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

NWIFCA-MB-EMS-002
Date completed: 30th March 2017
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Site: **Morecambe Bay and Duddon Estuary**

European Designated Sites: UK0013027 Morecambe Bay Special Area of Conservation (SAC)
UK 9005031 Morecambe Bay Special Protection Area (SPA)
UK11045 Morecambe Bay Ramsar
UK9005031 Duddon Estuary Special Protection Area (SPA)
UK11022 Duddon Estuary Ramsar
Morecambe Bay and Duddon Estuary pSPA

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 Communities:

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, intertidal biogenic reef: Sabellaria spp., 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.

Fishing activities assessed:

Gear type(s):

Towed Demersal **–** Light otter trawl

1. Introduction

1.1 Need for an HRA assessment

In 2012, the Department for Environment, Food and Rural Affairs (Defra) announced a revised approach to the management of commercial fisheries in European Marine Sites (EMS). The objective of this revised approach is to ensure that all existing and potential commercial fishing activities are managed in accordance with Article 6 of the Habitats Directive.

This approach is being implemented using an evidence based, risk-prioritised, and phased basis. Risk prioritisation is informed by using a matrix of the generic sensitivity of the sub-features of EMS to a suite of fishing activities as a decision making tool. These sub-feature-activity combinations have been categorised according to specific definitions, as red, amber, green or blue.

Activity/feature interactions identified within the matrix as red risk have the highest priority for implementation of management measures by the end of 2013 in order to avoid the deterioration of Annex I features in line with obligations under Article 6(2) of the Habitats Directive.

Activity/feature interactions identified within the matrix as amber risk require a site-level assessment to determine whether management of an activity is required to conserve site features. Activity/feature interactions identified within the matrix as green also require a site level assessment if there are “in combination effects” with other plans or projects.

Some European Sites within the NWIFCA District consist of features that are not fully marine (e.g. sand dunes) and therefore fall outwith of the EMS Review process. They have not been included in the original risk matrix. Due to the nature of some of the fisheries in the District, particularly intertidal fisheries, the NWIFCA has adopted the approach of carrying out full HRA on all the features (including non-marine) within European Sites to ensure that any potential risk from fishing activity has been identified and assessed.

Site level assessments are being carried out in a manner that is consistent with the provisions of Article 6(3) of the Habitats Directive, that is to determine that fishing activities are not having an adverse effect on the integrity of the site, to inform a judgement on whether or not appropriate steps are required to avoid the deterioration of natural habitats and the habitats of species as well as disturbances of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this directive.

If measures are required, the revised approach requires these to be implemented by 2016.

The purpose of this site specific assessment document is to assess whether or not in the view of NWIFCA the fishing activity of ‘Towed demersal – light otter trawl’ has a likely significant effect on the qualifying features of the Morecambe Bay and Duddon Estuary European Site and on the basis of this assessment whether or not it can be concluded that ‘Towed demersal – light otter trawl’ will not have an adverse effect on the integrity of this European Site.

1.2 Documents reviewed to inform this assessment

- Natural England's risk assessment Matrix of fishing activities and European habitat features and protected species[1]
- Reference list[2]
- Natural England's consultation advice
- Site map(s) – sub-feature/feature location and extent
- Fishing activity data (map(s), etc.)

2. Information about the EMS

(See cover pages).

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

The Morecambe Bay and Duddon European Site interest features, 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 activity within the site

The trawling fleet in Fleetwood has decreased significantly over the past 50 years from over 100 trawlers down to only a handful left, only fishing occasionally.

Within the European site there are four vessels which can use light otter trawls to fish for flatfish. The fishing activity is very low with the vessels going long periods of inactivity. When active, vessels typically only fish three to six days per year. When considering that the vessels fish a range of areas inside and outside of the Morecambe Bay European Site, the activity within the site is minimal. The fishing occurs between May and October with the concentration between July and September when the target species (usually sole and other flatfish) are present in the area.

The fishing gear consists of small otter trawl doors (wood or steel), a combination wire bridle and net which is lightly weighted by a ground rope with rubber disks and small chain (Annex 6). When towing the maximum width of gear, door to door is 30 m. Towing speed, including the movement with the tide, is approx. 2.4 knots or slower.

Typically vessels will target areas of sand. When comparing the fishing activity (Annex 4) with the broad scale habitat map (Annex 5), there is a mixture of habitats present in the fishing area including subtidal mud, sand, mixed and coarse sediments.

Otter Trawling Regulation

North Western Inshore Fisheries and Conservation Authority was set up in 2011 under the Marine and Coastal Access Act 2009 and replaced the Cumbria Sea Fisheries Committee and North Western Sea Fisheries Committee. Both SFC Byelaws were merged and there are currently two sets of existing byelaws

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[1] See Fisheries in EMS matrix: http://www.marinemanagement.org.uk/protecting/conservation/documents/ems_fisheries/populated_matrix3.xls

[2] Reference list will include literature cited in the assessment (peer, grey and site specific evidence e.g. research, data on natural disturbance/energy levels etc)

covering different parts of the site. The point in which the district byelaws are split is Haverigg Point (A line drawn true south west from 54.18967, -3.31833 to the 6nm boundary) as shown in Annex 5.

Otter trawling within the European Site is regulated by:

North Western IFCA District

NWIFCA	Byelaw 5	Heysham bass nursery area - prohibition of fishing
NWIFCA	Byelaw 6	Protection for European Marine Site features

North Western SFC District

NWSFC	Byelaw 2	Attachment to nets
NWSFC	Byelaw 9	Mechanically propelled vessels – maximum length

Cumbria SFC District

CSFC	Byelaw 3	Size limits of boats allowed inside the district
CFSC	Byelaw 13	Multi-rigged trawling gear
CSFC	Byelaw 15	Vessels with a registered engine power > 221kw
CSFC	Byelaw 20	For the protection of immature plaice – minimum mesh sizes

EU Council Regulations

Council Regulations (EC) No. 850/98 – Technical Measures

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 fishery will cause a likely significant effect on an EMS[3].

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: The following habitats have been screened out:-

- All sand dune and saltmarsh features and sub features have been screened out due to the fishing activity happening from a boat. It is not considered that any of the fishing activities will have an effect on the coastal processes which saltmarsh and sand dune features and sub features require.
- All intertidal features and sub features have been screened out due to the fishing activity occurring beyond the intertidal area.
- All reef features have been screened out due to the protection under NWIFCA Byelaw 6 for *Sabellaria alveolata* reef, the fishing activity not occurring on any reef feature and most of the fishing activity outside the vicinity of any reef features.

The NWIFCA undertook an exercise to overlay the fishing activity (Annex 4) onto mapping of the features and sub features of the SAC and the supporting habitats of the SPA (Annex 5). This has not been reproduced within the document as the detail gets lost in a reproduction. There are a variety of habitats which are present in the fishing area, these are a mixture of subtidal mud, subtidal sand, subtidal mixed and subtidal coarse sediments. All features and sub features that the fishing activity interacts with have been screened in to the table below. Although all of the fishing activity occurs outside of the pSPA boundary, all SPA features (bird species) have been screened into the assessment due to the close proximity of the activity to the pSPA.

Pressures: All pressures from the Advice on Operations table provided in the Morecambe Bay and Duddon Estuary Conservation Advice package have been screened out, other than the pressures in the following table due to:-

- the nature of the fishing activity
- the areas where the activity occurs
- the vessels used are small (with three vessels being under 10m and one vessel under 13.5m)
- the activity levels are very low
- the gear used is a light otter trawl which is small compared to conventional gear used by bigger vessels.

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

Qualifying Feature	Sub-feature	Potential pressure(s)	Sensitivity	Potential for Likely Significant Effect?	Justification and evidence
H1160. Large shallow inlets and bays	Subtidal mud Subtidal sand Subtidal mixed sediment Subtidal coarse sediment	Abrasion/disturbance of the substrate on the surface of the seabed	Sensitive	Yes	
		Changes in suspended solids (water clarity)	Sensitive	Yes	
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Sensitive	Yes	
		Siltation rate changes, including smothering (depth of vertical sediment overburden)	Sensitive	Yes	
		Removal of non-target species (Non-retained Bycatch)	Sensitive	Yes	
		Removal of target species (Fish)	No Score	Yes	
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 A160 *Numenius arquata*; Eurasian curlew A162 *Tringa totanus*; Common redshank	Supporting Habitats not assessed as activity fall outside of the pSPA boundary only bird features assessed due to the close proximity to the pSPA boundary.	Collision above water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Sensitive	Yes	All species have been taken through to AA.
		Collision below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Sensitive	Yes	Only species which could collide with objects below the water taken through to AA. - Great crested grebe - Red breasted merganser - Cormorant - Eider - Goldeneye
		Removal of non-target species (Non-retained Bycatch)	Sensitive	Yes	Only species with fish as a prey item taken through to AA: - Little Egret - Red Breasted Merganser - Cormorant - Great Crested Grebe
		Removal of target species (Fish)	Sensitive	Yes	Species with fish as a prey item taken through to AA: - Little Egret - Red Breasted Merganser - Cormorant - Great Crested Grebe
		Removal of target species (Bird bycatch)	Sensitive	Yes	Only species which may become entangled in the trawl net taken through to AA: - Red Breasted Merganser - Cormorant - Great Crested Grebe
		Visual disturbance	Sensitive	Yes	All species have been taken through to AA.
		Changes in suspended solids (water clarity)	Sensitive	Yes	Only species which could be affected by a change in water clarity due to suspended solids have been taken through to AA. - Little egret - Red breasted merganser - Cormorant - Great crested grebe - Eider - Goldeneye

A169 *Arenaria interpres*; Ruddy turnstone					
A176 Larus melancephalus; Mediterranean gull					
Phalacrocorax carbo; Cormorant					
Podiceps cristatus; Great crested grebe					
Seabird assemblage					
Waterbird assemblage					
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)	Supporting Habitats assessed above	Collision above water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Sensitive	Yes	All species have been taken through to AA.
		Collision below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Sensitive	Yes	All species have been taken through to AA.
		Removal of non-target species (Non-retained Bycatch)	Sensitive	Yes	All species have been taken through to AA.
		Removal of target species (Fish)	Sensitive	Yes	All species have been taken through to AA.
		Removal of target species (Bird bycatch)	Sensitive	Yes	All species have been taken through to AA.
		Visual disturbance	Sensitive	Yes	All species have been taken through to AA.
		Changes in suspended solids (water clarity)	Sensitive	Yes	All species have been taken through to AA.

Is the potential scale or magnitude of any effect likely to be significant?[4]	**Alone** Yes **Comments**	**OR In-combination**[5] Yes **Comments :** These activities also occur at the site: • Beam trawl (shrimp) • Pots and Creels • Fixed nets (gill, trammel, entangling) • Longlines • Shrimp push-net • Fyke and stakenet • Hand working (cockles and mussels) In combination effects will be assessed when all initial TLSEs for a site are completed.
Have NE been consulted on this LSE test? If yes, what was NE's advice?	Yes	

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

6. Appropriate Assessment

6.1 Potential risks to SAC features

6.1.1 Pressures and Potential Impacts

The potential direct impacts to the subtidal mud, sand, mixed sediment and coarse sediment features caused by light otter trawling is the change to the substrate on the surface of the seabed through sediment compaction, sediment resuspension and removal of sediment, as well as the damage to communities associated with the features and removal of target and non-target species. The potential indirect impact is smothering of fished and surrounding habitats and an increase in suspended solids (decreasing water clarity) due to the resuspension of sediment.

6.1.1.1 Abrasion/disturbance of the substrate on the surface of the seabed Penetration and/or disturbance of the substrate below the surface of the seabed

Physical disturbance

Light otter trawling gear creates tracks on the sea floor, the size and depth of which are dependent on the weight of the boards (Jones, 1992), the degree of contact with the sea floor and the speed the gear is dragged (Thrush and Dayton, 2002). There are considerable variations in both size and weight of trawls, with the impacts of the gear varying accordingly (Lokkeborg, 2005). Otter trawling appears to have least significant impact on fauna out of all demersal fishing gears. While otter doors have the greatest impact on sediment, they make up a small proportion of the width of the gear. It is important to note that rockhopper otter trawls have more considerable effects on biota than other otter trawl gears as they can damage biota on the seabed and scrape fauna from rocks (Kaiser et al., 2002).

Trawl doors can vary in size and weight. Differing sizes and their effects on the sea bed have been widely documented (Table 1): Brylinsky et al., (1994) recorded scoured furrows 80 to 85 cm wide and 1 to 5 cm deep with an 18 m otter trawl with 200 kg doors and footrope with 29 cm rubber rollers. Humborstad et al. (2004) recorded scars 10 cm deep and 20 cm wide from 2300 kg doors studied the effects of 3.5 foot by 4.5 foot otter boards with 300 kg doors which caused tracks to persist for a full year after trawling activity. (DeAlteris, et al., 1999) recorded 5-10 cm deep scours with berms up to 20 cm high, no information on the size or weight of the gear was given. Krost et al., (1990) described tracks surveyed using sidescan sonar and found tracks from the otter boards were the only gear tracks visible, with tracks from chain weights, bridles and groundrope indiscernible. No information on the weight of the gear was given.

Table 1 Dimensions of otter trawl gear and the effect on habitat types.

Dimensions of gear	Ground type	Effect	Source
60 foot footrope otter trawl with a 1.75in (4.4cm) netting and 200lb (90kg) doors	Sandy mud	Tracks up to 9 cm deep	(Mayer et al., 1991)
18 m trawl with 200 kg doors and footrope with 29 cm rubber rollers	Intertidal area characterised by silty sediments	Furrows 30 – 85 cm wide and up to 5 cm deep	(Brylinsky et al., 1994)

Otter doors 3.5 foot by 4.5 foot each door weighs approximately 700 lbs (300 kg)	Soft sediment	No information given	(Lindholm et al., 2013)
2300 kg trawl doors	Sandy/gravel bottom	Trawl door scars 10 cm deep and 20 cm wide	(Humborstad et al., 2004)
No information given	Sand and mud sediments	5 to 10 cm deep tracks from otter trawl doors and 10 to 20 cm high berms	(DeAlteris et al., 1999)

Assessments by the eye during exposure at low tide showed that the rollers from the ground ropes caused shallow marks, and bridles left no marks at all (Brylinsky, et al., 1994). Gilkinson et al., (1998) simulated the effects of otter trawl doors in a test tank to assess the physical disturbance caused. Their observations show that the most distinct marks are caused by the doors with only faint marks caused by other parts of the trawl. The effect of the nets on the bottom substrate has been documented through diver observations. Smith et al. 1985 (in Johnson, 2002) described minor sediment disturbance from the net of an otter trawl in Long Island Sound. The disturbance was mainly caused by wake turbulence which suspended flocculent material.

Sediment type (sensitivity)

The intensity of any fishing disturbance varies among habitat types; coarse sediments are less likely to be affected than fine sand or mud habitats which are more physically stable (Collie et al., 2000). Further, disturbance to the sediment can vary depending on the stability of the structure: a sandflat inhabited with tubicolous worms will be more stable and more adversely affected by trawling than sandflats with little infauna (Kaiser, et al., 2002). Hard substrata are also more vulnerable as they are more likely to carry biota that could be damaged by trawls (Kaiser et al., 2002).

A meta-analysis of 101 experimental fishing impact studies by (Kaiser et al., 2006) identified the types of fishing gear that have the greatest impact on the seabed and on the groups of organisms that are most vulnerable to fishing activities. It found that in sand habitats, otter trawling had no significant impact on the substrate although there was evidence of post fishing disturbance. In both muddy sand and mud habitats there was found to be a significant initial effect. Some studies have found trawling activity over sand habitats to have limited impacts (Kaiser and Spencer, 1996; Kenchington et al., 2001; Roberts et al., 2010). Krost et al. (1990) recorded a lack of tracks on sandy sediment due to mechanical resistance of the sediment type and a more rapid restoration of the sediment by currents and waves. Humborstad et al. (2004) recorded disturbance caused by trawling over the sandy gravel bottom of the Barents Sea. They recorded highly visible furrows of 10 cm deep and 20cm wide and berms of 10cm high caused by the gear doors. Five months after activity the marks had disappeared. A study in Narragansett Bay, Rhode Island looked at the effects of otter trawling over sand and mud sediments (DeAlteris et al., 1999). They found that scars from otter trawl doors persisted for the longest in deeper mud channels, and for a shorter time period in shallower sandy sediment (Table 1). To test the longevity of the scars or tracks in different sediments trenches were dug and monitored. While scars at mud sites persisted for over 60 days, those in sandy sites were less persistent. They concluded that in deeper mud sites track erosion would occur less than 5% of the time, so tracks would persist for longer. Whereas in shallower sandy areas the physical effects of otter trawling may be inconsequential. Sandy sediment habitats are able to recover within 100 days and they could potentially withstand 2-3 disturbances over year without changing in character (Collie et al., 2000).

The amount of physical disturbance varies with depth of trawl activity across all sediments types. Krost et al., (1990) studied disturbance over a variety of ground types at varying depths in Kiel Bay. They found that the density of trawl tracks was highest over muddy sediment and at depths greater than 20 m. From 0-10 m no tracks were evident in side scan sonar analysis of all bottom types (patchy, sand, muddy sand, sandy mud, mud and mixed). In sandy sediment no tracks were evident over all depths (0-10 m, 10-20 m, 20-28 m, >28m); this lack of tracks may be due to high mechanical resistance of the sediment. Other studies have recorded activity taking place at greater depths in which tracks were detectable for up to a year after trawling (Johnson, 2002).

Table 2 Sensitivity of habitat types to different demersal trawling intensities as identified by Hall et al. (2008), adapted from SIFCA (2016).

Gear type	**Habitat type**	**Gear Intensity***			
		Heavy	Moderate	Light	Single pass
Demersal trawls	Subtidal stable muddy sands, sandy muds and muds	High	Medium	Low	Low
	Stable subtidal fine sands	Medium	Medium	Low	Low
	Dynamic, shallow water fine sands	Medium	Low	Low	Low
	Stable spp. rich mixed sediments	High	Medium	Medium	Low
	Unstable coarse sediments – robust fauna	Medium	Medium	Low	Low

*Gear activity levels are defined as: Heavy – daily in 2.5 nm x 2.5 nm; Moderate – 1 to 2 times a week in 2.5 nm x 2.5 nm; Light 1 to 2 times per month during a season in 2.5 nm x 2.5 nm; Single pass – One pass of fishing activity in a year.

<u>Sediment character</u>

The sediment characteristics of the sea bed can be altered through mobile demersal fishing gear (Jones, 1992; Ball et al., 2000; Roberts et al., 2010). As the gear interacts with the bottom topography mixing of surficial and sub-surficial organic material can occur altering sediment characteristics (Jones, 1992). Otter trawling causes physical alterations which reduces the sediment heterogeneity and changes the texture of the sediment (Johnson, 2002). Lindholm et al. (2013) compared changes to the attributes of the seabed in Estero Bay, California. They analysed any changes in grain size from experimental otter trawling over coarse silt/fine sand at a depth of 160-170 m. Grain size did not differ between post- and pre-trawl samples however there was a slight increase in the silt content and a 2% decrease fine sand. The study found that there was no quantifiable sedimentary difference between trawled and non-trawled areas.

Following a three year study into the effect of otter trawling over a sandy bottom habitat of the Grand Banks, Newfoundland Schwinghamer et al. (1998) found that, similar to Lindholm et al. (2013), trawling activity had no immediate effect on sediment grain size. There was variability in the persistence of door track on the surface throughout the study. While the texture of the sediment was unaffected there was an increase in the surface relief or roughness and there were clear differences in the appearance of the sea bed pre- and post-trawling, with fewer and less pronounced hummocks post-trawling.

Ground type post trawling (recovery)

Humborstad et al., (2004) showed that highly intensive trawling over a sandy/gravel bottom caused a decrease in sediment hardness with an increase in surface roughness, whereas moderate trawling did not cause such changes in the property of the sediment. Therefore the intensity of trawling activity also has an effect on the bottom topography. Comparisons of areas of heavy and lighter activity show that, while trawling activity creates furrows which increases surface roughness, trawling activity over a prolonged period can lower surface roughness by smoothing any structures created through natural causes (Kaiser et al., 2002). It is unknown whether the initial man made features, such as tracks and trenches, compensate for any smoothing caused by the gear (Johnson, 2002). Heavily trawled areas have more exposed sediment and shell fragments with fewer mounds and flocculent organic matter than lightly trawled areas (Engel and Kvitek, 1998). Rate of recovery appears to be most rapid in habitats which are less physically stable, however more intensely fished habitats (even those fished in excess of three times per year) are likely to be in a permanently altered state (Collie, et al., 2000). Over time this can lower habitat complexity causing declines in some species (Collie et al., 2000).

Schwinghamer et al. (1998) examined the effect of experimental otter trawling over a sandy habitat in the Grand Banks, Newfoundland which had been closed to fishing for 6 years. They documented changes in surface sediment characteristics and any effects to sediment texture and hardness. They examined the effects at intervals after the trawling had stopped. Areas over which trawling had taken place were smoother and cleaner, areas which had not been trawled were more mottled and had more flocculated material. They noted changes in acoustic properties of the upper 4.5cm of sediment which indicated a decreased habitat complexity.

Foden et al. (2010) quantified sea bed recovery rates from benthic fishing and aggregate extraction in UK marine waters. Recovery periods were estimated through literature review for both gear types and fishing intensity. They found recovery rates to generally increase with sediment hardness (Table 2). Overall, in bottom fished areas 80% of the seabed was able to recover completely before repeat trawling. However, otter trawling over muddy sand and reef habitats occurred at such intensities that prevented a full recovery.
Table 3 Recovery time (d) for habitats by otter trawls. Adapted from: Foden et al. (2010).

Habitat type	Recovery time (d)	Source
Sand	0	Kaiser et al. (2006)
Gravel	365	Kenchington et al. (2006)
Muddy sand	213	(Ragnarsson and Lindegarth, 2009)
Reef	2922	Kaiser et al. (2006)
Mud	8	Kaiser et al. (2006)

Persistence of marks depends on current and wave action; in high energy environments recovery can occur within days, in lower energy environments recovery could take months or years (Lokkeborg, 2005). Humborstad et al., (2004) attributed no change to sediment post trawling, under moderate trawling intensity, to the survey area being exposed to strong currents. Brylinsky et al., (1994) expected a quick recovery from silty sediments in the Bay of Fundy, Nova Scotia as the area is commonly exposed to storms and winter ice. In a sheltered Scottish sea loch, with little current or tidal movement, disturbance from trawl gear was document for up to 18 months (Tuck, et al., 1998).
Inter-annual changes have been observed in the acoustic properties of the upper sediment layer that could not be attributed to trawling activity (Lokkeborg, 2005). Sediment grain size data suggest that there may be natural inter-annual changes that are more pronounced than those caused by the experimental trawling (Schwinghamer et al., 1998).

6.1.1.2 Removal of target species (Fish)

Removal of target species has the potential to affect the spatial distribution of subtidal mud, sand, mixed sediment and coarse sediment communities, change the presence and abundance of typical species and change the species composition of component communities. Fish, in particular flatfish, are an important marine species and a significant reduction of stock could affect the overall ecosystem function of the European Site.

6.1.1.3 Removal of non-target species (Otter trawling bycatch and effect to benthic species)

Direct damage to biota from trawl gear has been recorded a number of times with larger individuals showing higher direct mortality than smaller individuals (Lindeboom and de Groot, 1998; Bergman and van Santbrink, 2000).

Kenchington et al. (2001) simulated trawling disturbance in a test tank to understand biological damage caused to bivalves buried in and around an otter trawl path. A full-scale trawl door model was used to perform a scour test in a simulated environment designed to represent the sea bed found in the Grand Banks, Newfoundland. Bivalves buried in the scour path were displaced to berms with 58-70% of displaced individuals exposed on the surface; however only 5% showed physical damage to shells. Some burrowing species of sedentary bivalves may not be affected by trawl doors as they bury in sediment to depths greater than the penetration depth of the trawl doors (Bergman and van Santbrink, 2000).

Bergman and van Santbrink (2000) assessed damage caused by a single passage of commercial beam and otter trawls on macrofauna and megafauna. In macrofauna (including gastropods, starfish and small crustacea) mortality occurred in 5-40% of initial densities. This increased to 20-65% for bivalves. This mortality was attributed to direct damage from contact with the trawl gear. They found the otter trawl and a 4m beam trawl fisheries caused similar annual mortalities. Meiofauna are more likely to be resistant to the effects of trawling as they can become resuspended, with the sediment, rather than directly damaged (Schratzberger et al., 2002).

A meta-analysis of fishing impacts was conducted by Kaiser et al. (2002), they found otter trawling to have one of the least negative impacts on biota of demersal gear types. They found that the impacts on biota varied between sediment types and between studies. Direct mortality of benthic faunal species by one sweep of commercial beam and otter trawls has been assessed (Bergman and van Santbrink, 2000), mortalities of species was found to range from 0-65% (Table 3) with higher mortalities for bivalves, gastropods and echinoderms found in silty sediment.

Table 4 Mean direct mortality (% of the initial density in the trawl track) of megafaunal species caused by a single pass of an otter trawl in silty and sandy sediments of the southern North Sea. Adapted from: (Bergman and van Santbrink, 2000).

Species	**Mortality (% of initial density)**	
	Silty sediment	Sandy sediment
Bivalves	0-52%	0-21%
Gastropods	7%	-
Echinoderms	0-26%	12-16%
Crustacea	3-23%	3-23%

Fishing disturbance affects diversity, abundance, size structure and production of benthic communities (Kaiser, et al., 2000; Jennings, et al., 2001; Duplisea, et al., 2002). Prena et al., (1999) conducted an experimental study to assess the biological impacts of otter trawling over a sand substrate in Newfoundland from 1993 to 1995. They used trawl corridors and reference corridors to assess changes to biota. Total biomass decreased significantly within trawl corridors; the biomass of benthic organisms decreased by

24%. Several factors were discussed as the cause for this decrease including: removal by trawl, mortality through physical damage, exposure and predation, and migration. They concluded otter trawling over a sandy bottom caused a significant change in both the benthic habitat and communities.

Shifts in benthic community structures have been observed from a community dominated by higher biomass species to one dominated by more species of lower biomass (Collie et al., 2000). Sixteen months after trawling activity there was a significant difference in infaunal species richness where polychaetes increased but bivalves decreased (Tuck et al., 1998). Life history stages play a large role in the ability of a species to adapt to changes in sediment and turbidity. Shorter life history stages with high levels of recruitment are able to repopulate an area post disturbance (Churchill, 1989; Schratzberger et al., 2002). Levin (1984) described the rapid recolonisation of polychaetes with shorter larval stages and post-larval movements. They exhibited small scale dispersal to disturbed patches of trawling ground, and colonised there, resulting in high densities of infauna. Prolonged trawling has reduced the abundance of fragile large-bodied organisms and increased the abundance of opportunists (Ball et al., 2000). More fragile and slow recruiting animals are the most sensitive to trawling disturbance, with fast growing species with good recruitment the least susceptible (MacDonald et al., 1996). This resulted in an increase in small polychaetes but created stable communities with fewer species. These effects were recorded in an area where fishing was restricted for parts of the year (Ball et al., 2000). This follows the predicted change of anthropogenically disturbed communities towards r-strategists (such as polychaetes) and away from k-strategists (such as molluscs) (Jones, 1992).

In course sand, meiofaunal benthic organisms such as diatoms and nematodes were significantly lower within trawl corridors, with nematode numbers increasing 4-6 times after trawling activity (Brylinsky et al., 1994). In this sediment type there was no significant difference in abundance of macrofaunal polychaetes between trawled and non-trawled areas (Brylinsky et al., 1994). Schratzberger et al. (2002) investigated the effects of beam trawling on community structure, biomass and diversity of meiofauna on real fishing grounds in the North Sea and found no short or medium term (0-1 year after trawling) effects on the diversity or biomass and only slight effects on community structure. Any changes recorded were slight in comparison with seasonal and inter-annual changes to communities, after which the effects of trawling disturbance were no longer detectable (Kaiser, 1998).

Queirós et al., (2006) studied the effects of otter trawling over a muddy-sand habitat and beam trawling over a sandy habitat. They assessed biomass and productivity related to size of individuals within infaunal communities. In a muddy habitat chronic trawling had a negative impact on the biomass and productivity, whereas in a sandy habitat no impact was identified. The impact of trawling activity on communities and habitats depends on the adaptability of organisms to natural disturbances. However, some argue that the impact of fishing gear on habitats and communities is not comparable to natural disturbances (Bergman and van Santbrink, 2000).

An organisms vulnerability to fishing activity depends on its physical characteristics (hard or soft bodied), its mobility (mobile or sessile) and its habitat (infaunal or epifaunal) (Mercaldo-Allen and Goldberg, 2011). Larger bodied, slow moving, fragile organisms are most vulnerable (Kaiser and Spencer, 1996). The effects of trawling can have different impacts upon organisms with different methods of feeding; otter trawling had the greatest impact on suspension feeders in mud and sand habitats (Kaiser et al., 2006). Some organisms, such as suspension feeding bivalves, are heavily impacted by burial that is associated with trawling activity and are unable to escape burial of more than 5 cm (Tuck et al., 1998). Opportunistic feeders such as oligochaetes and nematodes increased year on year in highly trawled areas (Kaiser et al., 2006).

The impacts of trawling activity on epifauna are mixed in the literature, with no long-term effects having been reported in in the North Sea (Jennings et al., 2001), in Scottish sea lochs (Tuck et al., 1998) or in Hong Kong harbours (Thrush and Dayton, 2002). However Kenchington et al. (2001) found a 24%

reduction in epifaunal (and some infaunal as epibenthic sled used for sampling penetrates to 2-3 cm depth) organisms in the sandy habitats of Grand Banks, Newfoundland.

Scavenging organisms have been recorded feeding in a recently fished area. Ramsay et al. (1998) found the density of hermit crabs increased significantly in a recently fished area with no change in a non-fished control area. Diver observations also recorded starfish *Asterias rubens*, hermit crab *Pagurus bernhardus* brittle stars *Ophiura ophiura* and whelks *Buccinum undatum* feeding on damaged organisms in trawl paths. In other areas surveyed the number of scavenging organisms decreased. Therefore the response of species to fishing activity varies between communities.

In a *Nephrops* fishery in the Clyde Sea a large amount of invertebrate discards are produced. Bergmann and Moore (2001) assessed the post trawling mortality of echinoderms; they looked at injury from fishing activity and exposure on deck. Mortality was 0-31% with injured individuals having a long-term mortality of 22-96%. Common bycatch species in demersal trawl fisheries include demersal fish and invertebrates. The effects of beam trawls and otter trawls have been modelled to understand their effects on demersal bycatch species (Philippart, 1998). Numbers of several such species have declined within 35 years due to bottom trawling with the catchability 10x higher in beam trawls than otter trawls (Philippart, 1998).

6.1.1.4 Changes in suspended solids (water clarity)
Siltation rate changes, including smothering (depth of vertical sediment overburden)

There may be increased turbidity of the water column caused by dragging gear along (or close to) the seabed and disturbing sediments. An increase in suspended sediment can reduce light penetration and potentially reduce primary productivity and algae growth. Other organisms such as benthic fauna can become smothered which will reduce the ability of the organisms to feed. For organisms that are sessile, such as hydroids and bryozoan, smothering will reduce feeding and depending on the level of smothering will cause mortality.

6.1.2 Exposure of SAC features to pressures

6.1.2.1 Abrasion/disturbance of the substrate on the surface of the seabed
Penetration and/or disturbance of the substrate below the surface of the seabed

Most of the research into the effects of beam trawling on the structure, function and associated fauna of a sediment type has been performed using much larger and heavier otter trawls. Otter trawling in this site uses lightweight doors and gear. Most research indicates that using light otter doors results in light trawl tracks 5 to 10cm deep. The sensitivity of the habitats depends very much on the natural level of energy within the environment and how often the substrate is trawled.

Impacts of otter trawling in the Site will be minimal for the following reasons:

- the otter trawling gear used is light in comparison to more conventional gear used by larger vessels;
- the number of days fished within the site are very low;
- the number of operators is low;
- the fishing vessels are small with the majority being under 10m and one vessel under 13.5m;
- the speed at which the vessels tow is low;
- the natural environment within Morecambe Bay is highly dynamic and changeable with sediments, channels and sandbanks constantly changing and moving geographically, creating sediment habitats use to constantly shifting sediment and high energy conditions which are likely to have high recoverability rates.

The NWIFCA can therefore conclude that it is unlikely that abrasion, disturbance of the surface of the seabed and penetration and disturbance below the surface of the seabed will have an adverse effect on the integrity of the European Site.

6.1.2.2 Removal of target species (Fish)

EU Technical Measures (EC 850/98) controlling mesh sizes and technical specification of gear (e.g. square meshed panels) are in place to reduce the number of fish caught that are below the MLS / MCRS. Due to the very small scale of activity and the seasonality of fishing, it is unlikely that the removal of larger specimens of fish will have a significant effect on the overall population.

The NWIFCA can therefore conclude that it is unlikely that removal of target species will have an adverse effect on the integrity of the European Site.

6.1.2.3 Removal of non-target species (Otter trawling bycatch and effect to benthic species)

EU Technical Measures (EC 850/98) controlling mesh sizes and technical specification of gear (e.g. square meshed panels) are in place to reduce the number of fish caught that are below the MLS / MCRS. Due to the very small scale of activity and the seasonality of fishing it is unlikely that the removal of non-target species is going to have a significant effect on the overall population.

The effect to benthic species from otter trawling is likely to be minimal due to the following reasons:-

- the otter trawling gear used is light in comparison to more conventional gear used by larger vessels;
- the number of days fished within the site are very low;
- the number of operators is low;

- the natural environment within Morecambe Bay is highly dynamic and changeable which will be portrayed in the species that inhabit the sediment, they are likely to be resistant to change and disturbance with an absence of sensitive species such and hydroids, bryozoan and sponges.

The NWIFCA can therefore conclude that it is unlikely that removal of non-target species effect to benthic species will have an adverse effect on the integrity of the European Site.

6.1.2.4 Changes in suspended solids (water clarity)
Siltation rate changes, including smothering (depth of vertical sediment overburden)

Light otter trawling has the potential to decrease the water clarity by increasing the suspended solids in the water. Increasing the suspended solids can cause a change in siltation rates including smothering. The natural environment in Morecambe Bay is highly dynamic and changeable. The sediment is constantly shifting meaning that the background levels of suspended sediment are already naturally high. The use of light otter trawls with shallow penetration depths and only occasional fishing will result in negligible effect against background levels.

The NWIFCA can therefore conclude that it is unlikely that changes in suspended sediment and siltation rates from otter trawling will have an adverse effect on the integrity of the European Site.

6.2 Potential risks to SPA features (birds)

6.2.1 <u>Pressures and Potential Impacts</u>

The potential impact of the removal of target and non-target species, change of water quality and visual disturbance is that the condition, productivity and survivability of the qualifying bird features could be decreased leading to an overall population decrease. The removal of target and non-target species has the potential to remove a food source for the qualifying bird species. A decrease in water clarity can affect the success rate of feeding for plunge and diving birds. Visual disturbance can cause an increase in the amount of energy which is used due to the extra flights and increased alertness the bird takes to avoid the activity, decrease the amount of feeding time and concentrate the number of individuals into a smaller area, which in turn increases competition rates and potentially decreases the availability of the food resource.

6.2.1.1/2 Removal of target species and non-target species

Some regional declines of seabirds have been related to fishing activity (Anker-Nilssen *et al.* 1997). There may be indirect effects to birds from fishing activity through removing and competing for prey resources, as seen in the North Sea where black-legged kittiwakes have declined by over 50% since 1990 during a period where there was an active lesser sandeel fishery (Frederiksen *et al.* 2004). This was also thought to be partly due to profound oceanographic changes at the same time (Frederiksen *et al.* 2004).

There may also be benefits from fishing to birds, where birds gain extra food through feeding on fishing offal and discards (Hudson & Furness, 1989; Campyhusen *et al.* 1996), or where numbers of small fish prey increase following the removal of larger predatory fish (Tasker *et al.* 2000; Furness, 1982). However there can be negative impacts too, where smaller fish are targeted by fishing activity, reducing the food available as prey to birds and leading to increased competition (Frederiksen *et al.* 2004; Tasker *et al.* 2000).

A study by Oro and Ruix (1997) assessed how discards from trawlers are used by seabirds - ‘gulls and terns followed behind the trawlers, Procellariiformes were noted away from the stern…” and found that the discards at one of the two sites were unable to support the energy requirements of the scavenging seabird populations but could support them at the other site (Oro & Ruix, 1997). Camphuysen *et al.* (1995) showed species that profited most from scavenging, which included several gull species. In a study by Depestele et al. (2012) on the interactions between seabirds and fishery discards, lesser and greater black-backed gull were found to be associated with fishing vessels (potentially as scavengers), whilst little gull and black-headed gull were less frequently seen behind boats.

Walter and Becker (1997) investigated the occurrence and consumption of seabirds scavenging on shrimp trawler discards in the Wadden Sea. It was observed that the main scavengers were herring gull (*Larus argentatus*) and black-headed gull (*L. ridibundus*) with common gull (*L. canus*), lesser black-backed gull (*L. fuscus*), great black-backed gull (*L. marinus*), and common/arctic tern (*Sterna hirundo/paradisaea*) being less numerous. Herring gulls made up 45% of the birds counted but consumed 82% of the total number of discarded items. Out of the total number of items discarded seabirds consumed 41% of flatfish, 79% of round fish, 23% of invertebrates and 10% of the shrimp. When these percentages are applied to the total discards from the shrimping fleet of Lower Saxony it was estimated that the consumed discards met the energy demand of 60,000 birds for the year and suggest that discards may have a strong effect on the bird population of the Wadden Sea.

Seabird mortality from demersal trawling can be caused by birds becoming entangled in the net when it is being hauled or shot. Birds do not often become caught in the net when it is actively fishing. The birds which are at the highest risk are larger bodied birds such as petrels (Birdlife) and those which are attracted to the vessel for an easy food source when the nets are being hauled, the catch is being sorted and the discards including offal are going back into the sea.

6.2.1.3 Collision above water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures).

Marine birds can be attracted to or become disorientated by artificial light sources, which can result in collision and therefore injury or death. Bird collisions with vessels, including fishing vessels, have been recorded with the risk being greatest at night for lighted ships near coastal areas and when the vessel is relatively close to large breeding aggregations of seabirds. Mortality can also be caused by the seabirds flying into the warps (Maree et al. 2014). The birds are attracted to the vessel as it is often an easy food source. The highest level of mortality is when the nets are being hauled, the catch is being sorted and the discards including offal are going back into the sea.

6.2.1.4 Collision below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures).

Marine birds particularly diving birds have the potential to collide with vessels under the water which could result in injury or death. Larger vessel and fast moving vessels are more likely to cause a collision due to the greater distances which have to be moved to avoid a large vessel and the speed that is needed to avoid a fast moving vessel.

Potential for birds to become entangled with nets underwater will be assessed in the SPA removal of non-target species section 6.2.1.2 (pressures) and 6.2.2.2 (exposure).

6.2.1.5 Changes in suspended solids (water clarity)

There may be increased turbidity of the water column caused by dragging gear along (or close to) the seabed and disturbing sediment. Cook and Burton (2010) used the extent that different bird species used vision in foraging to assess the sensitivities of birds to the direct effects of turbidity and found that foraging terns, guillemot and gannets particularly used their vision. “The decline in Sandwich Tern *Sterna sandvicensis* populations in the Netherlands has been linked with increases in turbidity (Essink 1999) showing that on some scales this can have impacts at the population level”. A study by Furness and Tasker (2000) identified tern species as being vulnerable when looking at terns cost of foraging, potential foraging range, ability to dive, amount of spare time in the daily budget and ability to switch diet. Any reduction of feeding success due to changes in suspended solids (water clarity) could have a greater effect on terns compared to other species which are able to adapt more easily and scored as less vulnerable such as gannets, fulmar, cormorant and guillemot. Due to the relative inflexibility of their foraging habitat selection, Eider and Common Scoter were also found to be sensitive to the indirect effects of sedimentation.

6.2.1.6 Visual Disturbance

Visual disturbance can cause an increase in the amount of energy which is used due to the extra flights and increased alertness the bird takes to avoid the activity, decrease the amount of feeding time and concentrate the number of individuals into a smaller area, which in turn increases competition rates and potentially decreases the availability of the food resource.

6.2.2 Exposure to Pressures

6.2.1.1/2 Removal of target species and non-target species

The gull species (Mediterranean, lesser black-backed and herring) are opportunistic feeders and have a variety of food sources both marine and non-marine. Gulls will often exploit the easiest food source available. Gulls are known to feed on the bycatch from fishing activities and can often benefit, as fishing bycatch is often an easy food source (Walter and Becker, 1997) and requires minimal energy expenditure. It is therefore unlikely the light otter trawling will have an effect on the population and distribution of these species of birds.

The primary source of food for little egret, sandwich tern, common tern, red breasted merganser, cormorant and great crested grebe is juvenile fish and smaller fish species. The very low level of activity, the European Council legislation which protects juvenile fish by the enforcement of mesh size, square mesh panel and of technical regulations allow the NWIFCA to conclude that the removal of target and non-target species is unlikely to have an effect on prey availability, or to affect the population and distribution of these bird species.

It can therefore be concluded that the removal of target and non-target species is unlikely at the current levels to have an adverse effect on the integrity of the European Site.

The trawls which are used in the European Site are smaller in size than in other fisheries in Europe in otter board length, and small in overall net size which reduces the risk of the birds becoming entangled in the net.

The SPA species at risk of entanglement are diving birds, great crested grebe, red breasted merganser, cormorant, eider and goldeneye and to a less extent gulls and tern species. Impacts of otter trawling on these features will be minimal for the following reasons:

- the fishing is seasonal (May and October with the concentration between July and September);
- the fishing activity occurs outside of the pSPA boundary;
- the number of operators is low;
- the number of days fishing are very low;
- the fishing gear used is lightweight and relatively small;
- the fishing vessels are small with the majority being under 10m and one vessel under 13.5m;
- the speed at which the vessels travel is low;
- the speed at which the vessels tow is low;
- the majority of activity occurs during daylight;
- lights used on the vessels during occasional night fishing are small and few;
- fishing does not occur close to large breeding aggregations;
- there are no known issues with birds becoming entangled with the light otter trawl gear in the site.

The NWIFCA can therefore conclude that it is unlikely that any birds will become entangled and that there is no risk of adverse effect on the integrity of the European Site.

6.2.2.3 Collision above water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures).

The birds which may be attracted towards the fishing activity are gull species and potentially, but less likely, tern species. SPA features such as waders, ducks, divers and geese are unlikely to be affected.

The NWIFCA can conclude that it is unlikely that any birds will collide with objects above water and therefore no risk of adverse effect on the integrity of the European Site from this pressure, for the following reasons:

- the fishing is seasonal (May and October with the concentration between July and September);
- the fishing activity occurs outside of the pSPA boundary;
- the number of operators is low;
- the number of days fishing are very low;
- the fishing gear used is lightweight and relatively small;
- the fishing vessels are small with the majority being under 10m and one vessel under 13.5m;
- the speed at which the vessels travel is low;
- the speed at which the vessels tow is low;
- the majority of activity occurs during daylight;
- lights used on the vessels during occasional night fishing are small and few;
- fishing does not occur close to large breeding aggregations;
- there are no known issues with birds colliding with objects associated with light otter trawl gear in the site.

6.2.2.4 Collision below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures).

The SPA features which could collide with objects below water are diving birds, great crested grebe, red breasted merganser, cormorant, eider and goldeneye and to a less extent gulls and tern species. The NWIFCA can conclude that it is unlikely that any birds will collide with objects below water and therefore no risk of adverse effect on the integrity of the European Site from this pressure, for the following reasons:

- the fishing is seasonal (May and October with the concentration between July and September);
- the fishing activity occurs outside of the pSPA boundary;
- the number of operators is low;
- the number of days fishing are very low;
- the fishing gear used is lightweight and relatively small;
- the fishing vessels are small with the majority being under 10m and one vessel under 13.5m;
- the speed at which the vessels travel is low;
- the speed at which the vessels tow is low;
- the majority of activity occurs during daylight;
- lights used on the vessels during occasional night fishing are small and few;
- fishing does not occur close to large breeding aggregations;
- there are no known issues with birds colliding with objects associated with light otter trawl gear in the site.

6.2.2.5 Changes in suspended solids (water clarity)

Light otter trawling has the potential to decrease the water clarity by increasing the suspended solids in the water. For species which feed on fish (little egret, sandwich tern, common tern, red breasted merganser, cormorant, great crested grebe, eider and goldeneye) and rely on sight it has the potential to reduce feeding success rates. The natural environment in Morecambe Bay is highly dynamic and changeable. The sediment is constantly shifting meaning that background level of suspended sediment is already naturally high. Due to the operators using small lightweight otter trawls with shallow penetration depths, the increase in suspended solids levels from trawling are low compared to background levels, and are unlikely to affect the feeding success of these SPA features.

6.2.2.6 Visual Disturbance

It is unlikely that the four vessels which occasionally trawl for fish in the European Site will disturb waders - little egrets, golden plover, dunlin, black tailed godwit, bar tailed godwits, curlew, redshank, oystercatcher, ringed plover, grey plover, knot, sanderling and turnstone - due to fishing being boat based and the birds spending the majority of their time feeding on intertidal areas. There is a small possibility that when the birds are flying they may be disturbed but due to the size of the vessels, the occasional activity when compared to the level of background vessel movement, any disturbance from fishing activity will be minimal. The NWIFCA can therefore conclude that visual disturbance to waders will be minimal if at all, and therefore there is no risk of adverse effect on the integrity of the European Site from this pressure.

Whooper swans, pink footed geese, shelduck, Northern pintail, wigeon, goldeneye, red breasted merganser, cormorant, great crested grebe and eider are often found on the water, so there is potential for disturbance by boat trawling. Visual disturbance to ducks, geese and grebes will be minimal and any displacement temporary and short lived for the following reasons:

- the fishing is seasonal (May and October with the concentration between July and September);
- the fishing activity occurs outside of the pSPA boundary;
- the number of operators is low;
- the number of days fishing are very low;
- the fishing gear used is lightweight and relatively small;
- the fishing vessels are small with the majority being under 10m and one vessel under 13.5m;
- the speed at which the vessels travel is low;
- the speed at which the vessels tow is low;
- the majority of activity occurs during daylight;
- vessel lights used during occasional night fishing are small and few;
- whooper swans, pink footed geese, shelduck, pintail, wigeon and goldeneye numbers are greatest during the winter when fishing effort is very low or stopped.

The NWIFCA can therefore conclude there is no risk of an adverse effect on the integrity of the European Site from this pressure.

The gull species (Mediterranean, lesser black-backed and herring) are unlikely to be disturbed by any fishing activity, as gulls are opportunistic feeders and are more likely to be attracted to fishing activity as any easy food source rather than disturbed by it. It is therefore unlikely that visual disturbance on gulls from the fishing activity will have an adverse effect on the integrity of the European Site.

There is a potential for disturbance by boat trawling to tern species. Visual disturbance to terns will be minimal and any displacement temporary and short lived for the following reasons:

- the fishing is seasonal (May and October with the concentration between July and September);
- the fishing activity occurs outside of the pSPA boundary;
- the number of operators is low;
- the number of days fishing are very low;
- the fishing gear used is lightweight and relatively small;
- the fishing vessels are small with the majority being under 10m and one vessel under 13.5m;
- the speed at which the vessels travel is low;
- the speed at which the vessels tow is low;
- the majority of activity occurs during daylight;
- vessel lights used during occasional night fishing are small and few.

The NWIFCA can therefore conclude there is no risk of an adverse effect on the integrity of the European Site from this pressure.

Table 2: Summary of Impacts

Feature/Sub feature(s)	Conservation Objective	Potential pressure[6] (such as abrasion, disturbance) exerted by gear type(s)[7]	Potential ecological impacts of pressure exerted by the activity/activities on the feature[8] *(reference to conservation objectives)*	Level of exposure[9] of feature to pressure	Mitigation measures[10]
Subtidal mud **Subtidal sand** **Subtidal mixed sediment** **Subtidal coarse sediment** (Large shallow inlets and bays)	Maintain or restore the extent, distribution structure or function of the Intertidal sand and muddy sand.	Abrasion/disturbance of the substrate on the surface of the seabed Changes in suspended solids (water clarity) Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion Siltation rate changes, including smothering (depth of vertical sediment overburden)	Potential to effect the:- - Extent and distribution - Presence and spatial distribution of intertidal sand and muddy sand communities - Presence and abundance of typical species - Species composition of component communities - Sediment composition and distribution Potential to effect the:- - Water quality - turbidity Potential to effect the:- - Extent and distribution - Presence and spatial distribution of intertidal sand and muddy sand communities - Presence and abundance of typical species - Species composition of component communities - Sediment composition and distribution Potential to effect the:- - Extent and distribution - Presence and spatial distribution of intertidal sand and muddy sand communities - Presence and abundance of typical species - The species composition of component communities - Sediment composition and distribution - Sediment movement and hydrodynamic regime - Topography	Vessel numbers are low. Activity levels are very low. The natural environment s highly dynamic and changeable, with channels and sediments constantly changing and moving geographically. Otter trawls are small and lightweight with shallow penetration depths. Activity is seasonal and typically occurs between May and October. It will not affect the extent, distribution, structure or function of the feature, and will therefore not have an adverse effect on the integrity of the European Site.	None

[6] Guidance and advice from NE.
[7] Group gear types where applicable and assess individually if more in depth assessment required.
[8] Document the sensitivity of the feature to that pressure (where available), including a site specific consideration of factors that will influence sensitivity.
[9] 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.
[10] 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 (Fish) Removal of non-target species (non-retained bycatch)	Potential to effect the:- - Presence and spatial distribution of intertidal sand and muddy sand communities - Presence and abundance of typical species - The species composition of component communities	Due to scale of activity, number of vessels and days involved, management measures already in place, and seasonality - it is unlikely at current levels of activity that light otter trawling for flatfish will have a significant effect on populations and in turn the function of the SAC features, and therefore will not have an adverse effect on the integrity of the European Site.	None
- *Larus melancephalus;* Mediterranean gull - *Larus fuscus*; Lesser black-backed gull - *Larus argentatus*; Herring gull	Maintain or restore the population and distribution of the qualifying features.	Removal of target species (Fish) Removal of non-target species (non-retained bycatch – bird bycatch assessed below)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	Gulls are opportunists and have a variety of food sources. They will exploit the easiest. Most gull species are known to feed on fishing bycatch, and therefore they may benefit from light otter trawling. The activity will not affect the population or distribution of the features, and will therefore not have an adverse effect on the integrity of the European Site.	None
- *Egretta garzetta;* Little egret - *Sterna sandvicensis*; Sandwich tern (Breeding) - *Sterna hirundo*; Common tern (Breeding) - *Sterna albifrons*; Little tern (Breeding) - *Mergus serrator;* Red-breasted merganser - *Phalacrocorax carbo;* Cormorant - *Podiceps cristatus;* Great crested grebe	Maintain or restore the population and distribution of the qualifying features.	Removal of target species (Fish)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	Due to scale of activity, number of vessels and days involved, management measures already in place, and seasonality - it is unlikely at current levels of activity that light otter trawling for flatfish will have a significant effect on populations and in turn the function of the SAC features, and therefore will not have an adverse effect on the integrity of the European Site.	None
		Removal of non-target species (Non-retained bycatch– bird bycatch assessed below)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	Due to scale of activity, number of vessels and days involved, management measures already in place, and seasonality - it is unlikely at current levels of activity that light otter trawling for flatfish will have a significant effect on populations and in turn the function of the SAC features, and therefore will not have an adverse effect on the integrity of the European Site.	None

		Changes in suspended solids (water clarity)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	Vessel numbers are low. Activity levels are very low. The natural environment s highly dynamic and changeable, with channels and sediments constantly changing and moving geographically. Otter trawls are small and lightweight with shallow penetration depths. Activity is seasonal and typically occurs between May and October. It will not affect the extent, distribution, structure or function of the feature, and will therefore not have an adverse effect on the integrity of the European Site.	None
- *Egretta garzetta;* Little egret - *Haematopus ostralegus*: Eurasian oystercatcher - *Charadrius hiaticula*; Ringed plover - *Pluvialis apricaria*; European golden plover - *Pluvialis squatarola*; Grey plover - *Vanellus vanellus;* Lapwing - *Calidris canutus*; Red knot - *Calidris alba*; Sanderling - *Calidris alpina alpina*; Dunlin - *Calidris pugnax;* Ruff - *Limosa limosa;* Black-tailed godwit - *Limosa lapponica;* Bar-tailed godwit - *Numenius arquata*; Eurasian curlew - *Tringa totanus*; Common redshank - *Arenaria interpres*; Ruddy turnstone - *Vanellus vanellus;* Lapwing	Maintain or restore the population and distribution of the qualifying features.	Visual disturbance	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Extent and distribution of supporting habitat available whilst a fishing activity is occurring	It is unlikely that four vessels occasionally trawling will disturb waders due to fishing being boat based and waders spending majority of time feeding on the intertidal areas. There is a small possibility that when waders are flying they may be disturbed, but due to size of the vessels, occasional activity when compared to level of background vessel movements, any disturbance will be minimal. It is unlikely that visual disturbance to waders will cause an impact and therefore there is no risk of an adverse effect on the integrity of the European Site from this pressure.	None
		Collision below water with static or moving objects not naturally found in the marine environment (e.g. boats, machinery, and structures)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Extremely unlikely due to waders only wading in shallow water.	None
		Removal of non-target species (Bird bycatch)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Extremely unlikely due to waders only wading in shallow water.	None
- *Tadorna tadorna*; Common shelduck - *Anas acuta*; Northern pintail	Maintain or restore the population and distribution of the qualifying features.	Visual disturbance	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Extent and distribution of supporting habitat available whilst a fishing activity is occurring	Visual disturbance to ducks, geese and grebes is minimal and displacement temporary and short lived. Fishing is seasonal, activity occurs outside of the pSPA boundary; number of operators is	None

· *Somateria mollissima*; Common eider · Anas Penelope; Wigeon · Bucephala clangula; Goldeneye · Mergus serrator; Red-breasted merganser · *Phalacrocorax carbo;* Cormorant · *Podiceps cristatus;* Great crested grebe *Cygnus Cygnus*; Whooper swan · *Anser brachyrhynchus* Pink-footed goose				low; number of days fishing is low; fishing gear used is lightweight and relatively small; fishing vessels are small; speed at which vessels travel and tow is low; majority of activity occurs during daylight; lights used during occasional night fishing are small and few; whooper swans, pink footed geese, shelduck, pintail, wigeon and goldeneye numbers are greatest during winter when fishing effort is very low or stopped. Therefore there is no risk of an adverse effect on the integrity of the European Site from this pressure.	
		Collision below water with static or moving objects not naturally found in the marine environment (e.g. boats, machinery, and structures)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and the size of gear.	None
		Removal of non-target species (Bird bycatch)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and the size of gear.	None
· *Larus melancephalus;* Mediterranean gull · *Larus fuscus*; Lesser black-backed gull · *Larus argentatus*; Herring gull	Maintain or restore the population and distribution of the qualifying features.	Visual disturbance	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Extent and distribution of supporting habitat available whilst a fishing activity is occurring	Gull species unlikely to be disturbed by any fishing activity, as gulls are opportunistic feeders and more likely to be attracted to fishing activity as any easy food source rather than disturbed by it. It is therefore unlikely that visual disturbance on gulls will have an adverse effect on the integrity of the European Site.	None
		Collision above water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and size of gear.	None
		Collision below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and size of gear.	None
		Removal of non-target species (Bird bycatch)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and size of gear.	None

· *Sterna sandvicensis*; Sandwich tern · *Sterna hirundo*; Common tern · *Sterna albifrons*; Little tern	Maintain or restore the population and distribution of the qualifying features.	Visual disturbance	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Extent and distribution of supporting habitat available whilst a fishing activity is occurring	Visual disturbance to terns is minimal and displacement temporary and short lived. Fishing is seasonal, activity occurs outside of the pSPA boundary; number of operators is low; number of days fishing is low; fishing gear used is lightweight and relatively small; fishing vessels are small; speed at which vessels travel and tow is low; majority of activity occurs during daylight; lights used during occasional night fishing are small and few; whooper swans, pink footed geese, shelduck, pintail, wigeon and goldeneye numbers are greatest during winter when fishing effort is very low or stopped. Therefore there is no risk of an adverse effect on the integrity of the European Site from this pressure.	None
		Collision above water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and size of gear.	None
		Collision below water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and size of gear.	None
		Removal of non-target species (Bird bycatch)	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species - Assemblage diversity	Unlikely due to low number of operators, seasonality of fishing, areas fished and size of gear.	None

7. Conclusion[11]

Taking into account the information detailed in the Appropriate Assessment, the NWIFCA can conclude that at the current level of light otter trawling there is no risk of adverse effect on the integrity of the Morecambe Bay and Duddon Estuary European Site interest features.

8. In-combination assessment[14]

In combination effects will be assessed in a separate document when all initial TLSEs for a site are completed.

9. Summary of consultation with Natural England

See attached advice from Natural England (Annex 2).

10. Integrity test

The NWIFCA can conclude that light otter trawling has no adverse effect on the integrity of the Morecambe Bay and Duddon Estuary European Site interest features.

[11] If conclusion of adverse affect alone an in-combination assessment is not required.

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Annex 2: Natural England's consultation advice

Date: 4 May 2017
Our ref: 213316
Your ref: NWIFCA-MB-EMS-002

NATURAL ENGLAND

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Carnforth
Lancashire
LA5 9BY

BY EMAIL ONLY

Dear Jonathan

Formal Advice to NWIFCA: Fisheries in EMS Habitats Regulations Assessment for Amber Risk Categories in Morecambe Bay and Duddon Estuary EMS, including gear types: towed demersal – light otter trawl (NWIFCA-MB-EMS-002).

Thank you for your consultation on the above which was received by Natural England on 13 April 2017.

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.

In 2012, the Department for Environment, Food and Rural Affairs (Defra) announced a revised approach to the management of commercial fisheries in EMSs[1]. The objective of this revised approach is to ensure that all existing and potential commercial fishing activities are managed in accordance with Article 6 of the Habitats Directive. This document states that for 'green' risk activities a site level assessment will be required if there are 'in combination effects' with other plans or projects. The Department's strong preference is that site level assessments be carried out in a manner that is consistent with the provisions of Article 6(3) of the Habitats Directive. Appropriate management measures should be put in place to ensure that the fishing activity or activities either 1) have no likely significant effect on a site in view of its conservation objectives or 2) following assessment, can be concluded to have no adverse effect on the integrity of the site.

Natural England has considered the Habitat Regulations Assessment (HRA) prepared by North Western Inshore Fisheries and Conservation Authority (IFCA) for the purposes of making an assessment consistent with the provisions of Article 6(3). Please accept this letter as Natural England's formal advice on the assessments and the conclusions they make. The assessments consider the effects of the following fishing activities on the Morecambe Bay Special Area of Conservation (SAC), Morecambe Bay Special Protection Area (SPA), Morecambe Bay Ramsar, Duddon Estuary SPA, Duddon Estuary Ramsar and Morecambe Bay and Duddon Estuary potential SPA (pSPA):

- NWIFCA-MB-EMS-002: towed demersal – light otter trawl

[1] Defra revised approach: https://www.gov.uk/government/publications/revised-approach-to-the-management-of-commercial-fisheries-in-european-marine-sites-overarching-policy-and-delivery

We are content that the best available and most up to date evidence has been used to carry out the HRA by North Western IFCA officers to determine whether management of an activity is required to conserve site features, and thus to ensure the protection of the features, from direct and indirect impacts, from the collection of marine fisheries resources.

We note that in combination effects will be assessed in a separate document when all initial Tests of Likely Significant Effects (tLSEs) for a site are completed.

Subject to the outcomes of the in combination assessments, it is Natural England's view that through their HRA, North Western IFCA officers appear to have appropriately identified those activities that are likely to have a significant effect in view of the site's conservation objectives, and whether management measures are required in order to ensure that the assessed fishing activity or activities will have no adverse effect on the integrity of the EMS.

It is Natural England's view that any foreseeable risk, or harm to the site has been appropriately assessed; and a robust mechanism for re-assessing that risk is in place. This view is based on our current knowledge of the impacts of these fishing activities on the designated features.

If you require any further comments or have any queries regarding the above please contact me to discuss them further.

Yours sincerely

Lucy May
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Natural England
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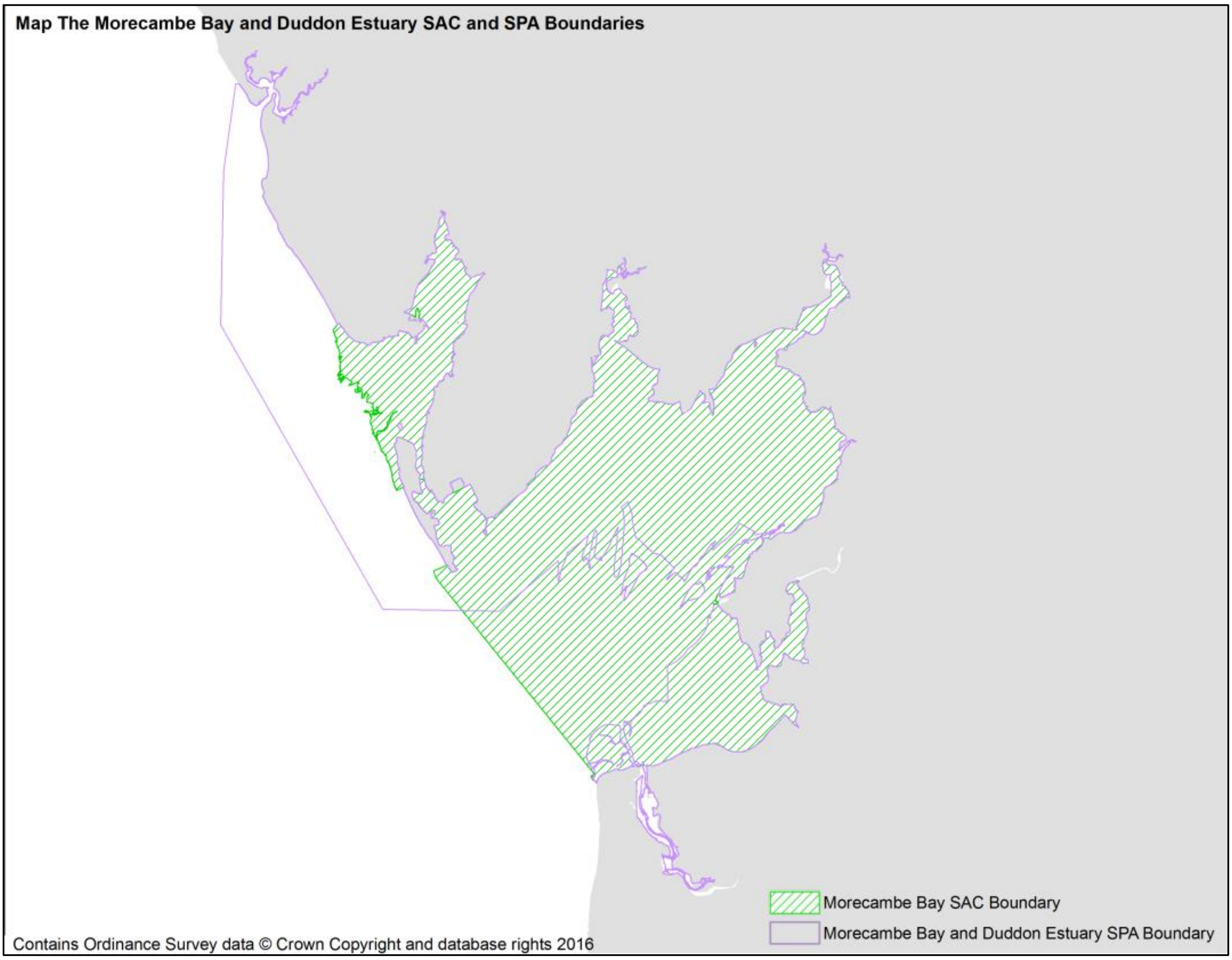
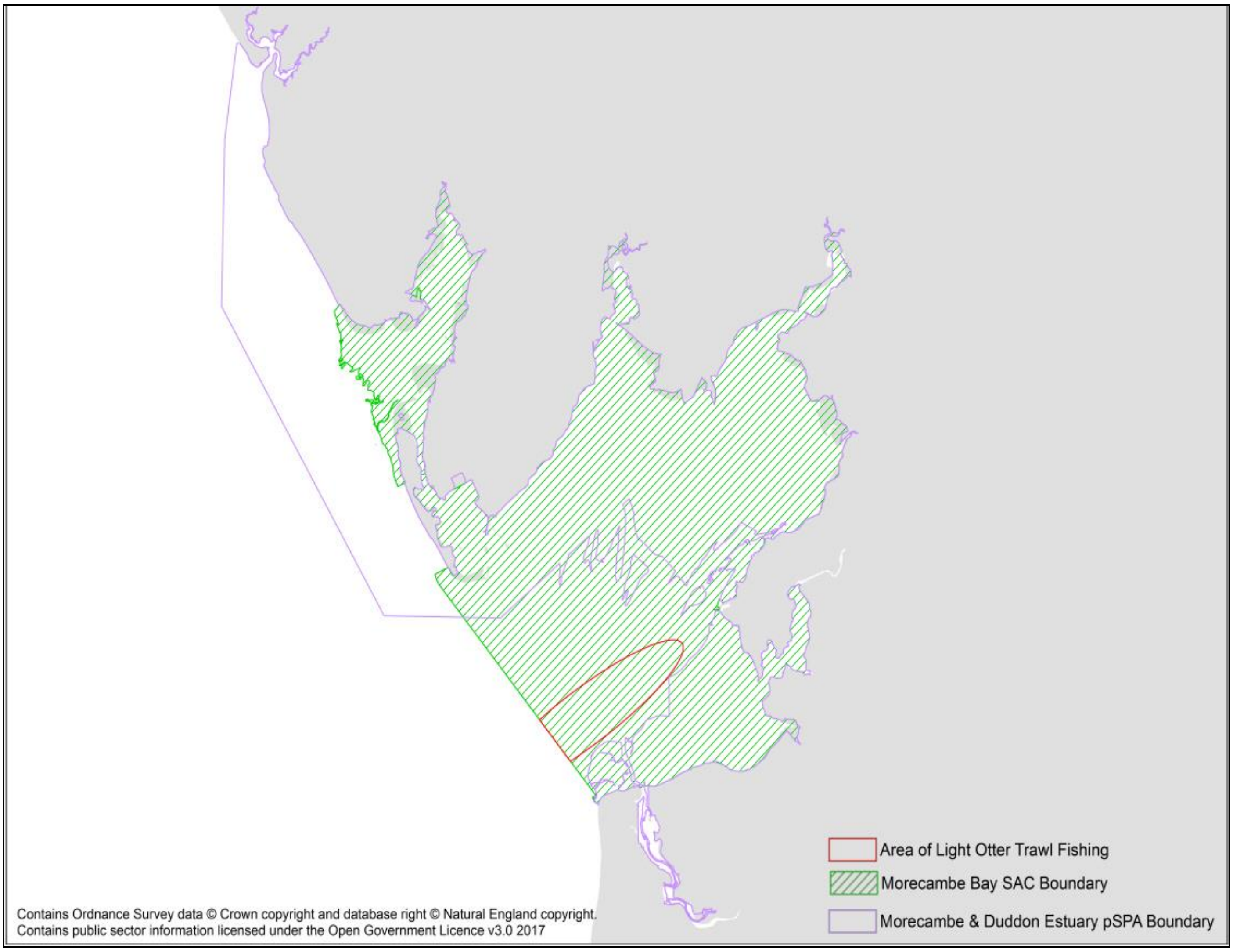
Tel: 0208 22 56003

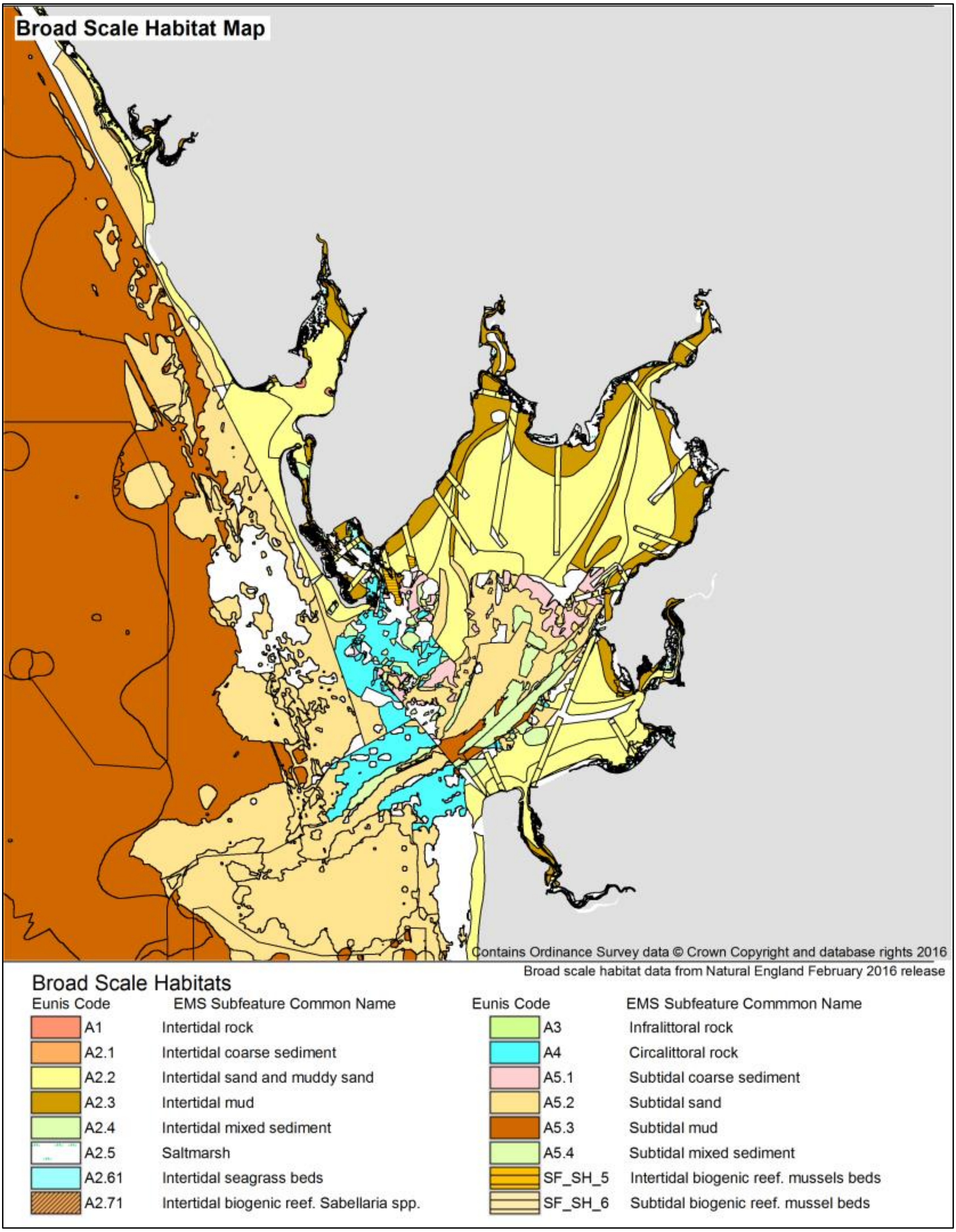
Annex 3: Site Map



Annex 4: Fishing activity maps



Annex 5: Broad Scale Habitat Map



Annex 6: Examples of Largest Light Otter Trawl Gear Used
(Photographs taken by NWIFCA at Fleetwood docks)