockles and Mussels (para 6.) by derogating against the minimum landing size for mussel for the hand gathered fishery.

The purpose of this site-specific assessment document is to assess whether or not, in the view of NWIFCA the proposed fishing activity of hand-gathering and vessel dredging of undersize mussel at the specified mussel bed in Morecambe Bay, is likely to have a significant effect on the designated features of the site. This assessment will determine whether the proposed activities will have an adverse effect on the integrity of this European Site.

2. Information about the EMS

(See cover pages, where details of the designated features and sub-features are listed.)

3. Interest feature(s) of the EMS categorised as 'Red' risk and overview of management measure(s) (if applicable)

The Morecambe Bay and Duddon Estuary European Site interest features of; boulder and cobble reef, *Sabellaria alveolata* reef and Seagrass beds are protected from all bottom towed gears, in addition Seagrass beds are protected from bait collecting or working a fishery by hand or using a hand operated implement through a prohibition under NWIFCA Byelaw 6, introduced in May 2014.

4. Information about the fishing activities within the site

4.1 Background

It is important to note that mussel beds in Morecambe Bay are almost exclusively found on hard substrate - post-glacial moraine skears – and consequently respond quite differently to fishing pressures than in other fisheries such as the Wash in the UK, and the Waddensee in the Netherlands, where mussel beds are on soft substrates. There are two distinct mussel resources in Morecambe Bay that can be highly variable in abundance and distribution. These are size mussel (>45mm), and undersize (seed and part-grown) mussel.

A feature of Morecambe Bay is the irregular but frequent occurrence of large and extensive mussel spat settlements. These settlements are usually very dense with little or no embyssment to the underlying substrate and quickly build up large amounts of sediment and pseudo-faeces (mussel mud). Within a very short space of time these populations become unstable and vulnerable to erosion through weather and/or tide, or predation from vast numbers of starfish. They are referred to as "ephemeral" beds (Dare, 1971 & 1976) and the Authority takes the line that although they are undersized they should be fished as early as possible as they would otherwise be washed out of the fishery and a valuable commercial resource lost. The mussel is fished, either by hand-raking or by specialised mussel dredgers, neither of which impact the cobble and boulder skears due to the deep soft mud layer on which the mussel sits. Removal of undersize has also been authorised over the years when huge swarms of common starfish (*Asterias rubens*) have been present on a bed, predating voraciously on mussel of varying sizes dependent on the size of the starfish and their ability to open the shells. The harvested mussel is re-deposited in other areas to grow on until of a commercially viable size. The number of mussel cultivation sites has grown in areas such as the Wash, Northern Irish and Irish loughs, and the Menai Strait, the latter of which is an MSC accredited sustainable fishery. Relaying in Morecambe Bay has been trialled unsuccessfully as the mussel, even though relaid in more sheltered areas, is unable to persist due to the prevailing environmental conditions.

4.2 Mussel Hand-gathering

Hand gathering of mussel has been a long-standing traditional fishery within Morecambe Bay and the Duddon Estuary. Methods have changed very little over the years, with a rake and net bag used to remove the mussel from the underlying muddy substrate. Hand gathers access the beds mainly by ATVs and occasionally tractors due to the soft sediment. Depending on the area being fished, fishing is often limited by the tides and can be severely restricted. There is little to no by-catch associated with this fishery as it is highly selective.

Hand gathering of seed mussel is by written authorisation to current NWIFCA Byelaw 3 permit holders only. As of the 1st of September 2022 this will be under the flexible permit conditions of the new NWIFCA Byelaw 3. Areas permitted for harvest are incorporated into the authorisation conditions, along with any other restrictions. Seed mussel is transported, usually by road-freight, to its relaying destination.

4.2.1 Regulation of Hand-gathering

NWIFCA regulates mussel hand-gathering fisheries in its District through a suite of byelaws. Regulations relating specifically to hand gathering of mussels in Morecambe Bay are listed below. The full text of the regulations available on the NWIFCA website (https://www.nw-ifca.gov.uk/byelaws/).

NWIFCA Byelaw 3	Permit to fish for cockles and mussels (revoked as of Sep 1st 2022)
NWIFCA Byelaw 3	Cockle and mussel hand fishing permit (2019) (in force as of Sep 1st 2022)
NWSFC Byelaw 13a	Cockles and mussels – management of the fishery
NWSFC Byelaw 16	Shellfishery – temporary closure

NWIFCA Byelaw 3 Permit to Fish for Cockles and Mussels was introduced in 2012 and succeeded in creating vastly improved management of the fisheries creating a more professional and responsible group of fishers. Under these regulations, the number of permit holders has reduced significantly. There are currently a maximum of 137 NWIFCA Byelaw 3 permits, which have be issued for the 2021 – 2022 season and a maximum of 150 permits, which could be issued for the 2022 – 2023 season under the new NWIFCA Byelaw 3 in force as of Sep 1st 2022. Without a permit within the NWIFCA district it is still permissible when mussel beds are open for 5kg per person per day of size mussel to be collected for human consumption.

In the NWIFCA District, all mussel beds are open to hand gathered size mussel fishing for Byelaw 3 permit holders. However, if it is deemed that activities may impact the protected features of the site, a HRA is conducted, and management implemented if/where required.

4.3 Mussel Dredging

Dredging of undersize mussel for aquaculture has been a regular occurrence in Morecambe Bay since the 1960s. Dredging of mussel for aquaculture has developed significantly with technology concentrating on gear with low environmental impact. Seed mussel dredgers scoop up the top layer of loose mussel and mussel mud, bringing the catch through the water giving the mud a chance to flush through the netting, and depositing the catch in open holds on-board. There is little by-catch associated with this fishery, with starfish, shore crab, and the occasional flatfish found in the catch.

Mussel is typically transported by vessel to where it is going to be re-laid where it is flushed through the sides of the vessel and straight on to the bottom growing lays. In areas such as the Menai Strait where much of the Morecambe Bay mussel goes, operators work together to farm the mussel. Long-standing studies of what works in practice along with a wealth of research with Bangor University scientists has led to a method of moving mussel around to gain best growth potential and minimise losses from crab and starfish predation. Much of this depends on the size of mussel when wild caught and the strength of its shell.

4.3.1 Regulation of Dredge Fishery

Dredging of undersize mussel has been previously been managed by the North West and North Wales Sea Fisheries Committee (NW&NWSFC) under a 30 year Fishery Order - the Morecambe Bay Mussel Fishery Order (MBMFO) 1978, whereby fishing could only be carried out by licensees of the Order. The SFC was the holder of the MBMFO and also the Menai Strait Several Order where it leased out areas for aquaculture. The MBMFO expired in 2009, and the administrative area for NWIFCA changed, removing North Wales and adding Cumbria to the old NW&NWSFC boundaries. NWIFCA managed the fishery from 2009 - 2017 by written authorisation.

In 2017 NWIFCA introduced a dredge byelaw that prohibits dredge fishing of all types across the District unless specifically permitted by the Authority, in which case fishers must apply and pay for a permit, with a fee structure based on vessel length. Areas permitted for dredging are incorporated into permit conditions, along with any other restrictions. Dredge permits fluctuate each year depending on the seed mussel resource and since the byelaw NWIFCA have issued a maximum of three permits in one year.

4.4 NWIFCA Un-written Policy on Seed Mussel

NWIFCA has been developing a Morecambe Bay mussel management plan over many years, unfortunately there have been a number of outstanding criteria to decide on in terms of brood stock and bird food requirement. Once completed, this work will assist with the policy of managing the mussel fisheries.

Naturally there is some competition between sectors for mussel resources, and in the past there have been major disagreements. Due to the make-up of IFCAs and the inclusion of fishery interests in committee members, these disagreements could at times dominate committee meetings. NWIFCA set up a separate stakeholder forum to remove these discussions from committee proceedings, called the Bivalve Mollusc Working Group (BMWG). Established in 2015 it is made up of NWIFCA officers, stakeholder representatives from all sectors of the fisheries along with Natural England and nature conservation representatives.

In 2017 BMWG agreed a definition of ephemerality in relation to the mussel resources to assist NWIFCA in making decisions on when mussel could be harvested as seed. The agreed definition is:

'*Certain conditions need to occur for the NWIFCA to authorise fishing of seed mussel, namely that the stock has been assessed as in imminent likelihood of being lost to the fishery through natural causes, and subsequently that a high proportion of it will not grow through to reach size; and that conditions pertain to fishing being possible without risk of damage to the cobble and boulder substrate conservation features. These include*:

- *settlement in high abundance and density, and;*
- *fast growing and high deposits of pseudofaeces (mussel mud), and;*
- *the mussel mud becoming very soft and loose and at risk of being washed out, taking the mussel with it;*
- *or dense settlement being heavily predated on by thousands of starfish.*

The fishery is highly variable depending on the vagaries of the stock, and the changes in the dynamic environment of the north west coast and have to be assessed on a year by year basis.

In addition to the variables outlined above affecting the recruitment and longevity of mussel within the Bay, the fact that the natural environment is highly changeable with sandbanks and channels shifting tens of metres overnight adds a further complexity to what can affect the stock on an annual if not seasonal basis. In light of the high unpredictability of stock and conditions NWIFCA scientists assess each bed to ensure that authorisation / permitting of seed mussel removal only occurs when the mussel is in a vulnerable condition. This is itself can be challenging as some areas in some years can only be accessed by boats drying out over low water.

4.5 Biosecurity

Morecambe Bay is currently shellfish disease free and the Authority considers it a priority to maintain this status. The non-native species Chinese Mitten Crab (Eriocheir sinensis), Wireweed (Sargassum muticum) and Leathery Sea-squirt (Styela clava) have previously been recorded within the area. In order to implement effective measures to prevent the introduction and / or spread of diseases or non-natives the Authority has developed and published a Biosecurity Plan, detailing controls and conditions that will be applied to all commercial shellfish activities. The Biosecurity Plan seeks to ensure that consignments and/or areas from which they come, are regularly and thoroughly checked for invasive non-native invasive species (INNS). NWIFCA now has firm evidence of Chinese mitten crabs in Morecambe Bay. In September 2020 two adult Chinese mitten crab were caught and retained and were subsequently confirmed by NWIFCA. Gathers have been advised to inspect their catch for Chinese mitten crabs whilst fishing on mussel beds and a reporting system is in place in the NWIFCA biosecurity plan. Officers from the NWIFCA also completed quarterly monitoring and surveillance on Heysham Flat and Foulney mussel beds, producing report to assist other regulators between 2018 and 2020. Officers have produced informative posters for the general public in order to raise awareness of the risk of the Chinese mitten crab, and requirement to report sightings.

4.6 Variability of Stock and Conditions

Managing a resource such as mussel in Morecambe Bay is hugely problematic due to the highly dynamic environment in which it is found, the vagaries of mussel recruitment, changing weather patterns particularly associated with climate change, and variability of predator presence, particularly from common starfish. It is impossible to predict what will occur from one year to the next, and in times and places from one month to the next. NWIFCA holds decades of reports, stock assessments and photographic evidence on this resource.

Morecambe Bay is characterised by vast areas sand underlain by glacial moraine. The channels shift, sometimes hundreds of metres overnight. The sand also moves around, sometimes covering over the glacial moraine, sometimes leaving it exposed. There are a number of examples where large areas have been covered in sand overnight.

Some areas of exposed moraine are relatively static due to their height on the shoreline and presumably shelter - Heysham Flat main skear, and Foulney Twist (main skear). The bottom ends of both of these areas have been sand covered in the past decade. Other areas are highly changeable and can change month on month, with areas that have been exposed one month, observed buried by a sand covering a month later.

Mussel needs a hard substrate on which to recruit, and when the moraine is exposed it provides ideal conditions. Where the brood stock for the dense aggregations seen in the Bay is situated has not established. There are older mussel stocks positioned on the upper reaches of Foulney and Foulney Ditch in most years and these may act as breeding stock. However, some larval dispersal modelling by Bangor University, although not specifically focussed on Morecambe Bay mussel, has provided evidence to the hypothesis that brood stock actually lies much further south even within the Mena Strait, has credence.

When considering the data from Dr Dare that 0 - 25% of stock might remain following natural scour, wash out and predation, a fact also observed by NWIFCA scientists, and also that dredge fishing is never 100% efficient and that a percentage of stock will remain post-fishing, it is natural to assume that some of this remaining mussel may over-winter. Un-embyssed seed mussel has an ability to ‘hunker down’ into the sediment when space allows in order to avoid the elements, particularly the effects of wind. This is commonly observed on Morecambe Bay mussel beds and can occur in coarse ground as well as soft. This provides some protection against scour. A frequent occurrence in the following spring is the next cohort of dense spat settling on top of this remaining mussel and smothering it. As the new mussel grows (rapidly) and puts down high levels of mussel mud, the older mussel disappears under this accumulation and generally dies.

4.7 Current Status of Stock

4.7.1 Heysham Flat mussel bed

Heysham Flat was inspected five times this year, as the nature of the beds can result in considerable changes over a short period. As of the most recent inspection on the 12th of August, the area on the higher shore to conger rock consisted of mussel 20-25mm with some up to 35mm mixed in ~ 80-90% coverage. The mussel was predominantly loose with some hard in and scoured areas present.

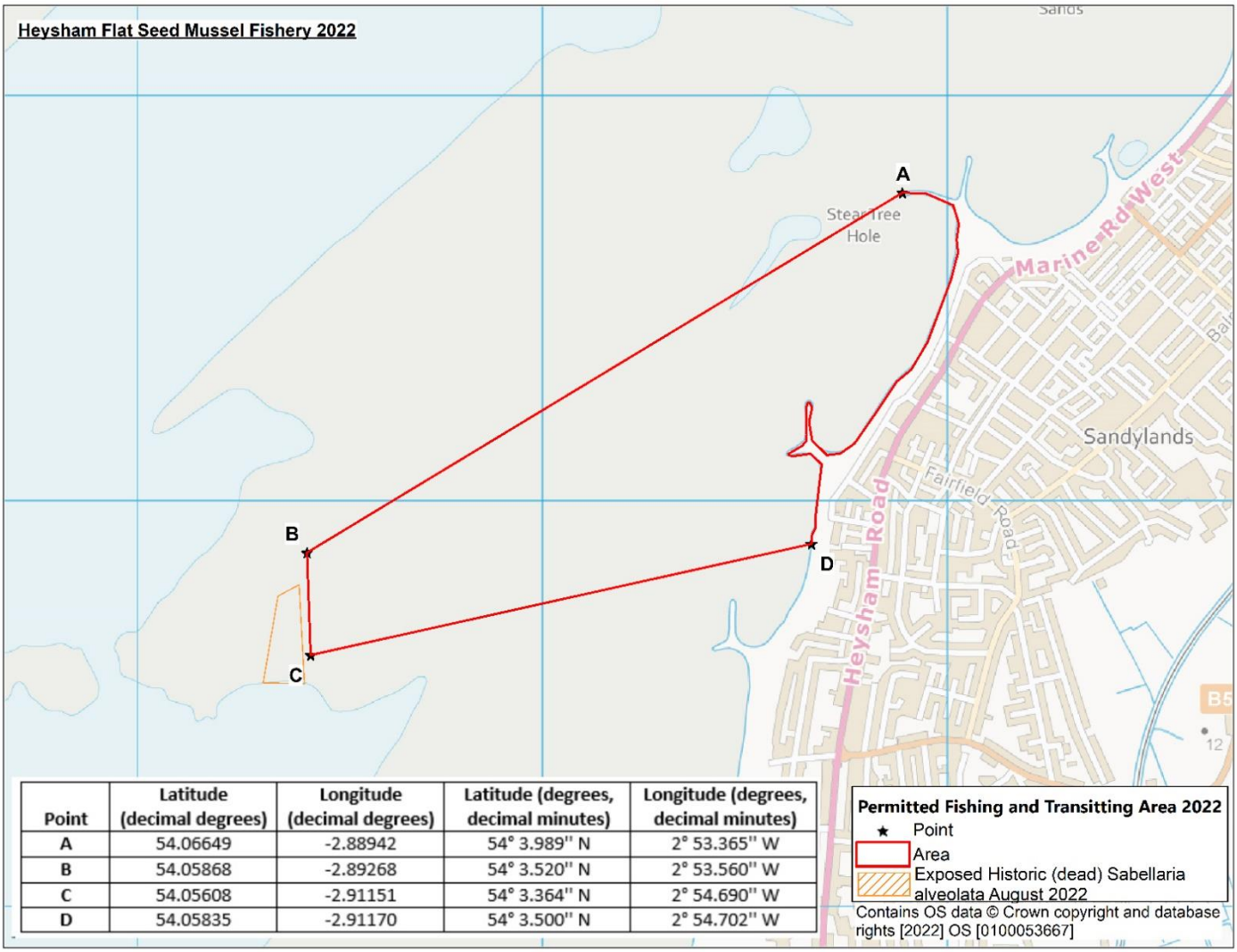
The area from conger rock to Dallam dyke has larger mussel present from 35-45mm. Areas further down the skear were very mixed, with size mussel making up approximately 40-50% of overall weight. The underlying substrate is a mix of sand and mud and is firm unlike the usual mussel mud present on Heysham. Visable presence of *Sabellaria alveolata* was found, with a band present across much of the skear to the West of conger rock (Figure 1). *Sabellaria* was also still present on the North and South of the skear away from the main mussel bed. Both sides of Dallam Dyke were scoured in large areas. The full survey report and images are provided in Annex 2.

In previous years, Heysham has been considered for a hand gathered seed fishery on the proviso that it has relatively uniform first year undersize mussel that has the high likelihood of being washed off over winter. This year, this appears to be the case for the section of bed between Conger Rock and the foreshore. However, the highly mixed size stock beyond Conger indicates some stock has survived the winter. In addition, the bed is currently unclassified; and the Food Law Code of Practice (Chapter 7.1.15)) states that they *‘do not permit the movement of adult or partially developed LBMs from an unclassified area for further*

short-term growth before marketing.' Therefore, our recommendation for mussel fisheries on Heysham flat is as follows:

Recommendation: This year, due to the presence of size mussel lower down the bed, Heysham Flat will aim to be re-classified, and assessed as a hand gathered size mussel fishery once classification is obtained. The **upper end of the bed from the shore to Conger Rock is proposed as a hand gathered seed fishery**.

The area of bed proposed for fishing is highlighted in red in the image below. The area is out with the area of *Sabellaria alveolata* indicated in orange.



Point	Latitude (decimal degrees)	Longitude (decimal degrees)	Latitude (degrees, decimal minutes)	Longitude (degrees, decimal minutes)
A	54.06649	-2.88942	54° 3.989'' N	2° 53.365'' W
B	54.05868	-2.89268	54° 3.520'' N	2° 53.560'' W
C	54.05608	-2.91151	54° 3.364'' N	2° 54.690'' W
D	54.05835	-2.91170	54° 3.500'' N	2° 54.702'' W

Figure 1. Map to show the approximate extent of the band of Sabellaria sp. present on Heysham Flat, and the area proposed for seed mussel hand gathering 12-08-22.

4.7.2 *South America mussel bed*

South America has been surveyed four times this year – all inspection notes are provided in Annex 3. The most recent survey on the 13th of August identified the bed was significantly smaller in extent than previous years. The full survey report is provided in Annex 3.

To the North of the mussel bed the mussel is patchy and on a thin layer of sediment, where there are bare areas the stony substrate is present. The mussel increased in density towards the middle of the bed. The mussel is a mix of 30-35mm mussel with size mixed in. The further South the less size mussel is present. Beyond the South extent of the area suitable for fishing the mussel become less dense, with little to no settlement present between the mussel and the stony substrate until no mussel is present. On the eastern side of the bed, the mussel reduced in density moving south with the layer of sediment over the stony substrate reducing in depth until there was no mud/sand between the mussel and the stony substrate.

To the North East of mussel there is a large area of newly settled *Sabellaria alveolata* which has inhabited the stony substrate exposed early this year. The location of the most suitable area for seed fishing, and the location of *Sabellaria alveolata* is provided in figure 2.

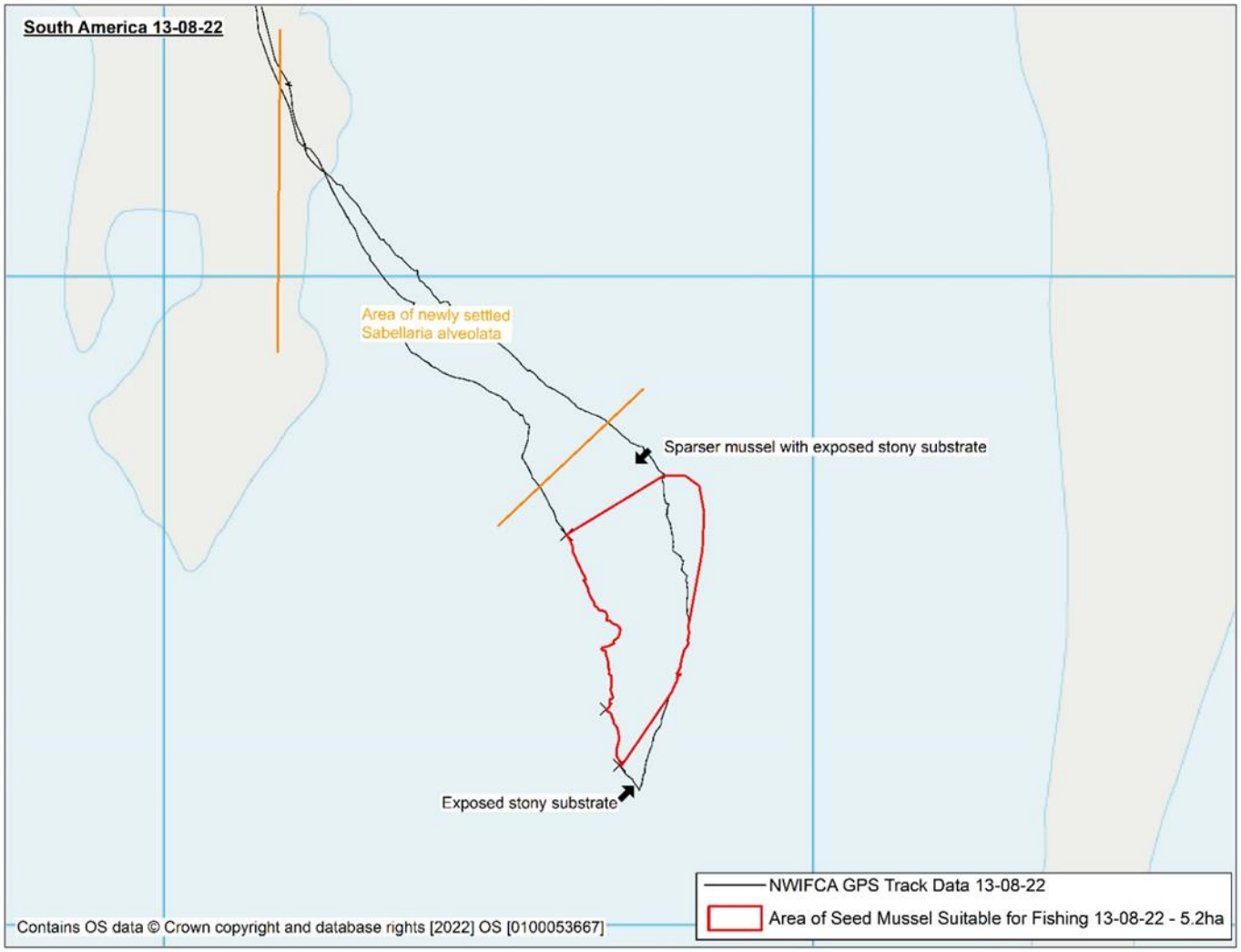
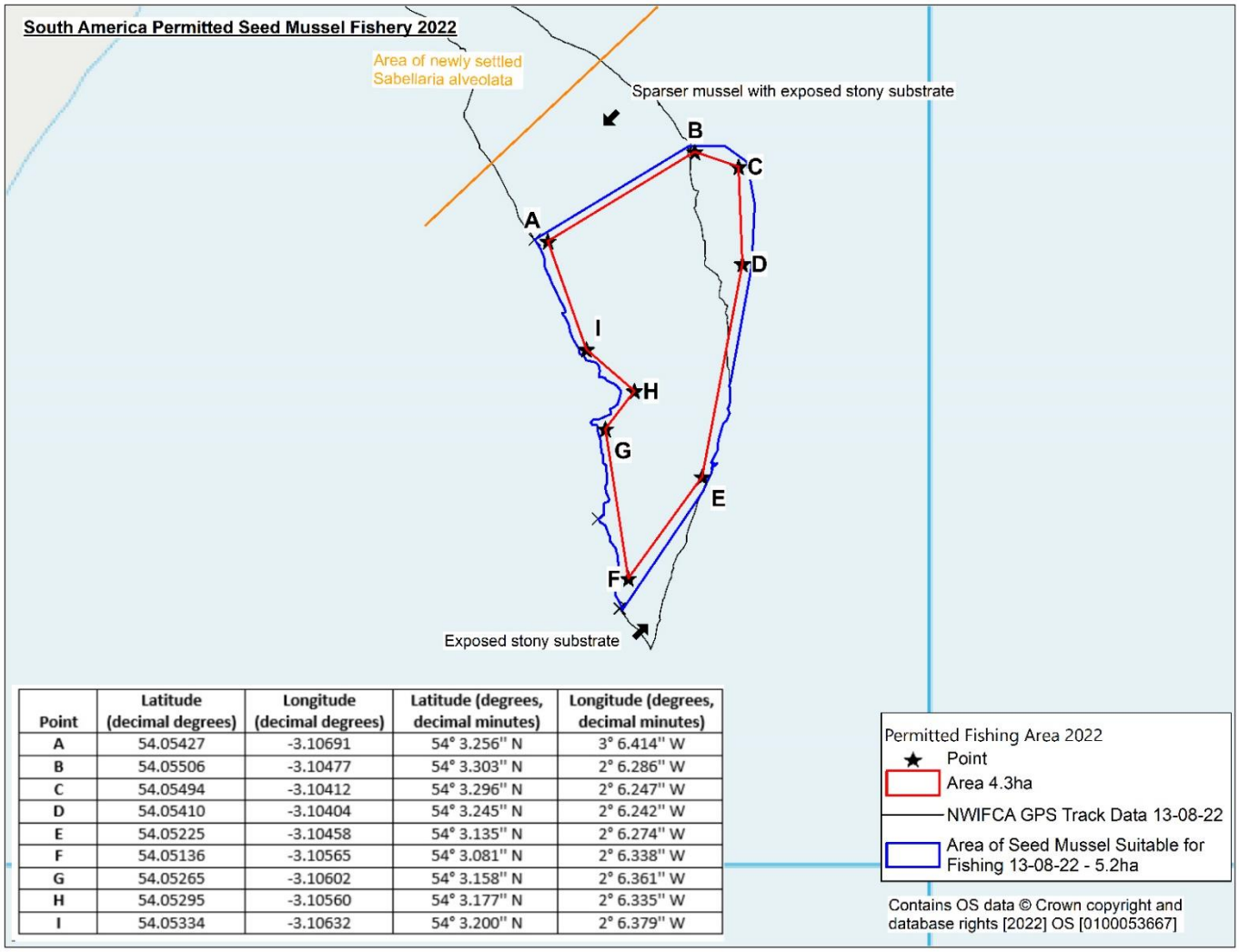


Figure 2. Map to show the approximate extent seed mussel suitable for fishing on South America and the location of *Sabellaria* 13-08-22.

Recommendation: This year, due to the reduced extent of the bed, the location and extent of *Sabellaria* and small patch of seed over suitable substrate, South America will be assessed for a **seed dredge mussel fishery in a restricted area (Figure 3).**



Point	Latitude (decimal degrees)	Longitude (decimal degrees)	Latitude (degrees, decimal minutes)	Longitude (degrees, decimal minutes)
A	54.05427	-3.10691	54° 3.256'' N	3° 6.414'' W
B	54.05506	-3.10477	54° 3.303'' N	2° 6.286'' W
C	54.05494	-3.10412	54° 3.296'' N	2° 6.247'' W
D	54.05410	-3.10404	54° 3.245'' N	2° 6.242'' W
E	54.05225	-3.10458	54° 3.135'' N	2° 6.274'' W
F	54.05136	-3.10565	54° 3.081'' N	2° 6.338'' W
G	54.05265	-3.10602	54° 3.158'' N	2° 6.361'' W
H	54.05295	-3.10560	54° 3.177'' N	2° 6.335'' W
I	54.05334	-3.10632	54° 3.200'' N	2° 6.379'' W

Figure 3. Map to show the approximate extent seed mussel suitable for fishing on South America and the proposed area to be open to seed fishing 13-08-22

4.7.3 *Fleetwood mussel beds*

The mussel beds in Fleetwood consist of Rossall Scar, Necking Scar, Kings Scar, Perch Scar and Black Scar. Inspection reports are provided in Annex 4. Fleetwood has been inspected three times this year, Perch Scar and Black Scar are normall considered to be commercially viable for seed dredge fisheries as they typically wash off each year, receive dense spat falls, and lay down mussel mud.

This year, very little mussel persists on Black Scar, most of the area is bare stony substrate. There has been a reduction in algal when compared to the July inspection (Figure 2). There is an area of mussel mud, approximately 50m x 50m (Figure 3) in the centre of the hard ground that is likely to have had mussel that has scoured out. A small amount of seed mussel remains that is 20-25mm in length. The band of larger mussel along the channel edge remains. Given the low spat cover and patchy nature of the bed, Black Scar will not be recommended for seed dredging this year.

In comparison, there was no algal growth on perch scar. An area of 2022 seed was present 2.2ha in size, with 40 - 60% coverage. The mussel has put down a layer of mussel mud. The mussel is 20-25mm in length. The area of seed does not cover the full extent of the hard substrate with little to no seed present near the channel and on the Northern end of the bed. This is a change from previous years as it typically receives a dense settlement.

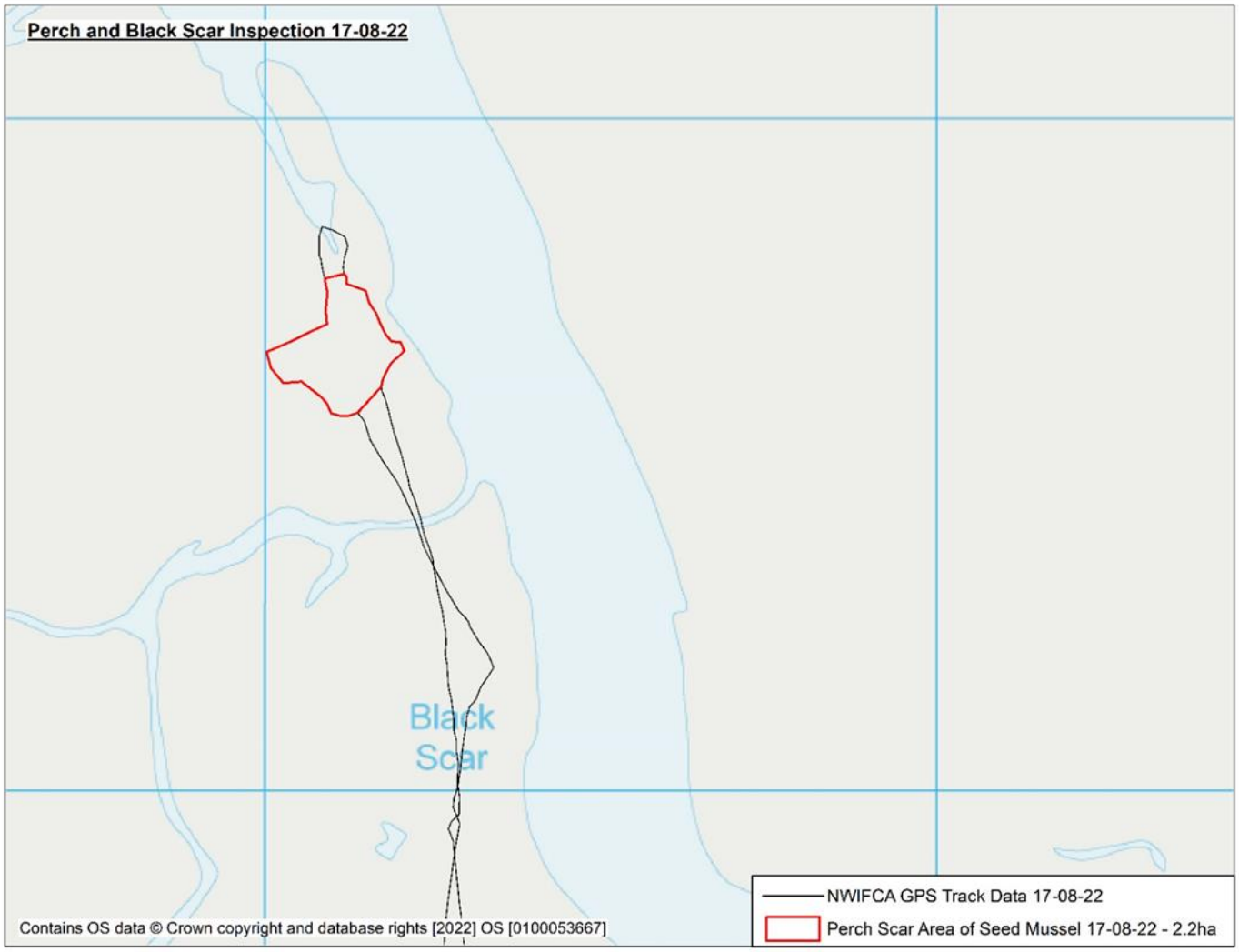
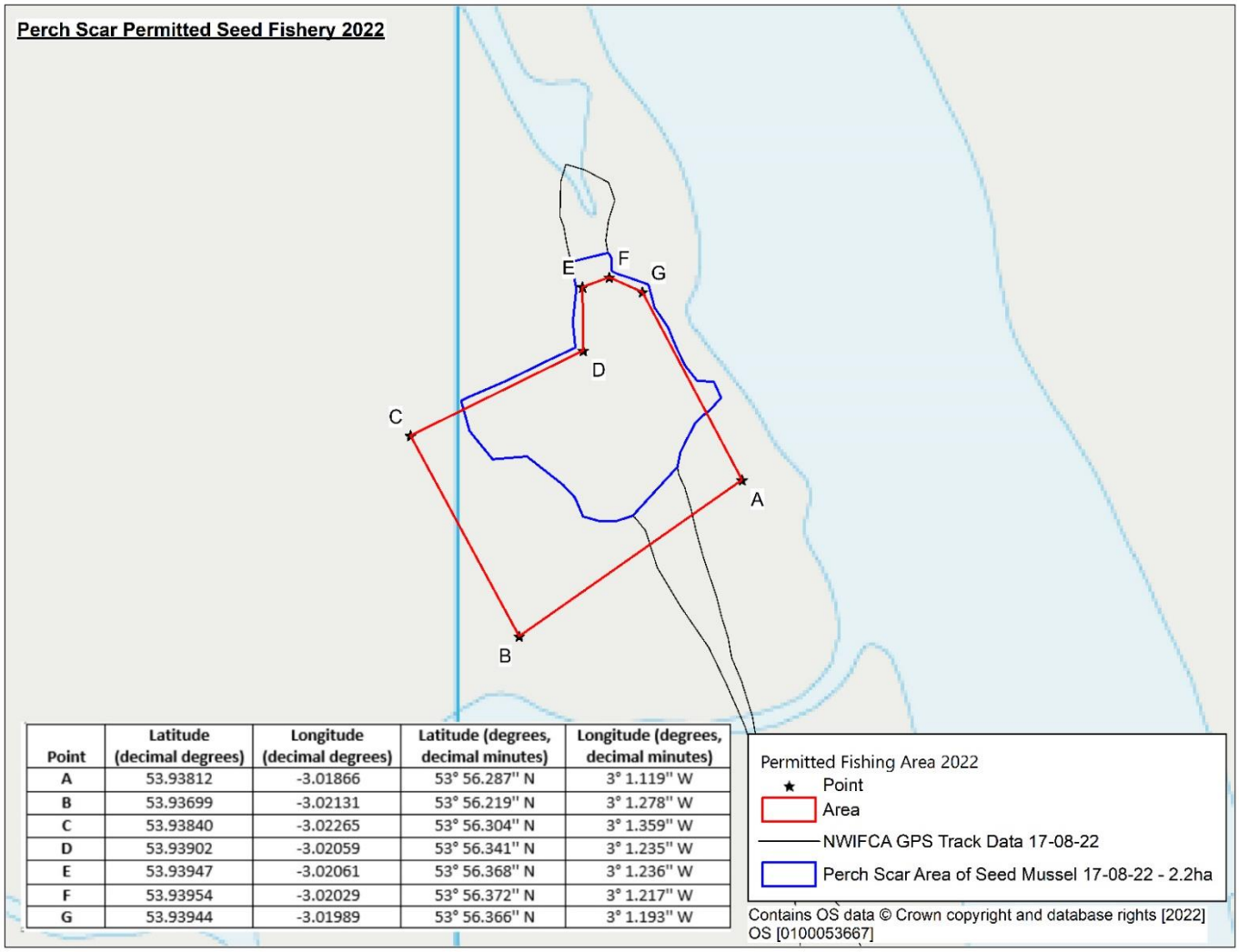


Figure 4. Area of seed mussel on Perch Scar 17-08-22

Recommendation: This year, due to the reduced extend of the bed, and small patch of seed over suitable substrate, Perch Scar will be assessed for **a seed dredge mussel fishery in a restricted area (Figure 5)**.



Point	Latitude (decimal degrees)	Longitude (decimal degrees)	Latitude (degrees, decimal minutes)	Longitude (degrees, decimal minutes)
A	53.93812	-3.01866	53° 56.287'' N	3° 1.119'' W
B	53.93699	-3.02131	53° 56.219'' N	3° 1.278'' W
C	53.93840	-3.02265	53° 56.304'' N	3° 1.359'' W
D	53.93902	-3.02059	53° 56.341'' N	3° 1.235'' W
E	53.93947	-3.02061	53° 56.368'' N	3° 1.236'' W
F	53.93954	-3.02029	53° 56.372'' N	3° 1.217'' W
G	53.93944	-3.01989	53° 56.366'' N	3° 1.193'' W

Figure 5. Restricted area of proposed seed mussel fishery on Perch Scar.

4.8 Summary of proposed fisheries

Based on the information provided in the inspection reports, consideration of the key features of the beds (presence of mussel mud, bed extent, presence of *Sabellaria alveolata* etc.), and the condition of mussel settlements, the following fisheries (Table 1) are proposed for this year. The possible impact of these fisheries on the designated features of Morecambe Bay will be assessed further in this document. All other mussel beds will remain closed to seed fishing.

Table 1. Summary of proposed undersize fisheries to be opened in Morecambe Bay.

Mussel bed	Proposed fishery	Legislation	Open date
Heysham Flat	Hand gathered seed fishery	NWIFCA Byelaw 3	September
South America	Dredge seed fishery	Restriction on the use of a dredge Byelaw 2017	September
Perch Scar (Fleetwood)	Dredge seed fishery	Restrictions on the use of a dredge Byelaw 2017	September

4.9 Information on fishing activity

There are currently ~150 Byelaw 3 permit holders able to fish for mussel and cockle in the district and could, in theory, target the beds for seed mussel. However, out of these permit holders, landings from the past two years show that ~20 fishers target mussel, and out of these, there are approximately 3 to 10 fishers that fish for seed mussel across the district by way of hand gathering when authorised to do so. In the past 5 years,

Heysham has been opened to hand gathered seed mussel since 2016. All previous HRA's are available here: https://www.nw-ifca.gov.uk/marine-protected-areas/hra/. Landings from the bed were 168 tonne in 2017, and 208 tonne in 2018, and the fishery was targeted for 1 to 2 months once opened. However, in the years from 2019 to 2021, no landings were made despite the fishery being opened. This is likely due to the presence of Chinese mitten crab.

The dredge fisheries have historically used a maximum of two boats. The activity takes between 1 to 4 tides once per year. South America has historically been open to dredge fishing each year since 2016, apart from 2017 to 2019, and was opened to hand gathered seed fishers in 2018. In the last dredge fishery, 1175 tonnes of seed was removed in 2021. Perch Scar was opened in 2019, 2020 and 2021.

5. Test for Likely Significant Effect (LSE)

The Habitats Regulations Assessment (HRA) is a step-wise process and is first subject to a coarse test of whether a plan or project will cause a likely significant effect on an EMS[1].

Is the activity/activities directly connected with or necessary to the management of the site for nature conservation? NO

5.1 Table 1: Assessment of LSE

Features: All qualifying features and sub-features that do not interact with the fishing activity have been **screened out.** Features and sub-features identified to interact with the fishing activity have been included table 1 below.

Pressures: All pressures from the Advice on Operations table provided in the Morecambe and Duddon Estuary Conservation Advice package (https://designatedsites.naturalengland.org.uk/SiteList.aspx?siteName=morecambe&countyCode=&responsiblePerson=&DesignationType=All) have been screened out, other than the pressures in the following table, due to the nature of the fishing activity.

Table 2. Designated features, their sensitivity to fishing activity and the potential for likely significant effect.

Qualifying Feature	Sub-feature	Potential pressure(s) from hand gathered and/or dredge fishing (where relevant)	Sensitivity	Potential for Likely Significant Effect?	Justification and evidence
H1130. Estuaries H1140. Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats H1160. Large shallow inlets and bays SPA Supporting Habitats	Intertidal mud	Abrasion/disturbance of the substrate on the surface of the seabed Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Sensitive Sensitive	No No	Activity does not occur within the vicinity of intertidal mud. Access to fishery will not be over the feature.
	Intertidal sand and muddy sand	Abrasion/disturbance of the substrate on the surface of the seabed Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Sensitive Sensitive	No No	Hand-gathered access to fishery will be over feature but unlikely to have any impact in such a highly dynamic site, due to low levels of effort and number of tides available for fishing. Hand-gathered access to fishery will be over feature but unlikely to have any impact in such a highly dynamic site, due to low levels of effort and number of tides available for fishing. Boat access over high water and no impact on intertidal sand and muddy sand features.
	intertidal /subtidal mixed sediments, intertidal coarse sediment	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Sensitive	Yes	Potential for interaction with mixed and coarse sediments. Feature and pressure taken through to AA.

[1] Managing Natura 2000 sites: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

	Intertidal / subtidal stony reef Intertidal / subtidal biogenic reef: including mussel and Sabellaria communities	Abrasion/disturbance of the substrate on the surface of the seabed	Sensitive	Yes	Both hand-gathering and seed mussel dredge fishing remove the mussel from the surface of the seabed and there is potential for abrasion / disturbance / penetration of the substrate on and below the seabed. Feature and pressures taken through to AA.
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Sensitive	Yes	
		Genetic modification & translocation of indigenous species	Sensitive	No	The area is shellfish disease and INNS free. Industry are encouraged to use recognised procedures to ensure equipment is clean of INNS. Consignments are monitored closely through CEFAS shellfish hygiene inspections, and NWIFCA liaison with regulators in Ireland and North Wales to ensure risk of translocation is minimal
		Litter	Sensitive	Yes	Feature and pressure taken through to AA.
		Removal of non-target species	Sensitive	No	There is little or no by-catch in this highly selective fishery.
		Removal of target species	Sensitive	Yes	Feature and pressure taken through to AA. The proposal is to remove mussel from the skear. Mussel beds are a characteristic and fluctuating community of the intertidal boulder and cobble skear interest sub-feature.
A026 Egretta garzetta; Little egret A038 *Cygnus Cygnus*; Whooper swan A040 *Anser brachyrhynchus*; Pink-footed goose A048 *Tadorna tadorna*; Common shelduck A050 Anas Penelope; Wigeon A054 *Anas acuta*; Northern pintail A063 *Somateria mollissima*; Common eider (Breeding) A067 Bucephala clangula; Goldeneye A069 Mergus serrator; Red-breasted merganser A130 *Haematopus ostralegus*; Eurasian oystercatcher A137 *Charadrius hiaticula*; Ringed plover A140 *Pluvialis apricaria*; European golden plover A141 *Pluvialis squatarola*; Grey plover A142 *Vanellus vanellus;* Lapwing A143 *Calidris canutus*; Red knot A144 *Calidris alba*; Sanderling A149 *Calidris alpina alpina*; Dunlin *A151 Calidris pugnax;* Ruff A156 *Limosa limosa;* Black-tailed godwit A157 *Limosa lapponica*; Bar-tailed godwit	Supporting Habitats assessed above	Removal of target species (Mussels)	Some species sensitive, others screened out	Yes	Species sensitive to removal of mussels: - Common eider - Eurasian oystercatcher - Red knot - Herring gull - All other shore feeding SPA feature which occasionally feed on infaunal molluscs.
		Removal of non-target species	Sensitive	No	Highly selective fishery. No by-catch or discards of non-target species.
		Visual disturbance	Sensitive	Yes	All species taken through to AA

A160 *Numenius arquata*; Eurasian curlew A162 *Tringa totanus*; Common redshank A169 *Arenaria interpres*; Ruddy turnstone *A176 Larus melancephalus;* Mediterranean gull *Phalacrocorax carbo;* Cormorant *Podiceps cristatus;* Great crested grebe A183 *Larus fuscus*; Lesser black-backed gull (Breeding) A184 *Larus argentatus*; Herring gull (Breeding)					
A191 *Sterna sandvicensis*; Sandwich tern (Breeding)					
A193 *Sterna hirundo*; Common tern (Breeding)					
A195 *Sterna albifrons*; Little tern (Breeding)					
Seabird assemblage					
Waterbird assemblage					

Is the potential scale or magnitude of any effect likely to be significant?[2]	**Alone** Yes **Comments :**	**OR In-combination[3]** Yes **Comments :** These activities also occur at the site: • Beam Trawl (Shrimp) • Pots and Creels • Light otter trawl (Fish) • Drift and Fixed nets (including stake) • Hand working (size mussel) • Hand-working (cockles)
Have NE been consulted on this LSE test? If yes, what was NE's advice?	No - NWIFCA consider AA required	

[2] Yes or uncertain: completion of AA required. If no: LSE required only.
[3] If conclusion of LSE alone an in-combination assessment is not required.

6. Appropriate Assessment

Potential risks to features

6.1 Potential risks to SAC habitat features of Morecambe Bay and Duddon Estuary from undersize hand gathered mussel or dredge seed fishery.

Features at risk of interacting with fishing activity:

- Intertidal / subtidal mixed sediments, intertidal / subtidal coarse sediment
- Intertidal / subtidal stoney reef
- Intertidal / subtidal biogenic reef: including mussel and *Sabellaria alveolata* communities

6.1.1 Pressures and Potential Impacts

The pressures that each Morecambe bay SAC feature and sub-feature are susceptible to are detailed in Natural England's 'Advice on Operations'. The key impacts that the relevant sub-features are vulnerable to are detailed below.

i. Abrasion/disturbance of the substrate on the surface of the seabed
ii. Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.

i) and ii) assessed together - both hand-gathering and seed mussel dredge fishing remove the mussel from the surface of the seabed and there is potential for abrasion / disturbance / penetration of the substrate on and below the seabed from the use of rakes and dredges.

iii. Litter

Past hand-gathered fisheries have had a poor reputation for large amounts of litter left deposited on the parking and access areas, and on the fishery. Items have included food and drink receptacles, net bags and sacks. Potential impacts could include entanglement of fish and birds in the bags and sacks, and swallowing / entanglement by / of birds and mammals (both marine and terrestrial) of other litter.

iv. Removal of target species from biogenic mussel bed communities

Potential to affect the presence and spatial distribution of feature communities, the presence and abundance of typical species and the species composition of component communities.

6.1.2 Exposure

In this section, the level of potential pressure caused by hand or dredge fishing on each sub-feature is considered, and a recommendation as to whether the activity is likely or not affect the integrity of the designated feature.

6.1.2.1 Abrasion and penetration

Pressure considered:

i. Abrasion/disturbance of the substrate on the surface of the seabed
ii. Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion

***Interaction with feature*:**

i. Intertidal / subtidal mixed sediments,
ii. intertidal / subtidal coarse sediment; and
iii. Intertidal / subtidal stoney reef

Hand-gathered seed Fishery: On Heysham, the mussel sits on a layer of soft substrate (mixture of mud, sand and sandy mud) which in places is over a metre thick. Hand-raking skims the mussel from its underlying sediment, with no contact with the cobble and boulder reef beneath.

Dredge Fishery: On South America and Perch Scar, the dredges used in the fishery have been developed over many years to impact the environment as little as possible by scooping the top layer (~10cm) of mussel and mud from the remaining layer and leaving the cobble substrate undisturbed. The presence of thick mud over the top of the protected feature minimises the potential interaction that fishing gear may have. Areas where mud was not deemed thick enough, or patches of bare ground were present, were excluded from the proposed fishing areas to ensure there was minimal interaction with the activity.

There is a history of both of these fishery activities occurring on these areas with no known impact to the underlying features.

The NWIFCA can conclude that due to the prevailing conditions of thick mud that abrasion and penetration on and below the surface of the seabed will have no risk of adverse effect on the integrity or conservation status of the designated features within the site.

Interaction with feature:

iiii. Intertidal / subtidal biogenic reef: Sabellaria alveolata communities

Heysham Flat:

Sabellaria alveolata, is currently present on Heysham Flat in an area from Conger Rock to Dallam Dyke (the main part of the mussel bed), there is a layer of sediment approximately 1 m in depth under the mussel and on top of previous *Sabellaria* reef. Visable presence of *Sabellaria alveolata* is present in a band across much of the skear to the West of conger rock (Figure 1). Sabellaria was also still present on the North and South of the skear away from the main mussel bed.

Previous advice from Natural England for Heysham Flat seed mussel fishery in 2016 highlights the importance of protecting the underlying 3D structure for potential future colonisation of *Sabellaria alveolata*. However, we have proposed opening the area of bed closes to the foreshore from Conger rock (Figure 1) to remove the possibility of the fishing activity interacting with the designated feature.

South America:

There is some *Sabellaria alveolata* on South America around the edge of the bed, with new settlement found over the other side of the channel away from South America on hard substrate. To ensure no impact on exposed *Sabellaria alveolata,* the area where it is present has been removed for the fishery as shown in figure 3, and a buffer zone provided to ensure no interaction takes place. As this is the main access point for hand gathered fishers, the fishery is not proposed for this year to alleviate any interaction. To ensure no interaction with seed dredge activities, NWIFCA propose to have on-board officers on industry dredge vessels to monitor the location of dredge activity.

Perch Scar:

There is no evidence of *Sabellaria alveolata* on Perch Scar, and therefore, there is no risk of this feature interacting with the proposed fishing activities at these sites.

The NWIFCA can conclude with the additional mitigation to remove the area of Sabellaria alveolata from the authorised fishery on Heysham and South America, that abrasion and penetration on and

below the surface of the seabed from a hand-gathered size mussel fishery (Heysham) and a seed dredge fishery (South America), will have no risk of adverse effect on the integrity or conservation status of the designated features within the site.

Due to the absence of Sabellaria alveolata Perch Scar, NWIFCA can conclude that the proposed fisheries at these sites will have no risk of adverse effect on the integrity or conservation status of the designated features within the site.

6.1.2.2 Litter

Pressure considered:

i. Litter

Since 2016 there have been a number of cockle fisheries in Morecambe Bay (Newbiggin, Flookburgh, Leven Sands and Pilling Sands) and in most years there has been a fishery on Heysham Flat for seed mussel as well as on-going size mussel fisheries around Morecambe Bay. There have only been a few reports of litter being an issue at any of these fisheries, which are regularly inspected by fishery officers. Where issues have been raised officers work with gatherers, buyers and the local authority to resolve the issues. A Code of Practice for Intertidal Hand-gathering includes responsibility for littering. NWIFCA takes a swift response to any alerts to littering issues.

There is very little risk of littering from the vessel dredge fishery. Vessels are large and modern and have all facilities for dealing with litter aboard.

The NWIFCA is confident that littering will be minimal and controlled and monitoring will be in place to identify quickly if litter is a problem. ***Therefore, the NWIFCA can conclude that litter will have no risk of adverse effect on the integrity or conservation status of the designated features within the site.***

6.1.2.3 Removal of target species

Pressure considered:

i. Removal of target species

Feature interaction:

i. Intertidal biogenic reef: including mussel and Sabellaria alveolata communities

The fishery is only being authorised due to the high likelihood that the single year class of 2022 mussel will wash out along with much of the mud on which it sits. Therefore, this resource would be removed by natural events whether fished or not. Although attempts have been made over the years to identify where the mussel is washed to, it has never been found within the Bay and is believed to either wash right out into the wider Irish Sea or to die. Each year, there has been subsequent settlements, demonstrating the bed's ability to recolonise after natural scouring.

NWIFCA is confident that the removal of target species will have no risk of adverse effect on the integrity or conservation status of the designated features within the site.

6.2 Potential risks to SPA and Ramsar features of Morecambe Bay and Duddon Estuary from hand gathered mussel or dredge seed fishery.

Features at risk of interacting with fishing activity:

- SPA and Ramsar birds

6.2.1 Pressures and Potential Impacts

The pressures that each Morecambe bay SPA feature and sub-feature are susceptible to are detailed in Natural England's 'Advice on Operations'. The key impacts that the relevant sub-features are vulnerable to are detailed below.

i) Removal of target species (mussels) for Common eider, Eurasian oystercatcher, Red knot, Herring gull, and those SPA features which occasionally feed on infaunal molluscs;

Mussels form part of an important prey resource for eiders, oystercatchers, knot and herring gull, as well as forming part of a wide variety of prey items for many of the designated species including grey plover, dunlin, sanderling and turnstone. If bird populations are to be maintained, or restored to healthy condition, sufficient shellfish to meet their demands must remain for them.

The impact of removal of essential prey resource by fishing activity varies at different times of the year. For example, prey resource requirements are far greater during autumn and at the beginning of winter than at other times of the year, as enough resource needs to be present for all the birds to feed through the cold months, when energy requirements are higher. Over-wintering waders require food to put on weight and get into best condition in the spring prior to migrations for the summer, or they will not survive long flight distances and suffer high mortalities. Equally, the breeding eider population of Morecambe Bay needs to get into prime condition prior to mating in order to reproduce successfully. This applies to both sexes but in particular to females who once on the nest do not feed again until ducklings have fledged, a period of up to three weeks. There have been concerns raised over the Bay's eider population, its sex ratio skew (3:1 males to females) and the lack of success in breeding.

Oystercatchers eat a range of sizes of mussels. Although the birds will eat alternative prey species when shellfish are scarce, these prey often are not as nutritious and do not enable birds to survive as well, and in such good body condition, as when shellfish are abundant (Atkinson et al 2003;Goss-Custard et al 2004).

Knot eat smaller bivalves with lower and upper size limits of around 5 and 12.5mm shell length respectively (Bell et al 2001).

Eiders generally feed on a mixed range of sizes of bivalves, although it is understood they will consume high quantities of small mussels when they are available.

Herring gulls fed on a range of sizes of bivalves with around 20mm thought to be the preferred size (Hilgerloh *et al*, 1997)

ii) Visual disturbance - All SPA species within vicinity of fishery, on the saltmarsh access route and over the sandbanks.

Visual disturbance could impact on the condition of any of the listed bird species, by causing unnecessary energy expenditure if flushed and taking to flight. For birds feeding on the affected areas it could also reduce feeding times, and increase competition if birds are forced to concentrate into reduced feeding areas.

6.2.2 Exposure

In this section, the level of potential pressure caused by the proposed hand or dredge fishing on each feature is considered, and a recommendation as to whether the activity is likely or not to affect the integrity of the designated feature.

i) Removal of target species (mussels) for Common eider, Eurasian oystercatcher, Red knot, Herring gull;

The seed mussel on South America, Heysham and Perch Scar is highly vulnerable to natural wash out and therefore would not be available to the birds through autumn or winter whether fished or not. Every year natural processes remove the majority of seed, and a new spat settlement takes place the following year. The size of the mussel removed by the fishing activity is in the 20 - 30mm size range and therefore outside of the typical feeding size range for knot, but within the feeding range for eider, oystercatcher and herring gull.

There are approximately 6 recognised cockle beds in the bay, and over 9 recognised mussel beds. NWIFCA survey or inspect all the beds annually. These inspections serve to provide estimates on the coverage and biomass of mussel and cockle in the bay, all of which contributes as a food source to protected bird species.

Although no specific figures have been given for the bird food requirements for bivalve eating birds, using the summary of the cockle and mussel bed surveys provided (Annex 7) and the reasons listed below, NWIFCA is confident that the bird food requirements are met for the site due to the following reasons:

- Fishing is never 100% efficient and neither method will remove all of the mussel from the bed. In addition, on Heysham, South America and Perch Scar, fishing will be limited to the restricted areas, and those accessible to fishers. There are portions of each bed unsuitable for seed fishing leaving these as an available food resource. On Heysham, the majority of the bed from Conger Rock to Dallam Dyke and beyond is not classified and therefore not available for commercial fishing.
- There will be a limited number of hand-gatherers prosecuting the fishery at Heysham with a maximum of 10 permit holders fishing over low water.
- On Heysham, South America and Perch Scar, the seed does not typically survive the winter and is already showing signs of scouring; therefore, it will likely not be available as a resource to birds either as size, or as seed.
- Cockle beds across Morecambe Bay are closed for 2022 until September 1st 2023. Athough, this is due to low cockle density and size cockle available, it will still serve as an additional resource to birds (Annex 7).
- The duration and extent (effort) of fishing on Heysham flat will be further limited by local council restrictions that specify the fishery can only take place on weekdays during daylight tides.
- The dredge vessels will fish over high water on smaller tides around the neap tide, and dredging will take place for 1-4 days maximum given the small size of the area and limited number of locations available. There will be a maximum of 2 boats targeting this fishery.
- Wader numbers are greatest during the winter months meaning feeding requirements are lower during the time of the fishery.
- Size and seed mussel stocks greater than those is present on the proposed seed areas are available on other mussel beds across the bay (Annex 7).

NWIFCA is confident that the removal of target species (both size and undersize mussel) will have no risk of adverse effect on the SPA features, which utilise mussel as a prey source and therefore have no risk of adverse effect on integrity or conservation status of the site.

ii) Visual disturbance - All SPA species within vicinity of the fishery, access route and over the sandbanks

Little egret have the potential to be disturbed when feeding. Little egret prefer to feed in shallow water 10cm to 20cm in depth (Kushlan & handcock 2005). There is potential for the birds to be disturbed by hand-gathering when tractors and quad bikes are travelling to and from the fishing areas and fishing. Little egret commonly feeds in solitary or in lose flocks (del hoyo et al. 1992), and therefore any disturbance is likely to affect only a few individuals and any displacement temporary and short lived for the following reasons;-

- Seed dredgers require deeper water for vessels to operate, and therefore will not interact with the little egret on Perch Scar of South America.
- The gatherers will only travel once to and from the fishing area per tide
- The authorised area for hand seed fishing in South America is 4.3 ha out of a bed area of 5.2 ha. For Heysham, they will be limited to the foreshore area of the bed.

Golden plover are only likely to feed in the intertidal areas when weather conditions are harsh and the ground is hard from frost on their normal inland feeding areas. Due to the fishing activity occurring mainly in August - September it is unlikely that golden plover will be found near the fishery.

Dunlin, black tailed godwit, bar tailed godwits, curlew and redshank mainly target mudflats as their feeding grounds. Lapwing use a variety of habitats (marine and terrestrial), and when present on the intertidal they tend to target mudflats. The fishing activity does not occur on or near to mudflats. Redshank are found on saltmarsh and are known to nest on saltmarsh but the fishing activity does not occur on or near saltmarsh. All access to the fishing grounds by hand-gatherers is by established access routes, and by vessels from open sea over high water; visual disturbance is unlikely.

Oystercatcher, ringed plover, grey plover, knot, sanderling and turnstone all feed on a variety of substrates in the intertidal area. Waders will move in and out with the tide feeding in and on the sediment, each wader will have a preferred prey source and size. Travel by hand-gatherers to and from the authorised area and fishing has the potential for disturbance. Visual disturbance to Oystercatcher, ringed plover, grey plover, knot, sanderling and turnstone will be minimal and any displacement temporary and short lived for the following reasons:

- At Heysham, the fishing area is limited to the foreshore.
- the gatherers will only travel once to and from the fishing area per tide
- plentiful mussel stock present on other beds and some additional cockle stocks as alternative feeding (Annex 7) giving large areas of undisturbed feeding.
- there will be a limited number of hand-gatherers prosecuting the fishery with a maximum of 20 permit holders fishing over low water.
- At South America and Perch Scar the dredge vessels will fish over high water on smaller tides around the neap tide. ie. at times when the birds will be resting or feeding on inshore / inland sites.

Shelduck, pintail and wigeon spend a proportion of their time feeding on intertidal mud. The fishing activity does not occur on or near to mudflats meaning disturbance is unlikely. Red breasted merganser, cormorant and great crested grebe spend the majority of time on the water, so there will be minimal to no disturbance from an intertidal fishery accessed from the shore. Whooper swans and pink footed geese numbers are

greatest during the winter, and as the fishery is in August to September and for a short period of time disturbance is likely to be minimal if any.

Eiders are known to feed on submerged mussels at shallow depths (2-3m) (Larsen & Guillemette 2000) and are regularly observed at or near to the Falklands beds, Foulney Island, Low Bottom, Morecambe and Fleetwood. Visual disturbance to Eiders by the fishing activity will be minimal and any displacement temporary and short lived for the following reasons:

Hand-gathering:

- no visual disturbance to feeding eiders from hand-gatherers as feeding on different tides to the fishing activity
- eiders loafing or resting on the exposed intertidal areas are mainly around Foulney and Walney Channel which is not part of the access route to Heysham. Those resting on the sands may be minimally disturbed as the quad bikes pass once on the way to the fishery and once on the way back over a low number of tides.

Dredge fishery:

- low number of boats with a large capacity meaning the fishery is often short lived – likely to be a max of 4 days.
- fishing lasts around 4-5 hours over high water at which point the boats are likely to move offshore until the next tide
- once the vessel has taken a load it has to steam back for a day or two to the operators lays
- fishing is not expected to take place over spring tides which further reduced the potential for visual disturbance.

Mediterranean gull, lesser black-backed gull, herring gull are present on both the intertidal and open water and therefore there is potential for visual disturbance from access and fishing to the authorised area. Visual disturbance to gulls will be minimal and any displacement temporary and short lived for the following reasons:

- Fishing can only take place in the upper part of the bed at Heysham Flat.
- The gatherers will only travel once to and from the fishing area per tide
- Plentiful mussel stock present on other beds and some additional cockle stocks as alternative feeding (Annex 7) giving large areas of undisturbed feeding.
- A large proportion of Heysham flat will remained closed to protect areas of *Sabellaria alveolata*, which is covered in mussel and available as an undisturbed area.
- There will be a limited number of hand-gatherers prosecuting the fishery with a maximum of 20 permit holders fishing over low water.
- The dredge vessels will fish over high water on smaller tides around the neap tide. ie. at times when the birds will be resting or feeding on inshore / inland sites.

Sandwich tern, common tern, and little tern rarely use the intertidal area at low water but will use the shallow areas covered by water. The tern species do nest in coastal areas but none of the known nest areas are access points for the fishery. The known nesting areas for terns in the European Site are Foulney and Hodbarrow. There is potential for fishing activity to disturb the terns while fishing in shallow water at low tide but terns have large foraging ranges and will not be displaced a large distance by the fishing activity. The main times of year when they are present are out with the time of these fisheries.

The NWIFCA is confident that visual disturbance to the SPA features will have no risk of adverse effect on the integrity or conservation status of the site.

7. Management and Mitigation to Ensure No Adverse Effect on the Integrity of the European Site:

In order for the NWIFCA to be fully confident of no risk of adverse effect on the integrity or conservation status of the sites a precautionary approach is being taken, and the following management measures implemented:

a) Rigorous enforcement of the conditions set out in the authorisation and permit conditions including sensitive areas outside of the fishery;
b) Monitored landings through:

   i. Regular IFCO reporting of numbers fishing and estimates of quantities removed;

   ii. Landings returns from Byelaw 3 permit holders and Dredge permit holders (required under both byelaws);

c) Monitoring and inspection to inspect catch and ensure that there are no litter issues;
d) NWIFCA enforcement officers will use intelligence and contacts with fellow enforcement agencies to pursue any suspicions of non-permitted or illegal gathering activity;
e) A NWIFCA officer will be present on the dredge vessel to ensure activities take place within the restricted areas and can enforce a closure at any point should the activity extend beyond the specified boundaries.

Table 2: Summary of Impacts

Feature/Sub feature(s)	Conservation Objective	Potential pressure[4] (such as abrasion, disturbance) exerted by gear type(s)[5]	Potential ecological impacts of pressure exerted by the activity/activities on the feature[6] *(reference to conservation objectives)*	Level of exposure[7] of feature to pressure	Mitigation measures[8]
Intertidal mixed sediments, intertidal coarse sediment Intertidal biogenic reef: including mussel and Sabellaria alveolata communities	Maintain or restore the extent, distribution structure or function of the feature.	Abrasion/disturbance of the substrate on the surface of the seabed	Both hand-gathering and seed mussel dredge fishing remove the mussel from the surface of the seabed and there is potential for abrasion / disturbance / penetration of the substrate on and below the seabed from the use of rakes and dredges.	As in 6.1.2.1	Additional management required by removing area of *Sabellaria alveolata* from the fishing area at Heysham. Restricting activity to the area between the foreshore and Conger Rock. Areas of bare substrate in South America and Perch Scar were removed from the permitted fishery area.
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion			Additional management required by removing area of *Sabellaria alveolata* from the fishing area at Heysham. Areas of bare substrate in South America and Perch Scar were removed from the permitted fishery area.
		Litter	Litter could pose potential threat to wildlife, especially birds through ingestion or entanglement	As in 6.1.2.2	None - current management measures sufficient with monitoring of the fishery

[4] Guidance and advice from NE.
[5] Group gear types where applicable and assess individually if more in depth assessment required.
[6] Document the sensitivity of the feature to that pressure (where available), including a site specific consideration of factors that will influence sensitivity.
[7] Evidence based e.g. activity evidenced and footprint quantified if possible, including current management measures that reduce/remove the feature's exposure to the activity.
[8] Detail how this reduces/removes the potential pressure/impact(s) on the feature e.g. spatial/temporal/effort restrictions that would be introduced.

		Removal of target species	Potential to affect the:- - Presence and spatial distribution of the feature communities - Presence and abundance of typical species - The species composition of component communities	As in 6.1.2.3	None - current management measures sufficient with monitoring of the fishery
- *Somateria mollissima*; Common eider - *Haematopus ostralegus*: Eurasian oystercatcher - *Calidris canutus*; Red knot *Larus argentatus*; Herring gull	Maintain or restore the population of each of the qualifying features, and, the distribution of the qualifying features within the site	Removal of target species (mussels)	Potential to affect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	As in 6.2.2 (i)	None - current management measures sufficient with monitoring of the fishery
- Common eider - Eurasian oystercatcher Red knot Little egret Whooper swan Pink-footed goose Common shelduck Wigeon Northern pintail Common eider Goldeneye Red-breasted Merganser Eurasian oystercatcher Ringed plover European golden plover Grey plover Lapwing Red knot Sanderling Dunlin Ruff Black-tailed godwit Bar-tailed godwit Eurasian curlew Common redshank Ruddy turnstone Mediterranean gull Cormorant Great crested grebe Seabird assemblage Waterbird assemblage	Maintain or restore the population of each of the qualifying features, and, the distribution of the qualifying features within the site	Visual disturbance	Potential to affect the:- - Condition and survival of SPA species - Abundance of SPA species - Extent and distribution of supporting habitat available whilst a fishing activity is occurring	As in 6.2.2(ii)	None - current management measures sufficient with monitoring of the fishery

Lesser black-backed gull Herring gull Sandwich tern Common tern Little tern					

7. Conclusion

The authorisation, permit, management and mitigation measures incorporated into this fishery, the use of an effective enforcement team of NWIFCA Officers with multi-agency support, the highly dynamic environment in which the fishery lies, and the recorded history of the resources in this area, allows the NWIFCA to conclude that:

- A permitted dredge, seed mussel fishery at Perch Scar (Fleetwood) in August/September 2022;
- A authorised hand gathered seed mussel fishery at Heysham Flat in August/September 2022; and
- A permitted dredge seed mussel fishery at South America (North Morecambe Bay) in August/September 2022,

will not have an adverse effect on the integrity of the designated features of Morecambe bay, Ramsar, SAC and SPA.

8. In-combination assessment

8.1 Other ongoing and Authorised Fisheries to be Included in the In-combination assessment:

- Tractor shrimp fishery – it is possible that some operators could go shrimp fishing in close proximity with the mussel fishery.
-
- Size mussel fisheries – there is an active hand-gathered size mussel fishery in Foulney.

8.1.2 In-Combination Assessment

Low water intertidal fisheries:

The shrimp fishery has undergone an HRA which concluded no adverse effect on the integrity of the European Site. Most of the shrimp fishing occurs between spring and autumn with autumn being the key time. Most of the shrimp tractor fishers in Morecambe Bay are also NWIFCA Byelaw 3 permit holders. Most of them prosecute a range of fisheries and it is most likely that they will fish size mussels at Foulney which will result in reduced shrimp fishing.

The size mussel fishery is open throughout the District all year round for Byelaw 3 permit holders. Each fishery is rigorously monitored and enforced by warranted IFCOs. In reality each fishery is only prosecuted by low numbers and modest amounts of mussel removed. For example in the first four months of 2022 landings reports for the north Morecambe Bay mussel beds, which include Low Bottom, Foulney Ditch, Walney Channel, Foulney and Foulney Island, came to 69 tonnes. Biomass estimates of size mussel made from Dutch Wand survey data in March came to 455 tonnes for Walney Channel and 1055 tonnes for Foulney and Foulney Island, illustrating it is a low level fishery. In addition, there was some 684 to 4201 tonne of undersize available at that time, much of which will have grown on to size. These same gatherers will prosecute the undersize mussel if they chose and therefore in relative terms of resource removed and disturbance risk there is no effect.

Considering cockle, size mussel and shrimp fisheries in the Bay in combination with intertidal hand-gathering of seed mussel the NWIFCA can conclude no adverse effect on the integrity of the European Site providing the management measures of the authorised mussel fishery are implemented and enforced.

High water dredge fishery:

The area of the fishery is small in size a prosecute by a low number of vessels. The resource is often lost to natural causes if not fished. Dredging occurs over different tides to hand-gathering and tractor shrimping.

Considering cockle, size mussel and shrimp fisheries in the Bay in combination with dredge fishery of seed mussel the NWIFCA can conclude no adverse effect on the integrity of the European Site providing the management measures of the authorised mussel fishery are implemented and enforced.

9. Summary of consultation with Natural England

Natural England were involved in discussions around the management of the fishery when discussed at TSB.

10. Integrity test

The NWIFCA concludes no adverse effect on the integrity of the European Site providing the management and mitigation measures of the undersize mussel fisheries 2022 are implemented and upheld.