

BRITISH TELECOMMUNICATIONS PLC

R100 Scottish Isles Fibre-optic Project

Technical Appendix F - Fishing Activity Study - Shetland



DOCUMENT RELEASE FORM

British Telecommunications Plc

P2308_R5367_Rev0

R100 Scottish Isles Fibre-optic Project

Technical Appendix F - Fishing Activity Study - Shetland

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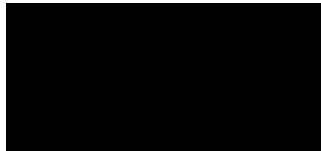
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GLOSSARY

AIS

Automatic Identification System

BAP

Biodiversity Action Plan

BMH

Beach Manhole

BT

British Telecommunications plc

cm

Centimetre

DTS

Desk Top Study

EU

European Union

FAS

Fishing Activity Study

FLMAP

Fisheries Liaison Mitigation Action Plan

FLO

Fisheries Liaison Officer

FPO

Fish Producers Organisation

ICES

International Council for the Exploration of the Sea

IUCN

International Union for Conservation of Nature

NM

Nautical Mile

m

Metre

MarLIN

Marine Life Information Network

MEA

Marine Environmental Appraisal

mm

Millimetre

MMO

Marine Management Organisation

MS

Marine Scotland

NMPi

National Marine Planning Interactive Tool

NtM

Notice to Mariners

PMF

Priority Marine Feature (Scotland)

R100 Project Area

Orkney, Shetland and Inner Hebrides

SSMO

Shetland Shellfish Management Organisation

TAC

Total Allowable Catch

VMS

Vessel Monitoring System

1. INTRODUCTION

1.1 Project Overview

The marine elements of the R100 Project are to install sixteen telecommunication cables to extend superfast broadband (30Mbps+) coverage across Shetland, Orkney, and the Inner Hebrides. These new cables will form part of the Scottish Government's 'Reaching 100%' (R100) programme contracted to BT Plc. The sixteen cables are across three geographical regions: Orkney, Shetland and the Inner Hebrides, as follows:

- Orkney - Seven routes
- Shetland – Five routes
- Inner Hebrides – Four routes

This Fishing Activity Study (FAS) has been drafted to support the Marine Environmental Appraisal (MEA) for the Shetland geographical area. A full project description for installation of the R100 cable corridors is provided in Section 2 of the MEA Report, Document Reference (P2308_R5367).

1.2 Scope and Objectives

This report focuses on the fishing activity within the Shetland geographical area (Figure 1-1, Drawing reference: P2308-FISH-001_SH_B).

The purpose of this report is to review fishing activity within the Shetland geographical area and identify the relative importance of the geographical area to the fishing industry. It has been informed by a review of the latest publicly available fisheries data and literature for the geographical area.

A separate Fisheries Liaison Mitigation Action Plan (FLMAP) has been prepared which details the potential impacts of the proposed R100 Project on fisheries and provides a mitigation plan. The FLMAP also includes an overview of the fisheries liaison and consultation that has been undertaken. A full list of consulted fish producer organisations (FPO's) is provided in the FLMAP (Appendix F to the MEA).

The findings of this Fishing Activity Study (FAS) and the FLMAP have been used to inform Section 6 of the MEA Report – The Human Environment.

1.3 Shetland Geographical Area

The UK Government take International Council for the Exploration of the Sea (ICES) scientific advice on fisheries management. ICES gather data across the UK Continental Shelf and divide the area into ICES areas. The ICES areas are subdivided into ICES statistical rectangles. Each ICES rectangle is used for statistical purposes and is '30 min latitude by 1 degree longitude' in size (approximately 30 nautical miles by 30 nautical miles). The Shetland geographical area falls within five ICES rectangles, as shown in Figure 1-1 (Drawing reference: P2308-FISH-001_SH_B). Table 1-1 provides a breakdown for the ICES rectangles crossed for each proposed cable corridor in the Shetland geographical area. Comparison of the statistics for each rectangle provides a spatial picture of the differences in species caught and fish landings for each rectangle.

Whilst this report covers the Shetland geographical area and the cable routes corridors within it, one cable (Cable 2.3) links Shetland back to the Orkney Island of Sanday and as such the fishing activities of Orkney are also considered. Further detail on Orkney Fishing activity is provided in the Orkney Fishing Activity Study Report P2308_R5310_Rev0.pdf (Appendix D of MEA for Orkney geographical area).

Figure 1-1 Shetland Geographical Area Cable Corridors and ICES Rectangle (P2308-FISH-001_SH_B)

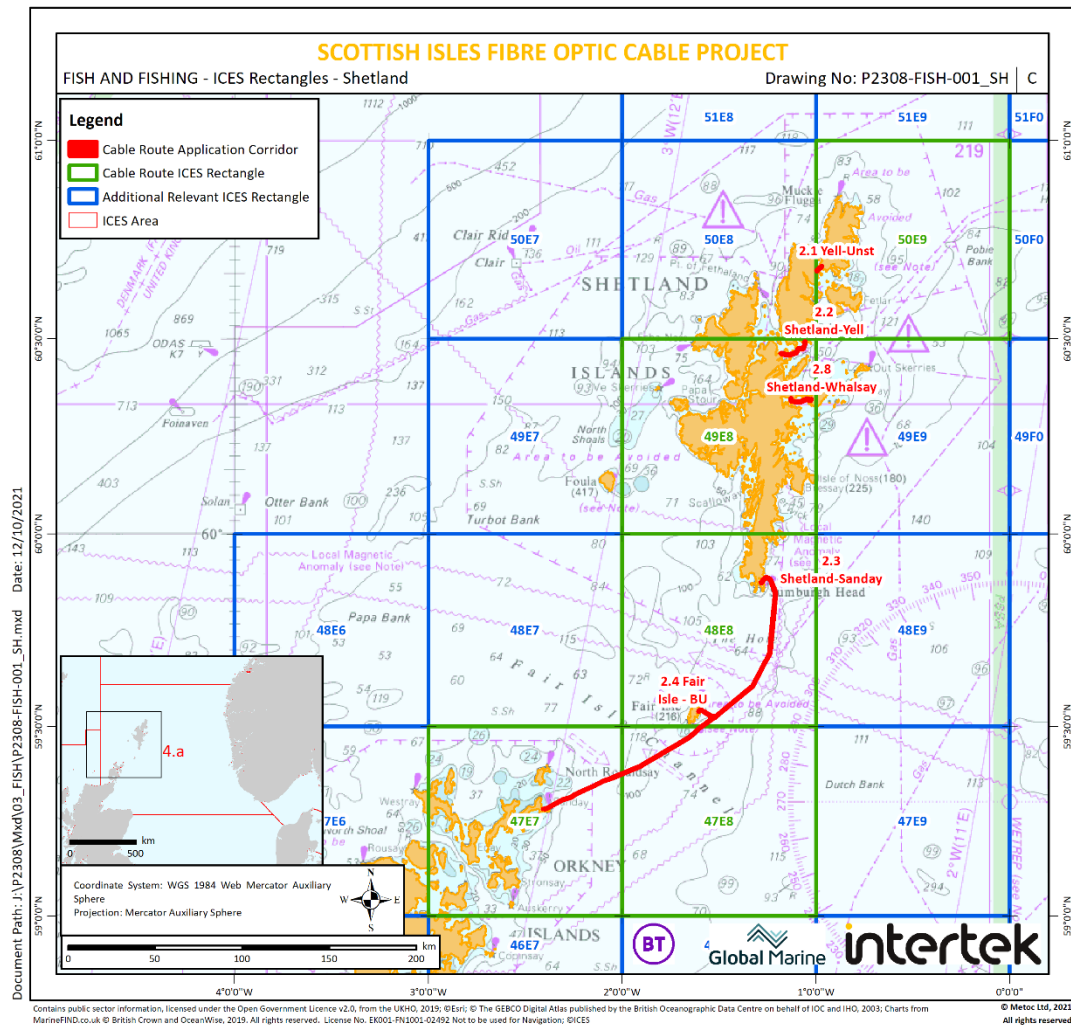


Table 1-1 Summary of ICES Rectangles in Relation to Shetland Geographical Area

Shetland Cable Corridors	ICES Area	ICES rectangle				
		47E7	47E8	48E8	49E8	50E9
2.1 Yell-Unst	IVa					✓
2.2 Shetland – Yell	IVa				✓	
2.3 Shetland – Sanday	IVa	✓	✓	✓		
2.4 Fair Isle – branching unit (BU)	IVa			✓		
2.8 Shetland - Whalsay	IVa				✓	

2. DATA SOURCES

This report presents the latest fisheries information gathered as part of a desktop study to provide relevant details of the fishing methods and fisheries activity that takes place in the vicinity of the R100 Project. The most recently available and / or most relevant (at the time of writing) data sources have been used throughout this report. The primary sources of information used to inform the description of the fisheries activities are as follows:

Statistics on the Scottish fleets

- Scottish Sea Fisheries Statistics 2019 (Scottish Government 2020).
- 2019 UK Sea Fisheries Statistics (Marine Management Organisation, MMO 2020a).
- Shetland Fisheries Statistics 2019 (University of the Highlands and Islands 2020)
- Shetland Shellfish Management Organisation Spatial Management Plan (SSMO 2020).
- Inshore Fisheries Management Plan Orkney (Orkney Sustainable Fisheries Ltd 2016)

Mapping tools for Scotland

- National Marine Planning Interactive (NMPi) tool (Marine Scotland 2021).

GIS data set

- 2019 Fishing Vessel Density (EMODnet 2020).
- 2017 Fishing – tonnage, effort, and value maps for UK vessels over 15 m (MMO 2020b).
- 2009 - 2013 amalgamated Vessel Monitoring system (VMS) intensity layers (Marine Scotland 2016).

Consultation with fisheries stakeholders as part of the FLMAP (Seagard 2021) has been incorporated into the FAS and is referenced where applicable.

The most important target species presented in Section 4 were identified through Marine Scotland Fisheries Statistics (2020), the Shetland Fisheries Statistics 2019 (Napier 2019) and the Inshore Fisheries Management Plan (Orkney Sustainable Fisheries Ltd 2016).

The main fishing methods and gear types presented in Section 4 were also identified through analysis of the statistics and landings data (Scottish Government 2020, MMO 2020a). Descriptions of the fishing gear and methods were based on British Seafishing (2020), Seafish (2019) and Galbraith & Rice (2004).

Where possible this data set has been supplemented by information from consultation with the appropriate fish producer organisations (FPOs). Additional data resources are referenced throughout this report.

3. SCOTTISH FISHING FLEETS

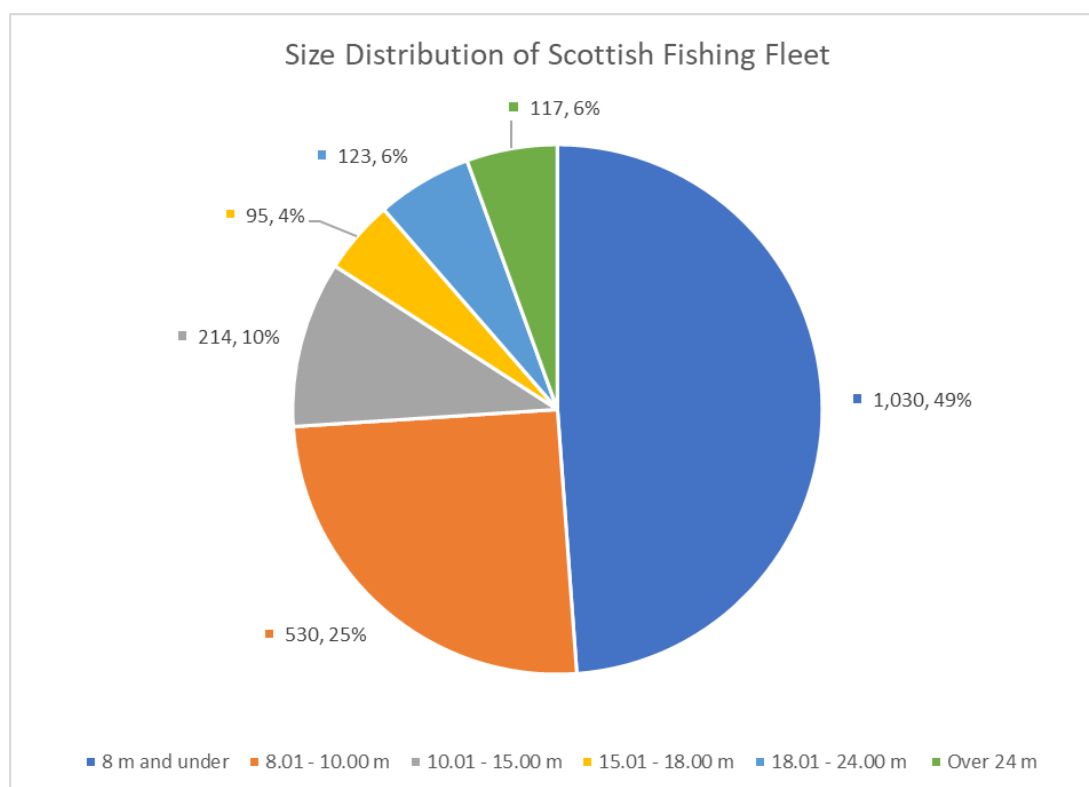
3.1 Fleet Size and Composition

3.1.1 Scotland

The total number of active fishing vessels registered in the United Kingdom in 2019 was 5,911 (MMO 2020a). It should be noted that more recent data is published than 2019 but does not include data split by type, only by length, therefore the previous year data provides a reflection of the Scottish fleet by type and length.

The Scottish fleet consists of 2,109 vessels (36 % of the total UK vessels) and is predominantly made up of vessels under 10 m in length. The breakdown of vessels by length is shown in Figure 3-1 below:

Figure 3-1 Size Distribution of Scottish Fishing Fleet



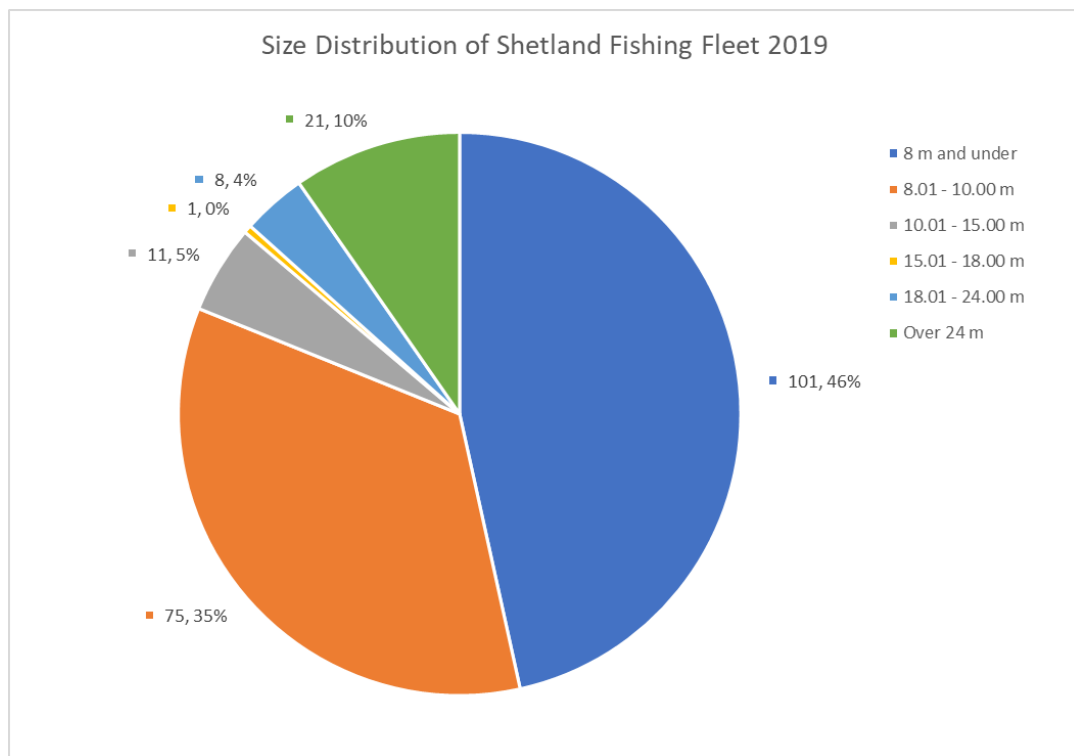
Source: MMO (2020)

The size distribution of fishing vessels has a significant impact on the interpretation of recorded fishing activity and landings data. Only vessels over 10 m in length are required to record their landing data, and only vessels over 15m in length are required to have Automatic Identification System (AIS) equipment to record their position. These two factors mean that it is likely that there is an under-representation of fishing activity in the available statistics and spatial patterns due to the large percentage of vessels that fall under 10 m (74 %) and 15 m (84 %). Shetland Fisheries Statistics 2019 (Napier 2020) and Inshore Fisheries Management Plan Orkney (Orkney Sustainable Fisheries Ltd 2016) have been used to inform the report in addition to fisheries consultation to identify the gaps and a reflection of the fishing activity within the Shetland geographical area.

3.2 Fishing Ports

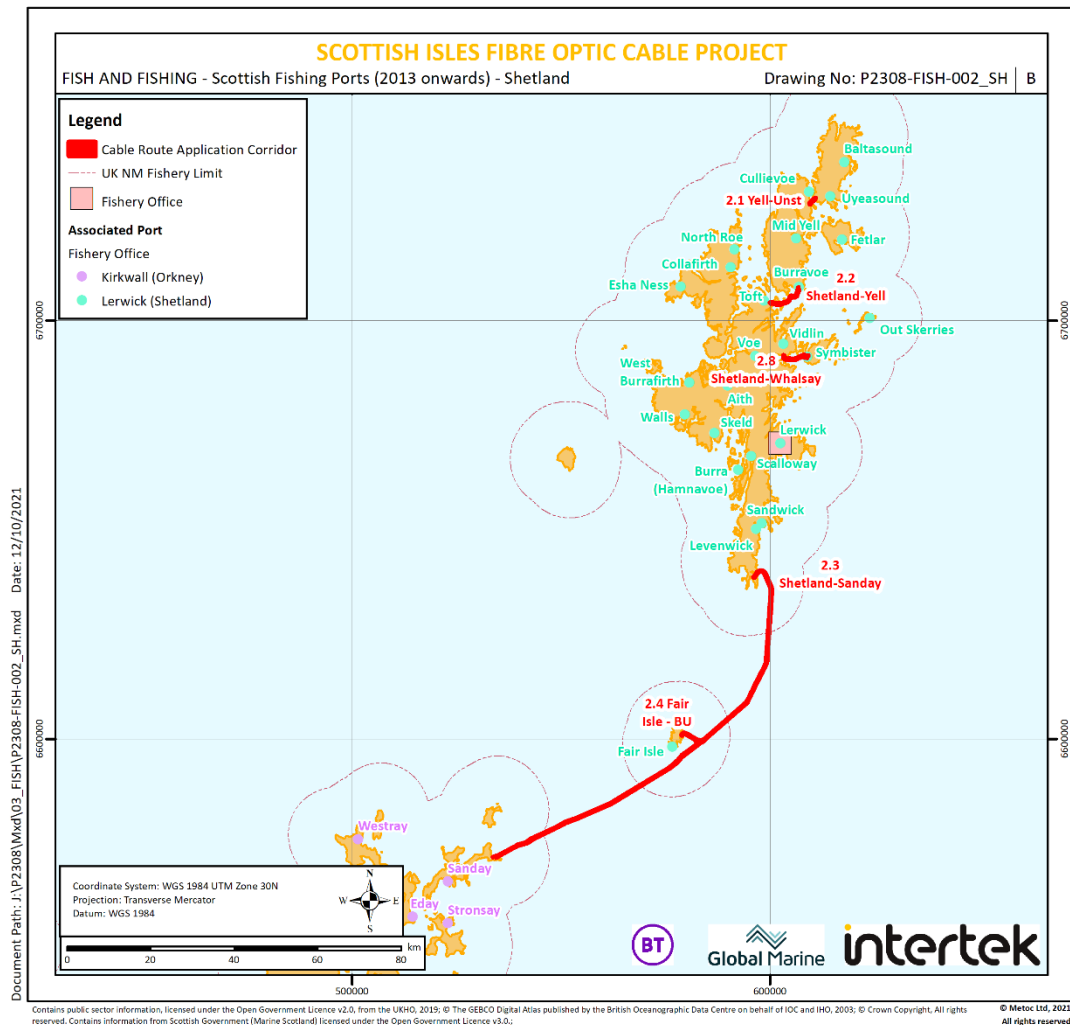
In Scotland, there are a total of 148 fishing ports divided over 18 districts. There are 24 fishing ports in the Shetland geographical area associated with the Shetland District with the Fishery Office located in Lerwick. Other important ports for landing fish are Scalloway and Cullivoe (Napier 2019). During 2019, more fish and shellfish were landed in Shetland than in any other port in the UK (except Peterhead) (Napier 2019). In addition to Shetland ports, there are a number of fishing ports located in Orkney which are likely to be active particularly in the region of cable 2.3 Shetland to Sanday. The distribution of the size of vessels registered in the Shetland district is shown in Figure 3-2. Of these, 81% are under 10m and 86% are under 15m in length. This shows that the vessels registered in Shetland are fairly representative of the Scottish Fleet as a whole with the majority being smaller vessels. Figure 3-3 (Drawing reference: P2308-FISH-002_SH) provides the location of the Shetland fishing ports in relation to the proposed cable corridors.

Figure 3-2 Size Distribution of Shetland Fishing Fleet



Source: MMO (2020)

Figure 3-3 Scottish Fishing Ports (2013 onwards) – Shetland (P2308-FISH-002_SH)



4. TARGET SPECIES AND FISHING METHODS

4.1 Introduction

The following section provides the details of the target species and fishing methods used in the Shetland geographical area. Fishing techniques used within the geographical area include trawling, potting, dredging, diving and aquaculture. The spatial distribution of fishing vessels within the MMO statistical data indicate that larger vessels likely to be engaged in pelagic fish catches are recorded in the region. These vessels are predominantly located further offshore and for this Project area will be more likely to be present in the waters between Shetland and Orkney (cable corridor 2.3 Shetland to Sanday) and not as likely with the smaller inter island cables in the Shetland geographical area.

4.2 Target Species

The proposed cable installation within the Shetland geographical area will be within the inshore fisheries area (within 6NM of the coast) in addition to the waters within cable corridor 2.3 further offshore between Shetland and Orkney. Table 4-1 provides an overview of the key inshore fisheries markets in the Shetland geographical area, with weight and value information for 2019 (Shetland Fisheries Statistics, Napier 2019).

Table 4-1 Target Species Within the Shetland Inshore Area (2019)

Target species	Total Weight Landed (tonnes)	Total Value (£m)	Fishing Method
Pelagic fish (mackerel, herring)	24,045	£22.65	Pelagic trawling – mid water
Whitefish (cod haddock, monks, flatfish)	24,090	£52.15	Demersal trawling – mid water
Shellfish (nephrops, crab, lobster, scallop)	2,076	£5.98	Demersal trawling, pots and creels, dredging and diving

Source: Shetland Fisheries Statistics (Napier 2019)

4.3 Trawl Fisheries

Trawling is towing a net (trawl) through the water behind a fishing vessel. Trawling can be divided into bottom trawling (demersal) and midwater trawling (pelagic), based on the position of the net. Bottom trawling or demersal trawling, is towing the net along the seabed targeting species such as Nephrops or just above the seabed for species such as cod and haddock. Midwater trawling, also known as pelagic trawling, targets species in the water column such as herring and mackerel.

Trawl nets comprise of a body of net ending in a cod-end where the fish are collected. The mouth of the net must be held open. It is the method used to keep the mouth of the net open which distinguishes the type of trawl.

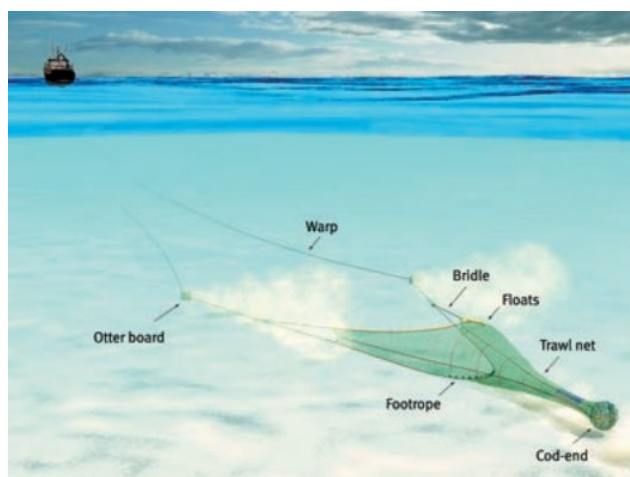
4.4 Beam Trawling

Beam trawling is the original and simplest form of demersal trawling, whereby the mouth of the net is held open by a solid metal beam, attached to two "shoes", which are solid metal plates, welded to the ends of the beam, which slide over and disturb the seabed. This method is mainly used on smaller vessels, fishing for flatfish or Nephrops, relatively close inshore.

4.5 Otter Trawling

Otter trawling is a form of demersal trawling. It derives its name from the pair of trawl doors (otter boards) which are used to keep the mouth of the trawl net open (Figure 4-1). Otter boards are made of timber or steel and are hydrodynamically designed in such a way that, when the net is towed along the seabed at a certain speed, they push outwards and prevent the mouth of the net from closing. They may also act like a plough digging up the seabed, to create a turbid cloud and scare fish towards the net mouth. Targeting both whitefish and Nephrops, the otter trawl is by far the most commonly used of the towed gears in Scotland (Galbraith & Rice 2004).

Table 4-2 The Principal Features of Demersal Otter Trawl (Bottom Trawling) Gear



Galbraith and Rice 2004

Scallop Dredging

Dredging is a fishing method by which metal dredgers are towed across the seabed to collect shellfish and bivalves. Each dredge consists of a rigid triangular steel frame and a tooth bar, behind which a mat of linked steel rings is secured (Figure 4-2). As scallops usually lie buried in sand and fine gravel, they are raked out by the teeth and swept into a collecting bag. Hydraulic dredgers also exist which spray jets of water onto the shellfish to dislodge them from their location. Large vessels can drag as many as twenty cages behind them (Figure 4-3).

Figure 4-1 Photo of Four Dredges



Source: Seafish (2019)

Figure 4-2 Schematic Showing Dredges Towed Behind a Vessel

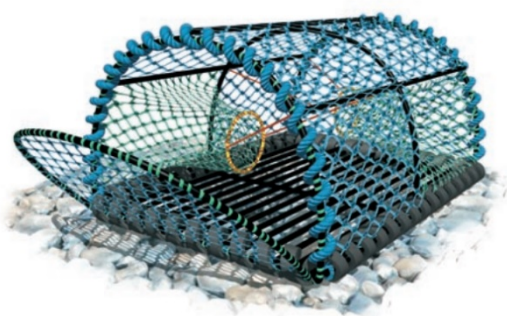


Source: Seafish (2019)

4.6 Pot Fisheries

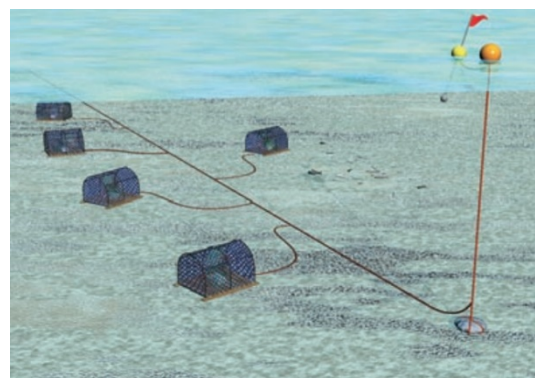
Pots, creels and static traps, often referred to as passive fishing techniques, are made of metal or wood and rope (Figure 4-43), are used to target active scavenging crustaceans such as brown crab, velvet swimming crab, European lobster and Nephrops. Their design lets crabs, lobsters and Nephrops enter the pot to take the bait, after which they cannot escape. The pots and creels are baited with dead fish and lowered to the seabed on ropes, usually about a dozen at a time. A buoy is used to mark the location (Figure 4- 5), with fishermen returning to retrieve their catch after a day or two (British Sea Fishing 2020).

Figure 4-3 Traditional 'D' Shaped Creel



Source: Galbraith & Rice (2004)

Figure 4-4 Creels Attached to a Buoy



Source: Galbraith & Rice (2004)

4.7 Diving

Diving for scallops involves collecting scallops by hand from the seabed. Although this method requires much more effort and quantities landed through diving are considerably lower than through dredging, scallops are landed in pristine condition so are more valuable. Dive-caught scallops are generally regarded as more sustainable than traditionally caught scallops. However, as divers can get to areas where vessels cannot, there are concerns that dive fishing has impacts on the stock by collecting from potential sources of spawning.

4.8 Aquaculture

Within the Shetland geographical area, aquaculture is an important contribution to the local and regional economy (Figure 4-6, Drawing Reference: P2308-Fish-007 SH). Aquaculture includes farming of finfish and shellfish species and is permitted out to 3 nautical miles (NM) within the Shetland geographical region. Of the five cable corridors within the Shetland geographical area four of the cable corridors avoid aquaculture sites entirely. One active aquaculture site (Wick of Belmont) is located within the cable corridor 2.1 Yell - Unst. There are a number of active aquaculture sites for finfish and shellfish located within 5km of the cable corridors as identified within Table 4-2. Of the sites outside the cable corridors, the closest is the active North Voe site which is 49m from cable corridor 2.8 Shetland-Whalsay, and the Ness of Copister site which is 223m from cable corridor 2.2 Shetland - Yell (Marine Scotland 2021).

Table 4-3 Summary of ICES Rectangles in relation to Shetland geographical area

Shetland Cable Corridors	Aquaculture Sites within 5km of cable corridor
2.1 Yell-Unst	<p>One active finfish aquaculture site within the cable corridor: Wick of Belmont</p> <p>14 active sites within 5km: Snarravoe , East of Holm Heogland (Burkwell), Uyea Isle, Sandwick, Coutts Mill, North Ayre, Vee Taing, Bastavoe, Yell, Kirkabister, Croo Taing, Turness and Hawkness;</p> <p>7 inactive sites: Wick of Garth, Wick of Belmont (South), Mula, South Wick Cullivoe, South Holm of Heogland, Kirk Loch Incubation Unit, Bastavoe;</p> <p>8 deregistered sites: Belmont Loch, Linga Bluemull Sound, Brecknagarth, Rockfield, Pier, Papil Bay, Port Arthur, Basta Ness.</p>
2.2 Shetland-Yell	<p>No aquaculture sites within 5km of the cable corridor.</p> <p>8 active aquaculture sites within 5km: Ness of Copister, Hamnavoe, Linga (Setterness), Swinister Voe, Bight of Foraness, Setterness North (Bomlo), Poseidon, and West Taing;</p> <p>11 inactive sites: Littlester, Hamna Voe, Heatherlea, West of Linga, Fish Holm, Arisdale Smolts, Burravoe, Hamnavoe, For a Ness, Boatsroom Voe, and Collafirth 3</p> <p>8 de-registered sites: Hamnavoe, Hamnavoe Yell, Swinister Voe, Feorwick, Heog, West of Foraness, and West Taing, Site B.</p>
2.3 Shetland-Sanday	No aquaculture sites within 5km
2.4 Fair Isle - BU	No aquaculture sites within 5km
2.8 Shetland-Whalsay	<p>Six active aquaculture sites within 5km: North Voe, Swarta Skerry, Dury Voe, Bight of Bellister, Dury Voe, East of Little Ness, Grunna Voe, and Vidlin North,</p> <p>3 inactive sites: West Linga, Whalsay, Vidlin Voe - Site 1, Vidlin Ness.</p> <p>8 de-registered sites: Northwest Green Isle, Bight of Bellister, Dury Voe, Bight of Bellister, South Voe Brough, Dury Voe I, North Nesting, Houll Loch, and Houll Burn.</p>

Source: Marine Scotland (2021)

Figure 4-5 Aquaculture Sites within the Shetland Geographical Area (1) (P2308-FISH-007_SH_1)

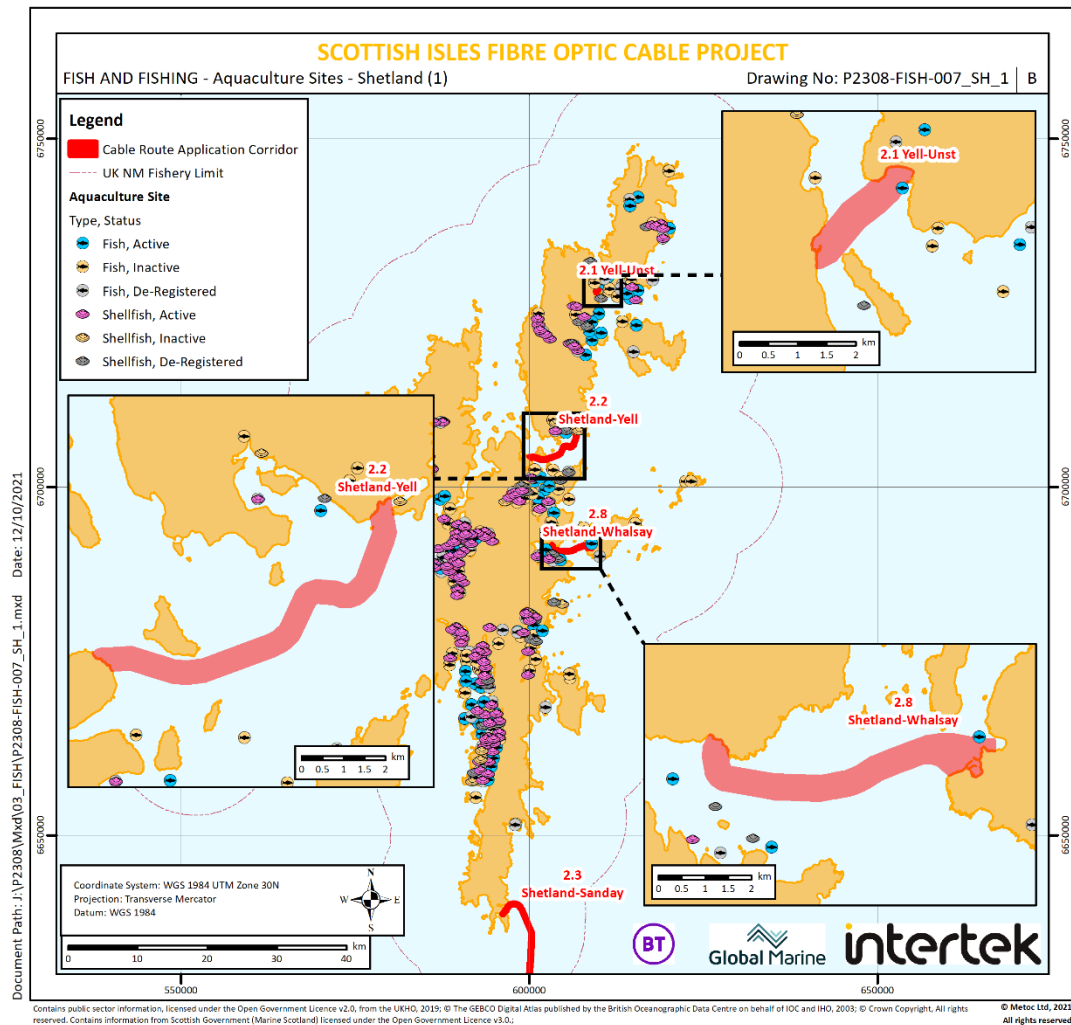
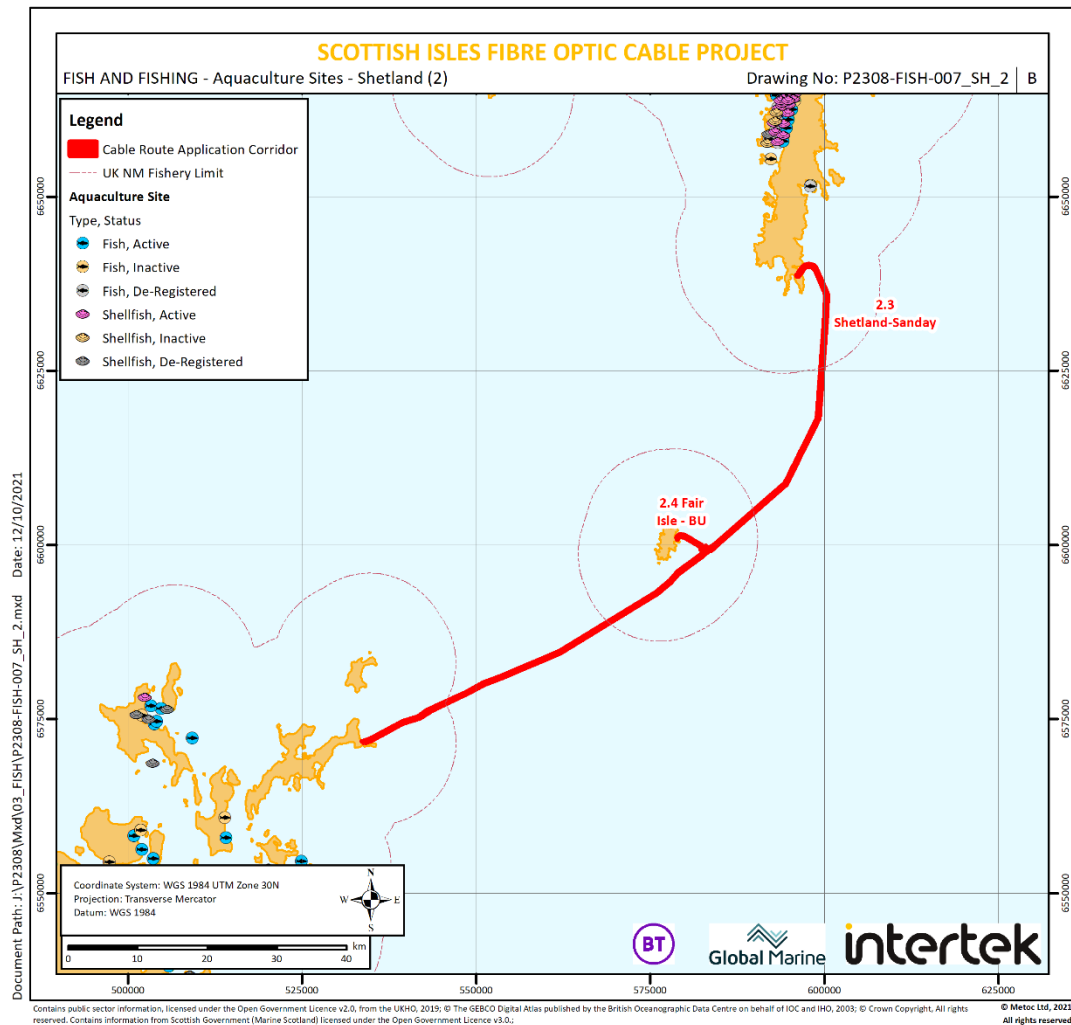


Figure 4-6 Aquaculture Sites within the Shetland Geographical Area (2) (P2308-FISH-007_SH_2)



5. SPATIAL FISHING PATTERNS

5.1 Introduction

This section summarises the spatial patterns of fishing activity. Vessel Monitoring System (VMS) data is provided through the use of AIS equipment for all vessels over 15 m in length. Whilst this can show a good representation of the larger scale fishing efforts from larger vessels, it cannot be used to infer the patterns of smaller, particularly inshore fishing vessels.

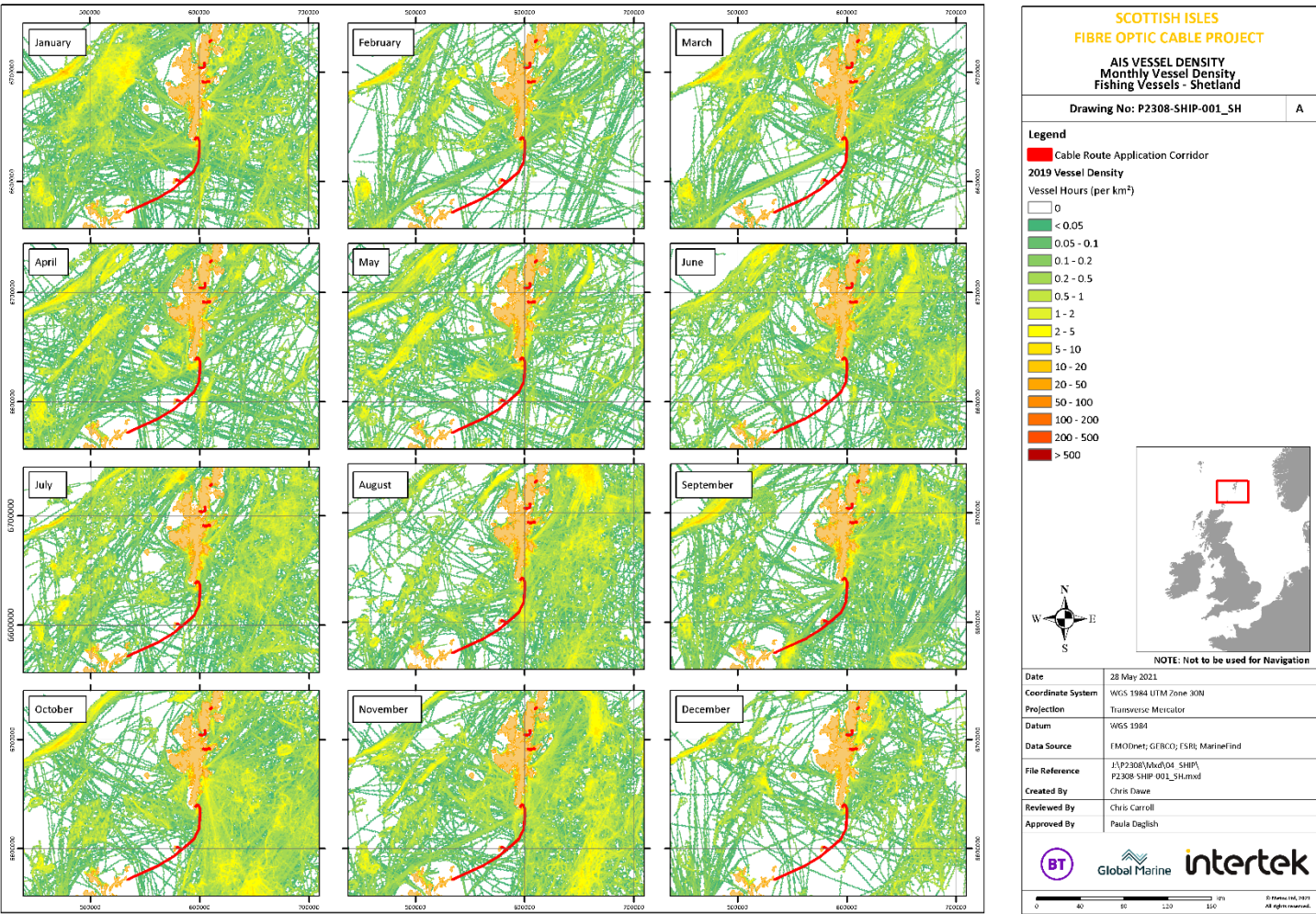
5.2 Vessel Density

Figure 5-1 (Drawing reference: P2308-SHIP-001_SH) shows the monthly vessel density of fishing vessels over 15 m in length in relation to the five proposed cable corridors. Monthly AIS vessel density is moderate – high off the East and West coast of Shetland all year round with targeted areas receiving particularly high areas of traffic throughout different stages of the year (EMODnet 2020 and Marine Scotland 2016).

5.3 Fisheries

Figure 5-2 (Drawing reference: P2308-FISH-006_SH) shows the amalgamated VMS fishing intensity for targeted species for the period 2009-2013 (EMODnet 2020 and Marine Scotland 2016). Demersal (mobile) and Pelagic fishing is important in the waters around Shetland, particularly Herring and Mackerel, with Scallop and Crab being the important Shellfish Species. Whilst the VMS intensity data shows that demersal and pelagic fishing with vessels over 15 m is present within the same ICES rectangles as the proposed cable corridors, it is more concentrated on the waters outside the Shetland islands as opposed to inshore waters where smaller vessels operate.

Figure 5-1 Monthly Fishing Vessel Density Patterns within the Shetland Geographical area (P2308-SHIP-001_SH



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**SCOTTISH ISLES
FIBRE OPTIC CABLE PROJECT
FISH AND FISHING
Average Fishing Intensity (Hours) 2009-2013
Shetland**

Drawing No: P2308-FISH-006_SH

Legend

- Cable Route Application Corridor
- ICES Rectangle

Monthly Average Fishing Vessel Intensity (2019)
Vessel Hours per km² (log scale)
High : 100
Low : 0

**Amalgamated VMS Intensity
2009 - 2013 - by Species**

Crab High : 0.96 Low : 0	Pelagic - Herring High : 0.73 Low : 0	Scallop High : 0.81 Low : 0
Demersal mobile High : 0.47 Low : 0	Pelagic - Mackerel High : 1.69 Low : 0	Squid High : 5.33 Low : 0
Demersal static High : 1.19 Low : 0	Nephrops mobile High : 0.62 Low : 0	
Lobster High : 2.22 Low : 0	Nephrops static High : 19.86 Low : 0	

NOTE: Not to be used for Navigation

6. FISH LANDINGS DATA

6.1 Scottish Sea Fisheries Statistics

6.1.1 Landing Data

Landing tonnage and their respective value provide a good indication of the importance of commercial fishing in an area. The proposed cables in Shetland are located within ICES rectangles 47E7, 47E8, 48E8, 49E8, and 50E9.

The Scottish Sea Fisheries Statistics have been used for the most recently available 5 years data (2015 – 2019). The average annual value of fish and shellfish landed per ICES rectangle for during this time for the specified rectangles was approximately £20.1 million, with 47E7 having the lowest average of £8.9 million and 49E8 the highest average of £34.9 million. The average annual tonnage was 20,329 tonnes (Marine Scotland 2020) with the highest average of 33,417 tonnes being recorded in 49E8, although contrary to the annual value, 50E9 was recorded as having the lowest average of 9,638 tonnes. The overall catch data is sub-divided into fisheries targeting bottom living or demersal fish (including cod, haddock, monkfish and ling); mid-water and surface or pelagic fish (including mackerel and herring); and shellfish (including nephrops, edible crab, velvet swim crab, lobster and squid), with information available at species level within each group.

6.1.2 Species Type

Tables 6-1 to Table 6-4 summarise the annual catch value and species type per ICES rectangle for each fisheries type over the past 5 years within the Shetland geographical area.

ICES rectangle 47E7 is located to the southwest of Shetland and encompasses corridor 2.3 Shetland to Sanday from the landing point on Sanday (Orkney) and offshore. The statistical data in Table 6-1 indicate that rectangle 47E7 is important for pelagic fishing both by quantity and value over the period considered. Pelagic species have the greatest value over the period reviewed, however it is also the most variable in terms of quantity targeted or landed. Pelagic fisheries are located further offshore and are not likely to be the main fishing activity in the vicinity of the cable installation works. Shellfish and demersal fishing are the most consistent target species within 47E7, with shellfish being the most important fishery for consistent value and value per tonne.

Table 6-1 Annual Catch Quantity and Value per Species Type for ICES Rectangle 47E7

Year	Quantity (tonnes)				Price (£)			
	Demersal	Pelagic	Shellfish	Total	Demersal	Pelagic	Shellfish	Total
Average	843	9,309	922	11,074	£1,722,010	£4,546,276	£2,582,535	£8,850,821
2015	440	22,286	1,380	24,106	£887,348	£8,783,266	£3,785,046	£13,455,660
2016	1,001	2	967	1,970	£2,025,750	£3,230	£3,115,195	£5,144,175
2017	980	1	700	1,681	£1,228,299	£1,399	£1,981,449	£3,211,147
2018	1,582	12	552	2,146	£3,908,470	£18,941	£1,195,443	£5,122,854
2019	212	24,247	1,013	25,472	£560,185	£13,924,547	£2,835,543	£17,320,275

Source: Scottish Government 2020

ICES rectangle 47E8 is located to the south-east of Shetland and encompasses a section of cable corridors 2.3 Shetland to Sanday. The statistical data in Table 6-2 reflects the offshore nature of this section of cable corridor 2.3. The key fishery of primary importance in terms of quantity landed and value is pelagic fishing, although variable across the years considered, while shellfish are of least importance. Rectangle 47E8 is also of key importance to the demersal fishermen and tonnage landed and value is fairly consistent across the years considered.

Table 6-2 Annual Catch Quantity and Value per Species Type for ICES Rectangle 47E8

Year	Quantity (tonnes)				Price (£)			
	Demersal	Pelagic	Shellfish	Total	Demersal	Pelagic	Shellfish	Total
Average	3,534	18,297	102	21,933	£6,234,045	£15,450,783	£254,164	£21,938,992
2015	1,941	5,443	138	7,522	£2,835,131	£2,998,451	£215,229	£6,048,811
2016	2,095	30,995	48	33,138	£3,217,406	£31,566,382	£106,998	£34,890,786
2017	3,693	32,821	47	36,561	£6,666,861	£21,593,797	£152,845	£28,413,503
2018	6,146	13,377	143	19,666	£11,199,413	£13,427,564	£426,037	£25,053,014
2019	3,795	8,849	133	12,777	£7,251,414	£7,667,723	£369,713	£15,288,850

Source: Scottish Government 2020

ICES rectangle 48E8 is located to the South of Shetland and encompasses one proposed cable corridor Corridors 2.3 Shetland to Sanday and 2.4 Fair Isle to BU. The statistical data in Table 6-3 indicate that rectangle 48E8 is highly important for pelagic fishing both by weight and by value, although are variable over the period considered. Catches of demersal species are variable across the years considered. Demersal fishing is also important and has increased in more recent years. The shellfishery component is lower, however is likely to be greater than 47E8 due to the proximity to Shetland and Fair Isle and nearshore vessel activity within this ICES rectangle.

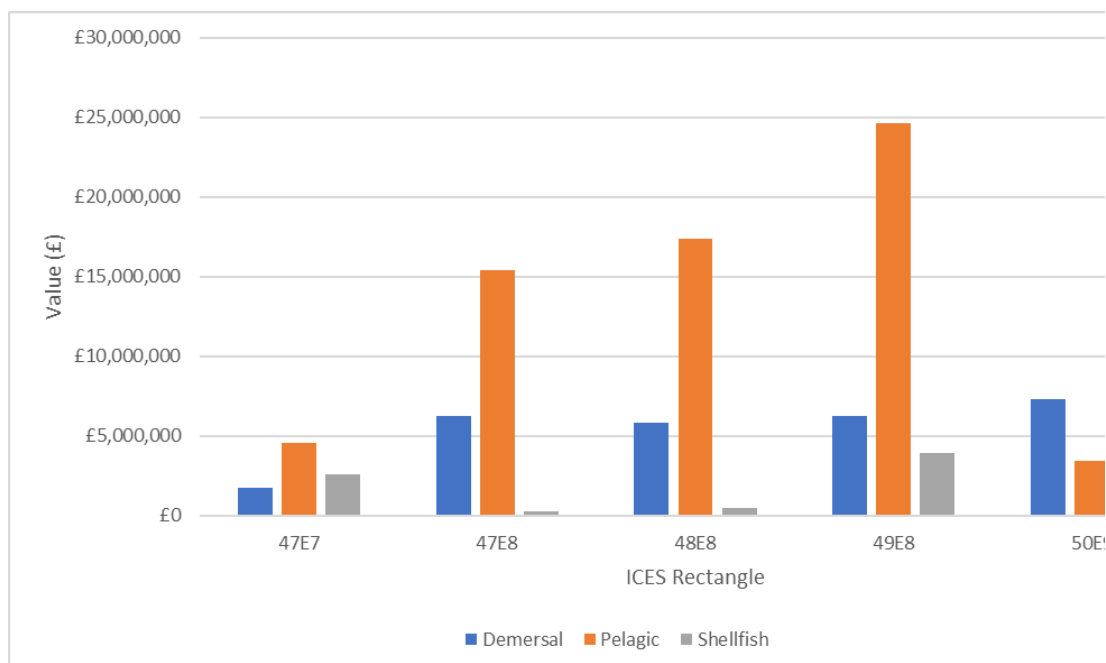
Table 6-3 Annual Catch Quantity and Value per Species Type for ICES Rectangle 48E8

Year	Quantity (tonnes)				Price (£)			
	Demersal	Pelagic	Shellfish	Total	Demersal	Pelagic	Shellfish	Total
Average	3,016	22,263	303	25,582	£5,862,459	£17,368,069	£461,921	£23,692,449
2015	1,735	42,749	57	44,541	£2,822,684	£24,730,842	£115,114	£27,668,640
2016	2,426	17,121	979	20,526	£4,280,948	£16,440,632	£914,201	£21,635,781
2017	3,288	19,296	200	22,784	£6,366,664	£15,401,309	£422,555	£22,190,528
2018	4,335	22,317	174	26,826	£8,634,809	£22,326,909	£484,384	£31,446,102
2019	3,294	9,834	106	13,234	£7,207,192	£7,940,652	£373,349	£15,521,193

Source: Scottish Government 2020

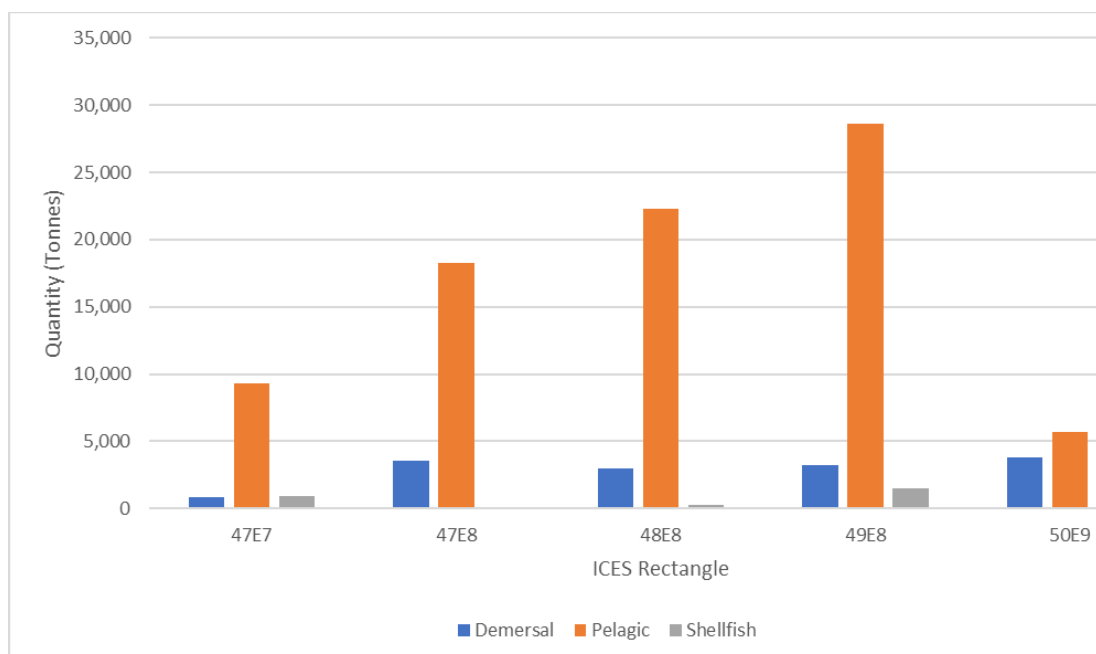
ICES rectangle 49E8 is located around central Shetland and encompasses two proposed cable corridors 2.2 Shetland – Yell and 2.8 Shetland – Whalsay. The statistical data in Table 6-4 indicate that rectangle 49E8 is highly important for pelagic fishing both by weight and by value, although are highly variable over the period considered. Demersal fishing is also important and has increased in weight and value since 2017. The shellfishery component is lower, but consistent over the period considered.

Figure 6-1 Annual Average Value (2015 – 2019) by Species Type within the Shetland Geographical Area



Source: Scottish Government 2020

Figure 6-2 Annual Average Quantity (2015 – 2019) by Species Type within the Shetland Geographical Area



Source: Scottish Government 2020

6.2 Spatial Patterns of Species Type for Vessels over 15 m

Figure 6-8 (Drawing reference: P2308-FISH-003_SH), Figure 6-9 (Drawing reference: P2308-FISH-004_OSH) and Figure 6-10 (Drawing reference: P2308-FISH-005_SH) show the spatial patterns of fishing activities within the Shetland geographical area per gear type in terms of weight, value, and fishing effort, at a resolution of ICES sub-rectangles (20x10 per ICES rectangle). This allows for a refinement in viewing where fishing activity is taking place relating to specific species type. The most recent data published by the Marine Management Organisation (MMO) with this level of spatial resolution is for 2017 (MMO 2020b). As with other spatial datasets, this information is only collected for vessels with AIS equipment and is limited to vessels over 15 m in length and as such does not represent the spatial patterns of smaller fishing vessels.

Based on the figures below, demersal fishing effort is high, particularly in waters offshore to the east, of Shetland within ICES rectangle 50E9 for demersal fishing. Pelagic fishing effort within the Shetland geographical area is also higher within ICES rectangles 50E9. In comparison shellfish effort is relatively low but also focuses effort within 50E9 and 49E6 to the west of Shetland reflecting the data is limited to vessels over 15m in length and not representative of the Scottish fleet with 81% of vessels under 10m and not represented in these figures.

Figure 6-3 Demersal Fishing Activity within the Shetland Geographical Area (P2308-FISH-003-SH)

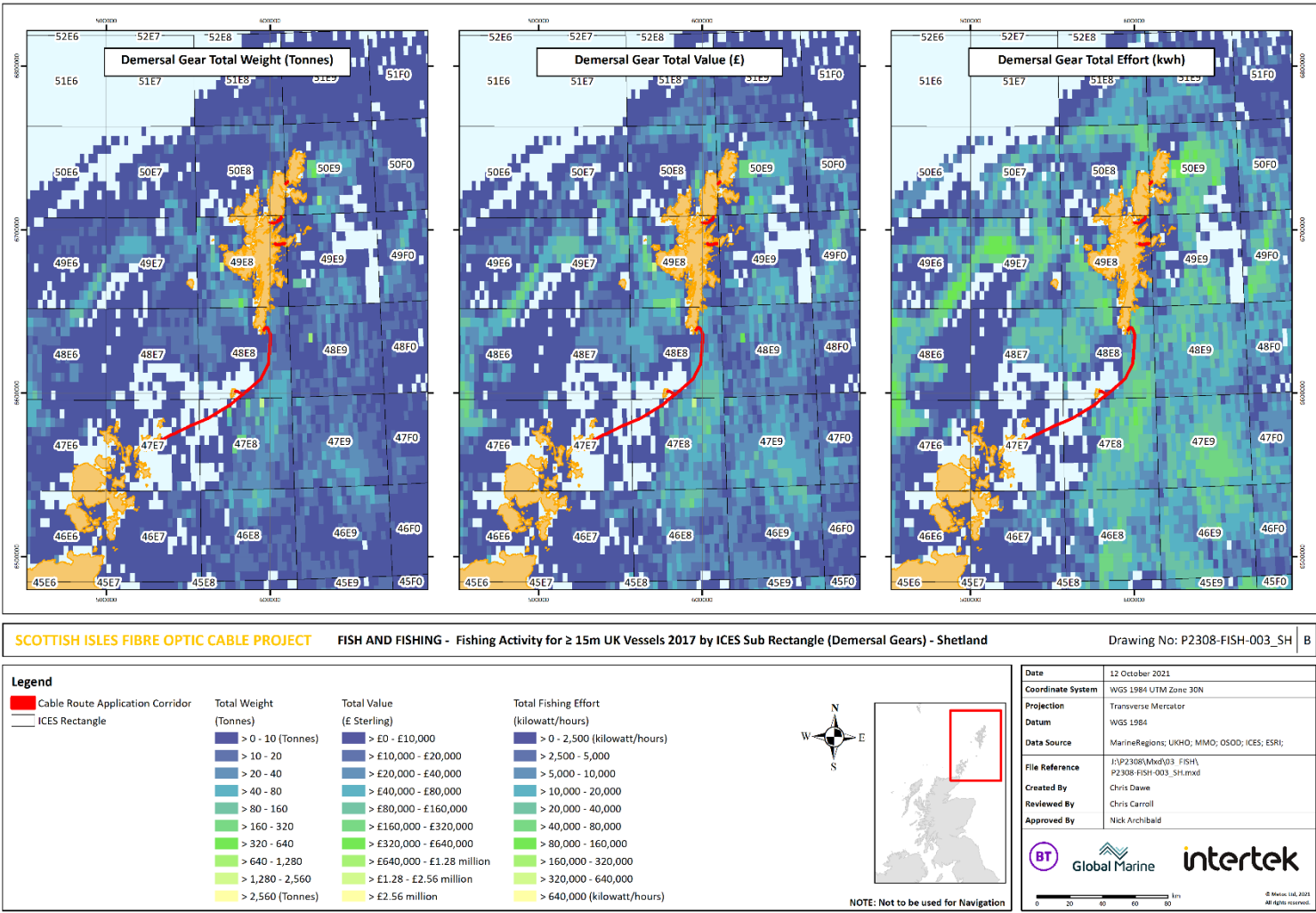


Figure 6-4 Pelagic Fishing Activity within the Shetland Geographical Area (P2308-FISH-004-SH)

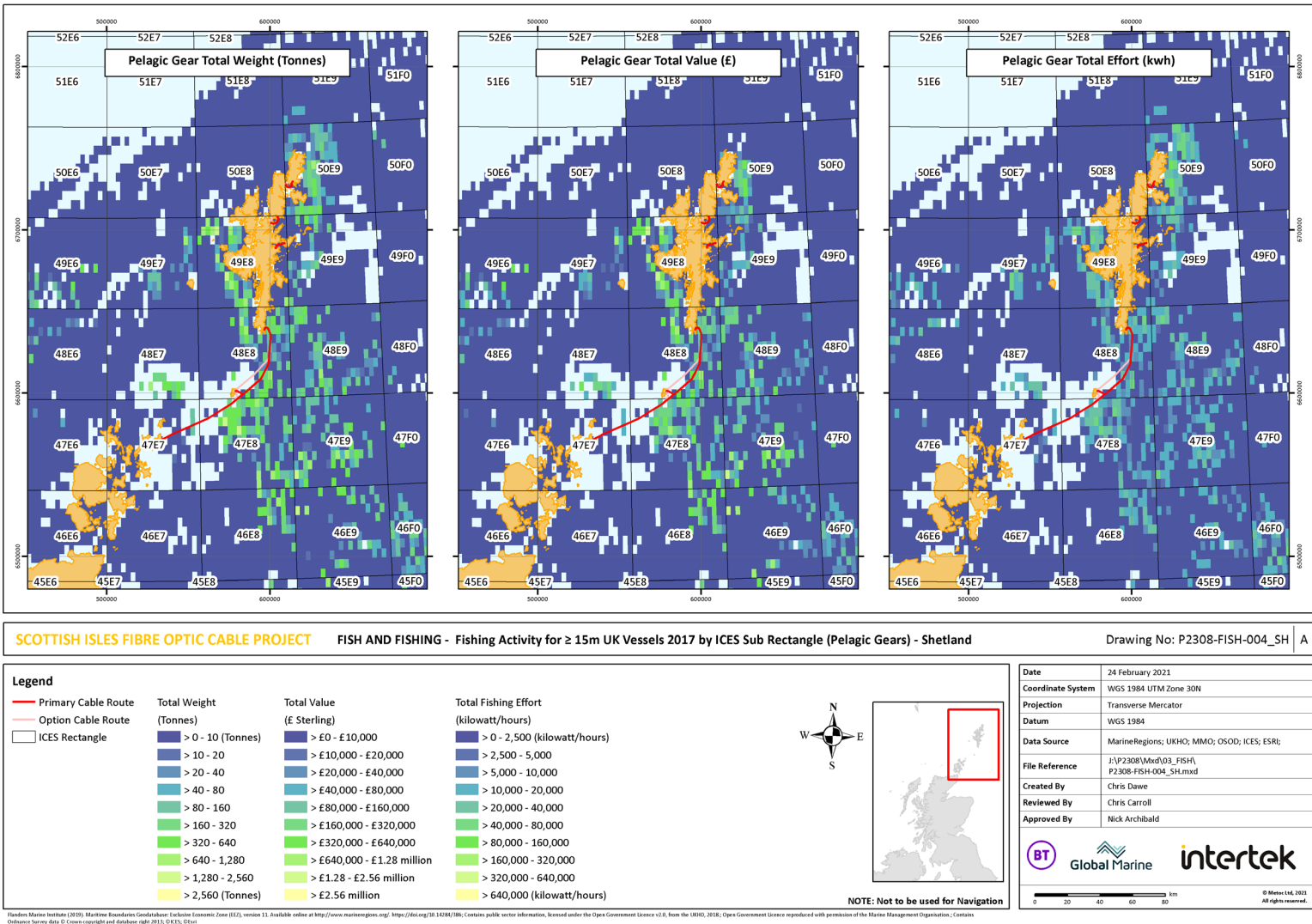
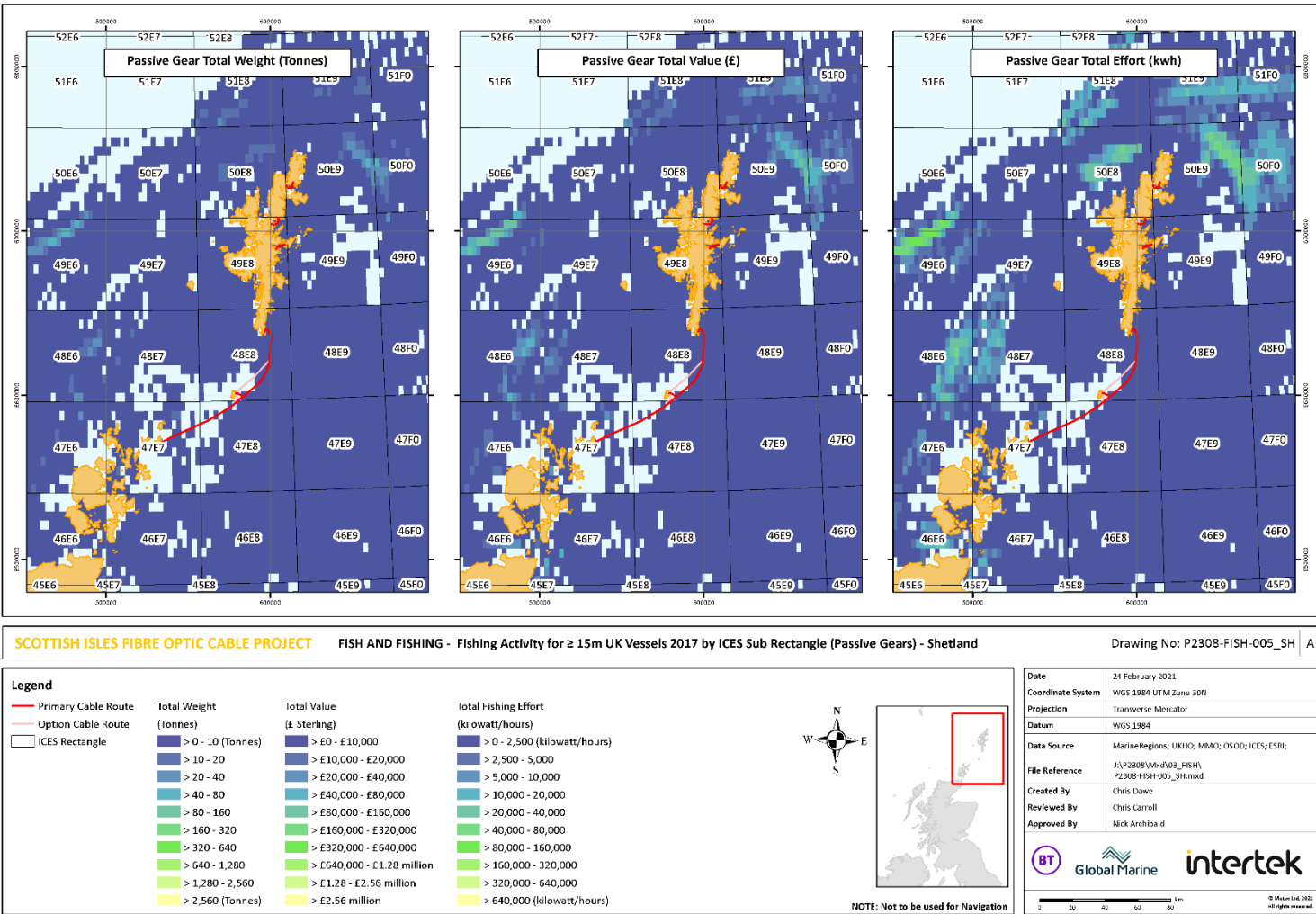


Figure 6-5 Passive (static) Fishing Activity within the Shetland Geographical Area (P2308-FISH-005-SH)



7. LANDINGS BY SPECIES

7.1 Introduction

This section summarises the key species targeted and landed within the ICES rectangles which lie in the Shetland geographical area. The data used to inform this section is the Scottish Sea Fisheries Statistics 2019 (Scottish Government 2020).

7.2 Key Species Landed in Shetland

Table 7-1 and Table 7-2 show the top species landed by value and weight respectively. The top species landed in the Shetland geographical area by value in 2019 are pelagic species such as herring, mackerel, cod and hake. In terms of quantity (tonnage landed), the most important species within the Shetland geographical area are mackerel and herring. The top five species landed by value and quantity in the Shetland geographical area is also dominated by herring and mackerel (pelagic fish as described in Section 6). Shellfish become an important component towards the south of the Shetland geographical area.

Table 7-1 Top Five Landed Species by Value (£) in 2019 per ICES Rectangle

Rank	47E7	47E8	48E8	49E8	50E9
1	Herring	Mackerel	Mackerel	Mackerel	Mackerel
2	Scallops	Cod	Herring	Cod	Hake
3	Crabs (C.P.Mixed Sexes)	Herring	Cod	Scallops	Cod
4	Crabs - Velvet (Swim)	Haddock	Haddock	Haddock	Monks or Anglers
5	Lobsters	Whiting	Whiting	Whiting	Whiting

Source: Scottish Government (2020)

Table 7-2 Top Five Landed Species by Quantity (tonnes) in 2019 per ICES Rectangle

Rank	47E7	47E8	48E8	49E8	50E9
1	Herring	Herring	Herring	Mackerel	Mackerel
2	Crabs (C.P.Mixed Sexes)	Mackerel	Mackerel	Cod	Hake
3	Mackerel	Cod	Cod	Scallops	Saithe
4	Scallops	Haddock	Haddock	Whiting	Whiting
5	Crabs - Velvet (Swim)	Whiting	Whiting	Herring	Cod

Source: Scottish Government (2020)

8. SEASONAL TRENDS

8.1 Value

Figures 8-1 to 8-5 show the monthly landings in terms of value. Seasonal trends within the Shetland geographical area are variable. Analysis of the figures shows:

- Across all ICES rectangles within the Shetland geographical region, fishing effort and value is greatest between August and December. This could be due to seasonal market demand.
- Within ICES rectangle 47E7, there is a shorter seasonal trend of increasing value from July until October, when value falls again.
- Within ICES rectangles 49E8 and 50E9 (located to the north of the Shetland geographical area), the value landed year-round is higher than areas in the south of the Shetland geographical area.

Table 8-1 Annual Catch Quantity and Value per Species Type for ICES Rectangle 49E8

Year	Quantity (tonnes)				Price (£)			
	Demersal	Pelagic	Shellfish	Total	Demersal	Pelagic	Shellfish	Total
Average	3,248	28,652	1,517	33,417	£6,271,385	£24,671,446	£3,909,573	£34,852,404
2015	1,789	62,682	1,638	66,109	£2,951,209	£38,464,075	£3,343,812	£44,759,096
2016	2,900	2,899	1,617	7,416	£4,618,598	£2,382,357	£3,357,768	£10,358,723
2017	4,303	23,925	1,677	29,905	£8,285,705	£20,396,424	£4,410,232	£33,092,361
2018	4,266	48,080	1,303	53,649	£8,760,337	£55,325,078	£3,935,777	£68,021,192
2019	2,981	5,675	1,349	10,005	£6,741,075	£6,789,299	£4,500,275	£18,030,649

Source: Scottish Government 2020

ICES rectangle 50E9 is located to the north-east of Shetland and encompasses one proposed cable corridor 2.1 Yell - Unst. Of the five CES rectangles within the Shetland geographical area, 50E9 is the most important by value for demersal fishing. The statistical data in Table 6-5 indicates that Pelagic fishing is also important however is approximately half the value of demersal fishing. Shellfish has increased on recent years but remains relatively low in this ICES rectangle.

Table 8-2 Annual Catch Quantity and Value per Species Type for ICES Rectangle 50E9

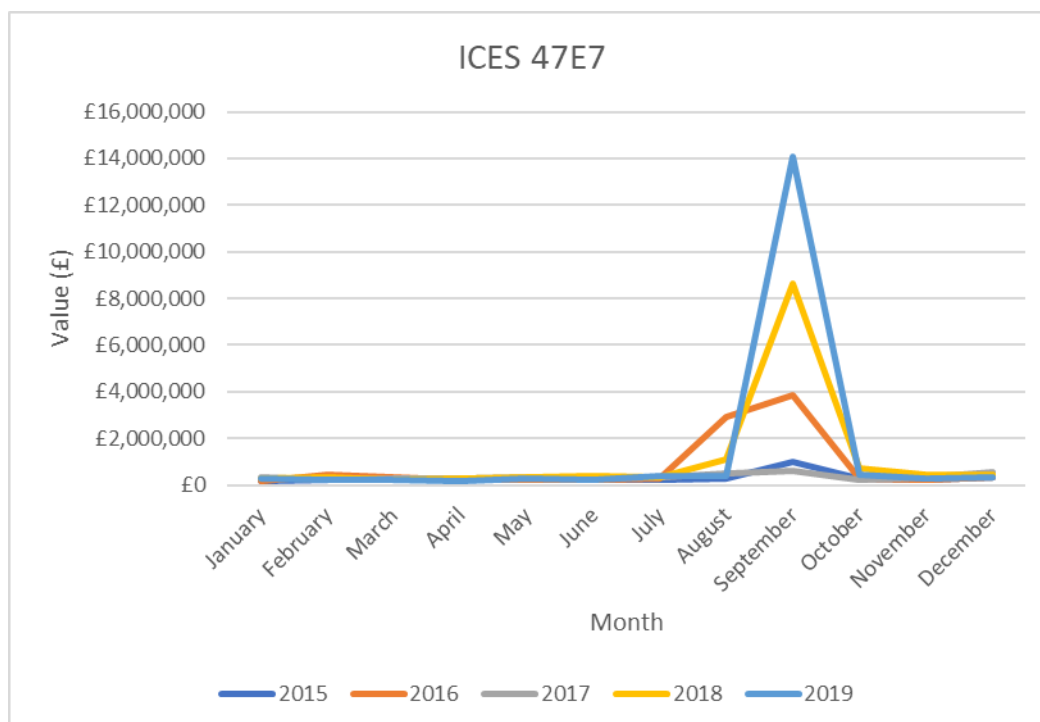
Year	Quantity (tonnes)				Price (£)			
	Demersal	Pelagic	Shellfish	Total	Demersal	Pelagic	Shellfish	Total
Average	3798	5675	165	9,638	£7,318,859	£3,469,233	£411,362	£11,199,454
2015	1922	2202	59	4,183	£3,172,944	£839,012	£124,607	£4,136,563
2016	2488	2253	126	4,867	£4,656,467	£1,097,945	£212,103	£5,966,515
2017	4779	10254	127	15,160	£9,479,588	£3,762,727	£386,480	£13,628,795
2018	4887	10287	289	15,463	£9,396,990	£7,804,931	£769,770	£17,971,691
2019	4917	3377	222	8,516	£9,888,305	£3,841,550	£563,851	£14,293,706

Source: Scottish Government 2020

The data within the tables above is summarised in Figure 6-1 and Figure 6-2 below. The figures provide an overview of the value and quantity of landings by fisheries within the ICES rectangles relevant to the Shetland geographical area. The graphs highlight the importance of the Pelagic fishery to the region particularly within ICES rectangles 49E8, however demersal fishing is more important in terms of value within ICES rectangle 50E9.

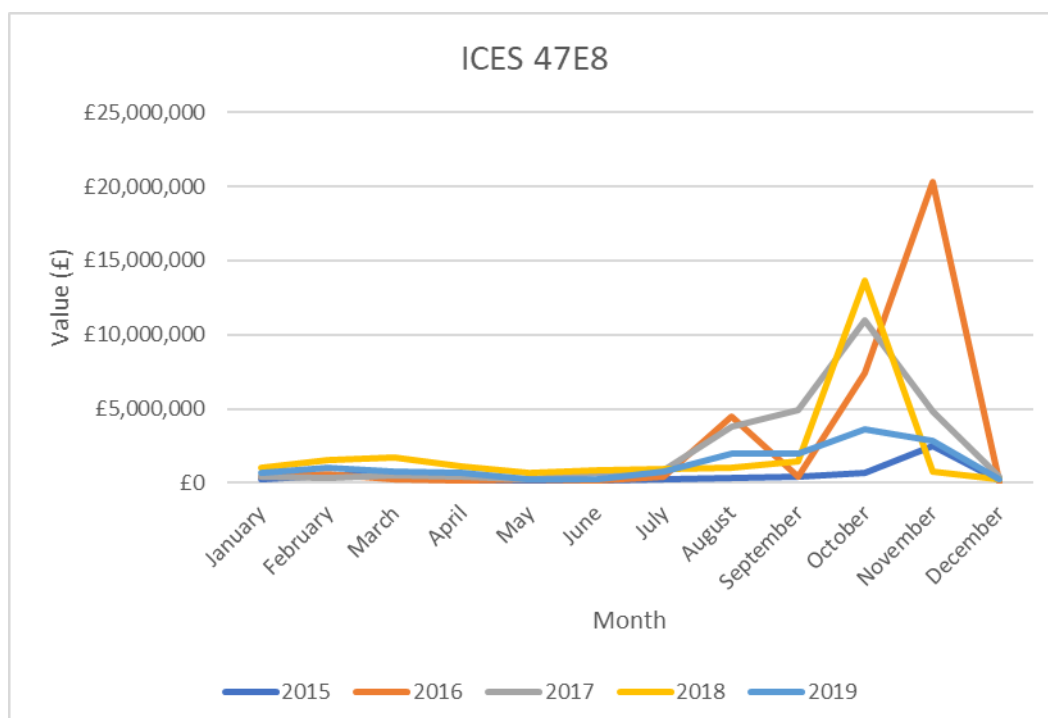
Pelagic fishing is shown to be dominant in the ICES rectangles across the Shetland geographical area, however closer analysis of the temporal data show that this average is not representative of every year. For each of the ICES rectangle, in terms of both quantity and value, the pelagic fishing statistics show that there is either very little or comparatively large amounts of fishing each year. Pelagic vessels operate offshore and are unlikely to be operating within the proposed cable corridor locations

Figure 8-1 Landing Value per Month for ICES Rectangle 467E7



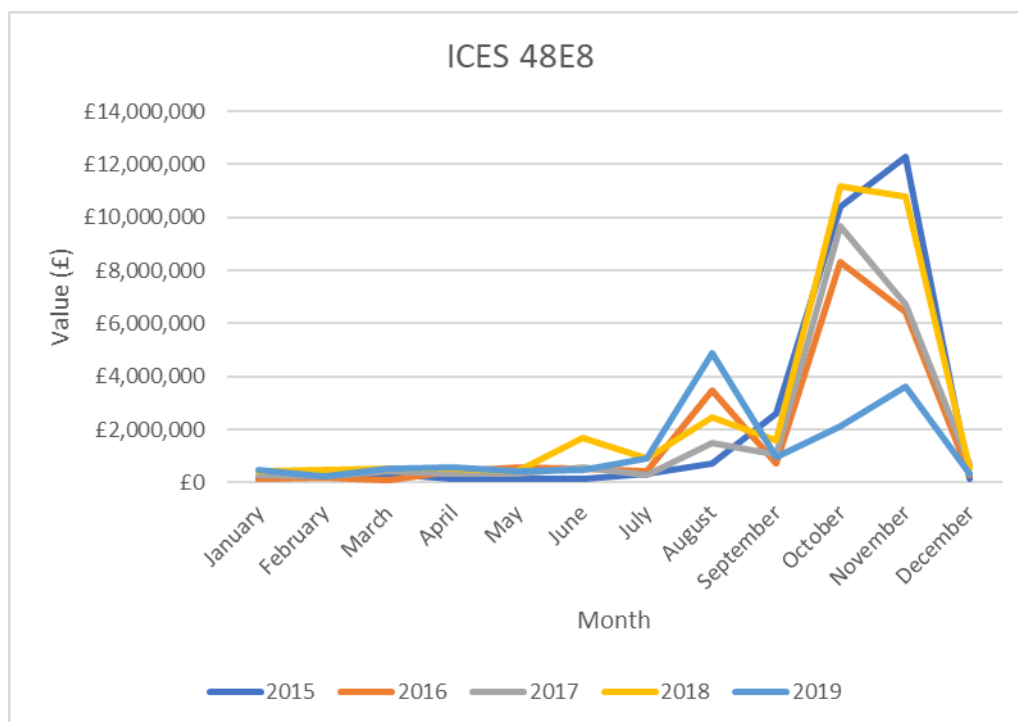
Source: Scottish Government 2020

Figure 8-2 Landing Value per Month for ICES Rectangle 47E8



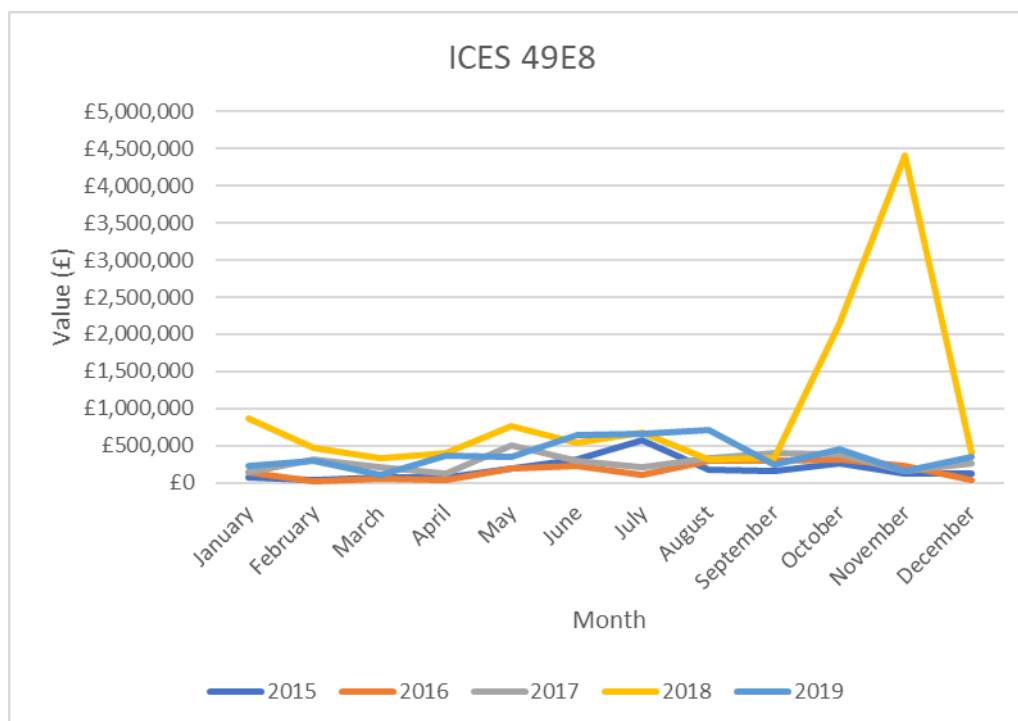
Source: Scottish Government 2020

Figure 8-3 Landing Value per Month for ICES Rectangle 48E8



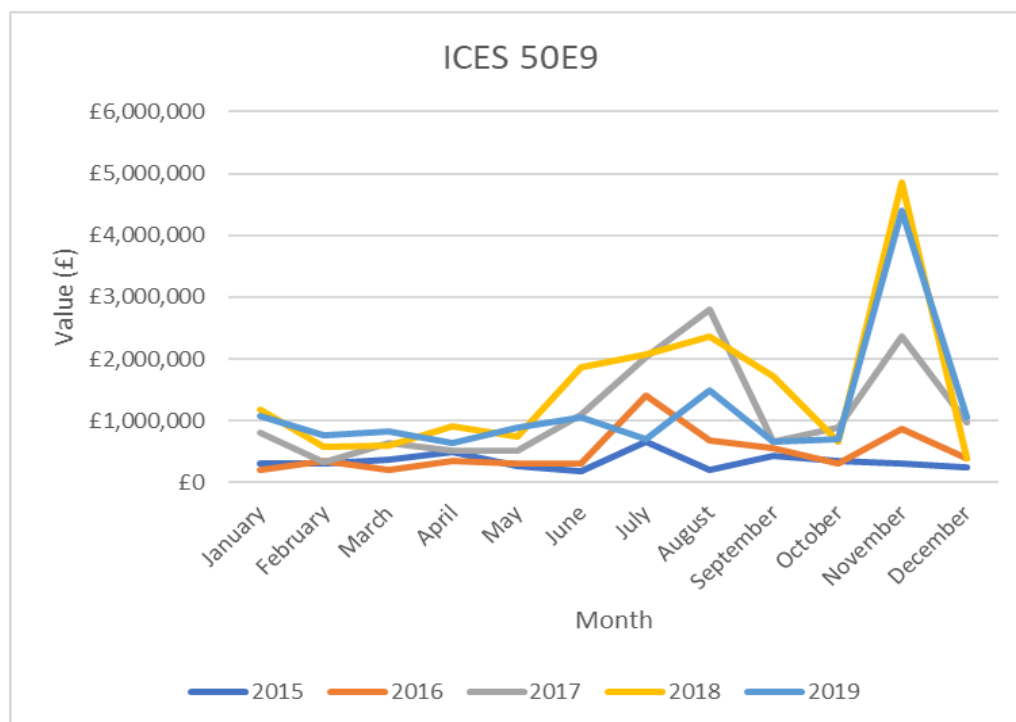
Source: Scottish Government 2020

Figure 8-4 Landing Value per Month for ICES Rectangle 49E8



Source: Scottish Government 2020

Figure 8-5 Landing Value per Month for ICES Rectangle 50E9



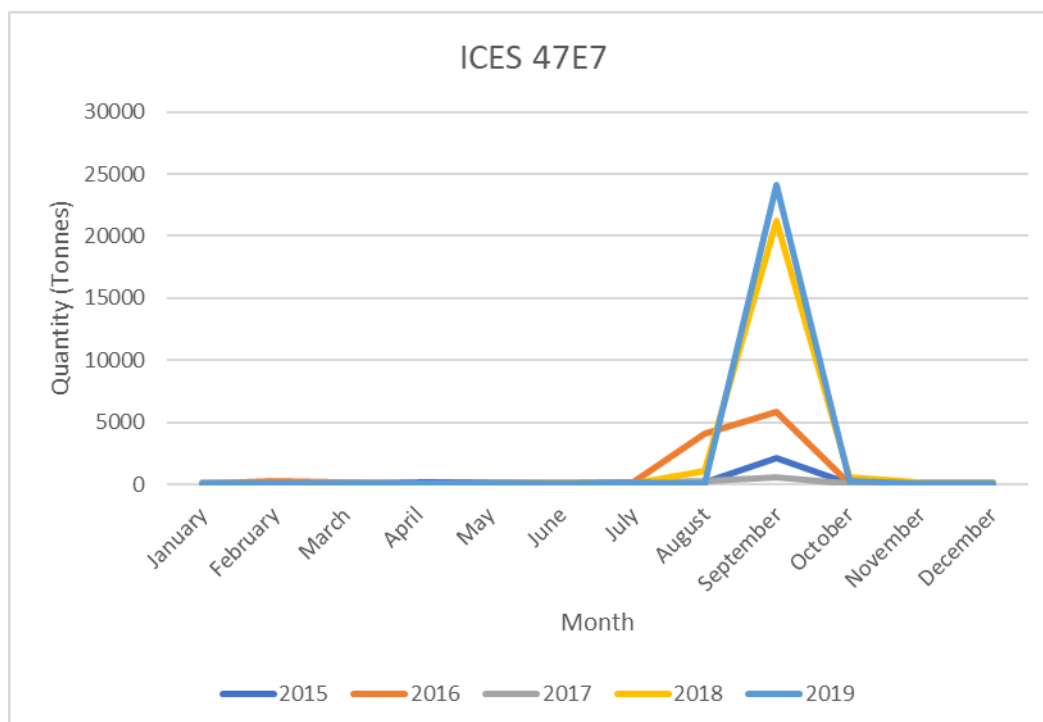
Source: Scottish Government 2020

8.2 Quantity

Figures 8-6 to 8-10 show the monthly landings in terms of quantity (tonnage). Similar to the trends by landings value, they vary within each ICES rectangle within the Shetland geographical area. Analysis of the data indicates:

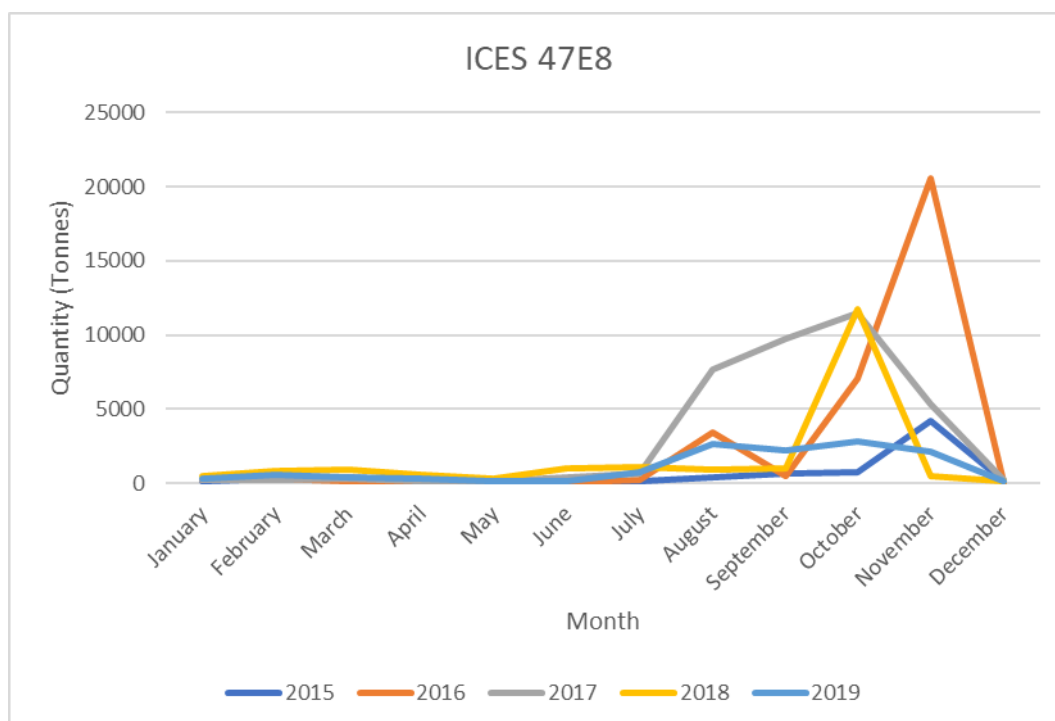
- The peak landings quantity within ICES rectangle mirrors the peak landings value, with peaks between August and December across all the years considered.
- Within ICES rectangle 47E7, there is limited fishing activity year-round until July, peaking in September before falling to low/none again.
- In ICES rectangle 50E9, there are two distinct peaks in quantity landed in August and again in November across all years considered. This could reflect the demersal and pelagic fisheries operating within this ICES rectangle.

Figure 8-6 Landing Quantity per Month for ICES Rectangle 47E7



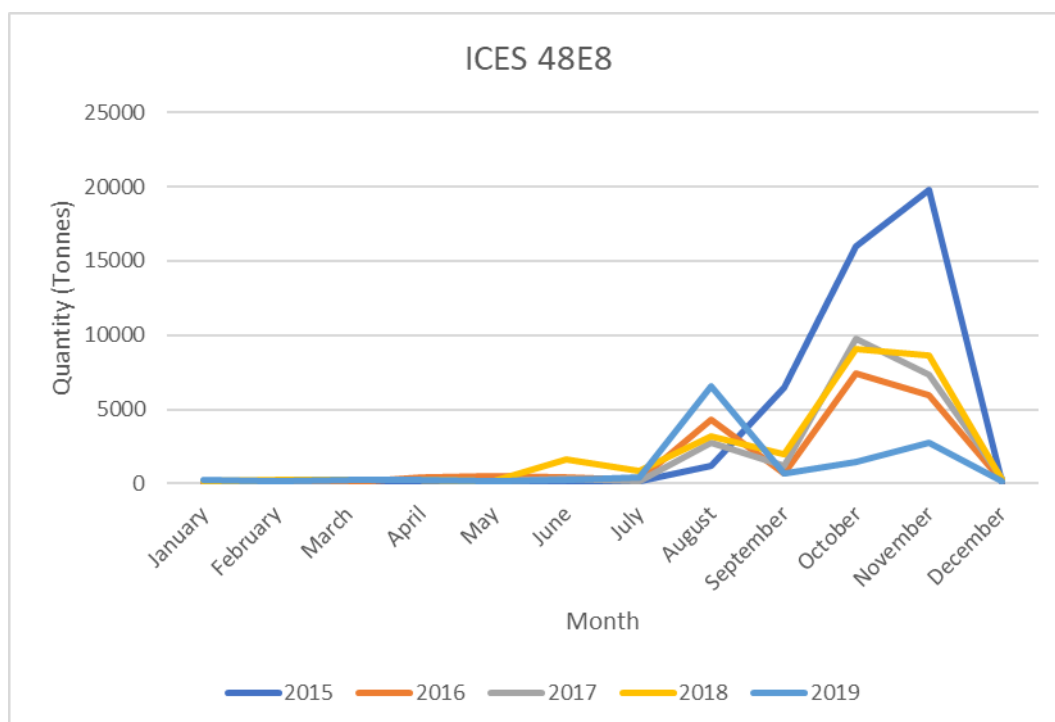
Source: Scottish Government 2020

Figure 8-7 Landing Quantity per Month for ICES Rectangle 47E8



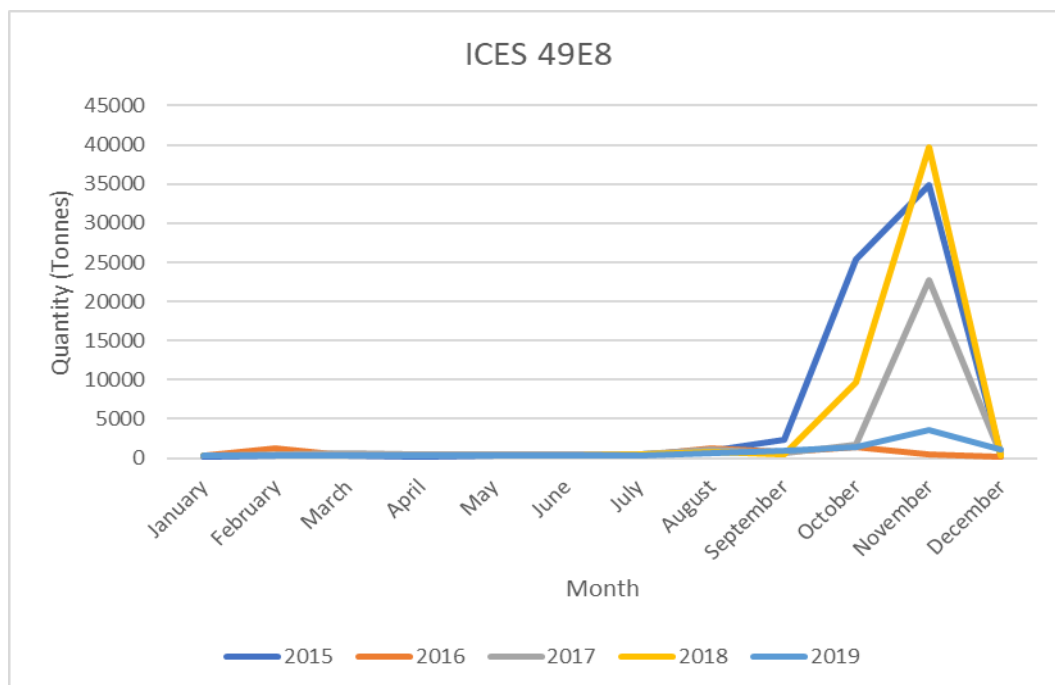
Source: Scottish Government 2020

Figure 8-8 Landing Quantity per Month for ICES Rectangle 48E8



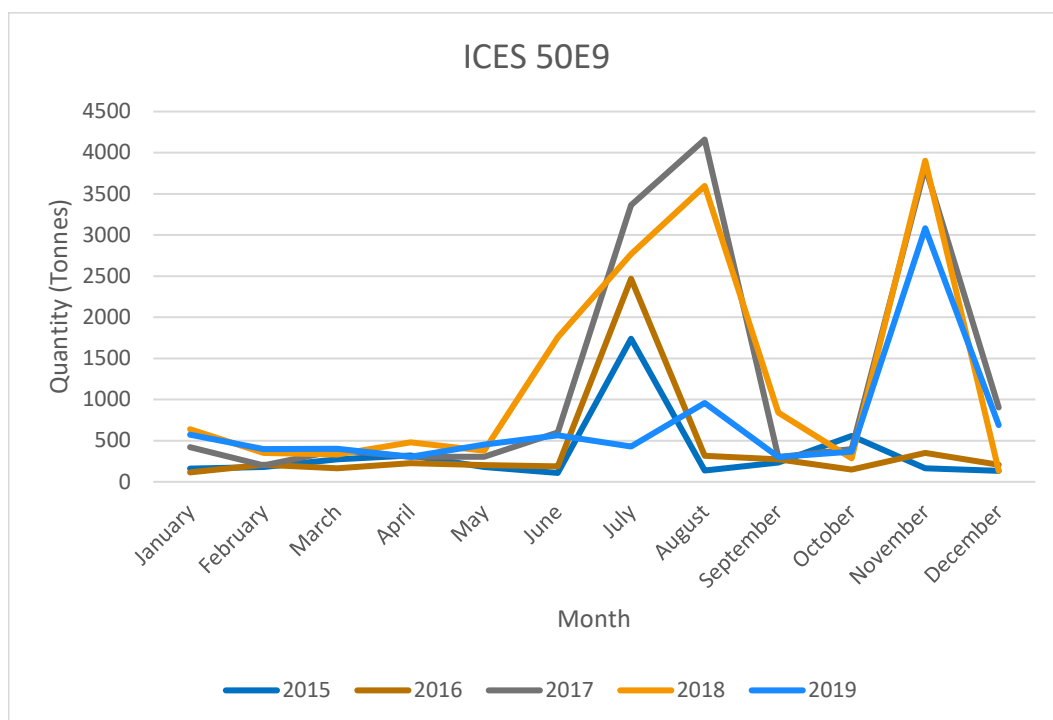
Source: Scottish Government 2020

Figure 8-9 Landing Quantity per Month for ICES Rectangle 49E8



Source: Scottish Government 2020

Figure 8-10 Landing Quantity per Month for ICES Rectangle 50E9



Source: Scottish Government 2020

9. SUMMARY OF FISHING ACTIVITY FOR SHETLAND GEOGRAPHICAL AREA

9.1 Overview

This report has reviewed publicly available fisheries data and has identified the fishing activity across the Shetland geographical area. This includes a review of target species and fishing methods, spatial patterns, landings data and seasonal trends. The findings have been summarised for each cable corridor within the Shetland geographical area in Table 9-1 below.

Table 9-1 Summary of Fisheries Activity by Cable route Corridor

Cable Corridor	ICES rectangle	Target Species	Dominant Fishing type			Peak season
			Shellfish	Demersal	Pelagic	
2.1 Yell-Unst	50E9	Mackerel, hake, cod, monks or anglers, whiting, saithe		✓		November
2.2 Shetland-Yell	49E8	Mackerel, cod, scallop, haddock, whiting			✓	November
2.3 Shetland-Sanday	47E7	Herring, mackerel, scallops, crabs, lobster			✓	September
	47E8	Mackerel, herring, cod, haddock, whiting			✓	September - November
	48E8	Mackerel, herring, cod, haddock, whiting			✓	August and October
					✓	August and October
2.4 Fair Isle - BU	48E8	Mackerel, herring, cod, haddock, whiting			✓	August and October
					✓	
2.8 Shetland - Whalsay	49E8	Mackerel, cod, scallop, haddock, whiting			✓	November

10. CONCLUSION

The Scottish fishing fleet is largely comprised of vessels of 10m and under (74% of the fleet). These vessels are not required to record their landings or be traced using VMS, therefore may be under-represented within fishing statistics. From the information available, key fishing activities within the Shetland geographical area in relation to the proposed cable corridors are pelagic, (24,000 tonnes of pelagic fish, worth £23 million, were landed in Shetland during 2019), demersal and aquaculture fishing, with some shellfish (2,100 tonnes of shellfish, worth £6 million, were landed in Shetland during 2019). Mackerel and herring are the key target species. The inshore fishery, which would include shellfish such as scallop, crab and lobster is likely to be unrepresented in the statistics provided by Scottish Government (2020). The fishing activity around Shetland is relatively constant throughout the year with a peak in the autumn.

There are numerous aquaculture sites around Shetland. Aquaculture includes farming of finfish and shellfish species and is permitted out to 3 nautical miles (NM) within the Shetland geographical region. One active aquaculture site (Wick of Belmont) is located within cable corridor 2.1 Yell - Unst. Of the sites outside the cable corridors, the closest is the active North Voe site which is 49m from cable corridor 2.8 Shetland-Whalsay, and the Ness of Copister site which is 223m from cable corridor 2.2 Shetland - Yell. All other sites are over 500m from the cable corridors.

The Project Fishing Liaison Officer is in regular communication with the Shetland and Fair Isle fishing interests and has held pre-application meetings and workshops to seek the opinion of fishing community. These communications will continue through the Marine Licence determination and into the installation phase of the R100 Project. A Fisheries Liaison Mitigation Action Plan (FLMAP) has been developed which considers the fishing interest opinions. The mitigation measures proposed will seek to minimise displacement and disturbance to commercial fishers within the Shetland geographical area as far as possible. The mitigation measures proposed in the FLMAP (Appendix F to the MEA), are summarised in the MEA Section 8 (Report Ref: P2308_R5367_ Rev0).

REFERENCES

- 1** British Sea Fishing (2020). Commercial fishing methods. [Online]. Available at: <https://britishseafishing.co.uk/commercial-fishing-methods/> (Accessed February 2021)
- 2** EMODnet (2020). 2019 Fishing Vessel Density. [Online] Available at: <https://www.emodnet-humanactivities.eu/view-data.php> [Accessed June 2021]
- 3** Galbraith, R. D. and Rice, A. (2004) An Introduction to Commercial Fishing Gear and Methods used in Scotland. Fisheries Research Services. Scottish Fisheries Information Pamphlet No. 25 2004. [Online] Available at: <https://www2.gov.scot/Uploads/Documents/Fishing%20Gear.pdf> (Accessed February 2021)
- 4** Marine Management Organisation. (2020a). UK sea fisheries annual statistics report 2019. [Online]. Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2019> (Accessed February 2021)
- 5** Marine Scotland (2016). Vessel Monitoring System Intensity layers. [Online] Available at: <http://marine.gov.scot/information/average-intensity-hours-fishing-using-ices-vms-data-sets> [Accessed June 2021]
- 6** Marine Scotland. (2020). 2019 Scottish Sea Fisheries Statistics – Fishing Effort and Quantity and Value of Landings by ICES Rectangles, species group and species. [Online]. Available at: <https://data.marine.gov.scot/dataset/2019-scottish-sea-fisheries-statistics-fishing-effort-and-quantity-and-value-landings-ices> (Accessed June 2021)
- 7** Napier I.R. (2019), Shetland Fisheries Statistics. Available at: https://pureadmin.uhi.ac.uk/ws/portalfiles/portal/14812567/Shetland_Fisheries_Statistics_2019.pdf [Accessed June 2021]
- 8** Marine Scotland. (2021). National Marine Plan Interactive. [Online]. Available at: <https://marinescotland.atkinsgeospatial.com/NMPI/default.aspx?redirect=false> (Accessed February 2021)
- 9** Orkney Sustainable fisheries ltd (2016) Inshore Fisheries Management Plan Orkney, Jan 2016
- 10** Seafish (2019) Seafish Gear Database. [Online]. Available at: <https://seafish.org/gear-database/> (Accessed February 2021).
- 11** Seagard (2021), Fishing Liaison Mitigation Action Plan Document Ref: SG001072021_R100FLMAP
- 12** Scottish Government (2020). Scottish Sea Fisheries Statistics 2019. [Online]. Available at: <https://www.gov.scot/publications/scottish-sea-fisheries-statistics-2019/> (Accessed February 2021)
- 13** Shetland Shellfish Management Organisation (SSMO) Spatial Management Plan (2020)