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

NWIFCA-MB-EMS-003
Date completed: 18th November 2016
Completed by: J. Haines

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 **–** Tractor and Boat Beam Trawl (Shrimp – *Crangon crangon*)

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 – beam trawl (shrimp – *Crangon crangon*)’ 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 – beam trawl (shrimp)’ 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] (Annex 1)
- Natural England's consultation advice (Annex 2)
- Site map(s) – sub-feature/feature location and extent (Annex 3)
- Fishing activity data (map(s), etc.) (Annex 4)

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

Fishing for shrimp within Morecambe Bay goes back hundreds of years and is a local artisanal industry and is still done by the local fishing communities around the bay. The knowledge of the fishery is often passed down through the fishing families. The principle and target areas are still much the same. Much of the shrimping from the shore use to be done by horse and cart but now uses a tractor. The size of the fleet fishing for shrimp has decreased considerably over the years only leaving 6 boats which still trawl for shrimp and with only 2 boats that regularly fish. Much of the processing of the shrimp is done locally and is branded as Morecambe Bay potted shrimp which is known nationally. Potting the shrimp increases the value of the catch and means that smaller quantities of the shrimp make the fishing commercially viable.

Beam trawling for shrimp in the Morecambe Bay and Duddon European Site can be split into two distinct methods: shrimp beam trawling from a boat and shrimp beam trawling from a tractor. The season for shrimp fishing historically starts in the spring as the water temperature increases with a lull in peak summer, and ends in late autumn when the air temperature begins to decrease. If the levels of shrimp in the Bay are high then operators will concentrate on shrimping; if levels of shrimp are low then they will concentrate on other fisheries. Operators typically target the channels and natural depressions in the sand where there are concentrations of shrimp.

Local IFCOs report that there are currently 6 vessels that commercially beam trawl for shrimp from a boat. All vessels are smaller inshore vessels and range in size between 4.8 metres and 9.15 metres, the size of the vessel limits the size of the beam that can be carried and the weather and tidal conditions it can be fished in. 2 vessels fish most days throughout the season if the catches are good, whereas the other vessels only fish a couple of days a month during the season. Fishing can occur at any time but smaller tides are preferred as the tide is not as strong. On spring tides operators with smaller beams do not fish as the tide is too strong and lifts the beam from the sea

[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)

bed. The operator's fish using a lightweight beam, made of either wood or metal tubing and are restricted by technical measures by NWSFC Byelaw 6 and EC Council Regulation No. 850/98.

Local IFCOs report and evidence provided from members of the fishing industry show there are currently nine full time operators and eight part time operators that commercially beam trawl for shrimp using a tractor. They fish from Flookburgh, Ulverston and Middleton Sands. The operators generally trawl using two 4 metre beams connected to a trailer. The beams are positioned at each side of the trailer and consist of a hollow metal bar with a lightweight rectangular metal frame 0.3m to 0.4m tall with a net behind (Annex 6). Fishing typically occurs over low water for three hours at a time and consists of two to four tows depending on location and conditions. Operators will move to different fishing locations to find the best catches of shrimp. The main access points are at Sandgate, West Plain, Baycliff, Newbiggin, Middleton and Pilling on established access routes. When the fishing is good a full time operator will fish 60 tides in the spring and 90 tides in the autumn. Reports from 2016 would suggest that the catches are low and therefore effort is likely to be less.

Annex 4 indicates the areas in which fishing occurs. Operators target channels and naturally occurring depressions in the sandy substrate meaning the actual fished area is much smaller than indicated on the map. The channels are continuously moving in the European Site: Ordnance Survey maps have been used to give an approximate area of the channels as an estimate of the area of the ground which would be targeted by operators. The total channel area from OS maps in the fished boxes is approx. 39.84 km^2 which equates to 6.12% of the total SAC area and 5.98% of the total SPA area.

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. This meant that the new NWIFCA boundary covered two SFCs and that there are two sets of existing byelaws. 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).

<u>Regulations Covering Beam Trawls for Shrimp from a Vessel</u>

EC Council Regulation 850/98 (Commercial fishing vessels only)

<u>Regulations Covering Beam Trawls for Shrimp</u>

North Western IFCA District

NWIFCA	Byelaw 6	Protection for European Marine Site Features

North Western SFC District

NWSFC	Byelaw 2	Attachment to nets
NWSFC	Byelaw 6	Shrimp and prawns – restriction on fishing
NWSFC	Byelaw 9	Mechanically propelled vessels – maximum length

Cumbria SFC District

CSFC	Byelaw 3	Size limits of boats allowed inside the district
CSFC	Byelaw 14	Shrimps and prawns
CSFC	Byelaw 15	Vessels with a registered engine power > 221kw

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: All sand dune and saltmarsh features and sub features have been screened out due to the fishing activity either happening from a boat or access to the intertidal area via established access routes. 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 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 fishing activity (Annex 4) has been overlaid onto a mapped (Annex 5) of the features and sub features of the European Site. All features and sub features that the fishing activity interacts with have been screen in to the table below. All SPA feature (bird species) have been screened in to the assessment.

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 vehicles and vessels used are small (typical sized tractor and vessels under 10m), the activity levels are low to medium, and the gear used is relatively small and lightweight compared to conventional gear used elsewhere in Europe.

Qualifying Feature	Sub-feature	Potential pressure(s)	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	Sensitive	No	The fishing activity does not target mud.
		Changes in suspended solids (water clarity)	Not Sensitive	No	
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Sensitive	No	
		Siltation rate changes, including smothering (depth of vertical sediment overburden)	Sensitive	No	
		Removal of target species (Shrimps)	Sensitive	No	
		Removal of non-target species (Shrimp beam trawling bycatch)	Sensitive	No	

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

	Intertidal sand and muddy sand	Abrasion/disturbance of the substrate on the surface of the seabed	Sensitive	Yes	
		Changes in suspended solids (water clarity)	Not 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 target species (Shrimps)	Sensitive	Yes	
		Removal of non-target species (Shrimp beam trawling bycatch)	Sensitive	Yes	
H1130. Estuaries H1160. Large shallow inlets and bays	Subtidal sand	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 target species (Shrimps)	Sensitive	Yes	
		Removal of non-target species (Shrimp beam trawling bycatch)	Sensitive	Yes	
H1160. Large shallow inlets and bays	Subtidal coarse sediment	Abrasion/disturbance of the substrate on the surface of the seabed	Not Sensitive	Yes	
		Changes in suspended solids (water clarity)	Not 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 target species (Shrimps)	Sensitive	Yes	
		Removal of non-target species (Shrimp beam trawling bycatch)	Sensitive	Yes	
A026 Egretta garzetta; Little egret	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.
A038 *Cygnus Cygnus*; Whooper swan					
A040 *Anser brachyrhynchus*; Pink-footed goose		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
A048 *Tadorna tadorna*; Common shelduck					
A050 Anas Penelope; Wigeon					
A054 *Anas acuta*; Northern pintail		Removal of target species (Shrimps)	Sensitive	Yes	All species have been taken through apart from Whooper swan and Pink footed goose. Shrimps can be found in the diet of the other designated species
A063 *Somateria mollissima*; Common eider (Breeding)					

A067 Bucephala clangula; Goldeneye		Removal of non-target species (Shrimp beam trawling bycatch)	Sensitive	Yes	All species have been taken through apart from Whooper swan and Pink footed goose. Bycatch species can be found in the diet of the other species
A069 Mergus serrator; Red-breasted merganser					
A130 *Haematopus ostralegus*; Eurasian oystercatcher		Visual disturbance	Sensitive	Yes	All species have been taken through to AA.
A137 *Charadrius hiaticula*; Ringed plover					
A140 *Pluvialis apricaria*; European golden plover		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 - Great crested grebe
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					
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)	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.
A184 *Larus argentatus*; Herring gull (Breeding)		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.
A191 *Sterna sandvicensis*; Sandwich tern (Breeding)		Removal of target species (Shrimps)	Sensitive	Yes	All species have been taken through to AA.
A193 *Sterna hirundo*; Common tern (Breeding)		Removal of non-target species (Shrimp beam trawling bycatch)	Sensitive	Yes	All species have been taken through to AA.
A195 *Sterna albifrons*; Little tern (Breeding)		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 (whitefish) • Pots and Creels • Light otter trawl • 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 and SPA supporting habitat features

6.1.1 Pressures and Potential Impacts

The potential direct impacts to the intertidal sand and muddy sand, subtidal sand and subtidal coarse sediment features caused by shrimp beam 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

Bergmen and Hup (1992) investigated the effects of a 12m beam trawl weighing 7 tonne with varying sizes of tickler chains on the macro fauna of sandy sediment. The study area was in the southern North Sea. Each study area was trawled three times over two days and sediment samples were taken up to two weeks after trawling. It was concluded that tickler chains penetrated at least 6cm into the sediment surface due to the species composition and the fact the tracks made by the beam shoes were visible on side scan sonar 16hrs later. The sediment samples showed there was a significant decrease (40-60%) in the number of *Asterias rubens*, *Echinocardium cordatum*, *Lanice conchilega* and *Spiophanes bombyx*, whereas *Magelona papillicornis* showed an increase in number. The less abundant mollusc and polychaete species showed no change in number after trawling. It was concluded that the effect of beam trawling has a greater effect on the number of individuals living on the sediment (starfish and urchins) and small individuals living in the sediment (polychaetes and molluscs). The larger individuals (larger bivalves) tend to live deeper or have better modes of escape.

Kaiser and Spencer (1996) investigated the effects of a commercial beam trawl weighing 3.5 tonnes fitted with tickler chains on a 4x2km study area in Liverpool Bay. The areas were trawled to ensure disturbance by the fishing gear. It was observed that in some areas the physical characteristics of the surface sediment were changed. For example surface ripples being flattened but mega ripples not showing change. It is suggested that the tickler chain may have caused the sediment to become unconsolidated. The conclusion is that the particle size distribution was not affected and observed changes may only be in the superficial layers of the sediment. It was shown that beam trawling in stable sediment areas had a negative effect on the abundance and diversity of species. In the top 20 common species, 19 species showed a decrease in number, and nine of these changes were statistically significant. In areas characterised by mobile sediment which are subject to frequent natural disturbance there were no detectable differences, as the sediments are already mobile and subject to continuous change due to natural processes, so the effects of fishing activity on the sediment structure would soon be undetectable. Overall, fragile infaunal species have a greater vulnerability to damage.

Leth and Kuijpers (1996) investigated the physical effects of beam trawling in the Danish North Sea using side scan to observe trawl marks in the sediment. It was seen that in finer sediment areas the trawl marks were faint. In one area of coarse grained sediment there were very clear well preserved trawl marks. It appeared that the trawl marks had been filled with finer sediment assumed to be from the conditions created by the tickler chain.

Under normal working conditions beam trawls influence only the top layers of the sea bed up to 30mm on muddy ground and up to 10mm on sandy ground. Summary of results to date suggest average penetration

depth 4-7cm. The depth depends on the bottom type and structure of the ticklers and does not always penetrate as the gear moves over the seabed at speeds of 6-7 knots (Groot. 1995).

6.1.1.2 Removal of target species (Shrimps)

Removal of target species has the potential to affect the spatial distribution of intertidal sand and muddy sand communities, change the presence and abundance of typical species and change the species composition of component communities. Shrimp are an important food source for many 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 (Shrimp beam trawling bycatch)

Lancaster and Frid (2002) looked at the fate of discarded juvenile brown shrimps in the Solway Firth. The fishing gear used was a 6m beam trawl with 21-23mm mesh fitted with a 30-65mm square mesh piece of net called a veil or sieve which is designed to reduce the catch of juvenile fish by up to 80%. The catch was then standardised to a 60 minute tow.

The study was taken on commercial fishing vessels between 1995 and 1997. Forty-seven hauls were sampled from commercial operators on forty three separate occasions throughout the study period. Tables 1 to 3 give a summary of the weight and percentage of each fraction and the weight and percentage of catch composition (shrimp, fish and other) of each fraction.

Table 1. Catch and riddle fraction composition by weight of commercial fishing vessels in the Solway Firth, study period1995-1997 (Lancaster and Frid. 2002)

Riddle Fraction	Composition of Fraction	Mean Weight (kg)	Mean proportion of haul (%)	Fate
Top	Large fish, crabs and debris	7.55	14.59	Discarded
Consumption	Consumption shrimps and fish	22.98	56.27	Cooked
Discards	Small shrimps and fish	13.2	29.13	Discarded

Table 2. Percentage of catch and riddle fraction composition by weight of commercial fishing vessels in the Solway Firth, study period1995-1997 (Lancaster and Frid. 2002)

Riddle Fraction	Percentage of *C. crangon*	Percentage of fish	Percentage of crab	Percentage of weed / trash
Top	2.0	90.5	3.7	3.4
Consumption	85.7	10.0	0.8	3.4
Discards	83.5	6.0	0.01	10.5
Total	**75.5**	**18.5**	**0.8**	**5.2**

Table 3. Weight of catch for composition of each riddle fraction of commercial fishing vessels in the Solway Firth, study period1995-1997 (Lancaster and Frid. 2002)

Riddle Fraction	Weight of *C. crangon* (kg)	Weight of fish (kg)	Weight of crab (kg)	Weight of weed / trash (kg)
Top	0.15	6.83	0.28	0.26
Consumption	19.69	2.30	0.18	0.78
Discards	11.02	0.79	0.01	1.39
Total	**30.87**	**9.92**	**0.46**	**2.42**

Lancaster and Frid (2002) found that 99% of discarded undersized shrimps were returned to the sea alive of which it was estimated that 92% would have survived after 24 hours. Taking into account bird and fish

predation, it was estimated that between 77 - 80% of all undersized shrimp entering a shrimp beam trawl in the Solway Firth would survive depending on the level of bird predation.

Berghahn et el. (1992) investigated the mortality of fish from the by-catch of shrimp beam trawlers in the North Sea. Trawl times were one hour using a cod end mesh size of 11-12mm. Berghahn found in the discard fraction 100 % mortality was observed for whiting (*Merlangius merlangus*) and 10% mortality for sculpin (*Myxocephalus scorpius*), hooknose (*Agonus catapbractus*), and eelpout (*Zoarces viviparus*). The survival of flatfish depended strongly on the species, size of the specimens as well as the catch and catch processing conditions, and ranged from 17 to 100%. It was observed that mortalities increased considerably after the catch passed through a sorting sieve.

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 and SPA supporting habitat 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 beams. Shrimp beam trawling in the European Site uses lightweight beams. Most research indicates that using heavy beam trawls between 3 and 7 tonnes will on average penetrate the substrate 4 to 7 cm depending on the substrate. It can therefore be inferred that any penetration of the beam trawls used by Morecambe Bay fishermen will be much less if any at all. The length of time in which the trawl marks are present in the sediment is very dependent on the energy levels of the habitat. In high energy areas the trawl marks will soon be filled in by surrounding sediment and the sediment which has been displaced during the trawling activity.

There is potential for all operators that use a tractor to beam trawl to fish at the same time but this is unlikely because the fishermen that prosecute the shrimp fishery also prosecute a variety of other fisheries and 8 of the operators being part-time. The tractor shrimpers are restricted to the duration of fishing by the tide, meaning they can only fish the target ground for approximately 3 hours over low water. When catches of shrimp are good a full time operator would fish about 150 tides between spring and autumn with a lull in peak summer with part time operators fishing fewer tides. There are six vessels that commercial trawl for shrimp within the European Site, two of the operators will fish when the catches of shrimps are good 75 days and the other four vessels will only fish a couple of days a month. The main fishing season is between spring and autumn with a lull in peak summer.

Annex 4 indicates the areas in which fishing occurs. Operators target channels and naturally occurring depressions in the sandy substrate meaning the actual fished area is much smaller than indicated on the map. The channels are continuously moving in the European Site: Ordnance Survey maps have been used to give an approximate area of the channels as an estimate of the area of the ground which would be targeted by operators. The total channel area from OS maps in the fished boxes is approx. 39.84 km^2 which equates to 6.12% of the total SAC area.

The natural environment in Morecambe Bay is highly dynamic and changeable. The channels and the sandbanks are constantly changing and moving geographically. Due to the number of operators fishing, the seasonality of the fishery, the gear used the area of the targeted fishing ground and taking into account the highly dynamic and changeable environment in which the activity occurs, it is unlikely to have an adverse effect on the integrity of the European Site.

6.1.2.2 Removal of target species (Shrimps)

Morecambe Bay has a long history of shrimp fishing going back hundreds of years; from anecdotal evidence the catch per unit effort in 2015 was the best in the last 30 years. The number of operators which still prosecute the fishery is a lot less than it used to be with many more boats based a Morecambe. Catches of shrimp can vary greater from a few kg up to a tonne. A typical catch is between 20 and 75kg for a trip. It is unlikely that the amount of shrimp removed by fishing would have a significant effect on the overall shrimp population; environmental factors have a much greater effect on the shrimp population. The shrimp population in the European Site is variable year on year regardless of the fishing effort. It is unlikely that the removal of shrimp at the current levels will have an adverse effect on the integrity of the European Site. Annex 6 contains images of a shrimp beam trawl catch.

6.1.2.3 Removal of non-target species (Shrimp bycatch)

Mortality of bycatch in a shrimp fishery varies according to species, size of specimens and haul durations as well as other factors such as total catch, composition, durations of catch processing and exposure to solar radiation. Within NWSFC Byelaw 6 are measures to reduce the destruction of immature fish by ensuring that the total catch from the shrimp beam trawl is riddled as soon as practically possible and that immature fish that pass through the riddle must be returned to the sea. Article 25 of EC Council Regulation 850/98 sets out the requirements for all commercial vessels to have installed on board a functioning device designed to separate flatfish from common shrimps and fish with a separator trawl or a trawl with a sorting grid for the protection of flatfish. Larger fish mainly flatfish which are caught are kept if there is a market value for them or returned alive if not.

Lancaster and Frid (2002) found that the average percentage of fish in the total catch was 18.5% with the majority being larger specimens. The total average weight of small discarded fish caught in a 6m beam trawl towed for 60 minutes was 0.79kg the majority of the discards were made up of juvenile shrimp 83.5%. The survival of flatfish depended strongly on the species, size of the specimens as well as the catch and catch processing conditions, and ranged from 17 to 100%. Larger flatfish will have a higher survival rate as they will be more resistant to being crushed and damaged. Lancaster and Frid (2002) estimated that the survival rates of discarded shrimps to be between 77 - 80% taking into account bird predation. From results taken from the Solway Firth shrimp fishery and from discussions with fishermen the majority of the discards is shrimp that is too small for processing and debris. If the non-shrimp part of the catch (crabs, fish, jellyfish, plant debris, rubbish, shell) exceeds 30% of the total catch than it has been reported that the tractor shrimpers stop fishing. Annex 6 contains images of a shrimp beam trawl catch.

The amount of bycatch and survival rates of fish is unlikely to affect the overall fish populations of the European Site and is therefore unlikely that the removal of non-target species (shrimp trawling bycatch) at the current levels 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)

Beam 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 and due to the operators using small lightweight beam trawls with shallow penetration depths over only 6.12% of the Site the extra suspended solids from beam trawling is unlikely to have an adverse effect on the integrity of the European Site.

6.2 Potential risks to SPA features (birds)

6.2.1 Pressures and Potential Impacts

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 (Shrimps and bycatch)

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 hitting 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

6.2.2.1 Removal of target species (Shrimps)

Shrimps are not considered a targeted food source for the following bird features of the site as they do not rely on this prey as a food resource: common shelduck, wigeon, Northern pintail, common eider, goldeneye, Eurasion oystercatcher, ringed plover, European golden plover, grey plover, lapwing, red knot, sanderling, dunlin, ruff, bar tailed godwit, black tailed godwit, Eurasian curlew, common redshank and ruddy turnstone. Shrimps will occasionally be found in the diet of each of the species because as with most species of birds they are opportunistic and will feed on most food resources if they are available. It is therefore unlikely to affect the population and distribution of these species of birds.

Little egret, sandwich tern, common tern, red breasted merganser, cormorant and great crested grebe all feed on shrimp but a larger part of their diet comes from the associated bycatch species (fish). It is unlikely that the amount of shrimp removed by fishing would have a significant effect on the overall shrimp population (section 6.1.2.2); environmental factors have a much greater effect on the shrimp population. It is therefore unlikely that the removal of target species through shrimp beam trawling is going to affect the population and distribution of these species of birds and the NWIFCA can conclude no adverse effect on the integrity of the European Site from this pressure.

6.2.2.2 Removal of non-target species (Shrimp beam trawling bycatch)

Fish are not considered a targeted food source for the following bird features of the site as they do not rely on this prey as a food resource: common shelduck, wigeon, Northern pintail, common eider, goldeneye, Eurasion oystercatcher, ringed plover, European golden plover, grey plover, lapwing, red knot, sanderling, dunlin, ruff, bar tailed godwit, black tailed godwit, Eurasian curlew, common redshank and ruddy turnstone. Very small fish will very occasionally be found in the diet of each of the species because as with most species of birds they are opportunistic and will feed on most food resources if they are available. It is therefore unlikely to affect the population and distribution of these species of birds.

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 shrimp beam 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 level of activity, low level of bycatch, legislation to protect juvenile flatfish and reduce catches of fish species, and the survival rates of discarded fish (as assessed above in section 6.1.2.3) allow the NWIFCA to conclude that the removal of 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 non-target species is unlikely at the current levels to have an adverse effect on the integrity of the European Site.

The shrimp beam trawls which are used in the European Site are smaller than the size than in other shrimp fisheries in Europe in beam 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 and cormorant, and to a lesser extent gulls and tern species. Due to the fishing being seasonal between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the fishing gear used is lightweight and relatively small,

the vessels which are used are small between 4.8 and 10m, the speed at which the tractors and vessels are travelling, the majority of the fishing activity occurring during daylight and the lights used during occasional night fishing are small and few from the tractors and under 10m vessels, the fishing not occurring close to large breeding aggregations and there are no known issues with birds becoming entangled with the shrimping gear in the site, it is unlikely that any birds will become entangled and the NWIFCA can conclude no adverse effect on the integrity of the European Site from this pressure.

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 and geese are unlikely to be affected. Due to the fishing being seasonal between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the fishing gear used is lightweight and relatively small, the vessels which are used are small between 4.8 and 10m, the speed at which the tractors and vessels are travelling, the majority of the fishing activity occurring during daylight and the lights used during occasional night fishing are small and few from the tractors and under 10m vessels, the fishing not occurring close to large breeding aggregations and there are no known issues with birds colliding with shrimping tractors and vessels in the site, it is unlikely that any birds will collide with objects above water and the NWIFCA can conclude no adverse effect on the integrity of the European Site from this pressure.

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 and cormorant and to a less extent gulls and tern species. Due to the fishing being seasonal between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the fishing gear used is lightweight and relatively small, the vessels which are used are small between 4.8 and 10m, the speed at which the tractors and vessels are travelling, the majority of the fishing activity occurring during daylight and the lights used during occasional night fishing are small and few from the tractors and under 10m vessels, the fishing not occurring close to large breeding aggregations and there are no known issues with birds colliding with shrimping tractors and vessels in the site, it is unlikely that any birds will collide with objects below water and the NWIFCA can conclude no adverse effect on the integrity of the European Site from this pressure.

6.2.2.5 Changes in suspended solids (water clarity)

Beam 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) 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 beam trawls with shallow penetration depths, suspended solids levels from beam 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

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). The areas where tractor shrimp beam trawling and the feature may interact will be at the edge of channels and in shallow pools. There is potential for the birds to be disturbed when tractors are travelling to 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. Due to the fishing being seasonal between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the vessels which are used are small between 4.8 and 10m, the majority of the fishing activity occurs during daylight and the lights used during occasional night fishing are small and few from the tractors and under 10m vessels, any disturbance is likely to minimal.

It is unlikely that the six vessels which commercial beam trawl for shrimp in the European site are going to disturb little egrets due to it being a boat based activity and the birds spending the majority of its time on the intertidal areas feeding. There is a small possibility that when the birds are flying they may be disturbed but due to the size of the vessels and the level of background vessel movement any disturbance is going to be minimal.

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 majority of the fishing activity occurring between spring and autumn 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. In Morecambe Bay mudflats are not targeted by the shrimp operators and they do not travel over mudflats to get to the fishing areas. Redshank are found on saltmarsh and are known to nest on saltmarsh. All access to the fishing grounds is by established access routes and visual disturbance is unlikely. Any visual disturbance that does occur is likely to be short lived and any displacement minimal Due to the above species feeding on mainly on mudflats and the fishing being seasonal between spring and autumn when wader numbers are typically lower than the over wintering population, the footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the vessels which are used are small between 4.8 and 10m, the majority of the fishing activity occurs during daylight and the lights used during occasional night fishing are small and few from the tractors and under 10m vessels, any disturbance is likely to minimal. Black tailed godwits are in low numbers between April and June and bar tailed godwits migrate in March and arrive in October further reducing the chance of disturbance.

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. The time in which the fishing activity has the potential to cause disturbance is the 3 hours over low water near the waters' edge. Oystercatchers within Morecambe Bay are usually observed in the greatest number feeding on mussel beds and skears, in particular Heysham Flat mussel bed and Foulney mussel bed. The time when the greatest numbers of oystercatchers are observed on the sand and muddy sand substrate is when there is a large settlement of cockle and where the cockles are in the high densities. When there is a large settlement of cockle which has grown to MLS and the cockle beds are open there is likely to be a reduction in effort of shrimp fishing as the operators will move to cockle fishing. Grey plover are not present in significant number between May and July further reducing the likelihood of disturbance to grey plover. Due to the above species feeding on a variety of substrates, the fishing being seasonal between spring and autumn when wader numbers are typically lower than the over

wintering population, the footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the vessels which are used are small between 4.8 and 10m, the majority of the fishing activity occurs during daylight and the lights used during occasional night fishing are small and few from the tractors and under 10m vessels, any disturbance is likely to minimal and any displacement is going to be temporary and only a short distance.

Shelduck, Northern pintail, wigeon, goldeneye, red breasted merganser, cormorant and great crested grebe are often found on the water, so there is a potential for disturbance by boat beam trawling. However there are only six operators fishing seasonally between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, the vessels which are used are small between 4.8 and 10m and the majority of the fishing activity occurring during daylight resulting in very little visual disturbance compared to background vessel activity levels in the area. Shellduck, pintail and wigeon spend a proportion of their time feeding on intertidal mud. As mudflats are not targeted by the tractor shrimp operator's disturbance is unlikely.

Whooper swans and pink footed geese numbers are greatest during the winter when fishing effort is decreasing or stopped. Whooper swans can be found on large bodies of open water, it is unlikely that the tractor beam trawling will cause any visual disturbance to whooper swans. There is a possibility for boat shrimp trawling to visually disturb whooper swans and pink footed geese, however there are only six operators fishing seasonally between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, the vessels which are used are small between 4.8 and 10m and the majority of the fishing activity occurring during daylight resulting in very little visual disturbance compared to background vessel activity levels in the area. Pink footed geese are known to roost on the higher shore and saltmarsh when they are not feeding on farmland. Any disturbance will occur when tractors are travelling to and from the fishing areas. Access is via established routes that are used by a variety of beach users recreational and commercial. Due to the above species utilising a variety of habitats (both marine and terrestrial), the majority of the fishing activity occurring between spring and autumn and for 3 hours over low water any disturbance is going to be minimal and any displacement is going to be temporary and only a short distance.

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 both the shrimping tractors and boats. Gulls utilise a range of habitats both marine and terrestrial and likely to be attracted to the fishing as a food source opportunity. Any disturbance likely to minimal due to the fishing footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the vessels which are used are small between 4.8 and 10m, the majority of the fishing activity occurs during daylight and the lights used during occasional night fishing are small and few from the tractors and under 10m vessels, any disturbance is likely to minimal and any displacement is going to be temporary and only a short distance.

Sandwich tern, common tern, and little tern rarely use the intertidal area at low water when the tractors are working. The tern species do nest in coastal areas but none of the known nest areas are access points for the operators. The known nesting areas for Terns in the European Site are Foulney and Hodbarrow. There is potential for tractor beam trawling to disturb the terns when fishing in the channels at low water but terns have large foraging ranges and will not be displaced a large distance by the fishing activity. The low level of boat activity (six vessels), the footprint of the target area being 5.98% of the total area of the SPA, the vessels which are used are small between 4.8 and 10m meaning that there will be very little visual disturbance especially when compared to background vessel activity levels in the area.

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]
Intertidal sand and muddy sand (Estuaries, Mudflats and sandflats not covered by seawater at low tide, Large shallow inlets and bays, SPA supporting habitats)	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	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	The natural environment in which the fishing activity occurs is highly dynamic and changeable. The channels which are targeted (estimated at 6.12% of SAC area) are constantly changing and moving geographically. The beam trawls are small and lightweight with shallow if any penetration depths. The activity is seasonal and typically occurs between early spring and late autumn. 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
		Changes in suspended solids (water clarity)	Potential to effect the:- - Water quality - turbidity		
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	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		
		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 - The species composition of component communities - Sediment composition and distribution - Sediment movement and hydrodynamic regime - Topography		

[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 (Shrimps) Removal of non-target species (Shrimp beam trawling 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 the scale of the activity, the management measures in place, the seasonality and the fact that environmental conditions are more likely to have an effect on the shrimp population, it is unlikely at current levels of activity that beam trawling for shrimp will significantly affect the shrimp and fish populations and in turn the function of the SAC feature, and therefore will not have an adverse effect on the integrity of the European Site.	None
Subtidal sand (Estuaries, Large shallow inlets and bays)	Maintain or restore the extent, distribution structure or function of the Subtidal sand.	Abrasion/disturbance of the substrate on the surface of the seabed	Potential to effect the:- - Extent and distribution - Presence and spatial distribution of subtidal sand communities - Presence and abundance of typical species - Species composition of component communities - Sediment composition and distribution	The natural environment in which the fishing activity occurs is highly dynamic and changeable. The channels which are targeted (estimated at 6.12% of SAC area) are constantly changing and moving geographically. The beam trawls are small and lightweight with shallow if any penetration depths. The activity is seasonal and only occurs between spring and autumn. 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
		Changes in suspended solids (water clarity)	Potential to effect the:- - Water quality - turbidity		
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Potential to effect the:- - Extent and distribution - Presence and spatial distribution of subtidal sand communities - Presence and abundance of typical species - Species composition of component communities - Sediment composition and distribution		
		Siltation rate changes, including smothering (depth of vertical sediment overburden)	Potential to effect the:- - Extent and distribution - Presence and spatial distribution of subtidal sand communities - Presence and abundance of typical species - The species composition of component communities - Sediment composition and distribution - Sediment movement and hydrodynamic regime - Topography		
		Removal of target species (Shrimps) Removal of non-target species (Shrimp beam trawling 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 the scale of the activity, the management measures in place, the seasonality and the fact that environmental conditions are more likely to have an effect on the shrimp population, it is unlikely at current levels of activity that beam trawling for shrimp will significantly affect the shrimp and fish populations and in turn the function of the SAC feature, and therefore will	None

				not have an adverse effect on the integrity of the European Site.	
Subtidal coarse sediment (Large shallow inlets and bays)	Maintain or restore the extent, distribution structure or function of the Subtidal coarse sediment.	Abrasion/disturbance of the substrate on the surface of the seabed	Potential to effect the:- - Extent and distribution - Presence and spatial distribution of subtidal coarse sediment communities - Presence and abundance of typical species - Species composition of component communities - Sediment composition and distribution	There is only a very small area (less than 2% of the subtital coarse sediment in the SAC, taken from data provided in Natural England's broad scale habitat mapping Nov 2015) in which the activity and subtidal coarse sediment may interact. Shrimp beam trawling targets sandy areas.	None
		Changes in suspended solids (water clarity)	Potential to effect the:- - Water quality - turbidity		
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Potential to effect the:- - Extent and distribution - Presence and spatial distribution of subtidal coarse sediment communities - Presence and abundance of typical species - Species composition of component communities - Sediment composition and distribution		
		Siltation rate changes, including smothering (depth of vertical sediment overburden)	Potential to effect the:- - Extent and distribution - Presence and spatial distribution of subtidal coarse sediment communities - Presence and abundance of typical species - The species composition of component communities - Sediment composition and distribution - Sediment movement and hydrodynamic regime - Topography		
		Removal of target species (Shrimps) Removal of non-target species (Shrimp beam trawling 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 the scale of the activity, the management measures in place, the seasonality and the fact that environmental conditions are more likely to have an effect on the shrimp population, it is unlikely at current levels of activity that beam trawling for shrimp will significantly affect the shrimp and fish populations and in turn the function of the SAC feature, and therefore will not have an adverse effect on the integrity of the European Site.	None
- *Tadorna tadorna*; Common shelduck - *Anas acuta*; Northern pintail - *Somateria mollissima*; Common eider	Maintain or restore the population and distribution of the qualifying features.	Removal of target species (Shrimps) Removal of non-target species (Shrimp beam trawling bycatch – bird bycatch assessed below)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	Shrimps and marine fish are not considered a key food resource for these species. 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

· Anas Penelope; Wigeon · Bucephala clangula; Goldeneye · *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					
· *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 (Shrimps) Removal of non-target species (Shrimp beam trawling 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 shrimp beam 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 (Shrimps)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	Shrimps are eaten by all these species but are not considered the preferred target species over fish. Activity levels in the European Site are not likely to have a significant impact on the shrimp population and 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
		Removal of non-target species (Shrimp beam trawling bycatch– bird bycatch assessed below)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	Small fish are the target prey for all of these species. Fishing activity levels and existing management measures reduce the amount of fish by-catch and increase survivability. It is unlikely that shrimp beam trawling will have a significant impact on the fish population and 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
		Changes in suspended solids (water clarity)	Potential to effect the:- - Food availability - Condition and survival of SPA species - Abundance of SPA species	The natural environment in Morecambe Bay is highly dynamic and changeable. The sediment is constantly shifting meaning that the background levels of suspended sediment is already naturally high and due to the operators using small lightweight beam trawls with shallow penetration depths the extra suspended solids from beam trawling will not increase the turbidity of the water and 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*;	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	Little egret – solitary feeder wading in shallow water. Potential for a small amount of disturbance by tractors when fishing in channels. 5.98% of total SPA target. Any displacement minimal and only a short distance. Boats unlikely to disturb due to majority of time species spends on intertidal. Potential disturbance when flying but only six vessels, small vessels 4.8 – 10m, when compared to background levels very little disturbance potential. Golden plover – only likely to feed on intertidal in very cold condition when usual feeding areas frozen. Activity spring to autumn unlikely to be cold enough conditions to push golden plover onto intertidal.	None

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				Dunlin, black tailed godwit, bar tailed godwit, curlew, redshank and lapwing mainly on mudflats, mudflats not targeted for fishing. Black tailed godwits in low numbers between April and June and bar tail godwits arrive in October and migrate in Marsh, further reducing the likelihood of disturbance. Potential for disturbance on saltmarsh for breeding redshank. Assess by established routes any disturbance minimal and short lived. Fishing spring to autumn, wader numbers highest during winter, fishing only occurring three hours over low water and target fishing area being 5.98% of total SPA area. Oystercatcher, ringed plover, grey plover, knot, sanderling and turnstone feed on a variety of substrates, potential for disturbance three hours either side of low water by tractor trawling. Fishing spring to autumn, wader numbers highest during winter, fishing only occurring three hours over low water and target fishing area being 5.98% of total SPA area. Oystercatchers predominantly feeding on mussel beds (Foulney and Heysham). Grey plover not in significant numbers May to July. Any disturbance minimal and short lived.	
		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	Very unlikely due to most of the fishing activity occurring in the day, when in dark small lights as from a tractor / under 10m vessel. Waders unlikely to be actively attracted to the fishing activity. Fishing gear used small in comparison with shrimp gear used elsewhere in Europe.	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
· *Cygnus Cygnus*;	Maintain or restore the population and	Visual disturbance	Potential to effect the:- - Condition and survival of SPA species	Numbers of geese are highest in winter when fishing activity low or stopped.	None

Whooper swan · *Anser brachyrhynchus* Pink-footed goose	distribution of the qualifying features.		- Abundance of SPA species - Extent and distribution of supporting habitat available whilst a fishing activity is occurring	Species use a variety of habitats (marine and terrestrial). Low number of boats compared to back levels meaning disturbance unlikely. Access by tractors via established access. Any disturbance minimal and short lived due to fishing being seasonally between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, small vessels between 4.8 and 10m and the majority of the fishing activity occurring during daylight.	
		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 number of operators, seasonality of fishing, areas fished and the 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 the nature of the species 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 the nature of the species number of operators, seasonality of fishing, areas fished and the size of gear.	None
· *Tadorna tadorna*; Common shelduck · *Anas acuta*; Northern pintail · *Somateria mollissima*; Common eider · Anas Penelope; Wigeon · Bucephala clangula; Goldeneye · Mergus serrator; Red-breasted merganser · *Phalacrocorax carbo;* Cormorant · *Podiceps cristatus;* Great crested grebe	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	All species are often found on the open water only six operators fishing from vessel. The fishing is seasonal between spring and autumn, the footprint of the target area being 5.98% of the total area of the SPA, the vessels which are used are small between 4.8 and 10m and the majority of the fishing activity occurring during daylight resulting in very little visual disturbance compared to background vessel activity levels in the area. Shellduck, pintail and wigeon spend a proportion of their time feeding on intertidal mud. Mudflats not targeted by the tractor shrimp operator's disturbance is unlikely.	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 the number of operators, seasonality of fishing, areas fished and the size of gear.	None
		Collision below water with static or moving objects not naturally found in the marine environment (e.g. boats,	Potential to effect the:- - Condition and survival of SPA species - Abundance of SPA species	Unlikely due to the number of operators, seasonality of fishing, areas fished and the size of gear.	None

		machinery, and structures)	- Assemblage diversity		
		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 the 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	Gulls utilise a range of habitats both marine and terrestrial and likely to be attracted to the fishing as a food source opportunity. Any disturbance likely to minimal due footprint of the target area being 5.98% of the total area of the SPA, the low number of operators, the operators targeting different areas at different times of the tide, the fishing from a tractor is only for three hours over low water, the vessels which are used are small between 4.8 and 10m, the majority of the fishing activity occurs during daylight.	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 the number of operators, seasonality of fishing, areas fished and the 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 the 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 the number of operators, seasonality of fishing, areas fished and the 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	Terns rarely use the intertidal area at low water. Tern species do nest in coastal areas in the site, none of the known nesting areas are access points for the fishery. There is potential for tractor trawling to disturb the terns when fishing in the channels but terns have large foraging ranges and will not be displaced a large distance by the fishing activity. The low level of boat activity (six vessels), the footprint of the target area being 5.98% of the total area of the SPA,	None

				the vessels which are used are small between 4.8 and 10m means that there will be very little visual disturbance especially when compared to background vessel activity levels in the area.	
		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 the number of operators, seasonality of fishing, areas fished and the 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 the 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 the number of operators, seasonality of fishing, areas fished and the size of gear.	None

7. Conclusion[11]

Taking into account the information detailed in the Appropriate Assessment, it can be concluded that at the current level of beam trawling for shrimp there is no 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

It can be concluded that shrimp beam 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.

Annex 1: Reference list

Anker-Nilssen, T., R. T. Barrett, and J. v. Krasnov, 1997. Long and short term responses of seabirds in the Norwegian and Barents Seas to changes in stocks of prey fish. In: Proceedings of the International Symposium on the role of Forage Fishes in Marine Ecosystems, University of Alaska Sea Grant Rep. 97-01. Universityt of Alaska, Fairbanks, pp. 683-698.

Berghahn, R., Waltemath, M., Rijnsdrop, A.D., 1992. Mortality of fish from the by-catch of shrimp vessels in the North Sea. Journal of Applied Ichthyology 8: 293–306. DOI: 10.1111/j.1439-0426.1992.tb00696

Bergman, M.J.N.m., Hup, M., 1992. Direct effects of beam trawling on macro fauna in a sandy sediment in the southern North Sea. ICES Journal of Marine Science, 49, 05-Nov

Camphuysen, C. J., Calvo, B., Durinck, J., Ensor, K., Follestad, A., Furness, R. W., Garthe, S., Leaper, G., Skov, H., Tasker, M. L., and Winter, C. J. N. 1995. *Consumption of discards by seabirds in the North Sea*. Final Report of EC DG XIV Research Contract BIOECO/93/10. NIOZ-Report 1995–5. Netherlands Institute for Sea Research, Texel. 202 pp.

CCW Report. 2012. Review of the impacts of fisheries on marine birds with particular reference to Wales. Marine Spatial Planning in Wales Project. WWT consulting. CCW Policy Research Report No. 11/6.

Cook, A.S.C.P, & Burton, N.H.K. 2010. *A review of the potential impacts of marine aggregate extraction on Seabirds*. Marine Environment Protection Fund (MEPF) Project 09/P130

Depestele, J., Courtens, W., Degraer, S., Haelters, J., Hostens, K., Houziaux, J-S., Merckx, B., Polet, H., Rabaut, M., Stienen, E.W.M., Vandendriessche, S., Verfaillie, E. & Vincx, M. 2012. An integrated impact assessment of trammel net and beam trawl fisheries "WAKO II" - Final Report. Brussels : Belgian Science Policy Office 2012 – 233 p (Research Programme Science for a Sustainable Development).

Essink, K. 1999. Ecological effects of dumping of dredged sediments; options for management. *Journal of Coastal Conservation*. 5: 69-80.

Frederiksen, M., Harris, M. P., Daunt, F., Rothery, P. and Wanless, S (2004) The role of industrial fisheries and oceanographic change in the decline of North Sea blacklegged kittiwakes. Journal of Applied Ecology, 41, 1129-1139.

Furness, R, W., Tasker, M, L. 2000. Seabird – fishery interactions: quantifying the sensitivity of seabirds to reductions in sandeel abundance and identification of key areas for sensitive seabirds in the North Sea. Marine Ecology Progress Series, Vol 202: 253-264.

Groot, S.J., 1995. On the penetration of the beam trawl into the sea bed ICES . C.M. 1995/B:36
Hudson, A.V. & Furness, R.W., 1989. The behaviour of seabirds foraging at fishing boats around Shetland. *Ibis*, 131, 225-237

Kaiser, M.J., Spencer, B.E., 1996. The effects of beam trawl disturbance on infaunal communities in different habitats. Journal of Animal Ecology, 65, 348-358

Lancaster, J. and Frid C, L. J. 2002. The fate of discarded juvenile brown shrimps (*Crangon crangon)* in the Solway Firth UK fishery. Fisheries Research 58: 95-107

Leth, J.O., Kuijpers A., 1996. Effects on the seabed sediment from beam trawling in the North Sea. ICES (Annual Science Conference. Mini-symposium: Ecosystem Effects of Fisheries). C.M. 1996/Mini 3.

Maree, B.A, Wabless, R.M, Fairweather T.P, Sullivan, B.J, Yates, O 2014. Significant reductions in mortality of threatened seabirds in a South African trawl fishery. *Animal Conservation.* Volume 17, issue 6 pages 520-529.

Natural England Marine Interim Conservation Advice for Special Protection Area (UK9005081), UK9005081_Morecambe_Bay_SPA_Advice_on_Operations
UK9005081_Morecambe_Bay_SPA_SAT_Birds

Natural England Marine Interim Conservation Advice for Special Area of Conservation (UK0013027), UK0013027_Morecambe_Bay_SAC_Advice_on_Operations
UK0013027_Morecambe_Bay_SAC_Generic_SAT_Habitats
UK0013027_Morecambe_Bay_SAC_Generic_SAT_Species

Oro, D. & Ruix, X., 1997. Exploitation of trawler discards by breeding seabirds in the north-western Mediterranean: differences between the Ebro Delta and the Balearic Islands areas. *ICES Journal of Marine Science,* 54, 695- 707.

Tasker, M.J., Camphuysen, C.J., Cooper, J., Garthe, S., Montececchi, W.A. & Blaber, S.J.M., 2000. The impacts of fishing on marine birds. *ICES Journal of Marine Science,* 57, 531-547.

Walter, U. and Becker, P. H. 1997. Occurrence and consumption of seabirds scavenging on shrimp trawler discards in the Wadden Sea. – ICES Journal of Marine Science, 54: 684–694.

Annex 2: Natural England's consultation advice

Date: 07 November 2016
Our ref: 201966
Your ref: NWIFCA-MB-EMS-003

Jonathan Haines
North Western Inshore Fisheries and Conservation Authority
Preston Street
Carnforth
Lancashire
LA5 9BY

Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

T 0300 060 3900

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 – tractor and boat, and beam trawl (shrimp) (NWIFCA-MB-EMS-003).

Thank you for your consultation on the above which was received by Natural England on 18 November 2016.

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

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 Morecambe Bay Special Area of Conservation (SAC), Morecambe Bay Special Protection Area (SPA), Duddon Estuary SPA, Morecambe Bay and Duddon Estuary potential SPA (pSPA), Duddon Estuary Ramsar and Morecambe Bay Ramsar:

[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

- NWIFCA-MB-EMS-003: towed demersal – tractor and boat, and beam trawl (shrimp)

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.

It is Natural England's view that through their HRA, North Western IFCA officers appear to have appropriately identified those activities that are not 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.

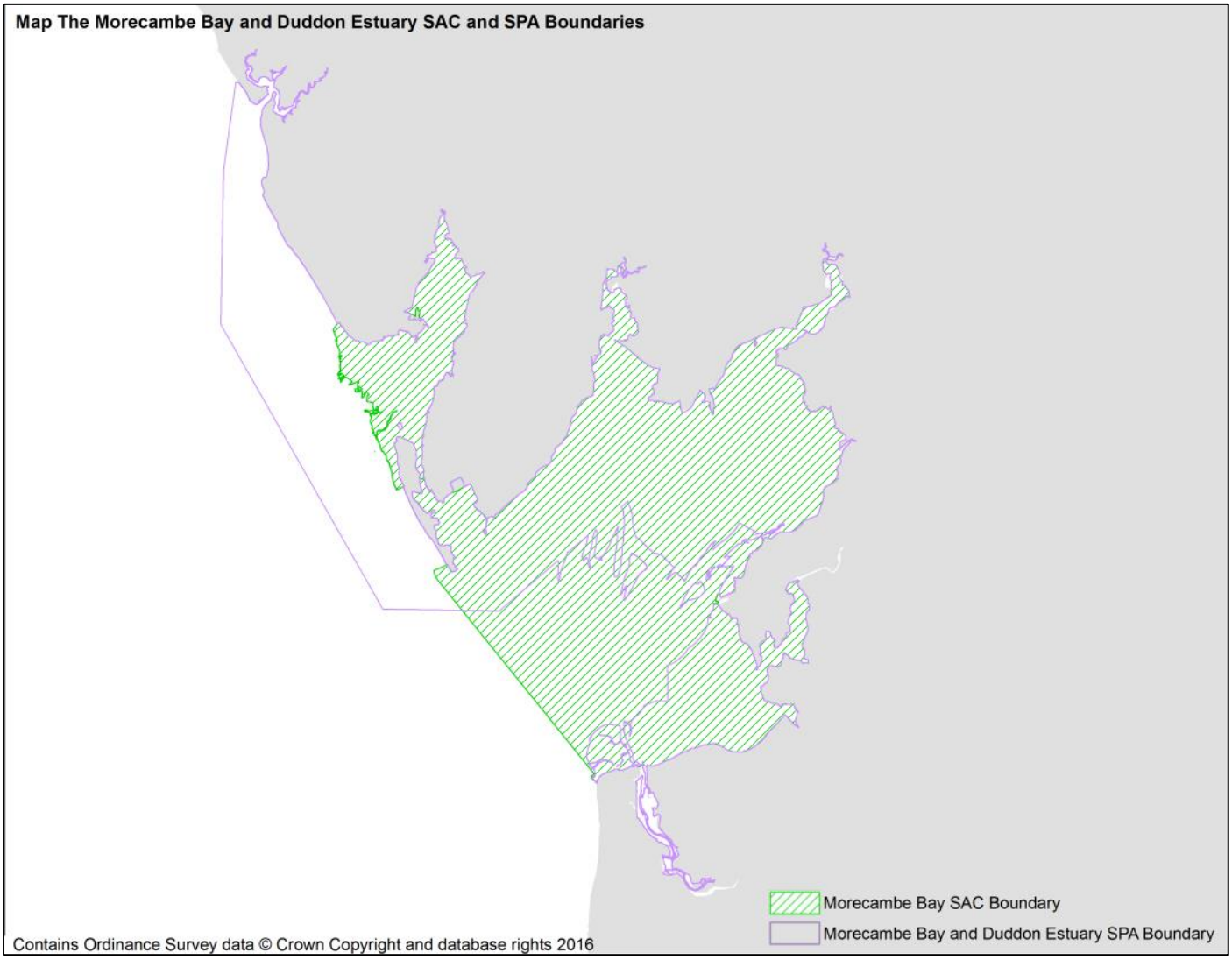
If you require any further comments or have any queries regarding the above please contact me to discuss them further.

Yours sincerely

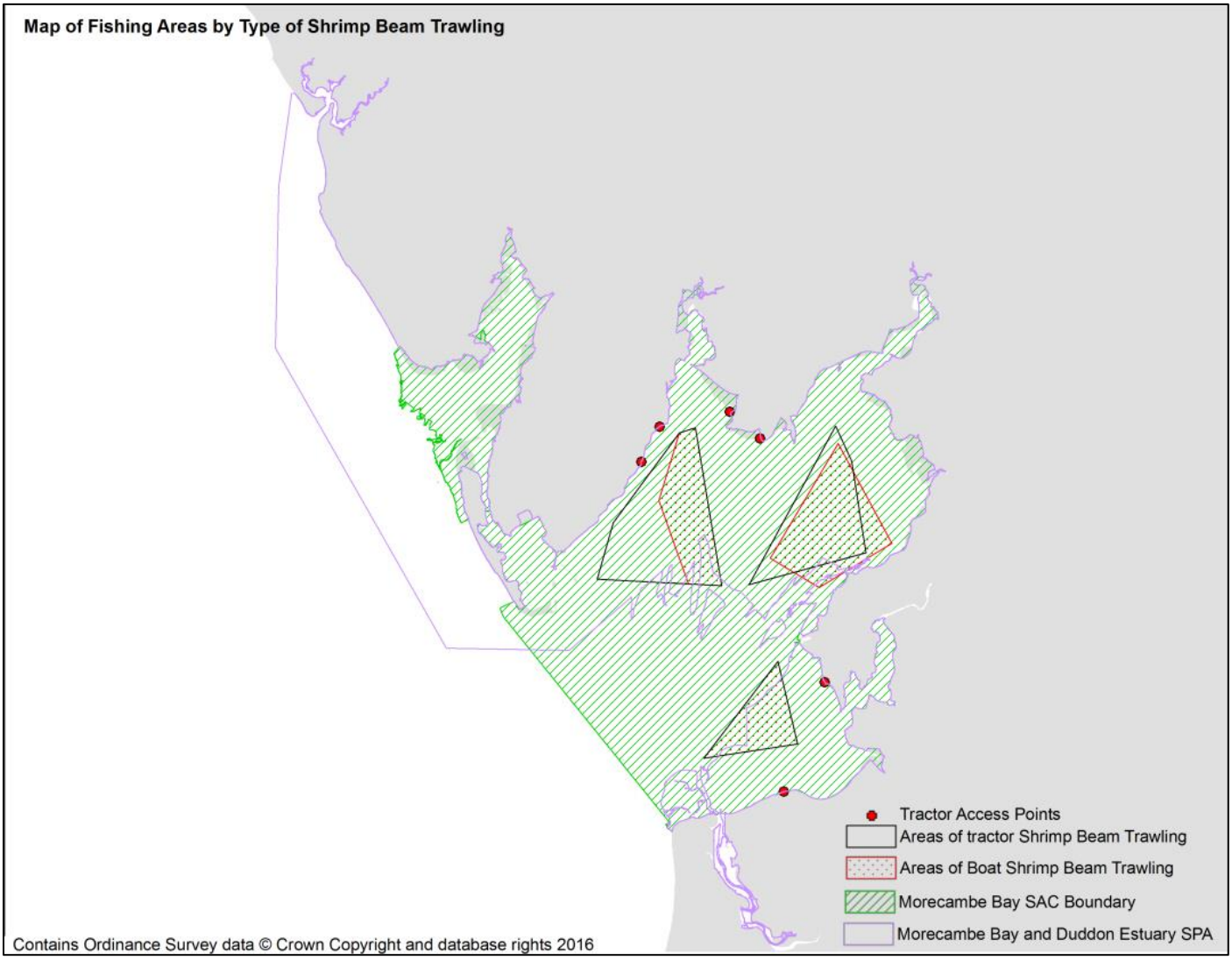
Lucy May
Marine Adviser
Natural England

Tel: 0208 22 56003

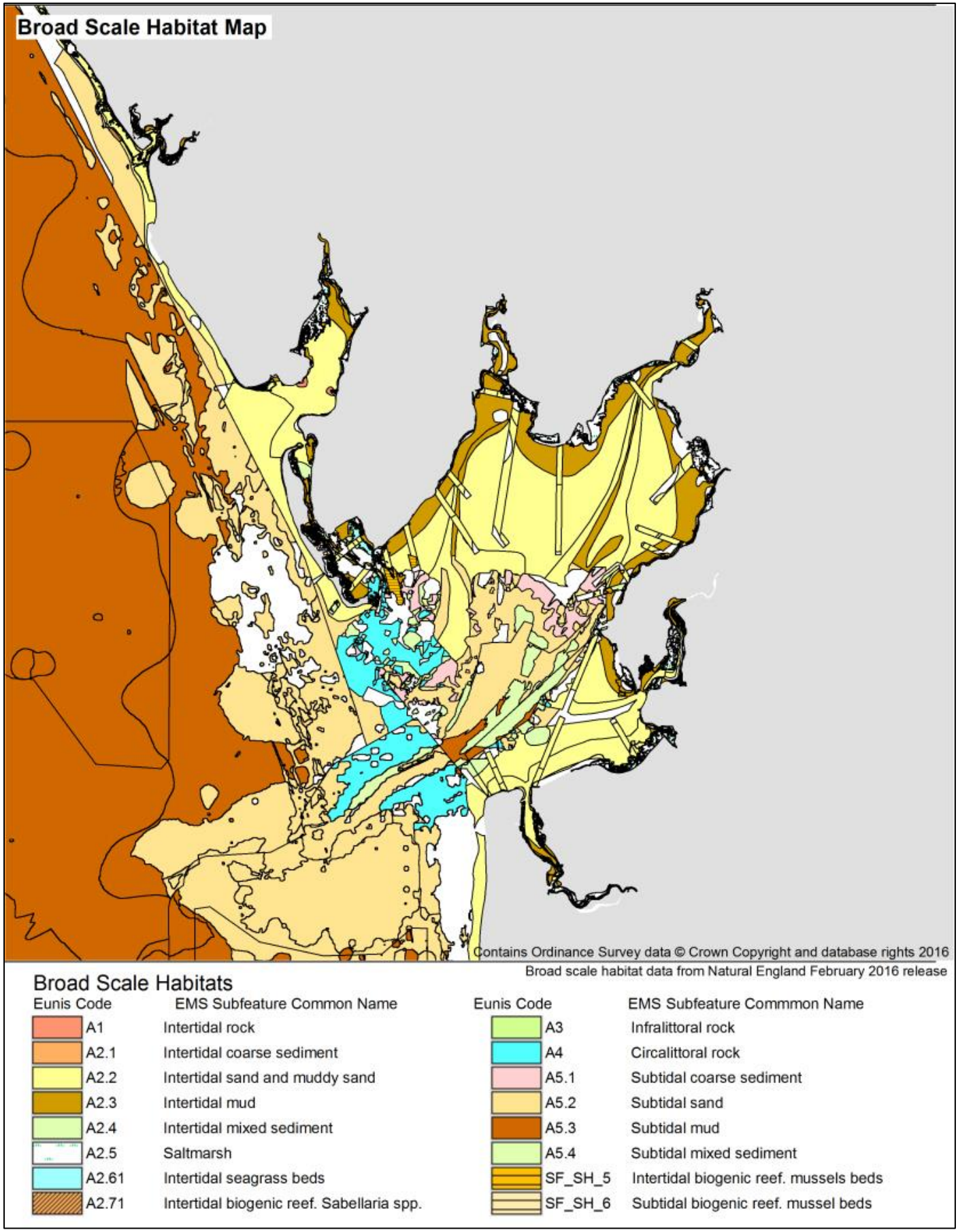
Annex 3: Site Map



Annex 4: Fishing activity maps



Annex 5: Broad Scale Habitat Map



Annex 6: Examples of Shrimping Gear Used (Photographs taken by NWIFCA at Westplane on the 11th February 2016 and by shrimp fishers 18th November 2016)


NO UNAUTHORIZED USE


UNAUTHORIZED USE