MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 2, Annex 6.1: Commercial fisheries technical report

September 2024
Rev: ES Issue

MOR001-FLO-CON-ENV-RPT-0041
MRCNS-J3303-RPS-10012

PINS Reference: EN020028
APFP Regulations: 5(2)(a)
Document reference: F2.6.1

Document status					
Version	Purpose of document	Approved by	Date	Approved by	Date
ES	For issue	AS	September 2024	IM	September 2024

Prepared by:

ERM

Prepared for:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd

Contents

Tables

Figures

Appendices

Glossary

Term	Meaning
Beam trawl	Beam trawls consist of nets that are held open by a heavy tubular steel beam, which is towed along the seabed. Beam trawls may use tickler chains, which are attached at the front of the net and slide along the seabed to disturb species of fish within its path, encouraging them to rise up into the net behind.
Cartilaginous fish	Cartilaginous fish are species characterised by having a skeleton of cartilage rather than bone.
Company Fisheries Liaison Officer	Primary contact for the Fishing Industry Representative and Offshore Fisheries Liaison Officer. Main point of contact for bp/EnBW and Flotation Energy/Cobra for any commercial fisheries related queries.
Demersal trawl	Demersal trawls consist of cone-shaped nets that are towed along the seabed to target demersal fish species. The mouth of the trawl is spread and held open by a pair of adjacent trawl doors.
Dredge	Dredges consist of rigid structures that target numerous species of shellfish through towing along the seabed. Dredges typically have an open-frame mouth with a collection bag.
Fishing ground	An area of water or seabed targeted by fishing activity.
Fleet	A physical group of vessels sharing similar characteristics (e.g. nationality).
Gadoid fish	Gadoid fish are species characterised by soft-fins.
Generation Assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations.
Gill nets	Gill nets are nets which hang vertically in the water column which entangle fish as they swim into them.
International Council for the Exploration of the Sea rectangle	Defined areas, 1 degree longitude x 0.5 degree latitude equalling approximately 30 x 30 NM used for fisheries statistics.
Inshore waters (England and Wales)	Mean High Water Springs to 12 nm offshore.
IS Boxes	IS Boxes are used to collect data for the Isle of Man Nest Forms Electronic Daily Scallop Catch Return. There are four IS Boxes per ICES Rectangle.
Kilowatt	Engine power of a fishing vessel. This is used in the calculation of fishing effort for Vessel Monitoring Systems data, whereby the time associated with the Vessel Monitoring Systems report is multiplied by the engine power of the fishing vessel. Engine power with gross tonnage determines the size of fishing licence required and therefore allowable catch, discards and quotas.
Minimum Landing Size	The smallest measurement of a fish or shellfish species that can be legally sold or landed.
Morecambe OWL	Morecambe Offshore Windfarm Ltd. is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd.

Term	Meaning
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore export cables, landfall and onshore infrastructure for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morecambe Offshore Windfarm: Generation Assets	The offshore generation assets and associated activities for the Morecambe Offshore Windfarm.
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy investments Ltd. and Energie Baden-Württemberg AG (EnBW).
Offshore Fisheries Liaison Officer	Primary point of contact between fishing vessels and project construction vessels during construction of the project and, if required, during major maintenance activities through the operation and maintenance phase.
Offshore Order Limits	See Transmission Assets Order Limits: Offshore (below).
Otter trawl	Otter trawls consist of a pair of otter boards (large rectangular boards) which hold open the mouth of a net.
Pelagic	Of or relating to the open sea.
Pelagic trawl	Pelagic trawls consist of nets which are used to catch fish in the water column, rather than on the seafloor.
Seine nets	A seine net consists of a large net which is drawn together to surround and enclose a shoal of fish.
Static gear	Gear that is set to catch fish or shellfish. This is a collective term and includes gears such as pots, traps and set nets.
Total Allowable Catch	Catch limits which are set for a specific fishery for a certain time period. Total Allowable Catches are generally expressed in tonnes of live weight.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above)
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning.
Transmission Assets Order Limits: Offshore	The area within which all components of the Transmission Assets seaward of Mean Low Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning. Also referred to in this report as the Offshore Order Limits, for ease of reading.
Vessel Monitoring System	Satellite tracking system using a device on vessel which transmits the location, speed and course of the vessel.

Acronyms

Acronym	Meaning
ANIFPO	Anglo-North Irish Fish Producers Organisation
bp	bp Alternative Energy Investments Ltd.
Cefas	Centre for Environment, Fisheries and Aquaculture Science
EIA	Environmental Impact Assessment
EU	European Union
EU STECF	European Union Scientific, Technical and Economic Committee for Fisheries
EnBW	Energie Baden-Württemberg AG
ES	Environmental Statement
FIR	Fisheries Industry Representative
GIS	Geographic Information System
ICES	International Council for the Exploration of the Sea
IS Boxes	Irish Sea Boxes
ISEFPO	Irish South & East Fish Producers Organisation
MFPO	Manx Fish Producers Organisation
MLS	Minimum Landing Size
MMO	Marine Management Organisation
MSAR	Monthly Shellfish Activity Report
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NWIFCA	North Western Inshore Fisheries Conservation Authority
NWWAC	North Western Waters Advisory Council
NRA	Navigation Risk Assessment
OFLO	Offshore Fisheries Liaison Officer
PEIR	Preliminary Environmental Information Report
SFF	Scottish Fishermen's Federation
SWFPA	Scottish White Fish Producers Association Ltd
S42	Section 42
TAC	Total Allowable Catch
UK	United Kingdom
VMS	Vessel Monitoring Systems
WCSP	West Coast Sea Products Ltd
WFA	Welsh Fishermen’s Association

Acronym	Meaning
WFC	Whitehaven Fishermen's Cooperative
WGSCALLOP	ICES Scallop Assessment Working Group

Units

Unit	Description
%	Percentage
£	Pound sterling
kg	Kilogram
knots (kn)	Knots (nautical mile per hour)
kW	Kilowatt (power)
kW/day	Kilowatt days
kWh	Kilowatt hours
m	Metres
mm	Millimetres
nm	Nautical miles (distance; one nm = 1.852 km)
t	Tonnes

1 Commercial fisheries technical report

1.1 Introduction

1.1.1.1 This document forms Annex 6.1: Commercial fisheries technical report of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets).

1.1.1.2 This technical report provides a detailed description of commercial fishing activity within the area of the proposed Transmission Assets and the wider, east Irish Sea region. The information within this technical report has been used to inform the Environmental Impact Assessment (EIA). The Transmission Assets are described in detail in Volume 1, Chapter 3: Project description of the ES.

1.1.1.3 This technical report has been produced by ERM on behalf of RPS, which has been appointed as the lead EIA consultant for the Transmission Assets by Morgan OWL (bp Alternative Energy Investments Ltd./Energie Baden-Württemberg AG (bp/EnBW)) and Morecambe OWL (Cobra/Flotation Energy Ltd.), hereafter referred to as the Applicants.

1.1.1.4 This objective of this technical report is to provide a baseline for commercial fishing activity in relation to the Transmission Assets study area and wider east Irish Sea region; through a review of official datasets, additional information and knowledge obtained through consultation with fisheries groups, and site-specific surveys.

1.1.1.5 This technical report should be read in conjunction with the following.

- Volume 2, Chapter 3: Fish and shellfish ecology of the ES.
- Volume 2, Annex 3.1: Fish and shellfish ecology technical report of the ES.
- Volume 2, Chapter 6: Commercial fisheries of the ES.
- Volume 2, Chapter 7: Shipping and navigation of the ES.
- Volume 2, Annex 7.1: Navigational risk assessment of the ES.
- Volume 2, Chapter 9: Other sea users of the ES.

1.1.1.6 Recreational rod and line fishermen, as well as charter-angling operators, are also active in the region, more details can be found in Volume 4, Chapter 2: Socio-economics of the ES.

1.2 Methodology

1.2.1 Sources of information (Generation Assets)

1.2.1.1 The Transmission Assets are to be located within the International Council for the Exploration of the Sea (ICES) Division VIIa (Irish Sea) statistical area, which is divided into statistical rectangles for the purpose of recording fisheries landings. The Offshore Order Limits encompass the Morgan

Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets Generation Assets (hereafter referred to collectively as the Generation Assets) and are located within ICES Rectangles 37E5, 37E6, 36E5 and 36E6 (**Figure 1.1**).

1.2.1.2 For the purposes of this technical report, the Generation Assets commercial fisheries technical reports have been aligned and utilised within this technical report (in regard to length of study period and data source) along with the following data sources.

- Landing statistics by ICES rectangle for United Kingdom (UK) and Isle of Man vessels.
- Landings statistics by port.
- Landings statistics by ICES rectangle for European Union (EU) vessels.
- Vessel Monitoring Systems (VMS) data for UK and Isle of Man vessels (≥15 m).
- VMS data for EU mobile bottom contacting gear vessels (>12 m).
- UK Inshore Fishing Intensity.
- ICES scallop assessment working group.

1.2.1.3 There is a range of different limitations and assumptions associated with this data, which is discussed in more detail in **section 1.2.5** and summarised in **Table 1.1**.

1.2.2 Study area

1.2.2.1 The study area is defined by the ICES rectangles that contain the Offshore Order Limits. Therefore, for the purposes of this technical report, the study area is defined as ICES rectangles 36E5, 36E6, 37E5 and 37E6 (**Figure 1.1**).

1.2.2.2 The Transmission Assets are located wholly within English waters (**Figure 1.1**).

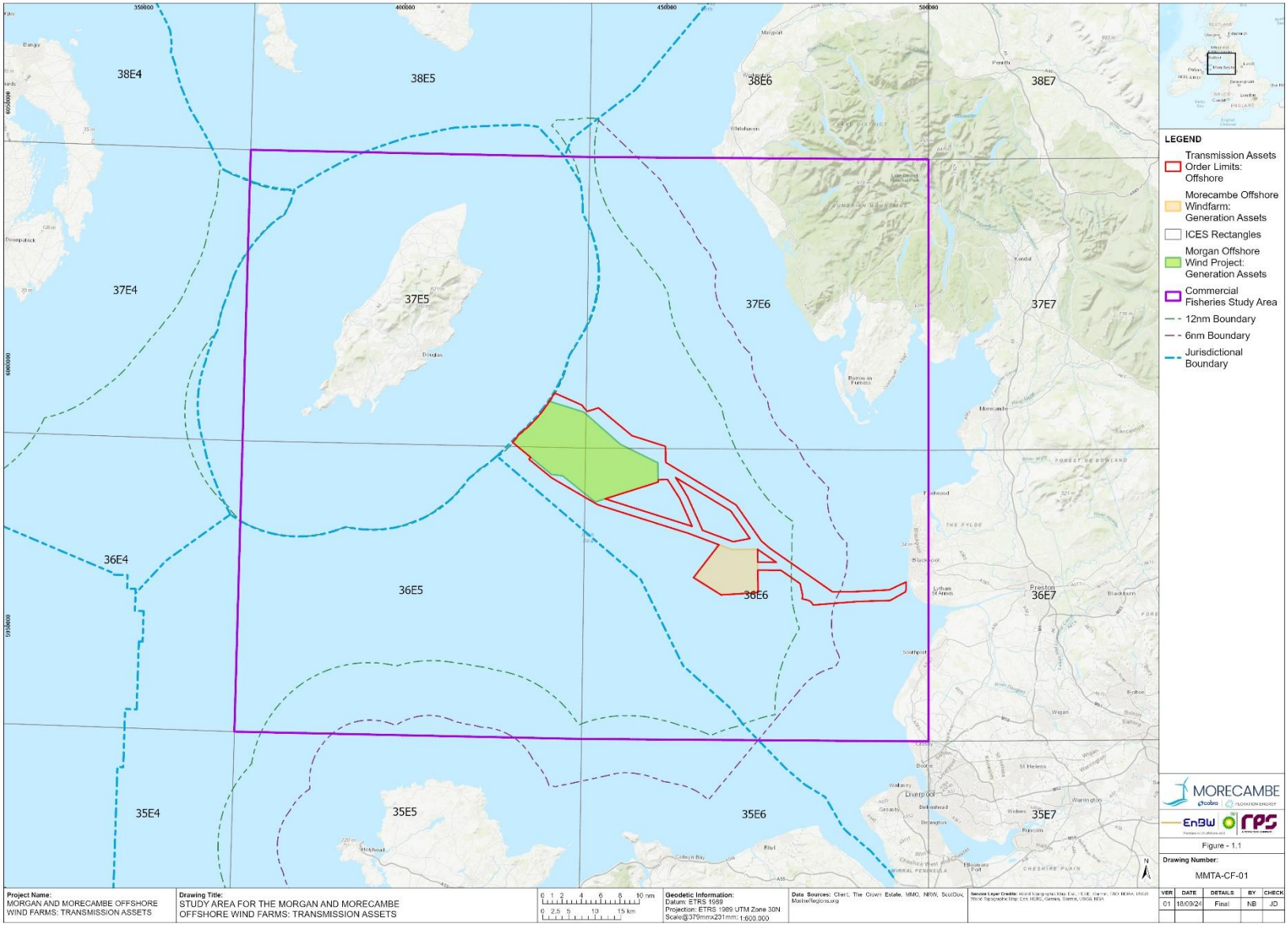


Figure 1.1: Morgan and Morecambe Offshore Wind Farms: Transmission Assets commercial fisheries study area

1.2.3 Consultation

1.2.3.1 A summary of the key topics raised during consultation activities undertaken to date specific to commercial fisheries is presented in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES and the Consultation Report (document reference E1).

1.2.4 Baseline methodology

1.2.4.1 The commercial fisheries baseline has been compiled through a detailed desk-based assessment of existing studies and datasets. Landings statistics have been analysed using Microsoft Excel, while Vessel Monitoring System (VMS) data have been analysed through ArcMap Geographic Information System (GIS) software.

1.2.4.2 Where possible, data has been collated over a 10-year period. This assessment period is justified by the following.

- To account for trends and seasonal variations in vessel landings and effort.
- To align and account for study periods utilised in the commercial fisheries technical reports of both the Morgan Offshore Wind Project: Generation Assets and the Morecambe Offshore Windfarm: Generation Assets.
- Consultation feedback has indicated that the scallop fisheries in the area of the Transmission Assets are cyclical, over periods of seven to eight years for queen scallop and three to four years for king scallop *Pecten maximus*.

1.2.4.3 These data have been supplemented with qualitative information gathered through consultation with commercial fisheries stakeholders and communication with the FIR. Additional data sources have also been used to supplement the VMS data, which does not capture smaller fishing vessels. More detail on the data sources used to inform the commercial fisheries baseline is provided in **section 1.2.5** below.

1.2.5 Desktop study

1.2.5.1 Information on commercial fisheries within the study area was collected through a detailed desktop review of existing studies and datasets. These sources are summarised in **Table 1.1**. Site-specific surveys, including methodology, are detailed in **section 1.3.8.**

1.2.5.2 The most recently available datasets have been collated from the various sources.

1.2.5.3 There is a range of different limitations and assumptions associated with the data, as summarised in **Table 1.1**. A confidence level has been assigned to each dataset, informed by the assessment teams expert judgment and based on the various data limitations (e.g. age of dataset, spatial resolution and size of vessels included). Care has been taken when interpreting the data, particularly those with lower confidence levels. Feedback from consultation

(summarised in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES) has been used to supplement the official datasets, particularly where there are recognised data limitations.

1.2.5.4 It is also important to note that all the values presented by the official data sources relate to value of landings (i.e. first-sale value at the quayside). Additional value (estimated at up to 60% of landed value) is added to many fish products, especially shellfish such as king scallop (*Pecten maximum*), brown crab *Cancer pagurus* and lobster *Homarus gammarus*, via onshore processing. The onshore processing sector is reliant on the fish products represented in the official data sources and supports a large number of jobs.

Table 1.1: Summary of key official data sources

Title	Source	Year	Confidence level and limitations
Landing statistics by International Council for the Exploration of the Sea (ICES) rectangle for UK and Isle of Man vessels (all vessel sizes).	MMO	2010 to 2022	• High confidence. • Finest available level of spatial resolution is by ICES rectangle. • Vessels ≤10 m are not required to complete logbooks, so may be under-represented within the data. • Duplication of species under different common names and grouping at higher taxonomic levels.
Landings statistics by port (all vessel sizes).	MMO	2010 to 2022	• High confidence. • Vessels ≤10 m are not required to complete logbooks, so may be under-represented within the data. • Landings into ports using this dataset cannot be filtered by ICES Rectangle and thus determine landings by ICES Rectangle into a specific port.
Landings statistics by ICES rectangle for European Union (EU) vessels (all vessel sizes).	EU Scientific, Technical and Economic Committee for Fisheries (EU STECF)	2006 to 2016	• Medium confidence. • Finest available level of spatial resolution is by ICES rectangle. • Data is provided by Member States - variable levels of confidence. • Lack of recent landings data. • Vessels ≤10 m are not required to complete logbooks, so may be under-represented within the data. • Duplication of species under different common names and grouping at higher taxonomic levels.
Vessel Monitoring Systems (VMS) data for UK and Isle of Man vessels (≥15 m).	MMO	2009 to 2020	• Medium confidence. • Finest available level of spatial resolution is by ICES sub-rectangle. • Uncertainty in exact position of fishing footprint due to resolution.

Title	Source	Year	Confidence level and limitations
			• Processing of the VMS data obtains a proxy of effort based on time, position, and a certain speed. However, vessel speed is not 100% accurate as an indicator of fishing activity, since it does not identify whether fishing is occurring or not. • Vessels <15 m are not included within the dataset.
VMS data for European[1] mobile bottom contacting gear vessels (>12 m).	ICES	2009 to 2020	• Medium confidence. • Finest available level of spatial resolution is by ICES sub-rectangle. • Uncertainty in exact position of fishing footprint. • Processing of the VMS data obtains a proxy of effort based on time, position, and a certain speed. However, vessel speed is not 100% accurate as an indicator of fishing activity since it does not identify whether fishing is occurring or not. • Vessels <12 m are not included within the dataset. • Data only for mobile bottom contacting gears. • Data is provided by Member States – variable levels of confidence. • Not inclusive of vessels from the Isle of Man.
UK Inshore Fishing Intensity.	Centre for Environment, Fisheries and Aquaculture Science (Cefas)	2010 to 2012	• Low level of confidence – based on surveillance and sightings data, so areas which were visited less often would result in lower confidence. • Considered to be a shorter study period for an assessment. • Data outdated. • Only vessels <15 m included.
ICES scallop assessment working group.	ICES	2019	• Low-medium confidence. • Data sources used by the scallop working group. – VMS data for vessels from England, Wales Scotland, Isle of Man, Guernsey and Jersey from 2009 to 2017. – VMS data for vessels from Northern Ireland from 2012 to 2016. – VMS data for vessels from Ireland for 2012 to 2019. • Polygon data based on VMS data, so activity from vessels <10 m may not be included

[1] This dataset was collated prior to the UK's withdrawal from the EU, so includes data from UK vessels.

Title	Source	Year	Confidence level and limitations
			(apart from vessels fishing for scallop within the Isle of Man territorial sea). • Preliminary maps, pending verification by the working group. • Towards the periphery of the polygons there may be limited fishing intensity. • Some of the defined polygons may have areas within them with zero or low VMS data which is not displayed.
Isle of Man pot hauls	Isle of Man Government, Department of Environment, Food and Agriculture (DEFA)	2010 to 2021	• Medium confidence. • Data has a limited spatial extent and limited resolution.
Isle of Man swept area	DEFA	2017 to 2023	• Medium confidence. • Based on EU VMS data merged with NestForms data. • Data has limited spatial extent.
Intertidal mussel and cockle landings data	NWIFCA	2017 and 2018 to 2023 and 2024	• High confidence. • Finest available level of spatial resolution is by mussel/cockle bed.
Summer, winter and spring Vessel Traffic Survey results	Nash Maritime	2022 to 2023	• Medium confidence. • Automatic Identification System (AIS) and radar data. • Limited by the short time period captured.

1.3 Desk study – baseline characterisation

1.3.1 Regional overview

1.3.1.1 Commercial fishing in the east Irish Sea region has a wide spatial distribution and targets a number of valuable fisheries for demersal, pelagic and shellfish species. Key shellfish species include; king scallop and queen scallop which are targeted by dredges; and whelk *Buccinum undatum*, lobster and crab, which are targeted by pots. The most important demersal target species include seabass *Dicentrarchus labrax*, sole *Solea solea*, thornback ray *Raja clavata* and plaice *Pleuronectes platessa*, which are typically caught by beam and otter trawlers. Pelagic fish landings from this area are mainly of herring *Clupea harengus* and mackerel *Scomber scombrus*, which are predominantly caught by pelagic trawls.

1.3.1.2 Landings data indicate that the east Irish Sea region is of importance to UK vessels nationalities, specifically Scottish landings from 36E5, Isle of Man landings from 37E5 and Northern Irish landings from 37E5 (MMO, 2023a).

1.3.1.3 EU landings data, sourced from the EU STECF dataset, indicate that non-UK fishing activity in the east Irish Sea region predominantly includes Belgian

trawlers targeting demersal species and Irish dredgers targeting king scallop. It is understood that Irish and French vessels hold historical access rights in the 6 to 12 nm zone, inshore of the Transmission Assets.

1.3.1.4 Up to 31 December 2020, commercial fisheries within UK waters, including the Irish Sea region, were managed through the EU Common Fisheries Policy, with fisheries of some stocks managed by the North East Atlantic Fisheries Commission and by coastal state agreements. Since the withdrawal of the UK from the EU on the 31 December 2020, the new EU-UK Trade and Cooperation Agreement stipulates that there will be a five-year transition phase, whereby 25% of the EU quota for British waters will be transferred to the UK fishing fleet.

1.3.2 Overview of the commercial fisheries study area

Transmission Assets

1.3.2.1 Fishing ports within the study area with the highest value (£) of landings are Fleetwood (UK mainland), Douglas, Peel, Port St Mary and Ramsey (Isle of Man) (further detail provided in **section 1.3.6**). Fishing vessels that are active in the study area are also based out of several ports across the wider region, including Annan (UK mainland), Kilkeel (UK mainland), Kirkcudbright (UK mainland) and Maryport (UK mainland); activity from these vessels is included in this technical report. Fleetwood and Lytham St Annes are the closest fishing ports to the landfall site, at 15.75 km and 7.6 km respectively. There are only eight vessels with Lytham St Annes as their home port, all of which are ≤10 m in length. There are 16 vessels with Fleetwood as their home port, eight of which are ≤10 m and eight of which are >10 m in length (MMO, 2024).

1.3.2.2 Within the study area, the key commercial fishing fleets identified were:

- dredging and trawling for king scallop and queen scallop;
- potting for whelk, crab and lobster;
- trawling for Norway lobster *Nephrops norvegicus (Nephrops);*
- beam trawling for flatfish and other demersal finfish; and
- trawling for herring.

1.3.2.3 Other important fisheries in the region include harvesting for cockles *Cerastoderma edule* and mussels *Mytilus edulis* within the shallow bays and traditional Brown shrimp (*Crangon crangon*) fisheries targeted by beam trawlers (Walmsley and Pawson, 2007). Harvesting for mussels within Morecambe Bay has been taking place for a number of years, and since 1992, Morecambe Bay has become one of the major sources of seed mussels within the UK (see **paragraph 1.3.5.23**).

1.3.2.4 A summary of each of the key regional fisheries is provided below.

Dredging and trawling for king scallop and queen scallop

1.3.2.5 Within the study area, Isle of Man and UK-registered scallop vessels from a variety of English, Welsh, Northern Irish, Scottish and Isle of Man ports are active. Vessels from the Republic of Ireland are active in this region, targeting both species of scallop, as well as whitefish and shellfish. Dutch vessels also catch king scallop within the study area. See **section 1.3.3** for more detail on landings by each nationality.

1.3.2.6 These species are primarily targeted using towed dredges and otter trawls, by vessels ranging in size from <10 m to 25 m length, withIsle of Man scallop vessels fishing with nets and lighter gears.

1.3.2.7 The scallop industry in the UK is one of the highest value commercial fisheries (Cappel *et al.*, 2018) and a large proportion of landings are caught in the Irish Sea. Scallop are a non-quota species and, therefore, not subject to Total Allowable Catch (TAC) limits (excluding in Isle of Man waters). However, there are technical management measures and minimum landings sizes (MLS) in place. There are restrictions on the number of dredges used, which depend on the distance from the coast. Beyond 12 nm, there are no regulatory limits on the maximum number of dredges permitted to be towed behind a vessel. Instead, the number of dredges is limited by the size and engine capacity of the fishing vessels. There are also seasonal closures within the Irish Sea for both king and queen scallop to protect the spawning periods, as outlined in **Table 1.2**.

Table 1.2: Seasonal closures of the scallop fisheries by administration

	King scallop closures	Area of closure	Queen scallop closure	Area of closure
England	1 June to 31 October	Irish Sea closed area.	1 April to 30 June	ICES area VIIa.
Isle of Man	1 June to 31 October	Isle of Man Territorial Sea.	1 April to 30 June	ICES area VIIa.
Wales	1 May to 31 October	Within 1 nm of the baseline and specified bays.	n/a	n/a

1.3.2.8 UK Scallop vessels deploying scallop gear operate all year-round and around the entire coastline of the UK. The UK scallop fleet is comprised of two main vessel size categories: a group of larger vessels (>15 m in length), which are nomadic and target scallop stocks around the UK; and a group of smaller local vessels (<15 m), which by virtue of their size, are more limited in their operational range than that of the larger nomadic vessels. The larger nomadic vessels are known to intensely fish an area until the scallop catch becomes unprofitable, with the vessels then moving onto new areas. Once scallop stocks have returned in an area previously exploited, to a level where dredging can once again become commercially viable, nomadic scallop fleets are known to return (a number of years later). Vessels from the larger nomadic scallop fleet may operate in a number of areas around the UK and are known to rotate between areas over a period of several years.

1.3.2.9 In addition to the nomadic scallop vessels, smaller local vessels are also known to target scallop. As these vessels are more limited in their operational range, they are more reliant on local grounds for the majority of their income when compared to the larger vessels. The catching capacity of these vessels is significantly lower than the large vessels due to the lower number of dredges that they can tow. Nomadic vessels from Scotland, Northern Ireland and England periodically target scallop grounds within the Irish Sea, with limited number of Welsh vessels also observed.

1.3.2.10 It has been established through the fisheries stakeholder consultation (summarised in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES) that there are approximately 11 vessels based in Kirkudbright, Scotland that fish for queen and king scallop within the study area; notably for queen scallop within the north west most part of the Offshore Order Limits. There are also Scottish scallop vessels active in the Irish Sea from Annan, and several large (14 to 24 m) Scottish nomadic vessels (Cappel *et al.*, 2018).

1.3.2.11 Feedback from stakeholder consultation has established that, at the time of writing, there are 55 vessels licenced to fish for king scallop in Isle of Man waters (29 of which are Isle of Man registered vessels) and 36 that can fish for queen scallops (25 of which are Isle of Man registered vessels). Due to the size and capacity of the Manx vessels, it is expected that the majority of these vessels will not fish beyond the Manx 12 nm. The majority of these vessels have a licence for both king and queen scallop. There are also multiple businesses on the Isle of Man which process scallops. Project specific consultation has established that Isle of Man vessels target queen scallop via the deployment of nets and lighter gear within Manx Territorial Waters, and king scallop via the deployment dredges within Manx Territorial Waters and areas beyond in UK waters. More information on the spatial distribution of scallop vessels licenced to operate in Manx waters in provided in **paragraph 1.3.7.19**.

1.3.2.12 A 2018 study found that in the Irish Sea, 59 vessels targeting scallop land into Northern Irish ports (Cappel *et al.*, 2018). However, it is unlikely that all these vessels are active within the study area, particularly given that 53% of the vessels are <12 m in length.

1.3.2.13 It has been established through the fisheries stakeholder consultation that has been undertaken to date that there are also several Irish vessels which are active in the area, predominantly between December to Spring (March to May).

1.3.2.14 Welsh vessels based in north Wales/Anglesey are also active in this region at certain times of year, transiting from scallop grounds off the Welsh coast (Cardigan Bay) to parts of the study area as/when market forces demand.

1.3.2.15 English scallopers, from as far as the south west region (Cornwall/Devon), also fish in these areas at times, in a similar, nomadic fashion to the Welsh vessels.

1.3.2.16 Whereas king scallop grounds are relatively extensive around the UK (WG SCALLOP, 2020), the major queen scallop beds are within the Irish Sea. Queen scallop are generally found in sandy gravelly substrates, whereas

king scallop can be found in coarser sediments. The biology and behaviour are different between the two species, and this is discussed further in Volume 2, Annex 3.1: Fish and shellfish ecology technical report of the ES. Generally, queen scallop are more mobile than king scallop, which influences the gear types used to catch them, as discussed in **section 1.3.6**. Further information on the spatial extent of these grounds is also discussed within this technical report (**sections 1.3.7** and **1.3.8).**

Potting for whelk, crab and lobster

1.3.2.17 Potting for whelk, crab (brown and spider crab) and lobster occurs across the study area (Walmsley and Pawson, 2007).

1.3.2.18 The whelk fishery in the Irish Sea has expanded significantly over the last two decades (Duncan and Emmerson, 2018). Whelk are landed all year round, and vessels operate across the inshore and offshore parts of the study area. Highest landings in terms of weight and value are generally during the summer months, which may be, partly, due to lower scallop vessel activity as a result of seasonal closures. Whelk operators land into both English and Welsh ports. MMO landings data indicate that vessels from Jersey, which predominantly targeted whelk, were active within the study area. However, such activity was observed at a relatively low level (**Figure 1.58**), and landings by Jersey vessels within the study area have not been observed since 2017 (MMO, 2023a).

1.3.2.19 It is evident through fisheries stakeholder consultation that one of the main whelk operators in the region is based out of Fleetwood and has four vessels that are active within the study area (including the Offshore Order Limits).

1.3.2.20 Lobster is generally caught close to the coast in rocky areas. Brown crabs are caught within both inshore and offshore parts of the study area.

1.3.2.21 There are no TACs or quotas for whelk, crab or lobster, however, all are subject to an MLS.

Trawling for *Nephrops*

1.3.2.22 The Irish Sea is an important fishing ground for *Nephrops* (also known as Norway lobster), particularly around the Irish and Cumbrian coast, and is targeted by a mix of both beam and otter trawls. Consultation undertaken with fisheries stakeholders to date has indicated that while there are *Nephrops* fisheries within the study area, none have been noted within the Offshore Order Limits. The *Nephrops* fishery is mostly targeted by Northern Irish and Scottish vessels or local English vessels.

1.3.2.23 *Nephrops* are subject to TACs, based on the aggregate total tonnage of removals recommended by relevant ICES Working Groups for separate ICES rectangles. There are byelaws which restrict the type of trawl that can be used for catching *Nephrops*, as well as restrictions on vessel specifications (e.g. engine size and vessel length).

Beam trawling for flatfish

1.3.2.24 The Irish Sea has been an important traditional fishing ground for beam trawl vessels for many decades (North Western Waters Advisory Council (NWWAC), 2013). Flatfish, specifically sole, are the main catch for these vessels. Through consultation with fisheries stakeholders, it has been established there are several large Belgian beam trawl vessels, and one vessel from the south west of England, that are active in this area. The grounds targeted for flatfish are generally within the north east part of the Offshore Order Limits, while also further to the east, and are fished during the Spring period (March to May).

1.3.2.25 There are TACs in place for sole, and ICES stock assessments highlight that sole stocks have increased in the Irish Sea over recent years (ICES, 2021a).

Trawling for demersal finfish

1.3.2.26 Seabass *Dicentrarchus labrax*, is a key target demersal finfish species, typically caught by beam and otter trawlers within The Irish Sea. Catch limits and seasonal restrictions during February and March apply to fishing for bass in the Irish Sea within the 12nm limit. Other commercially important demersal finfish within the region include hake *Merluccius merluccius* and Gadiformes such as cod, haddock, whiting and pollock. In the Irish Sea cod stocks are currently in recovery. This species is managed as a by-catch only species and cannot be directly targeted, however trawling for *Nephrops* and haddock fisheries still present a key risk to the population of cod.

Trawling for herring

1.3.2.27 The Irish Sea herring fishery is in the region around the Isle of Man. Herring are targeted by a mix of gear types, including mid-water trawls, pelagic trawls, and purse seine nets. Within inshore waters, gillnets may also be used to catch herring. Consultation with fisheries stakeholders indicated there are at least three pelagic trawlers from Northern Ireland, and two from England, that mostly engage in the herring fishery in the study area.

1.3.2.28 Following the collapse of the herring stocks in the Irish Sea during the 1980s, annual closures have been brought in to protect spawning and nursery grounds. The Douglas Bank area (south and east of the Isle of Man) is closed between 21 September and 15 November, although gill nets are excluded from this.

1.3.2.29 Herring is subject to TACs, and ICES advice recommends a 15% increase in the TAC for 2022 (ICES, 2021b). Since Brexit, the UK has gained a greater share in the Irish Sea herring quota. Following engagement between the Isle of Man Government, MFPO and the UK Government, a new deal has been agreed that allows for commercially viable quantities of herring to be caught by Isle of Man vessels within Manx territorial waters. The Isle of Man has been allocated 100 t of annual quota for herring from 2023. The Isle of Man has also been allocated a 100 t annual quota for *Nephrops*, from 2024. This agreement will allow the Manx fishery to diversify and become less commercially reliant upon scallop.

Morgan Offshore Wind Project: Generation Assets

1.3.2.30 The study area within the commercial fisheries technical report prepared for the Morgan Offshore Windfarm: Generation Assets is the same as the study area for the Transmission Assets (i.e. both projects define their study area by ICES Rectangles 36E5, 36E6, 37E5 and 37E6 (**Figure 1.1**)). There is no additional information within **Appendix A** not already covered in this commercial fisheries technical report for the Transmission Assets.

1.3.2.31 Full details of the Morgan Offshore Windfarm: Generation Assets commercial fisheries baseline environment is presented in **Appendix A** (Morgan Offshore Wind Limited, 2024).

Morecambe Offshore Windfarm: Generation Assets

1.3.2.32 Two scales of Morecambe Offshore Windfarm: Generation Assets commercial fisheries study areas are defined within **Appendix B**, which are as follows.

- The Morecambe Offshore Windfarm: Generation Assets is entirely located within ICES rectangle 36E6, which represents the local Morecambe Offshore Windfarm: Generation Assets commercial fisheries study area (Figure 2.1, Morecambe Offshore Windfarm Limited, 2023).
- To understand fishing activity in waters adjacent to the Morecambe Offshore Windfarm: Generation Assets, a regional commercial fisheries study area has been defined to include 36E6 together with surrounding ICES rectangles 37E6, 37E5, 36E5, 35E5 and 35E6 (Figure 2.2, Morecambe Offshore Windfarm Limited, 2023).

1.3.2.33 The Morecambe Offshore Windfarm: Generation Assets regional commercial fisheries study area differs slightly to that of the Transmission Assets and Morgan Offshore Wind Project: Generation Assets commercial fisheries study areas, where in addition to ICES rectangles 36E5, 36E6, 37E5 and 37E6, two additional ICES rectangles have been included, 35E5 and 35E6.

1.3.2.34 Despite this, key commercial fishing fleets identified within the Transmission Assets study area (discussed below) remain the same as those identified within **Appendix B**.

1.3.2.35 Full details of the Morecambe Offshore Windfarm: Generation Assets baseline environment is presented in **Appendix B** (Morecambe Offshore Windfarm Limited, 2024).

1.3.3 Overview of landings

Transmission Assets

1.3.3.1 A total of 168,145 t was landed by English, Isle of Man, Northern Irish, Scottish, Welsh and Jersey vessels across the study area (ICES rectangles 36E5, 36E6, 37E5 and 37E6), from 2012 to 2022, with Scottish vessels landing the largest proportion of total weight of fish caught by UK vessels (**Figure 1.2**) (MMO, 2023a).

1.3.3.2 A total of 7,492 t was caught by Belgian, French, Irish and Dutch vessels across the study area, between 2006 and 2016, with Irish vessels landing the largest proportion of total weight of fish caught by non-UK / non-Isle of Man vessels (**Figure 1.3**). The non-UK / non-Isle of Man vessels were active across the study area, although no nearshore activity was recorded for French vessels in rectangles 36E5, 37E5 and 37E6; or for Dutch vessels in rectangles 36E6, 37E5 and 37E6 (EU STECF, 2017).

1.3.3.3 Data assessed in this study was divided into classes, dependent on the length of the fishing vessel: ≤10 m and >10 m for the MMO data; <10 m, 10 to 15 m and >15 m for the EU STECF data. As expected, for UK and Isle of Man vessels, the largest proportion of vessels was from the >10 m class (**Figure 1.2**). The smaller vessels (≤10 m) were predominantly from the Isle of Man only, reflecting the closer proximity of home ports to these fleets, with relatively small recordings of landings for Scottish, Welsh and Northern Irish vessels (**Figure 1.2**).

1.3.3.4 Due to the distance from their home ports and the capabilities of the vessels, no non-UK vessels <10 m were active within the study area and the largest proportion of vessels was from the >15 m size class during the study period (**Figure 1.3**). The sum of landed weights across 2006 to 2016 for Belgian, Irish and Dutch vessels of 10 to 15 m were much smaller compared to total landings recorded by UK and Isle of Man vessels during 2012 to 2022 (**Figure 1.3**).

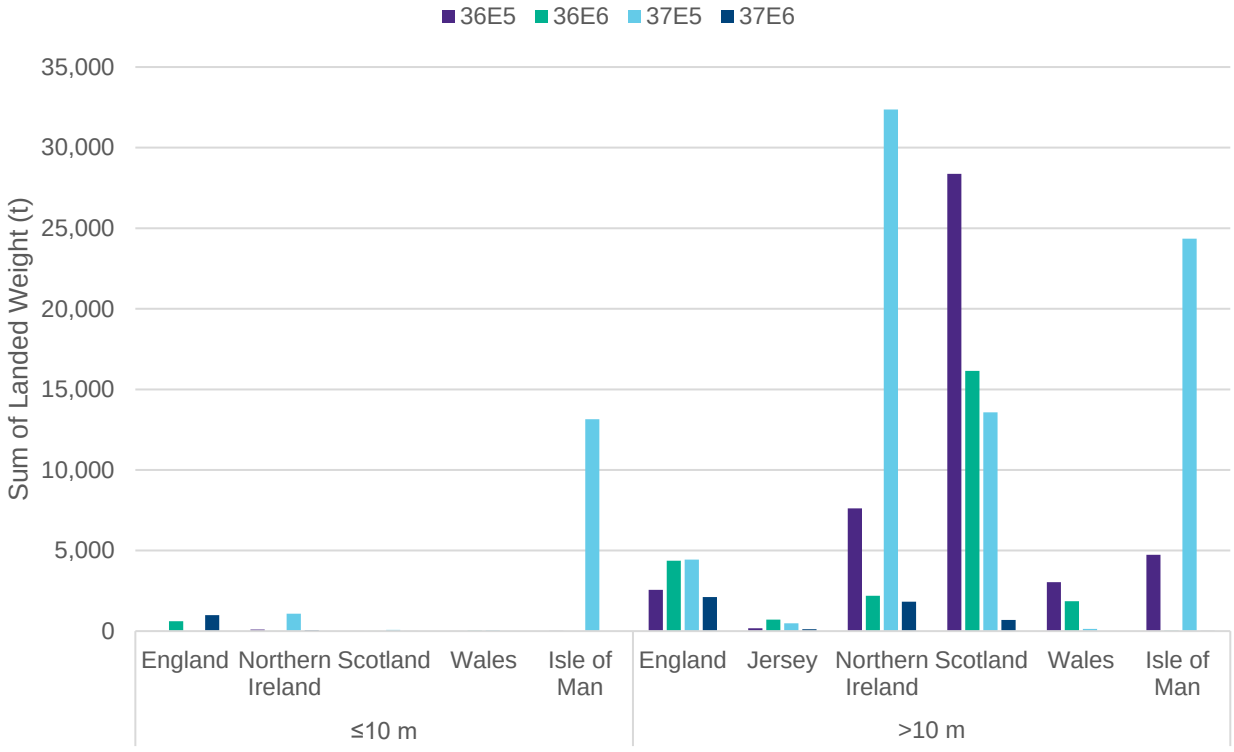


Figure 1.2: Sum of landed weight by vessel size class (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

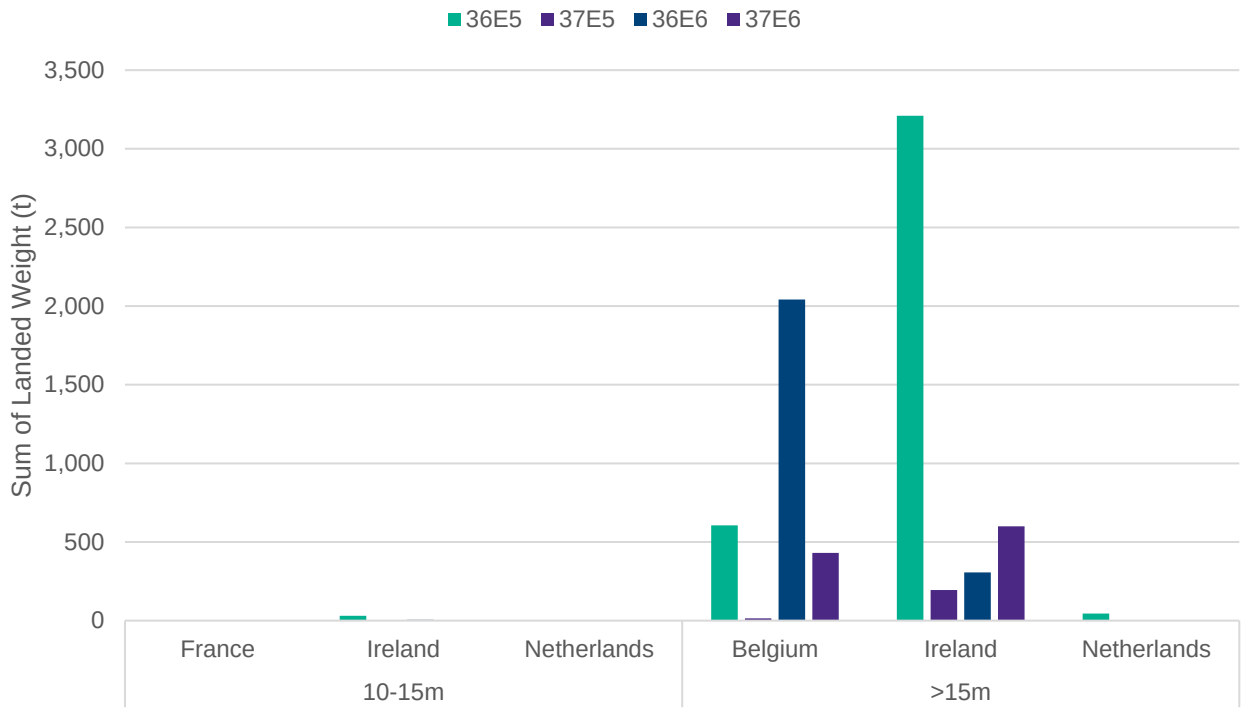


Figure 1.3: Sum of landed weight by vessel size class (2006 to 2016) within the Transmission Assets commercial fisheries study area (non-UK vessels) (Source: EU STECF, 2017)

1.3.4 Overview of temporal variation

Transmission Assets

Annual trends

1.3.4.1 The MMO data show that between 2012 and 2022, the sum of landed weight by UK and Isle of Man vessels across the study area decreased from a maximum of 25,842 t in 2012 to a minimum of 7,600 t in 2020 (**Figure 1.4**). The sum of landings value varied from a minimum of £11,400,194 in 2020, to a maximum of £26,450,826 in 2016 (**Figure 1.5**). Annual trends are discussed in more detail by key species in **section 1.3.5**.

1.3.4.2 The EU STECF data shows that between 2006 and 2016, the sum of landed weight by non-UK vessels across the study area reduced from a maximum of 1,097 t in 2006 to a minimum of 483 t in 2014, with a continued decreasing average trend to 2021 (**Figure 1.6**).

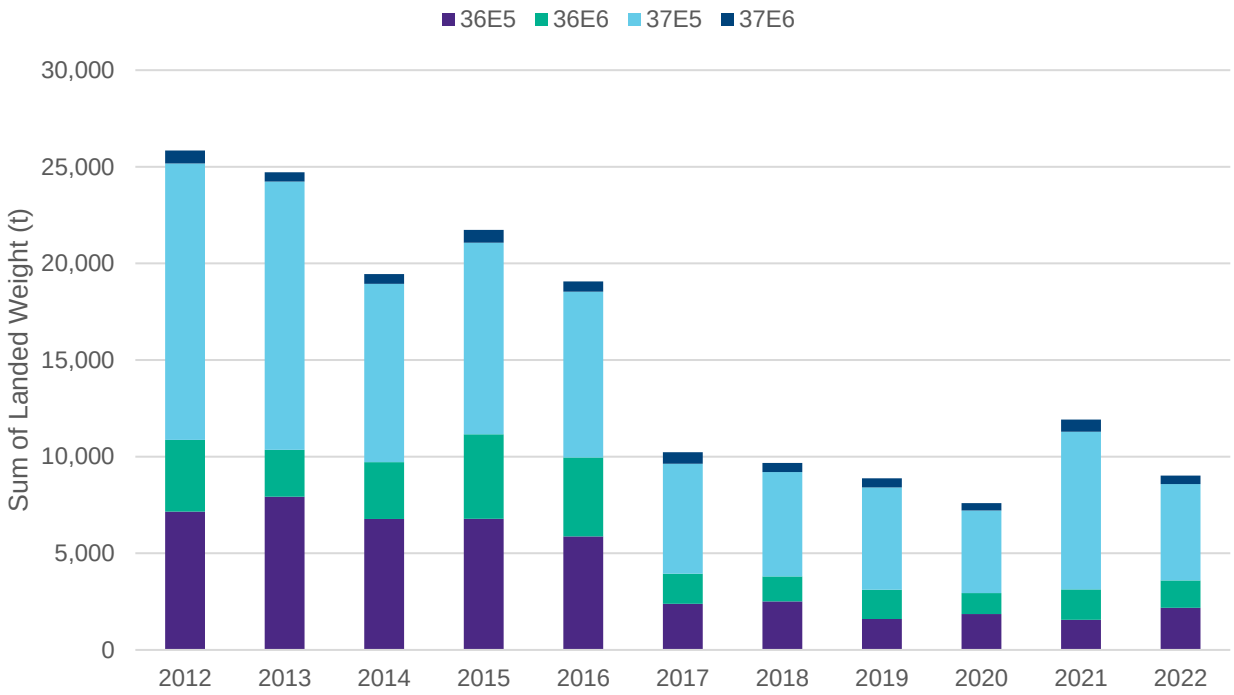


Figure 1.4: Annual trends in landings weight (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

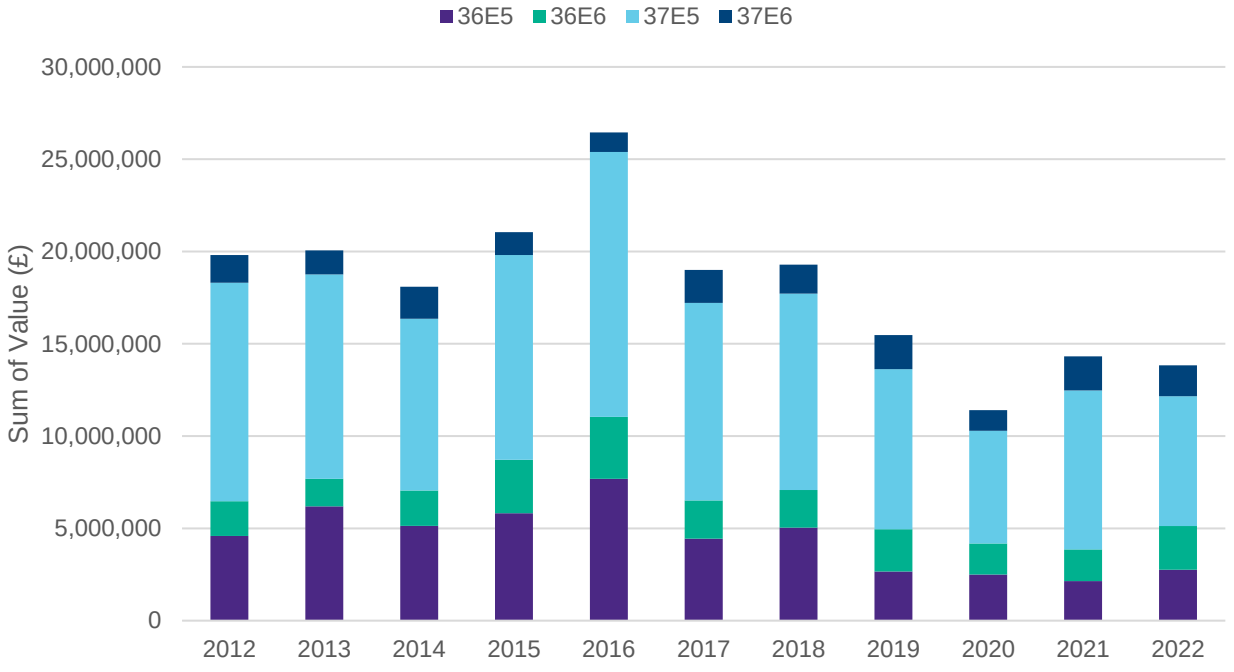


Figure 1.5: Annual trends in sum of landings value (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

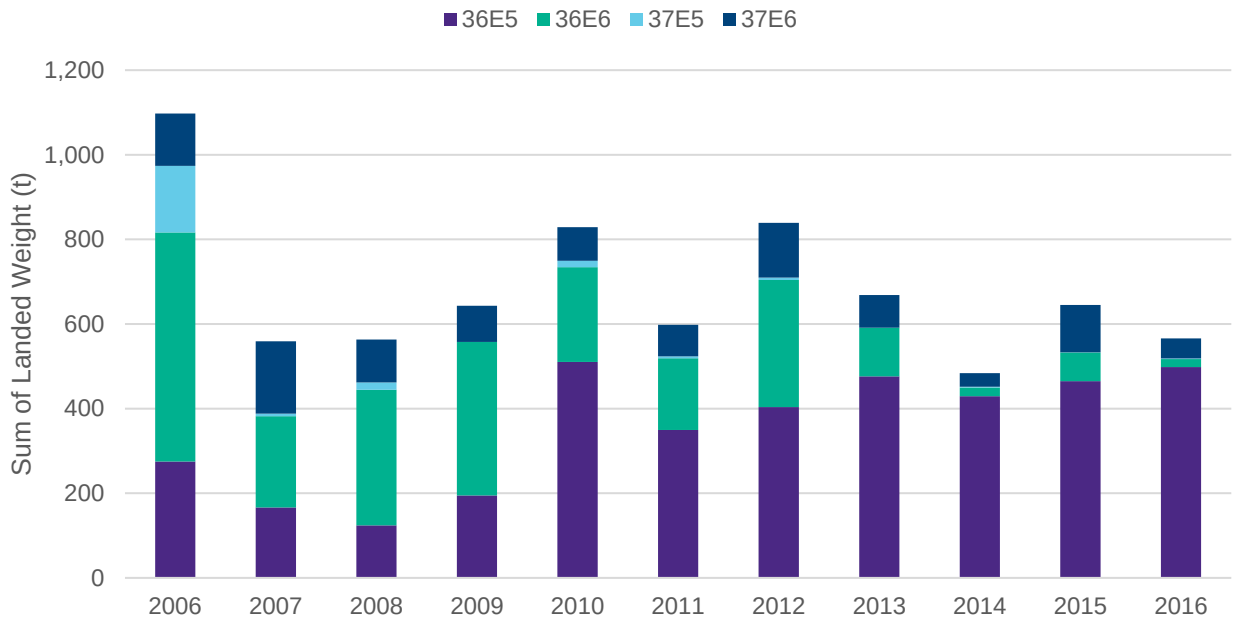


Figure 1.6: Annual trends in sum of landed weight (2006 to 2016) within the Transmission Assets commercial fisheries study area (non-UK vessels) (Source: EU STECF, 2017)

Seasonal trends

1.3.4.3 Across the study area, the seasonal (intra annual) range in landed weight (2012 to 2022) by UK and Isle of Man vessels varied from 7,334 t in June to 32,532 t in September (**Figure 1.7**).

1.3.4.4 The landed value followed a similar trend for UK and Isle of Man vessels, with the minimum value of £8,661,552 in June and maximum value of £26,735,285 in November (**Figure 1.8**). With respect to individual rectangles, 37E5 mirrored the overall trend, with peak landings in September and November. Peak landed values were observed in March and November for rectangle 36E5, and 36E6 and 37E6 experienced relatively lower and consistent levels of landings throughout all months. There were lower landings by UK and Isle of Man vessels in June and October, also reflected in the landed weight (**Figure 1.8**), which is likely due to seasonal queen scallop closures in the area.

1.3.4.5 It is noted that some fish species are worth more than others, explaining why slightly different peak months can be observed between **Figure 1.7** and **Figure 1.8** (i.e. king scallop, weight for weight is of a higher value than herring, with both species differing in key periods for highest landings). Seasonal trends are discussed in more detail by key species in **section 1.3.5**.

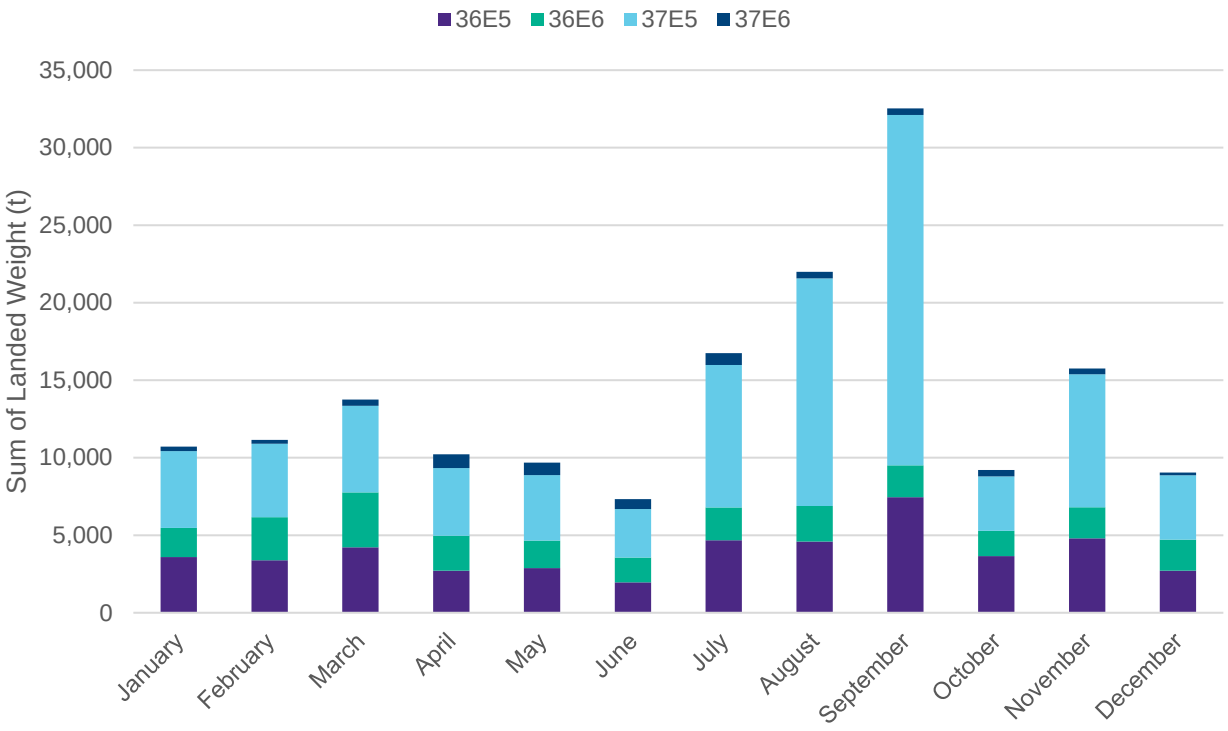


Figure 1.7: Seasonal trends in sum of landed weight (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

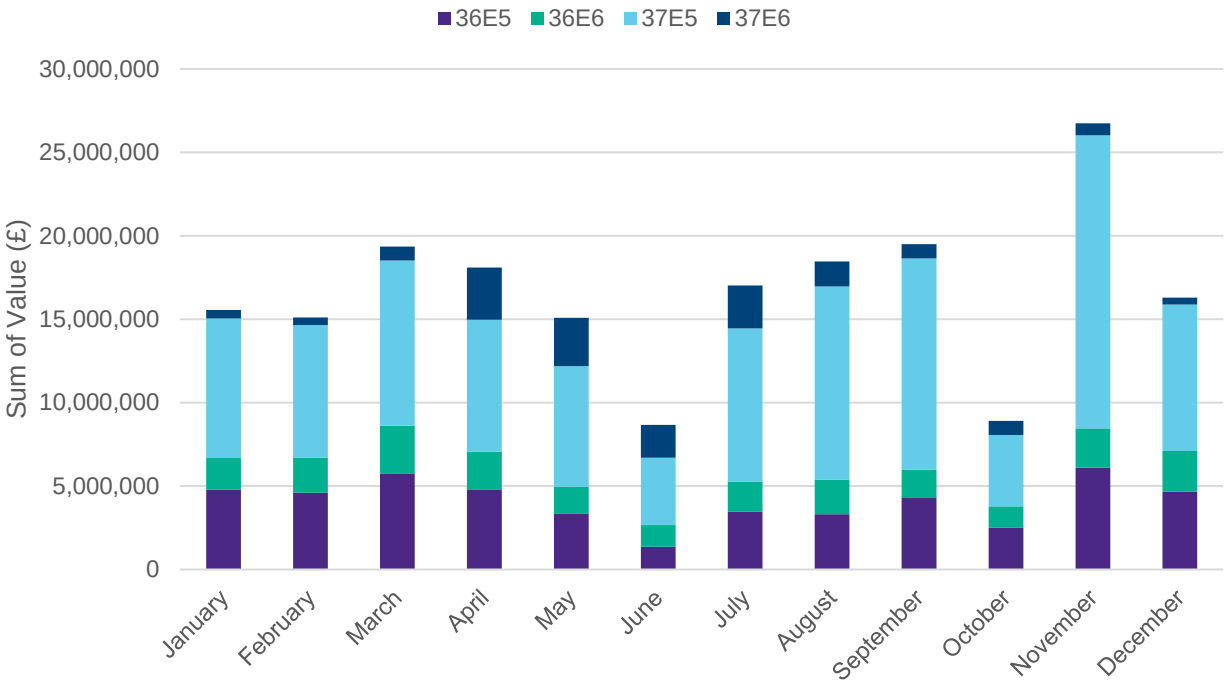


Figure 1.8: Seasonal trends in sum of landed value (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

1.3.4.6 Across the study area, the seasonal (intra-annual) range in landed weight (2006 to 2016) by non-UK vessels varied from 838 t during July to September to 2,615 t from January to March (**Figure 1.9**). With respect to individual rectangles, 36E5 and 36E6 mirrored the overall trend with peak landings in January to March, April to June and October to December, whereas 37E5 and 37E6 experienced consistently low levels of landings throughout all quarters. There were lower landings by non-UK vessels between July and September, which was likely due to seasonal scallop closures in the area.

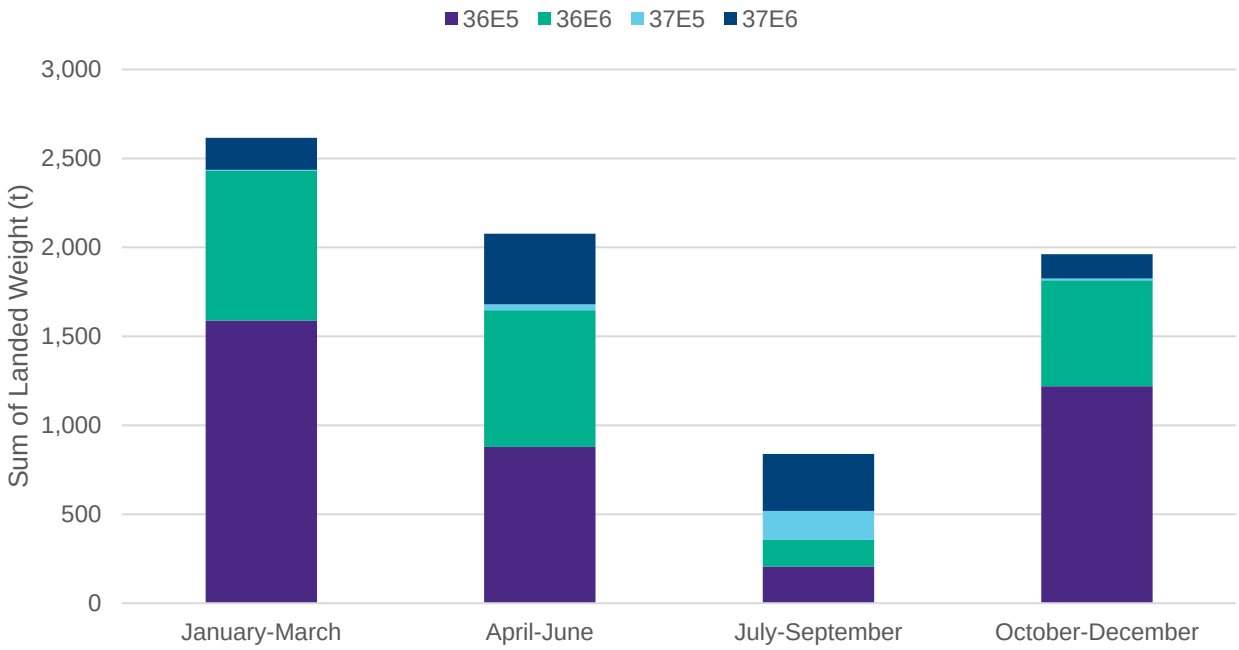


Figure 1.9: Seasonal trends in sum of landed weight (2006 to 2016) within the Transmission Assets commercial fisheries study area (non-UK vessels) (Source: EU STECF, 2017)

1.3.5 Species

Transmission Assets

1.3.5.1 The MMO and EU STECF datasets were used to determine the most important species groups and species for UK and Isle of Man, and non-UK / non-Isle of Man vessels within the study area. Due to the different formats between the two datasets, they are not directly comparable. The EU STECF data does not provide information on species group, so this is only presented for UK and Isle of Man vessels using the MMO data.

Species landed by UK and Isle of Man vessels

1.3.5.2 Shellfish was the most important species group in terms of landed weight and value for UK and Isle of Man vessels (**Figure 1.10** and **Figure 1.11**), with the highest landings from ICES rectangle 37E5. Landings of demersal and pelagic species were significantly lower than shellfish.

1.3.5.3 The top 15 species (by landed weight and value) caught by UK and Isle of Man vessels from the study area are presented in **Figure 1.12** (2012 to 2022).

1.3.5.4 King scallop, queen scallop, *Nephrops*, whelk and herring were the top five species in terms of landed value. In terms of landed weight, queen scallop, king scallop, herring, whelk and crab (mixed species) were the top 5. This reflects the importance of crab (mixed species, but predominantly brown crab) and lobster, which was the next most important species by landed weight, to some smaller, inshore vessels. The greatest total weight landed over the time period was from queen scallop, whereas the greatest total value was from king scallop.

1.3.5.5 An overview of the top five key species, in terms of landed value, is presented in **Table 1.3**.

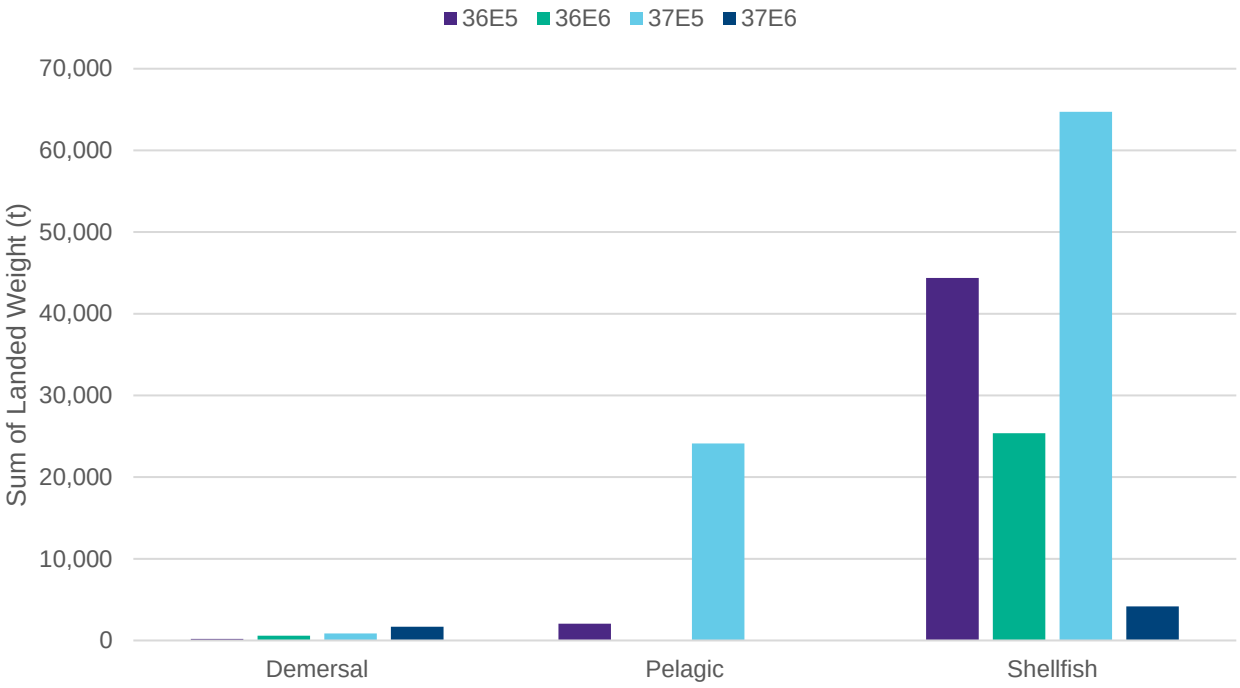


Figure 1.10: Sum of landed weight within the Transmission Assets commercial fisheries study area (2012 to 2022), displayed by species group (UK and Isle of Man vessels) (Source: MMO, 2023a)

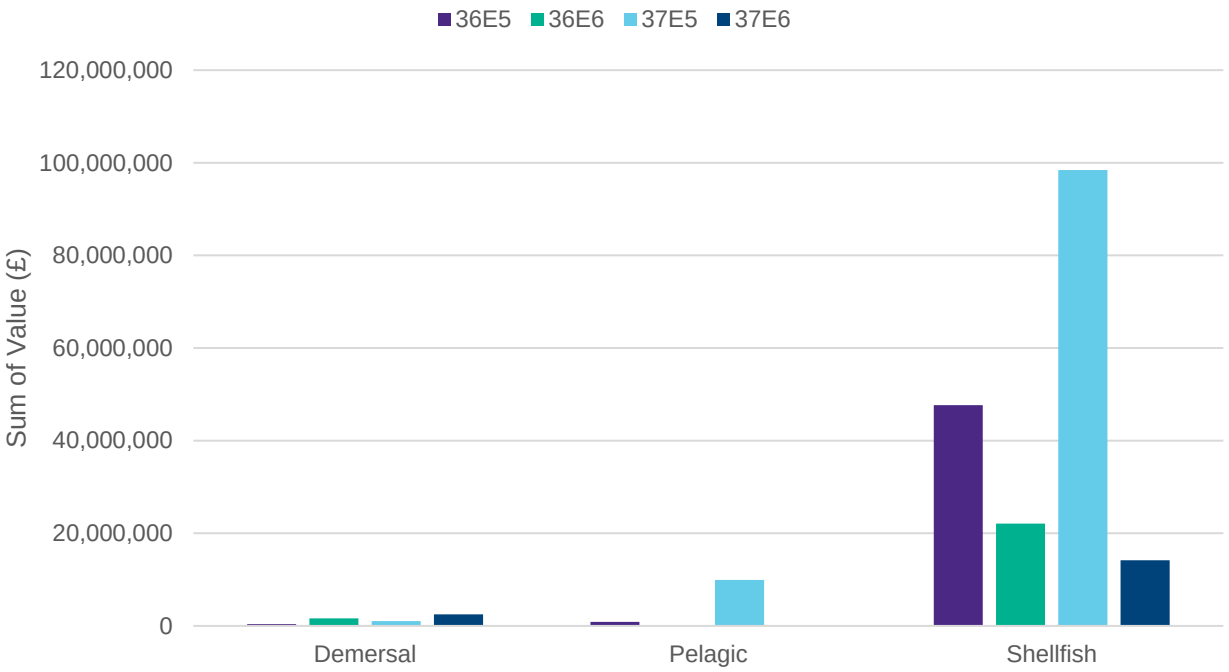


Figure 1.11: Sum of landed value within the Transmission Assets commercial fisheries study area (2012 to 2022), displayed by species group (UK and Isle of Man vessels) (Source: MMO, 2023a)

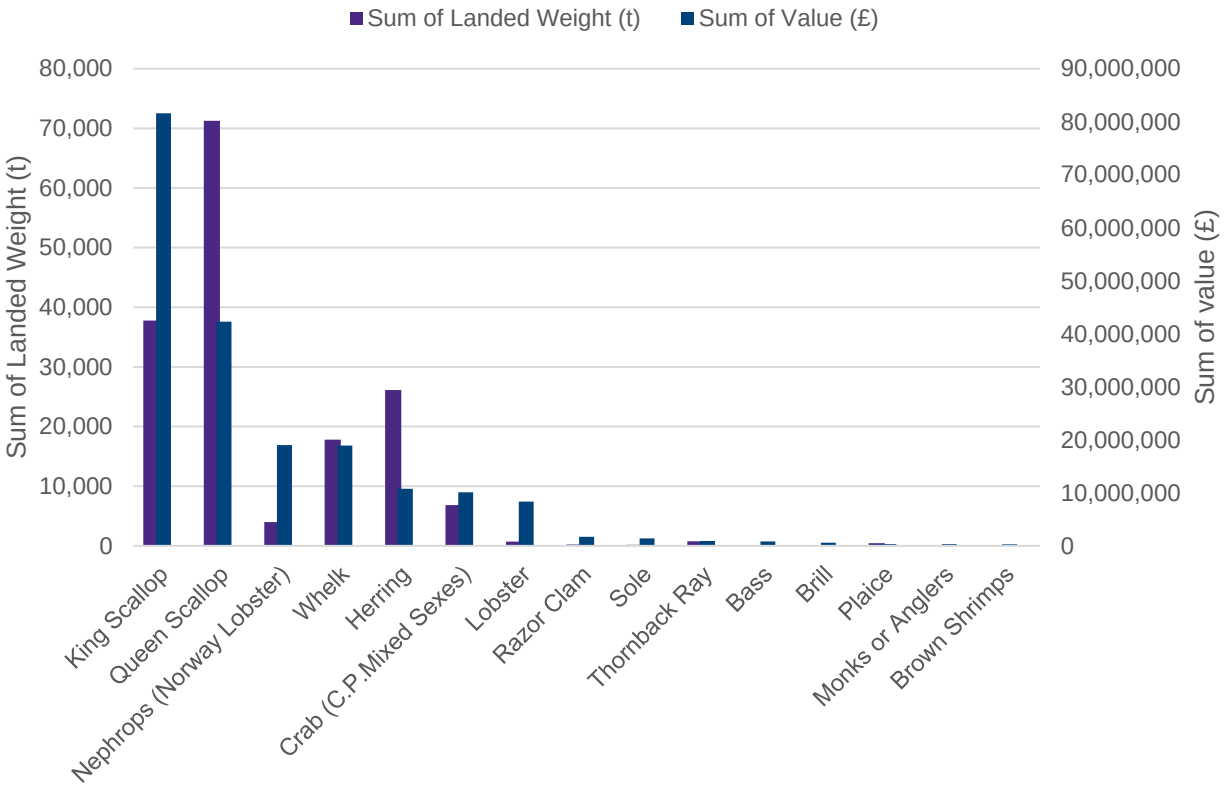


Figure 1.12: Sum of landed weight and value within the Transmission Assets commercial fisheries study area (2012 to 2022), for the top 15 species (UK and Isle of Man vessels) (Source: MMO, 2023a)

Table 1.3: Overview of the top five key species in terms of landed value targeted within the Transmission Assets commercial fisheries study area between 2010 to 2021 (UK Vessels and Isle of Man vessels)

Species	Latin name	Gear type	Vessel size	Seasonality
King scallop	*Pecten maximus*	Scallop dredge	>10 m	King scallop landings are generally highest during November. Fishery closed between 1 June and 31 October.
Queen scallop	*Aequipecten opercularis*	Scallop dredge or otter trawl	>10 m	Queen scallop landings are generally highest between July and September. Fishery closed between 1 April and 30 June.
Whelk	*Buccinum undatum*	Pot/trap	>10 m and ≤10 m	Whelk landings are higher in the summer but caught all year around.
Herring	*Clupea harengus*	Pelagic trawls or purse seine nets	>10 m	Herring landings are highest during August to October. Douglas Bank closure 21 September to 15 November.
Norway lobster	*Nephrops*	Pot/trap or bottom trawls	>10 m and ≤10 m	*Nephrops* landings are higher in the summer but caught all year around.

King scallop

1.3.5.6 King scallops are most commonly found in areas of optimum bivalve feeding conditions, where fine gravel and sand exposed to water currents are present. King scallops achieve reproductive maturity between three to five years, live to 10 to 15 years and are most abundant in depths of 20 to 70 m (Cappell *et al*., 2018; Howarth and Stewart, 2014; Salomonsen *et al*., 2015). Recruitment is generally perceived as unpredictable due to the dependency on larval production and spawning, as well as the transportation of larvae to areas optimum for development (Delargy *et al*., 2019). King scallop fisheries in the UK and Isle of Man are strictly regulated through the utilisation of gear restrictions, minimum legal landing sizes, effort controls and seasonal closures, as described in **section 1.3.2**.

1.3.5.7 As discussed in **paragraph 1.3.2.8**, the UK and Isle of Man scallop fleet is comprised of two main vessel size categories: a group of larger vessels (≥15 m in length), which are nomadic and target scallop stocks around the UK; and a group of smaller local vessels (<15 m), which by virtue of their size, are more limited in their operational range than that of the larger nomadic vessels. The larger nomadic vessels are known to intensely fish an area until the scallop catch becomes unprofitable, with vessels then moving onto new areas, and later revisiting once stock levels have returned. Vessels from the larger nomadic scallop fleet may operate in a number of areas around the UK and are known to rotate between areas over a period of several years.

1.3.5.8 Over the period 2012 to 2022, king scallop landings by weight within the study area were greatest from November to May (**Figure 1.13**), with a landed weight range across these months from 3,528 to 9,168 t. Landed weight of king scallop within the study area, across the 2012 to 2022 period, was highest in 2016 (5,573 t) , and lowest in 2020 (2,010 t) (**Figure 1.14**) in ICES Rectangle 37E5. Limited dredging occurred from June to October for all years, due to the king scallop seasonal closure during these months (June to October, **Table 1.3**).

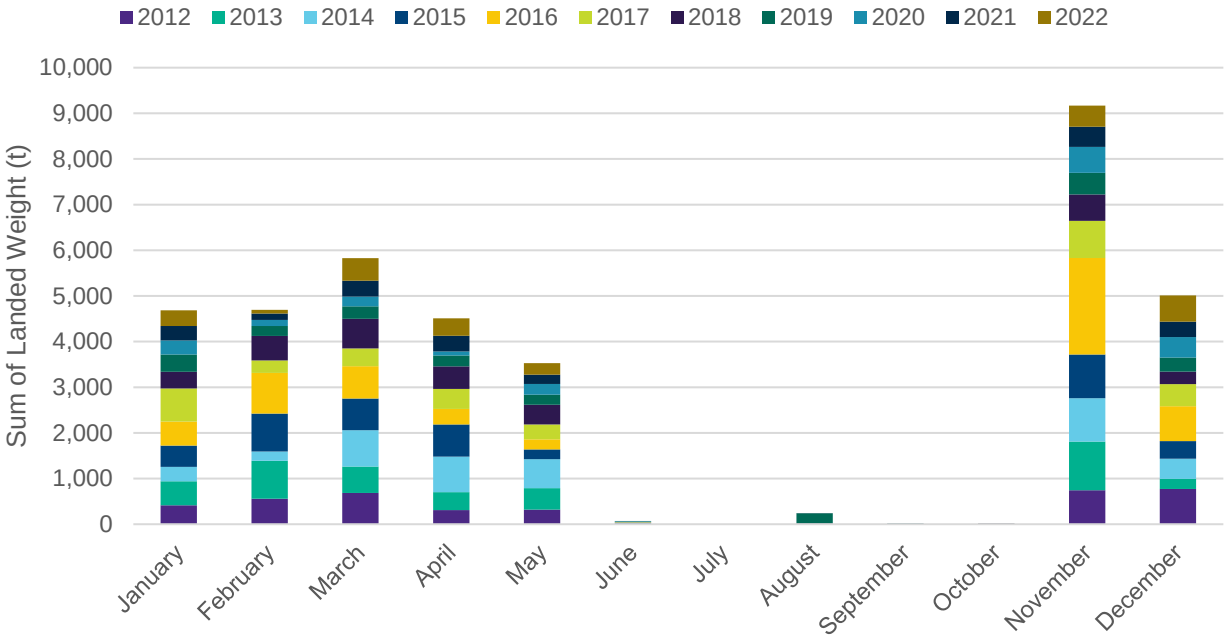


Figure 1.13: Seasonal trends of landed weight (t) of king scallop (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

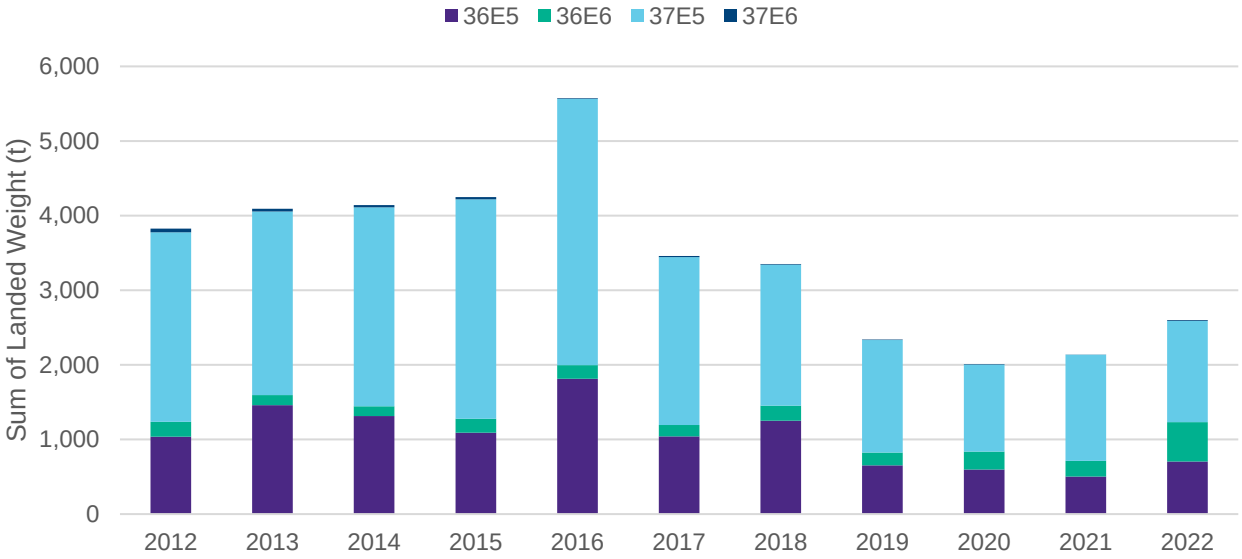


Figure 1.14: Annual trends of landed weight (t) of king scallop (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

Queen scallop

1.3.5.9 Queen scallops are dredged commercially throughout UK waters, with particularly commercially important grounds located around the Isle of Man. Queen scallop can be found in high densities within gravel or sand substrates, at depths of up to 100 m.

1.3.5.10 Key differences can be noted between queen and king scallop, where queen scallop possess two distinctive curved shells, the king scallops upper shell is almost flat, and queen scallop are typically smaller in size. Landings of queen scallop in the UK tend to be less valuable and more variable than king scallop.

1.3.5.11 The most important months for landings of queen scallop during the period 2012 to 2022 were July, August and September, with a landed weight range across these months from 10,089 to 12,069 t (**Figure 1.15**). Landed weight of queen scallop across the 2012 to 2022 period indicate a peak in 2016, with landed weights from 2018 to 2022 observed to be notably lower (**Figure 1.16**).

1.3.5.12 The no landings of queen scallop were recorded in the month of May throughout years 2016 to 2022. Out of the months where landings were recorded, minimum landings were observed during April 2017 at 0.72 t and maximum landings during July 2013 at 2,642 t. A notable lack of landings can be observed between April to June in recent years, attributed to the 2018 introduction of seasonal closures for queen scallop in the Irish Sea (**Figure 1.15**).

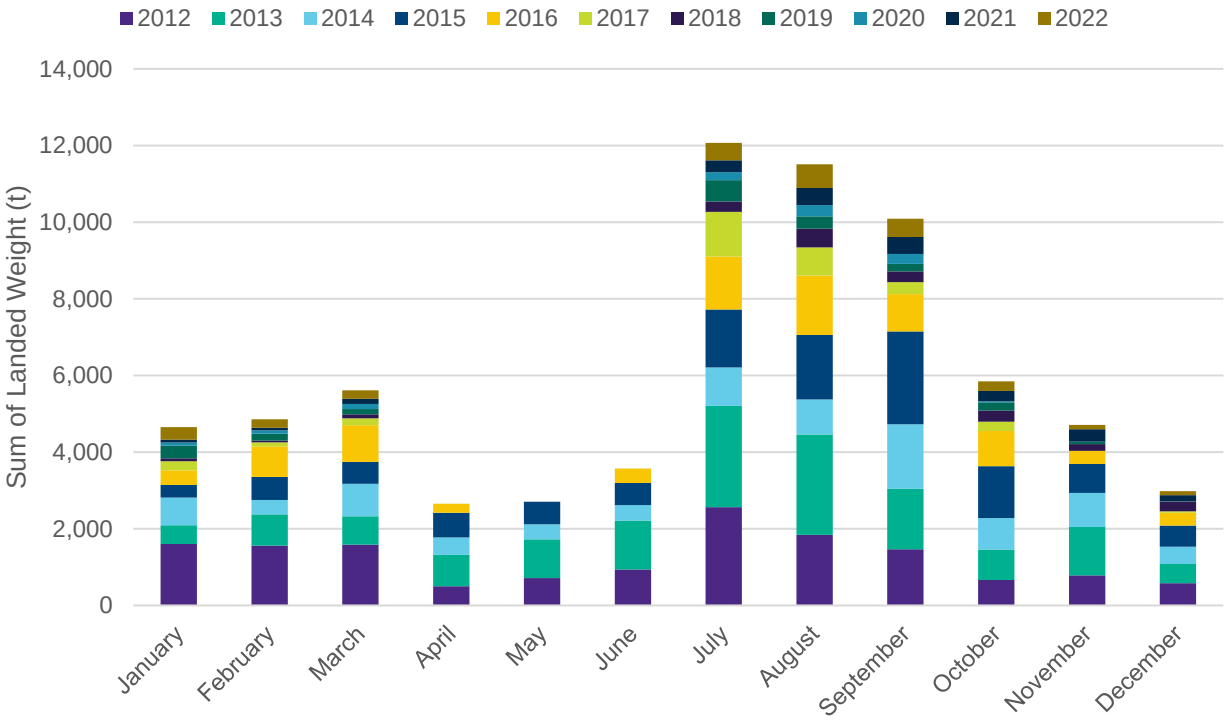


Figure 1.15: Seasonal trends of landed weight (t) of queen scallop (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

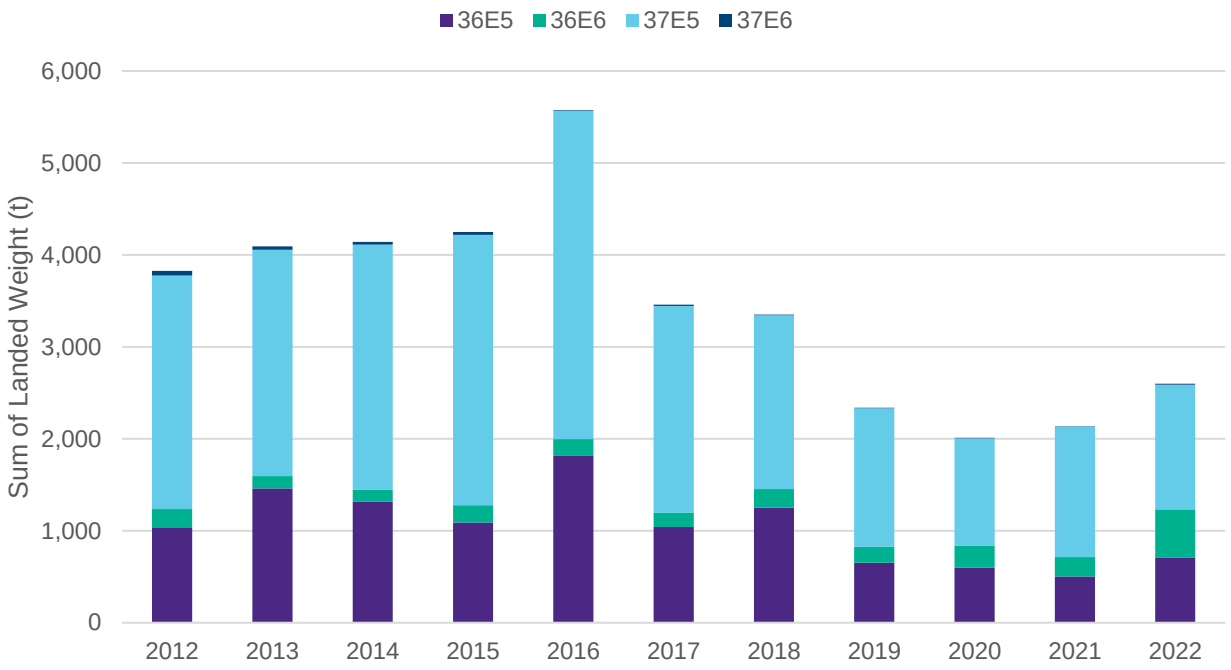


Figure 1.16: Annual trends of landed weight (t) of queen scallop (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2022a)

Whelk

1.3.5.13 Whelk are most abundant at water depths between 0 and 50 m and in habitats of mixed sediments. Depending on their environmental conditions and geographical location, whelk tend to achieve reproductive maturity at two to three years, grow to 150 mm and live for up to 15 years. A whelks life cycle does not consist of a pelagic phase, instead internally fertilised eggs are laid upon hard substrates, where juveniles emerge after three to five months.

1.3.5.14 Whelk landings, in terms of weight, over the period 2012 to 2022, were most prominent during April to August inclusive, with a landed weight range across these months from 1,761 to 2,326 t (**Figure 1.17**). Whelk landings, in terms of weight, were notably higher during April and May 2019 (312 t) and predominantly from ICES Rectangle 37E5. Landed weight of whelk was notably higher in 2016, and lower from 2019 to 2021. The minimum landed weight of whelk occurred in December 2012 (19 t) and January 2013 (18 t) (**Figure 1.18**).

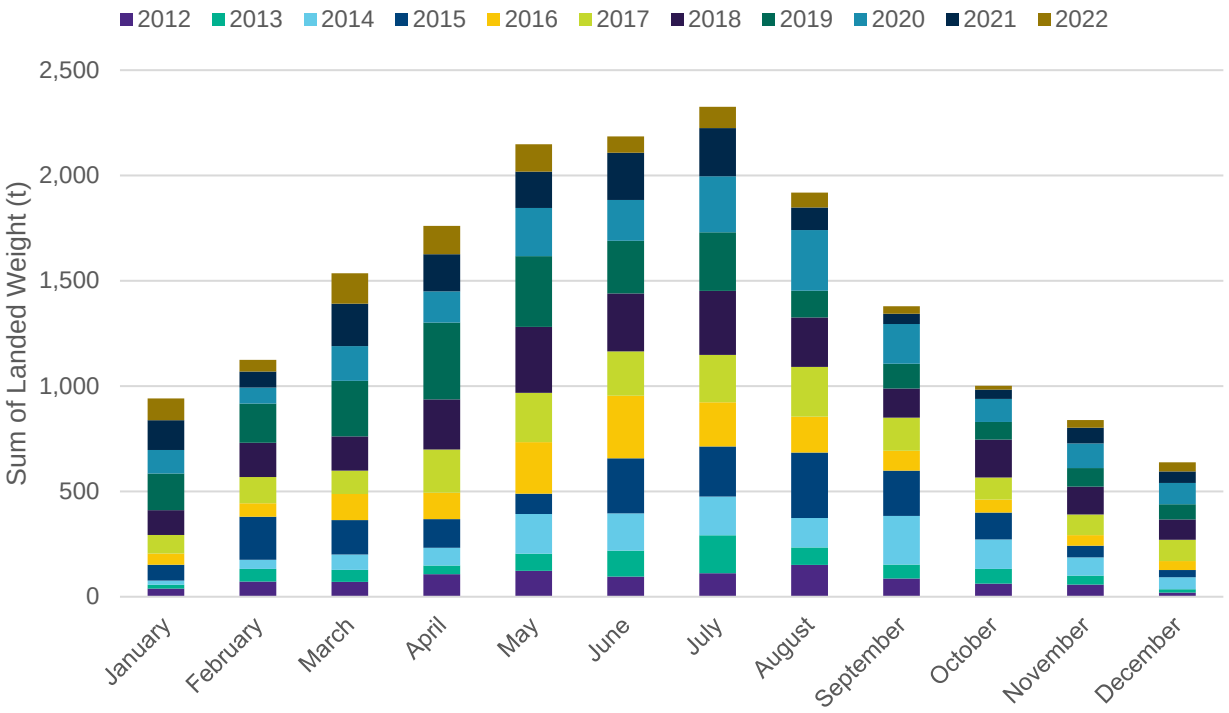


Figure 1.17: Seasonal trends of landed weight (t) of whelk (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

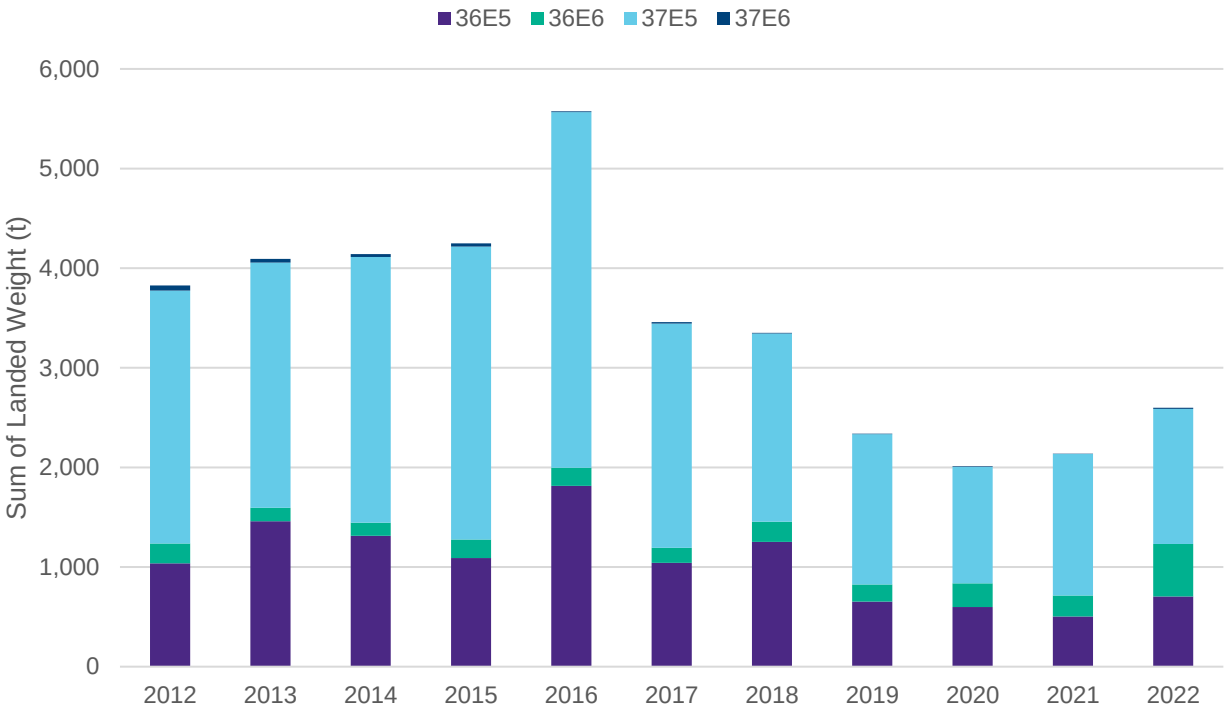


Figure 1.18: Annual trends of landed weight (t) of whelk (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

Nephrops

1.3.5.15 *Nephrops* are decapod crustaceans that can typically be found in soft sediments within shallow burrows. Unlike the edible crab, *Nephrops* do not undertake large migrations and have displayed territorial behaviour.

1.3.5.16 *Nephrops* landings, in terms of weight over the period 2012 to 2022, have declined since 2016 but were most prominent during April to May and July (**Figure 1.19**), and in ICES Rectangle 37E5, although this species is landed all year round(**Figure 1.20**) . The minimum of 0 t occurred in December 2014.

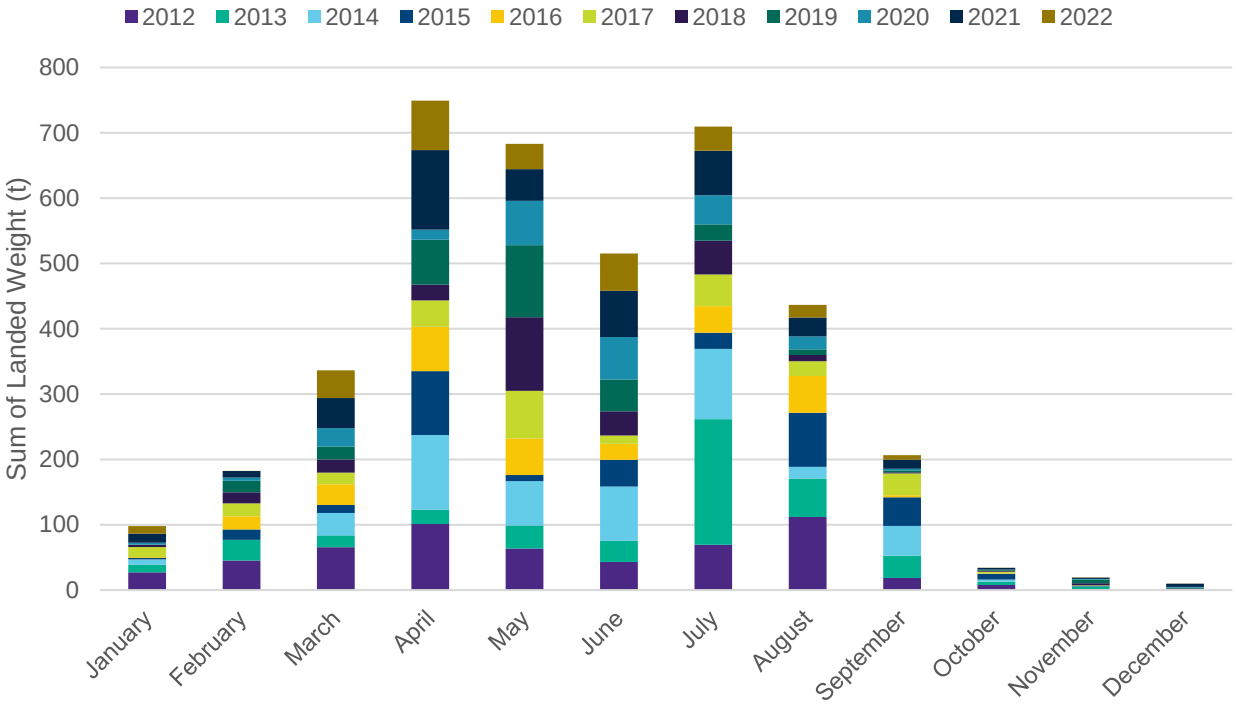


Figure 1.19: Seasonal trends of landed weight (t) of *Nephrops* (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

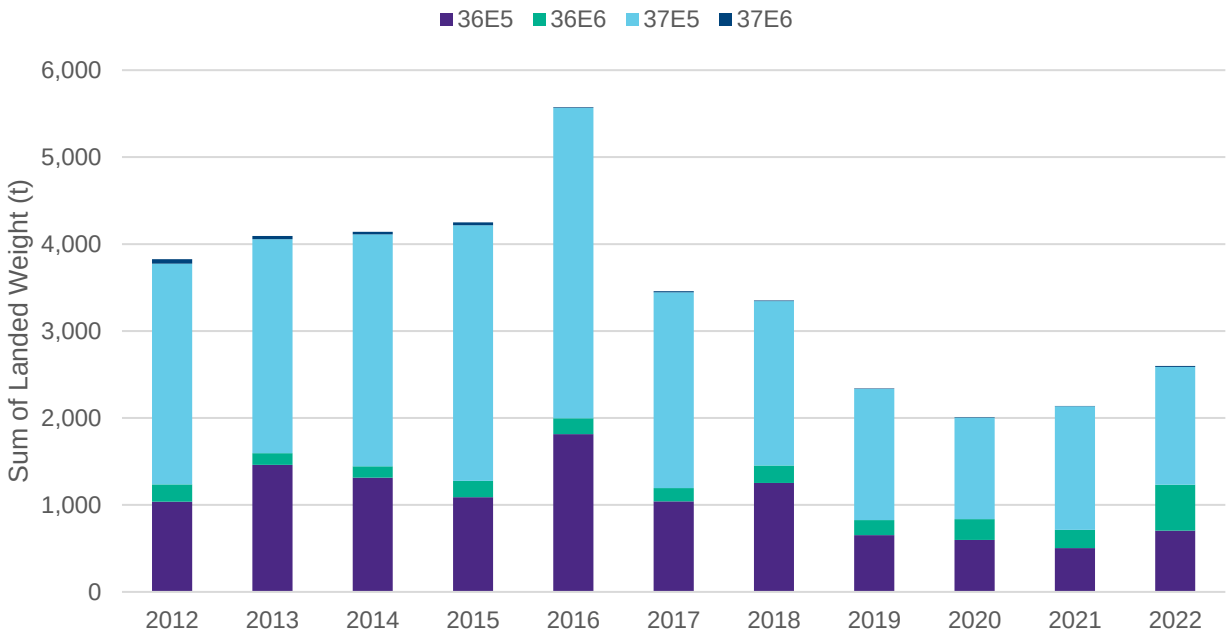


Figure 1.20: Annual trends of landed weight (t) of *Nephrops* (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

Herring

1.3.5.17 Herring are a planktivorous foraging fish, which spawn in coastal areas within specific benthic habitats consisting of gravel and small stones. Spawning occurs throughout September to November, and there are established spawning grounds north and east of the Isle of Man, and on the west Irish coast (Dickey-Collas *et al*., 2001). A proportion of the stock in the Irish Sea migrates northwards during the summer months.

1.3.5.18 Landings of herring in the study area over the period 2012 to 2022 were predominantly during August and September, and in ICES Rectangle 37E5 (**Figure 1.21**). The fishery targets herring during this time whilst fat content is rising, and the fish begin to aggregate prior to spawning (Duncan and Emmerson, 2018). A total of 64,4332 t was caught during August and 23,050 t was caught during September between 2012 to 2022. Annual landings of herring fluctuate on a decreasing trend (**Figure 1.22**), as the ICES advice sets the TAC, which in turn controls the landings.

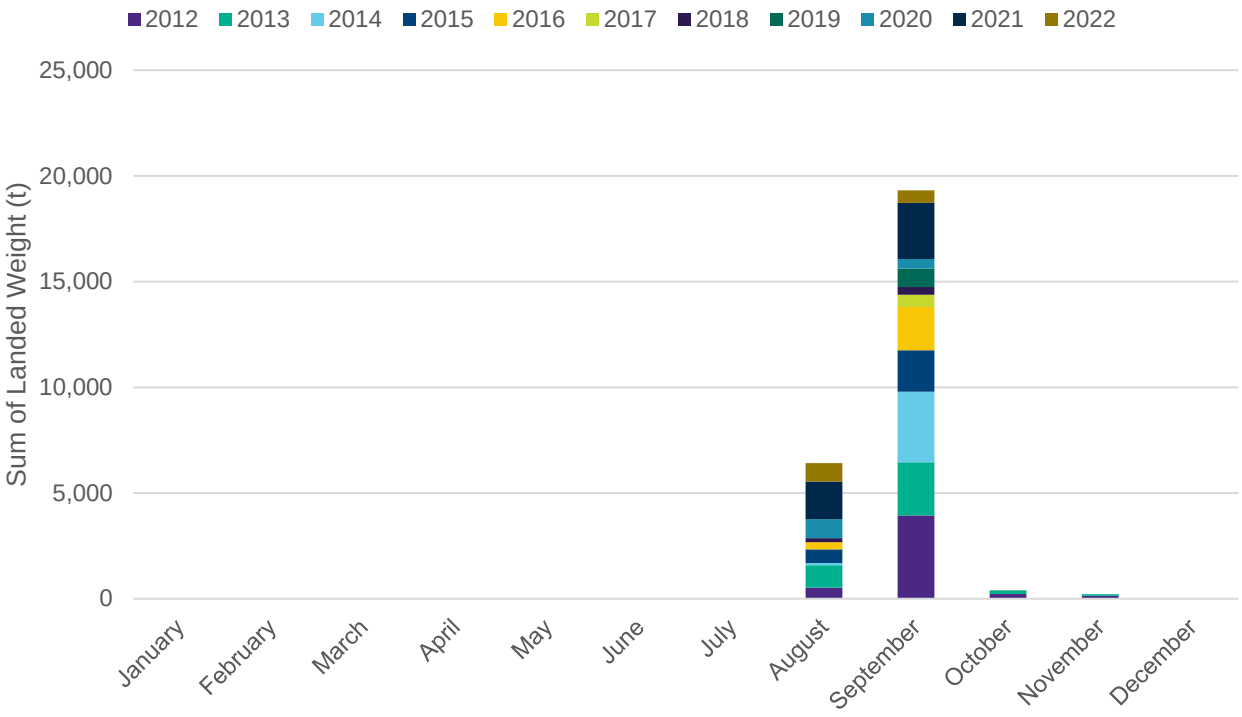


Figure 1.21: Seasonal trends of landed weight (t) of herring (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

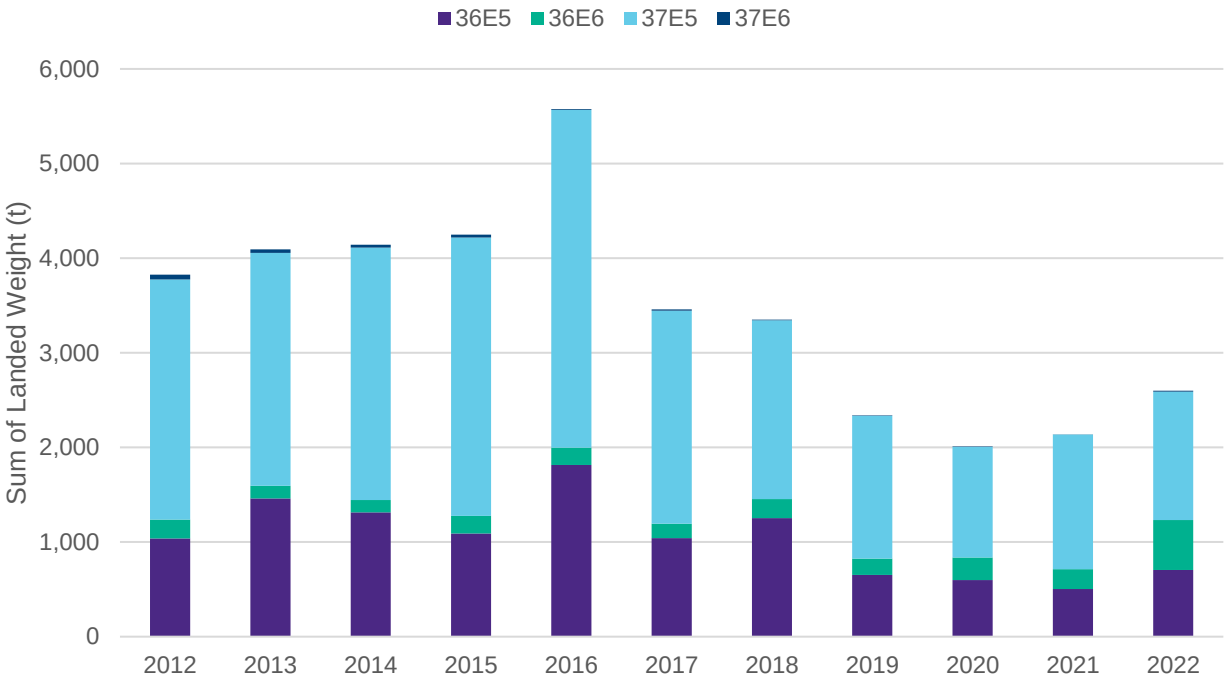


Figure 1.22: Annual trends of landed weight (t) of herring (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

Brown Crab (mixed sexes)

1.3.5.19 Brown crab or edible crab (*Cancer pagurus*) are decapod crustaceans that can typically be found inhabiting cracks and holes in rocks, but occasionally open areas as well. Crab undertake large migrations and display territorial behaviour.

1.3.5.20 Crab landings, in terms of weight over the period 2012 to 2022 (**Figure 1.23**), were most prominent during July, August and September in ICES Rectangle 37E5 and 36E5; although, this species is landed all year round. Landing of crab have generally decreased from 2016 to a minimum landed weight of edible crab occurring in 2020 (523 t) (**Figure 1.24**). Minor increases in crab landings by UK and Isle of Man vessels can be observed in 2021 and 2022.

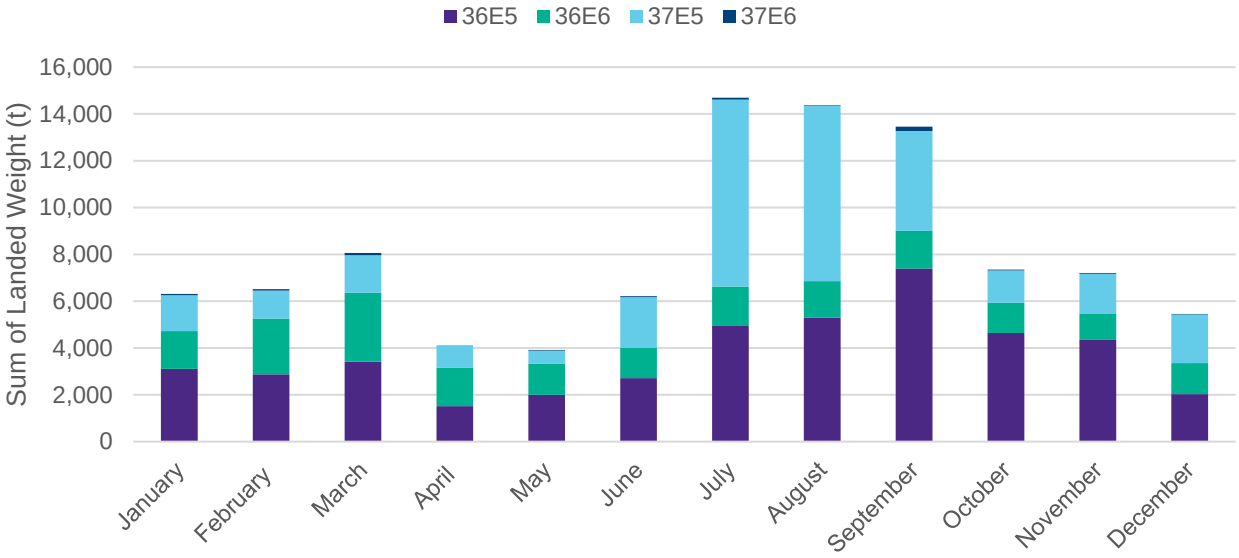


Figure 1.23: Seasonal trends of landed weight (t) of crab (mixed sexes) (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

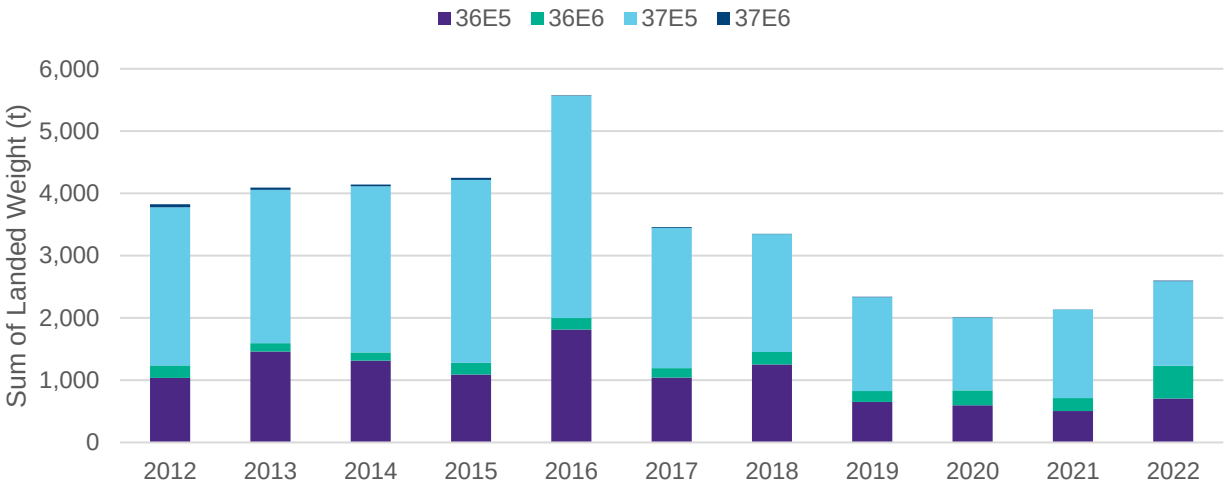


Figure 1.24: Annual trends of landed weight (t) of crab (mixed sexes) (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

Lobster

1.3.5.21 The European lobster is a decapod crustacean that can be typically found sheltering in crevices between boulders and rocks of rough ground and rocky reef habitats. Unlike the edible crab, lobster do not undertake large migrations, and juveniles are known to be particularly sedentary during the first three to four years of their life.

1.3.5.22 Lobster landings, in terms of weight over the period 2012 to 2022, were most prominent during July to September inclusive, although this species is landed all year round (**Figure 1.25**). The minimum landed weight across the study area occurred in 2013, at 46 t, while the highest landed weight across the study area occurred in 2017, at 85 t (**Figure 1.26**).

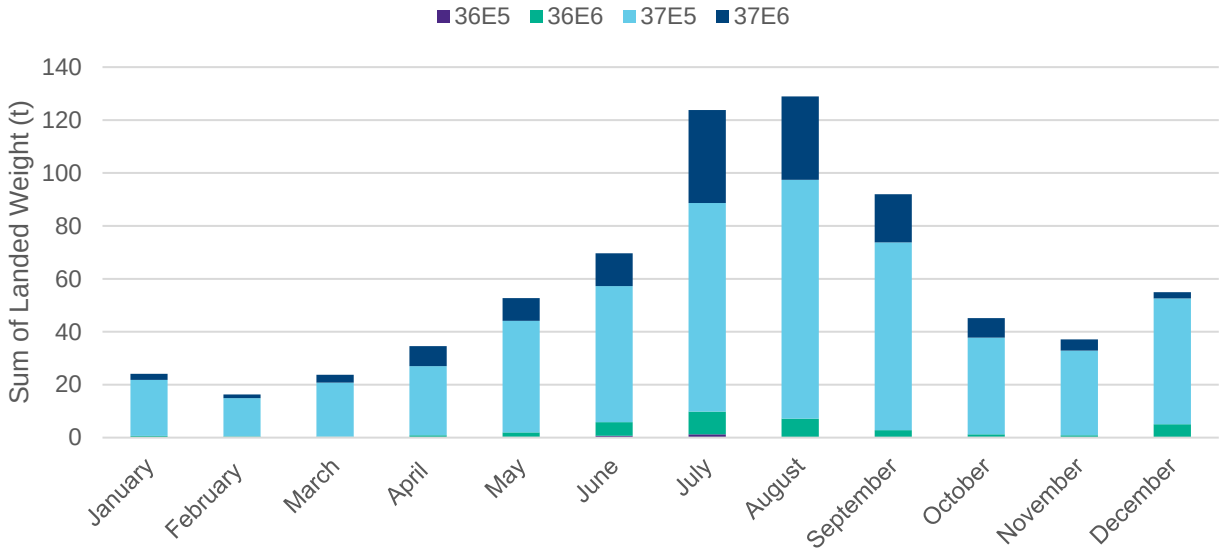


Figure 1.25: Seasonal trends of landed weight (t) of lobster (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

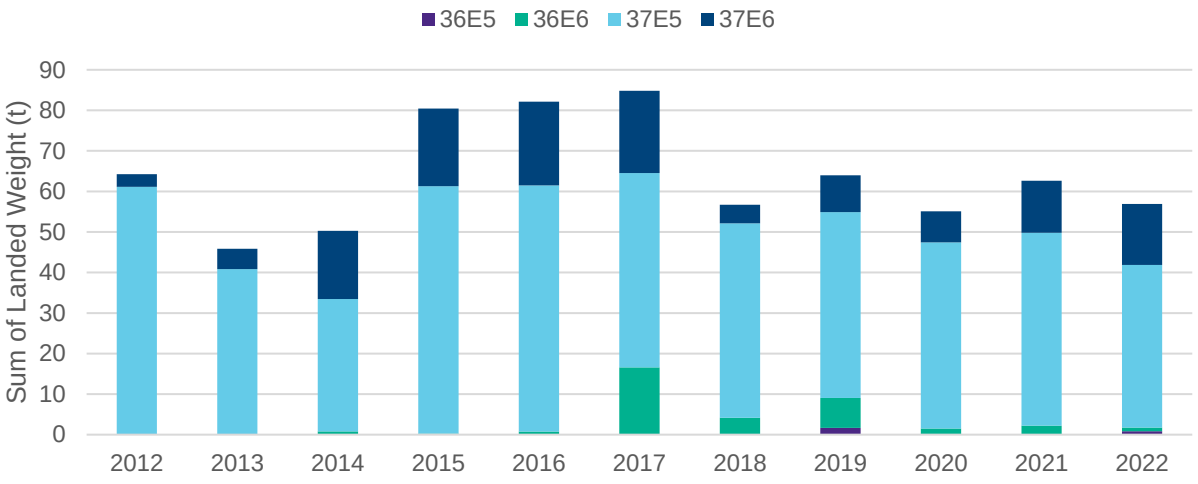


Figure 1.26: Annual trends of landed weight (t) of lobster (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

Intertidal mussel and cockle fishery

1.3.5.23 Even though not appearing in the Top 15 species by landed weight/value in the study area, another important UK fishery in this wider region is the intertidal harvesting of cockles and mussels, particularly within Morecambe Bay. It is noted that these beds do not occur within the Offshore Order Limits (**Figure 1.30**).

1.3.5.24 The intertidal mussel beds within Morecambe Bay, regulated by the NWIFCA, are defined as either permanent or ephemeral beds, which influences the type of fishing activity that can occur within and at what period of the year. Permanent mussel beds are maintained by recruitment of spat amongst adults and can be harvested all year round by hand gathers. At the time of writing, there are 150 permitted commercial hand gathers within the NWIFCA district. The deployment of mechanical or vessel based fishing gear is not permitted within these areas. Ephemeral mussel beds occur in areas where large amounts of spat settle intermittently on a substrate (i.e. rocky intertidal habitat), grow and rapidly build up mud, and become prone to dislodgement (i.e. washed away during a gale). Ephemeral mussel beds can be harvested by hand under derogation or fished by dredge vessel, typically at only one or two periods of the year. Intertidal cockle beds within Morecambe Bay, also regulated by the NWIFCA, are only harvested by hand gathers.

1.3.5.25 Of the permanent mussel beds within the study area, two were identified to be of commercial importance in terms of landed weight (kg) (**Figure 1.27**). A total of 3,308,655 kg was harvested from Foulney (minimum distance of 31.55 km north of the Offshore Order Limits) over the study period (2017 to 2023), where the highest landed weight occurred in 2023 (920,115 kg) and the lowest in 2022 (286,958 kg). A total of 382,698 kg and was harvested from Heysham (minimum distance of 28.44 km north east of the Offshore Order Limits) in 2017 (170,968 kg), 2018 (210,830 kg) and 2022 (900 kg). No landed weight of mussel from Heysham was recorded within the remaining years of the study period (2019, 2020, 2021 and 2023).

1.3.5.26 Of the ephemeral mussel beds within the study area, two were identified to be of commercial importance in terms of landed weight (kg) (**Figure 1.28**). The total landed weight observed within the ephemeral mussel beds (1,650 kg), Knott End Spit (1,000 kg) (minimum distance of 16.97 km north east of the Offshore Order Limits) and Knott End Spit Sea Life Centre South (650 kg) (minimum distance of 4.02 km north east of the Offshore Order Limits) was considerably less than that observed within the permanent mussel beds (**paragraph 1.3.5.25**), likely due to these areas only being fished during certain periods of the year. Landings within the ephemeral mussel beds identified, over the study period (2017 to 2023), can only be observed from 2021 to 2023.

1.3.5.27 Four cockle beds of commercial importance were identified within the study area (**Figure 1.29**). Across the study period (2017/18 to 2023/24), the highest landed weight (kg) of cockle can be observed within Flookburgh (3,501,816 kg) (minimum distance of 34.66 km north of the Offshore Order Limits), while landings were considerably less within Pilling (502,486 kg)

(minimum distance of 18.08 km north east the Offshore Order Limits), Newbiggin (81,274 kg) (minimum distance of 34.37 km from the Offshore Order Limits) and Leven Sands (21,680 kg) (minimum distance of 36.14 km north the Offshore Order Limits). Landed weight of cockle fluctuated annually. All four identified cockle beds were closed to hand gathers between 2022 to 2024, due to low stock and Habitat Regulations Assessment (HRA) considerations (NWIFCA, 2024).

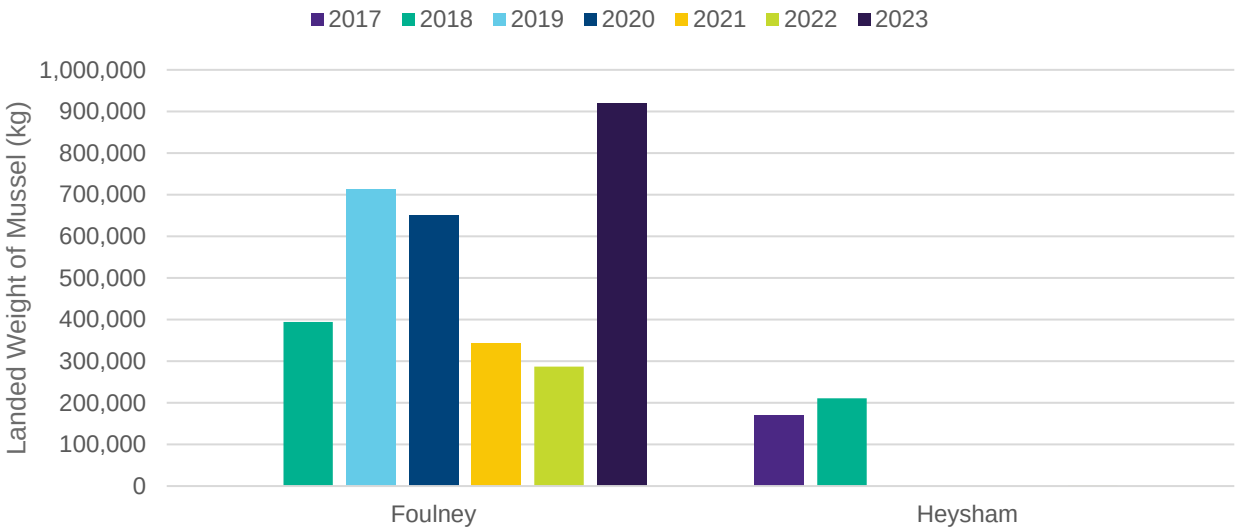


Figure 1.27: Annual trends of landed weight (kg) of hand gathered mussel (2017 to 2023) from permanent beds of commercial importance (Foulney and Heysham) within the Transmission Assets commercial fisheries study area (Source: NWIFCA, 2024)

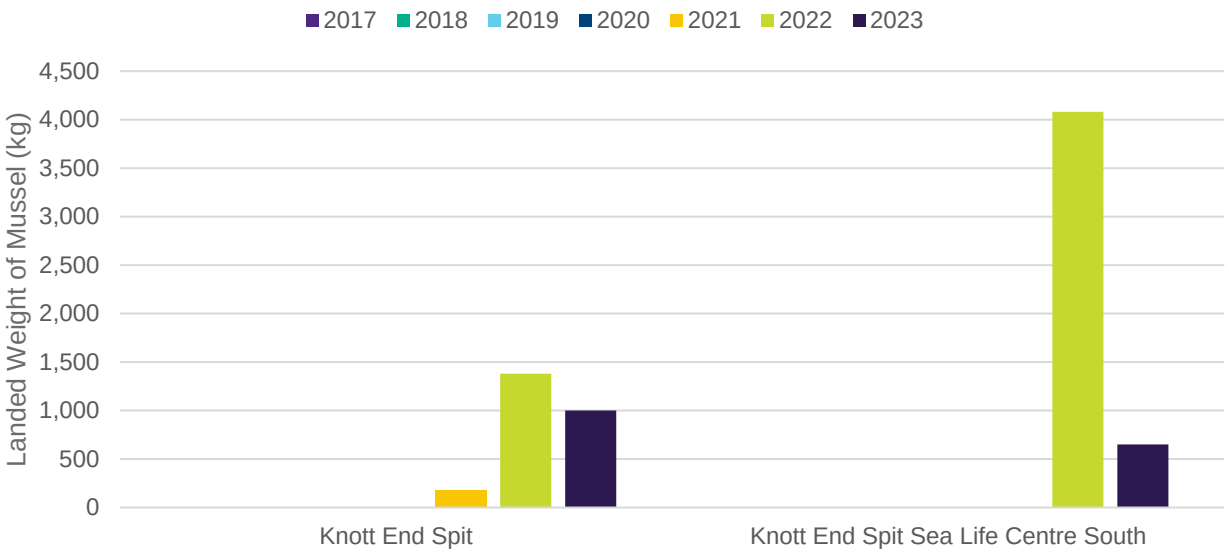


Figure 1.28: Annual trends of landed weight (kg) of hand gathered and/or dredged mussel (2017 to 2023) from ephemeral beds of commercial importance (Knott End Spit and Knott End Spit Sea Life Centre South) within the Transmission Assets commercial fisheries study area (Source: NWIFCA, 2024)

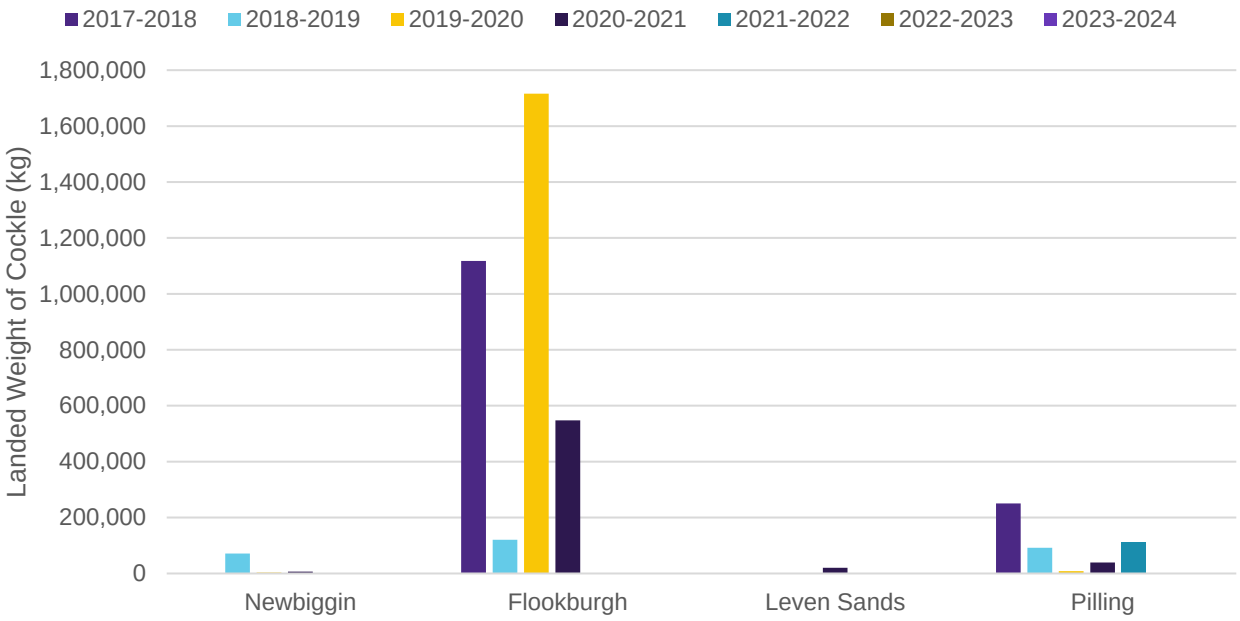


Figure 1.29: Annual trends of landed weight (kg) of hand gathered cockle (2017/18 to 2023/24) from cockle beds of commercial importance within the Transmission Assets commercial fisheries study area (Source: NWIFCA, 2024)

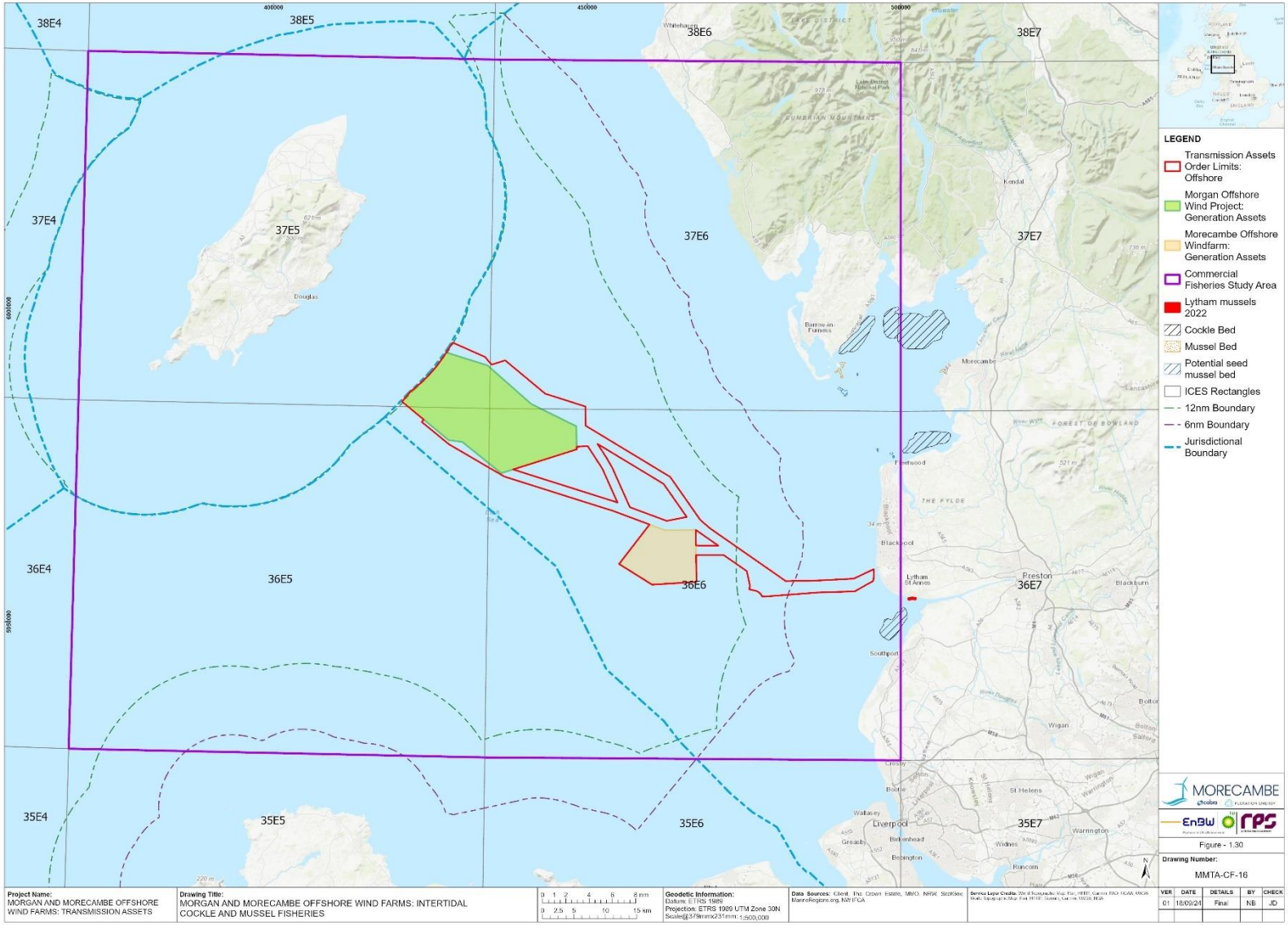


Figure 1.30: Intertidal mussel and cockle beds within the Transmission Assets commercial fisheries study area (Source: NWIFCA, 2024)

Species landed by non-UK vessels

Belgian vessels

1.3.5.28 A total of 53 species were landed by Belgian vessels over the period 2006 to 2016 from the study area. Of these 53 species, the top 20 species (**Figure 1.31**) constituted approximately 99% of the total Belgian catch landed during the period of this dataset. The top five species (common sole, European plaice, thornback ray, rays and skates, and brill *Scophthalmus rhombus*) constituted approximately 85% of the total Belgian tonnage landed from the region. Data from Belgian vessels shows that the fleets main targets were demersal species from ICES rectangle 36E6, and similar species were caught in all other associated rectangles (36E5, 37E5 and 37E6).

1.3.5.29 There was a large variety of species caught by the Belgian fleet and, given the understanding that the Belgian fleet almost exclusively uses beam trawls (**section 1.3.6**), this suggests that other species may have been caught as bycatch during fishing for the main target species.

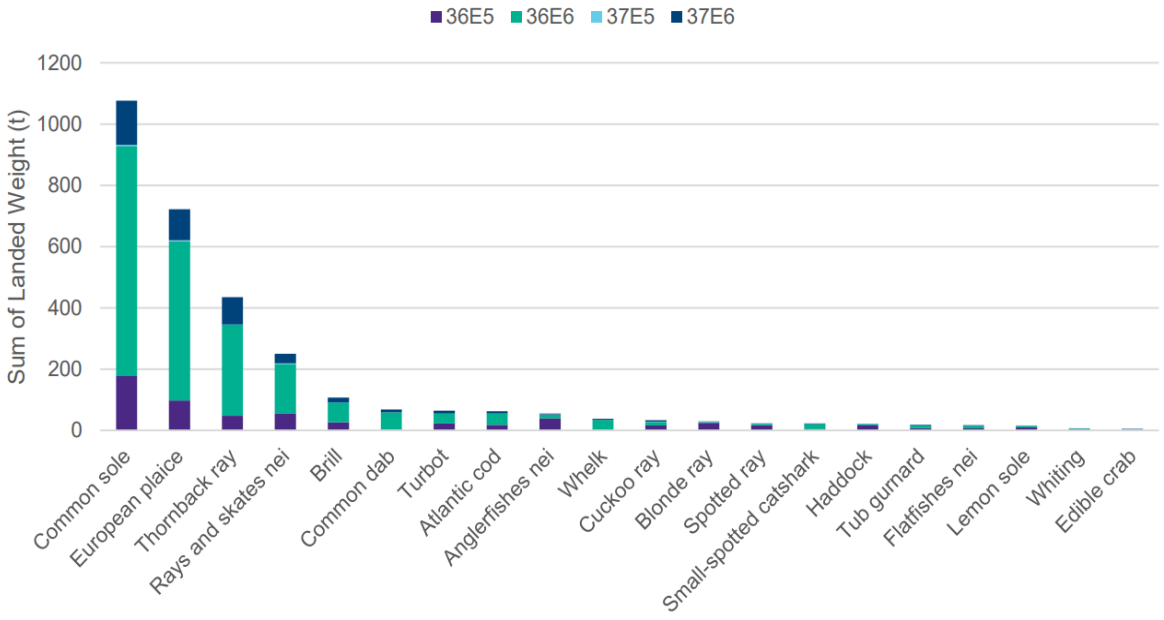


Figure 1.31: Total landings (t) from Belgian vessels within the commercial fisheries study area displayed for the top 20 species (2006 to 2016) (Source: EU STECF, 2017)

Irish vessels

1.3.5.30 A total of 35 species were landed by Irish vessels over the period 2006 to 2016 within the study area. The top 20 species in terms of landed weight are displayed in **Figure 1.32**. The top species (king scallop) constituted approximately 68% of the total Irish catch landed during the monitoring period, with landings predominantly from ICES rectangle 36E5. King scallop landings were significantly higher than other species landed by Irish vessels, indicating the importance of this species to Irish vessels active in the region.

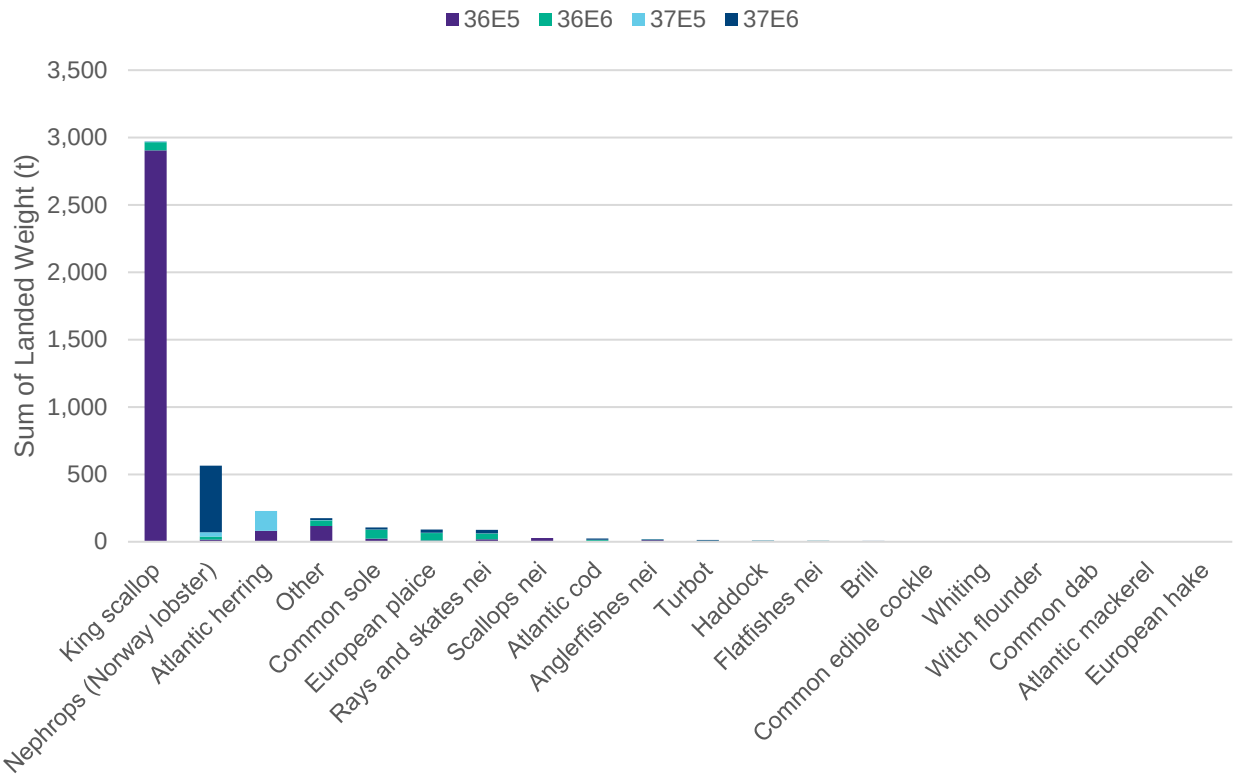


Figure 1.32: Total landings (t) from Irish vessels within the Transmission Assets commercial fisheries study area displayed for the top 20 species (2006-2017) (Source: EU STECF, 2017)

French vessels

1.3.5.31 Only one species (edible crab) was landed by French vessels during 2006 to 2016 within the study area, approximately 0.45 t over the 10 year period and only from ICES rectangle 36E6 (EU STECF, 2017).

Dutch vessels

1.3.5.32 A total of four species were landed by Dutch vessels over the period 2006 to 2016 (**Figure 1.33**) within the study area. There were no landings by Dutch vessels within ICES rectangle 37E5. Landings were recorded within 37E6, but this was a negligible amount that does not appear on **Figure 1.33**. The top two species, king scallop and European sprat *Sprattus sprattus*, constituted approximately 58% and 37%, respectively of the total Dutch catch landed during the monitoring period. The remainder of the total Dutch tonnage landed from the region was constituted of jack and horse mackerel *Scomber scombrus* (2.5%) and common sole *Solea solea* (2.5%). Data from Dutch vessels shows that the fleet targets most landings from ICES rectangle 36E5.

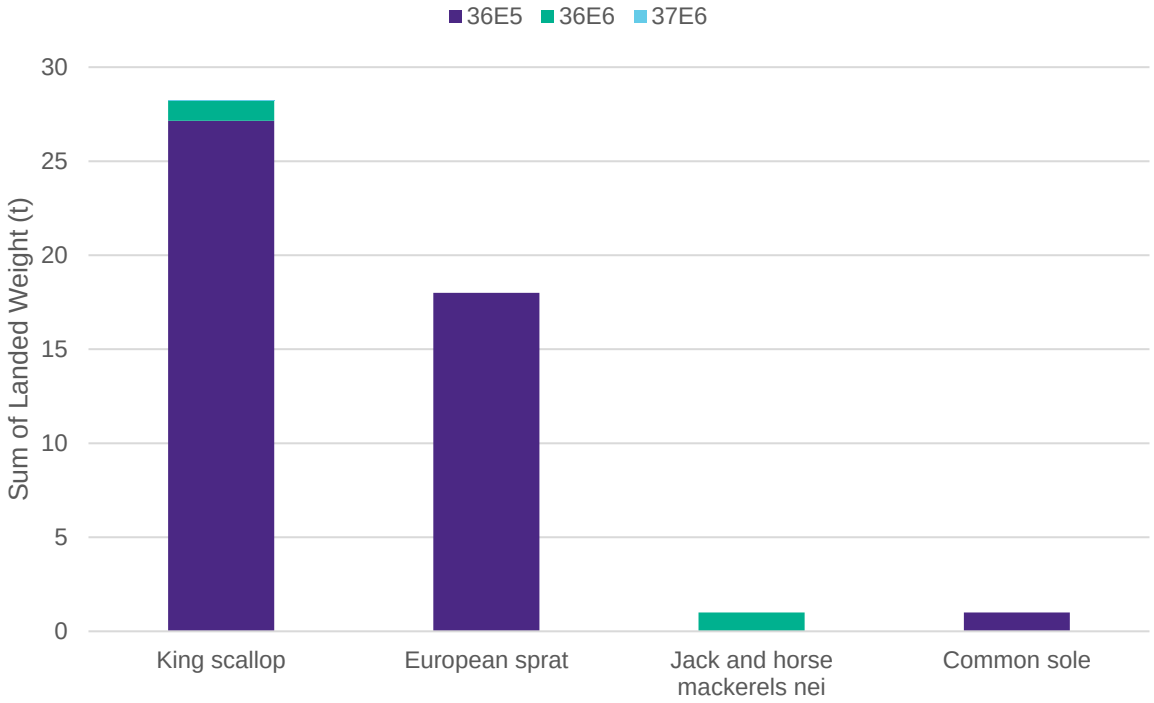


Figure 1.33: Total landings (t) from Dutch vessels within the Transmission Assets commercial fisheries study area, displayed by species (Source: EU STECF, 2017)

Annual variation of species landed by non-UK vessels

1.3.5.33 The EU STECF, 2017 species data was analysed further, allowing a closer look at the temporal variation of the top 15 most commercially important species for non-UK vessels. Overall, king scallop, common sole, European plaice, *Nephrops* and thornback ray were the dominant species caught by all non-UK vessels in terms of landed weight across all years and ICES rectangles 36E5, 36E6, 37E5 and 37E6 (**Figure 1.34**). King scallop appeared to be of particular importance in terms of landed weight during 2010 to 2016, and less so during prior years, which aligns with feedback from fisheries stakeholder consultation indicating that the fishery is cyclical.

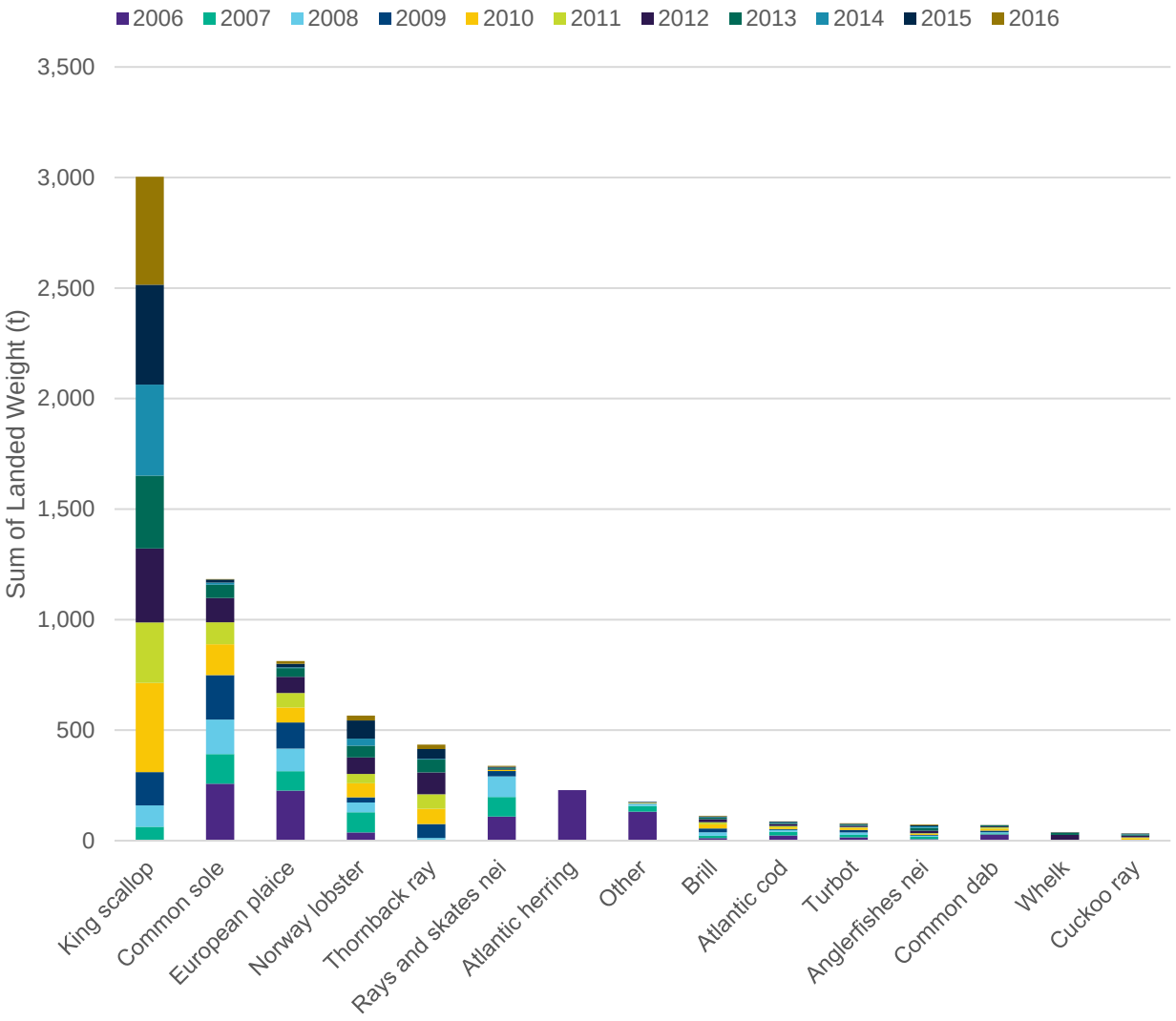


Figure 1.34: Annual trends in the top 15 species by total landings weight (2006 to 2016) within the Transmission Assets commercial fisheries study area (non-UK vessels) (Source: EU STECF, 2017)

Seasonal variation of species landed by non-UK vessels

1.3.5.34 **Figure 1.35** shows the seasonality for the top 15 species by landed weight from the non-UK vessels across the region. The landings data illustrates that over the period 2006 to 2016, January to March and October to December were the most productive periods of the year in terms of landings for king scallop; July to September was the least productive period, which is when the fishery is closed to protect spawning. Common sole was caught predominantly during the first half of the year, as also indicated by fisheries stakeholders (summarised in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES). Highest landings of European plaice were caught during January to March. April to September was the most productive time of the year for *Nephrops*. Notably, Atlantic herring was only caught between July to September.

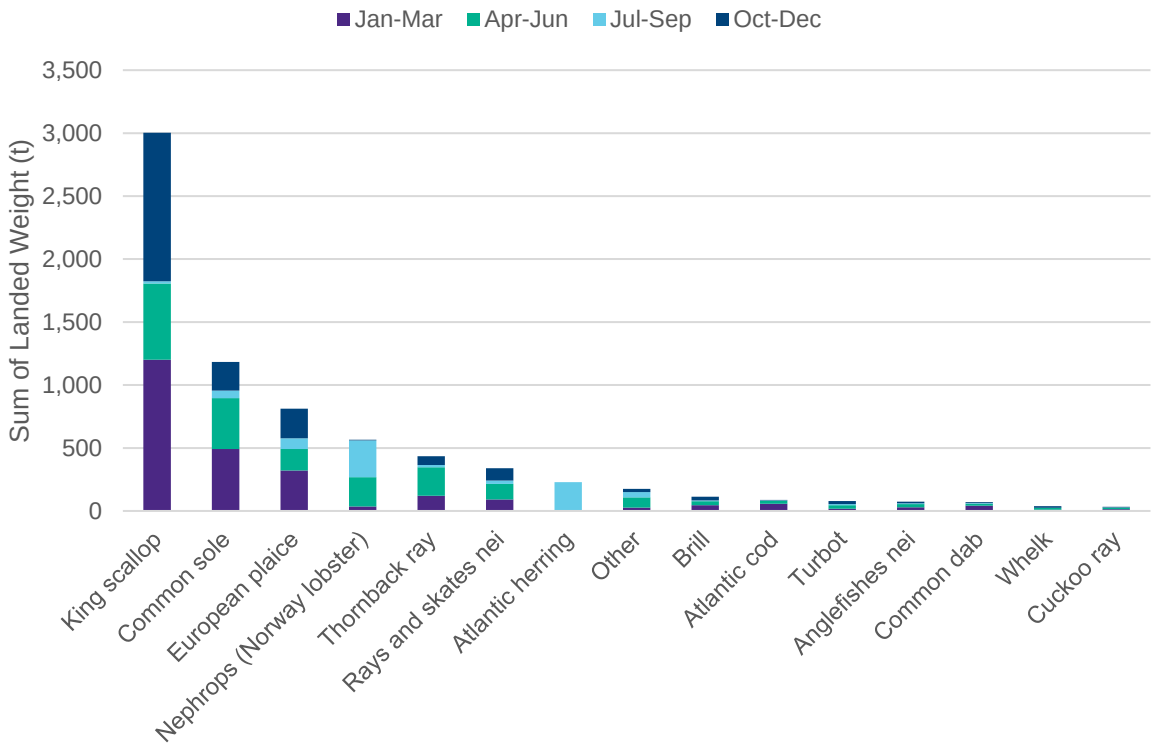


Figure 1.35: Seasonal trends in the top 15 species by total landings weight (2006 to 2016) within the Transmission Assets commercial fisheries study area (non-UK vessels) (Source: EU STECF, 2017)

1.3.6 Ports

Transmission Assets

1.3.6.1 Landings data compiled by the MMO (MMO, 2023b) was reviewed for the period 2012 to 2022 and filtered to just show landings into ports within the study area. The landings dataset provides summaries of fishing activity for both UK commercial fishing vessels landing into the UK and abroad, as well as foreign registered commercial fishing vessels landing into the UK, that are deemed to have been fishing within a specified calendar year.

1.3.6.2 Data was sorted by port and filtered to analyse details within different vessel size class, species group and nationality of vessels. The data was further sorted by species to analyse the most important commercial species, in terms of landed weight and value, into each port. This enabled a more detailed analysis of fishing activity from ports within the study area which are most likely to be affected by the Transmission Assets. Limitations in the data source are highlighted in **Table 1.1**.

1.3.6.3 The MMO Landings statistics by port dataset was used to identify key ports and fleets targeting fisheries within the study area (limitations of this dataset are highlighted in **Table 1.1**). Those relevant to the Transmission Assets include:

- whelk landed into Fleetwood; and
- bass and brown shrimp landed into Lytham St Annes.

1.3.6.4 Additionally, feedback from consultation with fisheries stakeholders indicated that a large proportion of the shellfish caught within the north region of the Offshore Order Limits, and wider study area, is landed into Fleetwood and Douglas. Therefore, landings into Fleetwood and Douglas have been analysed in this section, alongside landings from Lytham St Annes which is the closest to the landfall of the Offshore Order Limits, at 7.6 km.

1.3.6.5 **Figure 1.36** shows fish landings by value (£) into UK and Isle of Man regional ports, between 2009 and 2020, respectively (MMO, 2022b). Within the study area, Fleetwood had the highest value of landings in England between 2009 and 2021; landings into other English ports fluctuated across the time period. Landings into the Isle of Man were also high, notably for Douglas, Peel, Port St Mary and Ramsey. The closest ports to landfall within the Offshore Order Limits, which had fishing effort data recorded, were Fleetwood and Lytham St Annes.

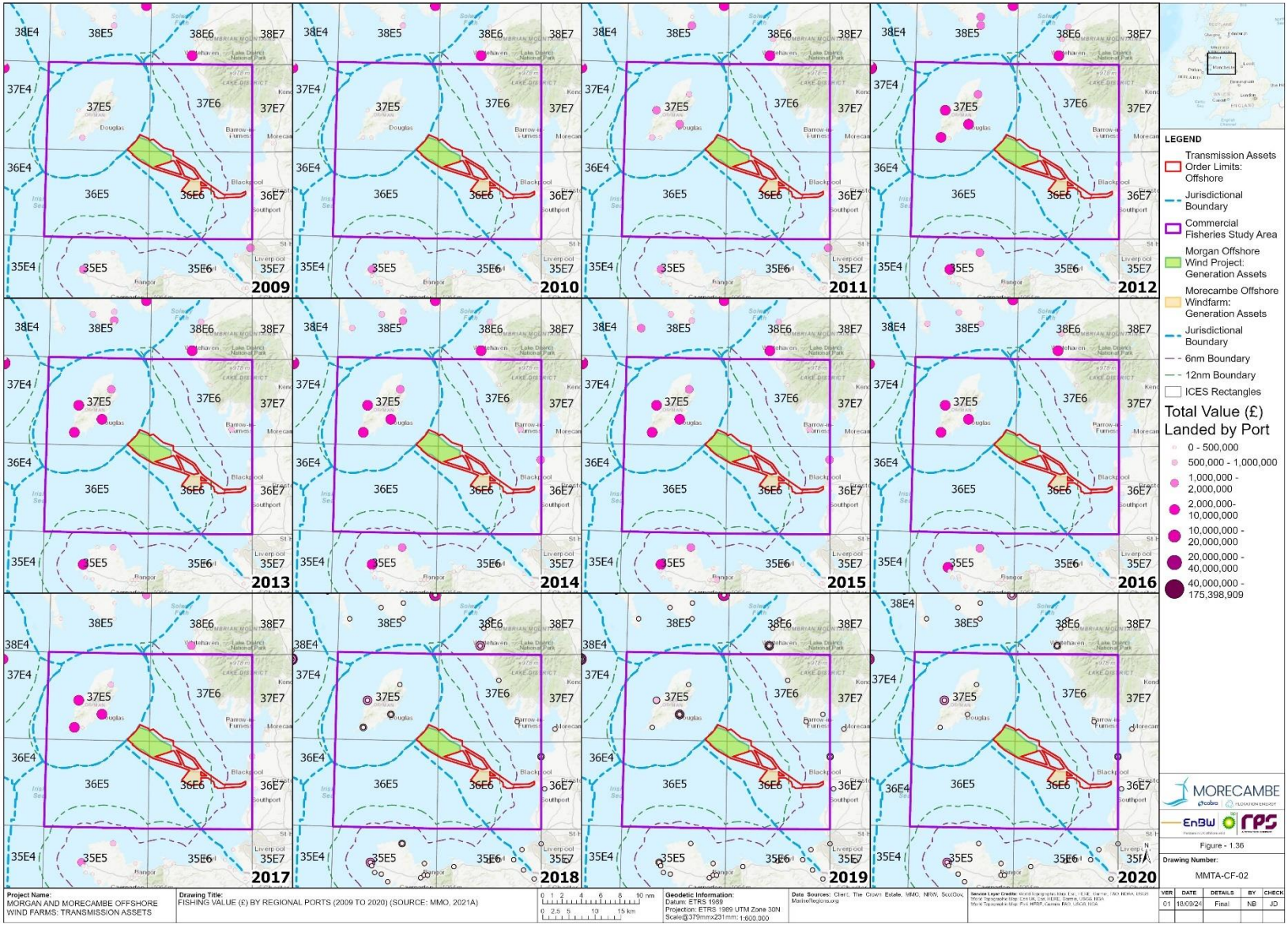


Figure 1.36: Fishing value (£) by regional ports (2009 to 2020) (Source: MMO, 2021a)

Fleetwood

1.3.6.6 Vessels >10 m were dominant, in terms of landed weight at the port of Fleetwood. Shellfish was the key species group landed into Fleetwood, with a total landed weight between 2012 and 2022 of 6,372 t (**Figure 1.37**). English vessels landed most shellfish species, although Welsh and Scottish vessels also made notable landings of shellfish species. Vessels >10 m from England also landed demersal species into Fleetwood, but total landed weights between 2021 to 2022 were significantly less than those of shellfish species.

1.3.6.7 Landed weights in the ≤10 m vessel size class were lower, with demersal and shellfish species landed mostly by English vessels. For both vessel size categories, the pelagic species group was the least dominant by weight and value of landings. No landings of pelagic species were recorded between 2012 to 2022 for vessels >10 m in length.

1.3.6.8 A total of 51 species were landed at Fleetwood from 2012 to 2022, with whelk the dominant species in terms of landed weight and value (total value of £6,973,434) (**Figure 1.38**). This reflects the role of the whelk fishery which operates out of Fleetwood and aligns with feedback from consultation. The next top species in terms of landed weight were lesser spotted dogfish *Scyliorhinus canicular*, plaice *Pleuronectes platessa*, thornback ray *Raja clavata* and brown crab.

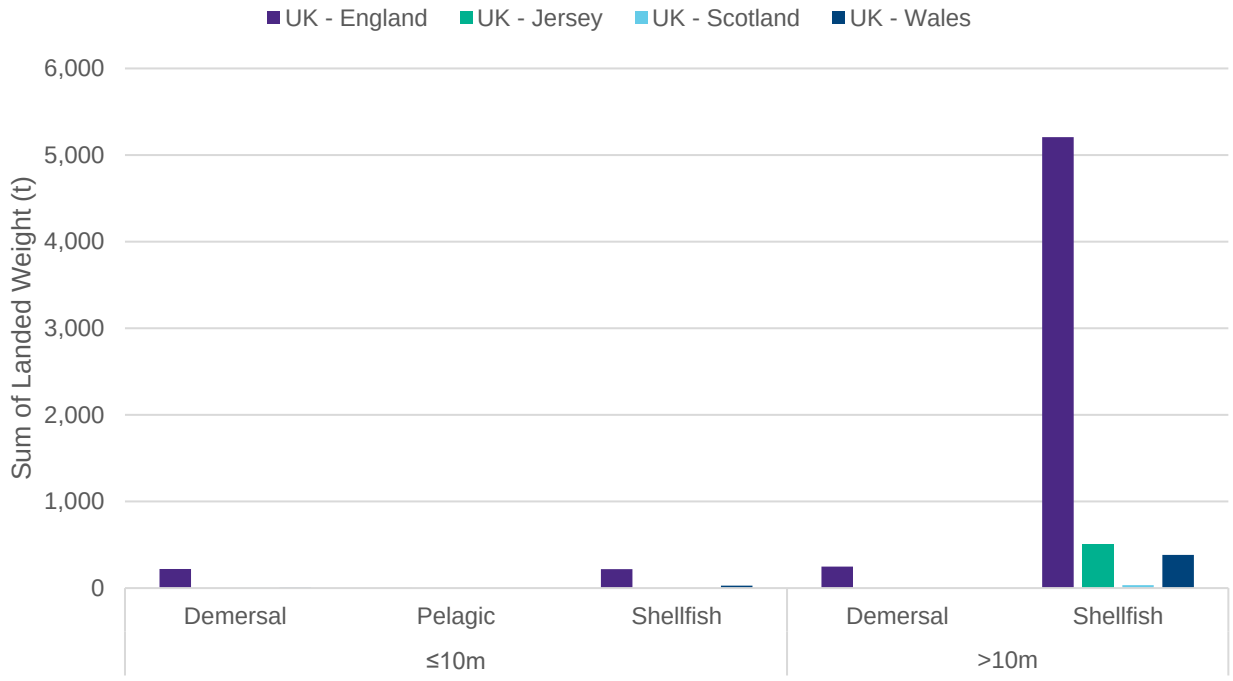


Figure 1.37: Total landings into Fleetwood (2012 to 2022) displayed by species group, vessel length and nationality (Source: MMO, 2023b)

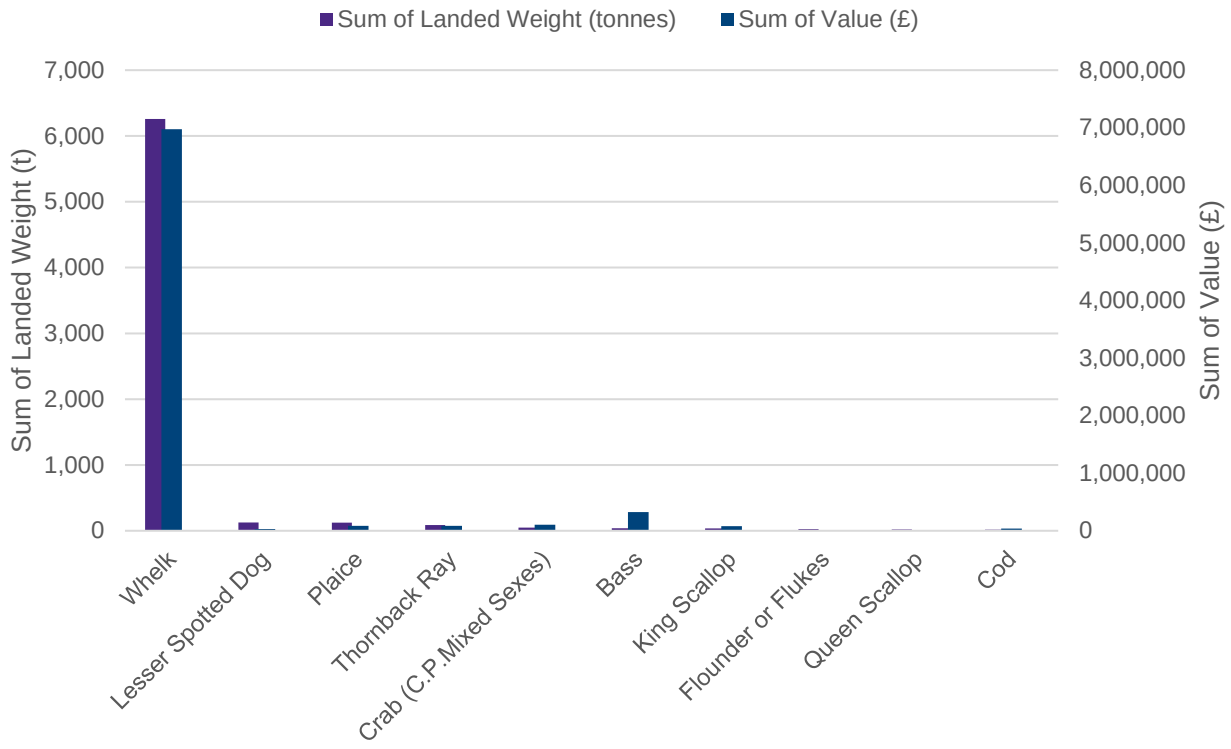


Figure 1.38: Total weight and value of landings into Fleetwood port (2012 to 2022) displayed by the top 10 species by weight (Source: MMO, 2023b)

Lytham St Annes

1.3.6.9 English vessels ≤10 m constituted all the landings into Lytham St Annes. Demersal fish were the key species group landed (**Figure 1.39**). There were also landings of shellfish species into Lytham St Annes and very low pelagic landings.

1.3.6.10 A total of 23 species were landed at Lytham St Annes from 2012 to 2022, with bass the dominant species in terms of landed weight and brown shrimp the dominant species in terms of landed value (**Figure 1.40**). The next top species in terms of landed weight were sole, mullet Mugilidae, thornback ray and plaice.

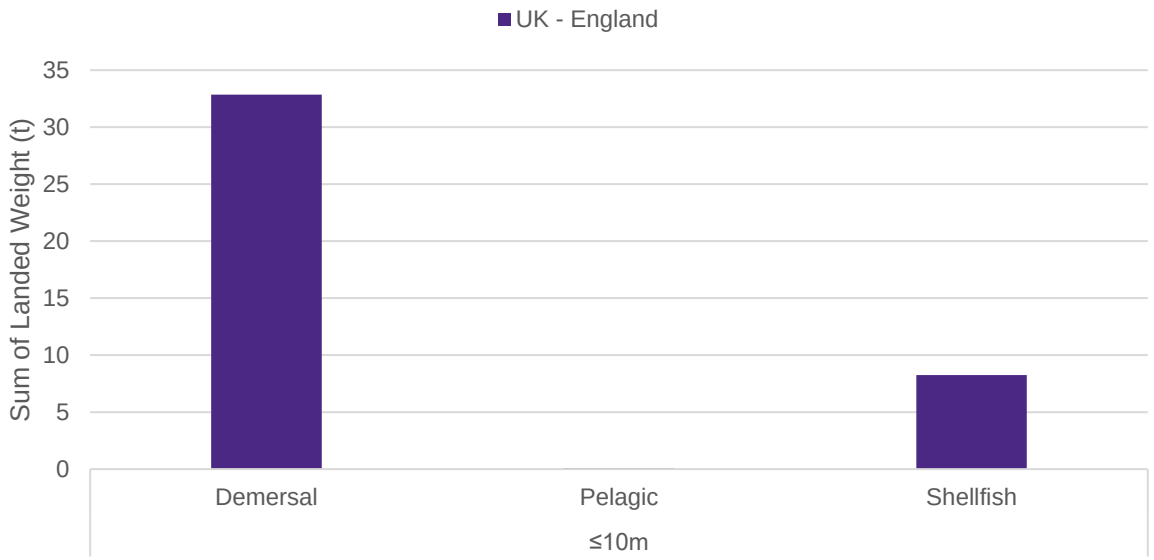


Figure 1.39: Total landings into Lytham St Annes (2012 to 2022) displayed by species group, vessel length and nationality (Source: MMO, 2023b)

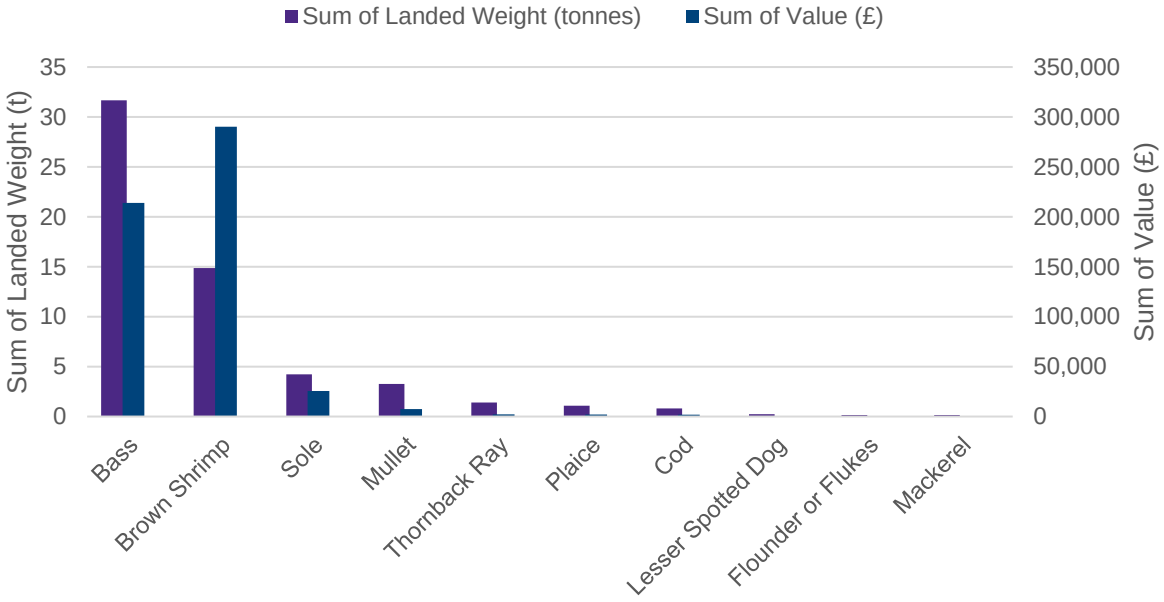


Figure 1.40: Total weight and value of landings into Lytham St Annes port (2012 to 2022) displayed by the top 10 species by weight (Source: MMO, 2023b)

Douglas

1.3.6.11 Shellfish was the key species group landed into Douglas, with a total landed weight between 2012 and 2022 of 29,766 t (**Figure 1.41**); landings of demersal and pelagic species were low. Scottish and Isle of Man vessels >10 m dominated the landed weight at the port of Douglas.. with the highest landings by Isle of Man vessels, followed by Scottish vessels. Isle of Man vessels dominated the ≤10 m shellfish landings into Douglas English, Northern Irish and Welsh vessels also landed shellfish species into Douglas, but total landed weights between 2012 to 2022 were significantly less.

1.3.6.12 A total of 47 species were landed at Douglas during 2012 to 2022. Queen scallop were the dominant species in terms of landed weight and value (**Figure 1.42**), followed by king scallop and whelk: these three species made up 99% of the landed weight into Douglas. This reflects the role of the scallop and whelk fisheries which operate out of Douglas and within the study area, which aligns with feedback from consultation. The next top species in terms of landed weight were crab, lobster, lesser spotted dogfish, mackerel, unidentified dogfish, squid *Loligo vulgaris* and pollack *Pollachius pollachius*.

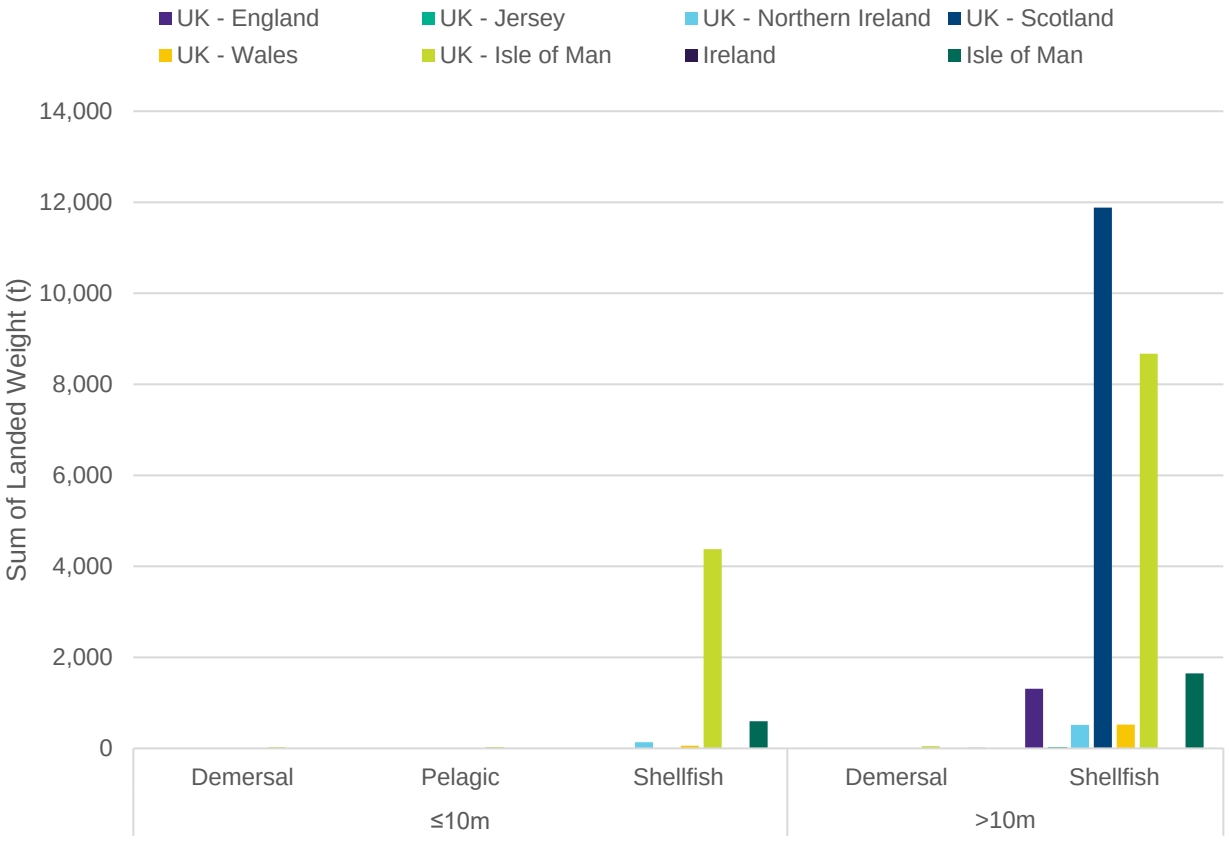


Figure 1.41: Total landings into Douglas (2012 to 2022) displayed by species group, vessel length and nationality (Source: MMO, 2023b)

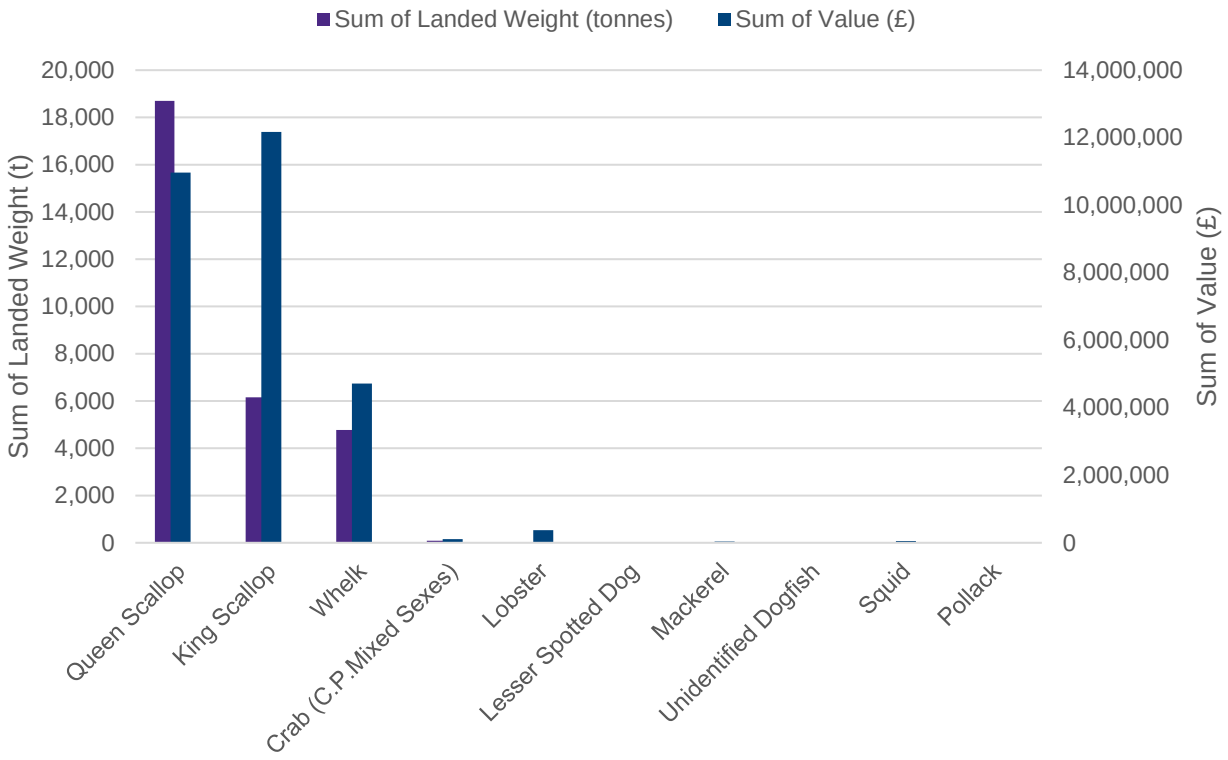


Figure 1.42: Total weight and value of landings into Douglas port (2012 to 2022) displayed by the top 10 species by weight Source: MMO, 2023b)

1.3.7 Spatial distribution of fishing activity

Transmission Assets

VMS data by gear type

1.3.7.1 VMS data from 2009 to 2020 was collated from the MMO and ICES to provide an overview of the spatial extent of fishing activity within the study area. The MMO dataset only captures data for ≥15 m vessels and the ICES dataset is from vessels >12 m in length. Smaller vessels are not captured within these datasets, so additional datasets have been used to provide a context for their activity. Fishing effort was provided in kWh, which has been calculated by multiplying the time associated with each VMS report by the engine power of the vessel concerned at the time of activity.

1.3.7.2 Consultation has previously been held with fisheries stakeholders (summarised in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES) to develop further understanding of fishing activity within the study area, particularly where there is a lack of data availability. The CEFAS data, site specific marine traffic and scouting surveys have also been used to inform the existing environment and support official data sources.

1.3.7.3 Efforts have been taken to agree the data sources with relevant fisheries stakeholders, particularly where there are limitations. Data sources were presented to fisheries stakeholders and were discussed during consultation. For example, with regard to the VMS data, it was concluded that official data

sources generally align with fisheries stakeholders understanding of fishing patterns, but it was noted and agreed that inshore fishing is likely to be under-represented by these data.

1.3.7.4 Both the MMO and ICES datasets are split by the ICES sub-rectangle and have been categorised into aggregated gear groups (**Figure 1.43** to **Figure 1.46**). The ICES data was only for mobile bottom contacting gear types, so pots and traps were not included. MMO data by gear type for pots has been analysed, but data were only available for the period 2016 to 2020.

1.3.7.5 **Figure 1.43** illustrates that potting vessels (≥15 m) were active across the study area. Higher intensities of potting activity were generally observed between Barrow-in-Furness and the English-Welsh maritime boundary, and north of the Isle of Man. Regarding potting activity within the Offshore Order Limits, levels of potting activity were generally higher in ICES rectangle 36E6, just beyond the 12 nm limit of England. Feedback from consultation with fisheries stakeholders has suggested that this activity is mostly from whelk vessels. Levels and spatial extent of potting activity fluctuated across the time period studied.

1.3.7.6 Over the period 2009 to 2020, beam trawl (vessels >12 m) activity within the study area was focused within two discrete areas. One of these areas was located south of the Isle of Man, while the other area was beyond the 12 nm limit of England and sporadically overlapped with the Offshore Order Limits within ICES rectangle 36E6 (**Figure 1.44**). Fisheries stakeholders consulted as part of this assessment have indicated that beam trawl vessels from the south west of the UK, and from Belgium, are active in the north most section of the Offshore Order Limits and the wider region during the Spring, with these vessels predominantly targeting sole. Beam trawl activity fluctuated across the time period studied.

1.3.7.7 **Figure 1.45** illustrates that dredge vessels (>12 m) were active across the study area. These dredge vessels are largely from Ireland, the Isle of Man, Northern Ireland and Scotland (**section 1.3.6**). Highest intensities of these vessels were observed within the Isle of Man 12 nm limit and to the west of the Offshore Order Limits. Generally, within the Offshore Order Limits, dredge vessel activity only overlapped with the most west part, which is supported by feedback from consultation with fisheries stakeholders. It is evident that dredge activity and intensity varies by year, which also corroborates information from fisheries stakeholders, which suggests that the fishery is cyclical over seven to eight-year periods for queen scallop and three to four years for king scallop.

1.3.7.8 Otter trawl vessels from Belgium, England, Isle of Man, Northern Ireland, Scotland and Wales were active within the study area (**section 1.3.6**). **Figure 1.46** illustrate that activity by these otter trawl vessels (>12 m) was highest in the west and north east parts of the study area, with an area of activity also located south east of the Isle of Man. Activity within the Offshore Order Limits was generally limited to the west, which can be attributed to vessels targeting scallop.

1.3.7.9 The higher intensity area off the Cumbria coast shows the *Nephrops* grounds (**Figure 1.46**), which do not overlap with the Offshore Order Limits. This area

of *Nephrops* grounds that is located off the Cumbria Coast, is also highlighted in data provided by Marine Scotland (under ICES functional unit 14 Irish Sea East), which displays suitable habitat for *Nephrops* in Scottish and adjacent waters (Marine Scotland, 2022). Within the Offshore Order Limits, activity was sporadic, with more activity beyond the 12 nm limit. Otter trawl activity fluctuated across the time period studied. Feedback from consultation suggested that otter trawl vessels from the Isle of Man target queen scallop, generally between July to October.

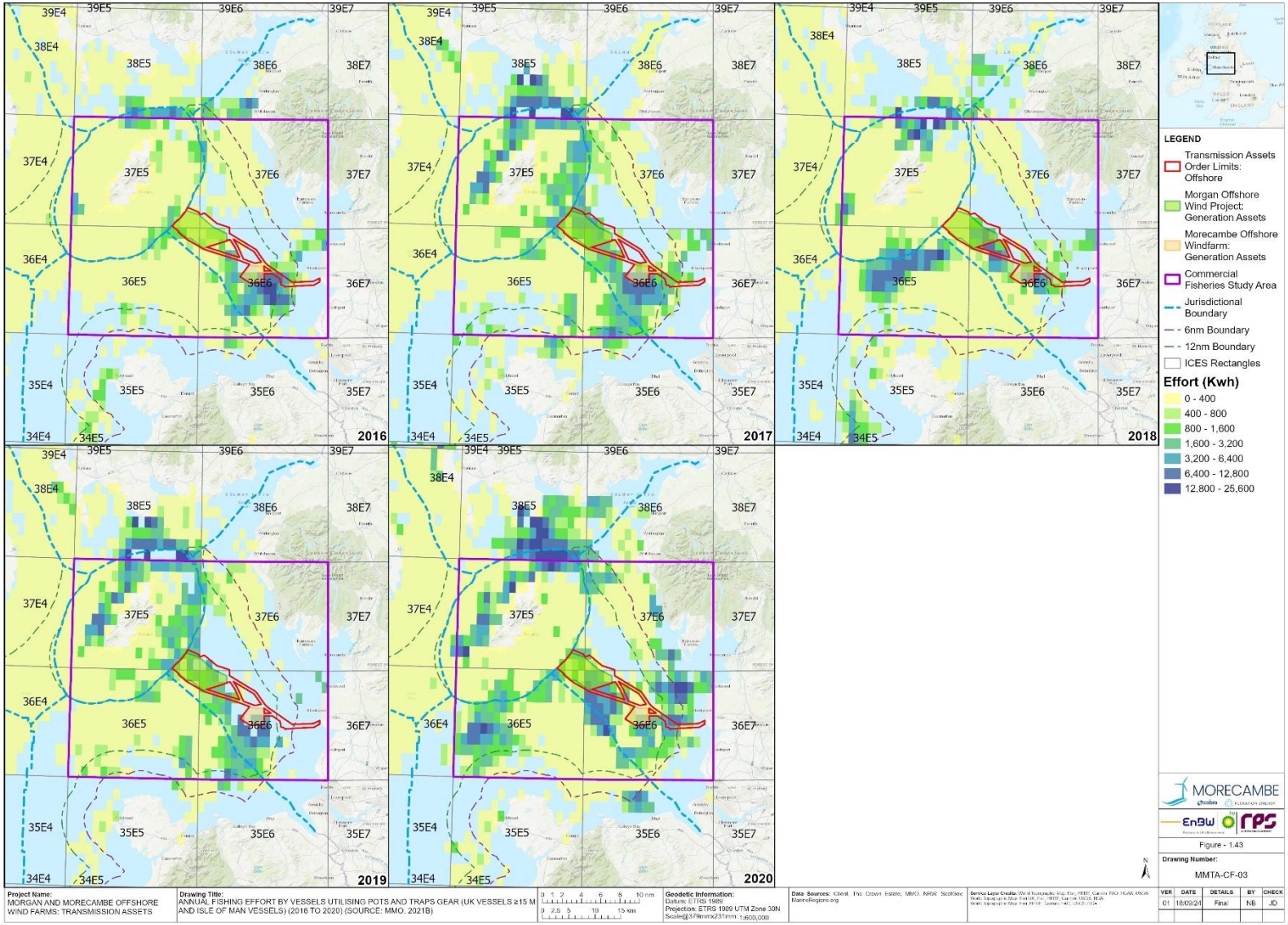


Figure 1.43: Annual fishing effort by vessels utilising pots and traps gear (UK and Isle of Man vessels ≥15 m) (2016 to 2020) (Source: MMO, 2021b)

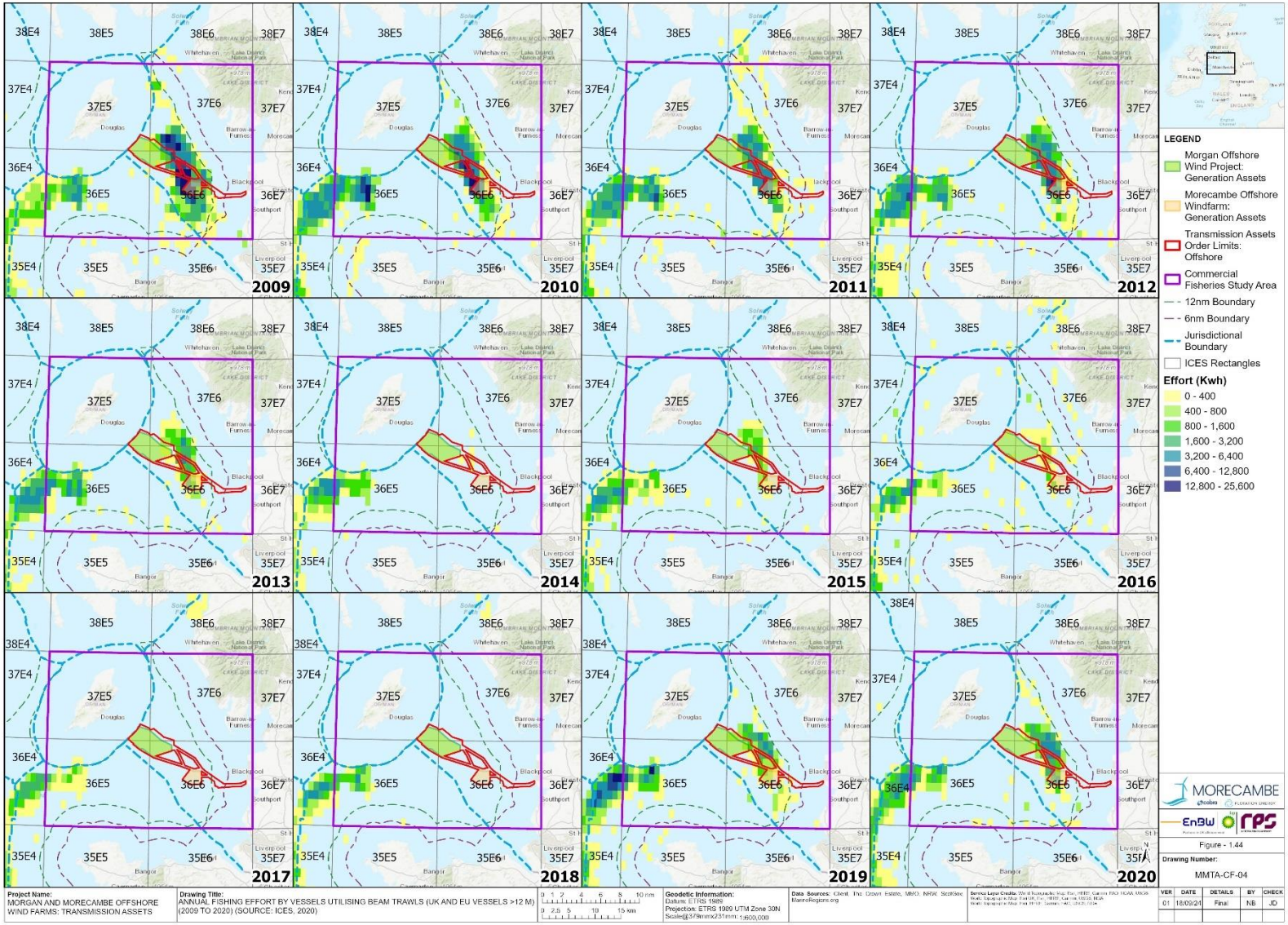


Figure 1.44: Annual fishing effort by vessels utilising beam trawls (UK and EU vessels >12 m) (2009 to 2020) (Source: ICES, 2020)

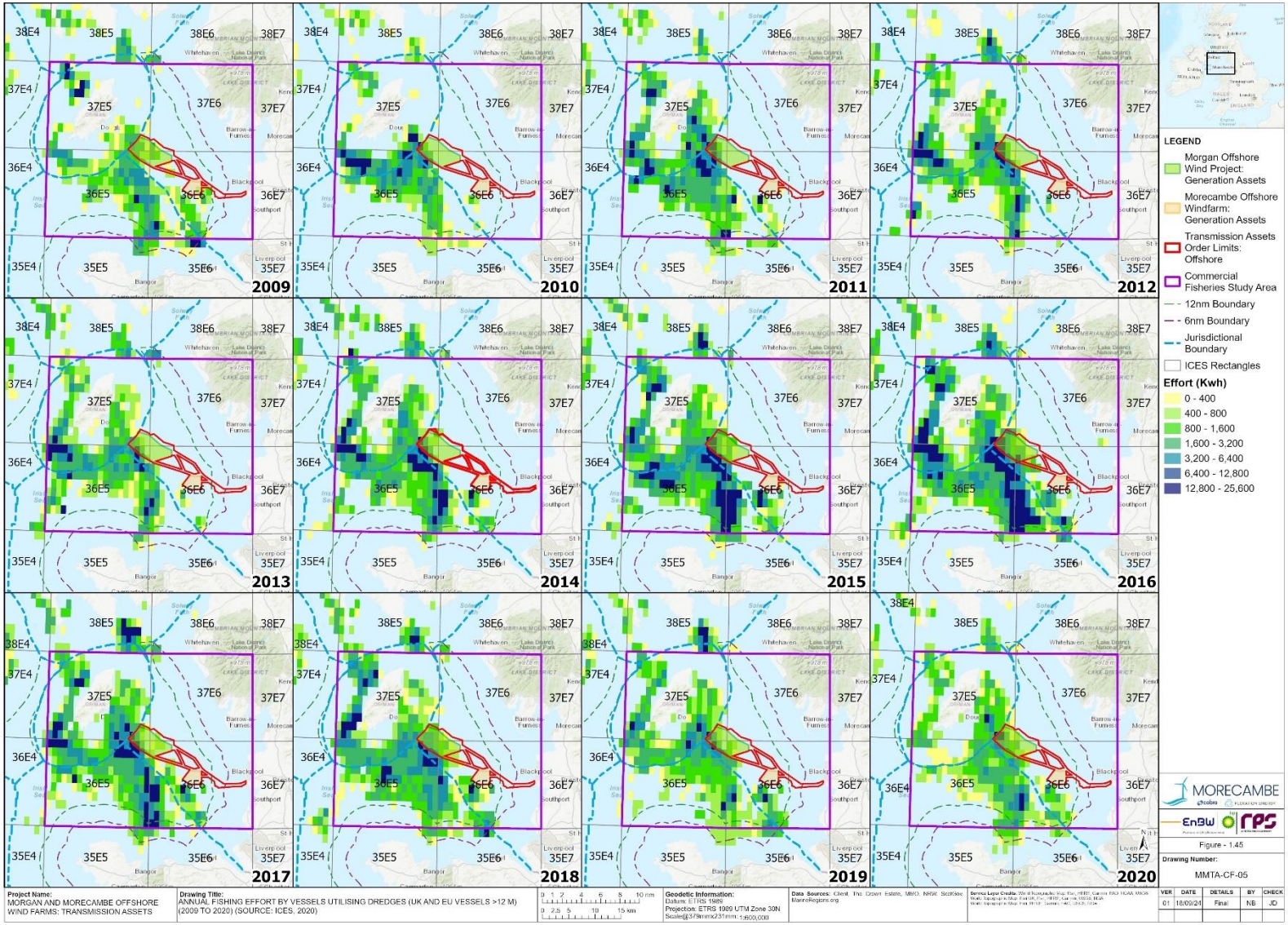


Figure 1.45: Annual fishing effort by vessels utilising dredges (UK and EU vessels >12 m) (2009 to 2020) (Source: ICES, 2020)

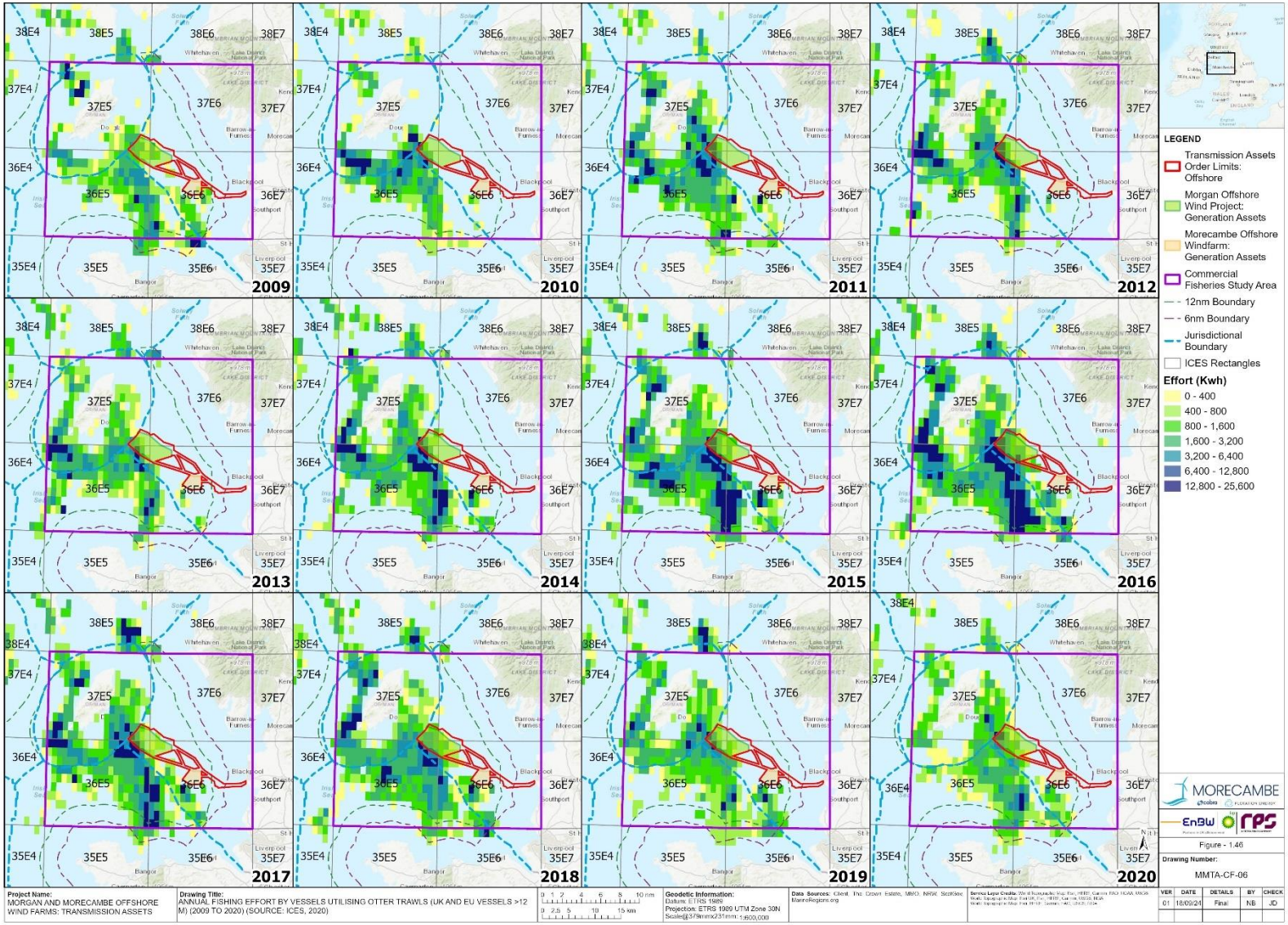


Figure 1.46: Annual fishing effort by vessels utilising otter trawls (UK and EU vessels >12 m) (2015 to 2020 (Source: ICES, 2020)

Scallop grounds – ICES Scallop Assessment Working Group and consultation feedback

1.3.7.10 The ICES Scallop Assessment Working Group (WGSCALLOP) is one of numerous technical fisheries working groups established by ICES. WGSCALLOP specifically seeks to develop and improve stock assessment methods for scallop and increase understanding of scallop populations and fisheries.

1.3.7.11 WGSCALLOP mapped king scallop fishing activity in the Irish Sea based on VMS data from 2009 to 2019; the data displayed is preliminary, and in the process of being verified by ICES, so will be used to supplement VMS data. This information includes historical data, so may include areas where there is limited fishing intensity (particularly on the edges of the polygons). The VMS data analysed included information on vessels from England, Guernsey, Ireland Jersey, Isle of Man, Scotland and Northern Ireland.

1.3.7.12 **Figure 1.47** shows that the king scallop fishery in the Irish Sea overlaps with a large proportion of ICES rectangles 36E5 and 37E5, the south west part of 36E6 and only a small part of the south west of 37E6. Vessels engaging in the king scallop fishery from the UK showed the largest spatial extent of activity and overlapped with parts to the west of the Offshore Order Limits. Irish vessels overlapped with the north west part of the Offshore Order Limits. There was a minor overlap of Northern Irish vessel activity within a discrete area of the north west part of the Offshore Order Limits.

1.3.7.13 This information is generally consistent with feedback from consultation with fisheries stakeholder, which suggested that the king scallop grounds cover a larger area than the queen scallop grounds in the study area (discussed in further detail within **Appendix A**).

1.3.7.14 VMS data and feedback from fisheries stakeholders (from Scotland and the Isle of Man) indicates that the north west part of the Offshore Order Limits (and west part of the Morgan Offshore Wind Project: Generation Assets) is the most important area for vessels targeting queen scallop; a figure illustrating these areas is included as part of the **Appendix A**, which have been produced through close liaison with Scottish fisheries stakeholders. Other parts of the Offshore Order Limits (and the Morgan Offshore Wind Project: Generation Assets) and areas beyond the boundary to the north west are of lesser importance for commercial queen scallop fishing but are recognised as important spawning areas.

1.3.7.15 Further information on the ecology of scallop is detailed in Volume 2, Annex 3.1: Fish and shellfish ecology technical report of the ES.

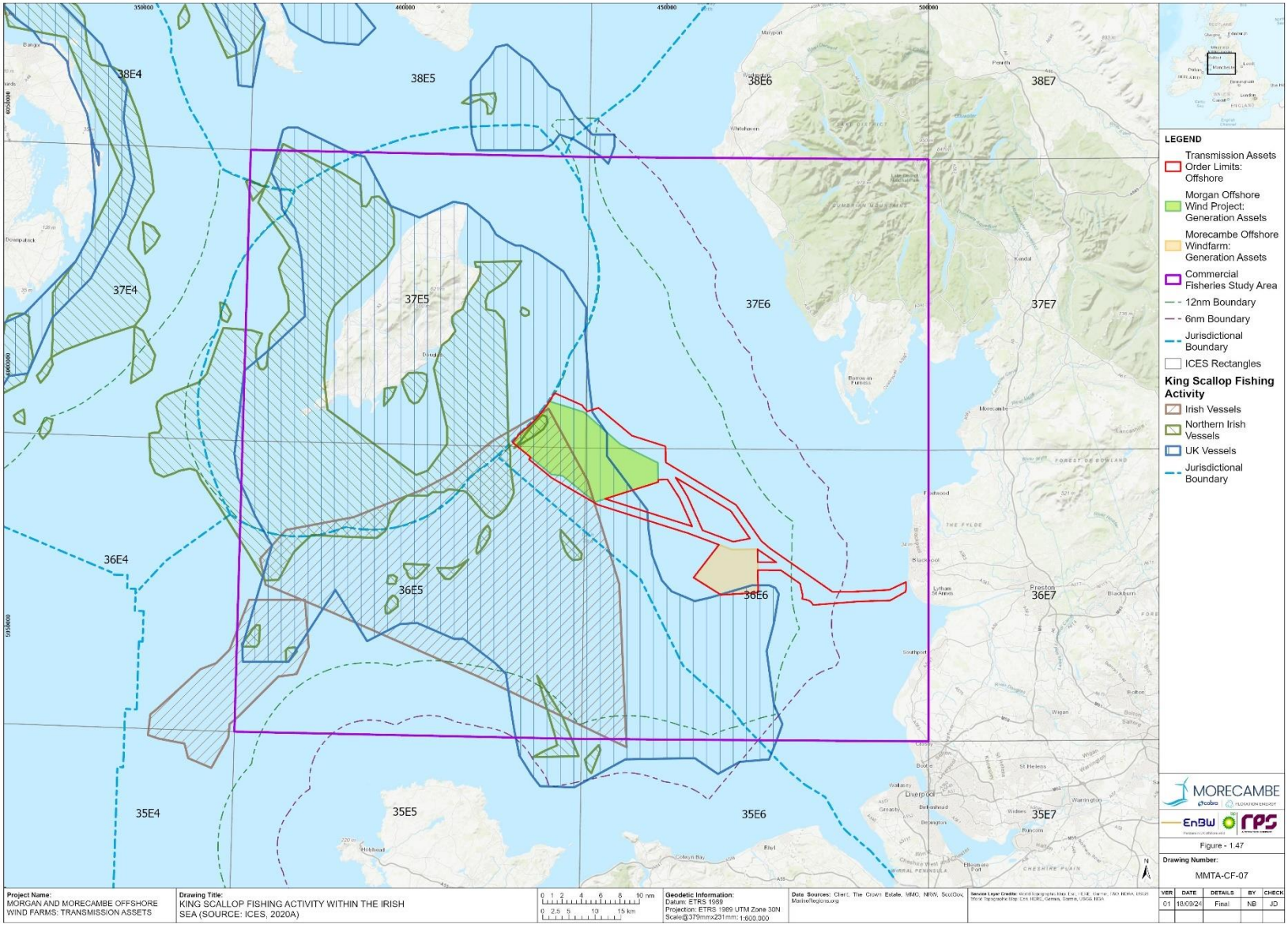


Figure 1.47: King scallop fishing activity within the Irish Sea (Source: ICES, 2017)

UK inshore fishing intensity

1.3.7.16 Cefas undertook a study between 2010 and 2012 to provide an improved understanding of inshore fisheries activity (vessels <15 m), with input from the Inshore Fisheries and Conservation Authorities, Welsh Government and the MMO. The dataset is based on sightings and surveillance effort. The various limitations of the data are outlined in **section 1.2.5**. The maps are purely indicative in nature but have been used to supplement the VMS data which does not capture smaller fishing vessels. The indicative fishing activity illustrated has been cross-referenced with knowledge of the local fleets gathered through informal consultations.

1.3.7.17 **Figure 1.48** indicates that static gear activity (<15 m vessels) was relatively low within the inshore parts of the study area. This generally aligns with feedback from fisheries stakeholder consultation and information collected through site-specific surveys (**section 1.3.8**). Activity within the Offshore Order Limits appeared to be relatively low.

1.3.7.18 **Figure 1.49** indicates that mobile gear activity (<15 m vessels) within the inshore areas was highest off the Cumbrian coast and the Welsh coast, which is also evident within the VMS data. Activity within the Offshore Order Limits appeared to be low.

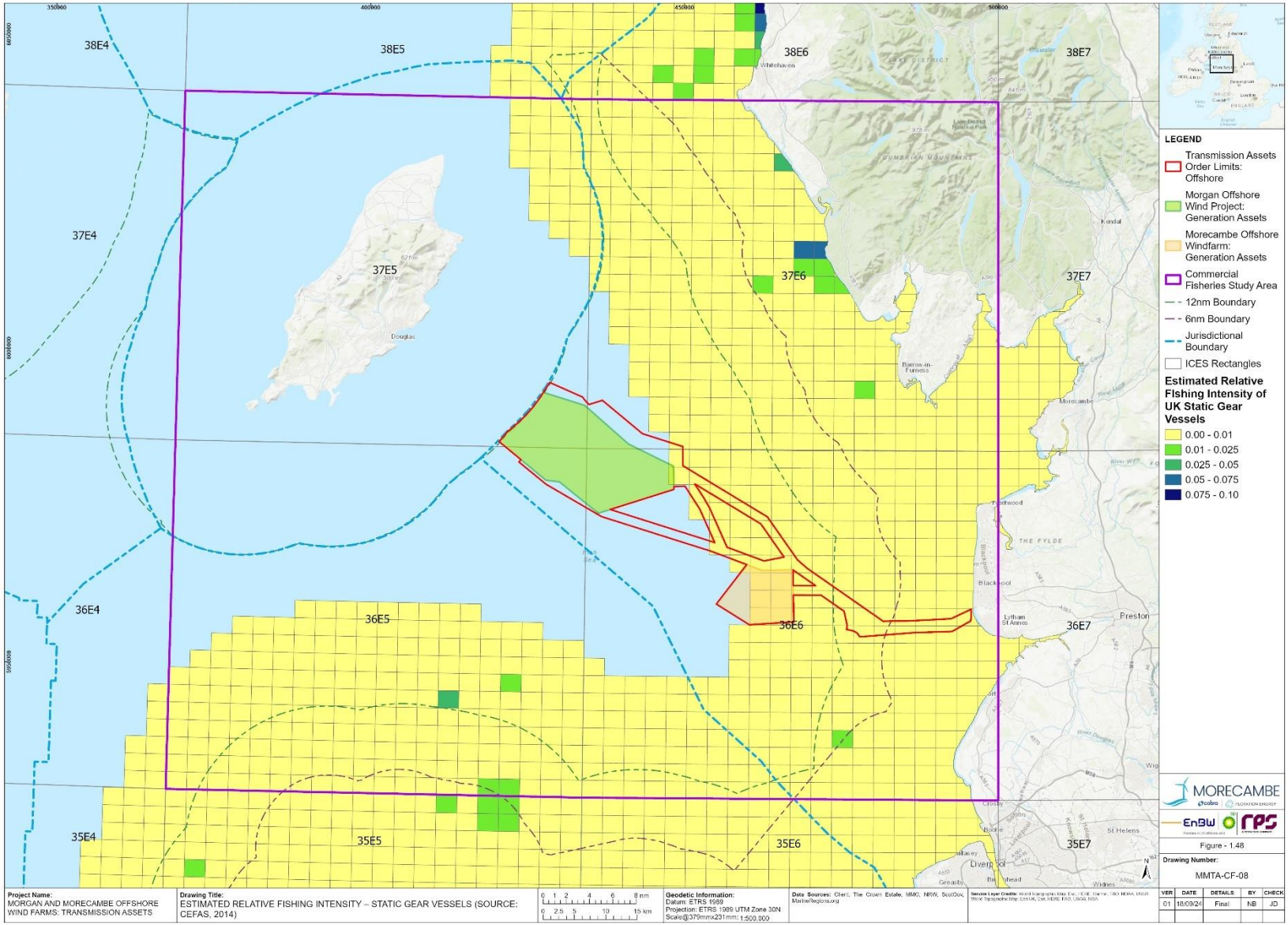


Figure 1.48: Estimated relative fishing intensity – static gear vessels (Source: Cefas, 2014)

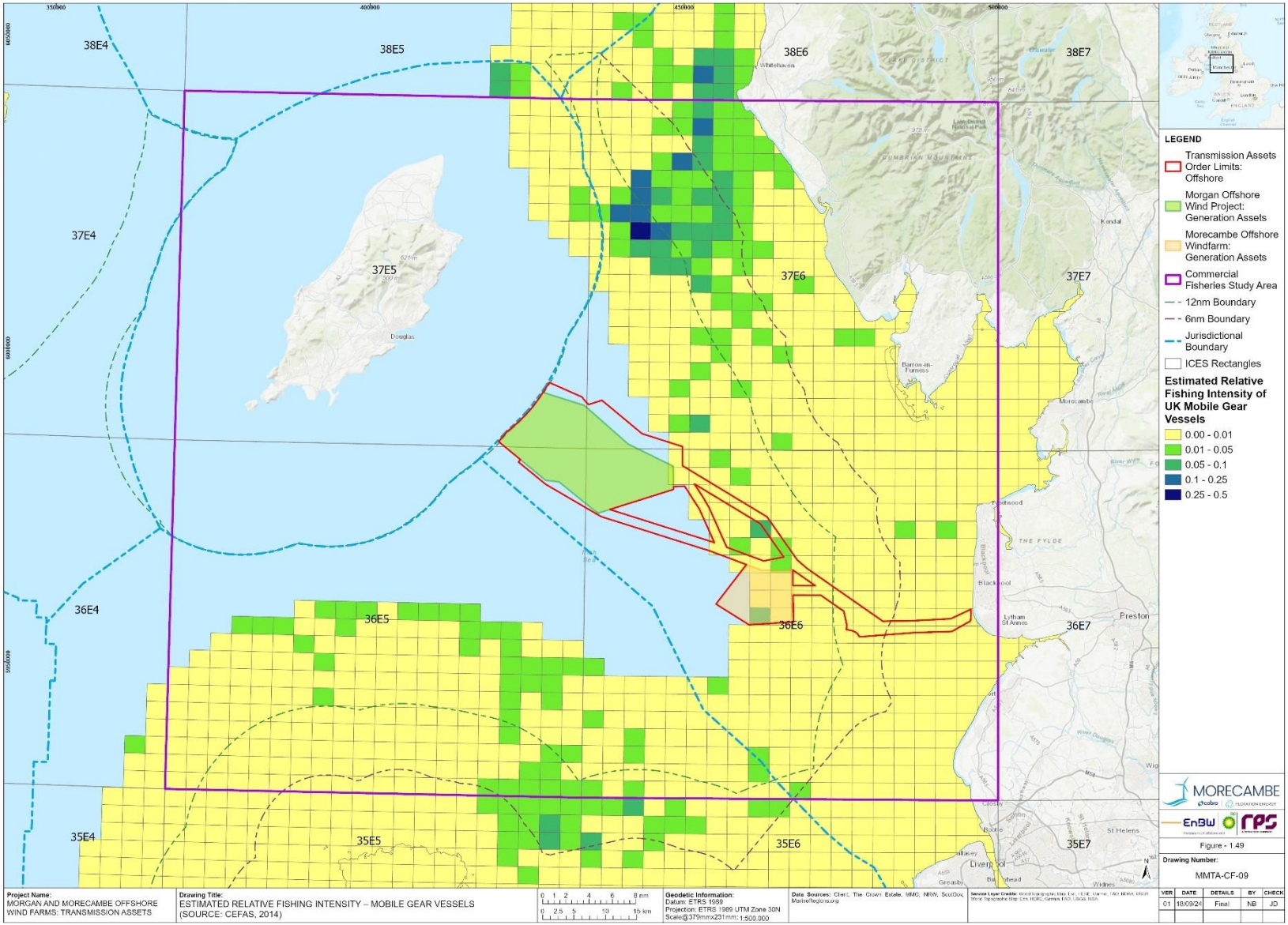


Figure 1.49: Estimated relative fishing intensity – mobile gear vessels (Source: Cefas, 2014)

Isle of Man king scallop dredge and queen scallop trawl/dredge swept area data

1.3.7.19 King scallop and queen scallop swept area (km^2) data between 2017 to 2023 was collated from the Isle of Man Government to provide an overview of the spatial extent of fishing activity within and around Manx territorial waters. All licenced scallop fishing vessels, regardless of size and country of origin, are required to operate a VMS system in Manx Territorial Waters. As such, data for all king scallop (dredge) and queen scallop (otter trawl/dredge) vessel sizes are available, with the dataset not being limited to vessels >15 m, or >12 m in length. The dataset provided are split by Irish Sea (IS) Boxes, which are used to collect data for the Isle of Man Nest Forms Electronic Daily Scallop Catch Return.

1.3.7.20 **Figure 1.50** illustrates that dredge vessels targeting king scallop were active across the Manx Territorial Sea, at varying intensities (2017/18 to 2021/22). Highest intensities can generally be observed within the Isle of Man 12 nm limit and to the north west of the Offshore Order Limits; high levels of activity overlapped with the north west part of the Offshore Order Limits. Lowest levels of activity can be observed beyond the Isle of Man 12 nm limit. It is evident that dredge activity and intensity varies by year, which also corroborates information from fisheries stakeholders, suggesting that the fishery is cyclical over seven to eight year periods.

1.3.7.21 **Figure 1.51** illustrates that activity by dredge and otter trawl vessels targeting queen scallop was generally highest in the south east section of ICES Rectangle 37E5, overlapping with the north west part of the Offshore Order Limits (2018 to 2022). Other areas of relatively high activity can be observed within the Isle of Man Territorial Sea, particularly in areas to the north and south of the Isle of Man. Lowest levels of activity can be observed beyond the Isle of Man 12 nm limit. Activity fluctuated across the time period studied.

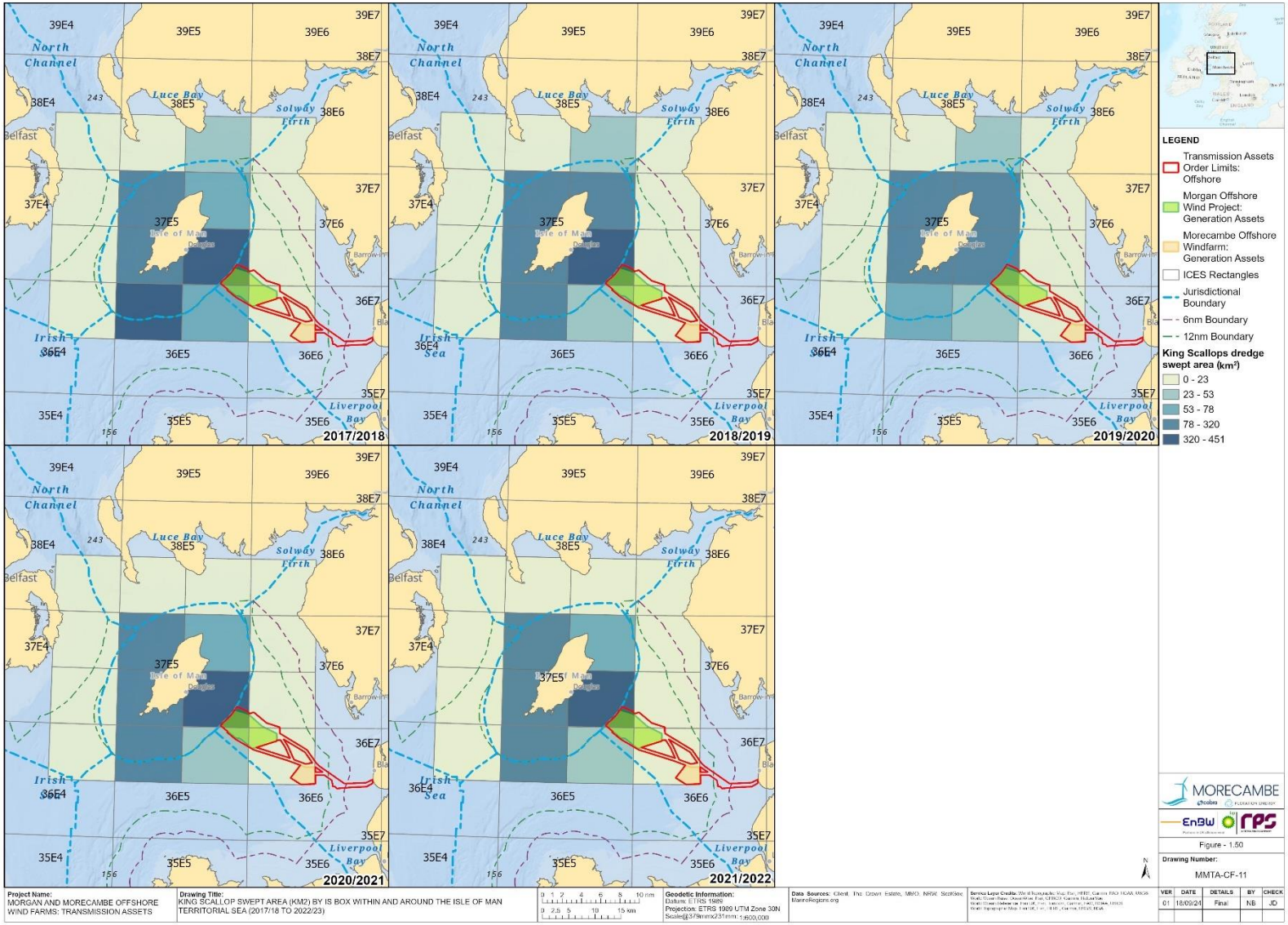


Figure 1.50: King scallop swept area (km^2) by IS Box within and around the Isle of Man Territorial Sea (2017/18 to 2021/22) (Source: DEFA, 2023)

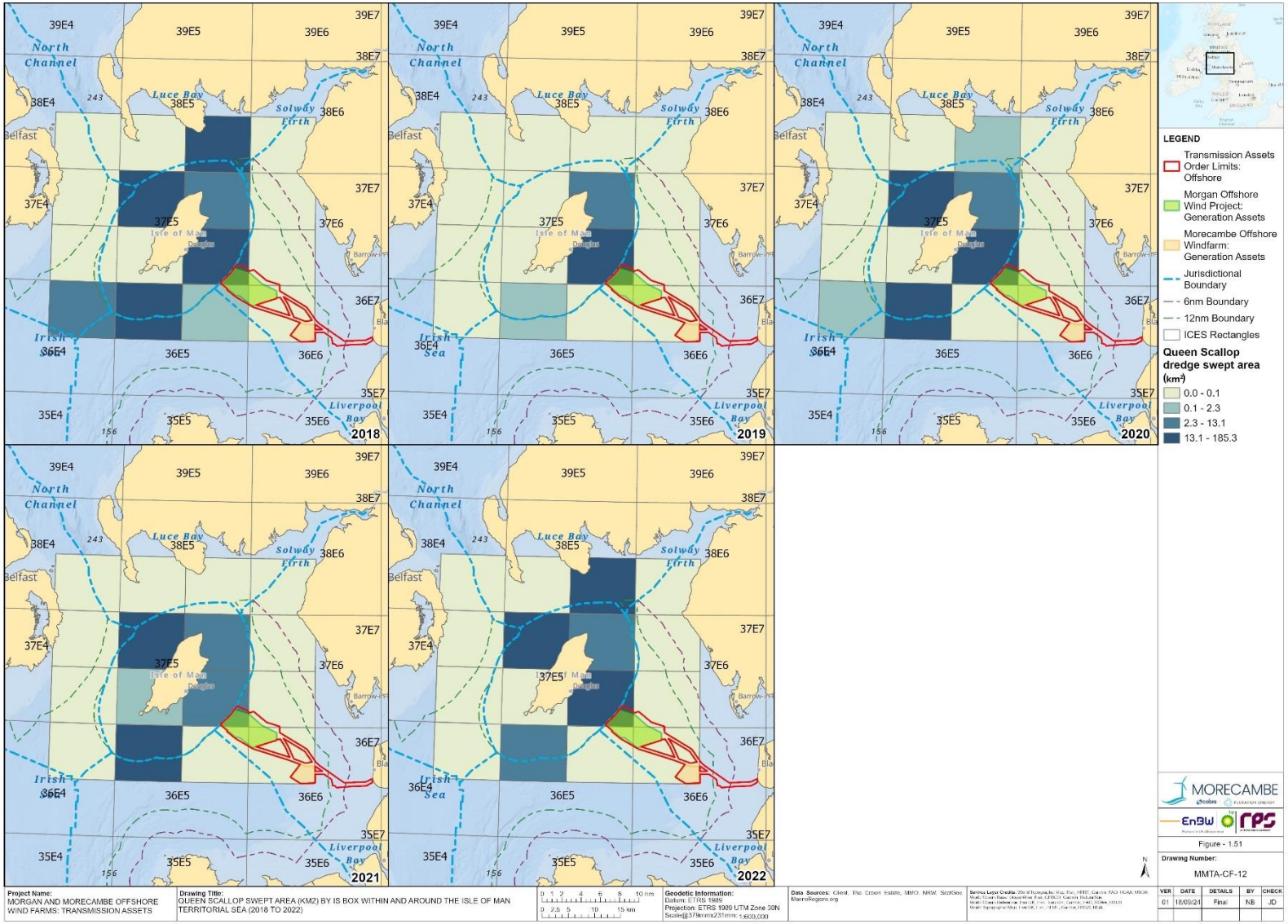


Figure 1.51: Queen scallop swept area (km^2) by IS Box within and around the Isle of Man Territorial Sea (2018 to 2022) (Source: DEFA, 2023)

Isle of Man crab, lobster and whelk pot haul data

1.3.7.22 Combined total crab and lobster pot haul, and whelk pot haul data was collated from the Isle of Man Government. The data was provided at Monthly Shellfish Activity Report (MSAR) square level for 2010 to 2021. MSAR squares only report on activity within ICES Rectangle 37E5, for all Manx registered vessels.

1.3.7.23 **Figure 1.52** illustrates that Isle of Man registered static gear vessels, targeting whelk, were active across ICES Rectangle 37E5 at varying degrees (2010 to 2021). Higher intensities of whelk pot haul effort were observed within the Manx 6 nm limit particularly in areas to the south east of the Isle of Man. Lower levels of activity can generally be observed in all areas of ICES Rectangle 37E5 beyond the Manx 6 nm limit. An overlap of whelk pot haul effort can be observed with the north most part of the Offshore Order Limits, although this is at a relatively low level.

1.3.7.24 **Figure 1.53** illustrates that Isle of Man registered static gear vessels, targeting crab and lobster, were active across ICES Rectangle 37E5 at varying degrees (2010 to 2021). Higher intensities of crab and lobster pot haul effort were observed to the south and west of the Isle of Man, within the Manx 6 nm limit. Lower levels of activity can generally be observed to the west of the Isle of Man and beyond the Manx 6 nm limit. An overlap of crab and lobster pot haul effort can be observed with the north most part of the Offshore Order Limits, although this is at a relatively low level.

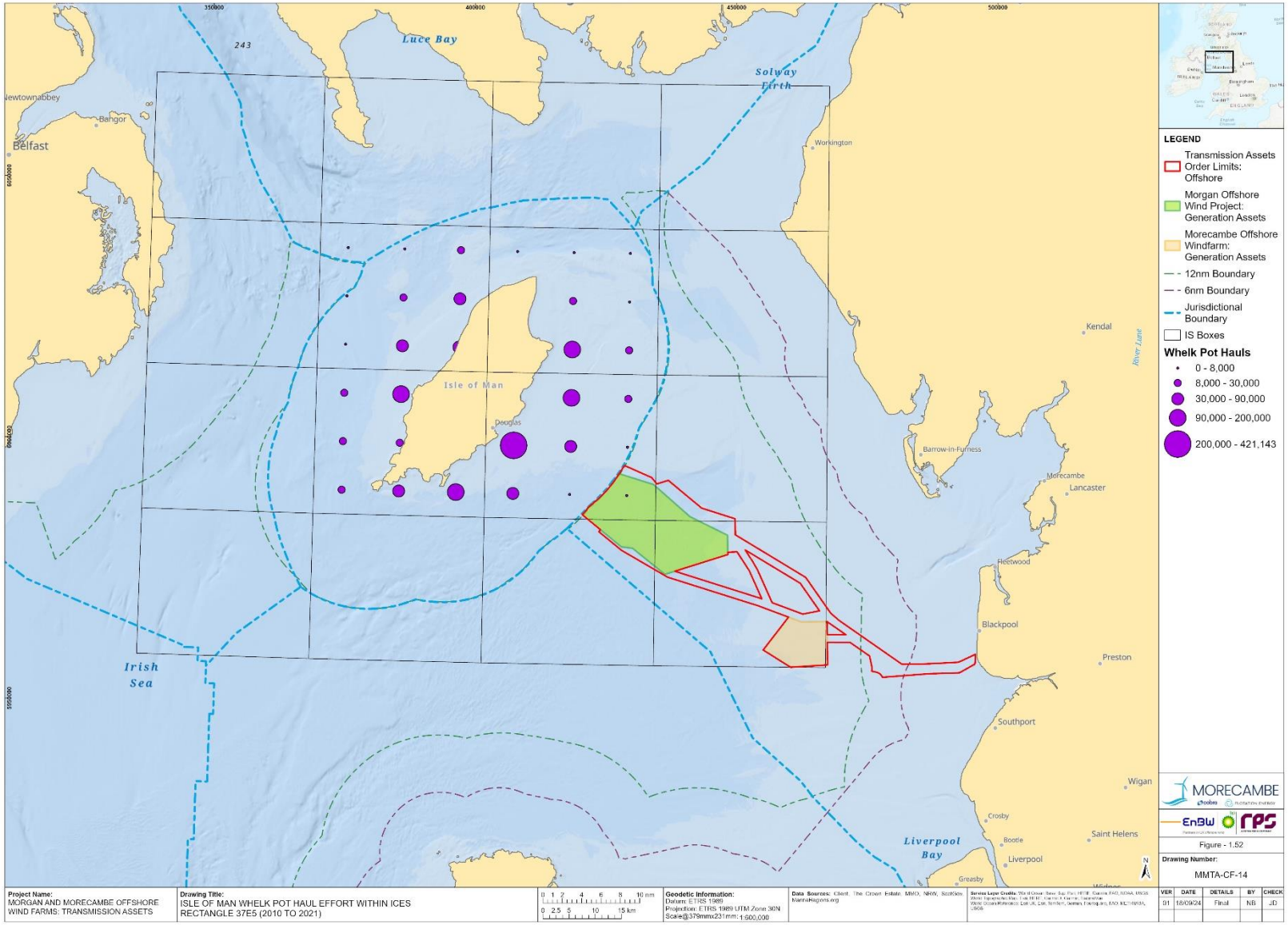


Figure 1.52: Isle of Man whelk pot haul effort within ICES Rectangle 37E5 (2010 to 2021) (Source: DEFA, 2023)

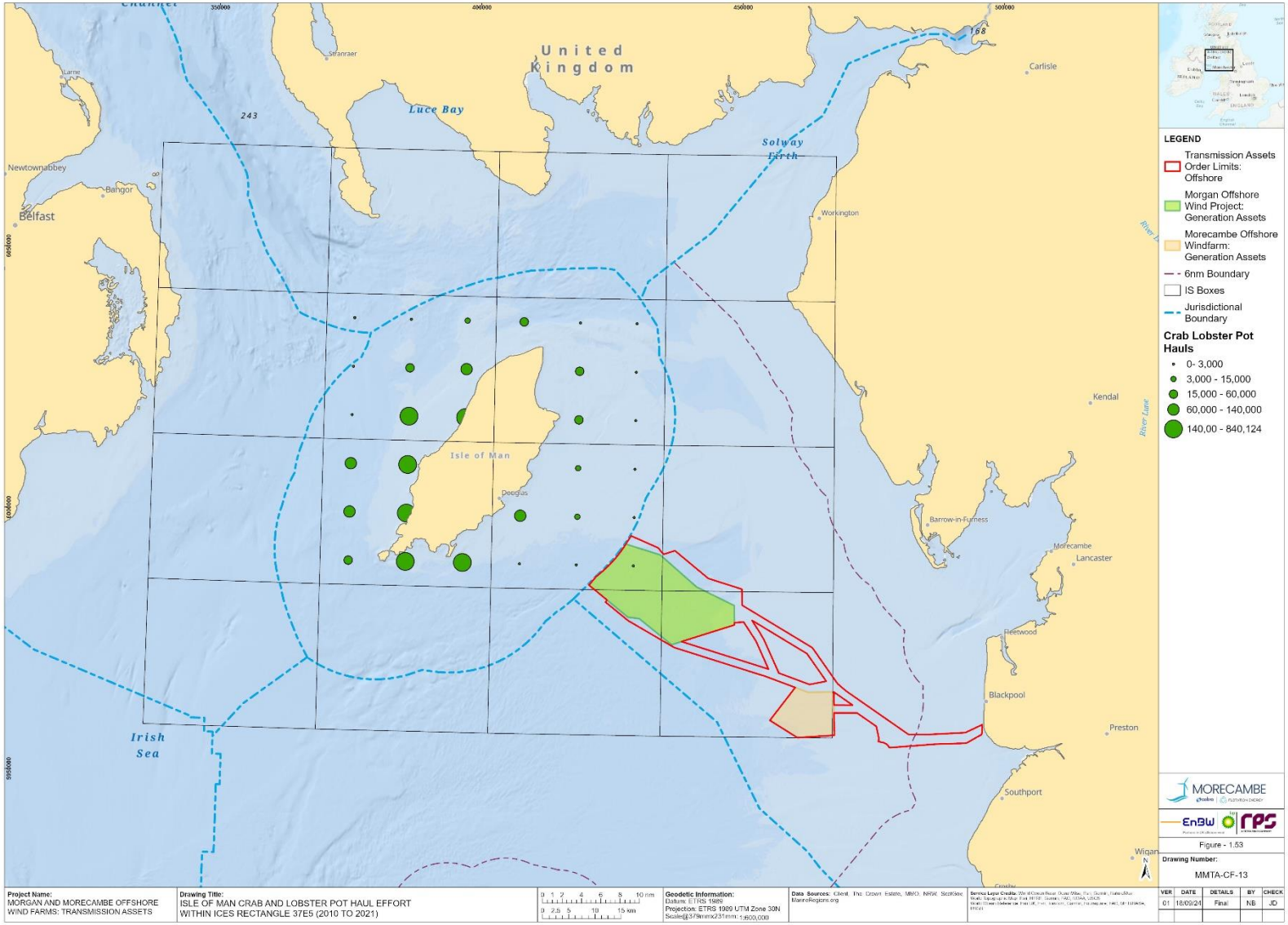


Figure 1.53: Isle of Man crab and lobster pot haul effort within ICES Rectangle 37E5 (2010 to 2021) (Source: DEFA, 2023)

1.3.8 Gear types

Transmission Assets

1.3.8.1 The data interrogated in this study provides information on the types of fishing gear used by the UK and Isle of Man fleets, and non-UK fleets in the study area. Data has been collated for the most recently available 10-year time period: 2012 to 2022 for the MMO data (UK and Isle of Man vessels), and 2006 to 2016 for the EU STECF data (non-UK vessels).

1.3.8.2 The data shows that 12 identifiable gear types were recorded as being used to target fish stocks by UK and Isle of Man vessels, specifically: demersal trawl/seine, pots and traps, otter trawl, pelagic trawl, demersal trawl, beam trawl, drift and fixed nets, gears using hooks, handlines, other mobile gears and other passive gears (MMO, 2023a).

1.3.8.3 Dredges accounted for approximately 54% of total landings by UK and Isle of Man vessels from the study area (**Figure 1.54**). This indicates the importance of the scallop fishery (see **section 1.3.5**). Demersal trawl/seine (targeting demersal dwelling species) were also of notable importance in the study area and consisted mostly of vessels >10 m in length.

1.3.8.4 A total of eight gear types were recorded for non-UK vessels: beam trawls, demersal seines, dredges, gill nets, longlines, otter trawls, pelagic trawls and pots (EU STECF, 2017).

1.3.8.5 For the non-UK vessels, beam trawls and dredges accounted for a large proportion of total landings from the study area (**Figure 1.55**). Similarities in gear types can be observed with the UK and Isle of Man vessels, which predominantly used dredges. The spatial distribution of vessels using the different gear types within the Transmission Assets commercial fisheries is discussed in **section 1.3.7**.

1.3.8.6 As is evident from the landings data for UK, Isle of Man and non-UK vessels, there is a range of fleets targeting different fisheries across the study area. The highest proportion of landings by weight from UK vessels is caught by dredges and pots and traps. For non-UK vessels, the highest proportion of landings by weight is caught by beam trawls and dredges. Further details on the gear types and vessels used within the key fisheries and fleets that operate across the study area are described throughout the following sections.

1.3.8.7 It is worth commenting on the general implications of the results of the gear type analysis. As described below in more detail, the use of dredges and the predominance of landings using fishing vessels >10 m in length, indicates that the seabed supports a range of species that live on or just above the seabed, and the region is important for demersal fish and shellfish. A full description can be found in Volume 2, Chapter 3: Fish and shellfish ecology of the ES; and Volume 2, Annex 3.1: Fish and shellfish ecology technical report of the ES. Additionally, use of these gear types suggests that the seabed across the region has areas of seabed with character conducive to towing bottom fishing gear (i.e. sediment rather than rock), more detail can be found in Volume 2, Chapter 1: Physical processes of the ES.

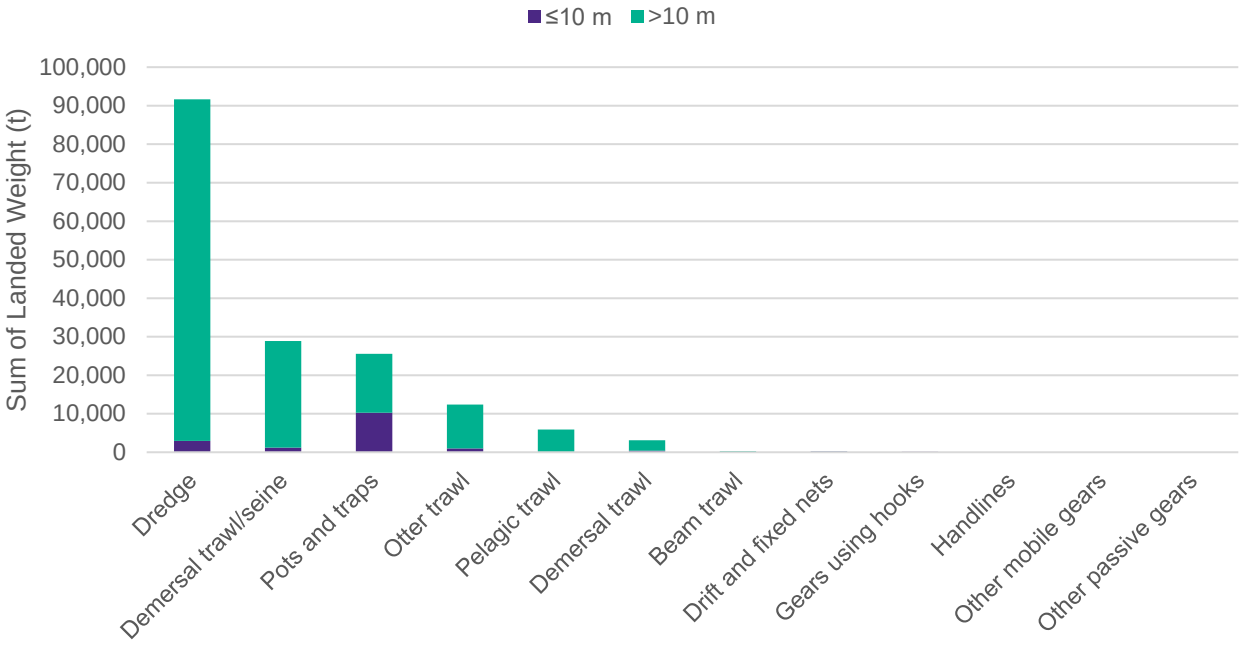


Figure 1.54: Total landings weight by gear type (2012 to 2022) within the Transmission Assets commercial fisheries study area (UK and Isle of Man vessels) (Source: MMO, 2023a)

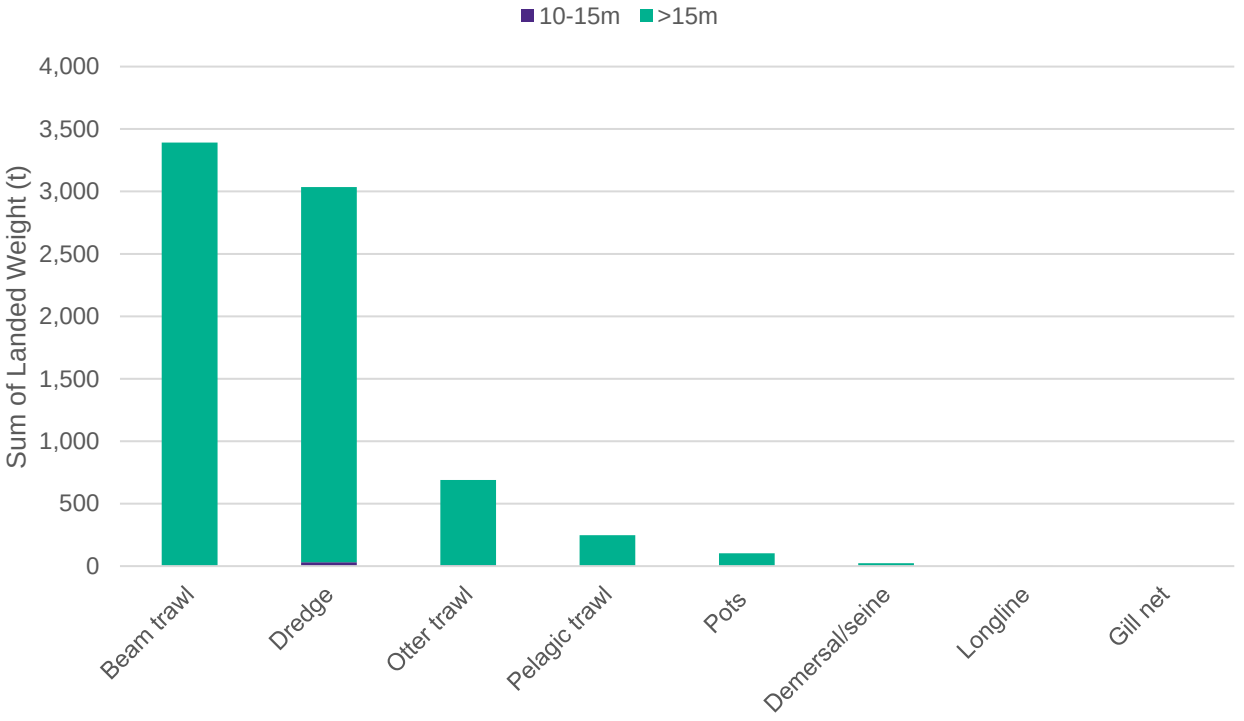


Figure 1.55: Total landings weight by gear type (2006 to 2016) within the Transmission Assets commercial fisheries study area (non-UK vessels) (EU STECF, 2017)

Gear type deployed by nationality

English vessels

1.3.8.8 The data indicates that English vessels utilised a variety of gear types across the study area (**Figure 1.56**). Of the gear types, the use of pots, traps and dredges was most dominant. The data also indicates that ICES rectangle 36E6 was of significant importance to English fleets utilising pots and traps; this likely reflects the whelk fishery, particularly vessels operating out of Fleetwood, which is discussed in **sections 1.3.1**, **1.3.5** and **1.3.6**.

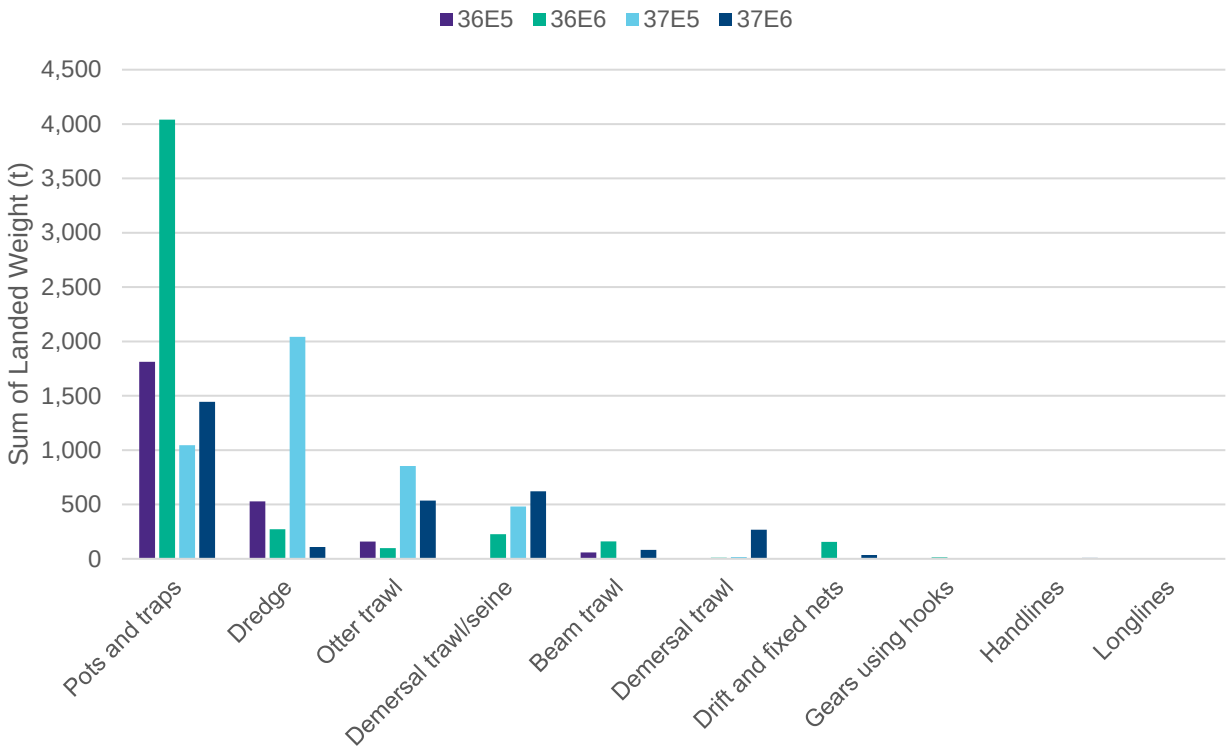


Figure 1.56: Total landings weight from English vessels by gear type (2012 to 2022) within the Transmission Assets commercial fisheries study area (Source: MMO, 2023a)

Isle of Man vessels

1.3.8.9 As expected**, Figure 1.57** illustrates that fleets from the Isle of Man were mostly active within ICES rectangle 37E5, which overlaps with Manx inshore waters. Dredges (targeting king and queen scallop) and pots and traps (targeting crab, lobster and whelk) accounted for the majority of landings. Other notable gear types used by the Manx fleet within the study area were demersal trawl/seine and otter trawl.

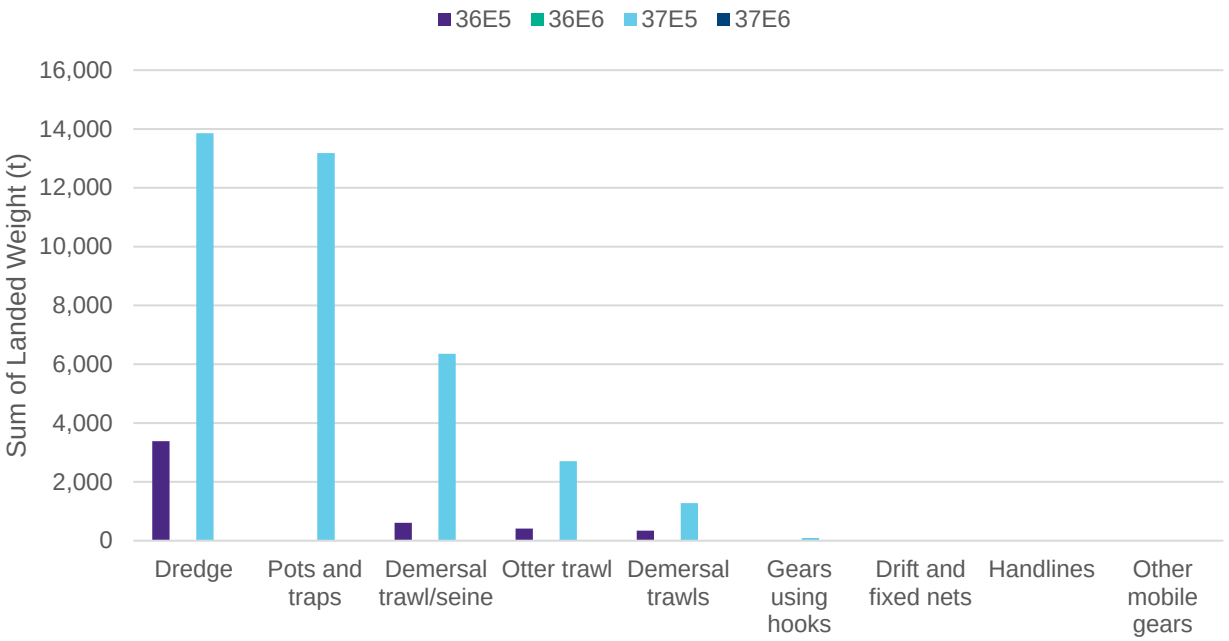


Figure 1.57: Total landings weight from Isle of Man vessels by gear type (2012 to 2022) within the Transmission Assets commercial fisheries study area (Source: MMO, 2023a)

Jersey vessels

1.3.8.10 A Jersey-based vessel showed significantly less variety of deployed gear types than English and Isle of Man vessels (**Figure 1.58**). Data shows that the Jersey vessel caught a relatively low landed weight (t) in comparison with other UK vessels, and only utilised pots and traps within the study area.

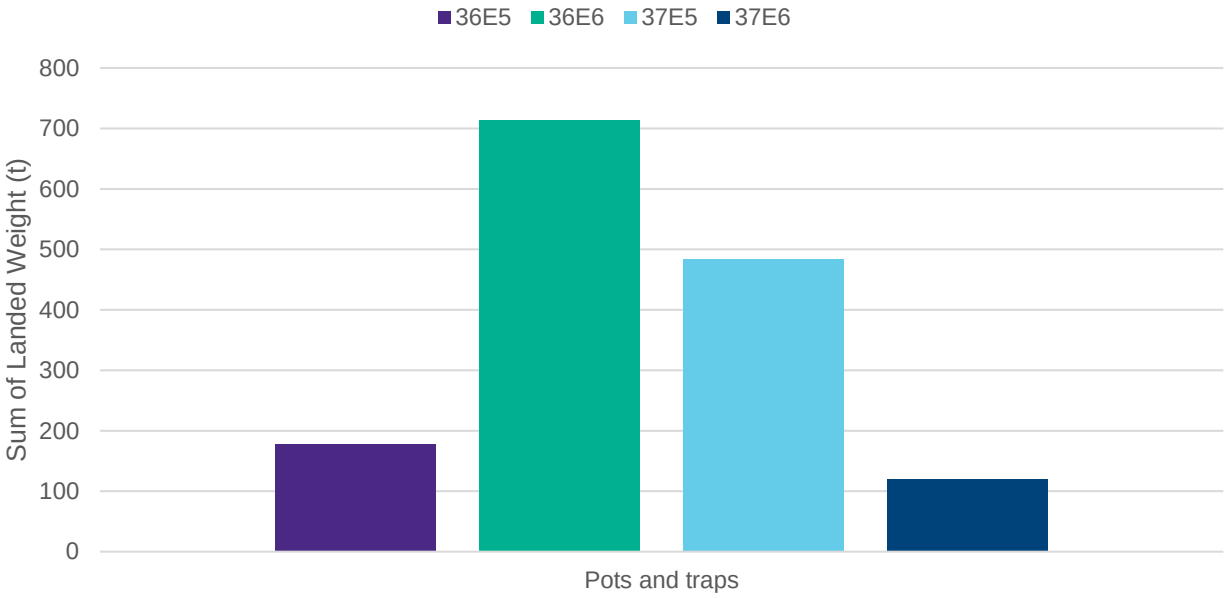


Figure 1.58: Total landings weight from a Jersey vessel by gear type (2012 to 2022) within the Transmission Assets commercial fisheries study area (Source: MMO, 2023a)

Northern Irish vessels

1.3.8.11 Northern Irish vessels were mostly active within ICES rectangle 37E5. Of the gear types, demersal trawl/seine, dredge and otter trawl were most dominant (**Figure 1.59**).

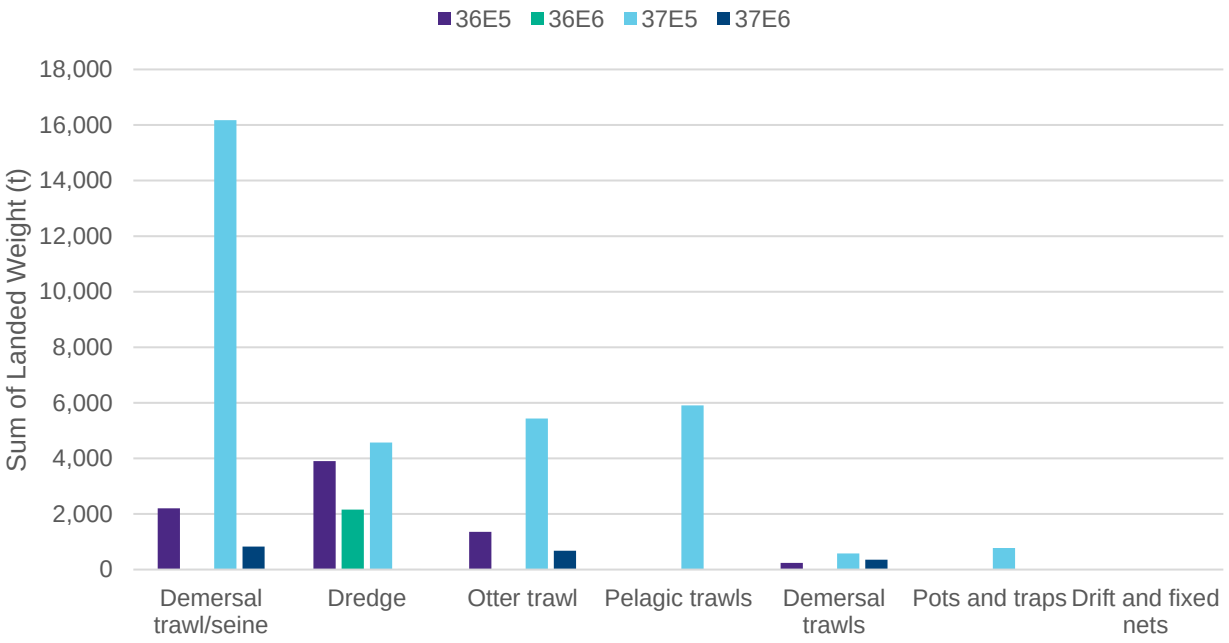


Figure 1.59: Total landings weight from Northern Irish vessels by gear type (2012 to 2022) within the Transmission Assets commercial fisheries study area (Source: MMO, 2023a)

Scottish vessels

1.3.8.12 Dredge vessels accounted for the majority of landings for the Scottish fleet active within the study area (**Figure 1.60**). Scottish vessels landed a significantly greater weight than vessels from other parts of the UK, particularly within ICES rectangle 36E5, highlighting the commercial importance of the region to Scottish vessels targeting king and queen scallop.

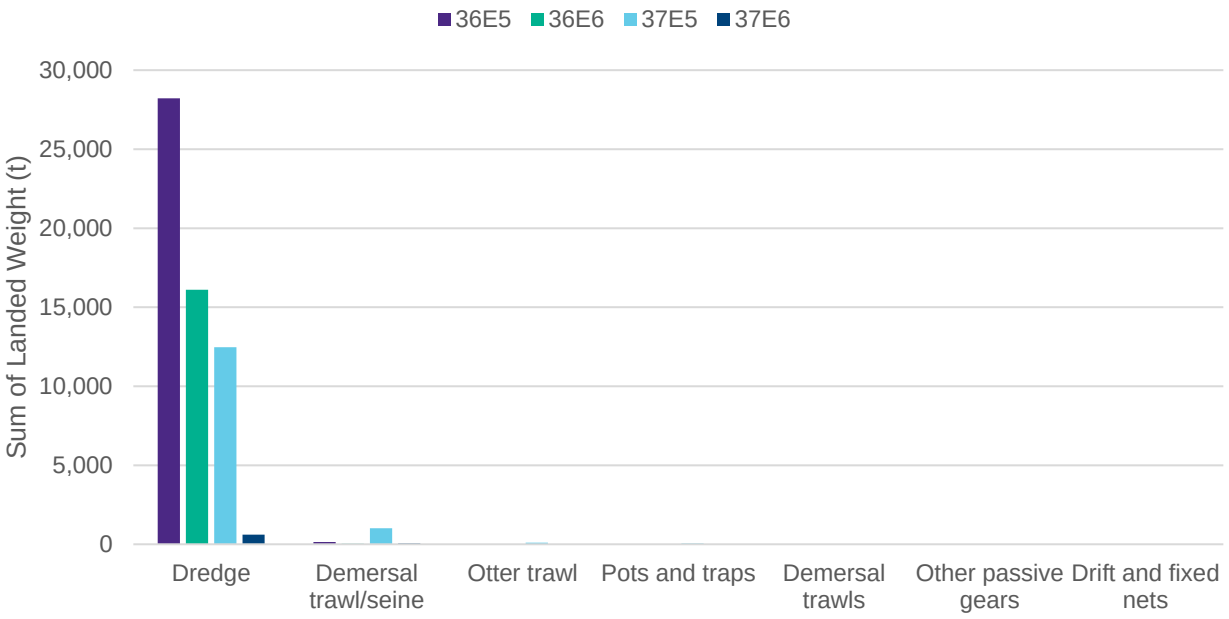


Figure 1.60: Total landings weight from Scottish vessels by gear type (2012 to 2022) within the Transmission Assets commercial fisheries study area (Source: MMO, 2023a)

Welsh vessels

1.3.8.13 Pots and traps and dredges were the dominant gear type used by the Welsh fleet across ICES rectangles, notably within ICES rectangle 36E5, which is north of Anglesey (**Figure 1.61**).

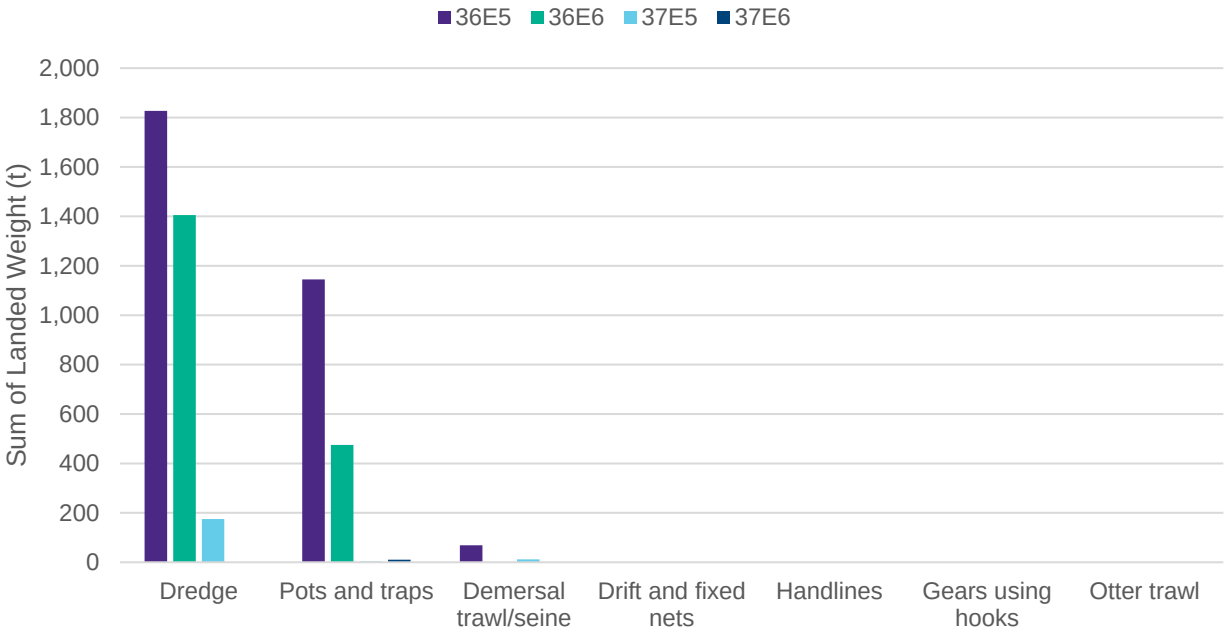


Figure 1.61: Total landings weight from Welsh vessels by gear type (2012 to 2022) within the Transmission Assets commercial fisheries study area (Source: MMO, 2023a)

Belgian vessels

1.3.8.14 The data indicates that Belgian vessels almost exclusively utilised beam trawls across the study area (**Figure 1.62**), suggesting that the Belgian fleet is targeting demersal species. Beam trawls are known to catch a wide variety of bottom dwelling fish which would result in a varied catch containing flatfish, gadoids, and cartilaginous species, aligning with findings of Belgian landing weights by species in **section 1.3.5**.

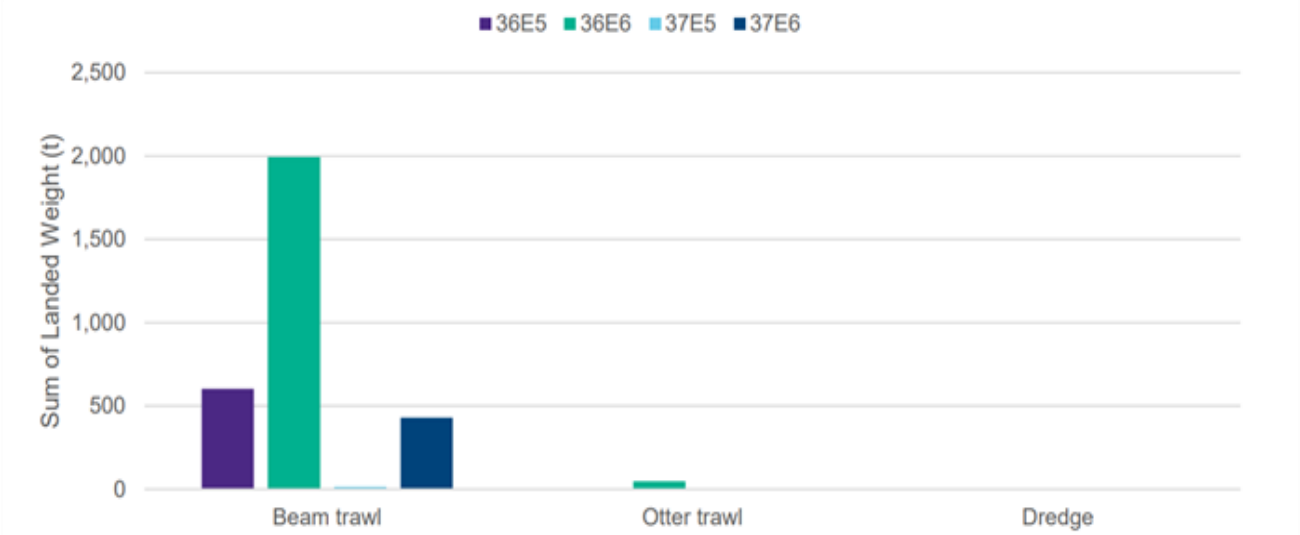


Figure 1.62: Total landings weight from Belgian vessels by gear type (2006 to 2016) within the Transmission Assets commercial fisheries study area (Source: EU STECF, 2017)

French vessels

1.3.8.15 French vessels caught a very low weight (t) of fish in comparison with other non-UK vessels. Data shows that French vessels only utilise pots within the study area and are only active in ICES rectangle 36E6.

Irish vessels

1.3.8.16 The Irish fleet showed a variety of gear types, with the utilisation of dredges (targeting king and queen scallop) in ICES rectangle 36E5 being the most prominent (**Figure 1.63**). Otter trawl, beam trawl, demersal seine, pelagic trawl and pots were also used by the Irish fleet within the study area.

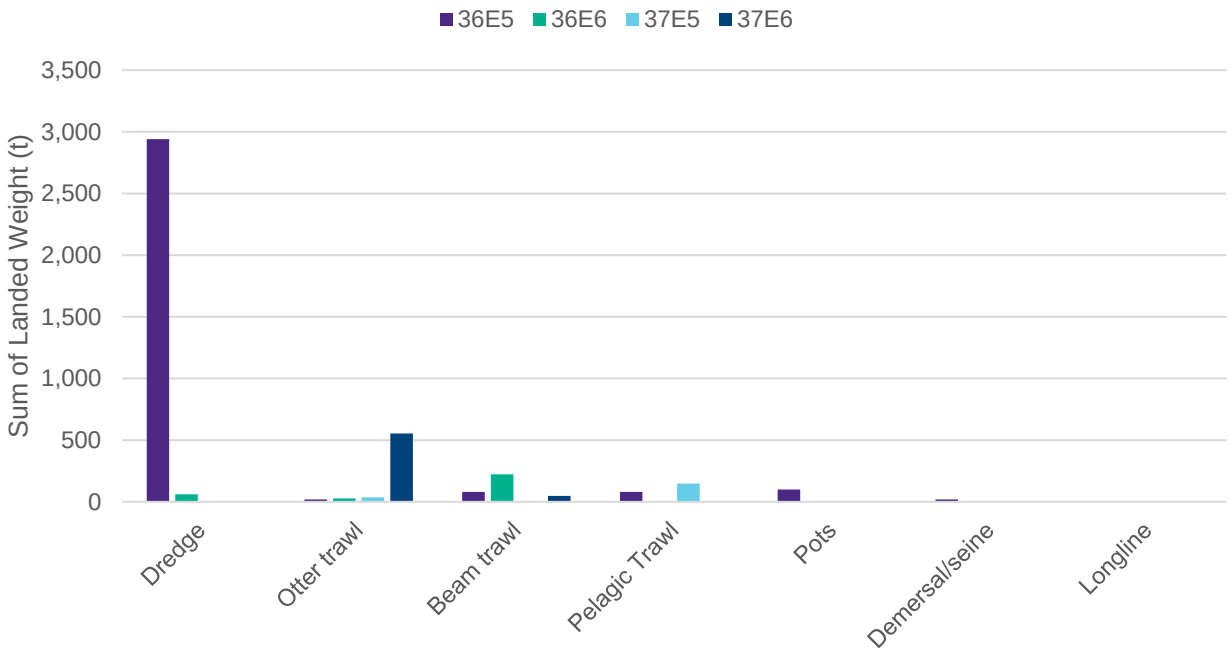


Figure 1.63: Total landings weight from Irish vessels by gear type (2006 to 2016) within the Transmission Assets commercial fisheries study area (Source: EU STECF, 2017)

Dutch vessels

1.3.8.17 The total landings by Dutch vessels in the study area were significantly lower in comparison to Belgian and Irish vessels. Dredges and pelagic trawls were the dominant gear type used by the Dutch fleet, notably within ICES rectangle 36E5 (**Figure 1.64**). No activity was recorded in ICES rectangle 37E5.

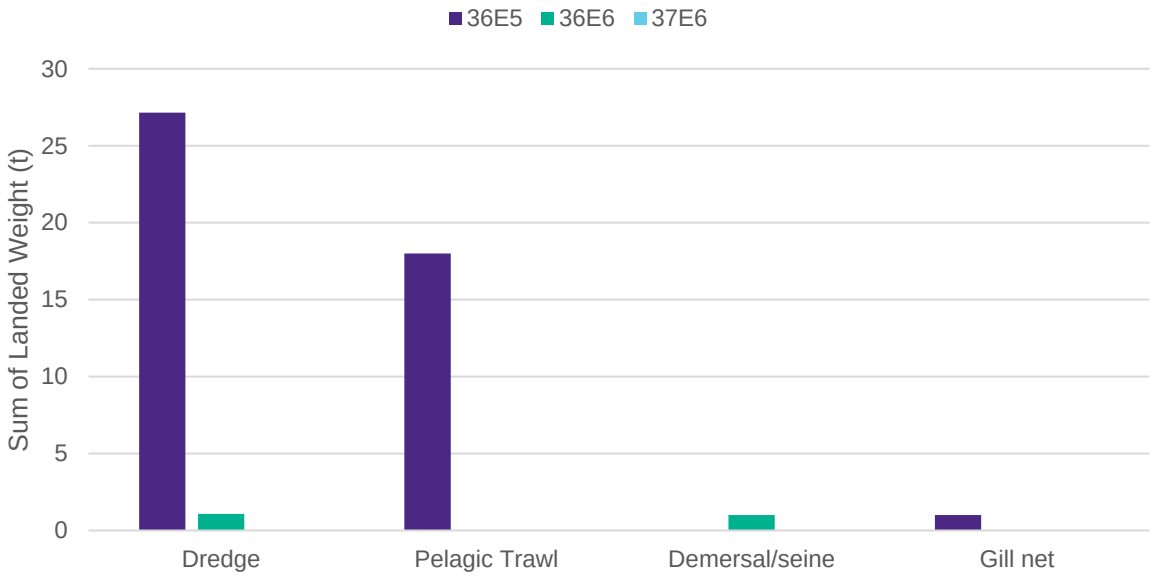


Figure 1.64: Total landings weight from Dutch vessels based on gear type (2006 to 2016) within the Transmission Assets commercial fisheries study area (Source: EU STECF, 2017)

Gear Types

Dredge

1.3.8.18 Dredges consist of rigid structures that target numerous species of shellfish through towing along the seabed (**Figure 1.65** and **Figure 1.66**). Within the study area, queen and king scallop are both caught by vessels deploying dredges, although due to the differences in behaviour between the two species, slightly different gear types may be used for them.

1.3.8.19 Scallop dredging is generally undertaken by larger vessels (>10 m in length), due to the engine capacity required to tow such a gear type along the seabed. Scallops are also caught by otter trawl vessels, as discussed in **paragraph 1.3.6**.

1.3.8.20 Restrictions on dredging activity differ between regional and national authorities and with distance of the activity from the shore. Vessels operating inshore are limited to the number of dredges, whereas vessels operating offshore may use a high number of dredges.

1.3.8.21 King scallops are generally fished by vessels operating Newhaven dredges, which comprise a triangular frame with a toothed lead bar that penetrates the seabed to scare or flip king scallop up and into a collecting bag behind. A number of these dredges are pulled behind a spreading bar either side of a vessel. Scallop vessels operating within the area have been observed to have between approximately 12 to 36 dredges in total.

1.3.8.22 Generally, queen scallop outside of Isle of Man waters are targeted using skid dredges (or otter trawls as discussed below in **paragraph 1.3.8.27**), which operate in a similar way as the toothed dredges targeting king scallop. However, with the skid dredges, a tooth bar is replaced with a ‘tickler chain’ which disturbs queen scallop resting on the seafloor, causing them to swim upwards into the water column where they can be caught by the dredge.

1.3.8.23 Tow directions are influenced by a range of factors, including the tide and weather. Within the north region of the Offshore Order Limits, tows by dredge vessels are generally north to south (established via commercial fisheries stakeholder consultation, summarised in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES). McNab and Nimmo (2021) found that within the Irish Sea region, dredge vessels typically tow their gear at a speed of 2 to 6 knots (kn) and have a vessel length from 10 m to 25 m.

1.3.8.24 The penetration depth of a typical Newhaven dredge is approximately 3 to 30 cm, but this varies with sediment type (Kaiser *et al*., 1996; Grieve *et al*., 2014; Eigaard *et al*., 2016). The Applicants, engaged with fisheries groups, via questionnaires for the Morgan Offshore Wind Project: Generation Assets, on their gear penetration depth within the study area (as summarised in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES.

1.3.8.25 Feedback from the questionnaires found that skid dredges targeting queen scallop have a maximum penetration depth of 20 cm, whereas dredges targeting king scallop have a maximum penetration depth of 30 cm (although this is dependent on seabed substrate).

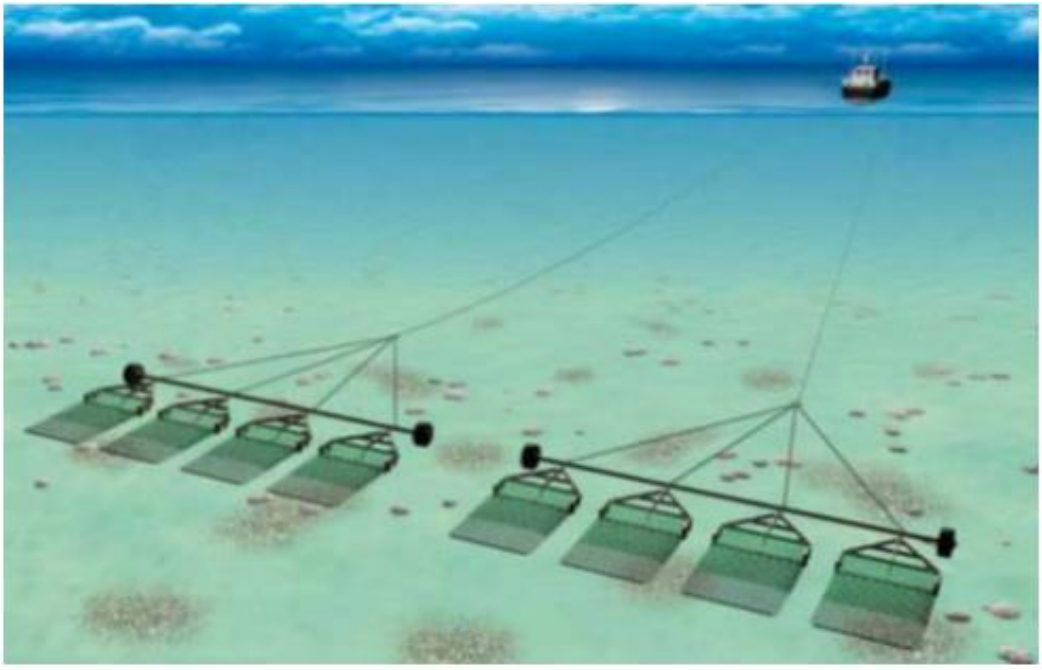


Figure 1.65: Typical dredge gear configuration (Source: Seafish, 2022)

Figure 1.66: Scallop dredge vessel example (Source: MarineTraffic, 2022)

Demersal trawls

1.3.8.26 Demersal trawls consist of cone-shaped nets that are towed along the seabed to target demersal fish species (Figure 1.67 and **Figure 1.68**). The mouth of the trawl is spread and held open by a pair of adjacent trawl doors

that possess bridles. These bridles are located between the wing-end of the net and the trawl doors, allowing for great areas of seabed to be trawled. These bridles can range from 0 m to 300 m in length, depending upon the seabed substrate and the target species. Demersal fish species are encouraged between the trawl doors, into the mouth of the trawl and along a funnel into the end (the 'cod-end') of the net. A range of net mesh sizes can be utilised to target different demersal species.

1.3.8.27 Otter trawl gears are used to target queen scallop, particularly by vessels from the Isle of Man, and to target *Nephrops*. This method, similar to skid dredges, targets queen scallop which are more active swimmers than king scallop. Queen scallop are generally caught during the summer months when water temperatures are higher and they are most active (Jenkins *et al*., 2003). The typical towing speed varies with ground, tidal and weather conditions, but is generally between 2 to 3 kn (Bloor *et al*., 2015).

1.3.8.28 McNab and Nimmo (2021) found that within the Irish Sea region, vessels deploying otter trawls typically tow their gear at a speed of 2 to 6 kn, while the majority of vessels have a vessel length of <10 m.

1.3.8.29 The Applicants engaged with fisheries groups, via questionnaires for the Morgan Offshore Wind Project: Generation Assets, on their gear penetration depth within the study area (as summarised in Table 6.3 of Volume 2, Chapter 6: Commercial Fisheries of the ES. Results found that vessels using otter trawls used to target scallops have a penetration depth ranging from approximately 5 cm to 10 cm.

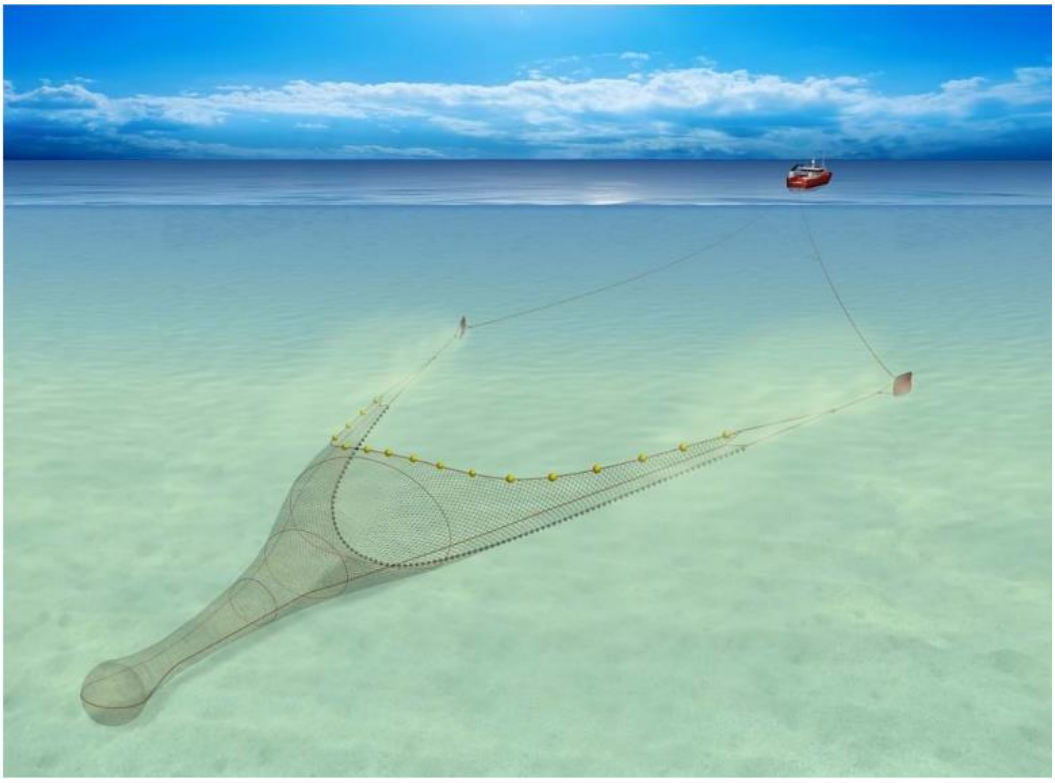


Figure 1.67: Typical demersal trawl gear configuration (Source: Seafish, 2022)

Figure 1.68: Example demersal trawl vessels (Source: MarineTraffic, 2022)

Pots and traps

1.3.8.30 The shape, size and number of pots and traps used by vessels varies depending on the target species, size of vessel and seabed substrate. Surface markers used include cans, buoys and flagged dhan buoys (**Figure 1.69**).

1.3.8.31 Pots used to catch whelk often comprise a weighted plastic drum (**Figure 1.70**). The number of whelk pots deployed is, generally, higher than for crab and lobster on a like-for-like basis but depends on the exact area fished and vessel size. Whelk vessels operating (**Figure 1.70**) within the study area, may be working strings of approximately 100 pots, whereas vessels targeting crab and lobster, will have strings of approximately 25 to 50 pots.

1.3.8.32 Parlour pots are generally utilised for the capture of crab and lobster. The design of these pots typically consists of a steel rod, D-shaped in sections, enclosed in netting and protected with rubber strips.

1.3.8.33 McNab and Nimmo (2021) found that within the Irish Sea region, vessels deploying pots and traps typically haul their gear at a speed of 0 to 9 kn and have vessel lengths of both >10 m and ≤10 m.

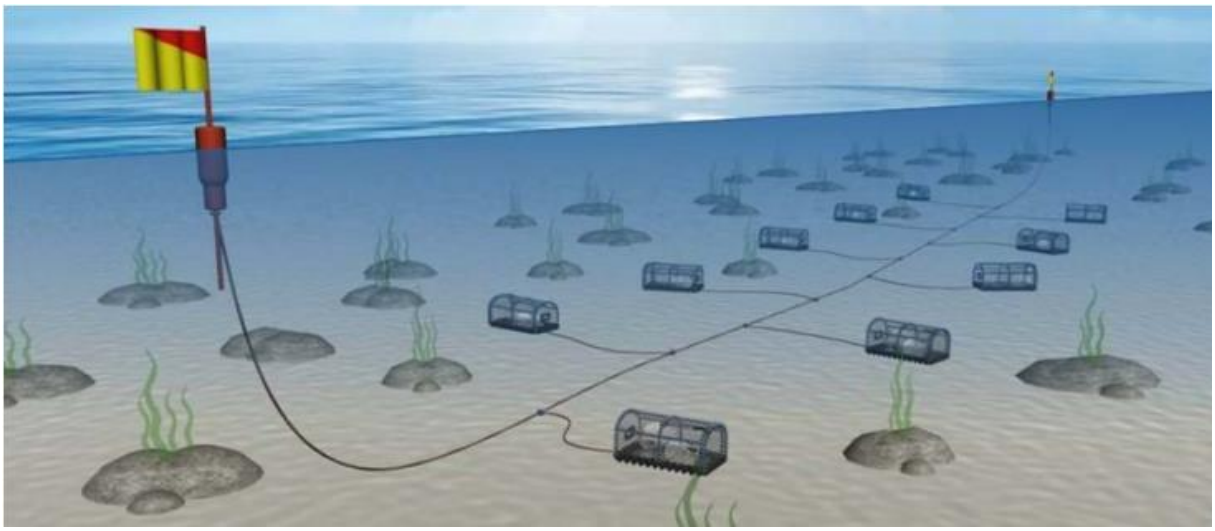


Figure 1.69: Typical potting gear configuration (Source: Seafish, 2022)

Figure 1.70: Typical whelk pot and whelk vessel (Source: Seafish, 2022; and MarineTraffic, 2022)

Beam trawls

1.3.8.34 Beam trawls consist of nets that are held open by a heavy tubular steel beam, which are towed along the seabed. Most beam trawls tow two beams at a time **(Figure 1.71**). Beam trawling catches a wide range of bottom dwelling species and has the potential to catch a variety of non-target bycatch.

1.3.8.35 Beam trawls may use tickler chains, which are attached at the front of the net and slide along the seabed to disturb species of fish within their path, encouraging them to rise into the net behind.

1.3.8.36 McNab and Nimmo (2021) found that within the Irish Sea region, vessels deploying beam trawls typically tow their gear at a speed of 3.5 to 8 kn, while

the majority of vessels have a vessel length of <10 m (**Figure 1.72**). Towing directions vary depending on a range of factors, including tidal and weather conditions.

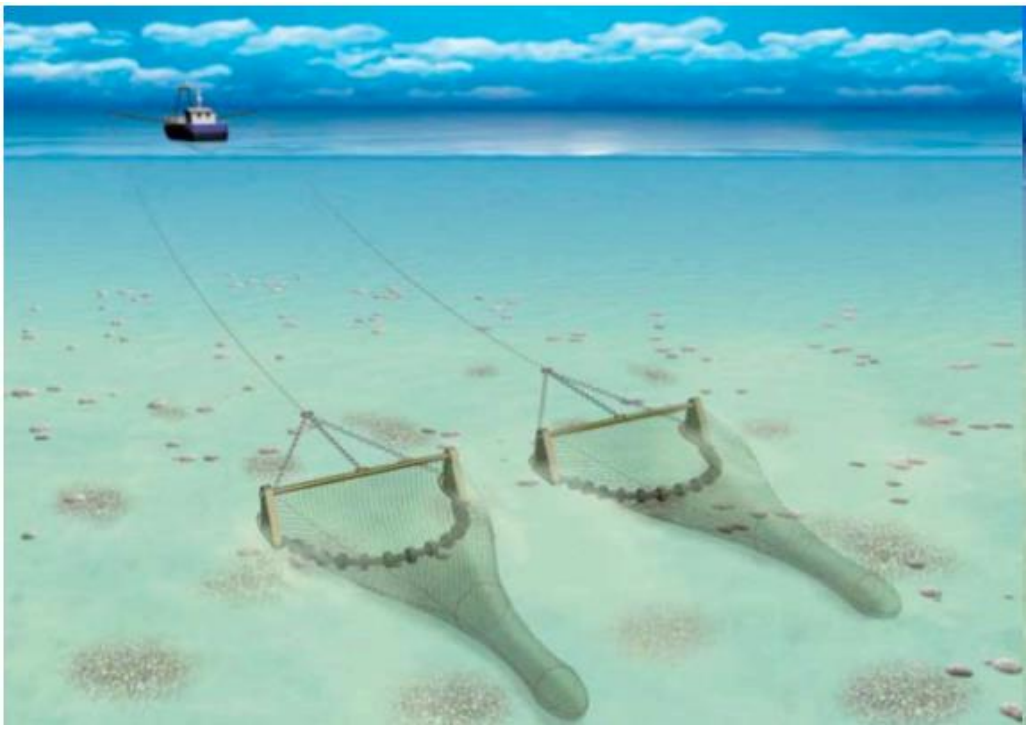


Figure 1.71: Typical beam trawl gear configuration (Source: Seafish, 2022)

Figure 1.72: Beam trawl vessel example (MarineTraffic, 2022)

1.4 Site-specific surveys

1.4.1 Overview

1.4.1.1 To complement the official commercial fisheries landings and activity data described in the previous sections, the following sections provide additional information on commercial fishing activity within the study area, along with details of how these additional data were collated.

1.4.1.2 As the Offshore Order Limits encompasses the Generation Assets, results from vessel traffic surveys specific to the Generation Assets have been included in **section 1.4.3** and **section 1.4.4** to provide further context to commerical fishing activity within and in proximity to the Offshore Order Limits.

1.4.1.3 A summary of the surveys undertaken to inform commercial fisheries is outlined in **Table 1.4** below.

Table 1.4: Summary of surveys undertaken to inform commercial fisheries

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Offshore Fisheries Liaison Officer (OFLO) observations 2021	Transmission Assets commercial fisheries study area plus 10 nm buffer.	OFLO onboard the survey vessel recorded observations (from AIS, radar, visual observations and radio communications) of fishing vessels and fishing gear present.	NFFO	30 June 2022 to 18 September 2022	**Figure 1.75**
Winter vessel traffic survey 2021	Morgan Offshore Wind Project: Generation Assets, plus a 10 nm buffer.	AIS and radar.	NASH Maritime	21 November 2021 to 4 December 2021	Morgan Offshore Wind Project: Generation Assets commercial fisheries technical report and Navigational Risk Assessment of the ES. **Table 1.5**.
Winter vessel traffic survey 2022	Morecambe Offshore Windfarm Generation Assets, plus a 10 nm buffer.	A summary of fishing vessels identified during a project-specific winter 2022 vessel traffic surveys.	NASH Maritime	9 February 2022 to 26 February 2022	Morecambe Offshore Windfarm: Generation Assets commercial fisheries technical report. **Section 1.4.4.**
Scouting survey	Defined area within the Transmission Assets Scoping Boundary.	Recordings of static gear.	NFFO	6 March 2022 to 13 March 2022	**Paragraph 1.4.5.13**.

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Summer vessel traffic survey 2022	Morgan Offshore Wind Project: Generation Assets plus a 10 nm buffer.	AIS and radar.	NASH Maritime	15 July 2022 to 29 July 2022	Morgan Offshore Wind Project: Generation Assets commercial fisheries technical report and Navigational Risk Assessment of the ES. **Table 1.5**.
Summer vessel traffic survey 2022	Morecambe Offshore Windfarm Generation Assets, plus a 10 nm buffer.	A summary of fishing vessels identified during a project-specific summer 2022 vessel traffic survey.	NASH Maritime	30 July 2022 to 13 August 2022	Morecambe Offshore Windfarm: Generation Assets commercial fisheries technical report. **Section 1.4.4.**
OFLO observations 2022	Transmission Assets commercial fisheries study area plus 10 nm buffer.	OFLO onboard the survey vessel recorded observations s (from AIS, radar, visual observations and radio communications) of fishing vessels and fishing gear present.	NFFO	1 April 2022 to 10 July 2022	**Figure 1.75**
MarineSpace observations 2022	Transmission Assets commercial fisheries study area plus 10 nm buffer.	Fisheries monitoring using Automatic Identification System data.	MarineSpace	July 2022 to September 2022	**Figure 1.75**
Spring vessel traffic survey 2023	Morgan Offshore Wind Project: Generation Assets plus 10 nm	AIS and radar.	NASH Maritime	4 May 2023 to 18 May 2023	Morgan Offshore Wind Project: Generation Assets commercial fisheries technical report and Navigational Risk Assessment of the ES. **Table 1.5.**
Summer vessel traffic survey 2023	Morgan and Morecambe Offshore Wind Farms: Transmission Assets	AIS and radar.	NASH Maritime	3 August 2023 to 17 August 2023	**Figure 1.73**
Morgan Generation Assets top up vessel	Morgan Offshore Wind Project: Generation	AIS and radar.	NASH Maritime	11 November 2023 to 27 November 2023	Morgan Offshore Wind Project: Generation Assets commercial fisheries technical report

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
traffic survey 2023	Assets plus 10 nm				and Navigational Risk Assessment of the ES. **Table 1.5**.
Winter vessel traffic survey 2023	Morgan and Morecambe Offshore Wind Farms: Transmission Assets	AIS and radar.	NASH Maritime	28 November 2023 to 13 December 2023	**Figure 1.74**

1.4.2 Methodology

1.4.2.1 NASH Maritime were commissioned to undertake two 14-day marine traffic surveys of the Morgan Offshore Wind Project: Generation Assets, in November and December 2021 and June to July 2022, and two 14-day marine traffic surveys of the Morecambe Offshore Windfarm: Generation Assets in February 2022 and August 2022. Additional 14-day marine traffic surveys were undertaken for the Morgan Offshore Wind Project: Generation Assets by NASH Maritime in May 2023 and November 2023. These were undertaken to address concerns raised by shipping and navigation stakeholders in the area between the Morgan Offshore Wind Project: Generation Assets and the Isle of Man.

1.4.2.2 NASH Maritime were also commissioned to undertake two 14-day marine traffic surveys specific to the Transmission Assets in August 2023 and November and December 2023.

1.4.2.3 These marine traffic surveys were commissioned to inform the Navigation Risk Assessment (NRA) being undertaken as part of wider EIA studies. In addition to visual records collected via these surveys, Automatic Identification System (AIS) and radar data were also collected from the same time periods to supplement the visual observations. AIS data included information on date, average speed, destination, ship name, ship category, length and draft. Radar data included information on vessel type and date. Although these data were collated during different seasons to account for seasonal variation and peak times in marine traffic and fishing activity, it is limited by the short time period captured. Therefore, it has only been used to supplement the official datasets and feedback from consultation with fisheries stakeholders. This data has been assessed with medium confidence.

1.4.2.4 An OFLO was present on the offshore geophysical, environmental and geotechnical survey vessels during the 2021 and 2022 survey operations. During 2021, only the Morgan Offshore Wind Project: Generation Assets, plus a 3 km buffer, was surveyed. During the 2022 surveys, the Morgan Offshore Wind Project: Generation Assets (plus a buffer of varying distances) and a defined area within the Offshore Order Limits were surveyed. The OFLO provided a Daily Progress Report (DPR) with information on the presence of any fishing vessels, fishing vessel type, location of vessel, name of vessel and whether the vessels were transiting or not. This data is only provided as point data, so it does not show individual fishing vessel tracks.

This data is also limited by the time period captured and the limited areas captured, so it has been used to supplement other datasets. This data has been assessed with medium confidence.

1.4.2.5 Locations of static gear were also recorded by the OFLO which have been used to inform the EIA, particularly as static gear vessels are generally not captured within the VMS data due to their smaller size. Exact locations of static gear have not been displayed within this technical report, due to potential commercial sensitivities. This data has been assessed with low-medium confidence.

1.4.2.6 During the 2022 surveys, where an OFLO was unable to be present on a survey vessel, MarineSpace undertook remote fisheries monitoring via daily reviews of data shown on the MarineTraffic App. These remote fisheries monitoring observations are limited to vessels which have AIS active, are limited by the time period at which the AIS was monitored, and are also limited by the area of capture. MarineSpace was able to observe fishing vessel patterns and add point data which is presented in this technical report to supplement official datasets. Data has been assessed with low-medium confidence.

1.4.2.7 A scouting survey of a defined area within the Transmission Assets Scoping Boundary was commissioned by the Applicants and undertaken by the NFFO in March 2022. The survey was undertaken to determine the density and spatial extent of static gear within this defined area. Weather conditions were favourable during the scouting surveys, with good visibility, and the vessel performed a minimum of three lines along the defined area within the Transmission Scoping Boundary (two on the outer boundary and one running along the centre). The NFFO indicated that higher levels of static gear would likely be observed later in the year, however, due to vessel availability, another scouting survey did not take place. This data is limited by the short time period of the survey and will be used to supplement other datasets. This data has been assessed with low-medium confidence.

1.4.3 Morgan Offshore Wind Project: Generation Assets

Fishing activity based on marine traffic survey data

1.4.3.1 Full details of the fishing vessels identified during the Morgan Offshore Wind Project: Generation Assets specific 14-day vessel traffic surveys (Winter 2021, Summer 2022, Spring 2023 and November 2023), are presented in **Appendix A** (Morgan Offshore Wind Limited, 2024).

1.4.3.2 A summary of the fishing vessels, including vessel type, identified during these vessel traffic surveys is presented in **Table 1.5**. Names and sizes of vessels were only captured by the AIS data, so there may have been additional fishing vessels active in the study area that are not listed here[2].

[2] It has been observed that some scallop vessels which fish in the area turn off their AIS during fishing, so may only be captured during steaming.

1.4.3.3 During the winter 2021 survey, nine fishing vessels were identified from the AIS data, six of which were scallop vessels, two were providing guard vessel services and one was a static gear vessel (**Table 1.5**). Of the nine vessels, seven were >18 m in length, one was 13.2 m and one was 10 m. The static gear vessel and the scallop vessel (trawler) would not have been captured within the VMS data, which includes vessels ≥15 m. Eight of the fishing vessels identified were UK registered and the scallop vessel (trawler) was from the Isle of Man. Out of the nine vessels detected by AIS data during the winter survey, only three were active within the Morgan Offshore Wind Project: Generation Assets during this time period, all of which were scallop vessels. The radar data collected during the winter survey indicated that there was a high level of fishing activity within the Isle of Man territorial sea, approximately 7 to 14 km north west of the Morgan Offshore Wind Project: Generation Assets. This is likely to be an area that is targeted for scallop by Isle of Man vessels (Morgan Offshore Wind Limited, 2024).

1.4.3.4 During the summer 2022 survey, three fishing vessels were identified from the AIS data, one of which was also observed during the winter survey. Of the three vessels, one was a guard vessel (16 m in length), one was a static gear vessel (13.2 m in length) and one was a scallop vessel (15 m in length) (**Table 1.5**). All fishing vessels identified were UK registered. The guard vessel and static gear vessel were identified within the Morgan Offshore Wind Project: Generation Assets. The scallop vessel was assumed to be fishing as its speeds were between approximately 2.5 to 4.8 kn; it was observed fishing in a north west to south east direction, approximately 3.8 km west of the Morgan Offshore Wind Project: Generation Assets. The radar data collected during the summer 2022 survey showed a fishing vessel operating out of Douglas on the Isle of Man, steaming to beyond the Isle of Man territorial sea and appeared to be towing within the north west part of the Morgan Offshore Wind Project: Generation Assets (Morgan Offshore Wind Limited, 2024).

1.4.3.5 During the Spring 2023 survey, 15 fishing vessels were identified from the AIS data, four of which were scallop vessels, seven were otter trawl vessels, two were beam trawl vessels, one was a static gear vessel and one was a static gear/otter trawl vessel (**Table 1.5**). Of the 15 vessels, nine were ≥15 m and six were <15 m in length. The fishing vessels under the smaller size category would not have been captured within the VMS data, as this includes vessels ≥15 m. Fourteen of the fishing vessels identified were UK registered and the beam trawl (38 m in length) was from Belgium (Morgan Offshore Wind Limited, 2024).

1.4.3.6 Out of the 15 vessels detected by AIS data during the Spring 2023 survey, only four were active within the Morgan Offshore Wind Project: Generation Assets during this time period, two of which were scallop vessels, one was an otter trawl vessel and one was a static gear vessel/scallop vessel (**Table 1.5**). The four identified vessels appeared to be fishing within the central and north most part of the Morgan Offshore Wind Project: Generation Assets, adjacent to the Isle of Man territorial sea, and within it. The radar data collected during the Spring 2023 survey indicated that there was a high level of fishing activity within the Isle of Man territorial sea. This is likely to be an area that is targeted for scallop by Isle of Man vessels, and the VMS data for

otter trawl vessels and the Isle of scallop trawl/dredge swept area data aligns with this area (Morgan Offshore Wind Limited, 2024).

1.4.3.7 During the Winter 2023 survey, seven fishing vessels were identified from the AIS and radar data, all of which were scallop vessels (six scallop dredge and one scallop trawler, **Table 1.5**). Two other fishing vessel tracks were recorded during the Winter 2023 survey; however the vessel type was unidentified. The identified scallop vessels appeared to be fishing within the central and west part of the Morgan Offshore Wind Project: Generation Assets and in a north to south orientation (Morgan Offshore Wind Limited, 2024).

Table 1.5: Summary of fishing vessels identified during the Morgan Offshore Wind Project: Generation Assets vessel traffic survey: 21 November to 4 December 2021, 15 to 29 July 2022, 4 to 18 May 2023 and 11 to 27 November 2023

Length (m)	Time period	Vessel type	Nationality
9.95	December 2021	Scallop vessel (trawler)	Isle of Man
13.2	December 2021	Static gear vessel	UK
16	December 2021	Scallop vessel (dredge)	UK
18.25	December 2021	Guard vessel	UK
20.5	December 2021	Scallop vessel (dredge)	UK
20.5	December 2021	Guard vessel	UK
23	December 2021	Scallop vessel (dredge)	UK
30.57	December 2021	Scallop vessel (dredge)	UK
34.1	December 2021	Scallop vessel (dredge)	UK
13.2	July 2022	Static gear vessel	UK
15	July 2022	Scallop vessel (dredge)	UK
16	July 2022	Guard vessel	UK
38	May 2023	Beam trawler	Belgium
21.3	May 2023	Scallop vessel (dredge)	UK
16	May 2023	Beam trawler	UK
16	May 2023	Static gear vessel (pots)	UK
16	May 2023	Otter trawler	UK
16	May 2023	Otter trawler	UK
15	May 2023	Otter trawler	UK
15	May 2023	Scallop vessel (dredge)	UK
15	May 2023	Scallop vessel (dredge)	UK
14	May 2023	Otter trawler	UK

Length (m)	Time period	Vessel type	Nationality
13	May 2023	Scallop vessel (dredge)	UK
13	May 2023	Otter trawler	UK
13	May 2023	Otter trawler	UK
12	May 2023	Otter trawler	UK
10	May 2023	Static gear vessel/Otter trawler	UK
24	November 2023	Scallop vessel (dredge)	UK
34	November 2023	Scallop vessel (dredge)	UK
23	November 2023	Scallop vessel (dredge)	UK
21.3	November 2023	Scallop vessel (dredge)	UK
23.66	November 2023	Scallop vessel (dredge)	UK
23	November 2023	Scallop vessel (dredge)	UK
24	November 2023	Scallop vessel (trawler)	UK
n/a	November 2023	Unidentified	n/a
n/a	November 2023	Unidentified	n/a

1.4.4 Morecambe Offshore Windfarm: Generation Assets

Fishing activity based on marine traffic survey data

1.4.4.1 No fishing vessel tracks were recorded within the Morecambe Offshore Windfarm: Generation Assets during the winter survey; however, seven individual vessels were identified within the wider survey area, noted as scallop dredgers operating to the south of the Morecambe Offshore Windfarm: Generation Assets. During the summer survey, one individual vessel was identified within the Morecambe Offshore Windfarm: Generation Assets, targeting whelk.

1.4.4.2 Full details of the marine traffic survey are presented in **Appendix B** (Morecambe Offshore Windfarm Ltd, 2023).

1.4.5 Transmission Assets

Fishing activity based on marine traffic survey data

1.4.5.1 NASH Maritime were commissioned to undertake two 14-day marine traffic surveys specific to the Transmission Assets in August 2023 and November/December 2023.

1.4.5.2 A summary of the fishing vessels, including vessel type, identified during these vessel traffic surveys is presented in **Table 1.6**. Names and sizes of

vessels were only captured by the AIS data, so there may have been additional fishing vessels active in the study area that are not listed here[3].

1.4.5.3 During the Summer 2023 survey, three fishing vessels were observed from the AIS data, one of which was a Belgian beam trawler, another a UK registered static gear vessel and one that was unidentified during the survey (**Table 1.6**). While no fishing activity was observed to overlap with the north section of the Offshore Order Limits and the Morgan Offshore Wind Project: Generation Assets, vessel tracks can be observed in a concentrated area in the central part of the Offshore Order Limits, just beyond the English 12 nm boundary and overlapping with the Morecambe Offshore Windfarm Generation Assets (**Figure 1.73**).

1.4.5.4 During the winter survey 2023, six fishing vessels were identified from the AIS data, all of which were >12 m. Of these vessels, three were UK registered static gear vessels, two were UK registered scallop vessels and one was a Belgian beam trawler (**Table 1.6**). Beam trawl and static gear vessel tracks were observed in discreet areas within the south east section of the Offshore Order Limits, just beyond the English 12 nm boundary and overlapping with the Morecambe Offshore Windfarm Generation Assets. The scallop vessels deploying dredges were observed to the north of the Offshore Order Limits.

Table 1.6: Summary of fishing vessels identified during the Transmission Assets vessel traffic survey: 3 to 17 August 2023 and 28 November to 13 December 2023

Length (m)	Time period	Vessel type	Nationality
38	August 2023	Beam trawler	Belgium
13	August 2023	Static gear vessel	UK
n/a	August 2023	Unidentified	n/a
38.9	November and December 2023	Beam trawler	Belgium
20	November and December 2023	Dredge vessel	UK
21.3	November and December 2023	Dredge vessel	UK
13	November and December 2023	Static gear vessel	UK
12	November and December 2023	Static gear vessel	UK
13	November and December 2023	Static gear vessel	UK

[3] It has been observed that some scallop vessels which fish in the area turn off their AIS during fishing, so may only be captured during steaming.

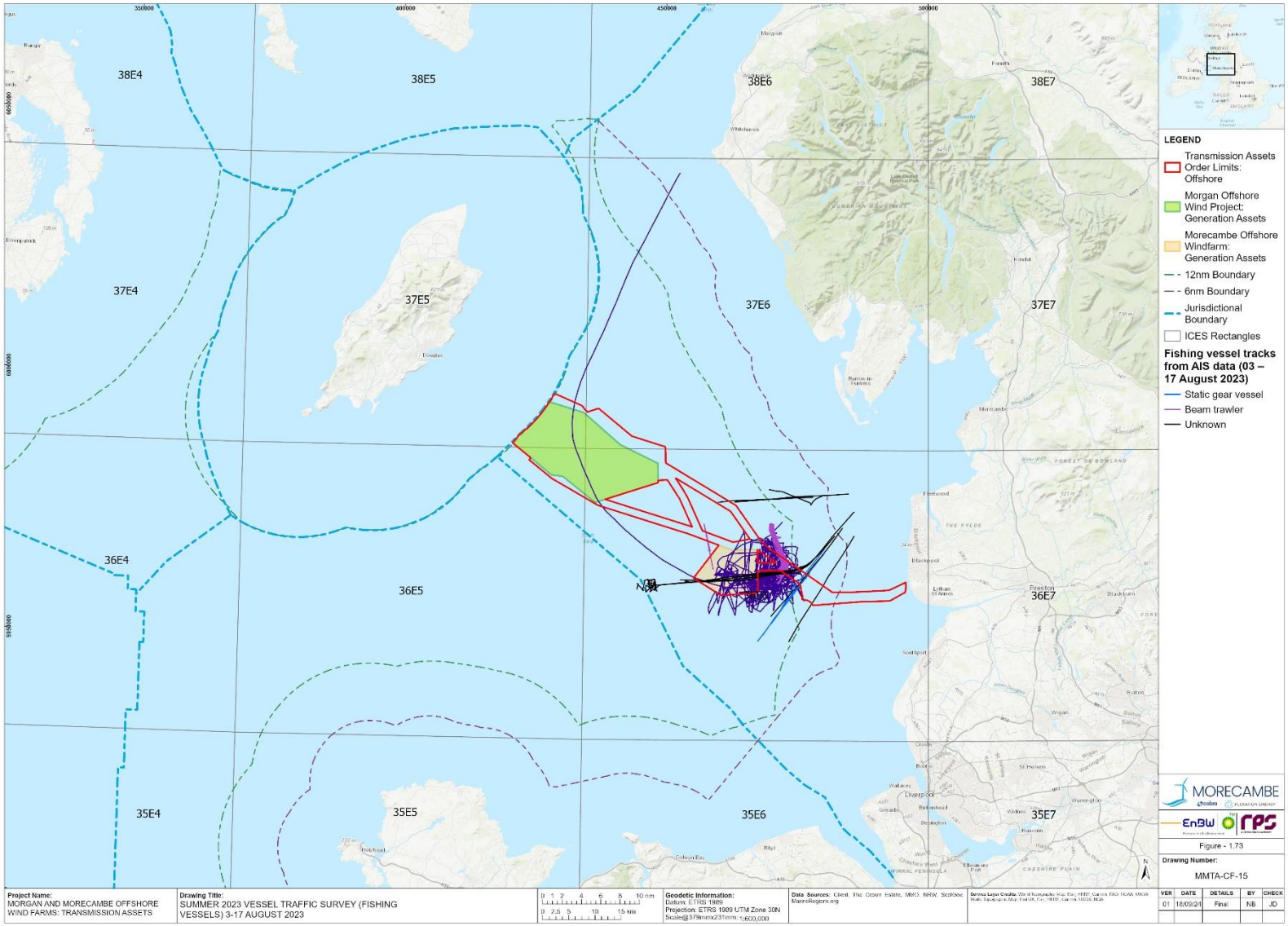


Figure 1.73: AIS fishing vessel track data from 3 to 17 August 2023 (Source: NASH Maritime, 2023)

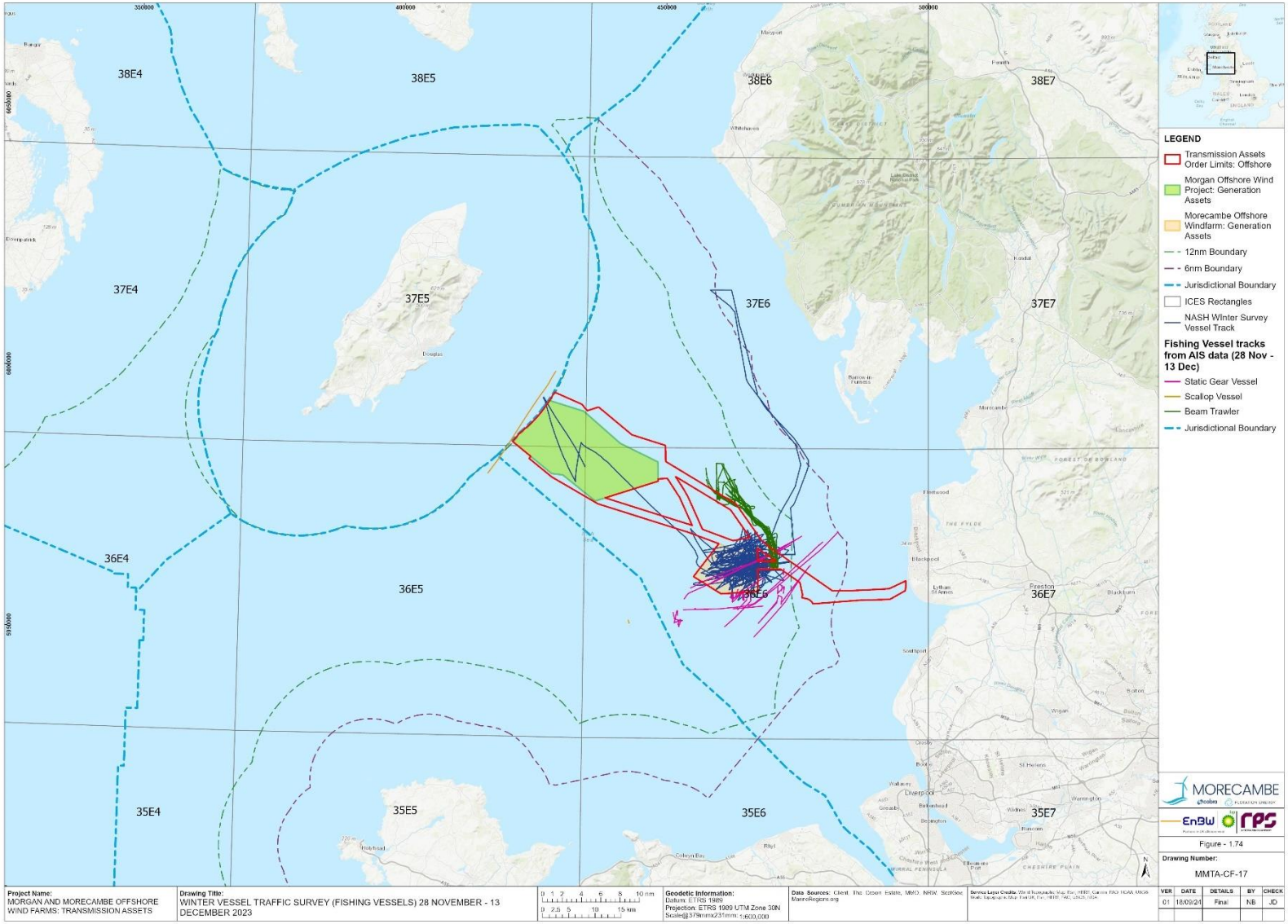


Figure 1.74: AIS fishing vessel track data from 28 November to 13 December 2023 (Source: NASH Maritime, 2023)

OFLO and MarineSpace observations

1.4.5.5 A summary of the fishing vessels identified by the OFLO present during the offshore geophysical, environmental and geotechnical surveys, undertaken in 2021 and 2022, is presented in **Table 1.7**. OFLO observations were recorded daily during 30 June 2021 to 18 September 2021 and 1 April 2022 to 10 July 2022. MarineSpace undertook additional fisheries monitoring (via daily reviews of the MarineTraffic App), until 30 November 2022. Data is not fully representative of fishing activity in the study area, particularly inside the 12 nm boundary, where survey vessels were not present. This data has been interpreted with care due to the low-medium confidence assigned, as discussed in **section 1.2.1**.

1.4.5.6 **Figure 1.75** displays all the observations recorded by the OFLO and MarineSpace. However, it is important to note that although all vessels were observed within the study area, not all vessels were observed within the Offshore Order Limits. **Table 1.7** outlines the fishing vessels which were identified within the study area, and notes which vessels were identified within the Offshore Order Limits.

Table 1.7: Summary of fishing vessels identified by the OFLO (30 June 2021 to 18 September 2021 and 1 April 2022 to 10 July 2022) and MarineSpace (10 July 2022 to 30 November 2022) during offshore surveys within the Transmission Assets commercial fisheries study area

Length (m)	Vessel type	Nationality	Transmission Assets commercial fisheries study area	Offshore Order Limits
No information	Scallop vessel (dredge)	UK	Y	N
No information	Trawler	UK	Y	N
No information	Otter trawler	France	Y	N
No information	Scallop vessel (dredge)	UK	Y	Y
No information	Scallop vessel (dredge)	UK	Y	N
No information	Otter Trawler	UK	Y	N
10	Otter trawler	Isle of Man	Y	N
10	Static gear vessel	UK	Y	N
11.6	Shellfish vessel	UK	Y	N
11.95	Otter trawler	UK	Y	N
11.99	Scallop vessel (dredge)	UK	Y	N
12	Static gear vessel	UK	Y	Y
13.09	Otter trawler	UK	Y	N
13.2	Static gear vessel	UK	Y	Y

Length (m)	Vessel type	Nationality	Transmission Assets commercial fisheries study area	Offshore Order Limits
13.39	Static gear vessel	UK	Y	Y
13.4	Trawler	UK	Y	N
13.97	Scallop vessel (dredge)	UK	Y	N
14	Otter trawler	Isle of Man	Y	Y
14	Otter trawler	Isle of Man	Y	N
14	Otter trawler	Isle of Man	Y	N
14.11	Trawler	UK	Y	N
14.5	Otter trawler	UK	Y	N
14.73	Scallop vessel (dredge)	UK	Y	Y
14.95	Otter trawler	UK	Y	N
14.96	Scallop vessel (dredge)	UK	Y	Y
14.98	Otter trawler	UK	Y	N
15	Scallop vessel (dredge)	UK	Y	N
15	Scallop vessel (dredge)	UK	Y	N
15.7	Otter trawl	UK	Y	N
16	Trawler	UK	Y	N
16	Scallop vessel (dredge)	Isle of Man	Y	N
16	Scallop vessel (dredge)	UK	Y	Y
16.4	Static gear vessel	UK	Y	Y
16.77	Scallop vessel (dredge)	UK	Y	N
16.89	Otter trawler	UK	Y	N
17	Otter trawler	UK	Y	N
17.13	Static gear vessel	UK	Y	Y
17.13	Static gear vessel	UK	Y	N
17.99	Trawler	UK	Y	N
18	Otter trawler	UK	Y	N
18.5	Otter trawler	UK	Y	N
19	Otter trawler	UK	Y	N
19.27	Trawler	Canada	Y	N
19.35	Trawler	UK	Y	N
19.9	Otter trawler	UK	Y	N

Length (m)	Vessel type	Nationality	Transmission Assets commercial fisheries study area	Offshore Order Limits
20	Scallop vessel (dredge)	UK	Y	N
20.5	Trawler	UK	Y	N
20.6	Trawler	UK	Y	N
20.86	Otter trawler	UK	Y	N
21	Otter trawler	UK	Y	N
22.4	Trawler	UK	Y	N
22.78	Trawler	UK	Y	Y
22.8	Otter trawler	UK	Y	N
22.94	Scallop vessel (dredge)	UK	Y	Y
23.09	Otter trawler	UK	Y	N
23.6	Otter trawler	UK	Y	N
29.86	Trawler	UK	Y	N
34	Trawler	Belgium	Y	Y
34.1	Trawler	UK	Y	Y
37	Beam trawler	Belgium	Y	N
37	Beam trawler	Belgium	Y	N
38	Beam trawler	Belgium	Y	N
38	Beam trawler	Belgium	Y	N
38.9	Beam trawler	Belgium	Y	N
40	Beam trawler	Belgium	Y	N
43.51	Trawler	UK	Y	N

1.4.5.7 During the offshore surveys a total of 67 fishing vessels were observed by the OFLO and MarineSpace within the study area, 14 of which were also observed within the Offshore Order Limits. The majority of vessels observed within the study area were from the UK, with vessels also from Belgium, Canada, France and the Isle of Man. Offshore static gear vessels showed the largest spatial extent, with activity observed across the majority of the study area (**Figure 1.75**).

1.4.5.8 While consultation and analysis of VMS data has established that highest intensities of scallop vessels were observed within the Isle of Man 12 nm limit, and to the west of the Offshore Order Limits, **Figure 1.75** also shows that scallop vessels have a relatively large spatial extent and were active across the study area. The high density of points inside the 12 nm and within ICES rectangle 37E6 clearly shows the *Nephrops* fishing grounds. Relatively

high densities of beam trawl vessels were observed south east of the Offshore Order Limits, beyond the 12 nm.

1.4.5.9 Within the Offshore Order Limits, the only non-UK vessels observed were from Belgium and the Isle of Man. However, it is unclear whether these vessels were actively fishing, or transiting through the area. This generally aligns with the information presented in **section 1.3.2** and with feedback from consultation. There was a cluster of static gear points in the east part of the Offshore Order Limits.

1.4.5.10 Static gear (crab and whelk pots) was also recorded and observed within the Offshore Order Limits, but the exact locations of this gear are not shown here due to commercial sensitivities.

1.4.5.11 **Figure 1.75** indicates that fishing vessels may transit through the Offshore Order Limits, for example between Fleetwood and fishing grounds within the wider Irish Sea region.

1.4.5.12 Few scallop vessels were observed by the OFLO during the 2021 and 2022 offshore surveys. This is likely due to the surveys overlapping with the seasonal closures for both queen and king scallop in the Irish Sea and vessels working in other areas to avoid interactions with the survey vessels. Some scallop vessels were also observed transiting towards the fishing grounds within the Offshore Order Limits but turning AIS off once they started fishing.

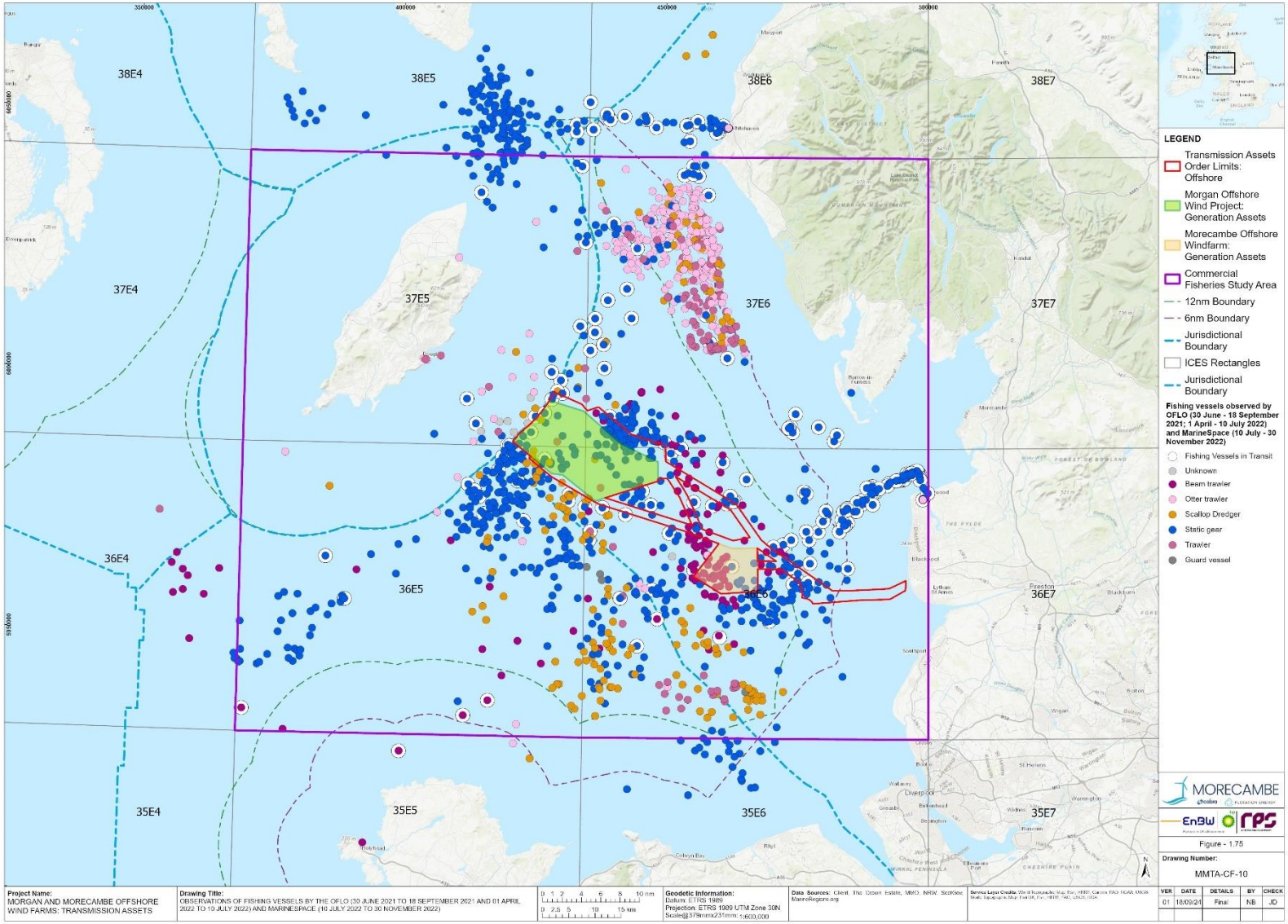


Figure 1.75: Observations of fishing vessels by the OFLO (30 June 2021 to 18 September 2021 and 1 April 2022 to 10 July 2022) and MarineSpace (10 July 2022 to 30 November 2022)

Scouting surveys

1.4.5.13 There were two sightings of static gear within the Offshore Order Limits during the scouting surveys held in March 2022. Both sightings were recorded close to the 12 nm limit. The NFFO commented that static gear vessels had not all started relaying gear after the winter, so in the nearshore areas there may be higher levels of gear observed later in the year.

1.5 Summary

1.5.1.1 A description of existing fishing activity in the region of the Offshore Order Limits and wider area has been undertaken via a review of official landings and fishing activity data, feedback from fisheries stakeholders, and data from site-specific surveys.

1.5.1.2 Within the study area, the key commercial fishing fleets identified were:

- dredging and trawling for king scallop and queen scallop:
- potting for whelk, crab and lobster:
- beam trawling for flatfish and other demersal finfish;
- trawling for herring; and
- trawling for *Nephrops*.

1.5.1.3 Shellfish account for the largest proportion of landings in the study area. Dredge vessels dominated UK and Isle of Man vessel landings, whereas beam trawl and dredge vessels dominated non-UK/ non-Isle of Man vessel landings. This reflects the importance of the king scallop and queen scallop in this region, which are targeted and captured within the north west parts of the Offshore Order Limits.

1.5.1.4 While the king scallop grounds are relatively extensive, the queen scallop grounds within the extreme north west part of the Offshore Order Limits are much more discrete and are heavily relied on by the UK and Isle of Man and non-UK/ non-Isle of Man fleets. The scallop fisheries are seasonal due to existing closures in the Irish Sea.

1.5.1.5 The whelk fishery within the study area comprises a range of vessel sizes; there are several UK and Isel of Man commercial fisheries operators which can operate all year round.

1.5.1.6 Beam trawling for flatfish is undertaken predominantly by several vessels from Belgium and the south west of England. These vessels are generally active in the study area during the spring and overlap with the north east part of the Offshore Order Limits.

1.5.1.7 Trawling and netting for herring is mostly undertaken by several vessels from Northern Ireland and England; this fishery is very seasonal and occurs mainly during June and July.

1.5.1.8 Trawling for *Nephrops* within the study area mostly occurs off the Cumbrian coast during the summer months but does not generally overlap with the north part of the Offshore Order Limits.

1.5.1.9 Within the study area, fishing activity occurs at lower levels around the coast by both static and mobile gear vessels. Within the Offshore Order Limits, there are several static gear vessels that are active, which operate out of Fleetwood.

1.5.1.10 A full impact assessment of commercial fisheries receptors has been undertaken and presented in Volume 2, Chapter 6: Commercial fisheries of the ES.

1.6 References

Bloor, I., Dignan, S., Murray, L. and Kaiser, M. (2015) Bycatch Survey – Isle of Man Queen Scallop Otter Trawl Fishery Summer 2014. Fisheries & Conservation Report, Bangor University, 67, 14.

Cappell, R., Huntington, T., Nimmo, F., and MacNab, S. (2018) UK Scallop Fishery: Current Trends, Future Management Options and Recommendations. Report produced by Poseidon Aquatic Resource Management Ltd., p.2-45.

Cefas (2014) UK Inshore Fishing Activities Intensity - Geographic Information System Data Layer 2011 to 2012. Available: [redacted]

DEFA (Department of Environment, Food and Agriculture) (2023) Isle of Man Government Data on vessel pot hauls and swept area.

Delargy, A., Hold, N., Lambert, G., Murray, L., Hinz, H., Kaiser, M., McCarthy, I. and Hiddink, J. (2019) Welsh waters scallop surveys and stock assessment. Fisheries and Conservation Report, Bangor University, 75, 48.

Dickey-Collas, M., Nash, R.D.M., and Brown, J. (2001) The location of spawning Irish Sea herring (*Clupea harengus*). Journal of the Marine Biological Association of the United Kingdom, 81, 713–714.

Duncan, P.F. and Emmerson, J. (2018) Commercial Fisheries & Sea Angling. In: Manx Marine Environmental Assessment (2nd Ed.). Isle of Man Government. 71.

Eigaard, O.R., Bastardie, F., Breen, M., Dinesen, G.E., Hintzen, N.T., Laffargue, P., Mortensen, L.O., Nielsen, J.R., Nilsson, H.C., O'Neill, F.G., Polet, H., Reid, D.G., Sala, A., Sko¨ld, M., Smith, C., Sorensen, T.K., Tully, O., Zengin, M. and Rijnsdorp, A.D. (2016). Estimating seabed pressure from demersal trawls, seines, and dredges based on gear design and dimensions. ICES Journal of Marine Science, 73: i27–i43.

EU STECF (Scientific, Technical and Economic Committee for Fisheries) (2017) Fisheries Dependent Information: Landings and effort (hours fished) data 2018. Available: [redacted]

Grieve, C., Brady, D.C. and Polet, H. (2014) Best practices for managing, measuring and mitigating the benthic impacts of fishing. Part 1. Marine Stewardship Council Science Series. 2: 18 – 88.

Howarth, L. and Stuart, B. (2014) The dredge fishery for scallops in the United Kingdom (UK): effects on marine ecosystems and proposals for future management. Marine Ecosystem Management Report, University of York, 5, 54.

ICES (2017) Interim Report of the Scallop Assessment Working Group (WG Scallop).

ICES (2020) Spatial Data Layers of Fishing Intensity/Pressure per Gear Type for Surface and Subsurface Abrasion, for the Years 2009 to 2017 in the OSPAR Regions (ver. 2, 22 January 2019): ICES data product release, Available: http://doi.org/10.17895/ices.data.4685.

ICES (2021a) ICES Advice on fishing opportunities, catch and effort. Celtic Sea ecoregion. Sole (Solea solea*)* in Division 7.a (Irish Sea). Version 2.

ICES (2021b) ICES Advice on fishing opportunities, catch and effort. Celtic Sea ecoregion. Herring (*Clupea harengus*) in Division 7.a North of 53 °30'N (Irish Sea).

Jenkins, S., Lart, W., Vause, B. and Brand, A. (2003) Seasonal swimming behaviour in the queen scallop (*Aequipecten opercularis*) and its effect on dredge fisheries. Journal of Experimental Marine Biology and Ecology, 289(2), 163-179.

Kaiser, M.J., Hill, A.S., Ramsay, K., Spencer, B.E., Brand, A.R., Veale, L.O., Prudden, K., Rees, E.I.S., Munday, B.W., Ball, B. and Hawkins, S.J. (1996) Benthic disturbance by fishing gear in the Irish Sea: a comparison of beam trawling and scallop dredging. Aquatic Conservation: Marine and Freshwater Ecosystems, 6(4), 269-285.

MacNab, S. and Nimmo, F. (2021) Awel y Môr Offshore Wind Farm Commercial Fisheries Baseline Report. Report, Poseidon Aquatic Resources Management Ltd.

Marine Scotland (2022) Norway Lobster (*Nephrops norvegicus*) - Functional Units and suitable habitat in Scottish and adjacent waters. Available at: [redacted].

MarineTraffic (2022) Global Ship Tracking Intelligence. [redacted]

Morecambe Offshore Windfarm Ltd. (2024) Morgan Offshore Windfarm: Generation Assets Commercial Fisheries Technical Report. Available at: [redacted]

Morgan Offshore Wind Limited. (2024) Morgan Offshore Windfarm: Generation Assets Commercial Fisheries Technical Report. Available at: [redacted]

MMO (Marine Management Organisation). (2023a) UK fleet landings by ICES Rectangle (2012 to 2022). Available: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022.

MMO (Marine Management Organisation). (2023b) UK fleet landings and foreign fleet landings into the UK by port (2012 to 2022). Available: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022.

MMO (Marine Management Organisation). (2021a) Fish Landings to UK Ports. Available: https://environment.data.gov.uk/dataset/229f21dc-9e8e-4e48-95db-f81bcfc13caa.

MMO (Marine Management Organisation). (2021b) Fishing activity for UK vessels 15 m and over, using Vessel Monitoring Systems data (2016-2020). Available: https://environment.data.gov.uk/dataset/229f21dc-9e8e-4e48-95db-f81bcfc13caa.

MMO (Marine Management Organisation). (2024) February 2024 Fishing Vessel List. Available: https://www.gov.uk/government/statistical-data-sets/vessel-lists-10-metres-and-under; https://www.gov.uk/government/statistical-data-sets/vessel-lists-over-10-metres.

NASH Maritime, 2023. Project Morgan and Morecambe Offshore Wind Farms: Transmission Assets: Marine vessel traffic survey results.

NWIFCA (2024) Landings data on intertidal cockle and mussel fisheries within the NWIFCA District.

NWWAC (2013) The Irish Sea Sole-Stock: A ‘’Sole’’ Belgian Problem? Working Document for the NWW RAC, Working Group 4-Irish Sea (bijdrage Vanhaecke Hilde, Moreau Kelle, Nimmegeers Sofie, Torreele Els). 1-23.

Salomonsen, H., Lambert, G., Murray, L. and Kaiser, M. (2015). The spawning of King scallop, Pecten maximus, in Welsh waters – A preliminary study. Fisheries & Conservation Report, Bangor University, 57, 21.

Seafish. (2022) Basic Fishing Methods. Available: [redacted]

Walmsley, S. and Pawson, M. (2007) The coastal fisheries of England and Wales, Part V: a review of their status 2005-6. Sci. Ser. Techn. Rep. Cefas Lowestoft, 140, 6-78.

WG Scallop (2020) Scallop Assessment Working Group (WGSCALLOP). ICES Scientific Reports, 111(2), 57.

Appendix A – Morgan Generation Assets: Commercial Fisheries Technical Report

Morecambe Offshore Windfarm: Generation Assets

Environmental Statement

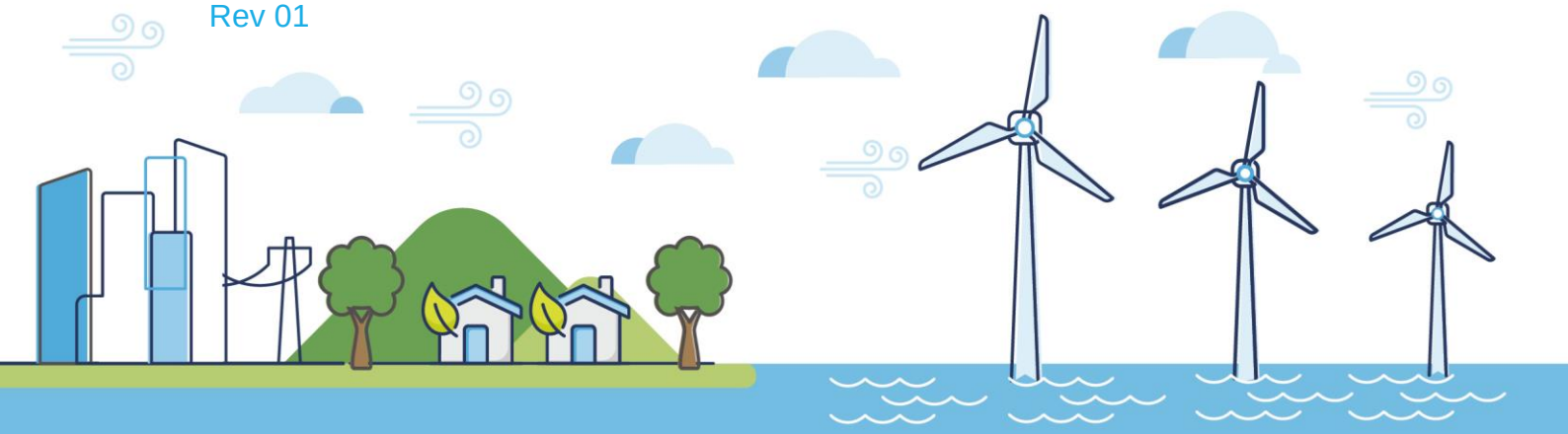
Volume 5

Appendix 13.1 Commercial Fisheries Technical Report

PINS Document Reference: 5.2.13.1

APFP Regulation: 5(2)(a)

Rev 01



MORECAMBE

Document History

Doc No	MOR001-FLO-CON-ENV-RPT-1131	**Rev**	01
Alt Doc No	1016/MOWF		
Document Status	Approved for Use	**Doc Date**	May 2024
PINS Doc Ref	5.2.13.1	**APFP Ref**	5(2)(a)

Rev	Date	Doc Status	Originator	Reviewer	Approver	Modifications
01	May 2024	Approved for Use	Nima Consultants Limited	Morecambe Offshore Windfarm Ltd	Morecambe Offshore Windfarm Ltd	n/a

Morecambe Offshore Windfarm Generation Assets

Appendix 13.1

Commercial Fisheries Technical Report

nimo CONSULTANTS

Report Information

Citation: MacNab, S. and Nimmo, F. 2023. Morecambe Offshore Windfarm Commercial Fisheries Baseline Report. Report produced by NiMa Consultants Ltd.

Client: HaskoningDHV UK Ltd on behalf of Morecambe Offshore Windfarm Ltd

Version: Rev01

Front cover: Photo by F. Nimmo

Report ref: 1016/MOWF

Date issued: 19 December 2023

Contents

Figures and Tables

Figures

Tables

Acronyms

Term	Definition
AIS	Automatic Identification System
DCF	Data Collection Framework
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
FLO	Fisheries Liaison Officer
FIR	Fishing Industry Representative
GIS	Geographic Information System
ICES	International Council for the Exploration of the Sea
MAP	Multi Annual management Plan
MCRS	Minimum Conservation Reference Size
MMO	Marine Management Organisation
NRA	Navigational Risk Assessment
PEIR	Preliminary Environmental Information Report
PLN	Port Letter and Number
SAR	Swept Area Ratio
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
UK	United Kingdom
UKFEN	UK Fisheries Economic Network
VMS	Vessel Monitoring System

Units

Term	Definition
€	Euros
£	Pound sterling
°C	Degrees Celsius
cm	Centimetres
hp	Horsepower
kg	Kilograms
km	Kilometres
knots	Nautical mile per hour
kW	Kilowatts
m	Metres
mm	Millimetres
NM	Nautical Mile
t	Tonne

1. Introduction

1.1 Overview and Purpose of this Report

This report has been prepared by NiMa Consultants Ltd (NiMa) to support the Environmental Impact Assessment (EIA) of the Morecambe Offshore Windfarm Generation Assets (the Project).

The information on commercial fisheries activity presented in this report is intended to inform the EIA for the Project, by providing a detailed understanding of the commercial fisheries baseline, against which the potential impacts of the Project can be assessed. An overview of the information presented in this Technical Report is provided in **Chapter 13 Commercial Fisheries** of the Environmental Statement (ES) for the Project (Document Reference 5.1.13).

Commercial fisheries activity described in this report, is defined as fishing activity legally undertaken where the catch is sold for taxable profit. A description of charter angling activity, defined as fishing for marine species where the purpose is recreation and not sale or trade, is provided in **Chapter 17 Infrastructure and Other Users** (Document Reference 5.1.17) of the ES. The ecology of the fish and shellfish species targeted by commercial fishing activity is described in, **Chapter 10 Fish and Shellfish Ecology** of the ES (Document Reference 5.1.10).

1.2 Report Structure

This report is structured as follows:

- **Section 1 (Introduction)** introduces the report and outlines its purpose;
- **Section 2 (Methodology)** presents the methodology and data sources applied to characterise the baseline environment;
- **Section 3 (Baseline Environment)** presents the characterisation of the existing environment for the commercial fisheries assessment, specifically focused on landing statistics;
- **Section 4 (Spatial Fishing Activity Assessment)** presents available spatial data to map fishing grounds for specific fleets and fisheries;
- **Section 5 (Fisheries Activity Assessments By Nation)** presents data available specific to UK, Isle of Man and foreign fishing fleets;
- **Section 4 (Future Baseline Environment)** presents the characterisation of the future baseline environment; and
- **Section 5 (Summary)** summarises the findings of this report.

2. Methodology

2.1 Approach

This report has been developed following a detailed and rigorous desk-based assessment of data and literature. Both publicly available data sets; and data results from specific requests, have been analysed. Landings statistics have been analysed using Excel; and Vessel Monitoring System (VMS) data have been evaluated using ArcMap Geographic Information System (GIS) software.

This quantitative data has been supplemented with qualitative information gained through direct consultation with the fishing industry; and communication and discussion between the onshore Fisheries Liaison Officer (FLO), the Fishing Industry Representative (FIR) and the fishing industry.

2.2 Study Area

The Project windfarm site is located within the eastern portion of the International Council for the Exploration of the Sea (ICES) Division 7a (Irish Sea) statistical area; within the United Kingdom (UK) Exclusive Economic Zone (EEZ). For the purposes of recording fisheries landings, ICES Division 7a is divided into statistical rectangles which are consistent across all Member States operating in the Irish Sea.

The windfarm site is entirely located within ICES rectangle 36E6, which represents the local commercial fisheries study area for the EIA. The local study area is shown in Figure 2.1; note that the windfarm site occupies only a portion of the ICES rectangle. In order to understand fishing activity in waters adjacent to the Project, a regional commercial fisheries study area has been defined to include 36E6 together with surrounding ICES rectangles 37E6, 37E5, 36E5, 35E5 and 35E6, as shown in Figure 2.2. Baseline data has been gathered and analysed for the regional study area.

To summarise, there are two scales of commercial fisheries study areas as follows:

- Local commercial fisheries study area: 36E6 (Figure 2.1); and
- Regional commercial fisheries study area: 37E6, 37E5, 36E6, 36E5, 35E5 and 35E6 (Figure 2.2).

The justification for defining this wider regional study area is that it aligns with the scale of statistical landings data; covers a wider area than the windfarm site; and takes into consideration that most commercial fish and shellfish receptor populations are distributed at a wider spatial scale, ensuring that potential implications of displacement of fishing activity can be adequately understood.

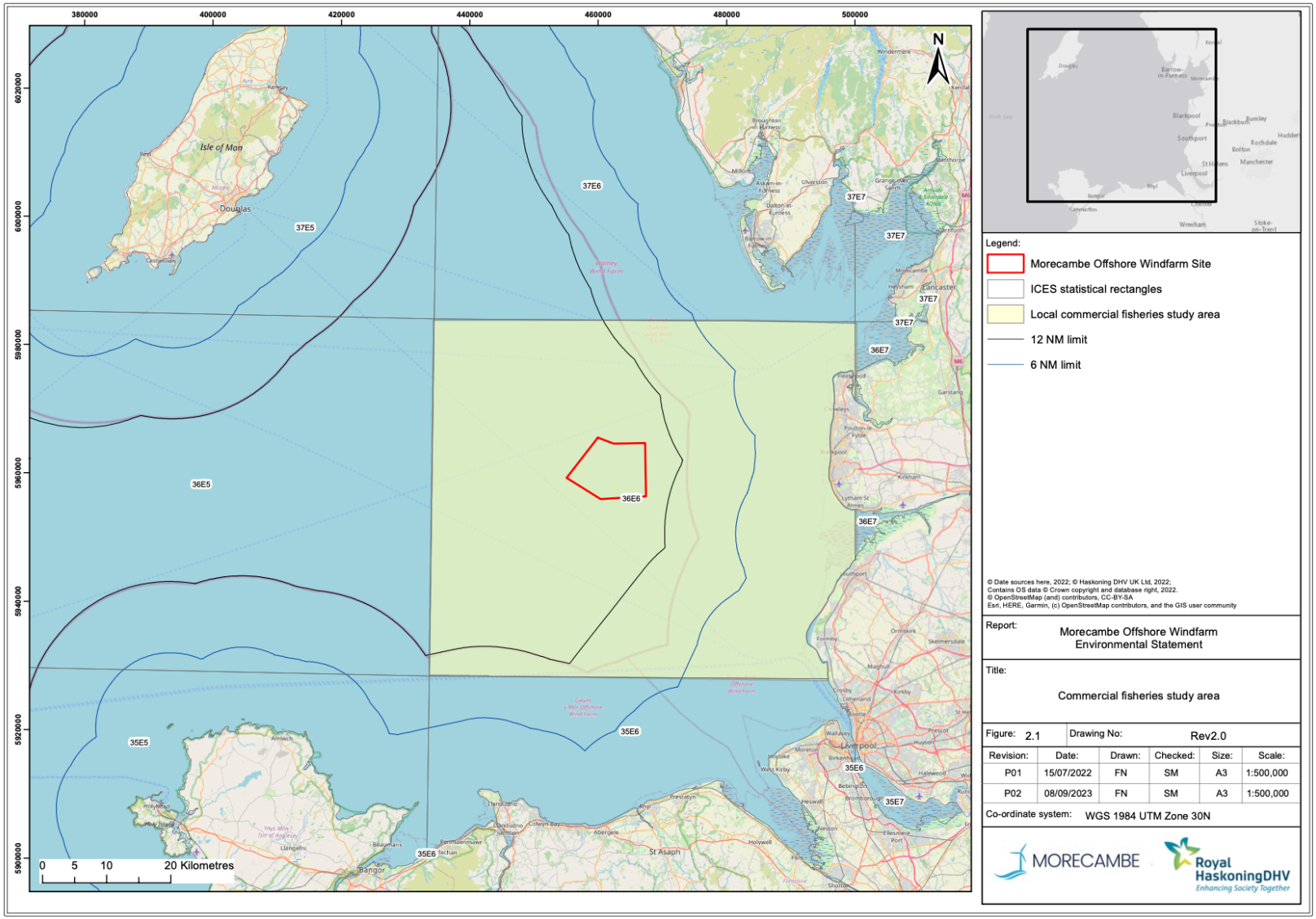


Figure 2.1 Local commercial fisheries study area

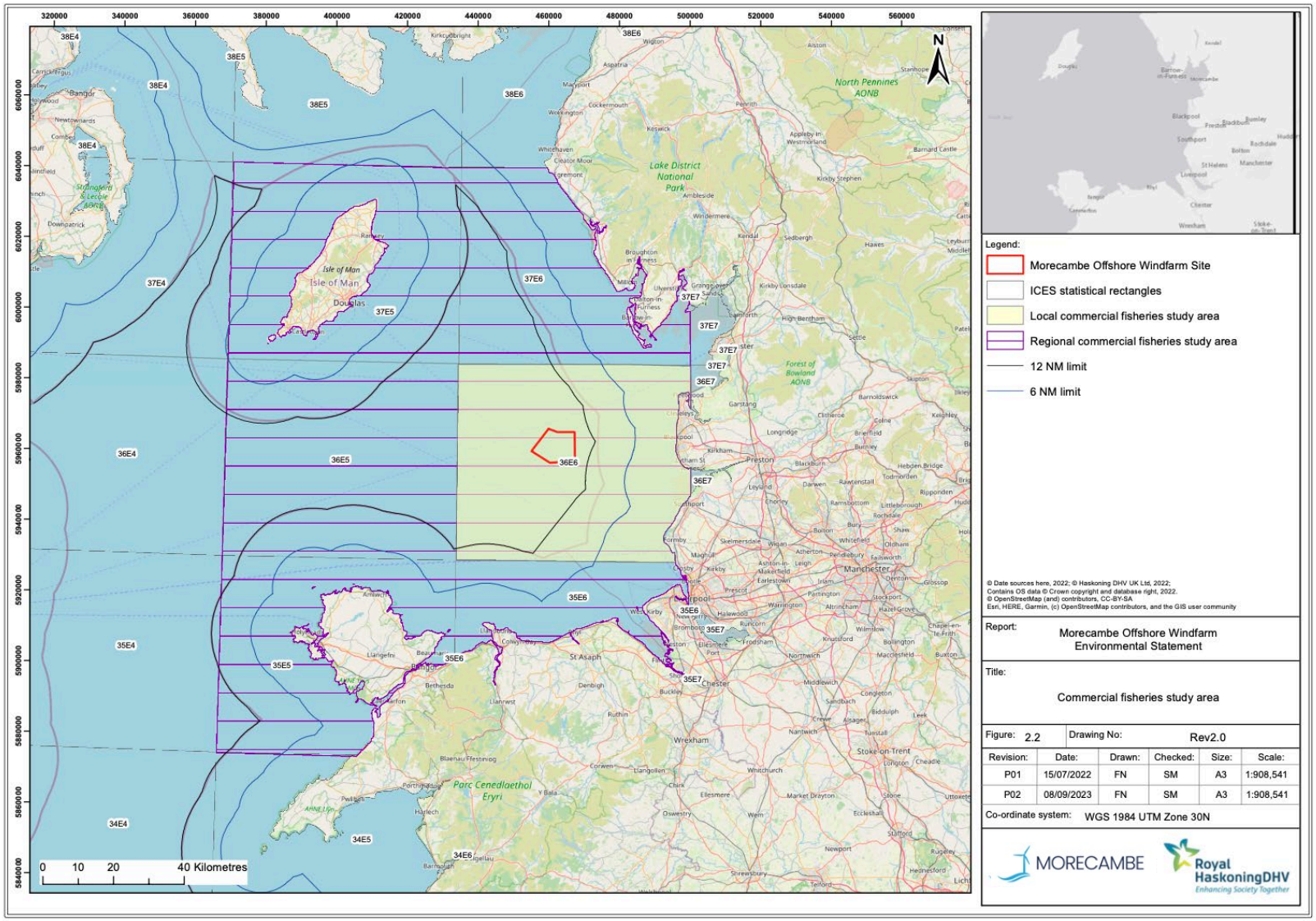


Figure 2.2 Regional commercial fisheries study area

2.3 Data Sources

A range of data sources have been analysed and presented within this report and these are listed in Table 2.1.

Data has been sourced from ICES, the EU Data Collection Framework (DCF), the UK Marine Management Organisation (MMO) and the European Maritime Safety Agency (EMSA).

Where data sources allow, a five to six-year trend analysis has been undertaken, using the most recent annual datasets available at the time of writing. The temporal extent of this five-year period is dependent on each data source analysed, e.g. 2012 to 2016 or 2016 to 2022, as annotated in Table 2.1.

Relevant literature from a number of sources has also been reviewed in the preparation of this report. A full list of references is provided at the end of this report and are cited within the text where appropriate. Information on fishing activity across the windfarm site has also been provided by the project Fisheries Liaison Officer (FLO); this includes the findings of scouting surveys undertaken in 2021.

Table 2.1 Data sources used to inform this report

Country	Data	Time period	Source
UK	Landings statistics data for UK-registered vessels, with data query attributes for: landing year; landing month; vessel length category; ICES rectangle; vessel/gear type; port of landing; species; live weight (tonnes); and value. These landings statistics are published annually by the MMO and include vessels registered to the following UK administrations and British Crown dependencies: England, Wales, Scotland, Northern Ireland, Isle of Man (IOM), Guernsey and Jersey. Commercial fishing vessels that are registered to the IOM are required to hold both IOM and UK fishing licences.	2016 to 2022	Marine Management Organisation (MMO)
All Europe	Landings statistics for EU registered vessels with data query attributes for: landing year; landing quarter; ICES rectangle; vessel length; gear type; species; and, landed weight (tonnes).	2012 to 2016	European Union (EU) Data Collection Framework (DCF) database
UK	VMS data for UK registered vessels ≥15 m length. Note that UK vessels ≥12 m in length have VMS on board, however, to date, the MMO provide amalgamated VMS datasets for ≥15 m vessels only. VMS data sourced from MMO displays the first sales value (£) of catches.	2016 to 2020	MMO
All Europe	VMS data for EU registered vessels ≥12 m length. VMS data sourced from ICES displays the surface Swept Area Ratio (SAR) of catches by different gear types and covers EU (including UK) registered vessels 12 m and over in length. Surface SAR indicates the number of times in an annual period that a demersal fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity.	2017 to 2020	ICES
All Europe	Fishing vessel route density, based on vessel Automatic Information System (AIS) positional data. AIS is required to be fitted on fishing vessels ≥15 m length.	2019 to 2022	European Maritime Safety Agency (EMSA)

2.3.1 Data Limitations and Uncertainties

A range of different data limitations and uncertainty exist for all of the commercial fisheries datasets assessed within this report. The level of uncertainty and confidence of each data set is defined in Table 2.2 based on expert judgement of the assessment team.

Limitations of landings data include the spatial size of ICES rectangles which can misrepresent actual activity across the windfarm site; and care is therefore required when interpreting these data.

It is noted that all commercial landings by UK registered vessels are subject to the Register of Buyers and Sellers legislation and therefore landings by UK vessels of all lengths are recorded within the MMO iFISH database. While it is recognised that there is no statutory requirement for owners of vessels 10 m and under to declare their catches, registered buyers are legally required to provide sales notes of all commercially sold fish and shellfish due to the 2005 Registration of Buyers and Sellers of First-Sale Fish Scheme (RBS legislation) (MMO, 2022). The RBS legislation is applicable to licenced fishing vessels of all lengths and requires name and Port Letter and Number (PLN) of the vessel which landed the fish to be recorded in relation to each purchase. For the 10 m and under sector, landing statistics are recorded on sales notes provided by the registered buyers (MMO, 2022). Information that may not be formally recorded on the sales note, such as gear and fishing area, is added by coastal staff based on local knowledge of the vessels they administer - for example, from observations of the vessel during inspections at ports or from air and sea surveillance activities as well as discussions with the owner and/or operator of the vessel (MMO, 2022).

Lack of recent landings statistics for EU (non-UK) fleets is also recognised as a data limitation; based on the most recent European Commission data call, more recent landings data (2017 to 2019) is no longer available by ICES rectangle. Data at a scale of ICES division (i.e. the whole of the Irish Sea) is less useful to understand fishing activity specific to the windfarm site.

Limitations of VMS data are primarily focused on the coverage being limited to larger vessels of 15 m and over for UK fishing vessels. It is important to be aware that where mapped VMS data may appear to show inshore areas as having lower (or no) fishing activity compared with offshore areas, this is not necessarily the case because VMS data do not include vessels typically operating in inshore area (i.e. which typically comprises of vessels <15 m in length). To assist in mitigating the risk of under-representing smaller inshore vessels, site-specific marine traffic survey data comprising information on vessel movements gathered by both Automatic Identification System (AIS) and radar has been analysed alongside publicly sourced VMS and AIS data.

Table 2.2 Data limitations and uncertainty (the uncertainty and confidence levels are defined based on judgement and are intended to inform the appropriateness of data used to inform the EIA)

Data source	Type of data	Limitations and uncertainty
Landing statistics		
MMO	Landings statistics (2016 to 2022) data for UK-registered vessels.	The data is recorded from sales notes and landing declarations for all vessel lengths. Due to the UK legislation of Registration of Buyers and Sellers data is considered accurate and verifiable. • Data assessed with low uncertainty and high confidence.
EU DCF	Landings statistics (2012 to 2016) data for EU landings from ICES rectangle 36E6 by country, species and gear type.	The data is submitted by individual member states and therefore limitations vary per country. Vessels under 10 m may be omitted or mis-represented by the data. Accuracy is likely to be greater for landings from larger vessels. • For UK vessels under 10 m length data is assessed with high uncertainty and low confidence. • For all other EU vessels data is assessed with low uncertainty and high confidence.
Spatial data		
Brown and May Marine	Scouting fisheries surveys to record gear locations.	The data was collated from October to November 2021 and represents a snapshot of activity during these months. All gear locations were recorded for all vessel lengths. Areas not surveys are not represented in the dataset. Dataset has limited coverage. • Data assessed with low uncertainty and high confidence.
MMO	UK VMS data for vessels ≥15 m length.	The data is only available for 15 m and over vessels, so is not representative of <15 m vessels. • Data assessed with medium uncertainty and medium confidence.
ICES	EU SAR data for vessels ≥12 m length.	The data is only available for 12 m and over vessels, so is not representative of <12 m vessels. • Data assessed with medium uncertainty and medium confidence.
EMSA	AIS data for fishing vessels ≥15 m length.	The data is only available for 15 m and over vessels, so is not representative of <15 m vessels. • Data assessed with medium uncertainty and medium confidence.
NASH Maritime	Marine traffic (AIS and radar) survey data (2022).	An assessment undertaken into fishing vessel activity within the Navigational Risk Assessment (NRA) undertaken for the Project windfarm site. Based on a 14 day AIS and radar survey in summer (August 2022) and winter (February 2022) and longer-term AIS data. • Data assessed with low uncertainty and high confidence.

3. Baseline Environment

3.1 Overview of Landings

3.1.1 Local commercial fisheries study area (36E6)

Commercial fisheries statistics presenting data for the annual (2016 to 2022) landed weight and first sales value landed by UK vessels from the local study area (36E6) are shown in Figure 3.1 and Figure 3.2 respectively. This data indicate that landings are dominated by shellfish species, notably queen scallop *Aequipecten opercularis*, whelk *Buccinum undatum*, and king scallop *Pecten maximus*. The majority of landings by UK fishing vessels are made by vessels registered in Scotland and England.

An annual average value of almost £2.22 million was landed by all UK vessels for the years 2016 to 2022 from the local study area (36E6). Queen scallop represents the highest value species commercially landed from the local study area (average £792,000 per annum), although landings are highly variable across the time series, peaking in 2016 with significant drops since. King scallop landings have remained more consistent with an average of £452,000 per annum. The trend seen in queen scallop landings is expected for this species, with higher production at specific grounds on a seven to ten year cycle. The lower level of landings noted from 2018 to 2022 is therefore not signifying a move away from this species, but representing the long term trends seen in catches, which is typical for queen scallop in the Irish Sea region. Notably, landings of queen scallop in 2021 have increased from 2020 levels, although dropped in 2022.

Whelk is also a key species for the local study area, with an average first sales value of £585,000 per annum, peaking in 2019 at £1 million. Relatively small quantities of other species are landed from the local study area, including lobster *Homarus gammarus* (£59,000 annual value), bass *Dicentrarchus labrax* (£54,000) and sole *Solea solea* (£90,000). A significant increase in sole landings are noted in 2022 with a value of £362,000 being landed, compared to the annual average of £90,000.

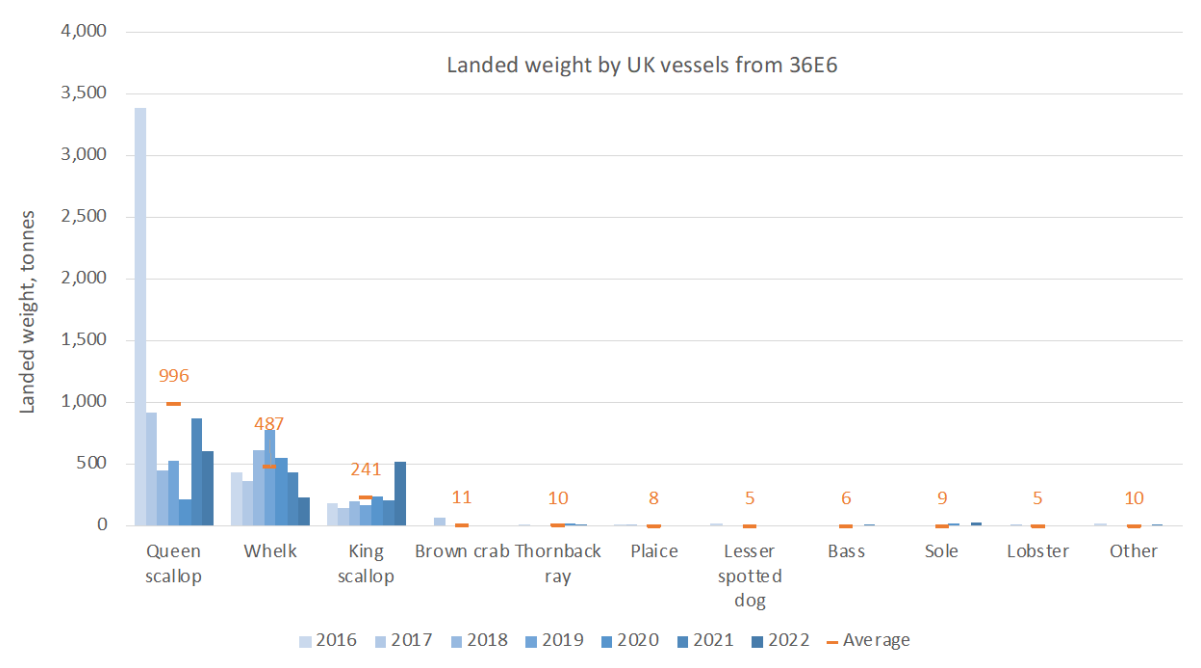


Figure 3.1 Key species by annual landed weight (tonnes) (2016 to 2022) from the local commercial fisheries study area (ICES rectangle 36E6) (MMO, 2022; MMO, 2023)

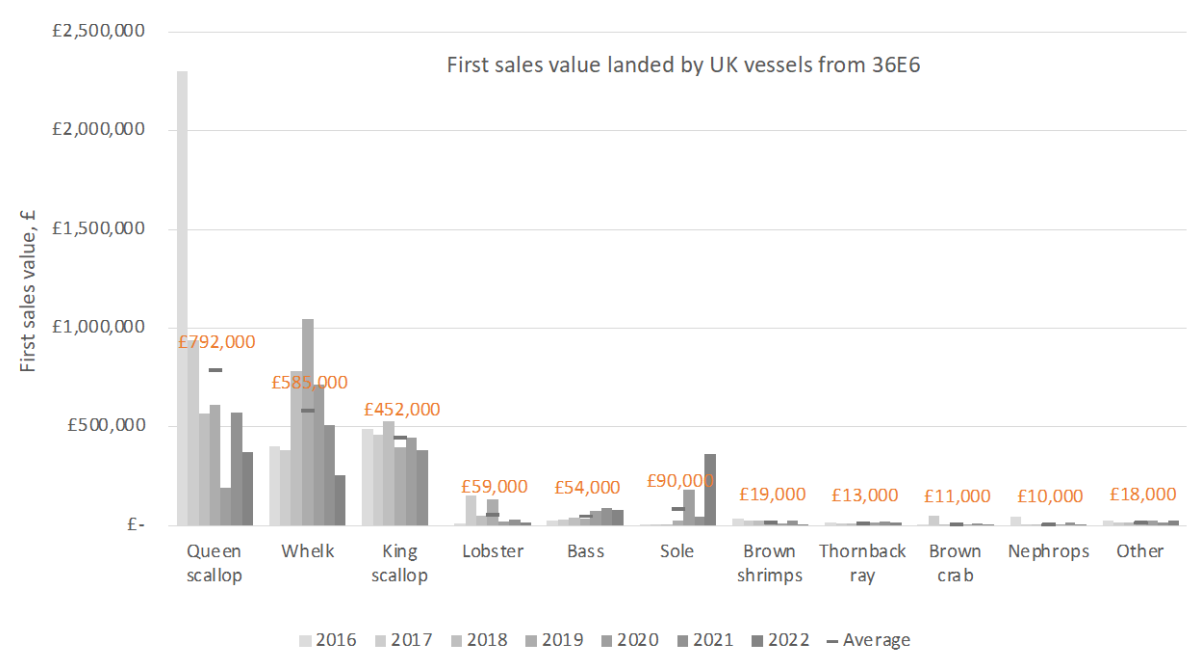


Figure 3.2 Key species by annual landed value (GBP) (2016 to 2022) from the local commercial fisheries study area (ICES rectangle 36E6) (MMO, 2022; MMO, 2023)

3.1.2 Regional commercial fisheries study area

Commercial fisheries statistics presenting data for the annual (2016 to 2022) landed weight and first sales value landed by UK vessels from the regional study area (seven ICES rectangles) are shown in Figure 3.3 and Figure 3.4 respectively.

Landings data indicates that in this wider regional study area, landings remain dominated by shellfish species, namely whelk, king scallop, queen scallop, nephrops *Nephrops norvegicus*, lobster and brown crab *Cancer pagurus*. Landings from the regional study area by UK and Isle of Man fishing vessels are made by vessels registered in England, Scotland, the Isle of Man and Wales.

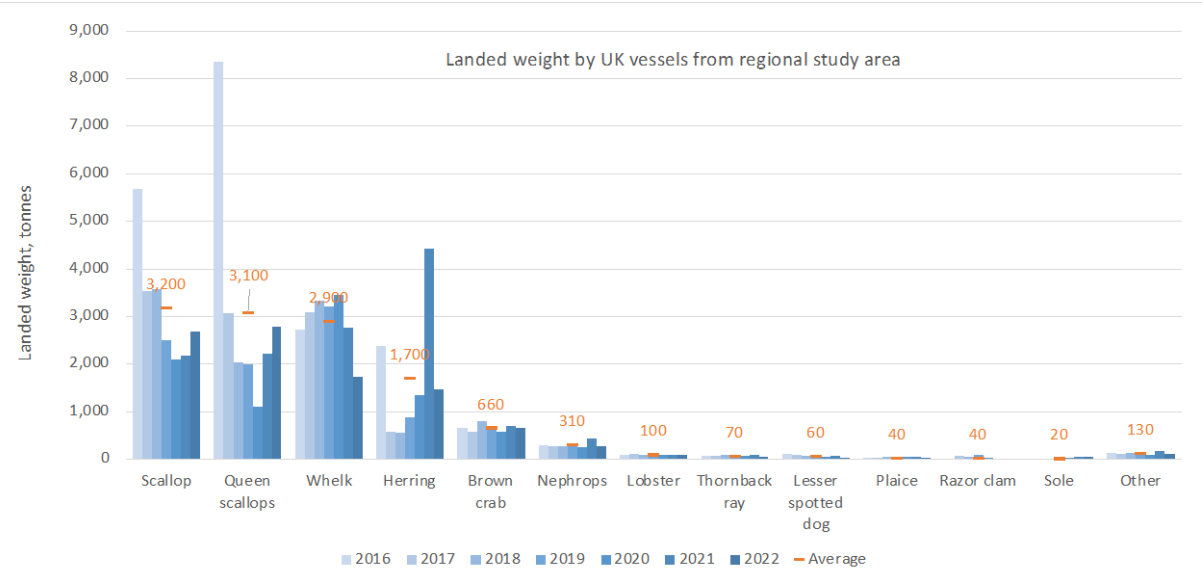


Figure 3.3 Key species by annual landed weight (tonnes) (2016 to 2022) from the regional commercial fisheries study area (MMO, 2022)

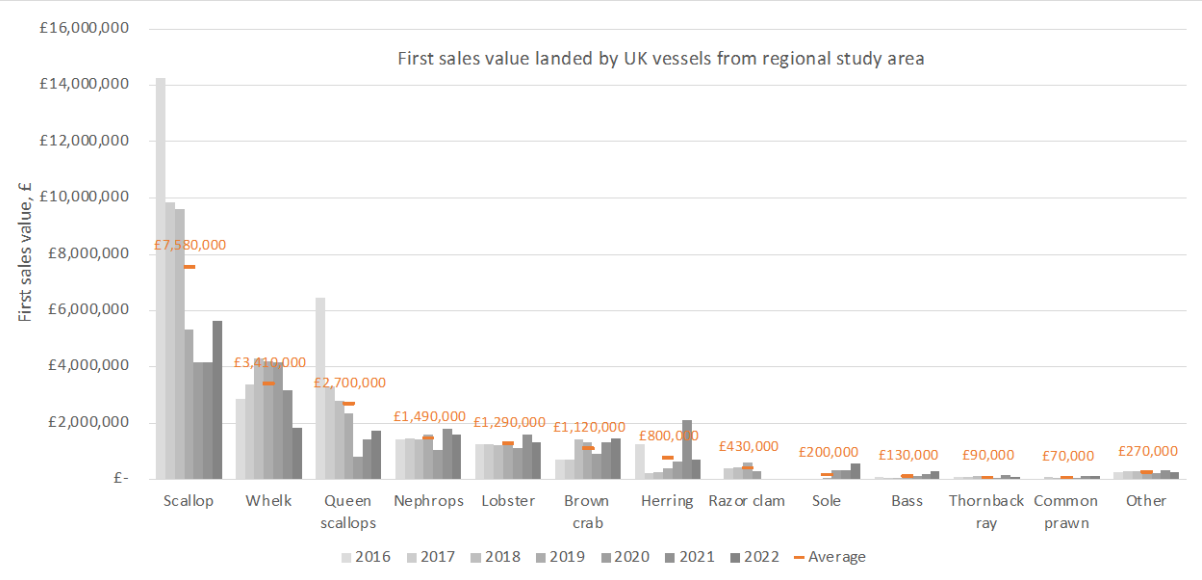


Figure 3.4 Key species by annual landed value (GBP) (2016 to 2022) from the regional commercial fisheries study area (MMO, 2022)

Regional landings data by ICES rectangle (Figure 3.5) illustrate the importance of the wider region to UK and Isle of Man vessel nationalities, specifically Isle of Man landings from 37E5, Scottish landings from 36E5, Welsh landings from 35E5 and Northern Irish landings from 37E5.

Landings data sourced from the EU DCF database indicates that non-UK fishing activity in the regional study area includes Irish dredgers targeting king scallops and Belgian trawlers targeting demersal species, particularly thornback ray *Raja clavata*, plaice *Pleuronectes platessa* and sole. It is understood that Irish and French vessels hold historical access rights in the 6 to 12 NM zone, inshore of the windfarm site.

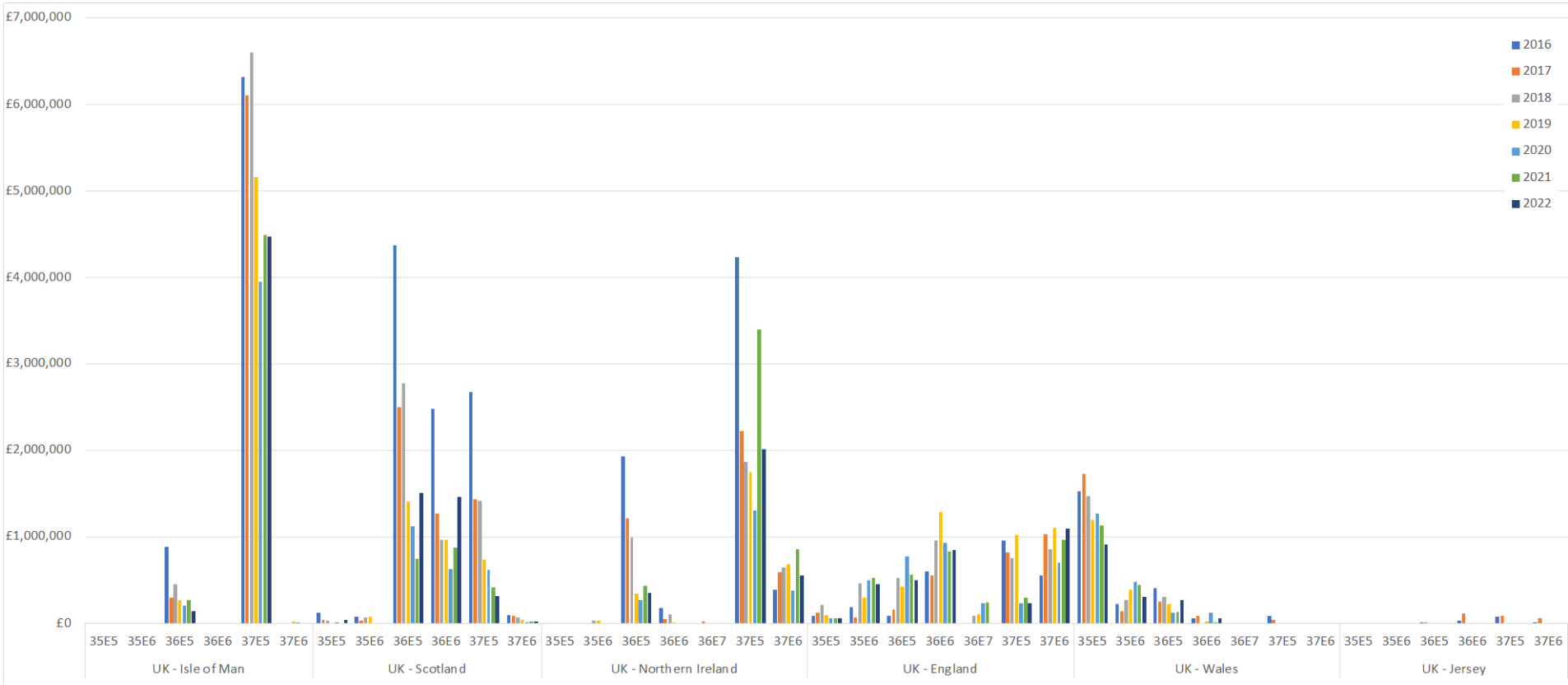


Figure 3.5 Annual landed value (GBP) (2016 to 2022) from the regional commercial fisheries study area by vessel nationality and ICES rectangle for UK and Crown Dependencies (MMO, 2022; MMO, 2023)

3.2 Key Fishing Fleets and Target Species

There are three descriptive units used for defining fisheries (Marchal, 2008):

- **Fishery** – a group of vessel voyages which target the same species or use the same gear;
- **Fleet** – a physical group of vessels sharing similar characteristics (e.g. nationality); and
- **Métier** – a homogenous subdivision, either of a fishery by vessel type or a fleet by voyage type.

A range of fleets target different fisheries across the local study area, as indicated by landings statistics for registered vessel nationality and gear type (Figure 3.6). Across the local study area, the highest proportion of landings by weight are caught by dredges and pots and traps. Vessel and gear types within the key fleets and fisheries that operate across the local and regional study areas are described within this section.

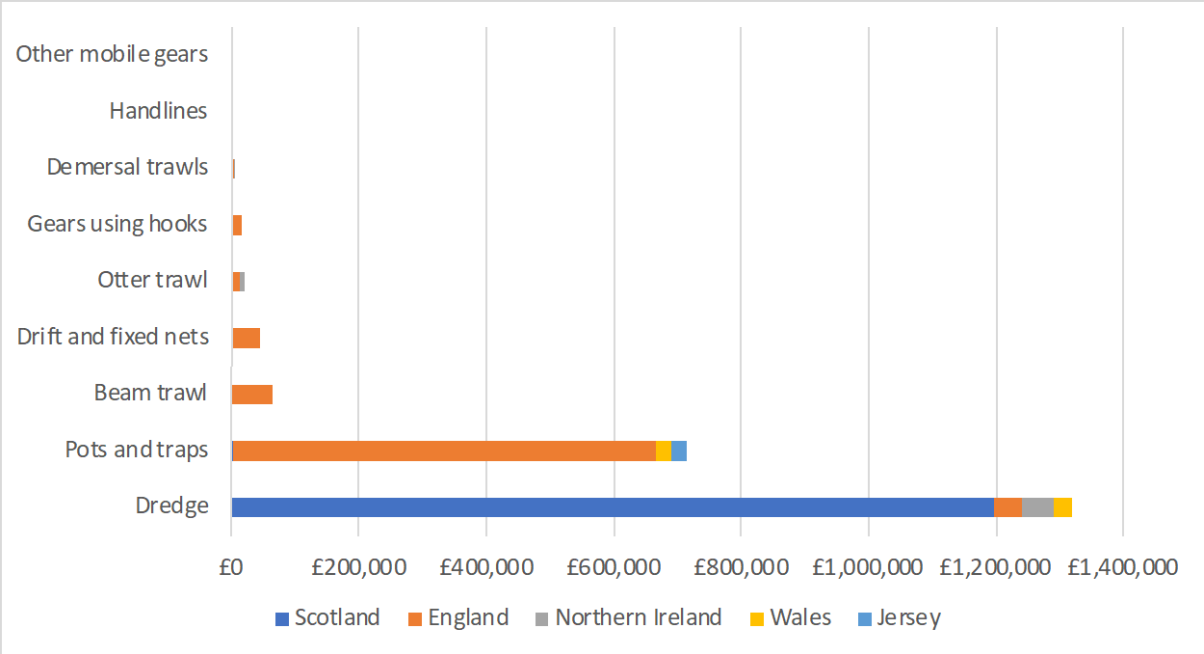


Figure 3.6 Annual average landings value 2016 to 2022 by gear type and vessel origin for the local study area, 36E6 (Data source: MMO, 2022)

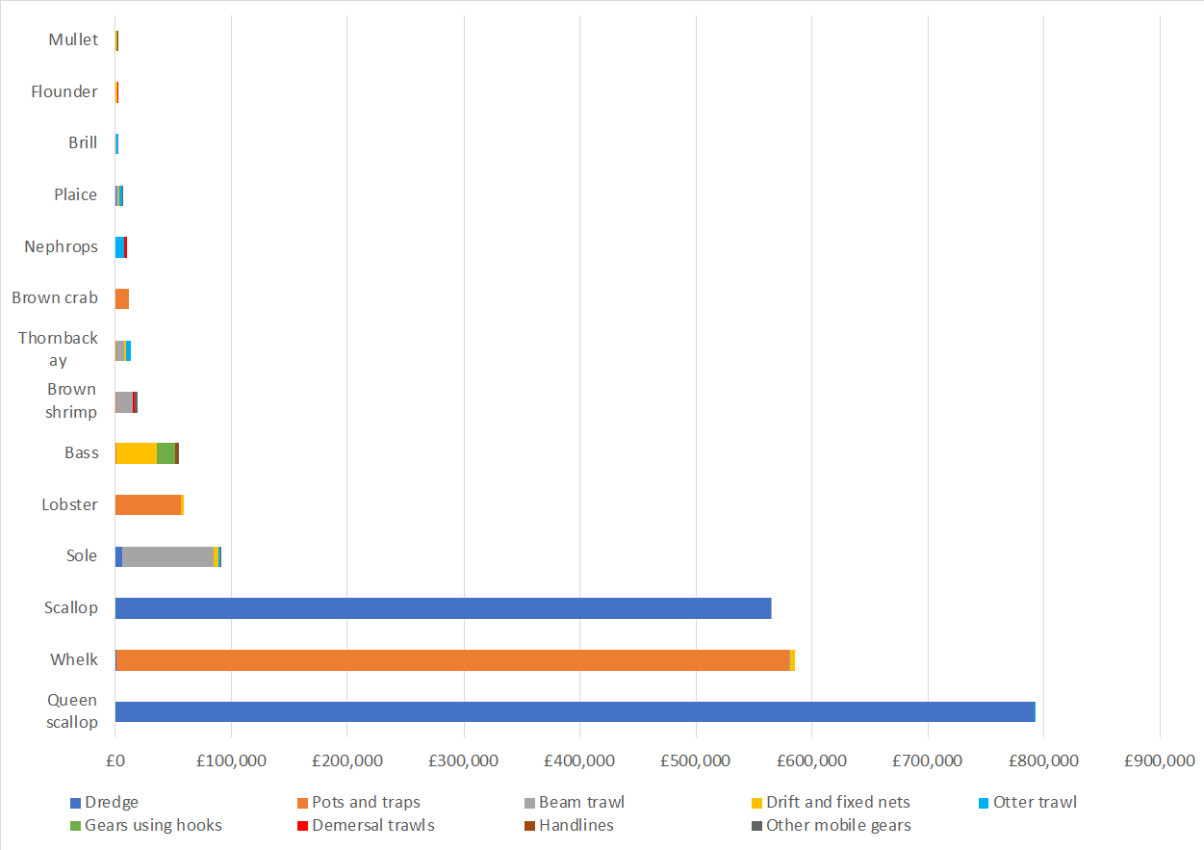


Figure 3.7 Annual average landings value 2016 to 2022 by gear type and key species for the local study area, 36E6 (Data source: MMO, 2022)

3.2.1 Scallop Dredge

Dredges are rigid structures that are towed along the seabed to target various species of shellfish. A typical scallop dredging vessel is shown in **Figure 3.83-8** and **Table 3.13.1** describes the profile of scallop dredging vessels active across the regional study area.

Scallop dredgers fish as the tooth bar of each dredge rakes through the sediment lifting out scallops and the spring-loaded tooth bar swings back, allowing the dredge to clear obstacles on the seabed. The dredges are held in a series on two beams, which are fished on each side of the vessel. Generally, queen scallop are targeted using skid dredges. Skid dredges operate in much the same way as toothed dredges which target king scallop, but the tooth bar is replaced with a "tickler chain" which disturb queen scallops resting on the seafloor, causing them to swim upwards into the water column where they can be caught by the dredge.

From the regional study area, king scallops are caught by vessels operating dredge gear; Queen scallops are caught by both dredge gear and demersal otter trawl. In the local study area queen scallop are caught by dredge gear operated by UK vessels; in the regional study area queen scallop are caught by UK scallop dredgers and Isle of Man demersal otter trawlers.

UK and Isle of Man scallop dredgers operate around the entire coastline of the British Isles. Scallop dredging takes place year-round. The UK and Isle of Man scallop fleet has two main components: a fleet of larger boats (> 20 m in length) which range in a nomadic fashion exploiting both inshore and offshore scallop stocks around the British Isles; and, smaller inshore boats (< 15 m in length) that are restricted in range to inshore waters. Larger nomadic vessels tend to fish intensely in an area until harvesting scallops becomes unprofitable. They will then move on to new areas but will return a number of years later when the scallop stocks have returned to a level where dredging for them has once again become viable. Due to this fishing pattern a large scallop dredger may operate in four or five, or even more, areas and rotate around them over a period of several years. In this way, most of the suitable grounds

around the UK are fished. At the other end of the spectrum are the smaller, inshore vessels, including some who will only fish for scallops on a part time basis, and others who rely on scallops for the majority of their income. These vessels are restricted, primarily by their size, in the areas and weather that they can fish meaning that they are likely to dredge for scallops only in their local area. The catching capacity of these vessels is significantly lower than the large vessels due to the lower number of dredges they can tow. Visiting vessels from Scotland, England and Northern Ireland periodically fish scallop grounds in the Irish Sea, and in addition there are a small number of Welsh dredgers based out of Holyhead.

Scallop dredging is an activity which is generally engaged by larger (>10 m vessel length) vessels due to the engine capacity required to tow this heavy fishing gear.

Not all scallops in the path of the dredge are retained by the dredges and efficiency of the Newhaven dredge (commonly used in the UK commercial scallop fishery) can vary between <10 % on soft ground to 51 % on hard ground. Dredge efficiency is affected by ground type (e.g. soft sand, gravel or cobble), towing speed, warp length, tide strength and direction and the experience of the skipper.

Table 3.1 Profile of typical dredging vessels active across the regional study area

Parameter	Indicative details
Main target species	King scallop and queen scallop
Nationality	Scottish, English and Northern Irish, some Welsh, Irish
Vessel length	10 m to 25 m
Horsepower	200 hp to 400 hp
Typical speed when shooting and hauling gear	2 to 6 knots
Typical duration of tow / dredge	1 to 2 hours
Seasonality of activity	King scallop targeted primarily in winter months (November to February) Queen scallop targeted year-round with spring/summer peak, noting current seasonal Irish Sea closure April to June
Typical gear	Up to 16 dredges per side of vessel. Each dredge consists of a triangular frame leading to an opening, a tooth bar with spring-loaded teeth, and a bag of steel rings and netting back.

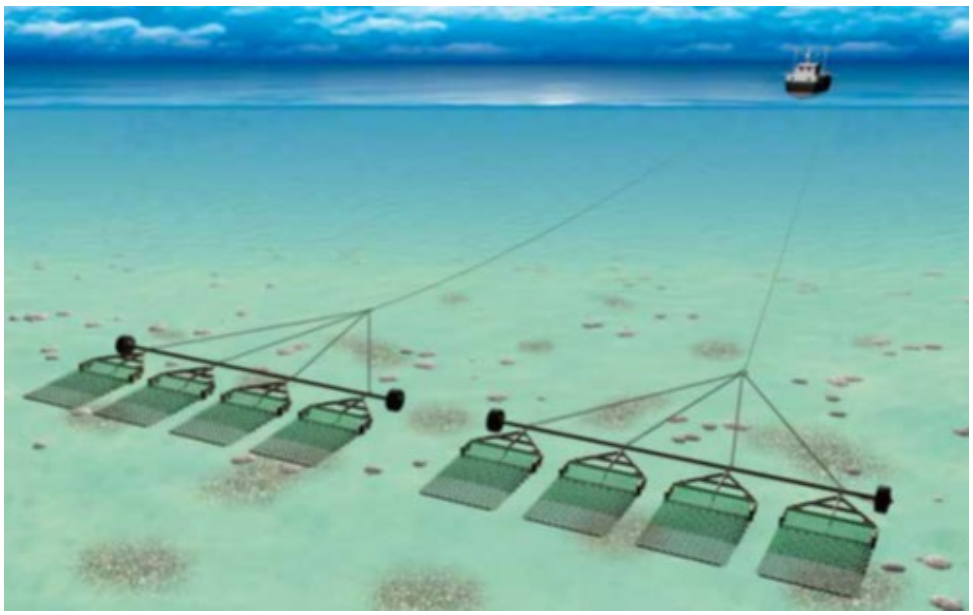


Figure 3.8 Typical dredge gear configuration (Source: Seafish, 2015)

Figure 3.9 Example of dredge vessel (Source: Fishing News)

Key species caught by vessels operating scallop dredge

Queen scallop

In the regional study area queen scallop are caught by scallop dredgers and demersal otter trawlers; in the local study area queen scallop are principally targeted by scallop dredgers.

The regional demersal otter trawl fleet targeting queen scallop is principally vessels registered in the Isle of Man. Further details of this fleet is provided in Section 5.5.

Queen scallop is found down to depths of 100 m, on sand or gravel habitats. It is fished commercially around the UK, with particularly important commercial grounds around the Isle of Man. It can grow up to 90 mm in diameter.

Queen scallop differ from king scallop in that they are smaller, and both shells (valves) are curved (convex), whereas for the king scallop the lower valve on which it lies is deeply convex and the upper valve is almost flat (Carter, 2008).

Most information available about the stock status of queen scallops in the Irish Sea is from research and stock assessments from Isle of Man territorial waters. The Isle of Man queen scallop stock could be an indicator of scallop stock status in the rest of the Irish Sea. Isle of Man queen scallop stock peaked at around 25,000 tonnes in 2010, and subsequently declined to around 1,200 tonnes in 2019, the lowest on record. Estimated biomass in 2021 is 2,004 tonnes: an improvement but still below the long term average. Therefore, there remains concern for the status of the stock. There are few management measures in place for Irish Sea queen scallop fisheries outside of territorial waters; a minimum landing size (MLS) of 45 mm is in place for queen scallop; however, it is generally uneconomic to process queen scallops less than 55 mm. The queen scallop fishery in the Irish Sea is currently subject to closure between April and June each year (MMO, 2018).

In general, landings of queen scallop are more variable and less valuable than king scallops. Landings of queen scallops from the local study area occur year-round, though typically peak in the summer months. Landings from the local study area have declined substantially in recent years from over 3,000 tonnes in 2016 to approximately 200 tonnes in 2020, increasing to 880 tonnes in 2021 and 600 tonnes in 2022.

Stakeholder consultation indicated the cyclical nature of queen scallop landings, which peak and trough on a 7 to 9 year cycle. A long term trend in landings has therefore been analysed for queen scallop, for the period 2011 to 2022 (i.e.,12 years). The data presented in Figure 3.10, Figure 3.11 and Figure 3.12 illustrate this long term trend relative to landed weight, value by ICES rectangle and value by ICES rectangle and vessel nationality for all UK vessels including Isle of Man.

The long term data trend in queen scallop landings indicates a clear pattern of higher landings from 2011 to 2016 compared to 2017 to 2022, and this trend is reflected in landings from all key ICES rectangles i.e., 36E5, 36E6 (within which the Project is sited) and 37E5 (where the majority of Isle of Man effort is focused).

The average annual value from the periods 2011 to 2016, 2017 to 2022 and 2011 to 2022 is shown in Table 3.2 for the regional study area and local study area. The landed value from the local study area dropped by 58% between the period 2011-2016 and 2017-2022; the regional landings dropped by 68% across the same periods.

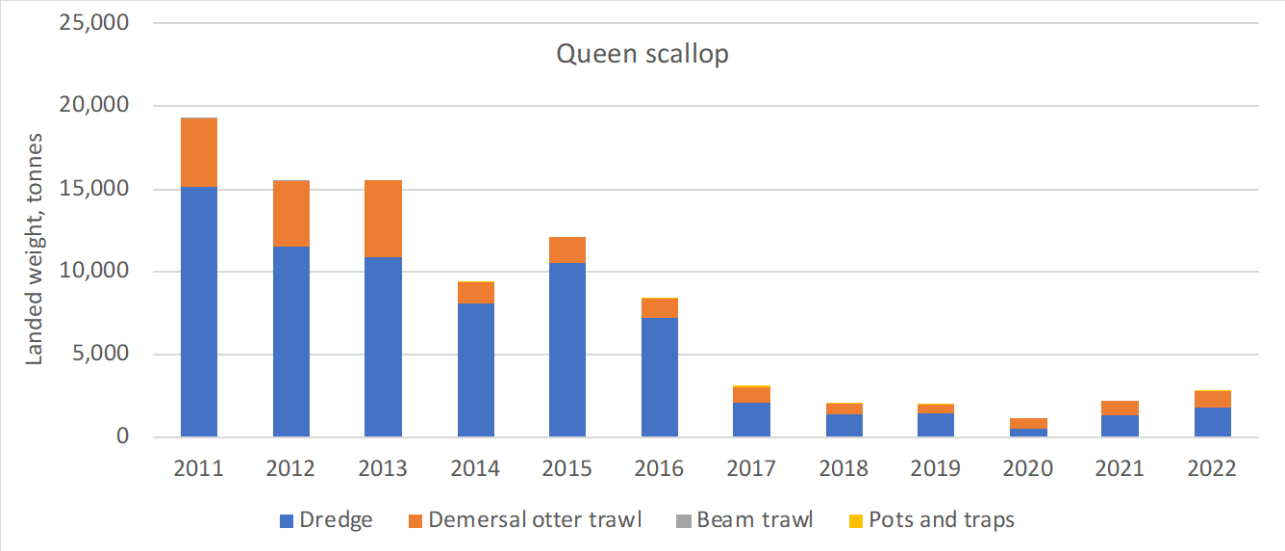


Figure 3.10 Long term trend in queen scallop landed weight, tonnes (2011 to 2022) by UK and Isle of Man vessels from the regional study area (MMO, 2016, 2022)

Table 3.2 Average annual first sales value of queen scallop landed by UK vessels (MMO, 2016, 2022; 2023)

	2011 to 2016 average	2017 to 2022 average	2011 to 2022 average
Regional study area	£6,381,174	£2,071,126	£4,226,150
Local study area (36E6)	£1,274,194	£541,317	£907,756

Most information available about the stock status of queen scallops in the Irish Sea is from research and stock assessments from Isle of Man territorial waters. The Isle of Man queen scallop stock could be an indicator of scallop stock status in the rest of the Irish Sea. Isle of Man queen scallop stock peaked at around 25,000 tonnes in 2010, and subsequently declined to around 1,200 tonnes in 2019, the lowest on record.

The Isle of Man Queen Scallop 2022 Stock Survey Report conducted by Bangor University's Sustainable Fisheries and Aquaculture Group (Bloor et al., 2022a) presents a comprehensive overview of the stock status, fishing effort, and management measures for the queen scallop fishery in and around the Isle of Man's territorial waters. Within Manx waters, queen scallop is managed via a TAC, however this TAC does not extend into English waters.

The variation in landings confirms the importance of considering long term trends in specific circumstances. The cyclical nature of the queen scallop fishery is noted, but not clearly evidenced in landings statistics for the regional study area. There is slight growth in landings in 2022 and while potential remains for queen scallop landings to increase in the near future, the recent stock assessments show a low biomass for this species.

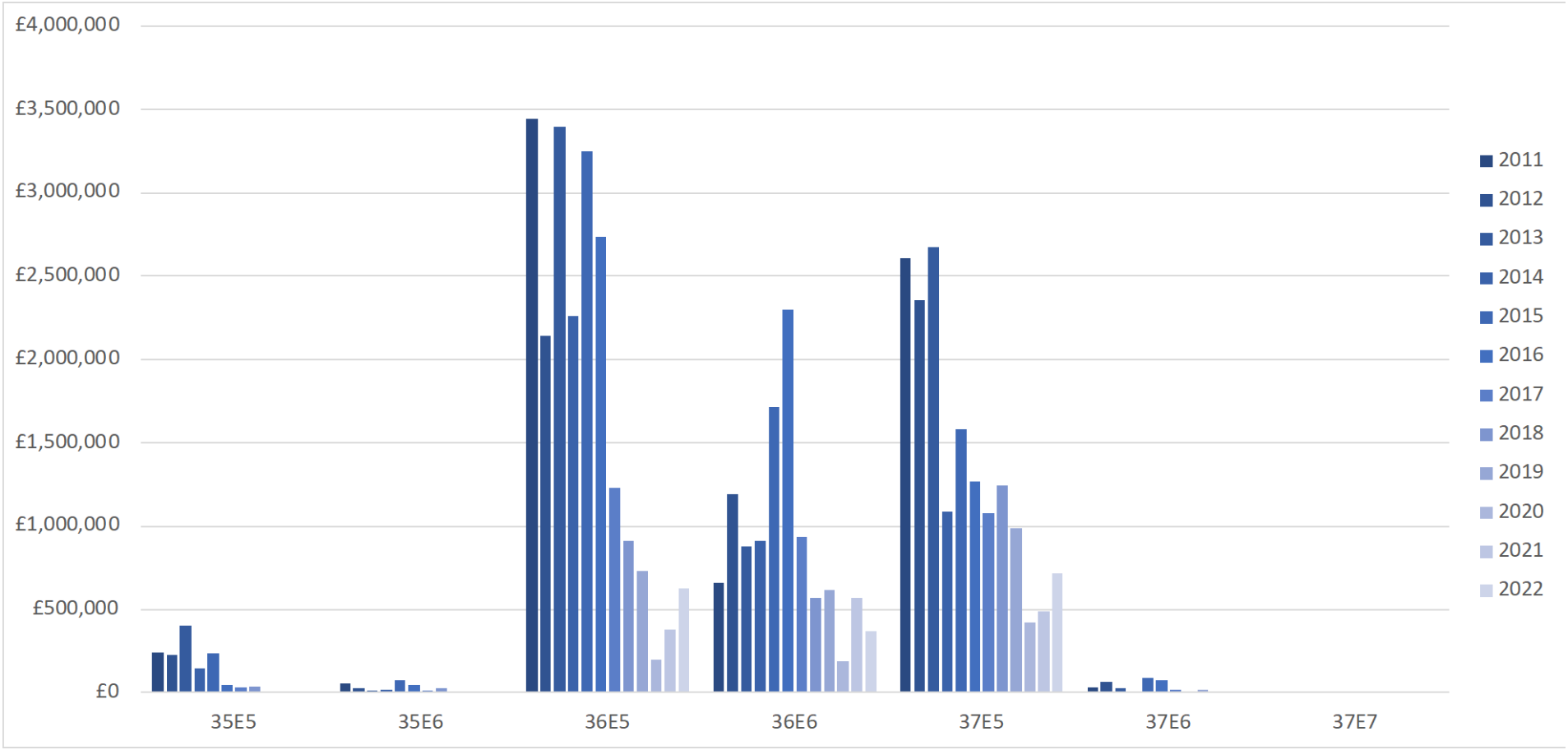


Figure 3.11 Long term trend in queen scallop landed value (2011 to 2022) by UK vessels from the regional study area (MMO, 2016, 2022)

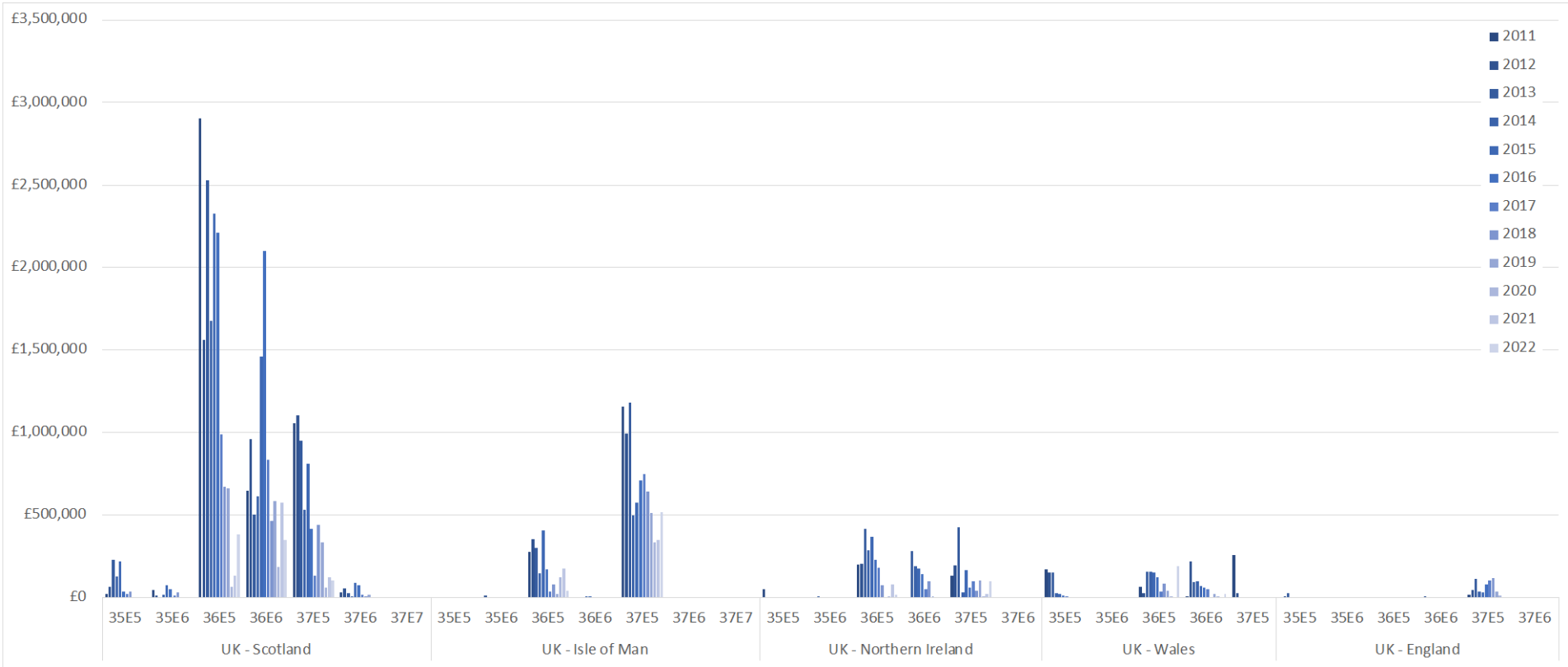


Figure 3.12 Long term trend in queen scallop landed value (2011 to 2022) by UK vessels from the regional study area (MMO, 2016, 2022)

King scallop

King scallop are most common in water depths of 20 to 70 m, in areas of clean firm sand and fine gravel exposed to water currents, which provide good feeding conditions for this bivalve mollusc. Adults are largely sedentary and usually found recessed in sediment. King scallop live to 10 to 15 years and reach reproductive maturity between 3 to 5 years, at a size of 60 mm; the average maximum size is 160 mm. Recruitment is usually unpredictable as it depends not only on successful spawning and larval production but also on if larvae are retained or transported to areas suitable for larval settlement. Larvae are pelagic, making settlement in a particular area somewhat unpredictable, which leads to an unstable age structure within stocks. As a consequence of this, king scallop beds frequently show a regional separation of year classes and spatial variability in age structure.

Whilst annual assessments of king scallop stock status in UK English waters are undertaken by Cefas, there is no analytical assessment of stock status in this area. However, several administrations have responsibilities for this area and dredge surveys within the Irish Sea have been undertaken by the Isle of Man, Ireland and Wales.

There are no total allowable catches (TACs) (i.e. catch limits) or quotas in place for this species; instead, UK king scallop fisheries are controlled predominantly through the use of minimum legal landing sizes, gear restrictions, seasonal closures and some effort controls on the largest boats. An EU Minimum Conservation Reference Size (MCRS) exists of 110 mm in the south Irish Sea and there is a cap on the level of effort (kWdays) that vessels ≥15 m can utilise in ICES area 7 by the Western Waters agreement (EC 1415/2004).

Landings of king scallop from the local study area typically peak from winter through to late spring **Figure 3.13**, and have fluctuated slightly around 200 tonnes per annum in recent years.

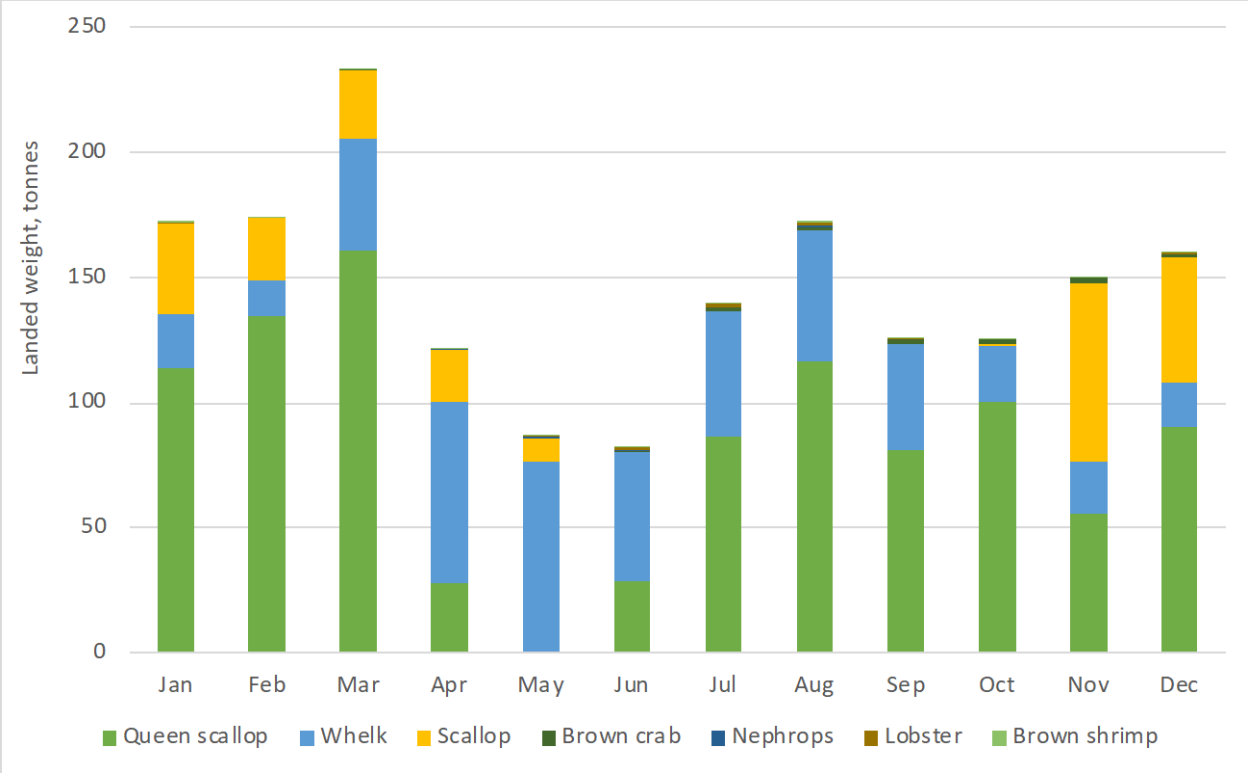


Figure 3.13 Seasonality of average monthly landings of shellfish species based on landed weight (tonnes) based on data from 2016 to 2022 from the local study area (MMO, 2022; 2023)

3.2.2 Pots and Traps

Figure 3.14 and Figure 3.15 show typical potting vessels, gear and the configuration of set pots and Table 3.3 describes the profile of potting vessels active across the regional study area.

For the capture of whelks, modified, weighted 25 litre plastic drum purpose designed pots are often used. Pots are typically rigged in 'fleets' or 'strings' of between 15 to 60 pots, depending upon vessel size and area fished. Hundreds of pots can be deployed across a fishing location. Lengths of fleets may range from 100 m to over 1 mile, anchored at each end with anchors or chain clump weights. A variety of surface markers are used, including flagged dhans, buoys and cans. Soak times, the time between emptying and re-baiting the pots, can vary between six and 72 hours, but would typically be 24 hours. All pots are worked on a rotational basis; after hauling and emptying, pots are baited and re-set. Bait for the whelk fishery is often crab or dogfish. Large vessels, 'super whelkers', fish year-round offshore.

Creels or pots used for the capture of lobsters and crabs, are set in a similar configuration as described for whelk pots. Creel design is typically D-shaped in section and made from steel rods covered in netting and protected or "bumpered" with rope or rubber strips. The number of pots fished in a location can range from 20 through to hundreds and soak times are typically between 24 and 168 hours. Pots are usually deployed in fleets of 10 to 60 on rocky substrate, though may less frequently be found on other softer substrates.

Larger potters working further offshore make fishing trips lasting around two days. Smaller potters under 10 m in length operate as day boats, returning to port after hauling, emptying, baiting and re-setting fleets of pots. Potting vessels may target a single or multiple shellfish species.

Table 3.3 Profile of typical potting vessels active across the regional study area

Parameter	Indicative details
Main target species	Whelk, brown crab, lobster
Nationality	Majority English, some Welsh
Vessel length	Over 10 m (primarily whelk) and under 10 m
Horsepower	60 hp to 350 hp
Typical speed when shooting and hauling gear	0 to 9 knots
Typical soak time	1 to 2 days
Seasonality of activity	Whelk landings peak through summer and spring. Brown crab landings peak through late autumn and winter. Lobster landings peak in summer months and in December.
Typical gear	Fleets of baited pots placed on the seabed. Pots typically hauled daily but may be left a number of days. Generally, day boats that return to port daily.

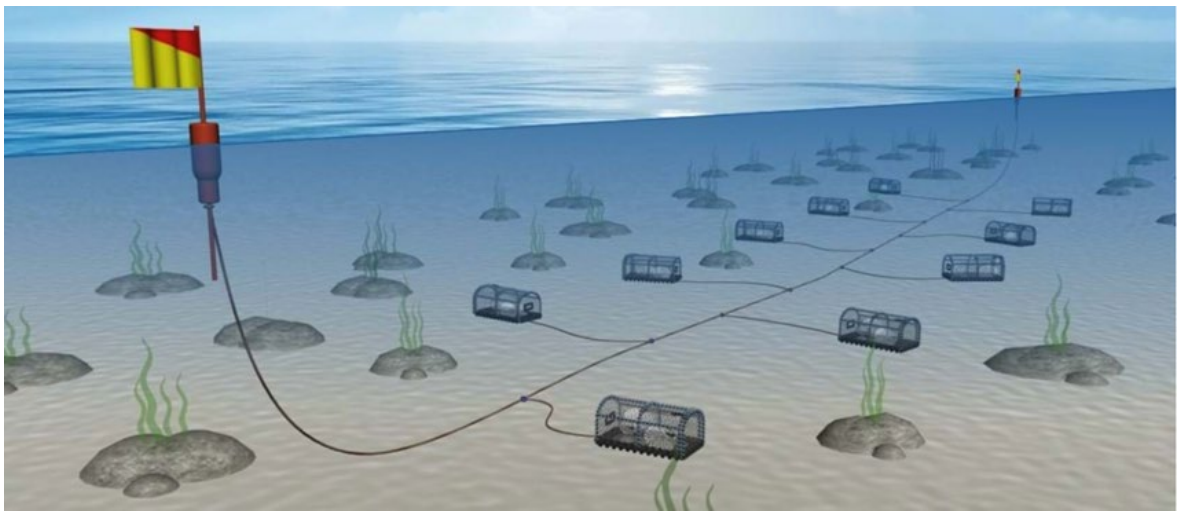


Figure 3.14 Typical potting gear configuration (Source: Seafish, 2015)

Figure 3.15 Example of potting vessels (Source: The Bosun's Watch; Poseidon)

Key species caught by vessels operating potting gear

Whelk

Common whelk are a gastropod mollusc that inhabits mixed sediment from the low water mark down to 1,200 m, being most common in water depths between 0 and 50 m. Whelk reach reproductive maturity at different sizes depending on their geographical location and environmental conditions. Whelks grow to 150 mm and live for up to 15 years, reaching maturity at 2 to 3 years. European populations are understood to breed from autumn to winter (Kideys et al., 1993). Eggs are fertilised internally and laid on hard benthic substrata, with juveniles emerging after approximately 3 to 5 months. The life cycle therefore has no pelagic phase, leading to limited dispersal between populations.

Whelk fisheries have typically been expanding around the UK in recent years as prices have increased and export to non-EU countries has grown. No TAC or quotas are in place for whelk. The current EU-wide MLS for whelks is 45 mm, noting that around the UK, whelks typically reach maturity between 45 mm and 78 mm.

Whelk landings from the local study area indicate a seasonal peak across spring and summer months, though they are landed year-round. In recent years, approximately 550 tonnes whelk has been landed from the local study area annually.

Lobster

Lobster is a long-lived decapod crustacean. Lobster breed once per year in the summer and newly berried females begin to appear from September to December. Lobsters do not undertake any significant migrations and juveniles in the first three to four years of life may be

particularly sedentary. From hatching it takes approximately five years for a lobster to recruit to the fishery. Lobsters typically inhabit rocky reef and rough ground, sheltering in crevices between rocks and boulders. The availability of suitable habitat is considered to influence the carrying capacity and size structure of lobster populations (Seitz *et al*., 2014).

There are no TACs or quotas in place for lobster. Primary management is by the technical measure of an MLS of 87 mm (Council Regulation 850/98).

Lobster is one of the highest value per kilogram, commercially exploited shellfish species found in UK waters. Fishing activity typically peaks across summer months in the local study area, with a second peak in December associated with supplying the Christmas-time market. Landings from the local study area fluctuated across 2016 to 2021, peaking at ~16 tonnes in 2017 and being as low as ~1 tonne in 2020, remaining low in 2021 at 2 tonnes.

Brown crab

Brown crab is a long-lived, large decapod crustacean. Brown crabs are very productive animals, and each female can hatch between 1 and 4 million eggs. Post larvae are known to settle inshore and juvenile crabs are more common in shallow waters. Adult crabs undertake extensive migrations, which may be associated with their reproductive cycle. Brown crab is found across a wide range of habitat types, ranging from rocky reefs to soft mud and sand.

As with lobster, brown crab are caught by pots and have no TACs or quotas in place. Primary management is by the technical measure of a MLS of 140 mm carapace width inside 6 NM and 130 mm outside 6 NM (Council Regulation 850/98).

Fishing activity typically increases through late summer months, peaking in autumn and winter in the local study area. Landings from the local study area fluctuated across 2016 to 2021, peaking at ~63 tonnes in 2017 and being ~4 tonnes in 2020 and ~6 tonnes in 2021.

3.2.3 Beam Trawl

Beam trawl nets are held open by a heavy steel beam which is towed along the seabed on a line approximately three times the depth of the water. Some beam trawls include tickler chains, which drag along the seabed in front of the net, disturbing fish in its path and encouraging them to rise into the net. Beam trawls can range in length from 4 m to 14 m and each trawler tows two beam trawls at a time from derricks on either side of the vessel.

Shrimp trawls used in inshore waters are a very lightweight version of a lightweight beam trawl but have a smaller cod end mesh and a sorting grid/veil attached.

Table 3.4 Profile of typical beam trawl vessel active across the regional study area

Parameter	Indicative details
Main target species	Sole, plaice, thornback ray, brown shrimp (lightweight trawling in coastal waters)
Nationality	English, Belgian
Vessel length	15 m to 45 m
Horsepower	500 hp to 2,000 hp
Typical towing speed	3.5 to 8 knots
Typical duration of tow / dredge	1 to 2 hours
Seasonality of activity	Peak activity in spring months
Typical gear	Twin beam or single beams; beam length up to 12 m Each beam weighing <10 tonnes. Chain matting or individual chains attached to underside.

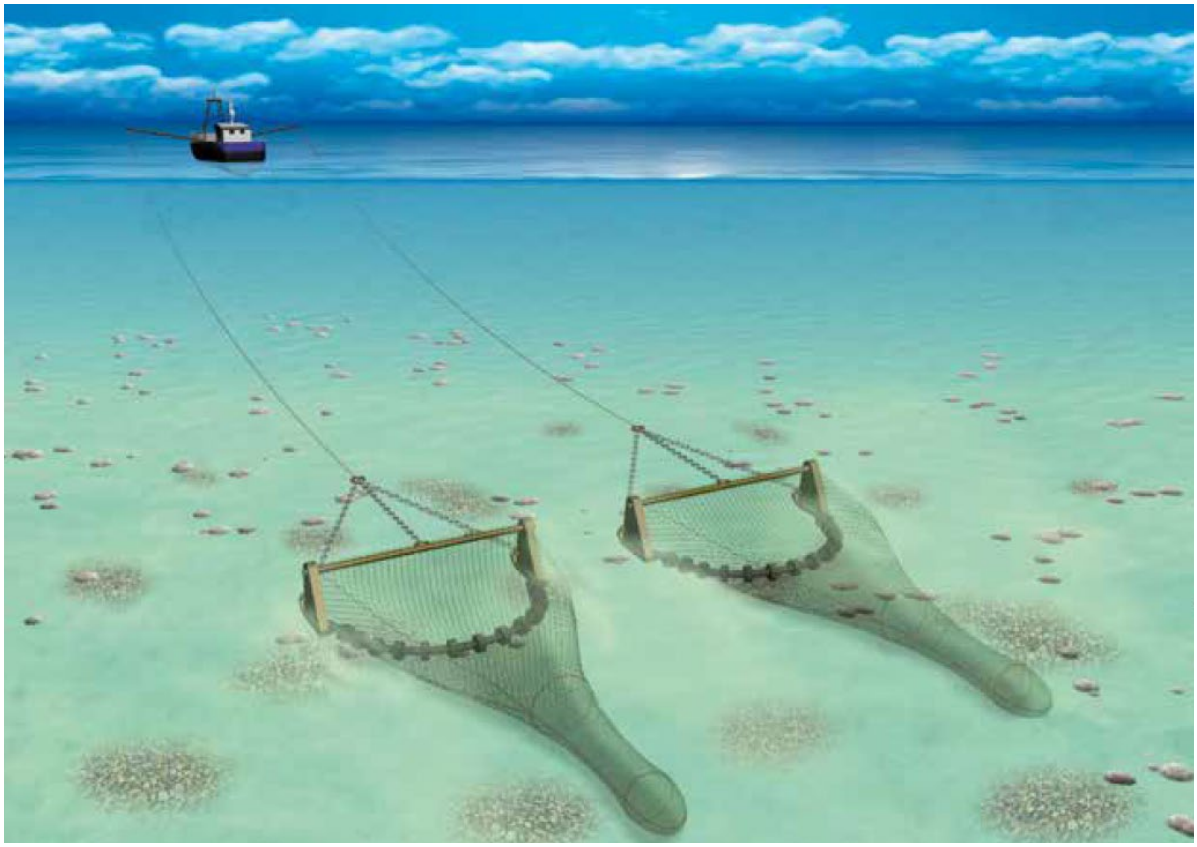


Figure 3.16 Typical beam trawl gear configuration (Source: Seafish, 2015)

Key species caught by vessels operating beam trawl

Plaice

Plaice is a bottom-dwelling flatfish. It spawns in the early months of the year (January to March) and sometimes makes long spawning migrations. They grow to around 50 to 60 cm in length but have been recorded up to 90 cm. Plaice are most commonly found on sandy bottoms but can live on gravel or mud. They are active at night and remain stationary during the day, usually buried within the sediment leaving only the eyes protruding. They have been recorded from between 0 and 200 m water depth, but are mostly between 10 and 50 m.

The Irish Sea plaice stock is in a very healthy state and fishing pressure is low (ICES, 2022), although the amount of fish discarded at sea is high. This stock is covered by the EU's Western Waters Multi Annual management Plan (MAP), in which it is considered bycatch. The TAC in recent years have been set in line with advice, and catches are usually below TACs (ICES, 2023), owing to limited market demand.

In the regional study area, plaice are taken year-round with landings peaking in summer months. Across the period 2016 to 2021, landings of plaice from the local study area averaged ~ 8 tonnes annually.

Sole

Sole is a flatfish and belongs to the family of flatfishes known as Soleidae. It spawns in spring and early summer in shallow coastal water, from April to June in the southern North Sea and from May to June off the coast of Ireland and southern England. The larvae remain in shallow inshore nursery areas such as estuaries, tidal inlets and shallow sandy bays, moving to join the spawning adult population at 2 to 3 years old. Adults are usually found at a depth range of between 10 and 60 m; in winter adults move further offshore and can reach depths of up to 120 m. The juveniles can undertake extensive migrations, although once they reach maturity,

will only carry out seasonal migrations from deeper water to shallower spawning habitat. They can reach 70 cm in length but are commonly between 30 and 40 cm.

Catches of sole have declined since the mid-1990s. After a record low spawning stock biomass in 2014, the latest ICES stock assessment observes that spawning stock biomass is estimated to be above the maximum sustainable yield trigger point (ICES, 2022b). Sole are subject to a TAC (set at 40 tonnes annually in the Irish Sea from 2016 to 2018, increasing more recently to 768 tonnes in 2021) and technical measures are applicable to the mixed demersal beam-trawl fishery (relevant to both sole and plaice), namely a minimum mesh size of 80 mm. A MCRS of 24 cm is in place.

Sole is caught in a mixed fishery with other flatfish as well as gadoids. In the regional study area, they are targeted using nets and demersal otter trawls, with landings peaking in summer months. Across the period between 2016 and 2021, landings of sole were less than 1 tonne per year between 2016 and 2018 reflecting the low TAC, increasing to 22 tonnes in 2020 and dropping to 6 tonnes in 2021.

Flounder

Flounder *Platichthys flesus* is a widespread coastal European fish species that divides its life cycle between brackish and freshwater habitats. It moves offshore into deeper water of higher salinity in winter where it spawns in the spring. Spawning takes place at depths of between 20 and 50 m from February to May. After spawning they migrate to inshore and sometimes brackish waters. Like plaice, they spend most of the day buried in the sand, but become very active at night and move into shallower water to feed. Flounder attains a length of 50 to 60 cm and can live up to 15 years.

Flounder is mainly taken as a bycatch species in fisheries for plaice and sole (though also caught in shore-based fixed nets in inshore waters) and data on the status of the stock is limited. ICES have noted that so long as the species in the targeted fisheries for which flounder is a bycatch species are exploited sustainably, there should be a low risk of flounder becoming overexploited. There is currently no TAC for this species and there is no minimum conservation reference size, though in inshore waters within 6 NM of the coast, an MLS of 25 cm is applicable between the Welsh border in the Dee Estuary to Haverigg Point in Cumbria (i.e. the former North Western Sea Fisheries Committee District). Across the period 2016 to 2021 landings of flounder from the local study area averaged ~ 3 tonnes per annum.

Brown shrimp

Crangon crangon, the common or brown shrimp, is found in mainly shallow water. It grows to about 8 cm, with length at maturity between 35 and 50 mm. Lifespan is 4-5 years, with females living longer.

Brown shrimp populations exhibit rapid growth, and also high natural mortality. There has been no stock assessment undertaken for brown shrimp in this region, and assessing such species is difficult as populations can widely fluctuate depending on environmental conditions and predation.

Fisheries occur mainly over sandy/muddy habitats within bays and estuaries including the Solway Firth, Morecambe Bay, the Ribble Estuary and the Dee Estuary. They are seasonal fisheries, historically the season starting in spring as the water temperature increases, with a lull in summer and ending in late autumn as the temperature decreases again. Across the period 2016 to 2021, landings of brown shrimp from the local study area peaked in 2017 at ~ 2 tonnes.

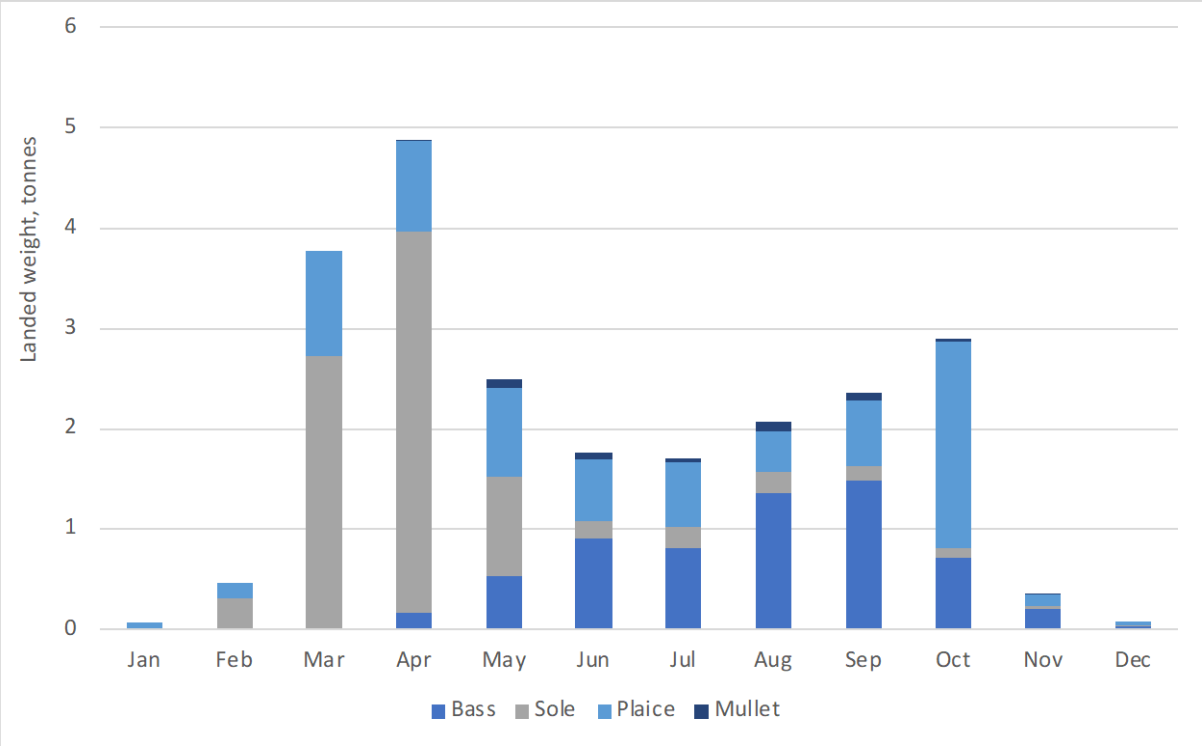


Figure 3.17: Seasonality of average monthly landings of demersal species based on landed weight (tonnes) based on data from 2016 to 2022 from the local study area (MMO, 2022; 2023)

3.2.4 Drift and Fixed Nets

Fixed nets include gill, tangle and trammel nets. They are typically used by small inshore vessels which target bass, flounder and rays.

The nets are usually fished in groups (or fleets) with the end of each fleet attached by bridles to a heavy weight, or anchor, on the seabed. Each weight, or anchor, is attached to a marker buoy or dhan flag, on the surface, by a length of rope equal to about twice the depth of water. Net lengths can vary significantly; individual nets can vary from 50 m to 200 m. The soak times, the time that a fleet is left fishing for, can range from a six-hour tidal soak up to 72 hours. The nets are shot over the stern of the vessel whilst steaming with the tide and are fished along the direction of the tidal stream, rather than across it (there are some exceptions to this, depending on the locations targeted, ground conditions and seabed obstacles, such as wrecks, as well as the gear and equipment configuration of individual vessels).

Smaller vessels under 10 m length are typically engaged in netting and may work both pots and nets, alternating between gears seasonally. Net catches can provide bait for pots.

Table 3.5 Profile of typical netting vessels active across the regional study area

Parameter	Indicative details
Main target species	Flounder, bass, thornback ray, lesser spotted dogfish, sole and plaice
Nationality	English
Vessel length	Under 10 m
Seasonality of activity	Year-round

Typical gear	Monofilament nylon net Set on seabed with each end anchored and left to fish

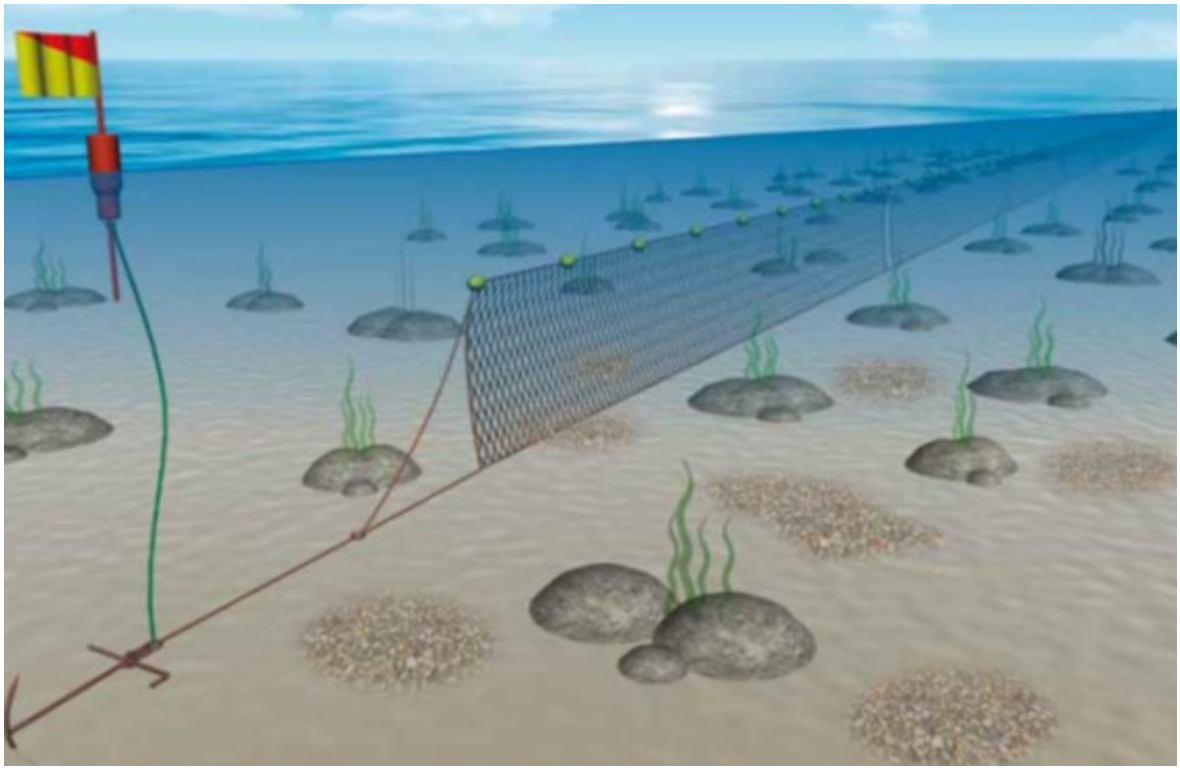


Figure 3.18 Typical fixed netting gear configuration (Source: Seafish, 2015)

Key species caught by vessels operating drift and fixed nets

Bass

Bass breed from February to May in the English Channel and eastern Celtic Sea. Juveniles use inshore sheltered areas as nursery grounds, particularly for their first few years. Once mature, bass may migrate within UK coastal waters and occasionally further offshore. It is a long-lived and slow growing species - up to 30 years of age - and can achieve a length of up to 1 m with a weight of 12 kg.

Bass spawning stock biomass has historically declined since 2005, showing signs of slow increase in recent years (ICES, 2021a), and fishing pressure has been reduced by a series of management measures, developed since 2015 when emergency measures were brought into force (e.g. increasing the MLS to 42 cm from 36 cm, stopping the offshore pelagic trawl fishery on spawning aggregations in 2015). Further measures were introduced in 2020, and commercial fishermen are prohibited from catching, retaining, transhipping or landing bass caught in a number of areas in UK waters, including in the Irish or Celtic Seas outside of the 12 NM limit (i.e. within the Project windfarm site). Bass are not subject to EU TACs or quotas.

Inshore of the local study area, an area around Heysham Nuclear Power Station has been designated as a bass nursery area. All fishing activity for any species has been prohibited within this site to protect juvenile bass.

Bass fisheries often have two distinctive components; an offshore fishery on pre-spawning and spawning seabass during winter months, and small-scale inshore fisheries catching mature fish returning to coastal areas following spawning and in some cases immature seabass. The inshore fisheries include small (10 m and under) vessels using a variety of fishing methods (e.g. trawl, handline, nets, rod and line). The fishery may either target seabass

or take them as a bycatch with other species. Across the period 2016 to 2021, landings of bass from the local study area averaged ~ 4.5 tonnes annually.

3.2.5 Gears using Hooks

Small inshore vessels of under 10 m length (with a specification broadly aligned with that provided immediately above for inshore netting vessels) use hook and line methods to primarily target bass and flounder, though a variety of other species may be taken.

A basic longline consists of a long length of line, with multiple branch lines with hooks on (snoods) attached at regular intervals. On smaller inshore vessels, where baiting and handling the gear is done by hand, they may use lines that are only a few hundred metres long with a few hundred hooks attached. Rod-and-line fisheries may encompass several different methods of fishing such as jigging and bait fishing, usually done by one or two people on board a small vessel. Fish are landed on a daily basis.

Table 3.6 Profile of typical hook and line fishing vessel active across the regional study area

Parameter	Indicative details
Main target species	Bass, flounder
Nationality	English
Vessel length	Majority under 10 m
Seasonality of activity	Summer/autumn peak
Typical gear	Baited monofilament nylon lines Set and left to fish or attached to rod

Figure 3.19 Typical line-fishing gear depicting rod & line (left) and set long lines (right) (Source: Seafish, 2015)

3.2.6 Demersal Otter Trawl

Otter trawling uses a cone-shaped net which is held open by water pressure on two otter boards. The net is towed either across the seabed or within the water column. Fish are herded between the boards into the mouth of the trawl and then forced along a funnel into the end of the net. Net mesh sizes can be altered to target different fish species. Light otter trawling can be conducted by smaller boats using small doors. Otter trawlers active in the regional study area target plaice, also taking thornback ray, lesser spotted dogfish and other demersal species.

Demersal otter trawlers from the Isle of Man target queen scallop primarily within Manx territorial waters, but also within UK waters. This is described further in Section 5.5.

Nephrops trawlers from Northern Ireland are also active in the regional study area. The prawn net used by these trawlers is a long winged low net with lightweight ground gear for towing over the soft muddy areas where nephrops are found. Generally a traditional prawn net will have a headline height (the height of the trawl) in the region of 1 to 1.2 metres. The net is designed to be very low to target the nephrops on the seabed with minimal round fish bycatch that usually swim higher off the seabed. In some areas over time the traditional prawn net design has evolved to have longer wings to make the net more efficient for targeting bottom fish / a mixed fishery.

Table 3.7 Profile of typical otter trawl vessel active across the regional study area

Parameter	Indicative details
Main target species	Queen scallop, plaice, thornback ray, lesser spotted dogfish, Nephrops
Nationality	English, Northern Irish (Nephrops)
Vessel length	Under and over 10 m, majority of Nephrops trawlers over 10 m
Horsepower	50 hp to 300 hp
Typical towing speed	2 to 6 knots
Typical duration of tow / dredge	1 to 2 hours, 2 to 4 hours for Nephrops
Seasonality of activity	Summer/autumn peak
Typical gear	Demersal otter trawl Two trawl doors hold the net open horizontally Various forms of ground gear depending on target species

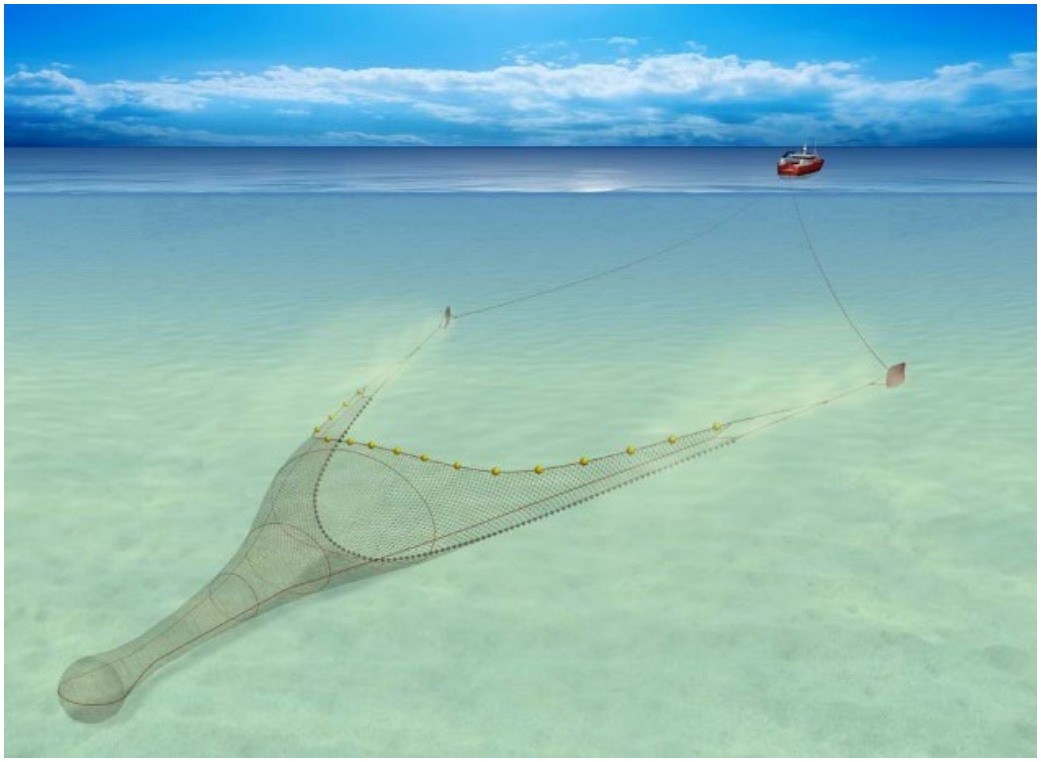


Figure 3.20 Typical otter trawl gear configuration (Source: Seafish, 2015)

Key species caught by vessels operating demersal otter trawl

Nephrops

Nephrops norvegicus is a small lobster, pale orange in colour. It grows to a maximum total length of 25 cm (including the tail and clawed legs), although individuals are normally between 18 to 20 cm. Nephrops do not reach sexual maturity until 2 to 3 years. Life span in the Irish Sea is understood to be 8 to 9 years.

They are found in soft sediment, commonly at depths of between 200 and 800 m, although considerable populations exist at depths <200 m. They live in shallow burrows and are common on grounds with fine cohesive mud which is stable enough to support their unlined burrows.

Nephrops stock assessments are conducted by ICES. Stock assessments are produced for 33 areas across the Northeast Atlantic, called Functional Units (FUs). However, management is applied to 18 areas, called management units. The local study area is located within FU14 (Irish Sea East). The density of Norway lobster in FU 14 is considered medium (~0.46 burrow m^2, average 2012–2021) compared with other FUs (ICES, 2021). Stock abundance in FU14 was estimated to be 393 million individuals in 2021, lower than that estimated for the previous year (496 million). However, the stock remains above target levels and not considered to be overfished.

TACs are in place, but these are not specific to the stock in FU14. One TAC covers the whole of the Celtic Seas surrounding Ireland and southwest England (ICES Subarea 7), encompassing eight different stocks. However, catches in Subarea 7 overall have been less than the TAC in recent years, as there has been a general decline in trawling fishing effort for Nephrops. Total catches for Irish Sea East have been somewhat below the advised limits, averaging just 27% of the advised limits between 2016 and 2020 (ICES, 2021).

There is a MCRS of 20 mm for UK and Irish trawlers in the Irish Sea. The Landing Obligation requires target species to be landed, and therefore prohibits the discarding of quota species. In UK waters the landing obligation is implemented via the Fisheries Act 2020 UK Statutory Instrument 2020 No.1542. For the nephrops trawl fishery in the Irish Sea, there is a de minimis exemption from the landing obligation consisting of a 6% discard rate by weight.

Two Fishery Improvement Projects are operating relevant to the eastern Irish Sea: Project UK (running until 2024), and the Irish Prawn FIP (running until 2025). Both are looking to reduce bycatch and implement better management in their respective fleets.

Fishing activity typically increases through late spring and summer months. Landings from the local study area decreased substantially across 2016 to 2021, peaking at ~10 tonnes in 2016, reducing to 0.04 tonnes in 2020 and climbing to 3 tonnes in 2021.

Thornback ray

Thornback rays *Raja clavata* or roker belong to the Rajidae family of skates and rays. Thornback rays have been described as showing philopatric behaviour (tendency of a migrating animal to return to a specific location in order to breed or feed). Females can grow to 118 cm in length and 18 kg in weight, while males can reach 98 cm in length and 15 kg. Thornback ray frequent a wide variety of grounds from mud, sand, shingle to gravel. It may be found to a depth of 300 m but is most common between 10 and 60 m. They move offshore to deeper waters in the autumn and winter, and back to shallower inshore waters in spring.

Information on the status of the stock is limited but there is currently no concern over fishing pressure. Skates and rays are managed under five regional TACs which are applied to a group of species, rather than individual skate and ray species. There are no official minimum landing sizes, though in inshore waters within 6 NM of the coast, an MLS of 45 cm is applicable from Haverigg Point in Cumbria to the Scottish border in the Solway Firth (i.e. the former Cumbria Sea Fisheries Committee District).

Thornback rays are targeted seasonally or as bycatch in trawl and gillnet fisheries. Across the period 2016 to 2021, landings of thornback ray from the local study area averaged 10.5 tonnes per annum, reaching 19 tonnes in 2020, dropping to 10 tonnes in 2021.

Lesser spotted dogfish

Scyliorhinus canicular is a small shark has a slender shark-shaped body with a blunt head, rounded snout and small dorsal fin. The species is known by several names including small spotted catshark, rough hound, rock salmon, small spotted dog fish and sandy dog. Lesser spotted dogfish are bottom-living sharks that occur in depths of 3 to 400 m but are usually found no deeper than 100 m on sandy, gravelly or muddy seabeds. Lesser spotted dogfish grow to a maximum length of 85 cm in the British Isles and North Sea. Maximum age has been estimated at 20 years.

Information on the status of the stock is limited but there is currently no concern over fishing pressure.

Lesser spotted dogfish are typically not part of a targeted fishery, but taken as bycatch in trawl and gillnet fisheries. They are often returned to the sea because of their low market value but those that are landed are utilised as bait for pot fisheries. Across the period 2016 to 2021, landings of lesser spotted dogfish from the local study area have declined substantially, from 24 tonnes in 2016 to <1 tonnes in 2021.

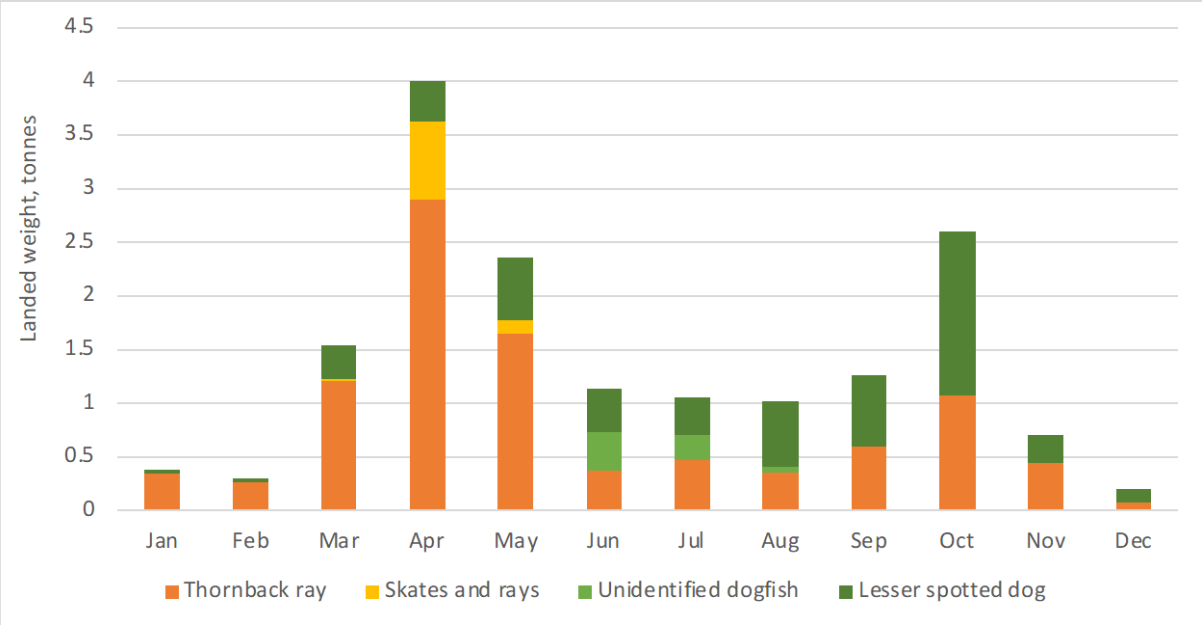


Figure 3.21: Seasonality of average monthly landings of elasmobranch species based on landed weight (tonnes) based on data from 2016 to 2022 from the local study area (MMO, 2022; 2023)

4. Spatial Fishing Activity Assessment

4.1 Fishing intensity based on VMS data

VMS data sourced from ICES[1] displays the surface Swept Area Ratio (SAR) of catches by different gear types and covers EU (including UK) registered vessels 12 m and over in length. Surface SAR indicates the number of times in an annual period that a demersal fishing gear makes contact with (or sweeps) the seabed surface. VMS data sourced from the MMO displays the value of catches for UK registered vessels 15 m and over in length.

Surface SAR provides a proxy for fishing intensity and has been analysed to determine an average annual SAR based on data from 2016 to 2020 for the following gear types:

- Figure 4.1: dredge;
- Figure 4.2: beam trawl;
- Figure 4.3: otter trawl.

VMS data sourced from the MMO displays the first sales value (£) of catches and covers UK registered vessels 15 m and over in length from 2016 to 2020 for the following gear types:

- Figure 4.4 and Figure 4.5: pots and traps;
- Figure 4.6and Figure 4.7: dredge;
- Figure 4.8 and Figure 4.9: beam trawl;
- Figure 4.10and Figure 4.11: otter trawl;
- Figure 4.12and Figure 4.13**:** pelagic trawl.

The data presented in these figures indicates that potting activity takes place across the Project windfarm site and throughout the local study area. The VMS data is not representative of all potting activity because a portion of potting vessels are under 15 m in length and are not captured in the data, but the data does indicate the presence of larger vessels in the windfarm site, expected to be targeting whelk.

Dredge activity is widespread across the Irish Sea. The data indicates that important king scallop grounds are located to the west and south of the windfarm site, and that some dredge activity takes place within the southern portion of the windfarm site, which data suggests is located on the fringes of a king scallop ground. King scallop grounds targeted by UK, Northern Irish and Irish vessels is presented in Figure 4.14, based on mapping undertaken by the ICES Scallop Working Group (ICES, 2021).

Beam trawl activity undertaken by UK vessels is limited across the local study area, and data does not indicate any activity within the windfarm site. SAR data capturing wider EU-vessel activity indicates that non-UK, understood to be primarily Belgian, beam trawlers are active within the local study area, outside and to the north of the windfarm site. Similarly, data indicates some otter trawl activity within the local study area, focused to the north of the windfarm site, with activity dominated by non-UK vessels, understood to be Irish vessels targeting Nephrops on the eastern Irish mud belt.

VMS data indicates potting activity throughout the windfarm site. This is corroborated by gear scouting surveys undertaken in 2022, which show gear marker locations within the middle southern portion of the windfarm site (Figure 4.15), together with stakeholder consultation; pots are understood to be deployed across the windfarm site.

4.1.1 Fishing intensity based on AIS data

Fishing vessel route density, based on vessel AIS positional data is shown in Figure 4.17. AIS is required to be fitted on fishing vessels ≥15 m length. The data is filtered to show only fishing

[1] Note that UK VMS data presents information on fishery value, whereas ICES VMS data presents 'swept-area ratio', which is the cumulative area contacted by a fishing gear within a grid cell over an annual period.

vessels (with no other commercial or recreational vessels included) and indicates the route density per square km per year. This data does not distinguish between transiting fishing vessels and active fishing, but does provide a useful source to corroborate fishing grounds.

Activity by fishing vessels within the centre of the windfarm site is present in all years analysed. This is anticipated to be associated with potting vessels which has been further corroborated through stakeholder consultation.

4.2 Fishing activity based on marine traffic survey data

Project-specific marine traffic surveys were undertaken in February 2022 and August 2022 (a 14 day period each), using AIS and radar tracking and visual observations to record vessel activity across the windfarm site. During the winter survey, no fishing vessel tracks were recorded in the windfarm site. Within the wider survey area, outside the windfarm site, seven individual fishing vessels were observed, noted to be scallop dredgers operating to the south of the windfarm site. During the summer survey, fishing vessel tracks were largely attributed to a single vessel, targeting whelk. Some fishing vessel tracks were recorded in the windfarm site, though most activity occurred to the north and east of the windfarm site (NASH Maritime, 2022).

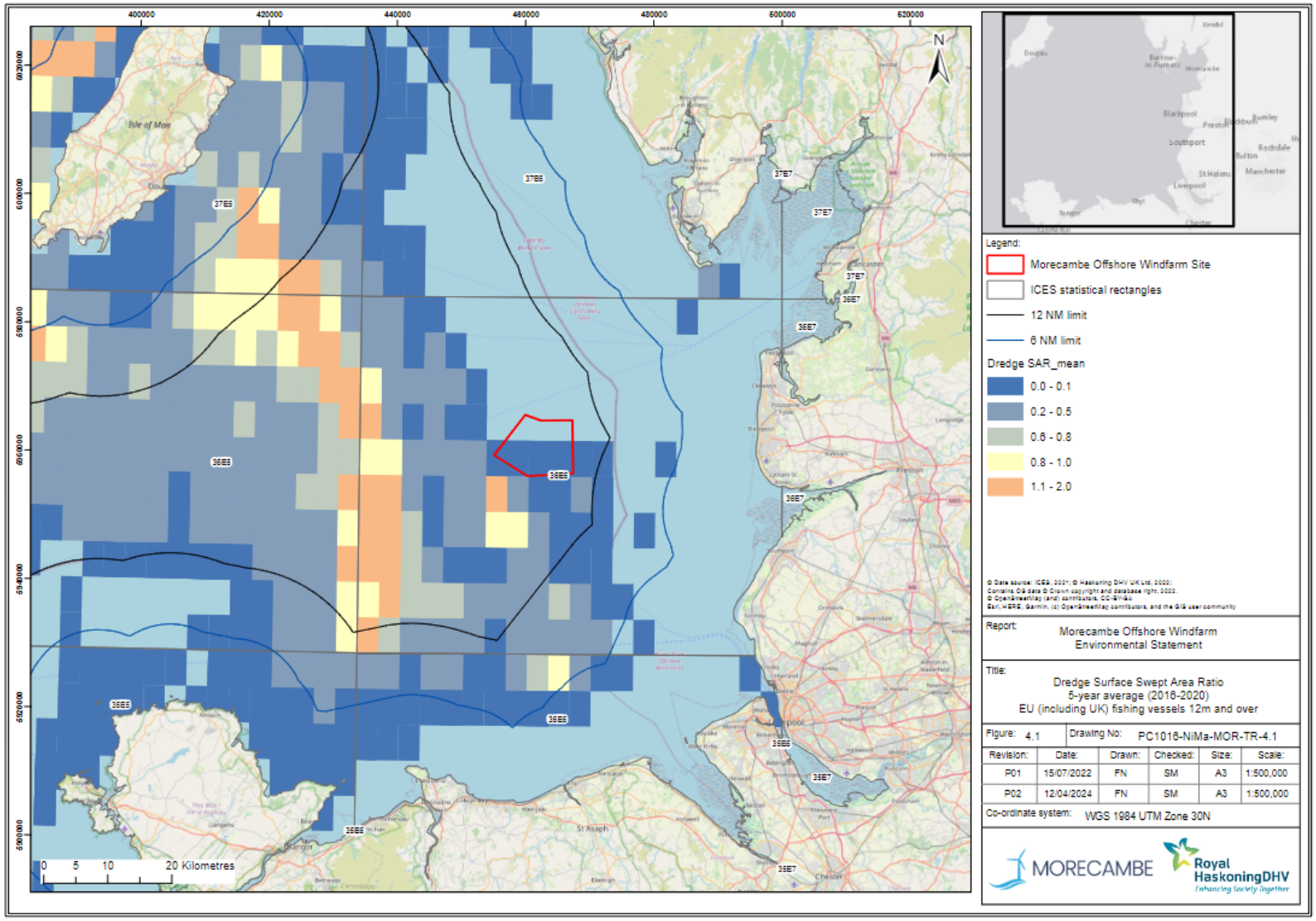


Figure 4.1 Surface Swept Area Ratio 2016 to 2020 for EU (including UK) vessels ≥ 12 m length using dredge gear (Source: ICES, 2021)

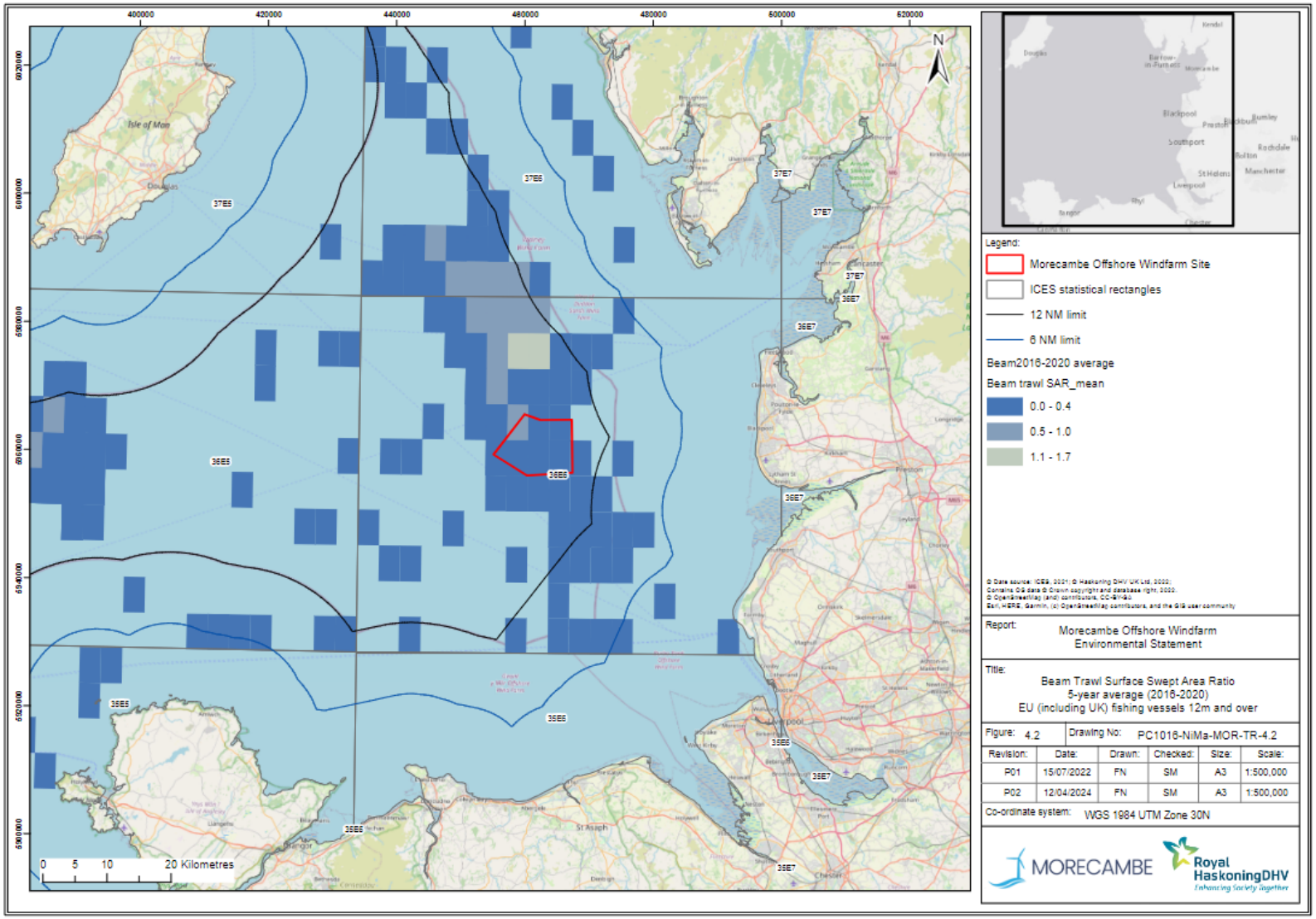


Figure 4.2 Surface Swept Area Ratio 2016 to 2020 for EU (including UK) vessels ≥ 12 m length using beam trawl gear (Source: ICES, 2021)

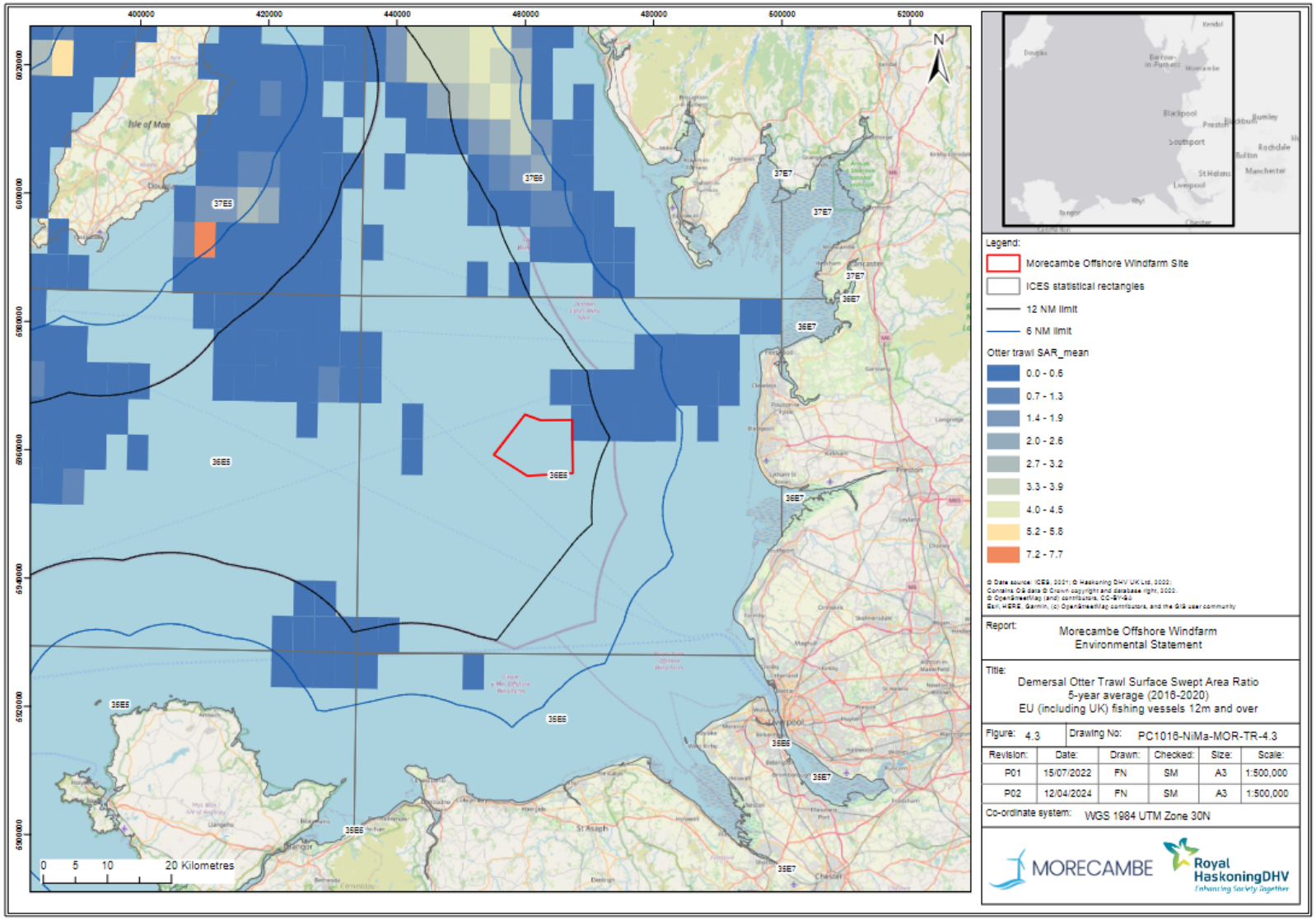


Figure 4.3 Surface Swept Area Ratio 2016 to 2020 for EU (including UK) vessels ≥ 12 m length using otter trawl gear (Source: ICES, 2021)

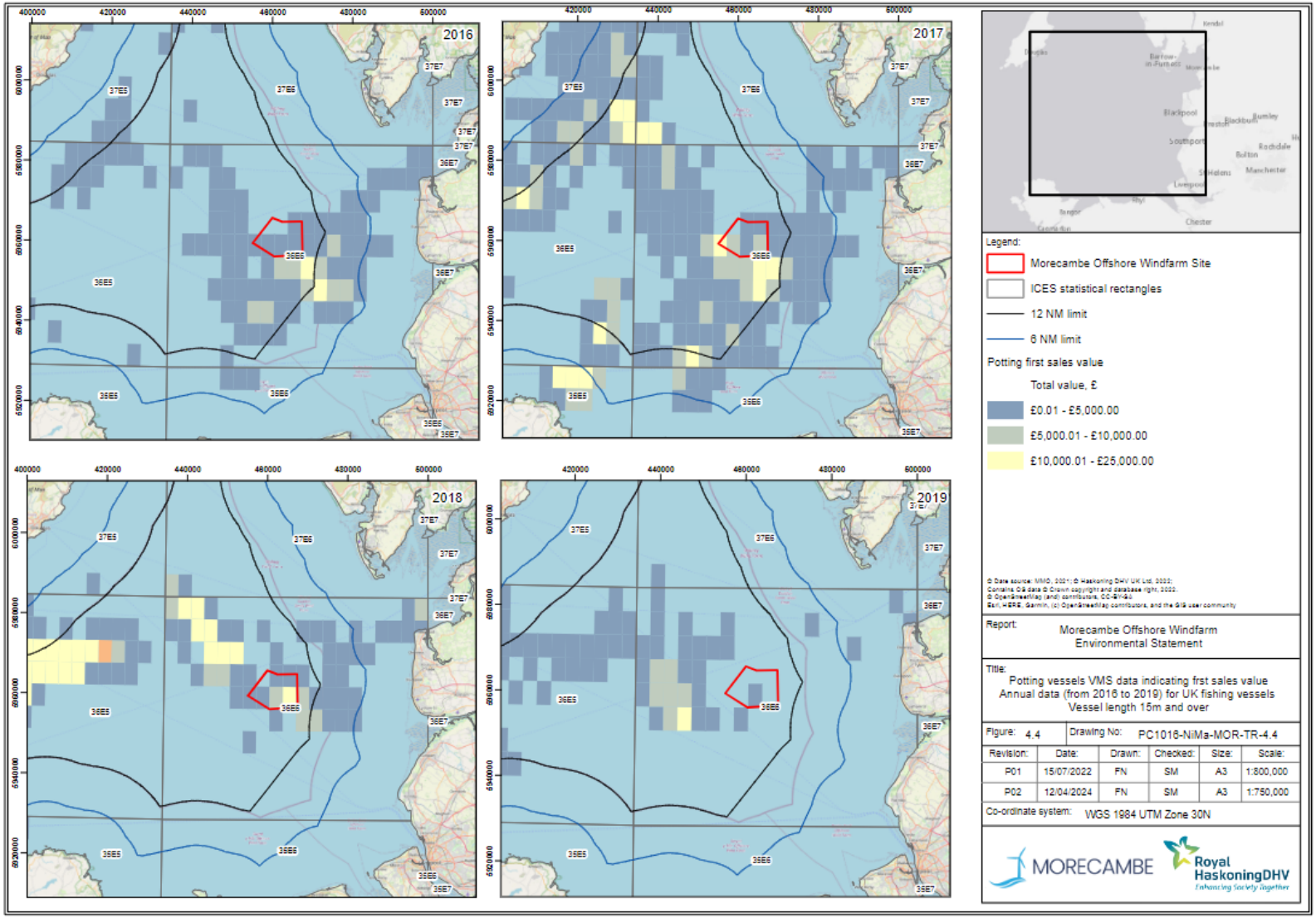


Figure 4.4 UK vessels ≥ 15 m length actively fishing using pots and traps 2016 to 2019 (Source: MMO, 2021)

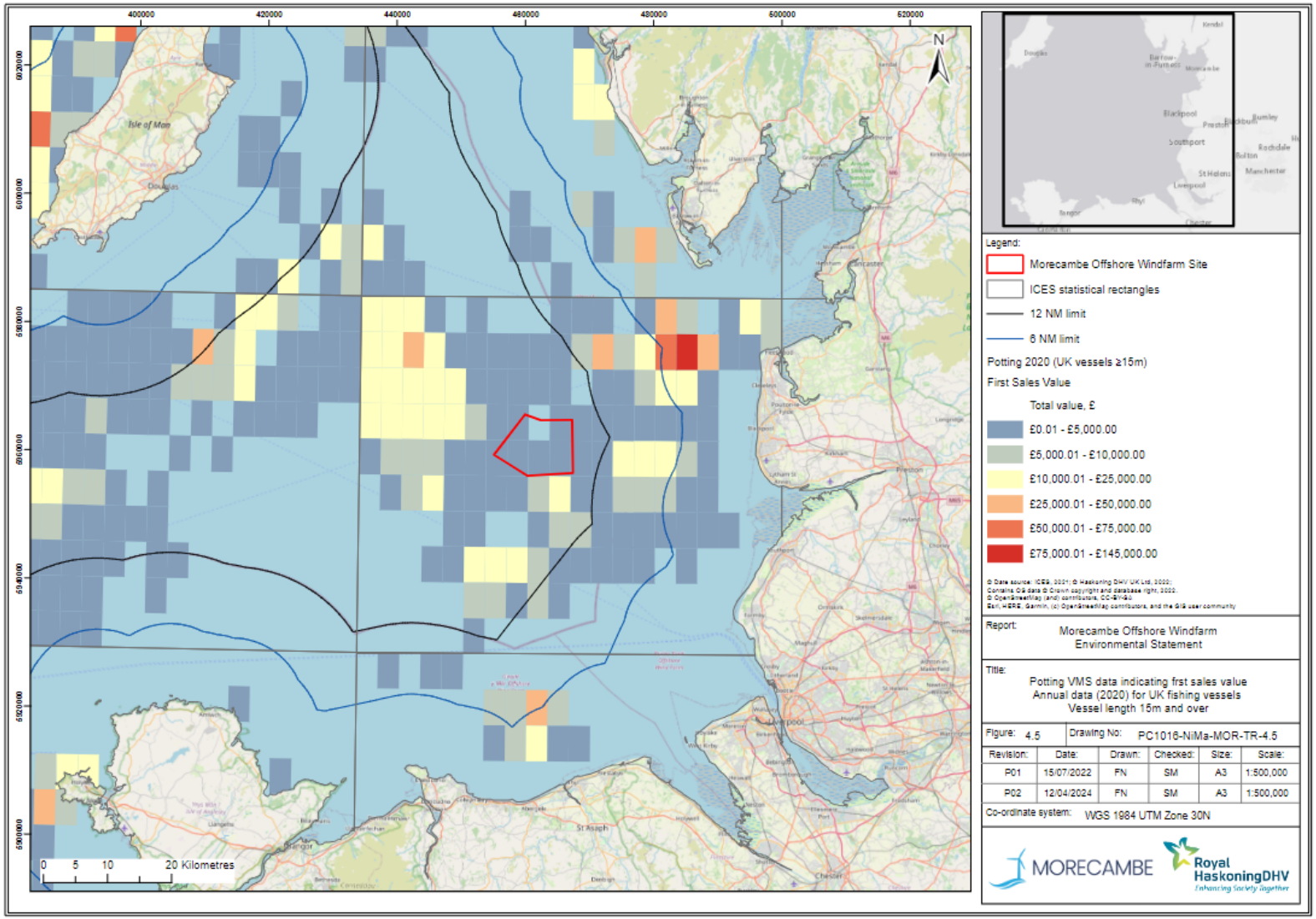


Figure 4.5 UK vessels ≥ 15 m length actively fishing using pots and traps 2020 (Source: MMO, 2020)

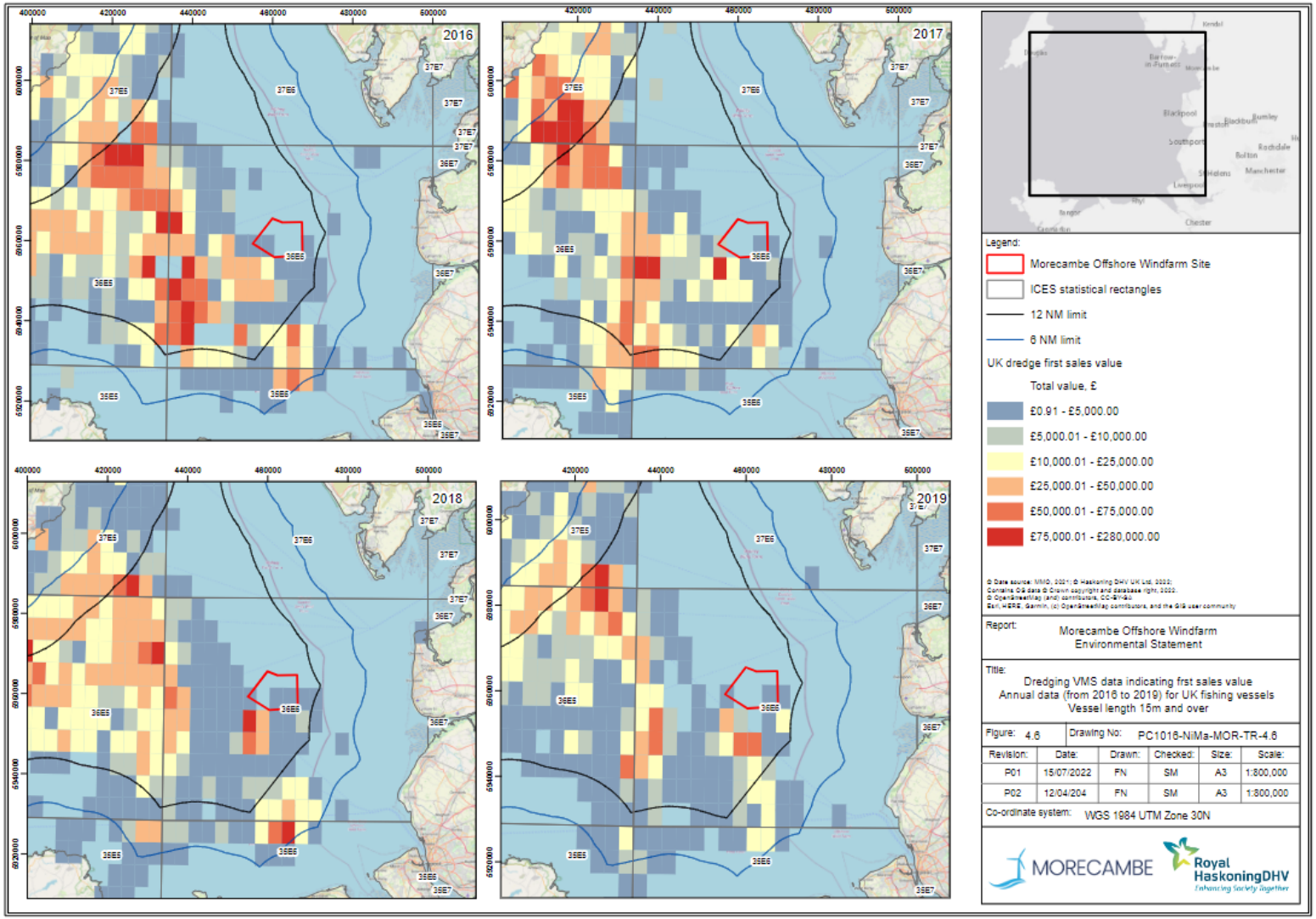


Figure 4.6 UK vessels ≥ 15 m length actively fishing using dredges 2016 to 2019 (Source: MMO, 2021)

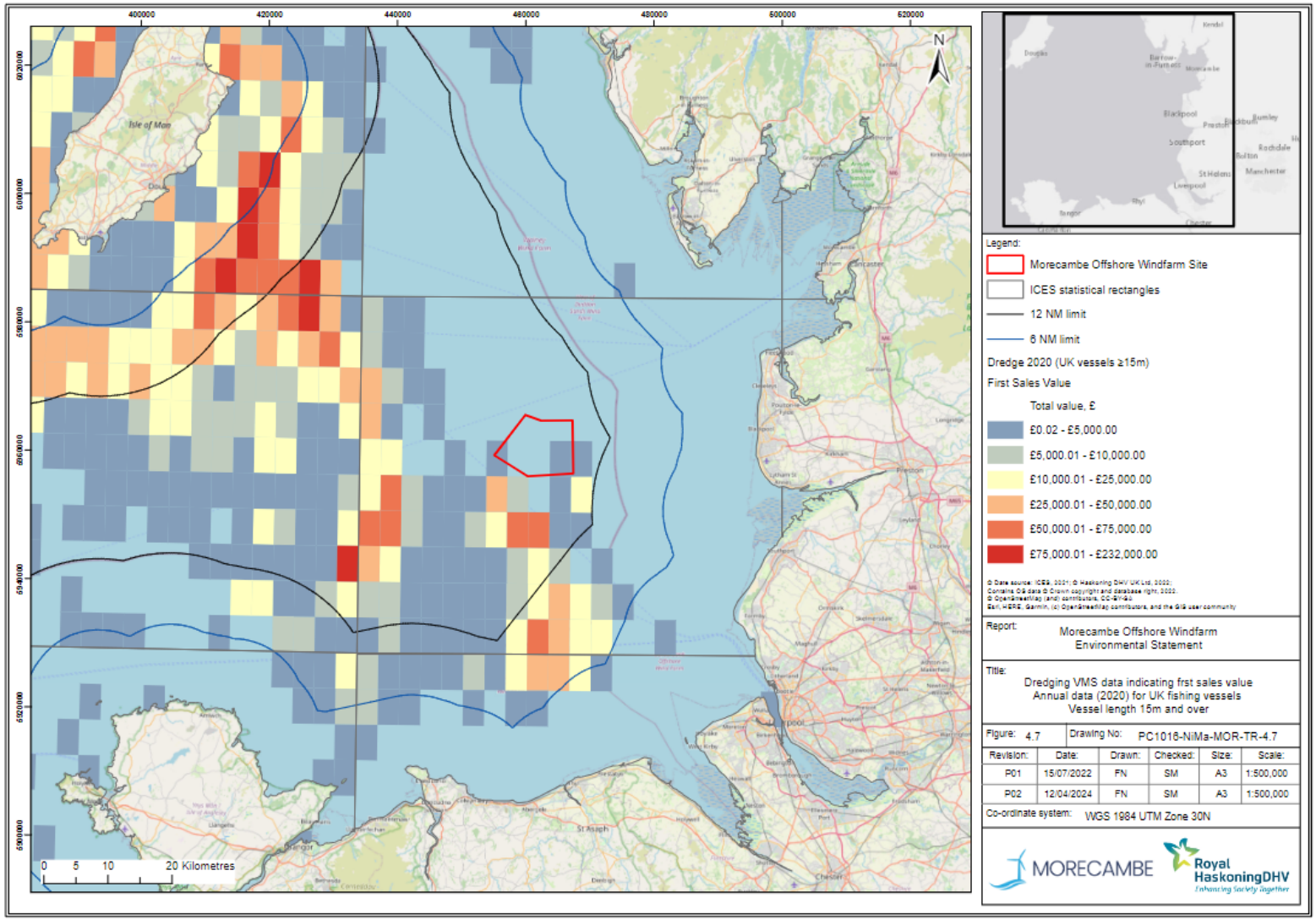


Figure 4.7 UK vessels ≥ 15 m length actively fishing using dredges 2020 (Source: MMO, 2023)

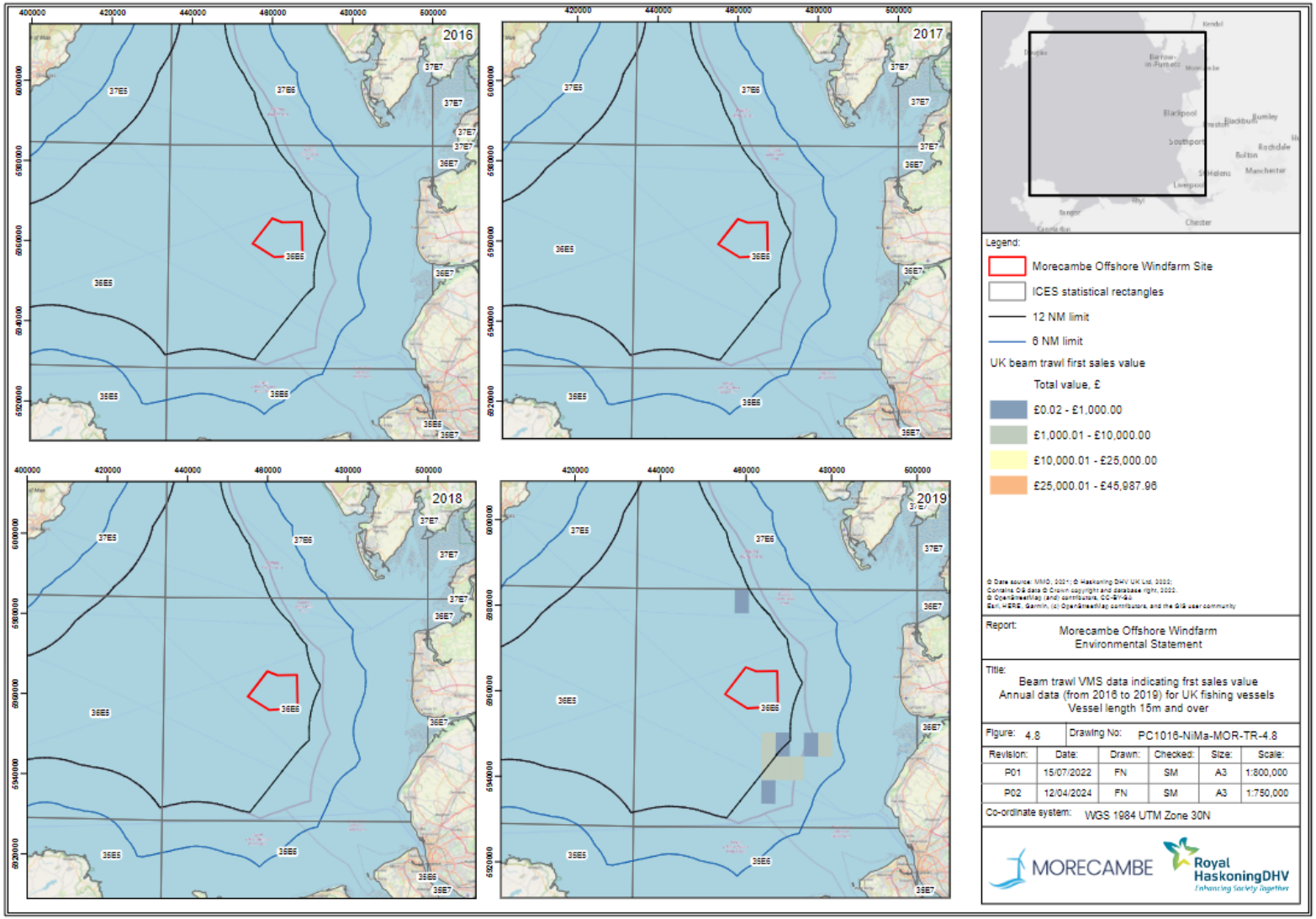


Figure 4.8 UK vessels ≥ 15 m length actively fishing using beam trawls 2016 to 2019 (Source: MMO, 2021)

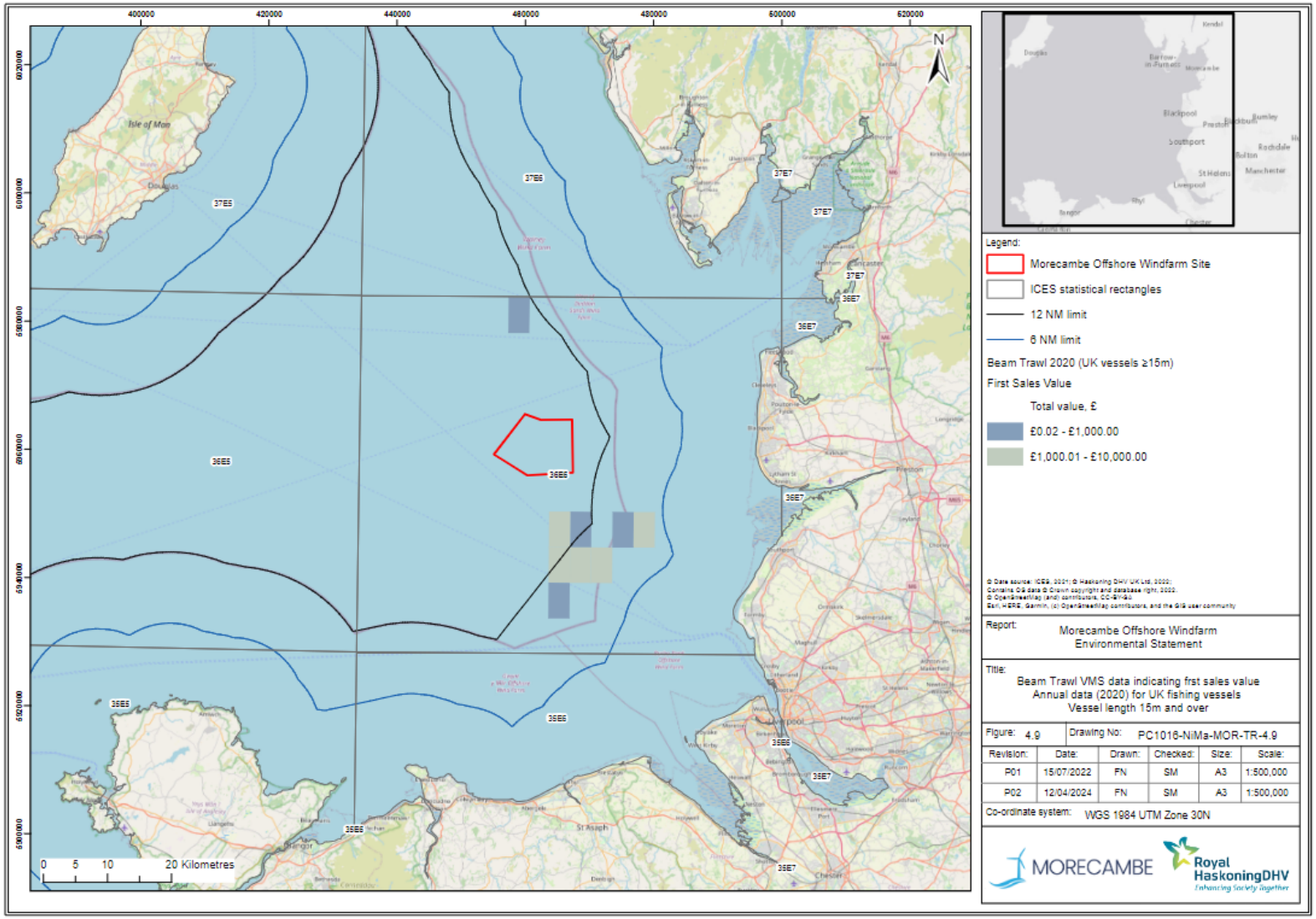


Figure 4.9 UK vessels ≥ 15 m length actively fishing using beam trawls 2020 (Source: MMO, 2023)

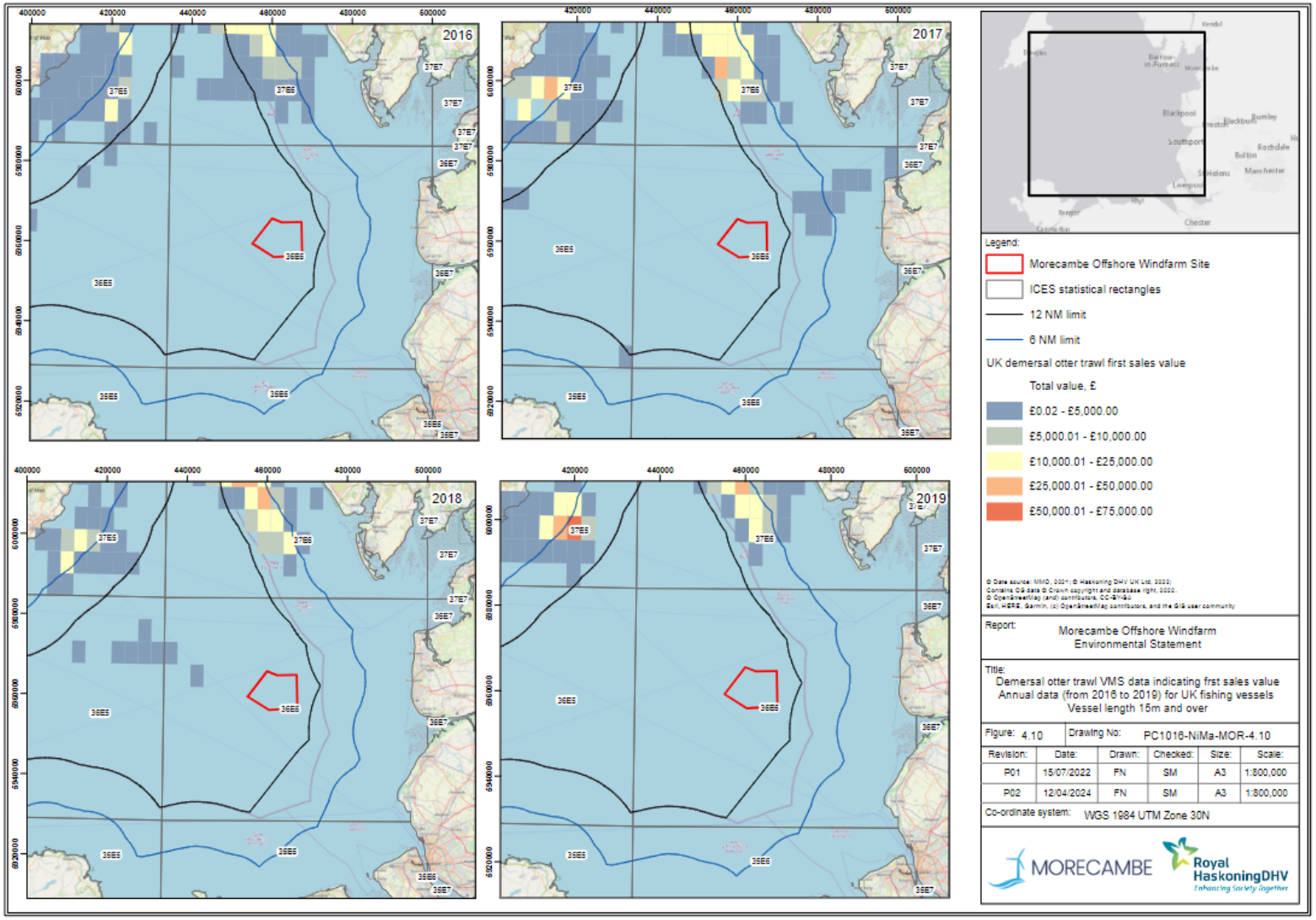


Figure 4.10 UK vessels ≥ 15 m length actively fishing using demersal otter trawls 2016 to 2019 (Source: MMO, 2021)

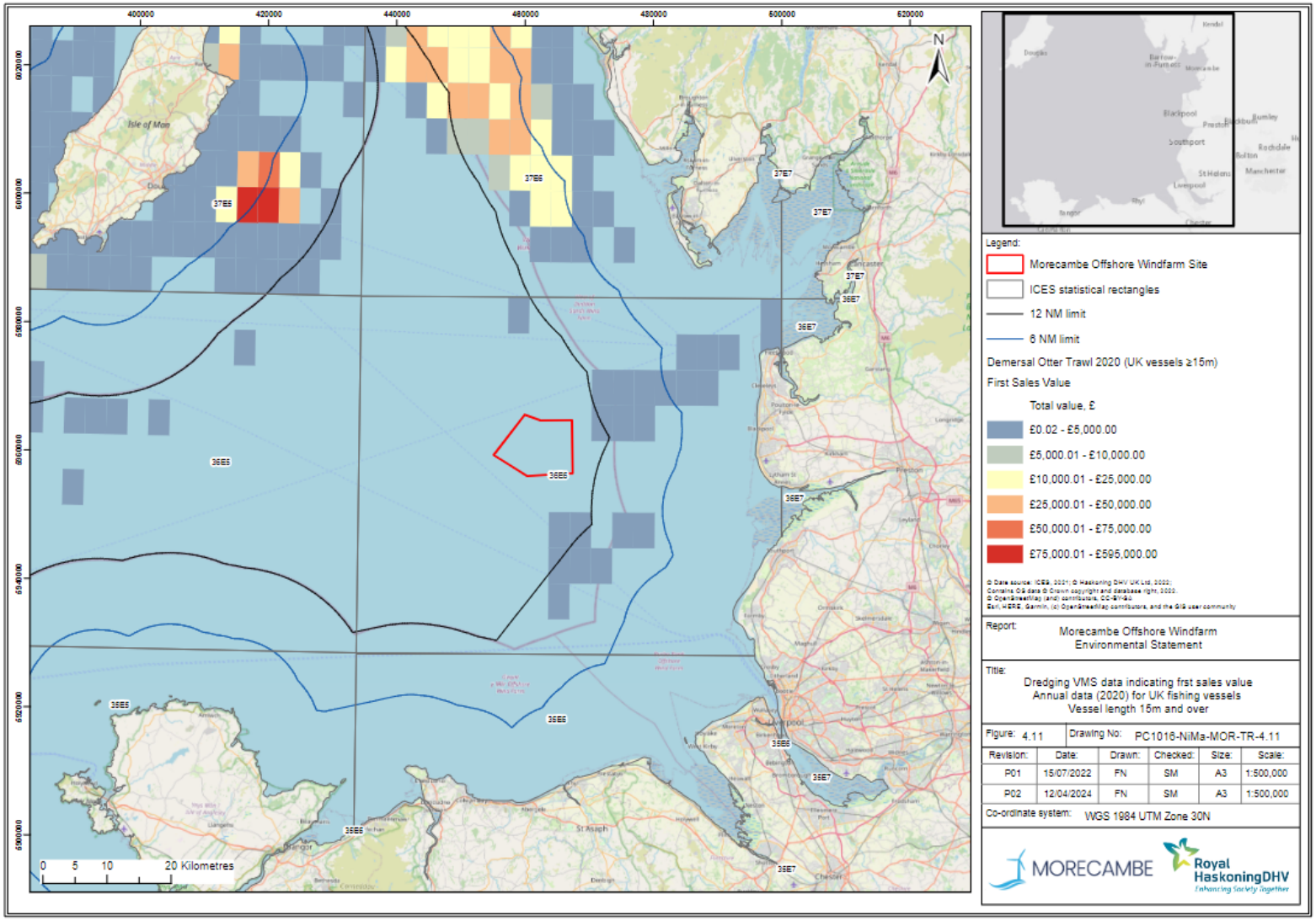


Figure 4.11 UK vessels ≥ 15 m length actively fishing using demersal otter trawls 2020 (Source: MMO, 2023)

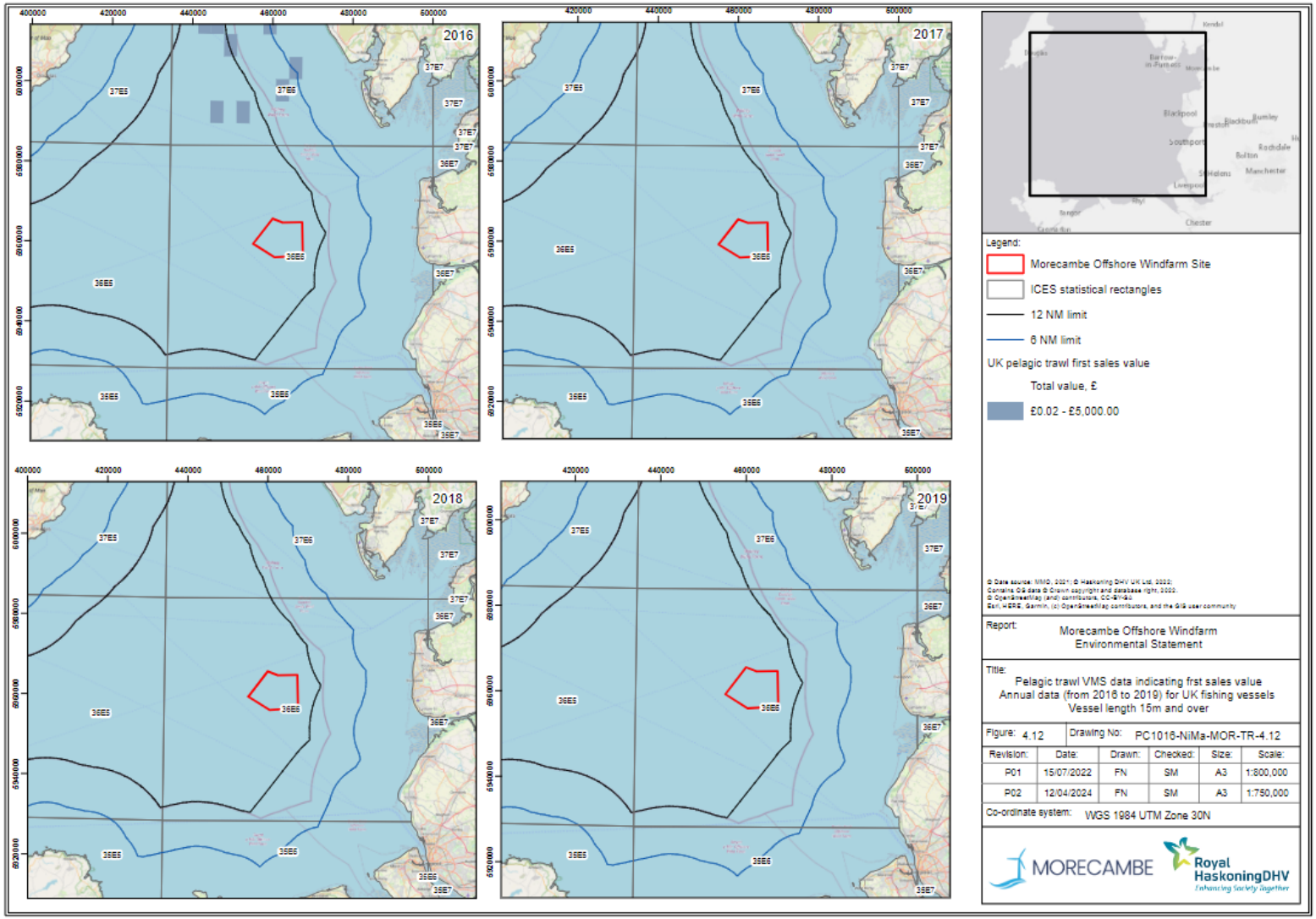


Figure 4.12 UK vessels ≥ 15 m length actively fishing using pelagic trawls 2016 to 2019 (Source: MMO, 2021)

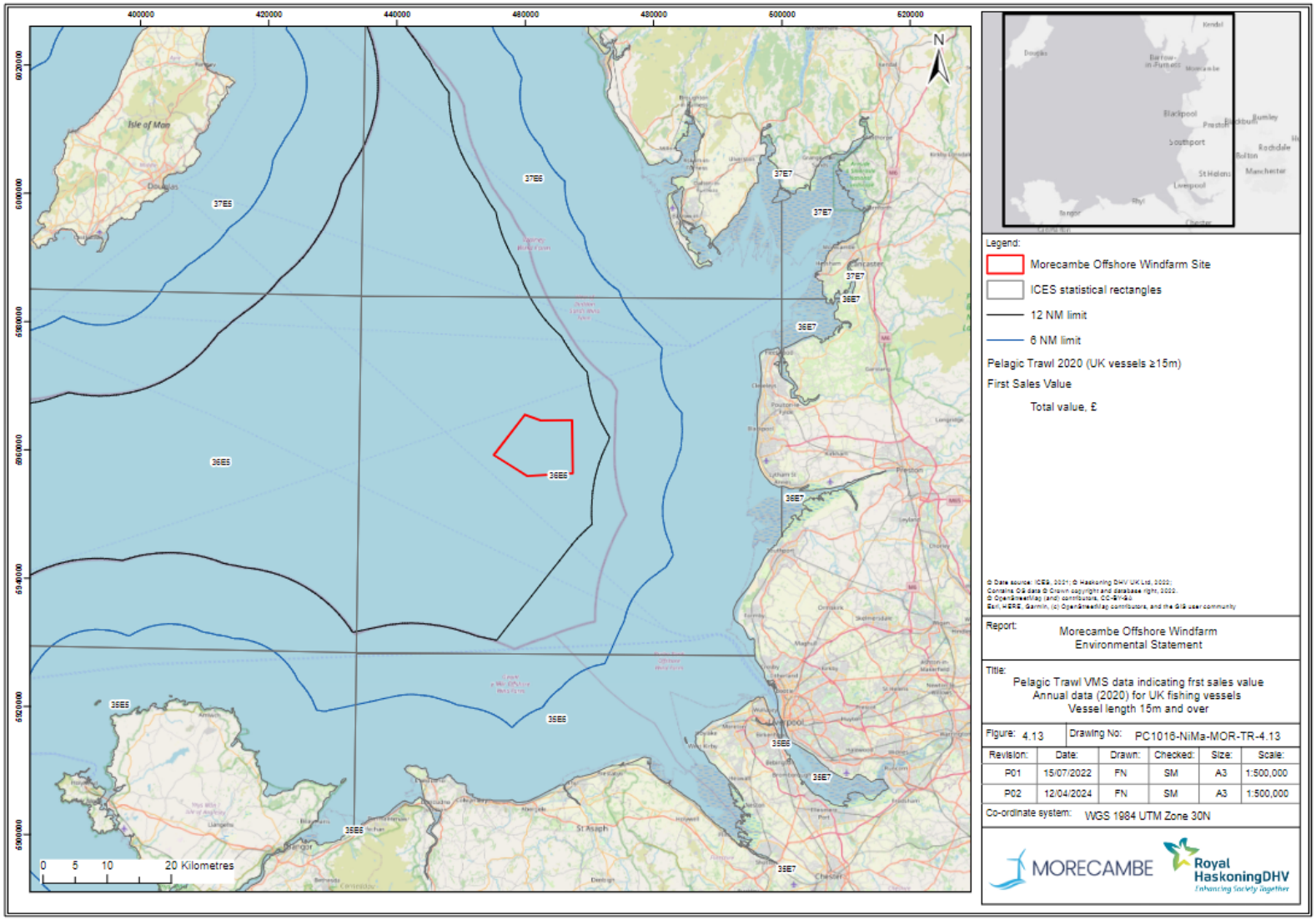


Figure 4.13 UK vessels ≥ 15 m length actively fishing using pelagic trawls 2020 (Source: MMO, 2023)

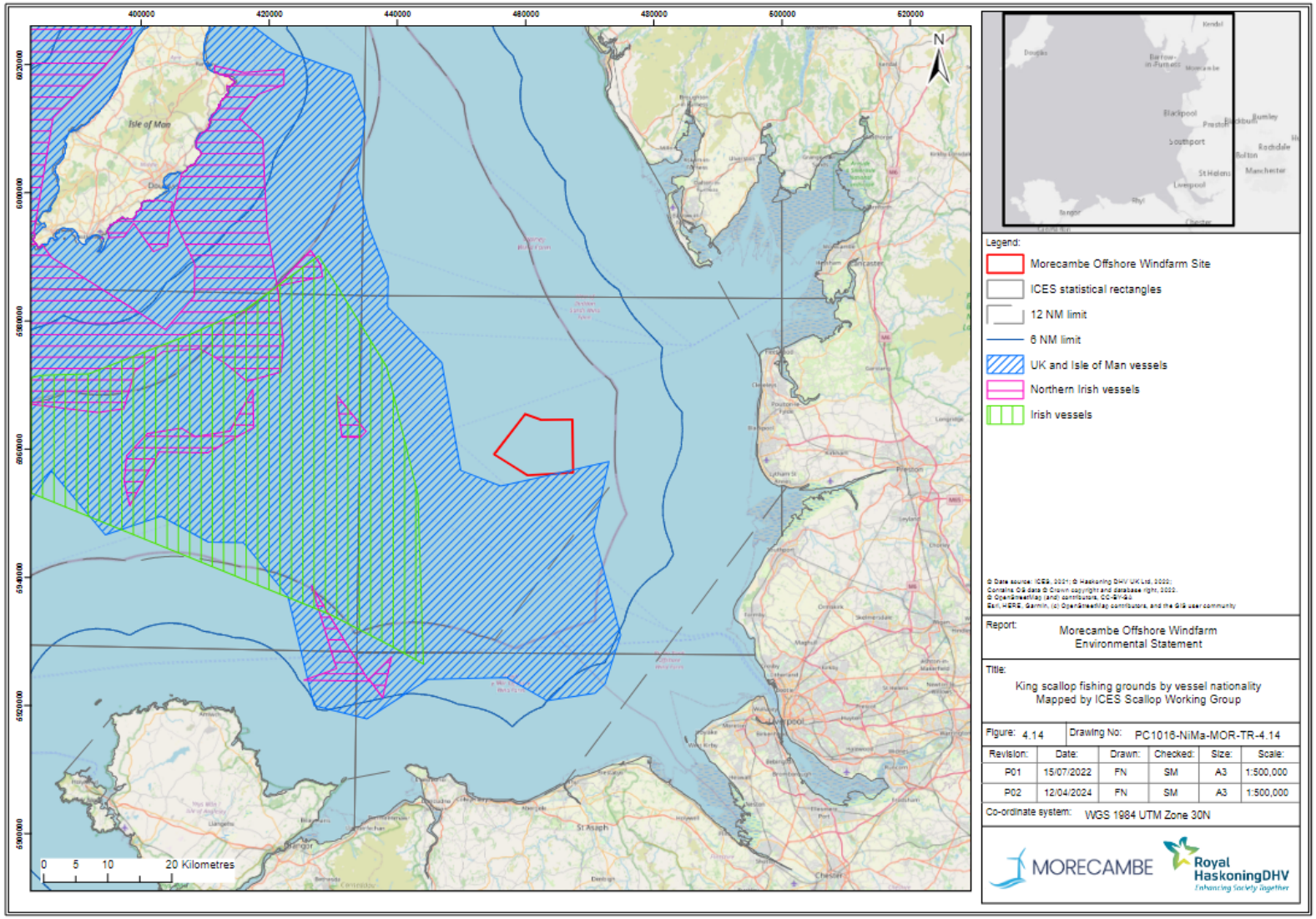


Figure 4.14 Irish Sea king scallop fishing grounds targeted by UK, Northern Irish and Irish vessels (Source: ICES, 2021)

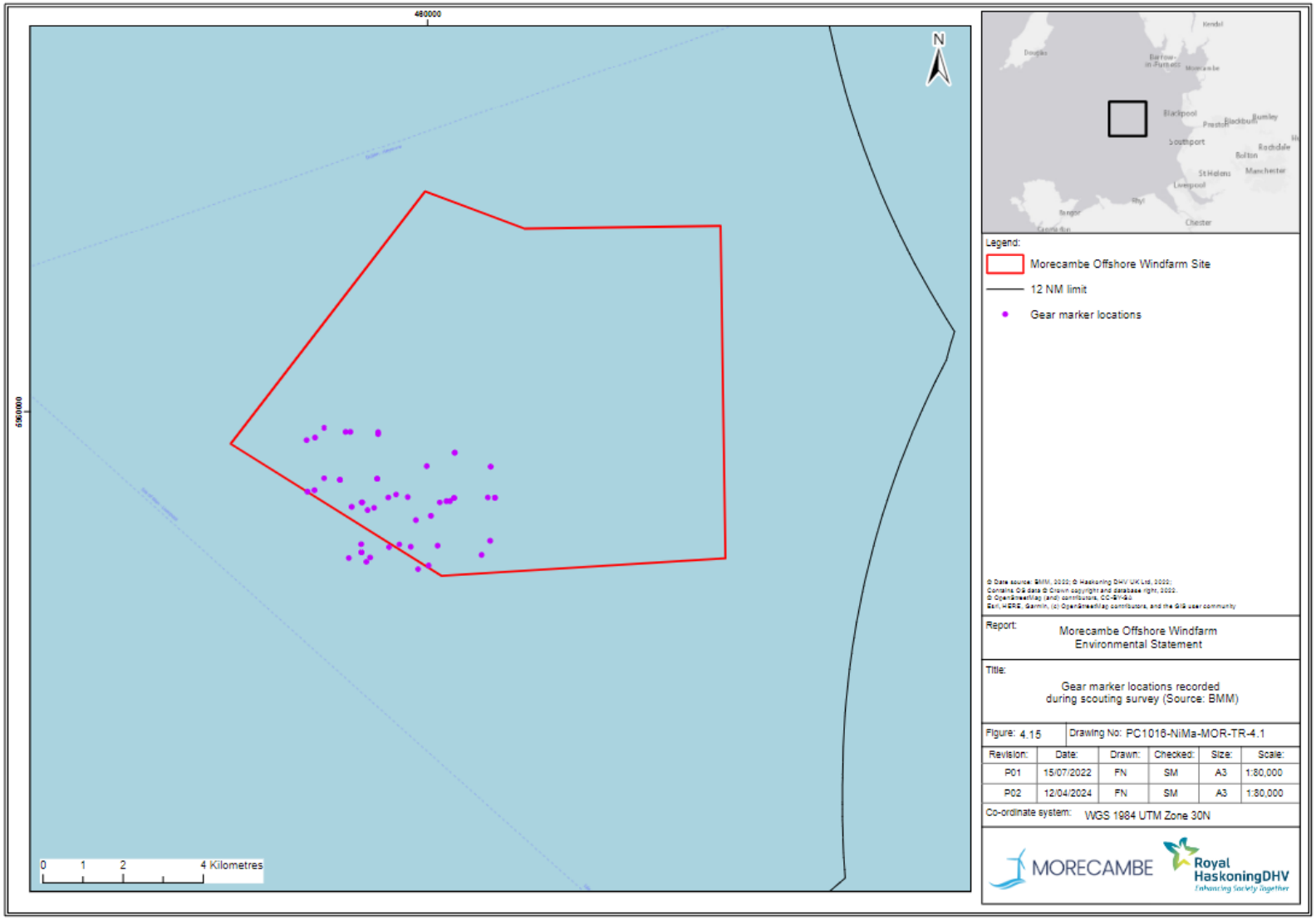


Figure 4.15 Gear marker locations recorded during scouting surveys (Source: BMM, 2022)

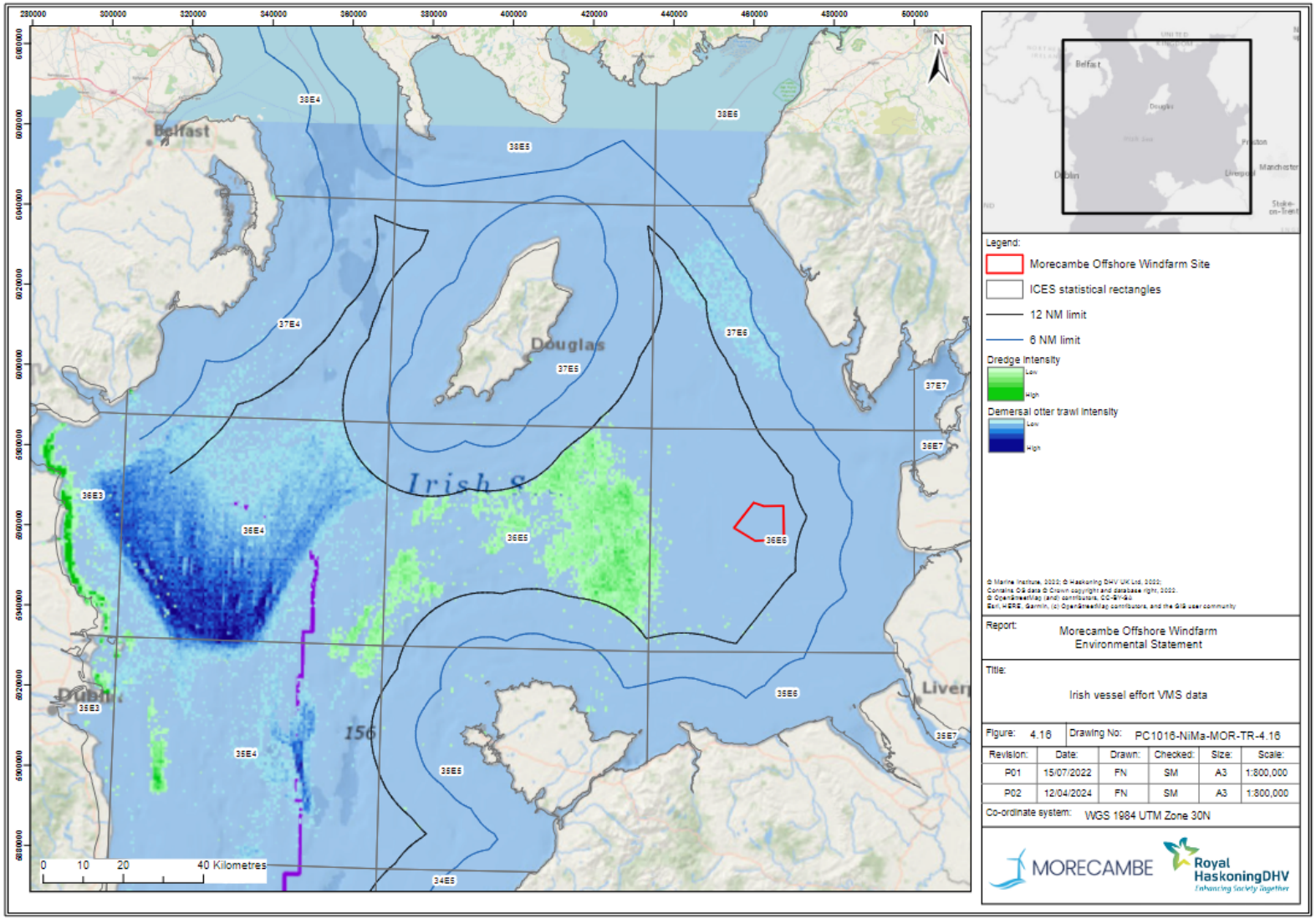


Figure 4.16 Effort VMS data from Irish registered vessels operating demersal otter trawl and dredge gear (Source: Marine Institute, 2022)

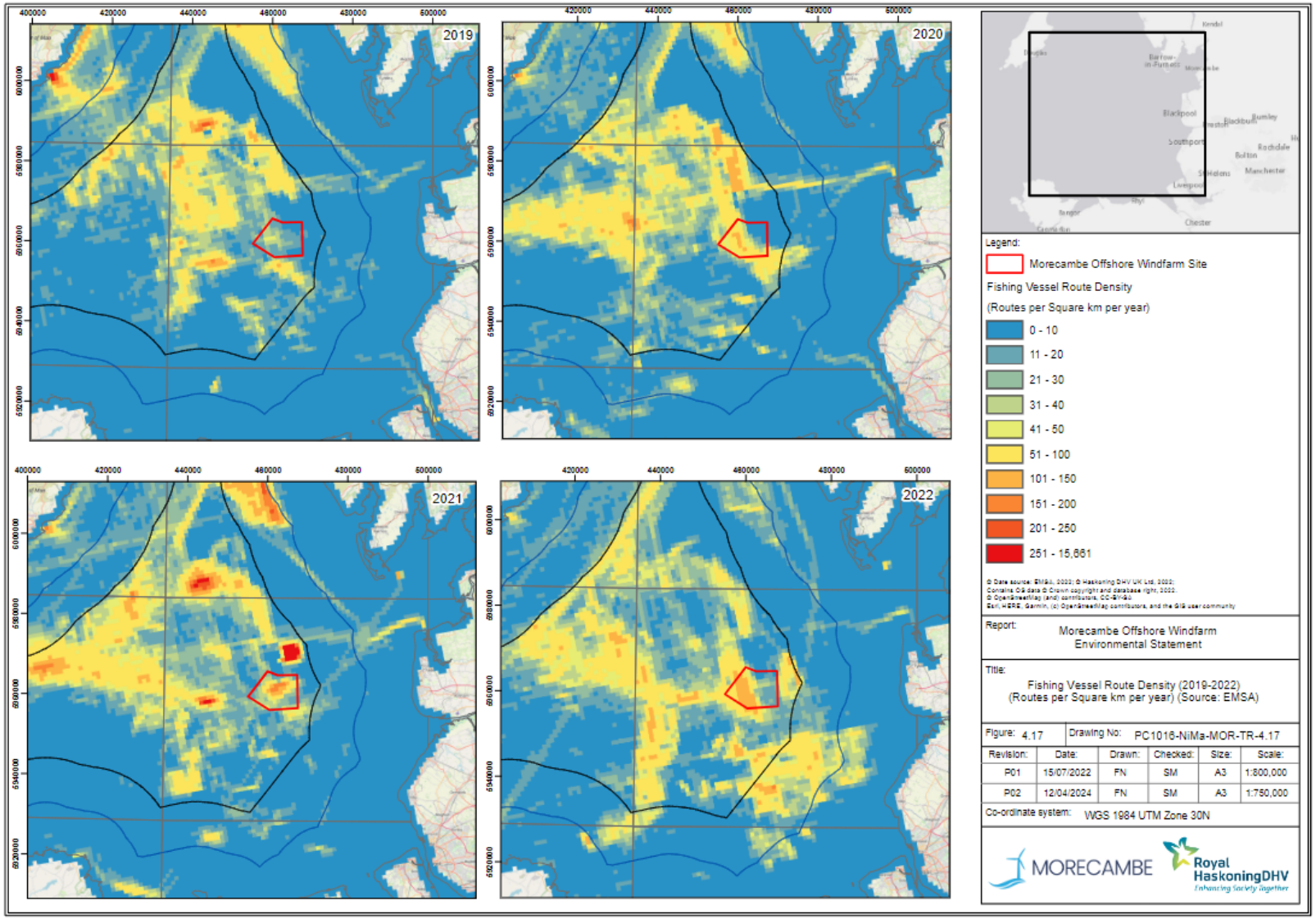


Figure 4.17 AIS fishing vessel route density 2019 to 2022.

5. Fisheries Activity Assessments by nation

5.1 English Fisheries Activity Assessment

5.1.1 Landings trends, fishing grounds and key species

The trends in landed value by English-registered vessels from the local study area are presented in Figure 5.1 for gear type and Figure 5.2 for species.

English landings from the local study area are dominated by vessels targeting whelk with pots. To a lesser extent, English vessels target other shellfish species with static gear and dredges, and a variety of demersal species primarily using trawls, nets and hooks.

Landings of whelk peaked in 2019. Landings of lobster, brown crab and shrimp have fluctuated, showing a general downward trend. Landings of sole showed a sharp spike in 2020 and 2022 and landings of bass have remained relatively consistent, also with a peak in 2021.

The average annual first sales value of English landings from the local study area between 2016 and 2022 was approximately £860,000, including whelk at £539,000 and lobster at £59,000. The value of landings from the local study area has increased by over £246,000 between 2016 and 2022.

Based on the landings data presented here and spatial data presented in the **Section 4**, English-registered vessels active in the windfarm site are primarily targeting whelk with pots on grounds that extend across the local and regional study areas. 2020 and 2022 saw significant peaks in landings of sole by English beam trawlers and it is possible that some of this fishing activity occurred within the windfarm site. The English beam trawl fleet are understood to travel from southwest ports to target this area. English-registered scallop dredgers may also be active within the southern portion of the windfarm site.

In waters inshore of the windfarm site, fishing activity includes potting for shellfish, netting for demersal species, and some demersal trawling.

Outside of the local study area, and in surrounding ICES rectangles, fishing activity by English-registered vessels is similar to that described immediately above, with shellfish species – notably whelk – dominating landings in terms of both landed weight and value.

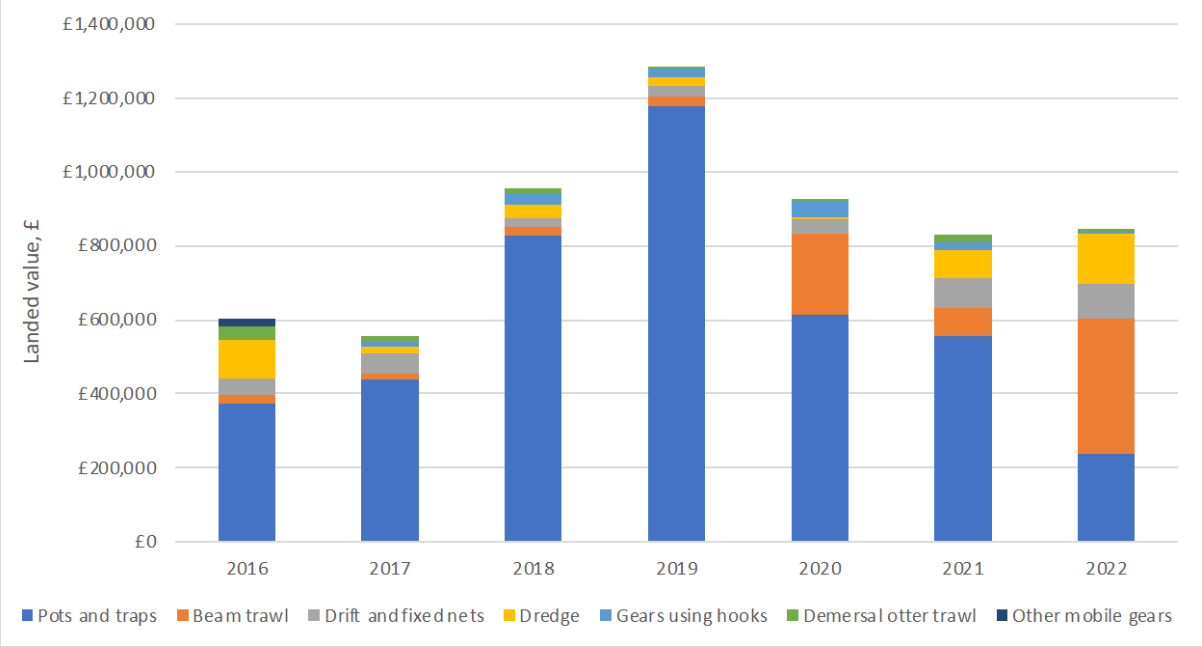


Figure 5.1 Landed value of all landings by English registered vessels from ICES rectangle 36E6 (local study area) indicating gear type (MMO, 2022, 2023)

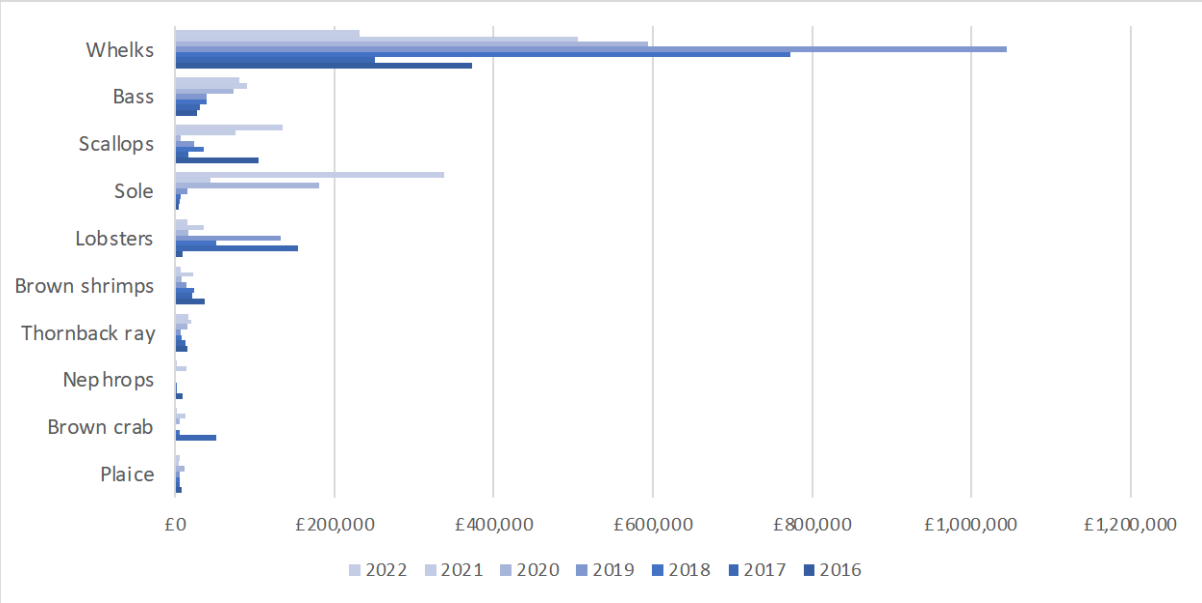


Figure 5.2 Landed value of all landings by English registered vessels from ICES rectangle 36E6 (local study area) indicating species (MMO, 2022, 2023)

5.1.2 Ports and vessel fleets

Vessels of 10 m or more in length accounted for approximately 78% of landings by English vessels from the local study area by value across 2016 to 2022. These larger vessels target shellfish species, namely whelk and king scallop in offshore waters in the vicinity of the windfarm site. Data also indicates some limited beam trawl activity by English vessels targeting sole.

Smaller vessels operating further inshore deploy pots to target whelk, lobster and brown crab and nets and hooked gear to target a variety of species, including bass, flounder and thornback ray. Relatively lightweight trawlers of less than 10 m length target mixed demersal species in small volumes and are active in the localised brown shrimp fishery.

The MMO provides 2021 landings statistics by port of landing attributed to specific ICES rectangles, allowing linkage of the location of fishing to the specific port the catch is landed into, as shown in Figure 5.3. Key ports and fleets targeting fisheries within the local study area (36E6) include:

- Whelk landed into Fleetwood and Whitehaven;
- Bass landed into Fleetwood, Barrow, Lytham St Annes and Liverpool;
- Scallop landed into Bangor; and
- Sole landed into Holyhead.

Comparable data for 2022 is shown in Figure 5.4, which indicates a significant growth in the sole landings from 36E6 into Holyhead and a drop in whelk landings into Fleetwood. The whelk landings into Whitehaven remain relatively consistent across 2021 to 2022.

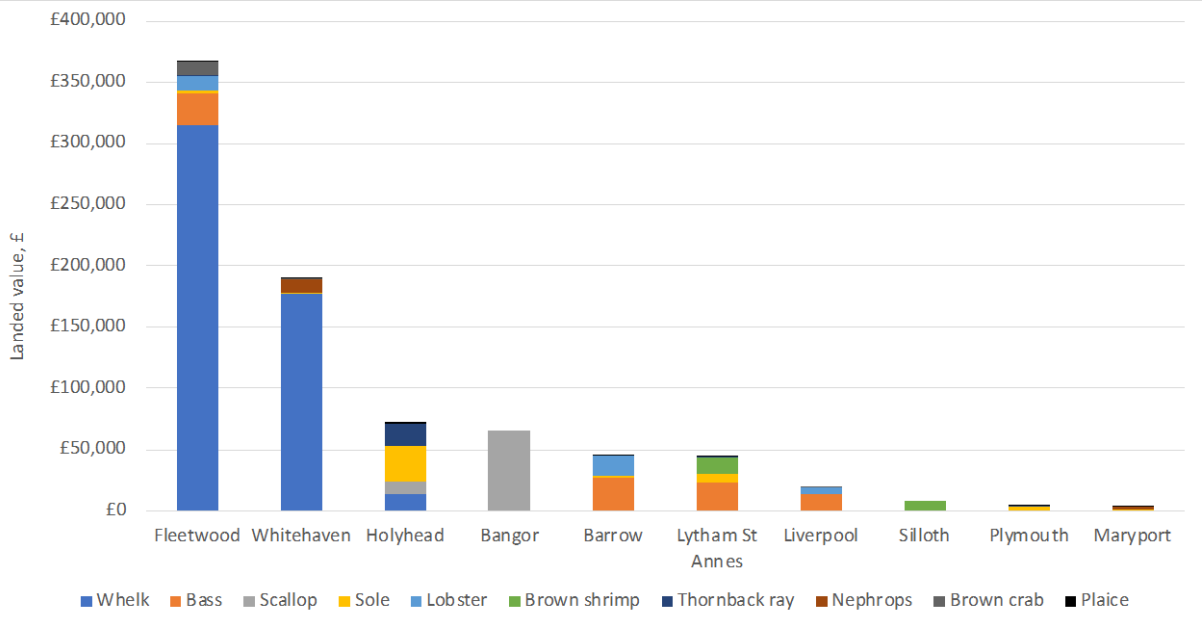


Figure 5.3 Value of landings from 36E6 by English registered vessels by port of landing in 2021 (MMO, 2022)

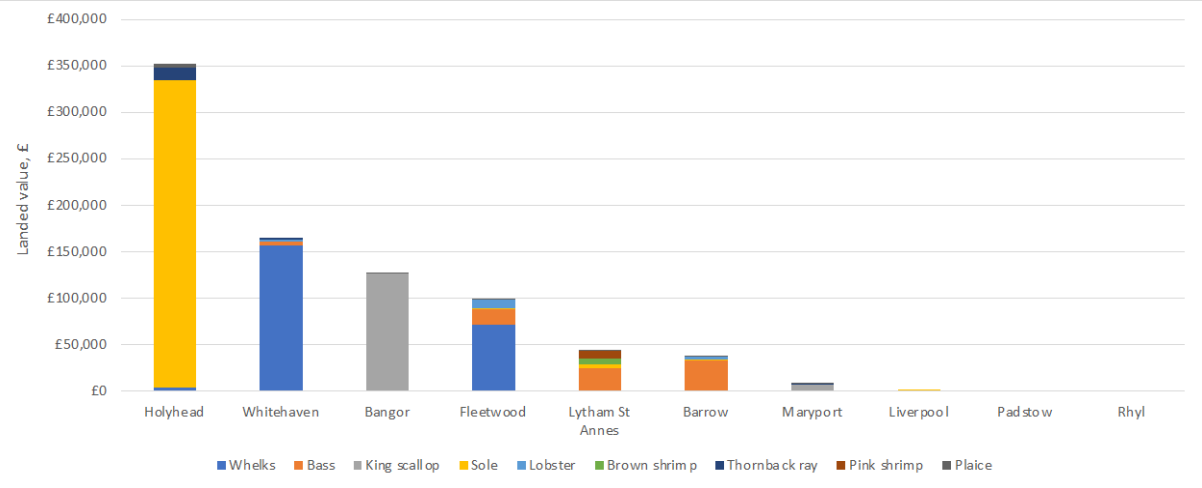


Figure 5.4 Value of landings from 36E6 by English registered vessels by port of landing in 2022 (MMO, 2023)

5.2 Scottish Fisheries Activity Assessment

5.2.1 Landings trends, fishing grounds and key species

The trends in landed value by Scottish-registered vessels from the local study area are presented in Figure 5.5 for gear type and Figure 5.6 for key species.

Scottish landings are dominated by vessels targeting king and queen scallops with dredges. Across the 2016 to 2022 period, landings have declined; this decline is associated with a reduction in landings of queen scallops (from an annual value of £2 million in 2016 to £180,000 in 2020, increasing to £570,000 in 2021, and dropping slightly in 2022). Overall an average of £727,000 of queen scallop are landed annually by the Scottish fleet from the local study area. Landings of king scallops have remained relatively consistent across the same period (with an average annual value of £503,000 across 2016 to 2022). The decline in queen scallop landings is consistent with the broad cyclical pattern seen in queen scallop landings over a

seven to ten year period, as informed by industry consultation. The introduction of a closed fishing season in the Irish Sea for dredge fisheries running between 1st April and 30th June from 2018 is also noted.

Based on the landings data presented here and spatial data presented in **Section 4.1**, Scottish-registered vessels are active in the local and regional study areas. Key targeted dredge grounds are located outside of the windfarm site, but spatial data indicates some dredge activity in the southern portion of the windfarm site.

In the regional study area fishing activity by Scottish-registered vessels is similar to that described immediately above, with shellfish species – notably scallop – dominating landings in terms of both landed weight and value.

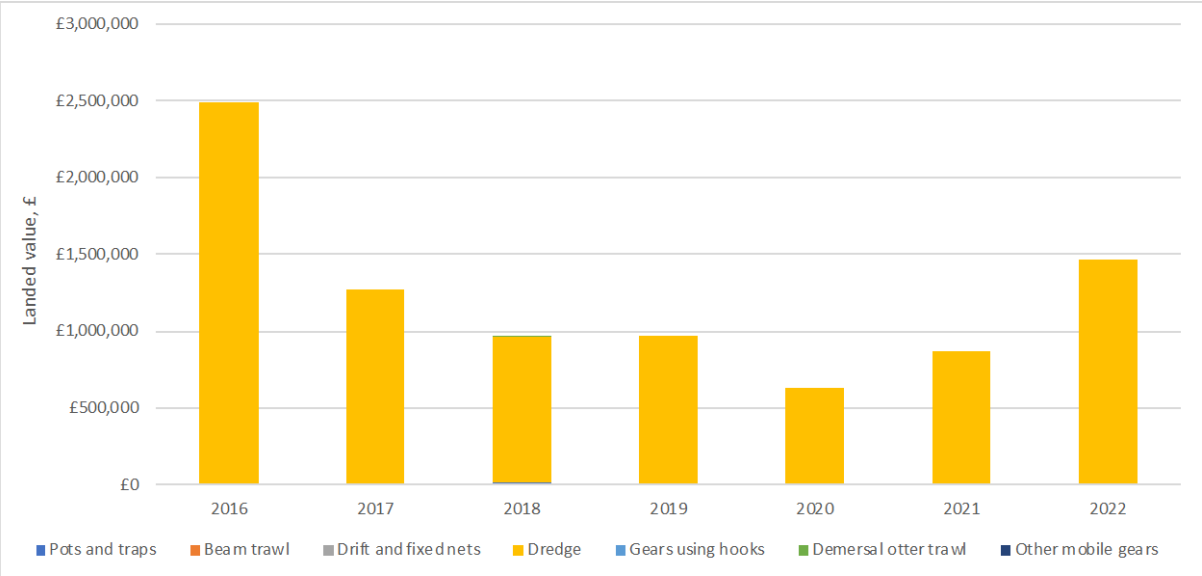


Figure 5.5 Landed value of all landings by Scottish registered vessels from ICES rectangle 36E6 (local study area) indicating gear type (MMO, 2022; MMO, 2023))

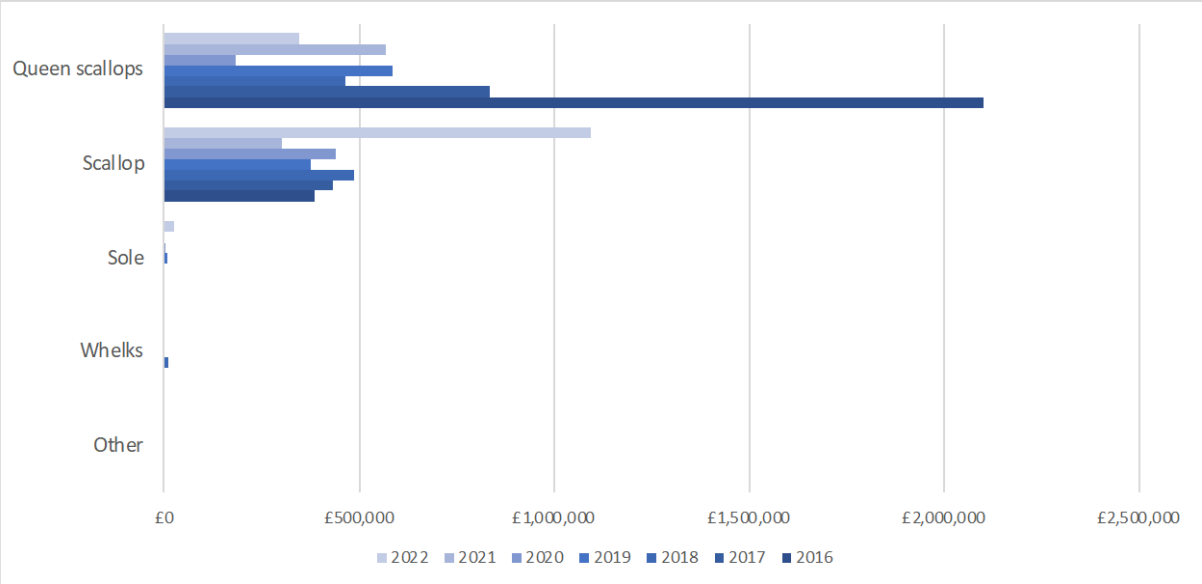


Figure 5.6 Landed value of all landings by Scottish registered vessels from ICES rectangle 36E6 (local study area) indicating species (MMO, 2022; MMO, 2023))

5.2.2 Ports and vessel fleets

Scottish dredge vessels, all over 10 m in length, land the majority of their catch into Kirkcudbright, in the Solway Firth, from which approximately 20 dredge vessels operate and where a shellfish processing plant is located. Reflecting declines in queen scallop landings across the Irish Sea, the value of scallop landings into Kirkcudbright has declined between 2016 and 2020.

It is noted that whilst a portion of landings into Kirkcudbright are expected to be associated with catches from the regional study area, some landings may be attributed to catches from further afield.

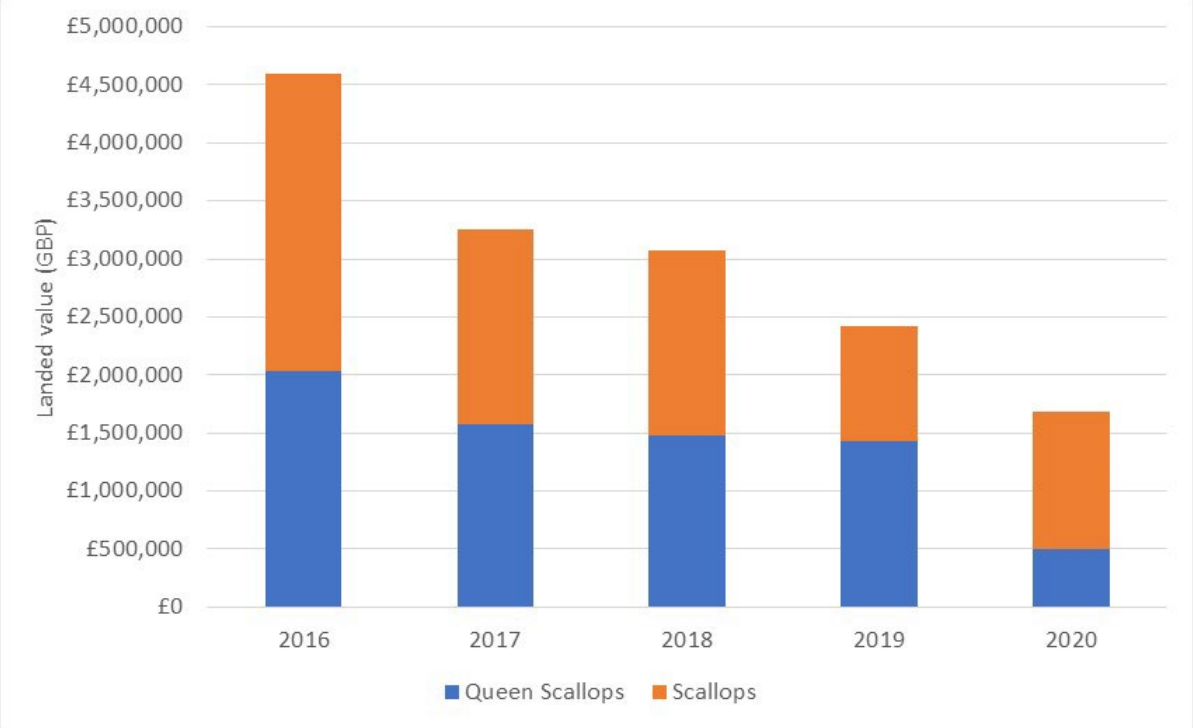


Figure 5.7 Value of scallop landings to Kirkcudbright 2016 to 2020 (MMO, 2021)

The MMO provides 2021 landings statistics by port of landing attributed to specific ICES rectangles, allowing linkage of the location of fishing to the specific port the catch is landed into, as shown in Figure 5.8. Key ports and fleets targeting fisheries within the local study area (36E6) include:

- Queen scallop landed into Kirkcudbright and Whitehaven; and
- King scallop landed into Silloth, Whitehaven and Holyhead.

Comparable data for 2022 is shown in Figure 5.9, which indicates a significant growth in the king scallop landings from 36E6 being landed into Kirkcudbright.

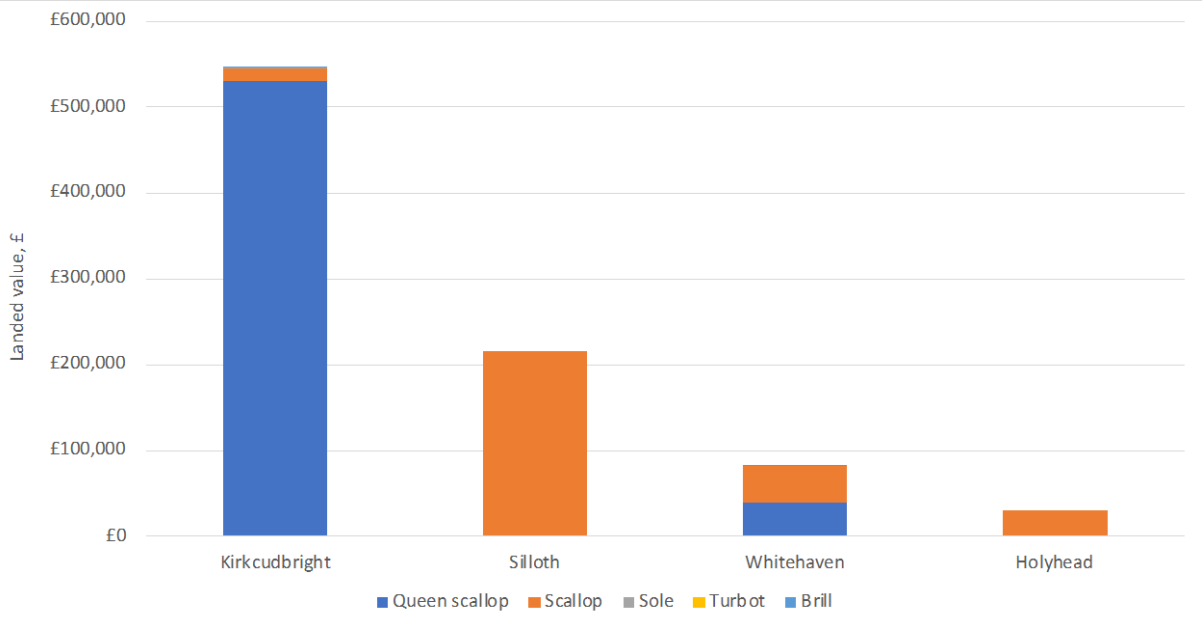


Figure 5.8 Value of landings from 36E6 by Scottish registered vessels by port of landing in 2021 (MMO, 2022)

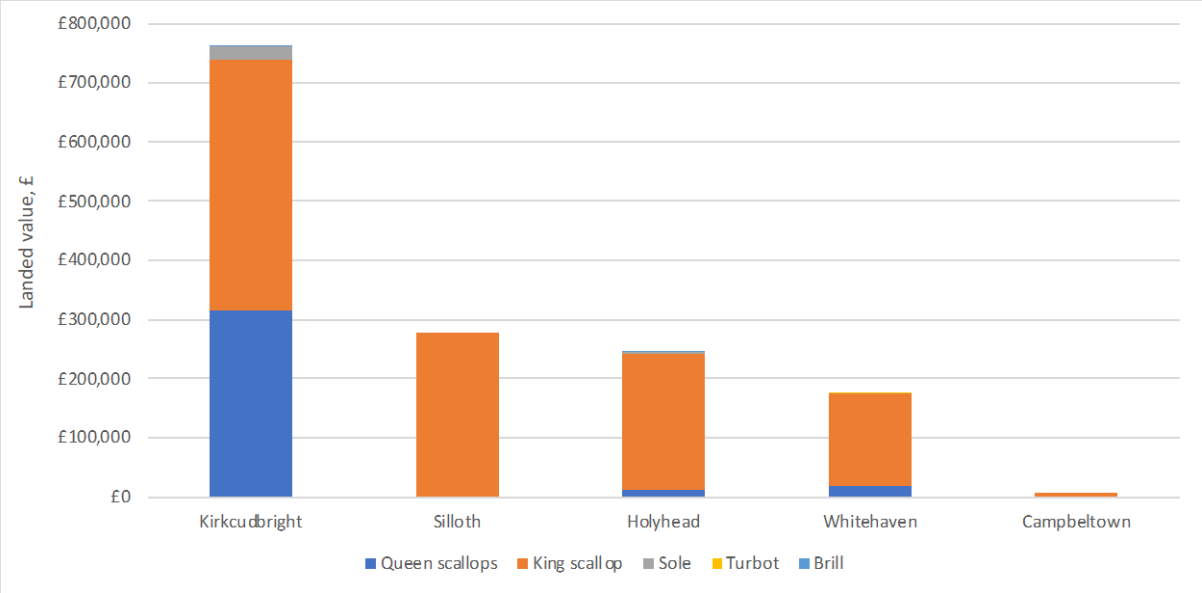


Figure 5.9 Value of landings from 36E6 by Scottish registered vessels by port of landing in 2022 (MMO, 2023)

5.3 Northern Irish Fisheries Activity Assessment

The trends in landed value by Northern Irish-registered vessels from the local study area are presented in Figure 5.10 for gear type and Figure 5.11 for key species.

Northern Irish landings are dominated by vessels targeting queen scallops with dredges and nephrops with demersal otter trawl. Landings by Northern Irish vessels from the local study area have averaged £69,000 annually over the 2016 to 2020 period, though peaked in 2016 and have declined substantially since, with negligible landings in 2021 and 2022. Vessels are understood to operate primarily out of Kilkeel, Ardglass and Portavogie.

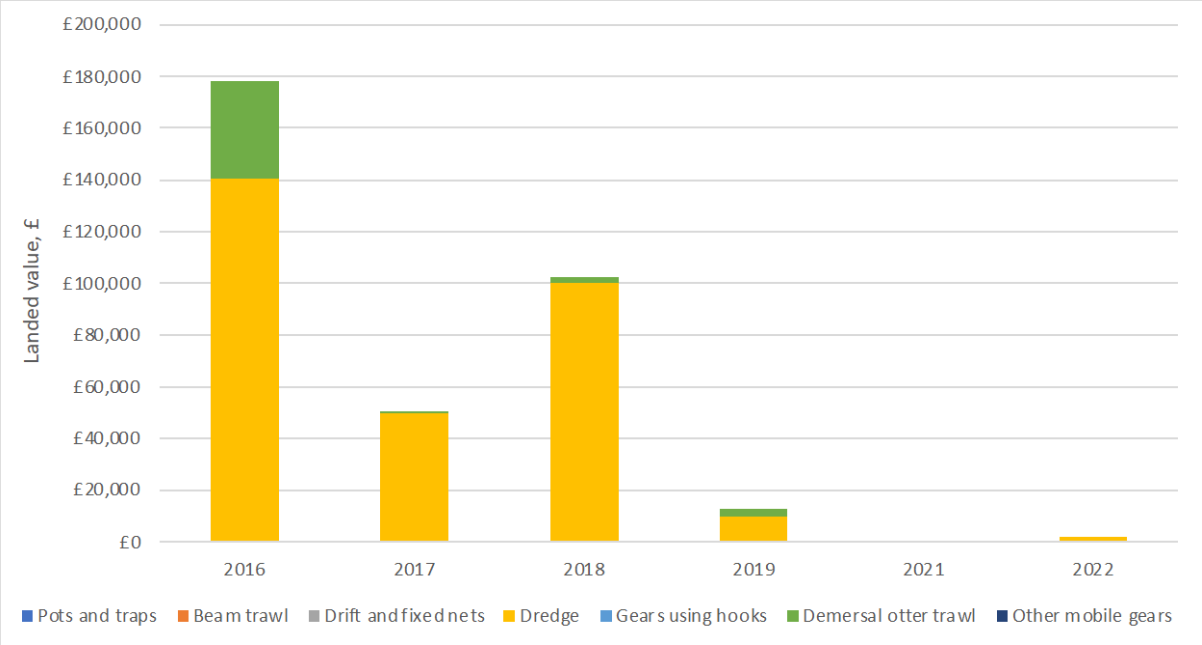


Figure 5.10 Landed value of all landings by Northern Irish registered vessels from ICES rectangle 36E6 (local study area) 2016 to 2022 (MMO, 2022; MMO, 2023))

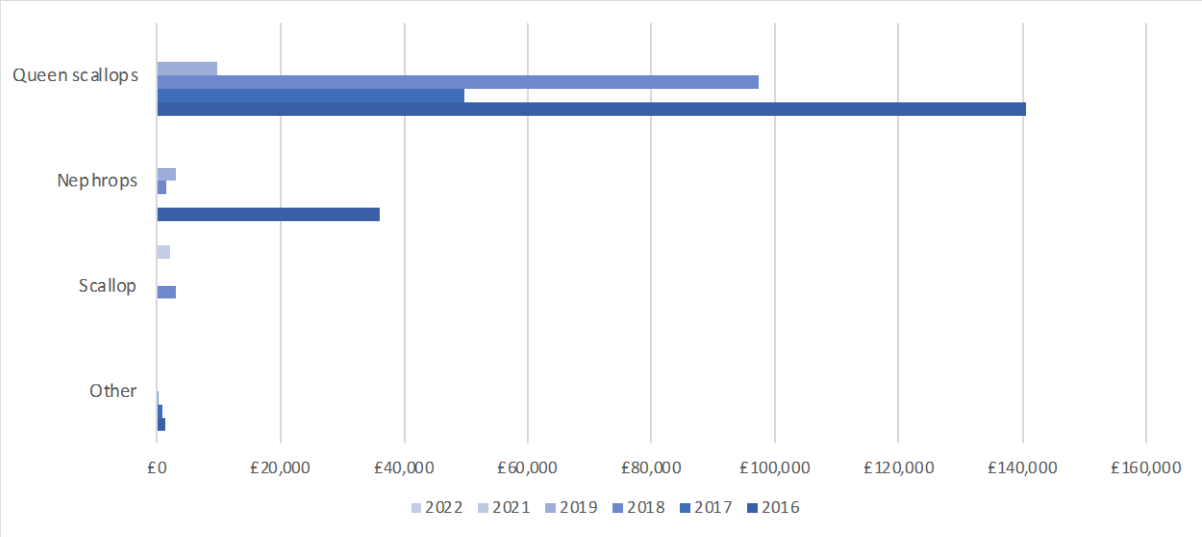


Figure 5.11 Landed value of all landings by Northern Irish registered vessels from ICES rectangle 36E6 (local study area) indicating species (MMO, 2022; MMO, 2023))

5.4 Welsh Fisheries Activity Assessment

The trends in landed value by Welsh-registered vessels from the local study area are presented in Figure 5.12 for gear type and Figure 5.13 for key species.

Welsh landings are dominated by vessels targeting queen scallops with dredges and potting for whelks. Landings by Welsh vessels from the local study area have averaged £52,000 annually over the 2016 to 2022 period, peaking in 2020 at over £120,000, related to landings of whelk. Vessels are understood to operate out of Bangor, Fleetwood, Holyhead and other ports in north Wales.

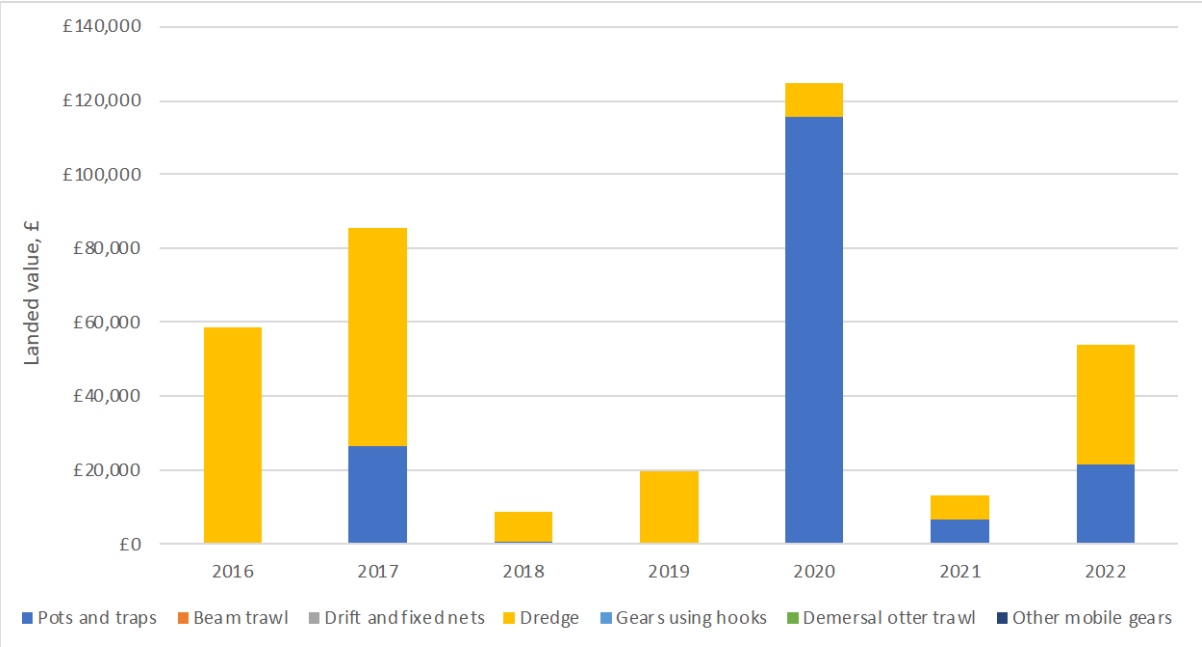


Figure 5.12 Landed value of all landings by Welsh registered vessels from ICES rectangle 36E6 (local study area) 2016 to 2022 (MMO, 2022; MMO, 2023)

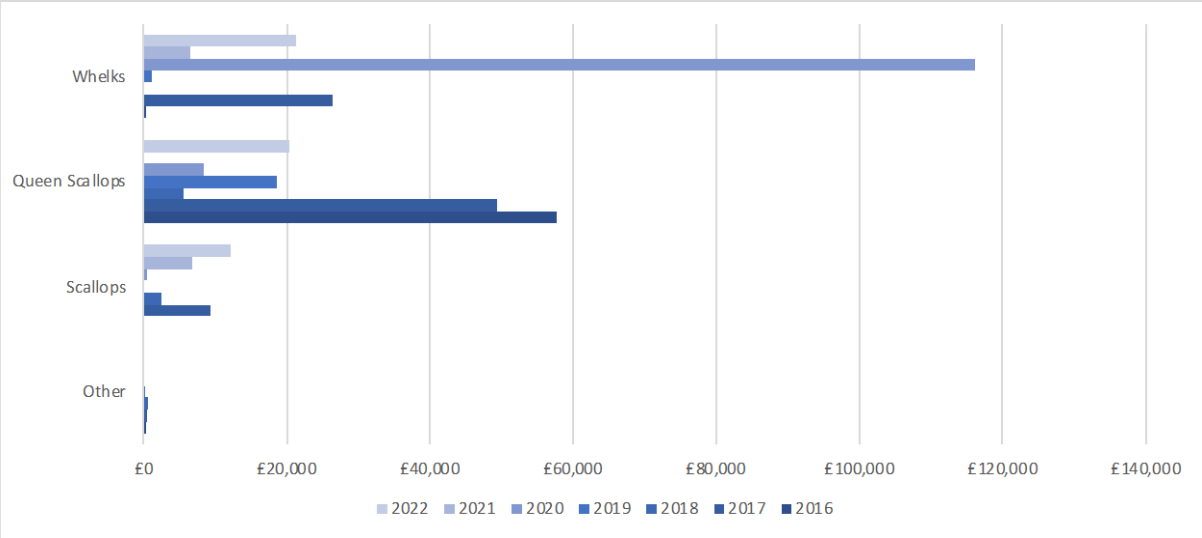


Figure 5.13 Landed value of all landings by Welsh registered vessels from ICES rectangle 36E6 (local study area) indicating species (MMO, 2022; MMO, 2023)

5.5 Isle of Man Fisheries Activity Assessment

No landings by vessels registered to the Isle of Man have been recorded from ICES rectangle 36E6 (local study area) from 2016 to 2021 and low levels were recorded in 2022. Specifically, 2 tonnes of queen scallop were landed in August 2022 by Isle of Man registered vessel(s) of length 15-18m deploying demersal otter trawl, with a first sales value of £1,400.

Across the wider regional study area, it is notable that activity by Isle of Man vessels targeting scallop is substantial in ICES rectangle 37E5, and also present to a lesser extent in ICES rectangle 36E5. These vessels target the important scallop grounds around the Isle of Man and land scallop into Ramsey, Peel, Douglas and Port St Mary.

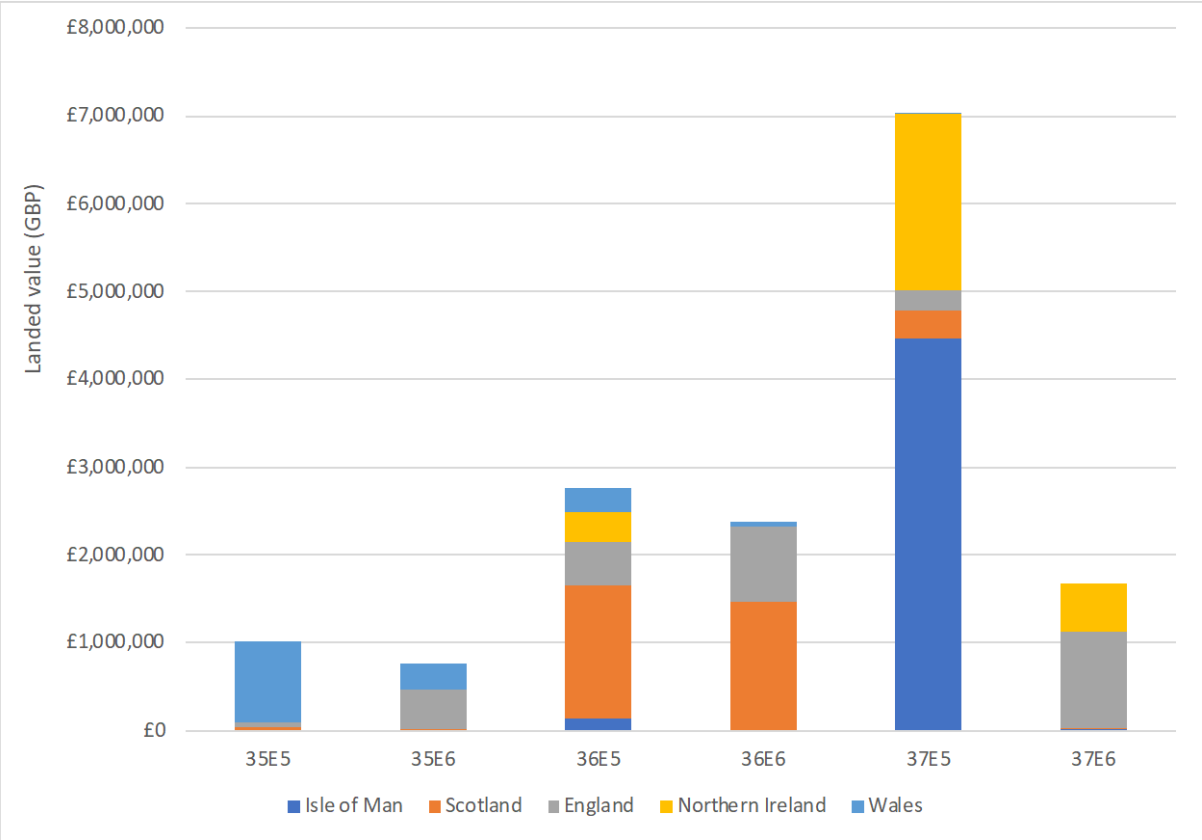


Figure 5.14 Landed value of all landings by UK registered vessels from the regional study area in 2022, indicating vessel nationality and ICES rectangle (MMO, 2023)

5.5.1 Isle of Man fisheries

The Department of Environment, Food and Agriculture (DEFA) is responsible for granting the sea fishing license and ensuring coherent and sustainable fisheries management within Manx Territorial Waters.

Key aspects of the legal, environmental, and economic considerations involved in the sea fishing licensing and regulatory framework within the Isle of Man territorial sea include:

- Legal Framework: The Fisheries Act 2012 and the Wildlife Act 1990 provide the legal powers for DEFA to regulate sea fishing activities through statutory documents, policy documents, and guidance notes.
- Public Asset and Shared Responsibility: Fish stocks within the Isle of Man territorial sea are considered a public asset and a shared natural resource, requiring cooperation, collaboration, and fairness in their utilization and sustainable management.
- Jurisdiction and International Cooperation: The Isle of Man's territorial sea jurisdiction, extended under the Territorial Sea Act, necessitates cross-jurisdictional cooperation and adherence to UK's international obligations through the Fisheries Management Agreement.
- Sustainable Resource Management: The document emphasizes the economic value of fish stocks to the Isle of Man's economy and the need for effective regulation to ensure sustainable harvesting and protection of marine ecosystems.
- Co-management and Strategic Approach: DEFA aims to work in partnership with stakeholders, adopting a co-management approach to fisheries management and implementing a strategic Future Fisheries Strategy.

Vessels registered in the Isle of Man and in the UK require both a UK and Isle of Man fishing licence to fish in Isle of Man territorial waters. In addition, an authorisation is required to catch king scallop, queen scallop, whelk and crab/lobster. The number of vessel licence owners and their administrative vessel nationality is presented in Table 5.1. For example, two English registered vessels have a licence to catch whelk within 3-12 NM area of Isle of Man territorial waters.

Table 5.1: Fishing licences within Manx Territorial Waters (source: DEFA, IoM Government)

Isle of Man Territorial Waters Access		Vessel nationality				
		Isle of Man	Northern Ireland	Scotland	Wales	England
General Access	IoM Licence	58	66	7	1	8
	0-3 Permit	56	20	4	1	7
King Scallop Authorisation	3-12 Area	29	16	4	1	5
	0-3 Area	25	2	0	0	4
Queen Scallop Authorisation	3-12 Area	26	6	1	1	3
	0-3 Area	24	5	1	1	3
Whelk Authorisation	3-12 Area	14	0	0	0	2
	0-3 Area	13	0	0	0	0
Crab/Lobster Authorisation	3-12 Area	28	6	0	0	0
	0-3 Area	28	6	0	0	0

Manx Marine Environmental Assessment

A Manx Marine Environmental Assessment (MMEA) was produced in 2018 with the commercial fisheries chapter of the MMEA documenting the changes in commercial landings from 2005 to 2016 and associated trends in fishery production (Duncan and Emmerson, 2018).

The main species of commercial value in Manx waters include king scallops, queen scallops, whelk, brown crab, lobster, langoustine, squid, European flat oyster, and various finfish species such as cod, haddock, plaice, turbot, brill, and dab. These species are important for the local fishing industry and contribute significantly to the commercial fisheries in the Isle of Man. Additionally, there are ongoing efforts to manage and sustainably develop these fisheries, as evidenced by the implementation of various management measures and stock assessments for species such as queen scallops.

The trends documented form 2005 to 2016 in the king and queen scallop fisheries in Manx waters indicate a dynamic and evolving situation. The queen scallop fishery experienced a peak in landings in 2011, followed by steep declines due to stock depletion and the subsequent introduction of management restrictions. The fishery has undergone a significant decline since 2014 and has undergone a stock-rebuilding process under highly-constrained fishing conditions. The king scallop fishery has also shown indications of excessive fishing effort, leading to the introduction of new, restrictive management measures since 2016. These measures include effort reduction and the development of a stock assessment and Total Allowable Catch (TAC) application in 2017.

Annual fisheries science report

The Annual Fisheries Science Report of 2022 by the Sustainable Fisheries and Aquaculture Group at Bangor University details the research and findings related to the Isle of Man's scallop fisheries (Bangor University and isle of Man Government, 2022).

Progress has been made in the research and assessment of scallop stocks. This includes the use of innovative techniques such as video surveys and the development of assessment models. The research also emphasizes the interconnected nature of scallop stocks across the

Irish Sea, involving collaborations with multiple jurisdictions to facilitate sustainable fishing practices.

These recommendations aim to ensure the sustainable management of the king scallop fishery for the 2022/2023 season, emphasizing the importance of real-time data collection, spatial monitoring, and the protection of high-density areas to maintain the health of the scallop stocks.

5.5.2 Isle of Man queen and king scallop fisheries

Queen scallop

The Isle of Man Queen Scallop 2022 Stock Survey Report conducted by Bangor University's Sustainable Fisheries and Aquaculture Group (Bloor *et al*., 2022a) presents a comprehensive overview of the stock status, fishing effort, and management measures for the queen scallop fishery in and around the Isle of Man's territorial waters.

The stock assessment is undertaken using a Catch-Survey Analysis (CSA) method, showing a slight increase in biomass over the last four years but remaining below sustainable levels.

The key findings from the 2022 annual stock survey of queen scallops include:

- Spatially discrete high-density areas within several fishing grounds have been created due to the closure of areas with high-density juvenile scallops for on-growing. The stock assessment method down-weights these high-density isolated patches when calculating the overall stock biomass, indicating that assessing the stock at the territorial sea level may be less applicable for the current fine-scale spatial management in place for queen scallops.
- The annual landings of queen scallops from ICES Rectangles 36E5, 37E5, and 38E5, which cover the main extent of the Isle of Man's territorial waters, show a similar pattern of landings to those from the wider Irish Sea (Area VIIa) over the period 2000 – 2020.
- The 2022 survey indicates a well-defined peak in recruiting queen scallops (15-45 mm) that was absent in 2021, suggesting the need to consider sustainable management over a period of more than one year and potential closures for areas containing high densities and proportions of queen scallop recruits.
- Both scientific and industry surveys show similar spatial trends for high-density areas, with a high-density hotspot identified at the Targets (TAR) fishing ground on the west of the island. The industry survey also indicates significant declines in the post-recruit survey index within the current restricted area at the Chickens (CHI) fishing ground in the south of the island following relatively high fishing pressure and landings.

King scallop

The Isle of Man king scallop 2022 stock survey report provides details on two annual surveys: a long-term, medium-resolution, fixed site survey on the R.V. Prince Madog, and a short-term, fine-resolution, random stratified survey on two industry fishing vessels (Bloor *et al*., 2022b). The survey data from both approaches is analysed to assess the stock development over time.

The annual king scallop landings in the ICES Rectangles 36E5, 37E5, and 38E5 show a similar pattern to those from the wider Irish Sea (Area 7a) over the period 1992 – 2019. There was a rapid increase in landings from 2006 to 2009, almost doubling during that period from 2111t to 3971t. Annual landings continued to increase since 2009, with an annual average of 4020t from 2010 – 2015 and a peak in 2016 of 5714t. However, there were decreases in landings in 2017, 2018, 2019, and 2020, with a slight increase again in 2021. These reductions in landings followed the introduction of TACs within Isle of Man territorial waters. It's important to note that TACs are not the only factor that may have influenced the reduction in landings, as stock decline, Brexit, and Coronavirus may have also had an impact.

The stock advice for the 2022/2023 season recommends a precautionary management approach and suggests a TAC based on the ICES Category 3 approach, with a potential increase of 20%. The report emphasizes the need for in-season reviews, spatial monitoring and management, as well as closed area management to protect high-density areas of post-recruits and recruits.

The king scallop fishery in Manx territorial waters has been subject to a Capacity Reduction Programme (Policy) as implemented through a long term management plan which became effective from 16 May 2022 (DEFA, 2022). The Capacity Reduction Programme sets a track-record requirement for eligibility in the fishery. Authorisations failing to meet this requirement become ineligible and revert to the Department. It is implemented under the authority of the Fisheries Act 2012.

Spatial distribution of the king scallop and queen scallop

The spatial distribution of the queen scallop fishery in the Isle of Man territorial sea is primarily concentrated within specific grounds; these grounds are named locally as: Targets, Chickens, Point of Ayre, Bradda and East of Douglas. These locations are shown in Figure 5.15 and have been the focus of fishing activity by Manx fishing vessels, as evidenced by VMS data between 2007-2013 (Duncan and Emmerson, 2018) and swept area ratio data from 2018-2022 (DEFA, 2023). The fishing activity tends to occur within the territorial sea, with occasional fishing further afield in UK waters, although this is restricted to relatively few boats. The distribution of fishing activity varies annually, but these areas represent the long-term locations of the king and queen scallop fishing activity. Additionally, the fishery is regulated with measures such as fishing curfews, closed areas, and individual and TAC quotas, as well as restrictions on fishing gear and vessel size. These regulations are aimed at managing and sustaining the queen and king scallop fisheries within the Isle of Man's territorial sea.

The distribution maps for queen scallop targeted by demersal otter trawl is shown in Figure 5.16. This includes Isle of Man and UK vessels of all lengths fishing within Isle of Man territorial waters. The distribution map for king scallop activity by dredge vessels operating in Manx territorial waters is shown in Figure 5.17.

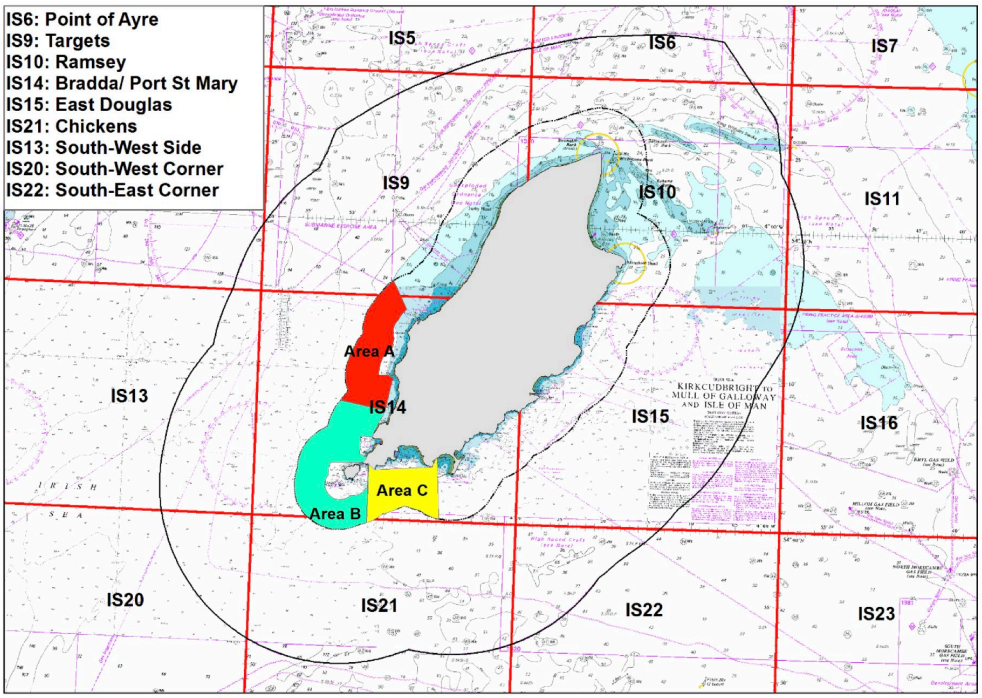


Figure 5.15: Map showing location of Irish Sea Boxes which are used to define fishing areas in the Nest Forms Landings Data. The fishing grounds delineated within each IS box are listed on the map. In addition, Subzones for reporting fishing within 3 subzones within the 0-3 nm limit are also shown (Bloor et al., 2022a)

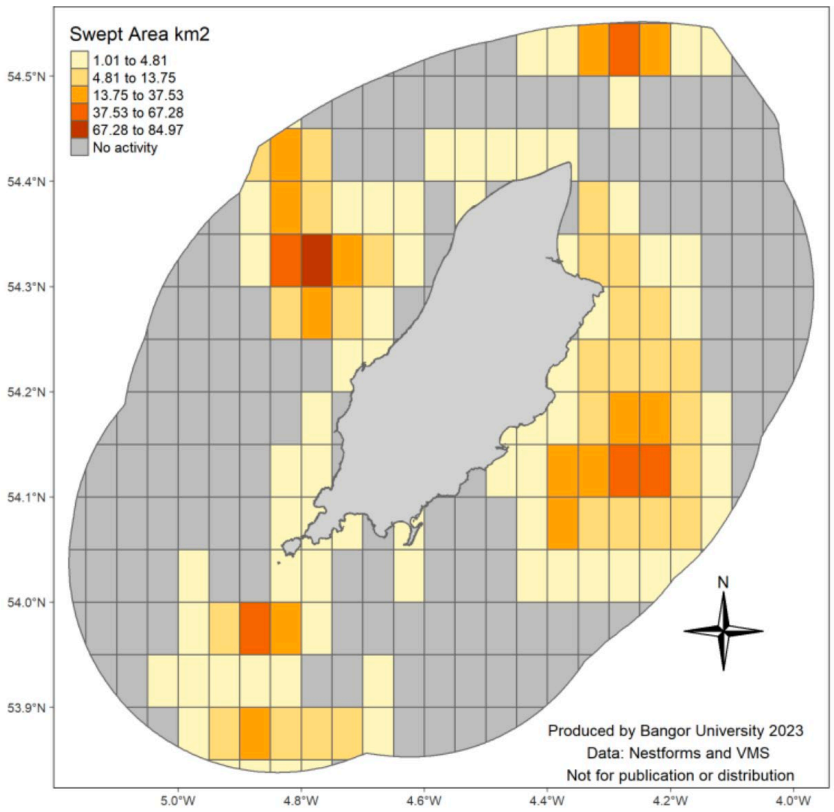


Figure 5.16: Queen scallop: fishing activity map (otter trawl) based on EU VMS data (2018-2022) from Citrix (available from MMO) merged with NestForms data (held by DEFA, IoM Government) (Bangor University, 2023a)

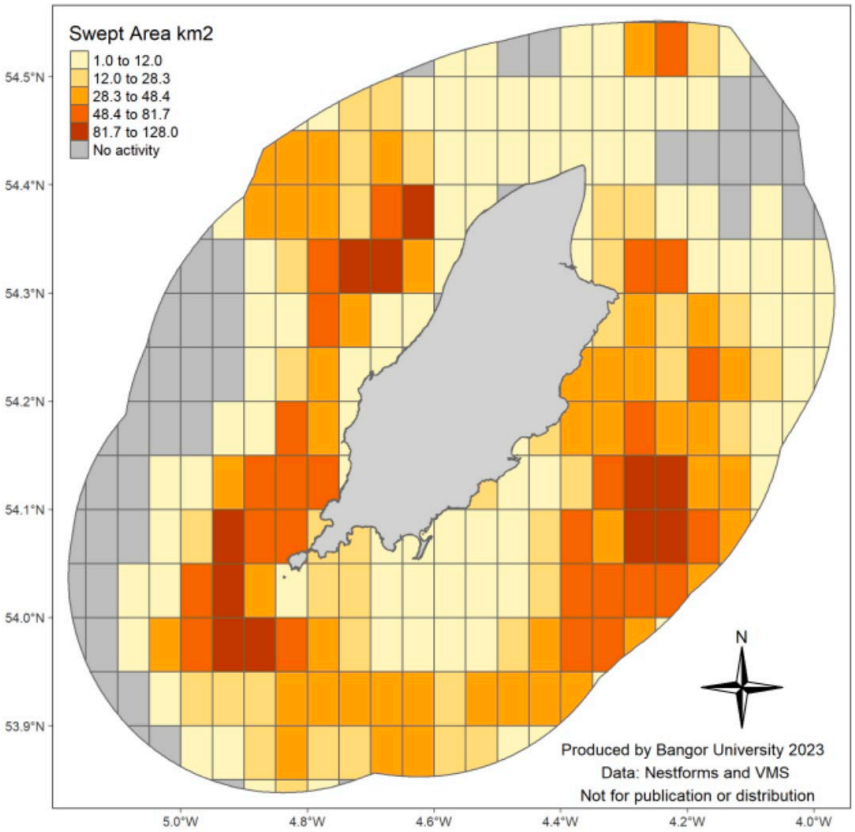


Figure 5.17: King scallop: fishing activity map (dredge) based on EU VMS data (2017/18-2021/22) from Citrix merged with NestForms data (held by DEFA, IoM Government) (Bangor University, 2023b).

5.5.3 Isle of Man potting fishery

Manx registered potting vessel target whelk using plastic pots and crab and lobster using creels.

Landings data provided by the DEFA, IoM Government (Table 5.2) for whelk, brown crab and lobster landings by Manx vessels into Manx ports closely matches with the MMO iFish database analysed for comparable parameters (i.e., Manx vessel landings from the regional study area) (Table 5.3). This provides confidence that Isle of Man vessels are accurately included in the MMO datasets analysed through this report.

Table 5.2: Landings of whelks, brown crab and lobster caught in all areas by Manx vessels into Manx ports from 2018 to 2021 (data source: DEFA, IoM Government)

Manx vessels into Manx ports (all landings)	Whelks		Brown crab		Lobsters	
	Landed Weight (tonnes)	Value (£)	Landed Weight (tonnes)	Value (£)	Landed Weight (tonnes)	Value (£)
2018	993	£1,166,231	629	£1,176,197	43	Not provided
2019	940	£1,087,085	437	£893,862	45	
2020	667	£773,199	465	£708,136	47	
2021	534	£603,165	531	£956,529	47	
Average annual	784	£907,420	516	£933,681	46	

Table 5.3: Landings of whelks, brown crab and lobster caught in the regional study area by Manx vessels into Manx and UK ports from 2018 to 2021 (data source: DEFA, IoM Government)

Manx vessels into Manx and UK ports (landings from from regional study area)	Whelks		Brown crab		Lobsters	
	Landed Weight (tonnes)	Value (£)	Landed Weight (tonnes)	Value (£)	Landed Weight (tonnes)	Value (£)
2018	993	£1,142,589	610	£1,127,929	43	£631,894
2019	940	£1,087,085	435	£889,901	45	£614,058
2020	675	£782,345	462	£708,147	46	£571,763
2021	534	£603,165	531	£957,376	47	£698,361
Average annual	785	£903,796	510	£920,838	45	£629,019

Whelk fishery distribution

The distribution of the whelk fishery in Isle of Man territorial waters is presented in Figure 5.18 for activity by vessels with an Isle of Man whelk license for the period 2010 to 2021, indicating the number of pot hauls. Activity is highest on the east side of the Isle of Man, specifically from 0 to approximately 6 NM.

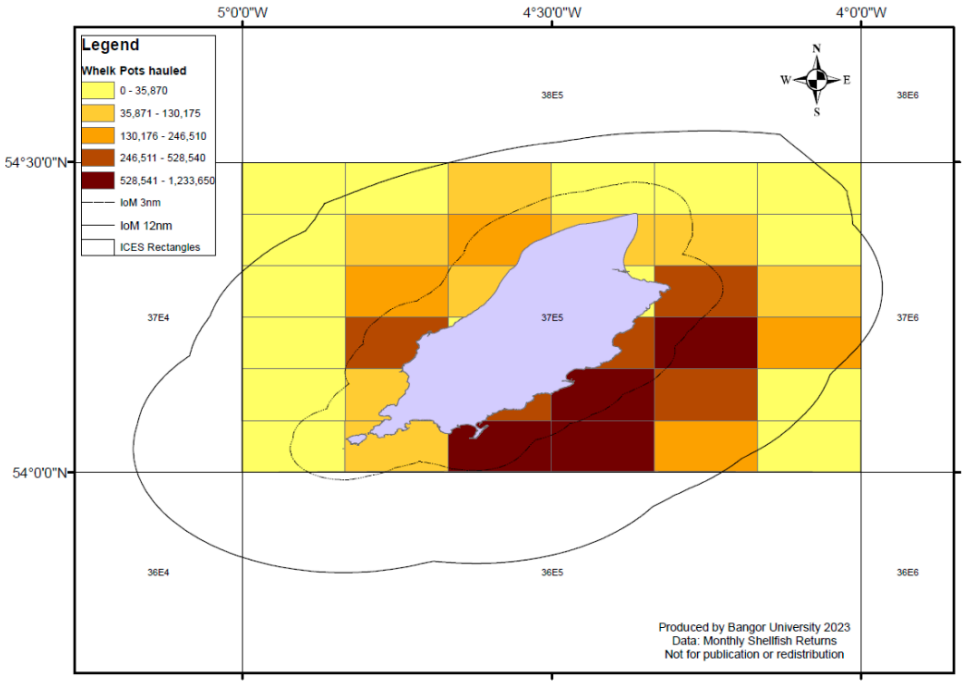


Figure 5.18: Whelk commercial fishery activity map (2010 to 2021)(static gear) based on pot hauls (as a proxy for fishing effort/activity). (Bangor University, 2023c).

Crab and lobster fishery distribution

The spatial distribution of crab and lobster fishing in the Isle of Man territorial sea is dynamic and occurs all around the island, principally within 3 NM (Figure 5.19). Activity is highest to along the northwest region. The distribution is influenced by factors such as the mating season, reproductive migrations, and the natural reduction of suitable habitat types. The industry primarily uses traditional creels and parlour pots, with bait typically consisting of oily fish such as mackerel or herring.

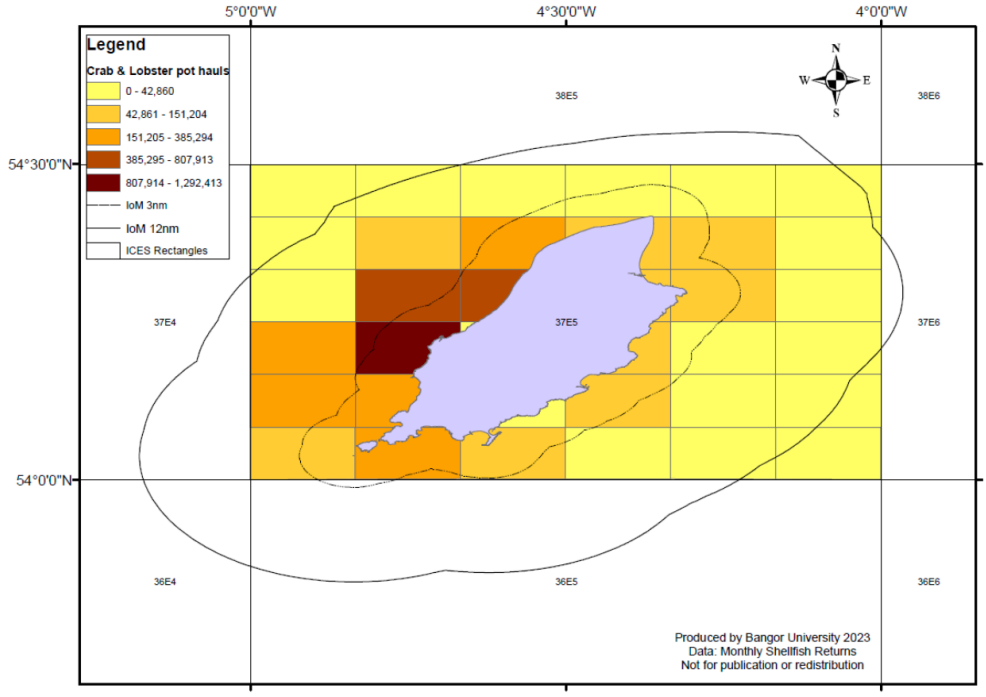


Figure 5.19: Crab and lobster commercial fishery activity data (2010 to 2021) (static gear) based on pot hauls (as a proxy for fishing effort/activity)) (Bangor University, 2023d).

5.5.4 Marine nature reserves

The marine nature reserves (MNRs) in Manx waters are designated areas aimed at biodiversity conservation and sustainable fisheries management. These reserves were established to protect specific habitats and species, and they serve as important areas for research, fisheries management, and conservation purposes. The MNRs were initially developed for research and fisheries management, primarily focusing on king and queen scallop fisheries between 1989 and 2009. Over time, the objectives of the MNRs have evolved to align more closely with fisheries management and conservation goals. The reserves are governed by specific legislation, such as the Sea Fisheries Byelaws and the Manx Marine Nature Reserves (Designation) Order 2018.

The location of MNRs within 0-3 NM of Isle of Man territorial waters is shown in Figure 5.20, with management measure summarised in Figure 5.21 and Table 5.4.

The MNRs are managed through a combination of input and output controls, including fishing curfews, closed areas, and individual and total TAC quotas. The reserves are also supported by scientific data and ongoing efforts to establish an ecologically coherent network of MPAs, ensuring sustainable commercial fisheries in the future. The MNRs are an integral part of the Isle of Man's marine conservation initiatives and contribute to the sustainable management of marine resources.

Figure 5.20: Isle of Man Marine Nature Reserves (as of 2018) (Duncan and Emmerson, 2018)

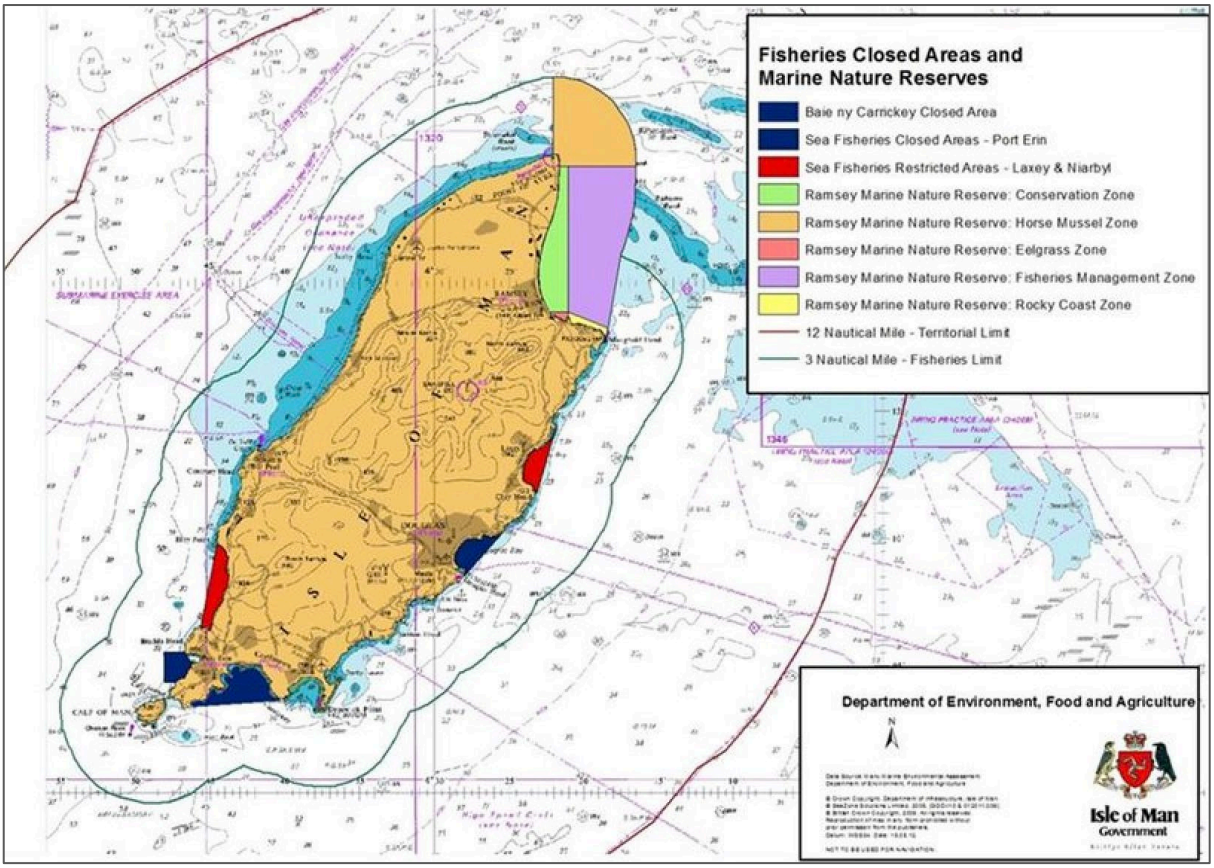


Figure 5.21: Fisheries closed areas and marine nature reserves around the Isle of Man, as of November 2012 (Leigh and Bryce, 2014)

Table 5.4: Characteristics of Marine Nature Reserves in Manx Waters (Duncan and Emmerson, 2018)

Closed Area	Legislation (selected)	Year Implemented	Restrictions
Baie ny Carrickey MNR	Sea Fisheries (Baie Ny Carrickey Closed Area) Byelaws 2012, Manx Marine Nature Reserves (Designation) Order 2018.	(2012, extended 2013 as Closed Area) MNR in 2018	Fishing with towed gear not permitted. See: Manx Marine Nature Reserves Byelaws 2018
Calf of Man and Wart Bank MNR	Manx Marine Nature Reserves (Designation) Order 2018.	2018	See: Manx Marine Nature Reserves Byelaws 2018
Douglas Bay MNR	Sea Fisheries (Douglas Bay Closed Area) Byelaws 2008, Manx Marine Nature Reserves (Designation) Order 2018.	(2008 as Closed Area) MNR in 2018	Fishing with towed gear not permitted. See: Manx Marine Nature Reserves Byelaws 2018
Langness MNR	Manx Marine Nature Reserves (Designation) Order 2018.	2018	See: Manx Marine Nature Reserves Byelaws 2018
Laxey MNR	Sea Fisheries (Scallop Ranching) (Restricted Area) Byelaws 2009, Manx Marine Nature Reserves (Designation) Order 2018.	(2009 as Restricted Area) MNR in 2018	No fishing for queen or king scallops without authority. See: Manx Marine Nature Reserves Byelaws 2018
Little Ness MNR	Manx Marine Nature Reserves (Designation) Order 2018.	2018	See: Manx Marine Nature Reserves Byelaws 2018
Niarbyl MNR	Sea Fisheries (Scallop Ranching) (Restricted Area) Byelaws 2009, Manx Marine Nature Reserves (Designation) Order 2018.	2009 as Restricted Area) MNR in 2018	No fishing for queen or king scallops without authority. See: Manx Marine Nature Reserves Byelaws 2018
Port Erin Bay MNR	Sea Fisheries (Experimental Area) Byelaws 2006 (I) & Amendments in 2007 (II), 2009 (III), Manx Marine Nature Reserves (Designation) Order 2018.	(1989, extended 2003, 2006 as Experimental Area) MNR in 2018	Fishing with towed gear not permitted. See: Manx Marine Nature Reserves Byelaws 2018
Ramsey Bay MNR	Ramsey Bay (Marine Nature Reserve) (Designation) Order 2011, Ramsey Bay (Marine Nature Reserve) (no. 2) byelaws 2011, Ramsey Bay (Marine Nature Reserve) (no.2) byelaws 2011 (amendment) byelaws 2016, Manx Marine Nature Reserves (Designation) Order 2018.	2011, re-designated 2018	Various, but towed gear only within Fisheries Management Zone and static gear excluded from Horse Mussel Zone and Eel Grass Zone, See: Manx Marine Nature Reserves Byelaws 2018
West Coast MNR	Manx Marine Nature Reserves (Designation) Order 2018.	2018	See: Manx Marine Nature Reserves Byelaws 2018

5.6 Non-UK Fisheries Activity Assessment

EU landings data and ICES spatial data (see Section 4.1), indicate the likely presence of other European-registered vessels in the local and regional study areas. These vessels are understood to include Irish vessels dredging for scallop and Belgian beam trawlers targeting sole and plaice.

The landings data presented in Figure 5.22 is available only up to 2016 and indicates that over the 2012 to 2016 period, landings by Belgian vessels substantially declined whilst landings by Irish vessel showed smaller fluctuation, averaging 40 tonnes per year.

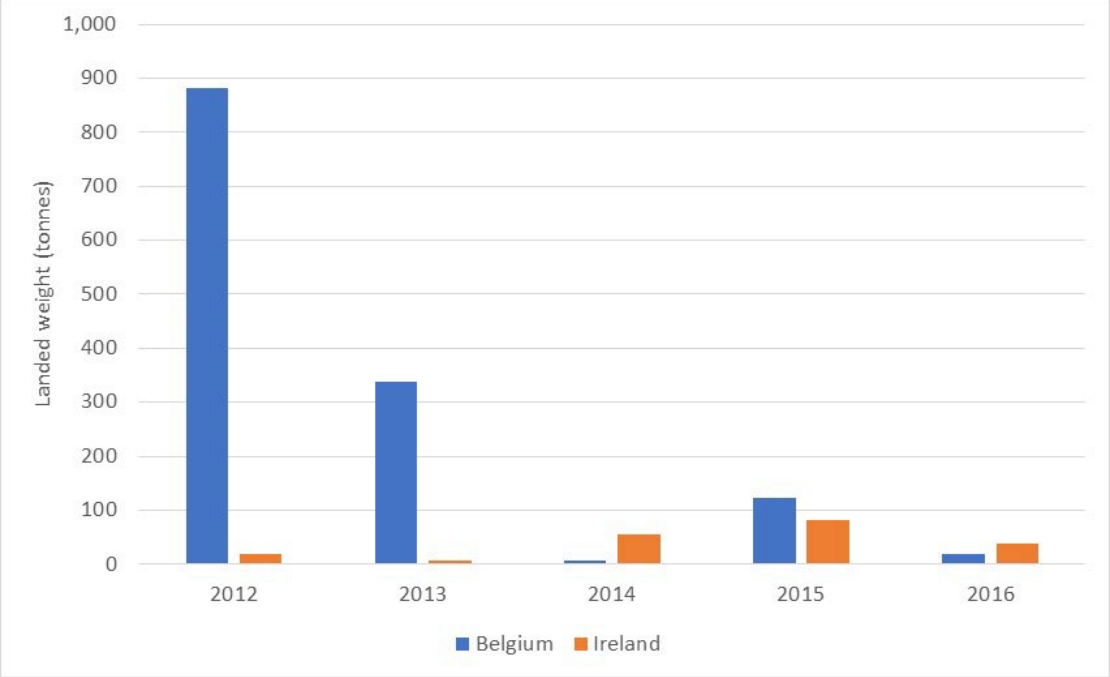


Figure 5.22 Landings from the local study area by non-UK vessels 2012 to 2016 (EU DCF, 2022)

Landings data for all vessel nationalities from 2012 to 2016 is presented in Figure 5.23 for the regional study area. This indicates that ICES rectangle 36E5 is more important to Irish vessels, which is corroborated by VMS data presented in Section 4. Belgian vessels have relatively low levels of activity across the region.

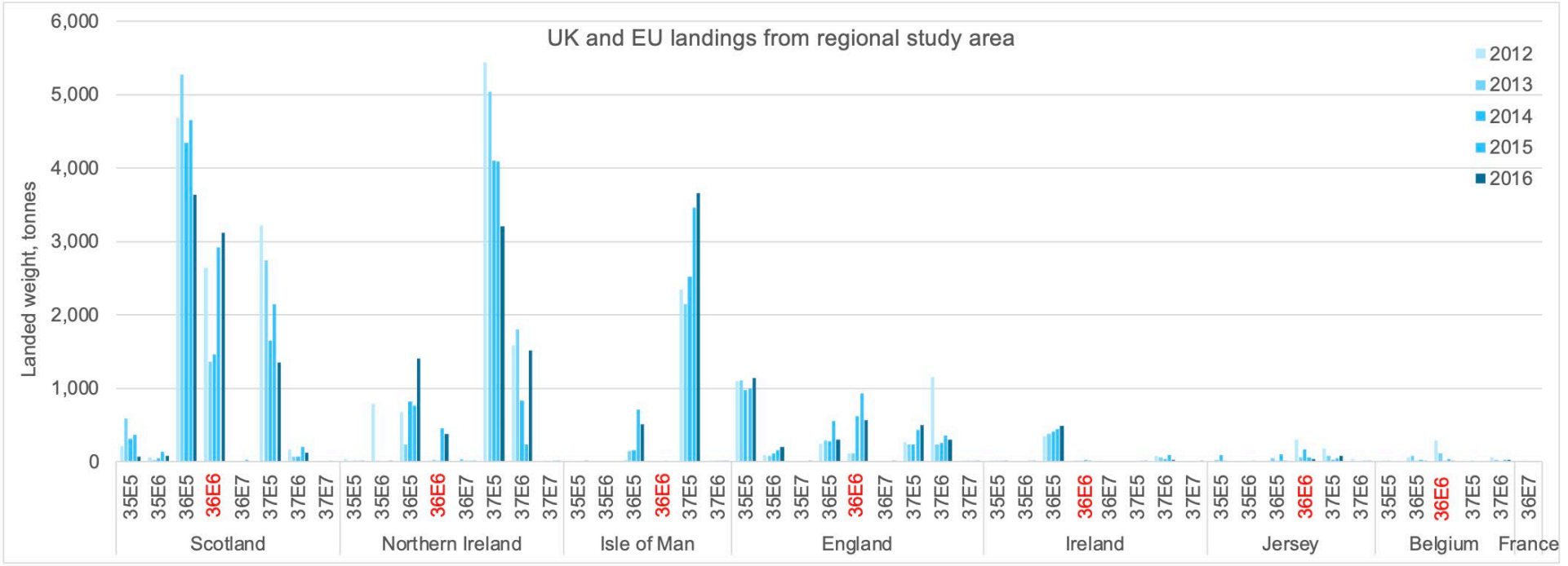


Figure 5.23 Landings from the regional study area by all vessel nationalities 2012 to 2016 (EU DCF, 2022).

6. Future Baseline Environment

Commercial fisheries patterns change and fluctuate based on a range of natural and management-controlled factors. This includes the following:

- Market demand: commercial fishing fleets respond to market demand, which is impacted by a range of factors, including the 2020 to 2021 COVID pandemic;
- Market prices: commercial fishing fleets respond to market prices by focusing effort on higher value target species when prices are high and markets in demand;
- Stock abundance: fluctuation in the biomass of individual species stocks in response to status of the stock, recruitment, natural disturbances (e.g. due to storms, sea temperature etc.), changes in fishing pressure etc.;
- Fisheries management: including new management for specific species where overexploitation has been identified, or changes in TACs leading to the relocation of effort, and/or an overall increase/decrease of effort and catches from specific areas;
- Environmental management: including the potential restriction of certain fisheries within protected areas;
- Improved efficiency and gear technology: with fishing fleets constantly evolving to reduce operational costs e.g. by moving from beam trawl to demersal seine; and
- Sustainability: with seafood buyers more frequently requesting certification of the sustainably of fish and shellfish products, such as the Marine Stewardship Council certification, industry is adapting to improve fisheries management and wider environmental impacts.

The variations and trends in commercial fisheries activity are an important aspect of the baseline assessment and forms the principal reason for considering up to five years of key baseline data. Given the time periods assessed, the future baseline scenario would typically be reflected within the current baseline assessment undertaken. However, in this case, existing baseline data do not capture any potential changes in commercial fisheries activity resulting from the withdrawal of the UK from the EU.

Following withdrawal, the UK and the EU have agreed to a Trade and Cooperation Agreement (TCA), applicable on a provisional basis from 1 January 2021. The TCA sets out fisheries rights and confirms that from 1 January 2021 and during a transition period until 30 June 2026, UK and EU vessels will continue to access respective Excusive Economic Zones (EEZs, 12 to 200 NM) to fish. In this period, EU vessels will also be able to fish in specified parts of UK waters between 6 to 12 NM.

25% of the EU's fisheries quota in UK waters will be transferred to the UK over the five-year transition period; most of this quota has already been transferred and distributed across the four nations of the UK. After the five-year transition there will be annual discussions on fisheries opportunities. Across the regional study area, where UK fisheries primarily target non-quota shellfish species, it is expected that fleets are unlikely to be impacted by quota transfers. It is possible that UK vessels will seek to exploit additional quota-species opportunities, but vessels would need to access quota holdings.

Market changes have the potential to impact fishing activity in the regional study area; some of the catch landed by UK vessels is exported to EU markets (e.g. brown crab) and potential tariff/non-tariff barriers could affect which species are targeted and to what extent. The key species landed by potters in the area, is whelk, which is primarily exported to non-EU countries, including Korea, Taiwan and Singapore. The trade in UK landed whelk has therefore not been as affected by the Brexit process and associated implications on shellfish exports in comparison to other species. In terms of future baseline scenarios, it is therefore possible, for example, that the UK fleet will more heavily target whelk given that prices have increased in recent years, and they are exported to non-EU countries.

7. Summary

The key fleet métiers operating across the regional study area include (in no particular order):

- UK (primarily Scottish, but also some Northern Irish, English and Welsh) and Irish dredgers targeting king and queen scallops;
- Isle of Man dredgers targeting king scallops;
- Isle of Man demersal otter trawlers targeting queen scallops;
- UK (primarily English) potters targeting shellfish, primarily whelk offshore, but also lobster and brown crab;
- Isle of Man potters targeting shellfish, primarily whelk offshore, but also lobster and brown crab;
- UK (primarily English) and Belgian beam trawlers targeting sole, plaice and other demersal species, with localised inshore trawling targeting brown shrimp;
- UK inshore vessels (English) under 10 m length targeting a variety of demersal species (e.g. bass) using nets and hooked gear;

Based on analysis of landings and spatial data, and the location of windfarm site beyond the 12 NM limit, fishing activity across the windfarm site is expected to be dominated by vessels over 12m in length operating potting gear targeting whelk and dredge targeting king scallop, with potential for occasional beam trawl activity.

References

Bloor, I.S.M & Jenkins, S.R. (2021). Isle of Man Queen Scallop 2021 Stock Survey Report. Bangor University Sustainable Fisheries and Aquaculture Group, Fisheries Report, 39 pages.

Bloor, I.S.M, Coleman, M.T., Jenkins, S.R. (2022a). Isle of Man Queen Scallop 2022 Stock Survey Report. Bangor University Sustainable Fisheries and Aquaculture Group, Fisheries Report, 50 pages.

Bloor, I.S.M & Jenkins, S.R. (2022b). Isle of Man King Scallop 2022 Stock Survey Report. Bangor University Sustainable Fisheries and Aquaculture Group, Fisheries Report, 47 pages.

Bangor University and Isle of Man Government (2022). Annual Fisheries Science Report 2022 Sustainable Fisheries and Aquaculture Group School of Ocean Sciences.

Bangor University (2023). Spatial distribution of Isle of Man fisheries including king scallop, queen scallop, whelk and crab/lobster fisheries.

DEFA (2022) A Long-Term Management Plan for the Isle of Man King Scallop Fishery. Department of Environment, Food and Agriculture (DEFA) in collaboration with the Isle of Man Scallop Management Board and Bangor University School of Ocean Sciences

Carter, M.C. (2008), 'Aequipecten opercularis Queen scallop'. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Plymouth: Marine Biological Association of the United Kingdom. https://www.marlin.ac.uk/species/detail/1997 [Accessed: 04 2021].

Defra. (2021). Fisheries: Apportioning additional quota between the UK administrations. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972734/fisheries-apportioning-additional-quota-summary-of-responses.pdf [Accessed: August 2022].

Duncan, P. and Emmerson, J. (2018). Manx Marine Environmental Assessment Commercial Fisheries & Sea Angling. MMEA Chapter 4.1

European Maritime Safety Agency (EMSA). (2022). Integrated Maritime Services Automatic identification system (AIS) data for EU fishing vessels from 2019 to 2022 indicating route density per km per annual period.

European Union Data Collection Framework (EU DCF) database. (Accessed 2022). Data by quarter-rectangle: Tables and maps of effort and landings by ICES statistical rectangles for 2012 to 2016.

Howarth, Leigh & Stewart, Bryce. (2014). The dredge fishery for scallops in the United Kingdom (UK): Effects on marine ecosystems and proposals for future management. Marine Ecosystem Management Report no. 5.

ICES. (2019). Annual report. Scallop Assessment Working Group (WGSCALLOP). ICES Scientific Reports. 1:90. 31 pp. [redacted]

ICES. (2020). Scallop Assessment Working Group (WGSCALLOP). ICES Scientific Reports. 2:111. 57 pp. Available at http:// [redacted]

ICES (2021). Spatial data layers of fishing intensity/pressure for EU vessels operating within ICES defined Celtic Seas Ecoregion and Greater North Sea Ecoregion.

ICES. (2021). ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. Sea bass (*Dicentrarchus labrax*) in divisions 4.b–c, 7.a, and 7.d–h (central and southern North Sea, Irish Sea, English Channel, Bristol Channel, and Celtic Sea).

ICES. (2021). ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. Thornback ray (*Raja clavata*) in divisions 7.a and 7.f–g (Irish Sea, Bristol Channel, Celtic Sea North).

ICES. (2021). Norway lobster (Nephrops norvegicus) in Division 7.a, Functional Unit 14 (Irish Sea, East). In Report of the ICES Advisory Committee, 2021. ICES Advice 2021, nep.fu.14. [redacted]

ICES. (2022). Plaice (Pleuronectes platessa) in Division 7.a (Irish Sea). In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, ple.27.7a. [redacted]

ICES. (2022). Sole (Solea solea) in Division 7.a (Irish Sea). In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, sol.27.7a. [redacted]

Lawler, A. and Nawri, N. (2019). Assessment of scallop stock status for selected waters around the English Coast 2018/2019. Cefas Project Report for Defra, x + 91 pp.

Lawler, A. and Nawri, N. (2021). Assessment of king scallop stock status for selected waters around the English coast 2019/2020. Cefas Project Report for Defra,+ 89 pp.

Marine Management Organisation (MMO) (2016). UK sea fisheries annual statistics report 2016.

Marine Management Organisation (MMO) (2022). UK sea fisheries annual statistics report 2021. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2021 [Accessed November 2022]

Marine Management Organisation (MMO) (2023). UK sea fisheries annual statistics report 2022.

Marine Management Organisation (MMO) (2021). Vessel Monitoring System data for non-UK registered vessels for 2016 to 2019 indicating hours fishing for mobile and static vessels to a resolution of 200th of an ICES rectangle. [Accessed November 2022]

Marine Management Organisation (MMO) (2023). Vessel Monitoring System data for non-UK registered vessels for 2020 indicating hours fishing for mobile and static vessels to a resolution of 200th of an ICES rectangle. [Accessed September 2023]

Marine Management Organisation (MMO) (2023). UK sea fisheries annual statistics report 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022 [Accessed November 2023]

Marine Scotland, 2017. New controls in queen scallop fishery: summary of consultation responses. Available at https://www.gov.scot/publications/consultation-new-controls-queen-scallop-fishery-ices-divisions-via-viia-9781788511537/

MMO, 2018. Queen scallop seasonal closure. Available at https://www.gov.uk/government/publications/queen-scallop-seasonal-closure

NASH Maritime, 2022. Morecambe OWF. Vessel Traffic Survey Report.

North Western Inshore Fisheries and Conservation Authority website. https://www.nw-ifca.gov.uk/managing-sustainable-fisheries/ [Accessed August 2022].

Seafish. (2015). Basic fishing methods. A comprehensive guide to commercial fishing methods.

nima
CONSULTANTS

Appendix B - Morecambe Generation Assets: Commercial Fisheries Technical Report

Partners in UK offshore wind

MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS

Environmental Statement

Volume 4, Annex 6.1: Commercial fisheries technical report

Planning Inspectorate Reference Number: EN010136

Document Number: MRCNS-J3303-RPS-10073

Document Reference: F4.6.1

APFP Regulations: 5(2)(a)

April 2024

F01

Image of an offshore wind farm

www.morganandmona.com/morgan

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
F01	Application	RPS	Morgan Offshore Wind Ltd.	Morgan Offshore Wind Ltd.	April 2024

Prepared by:

RPS

Prepared for:

Morgan Offshore Wind Ltd.

Contents

Tables

Figures

Glossary

Term	Meaning
Beam trawl	Beam trawls consist of nets that are held open by a heavy tubular steel beam, which is towed along the seabed. Beam trawls may use tickler chains, which are attached at the front of the net and slide along the seabed to disturb species of fish within its path, encouraging them to rise up into the net behind.
Company Fisheries Liaison Officer	Primary contact for the Fishing Industry Representative (FIR) and Offshore Fisheries Liaison Officer (OFLO). Main point of contact for bp/EnBW for any commercial fisheries related queries.
Demersal trawl	Demersal trawls consist of cone-shaped nets that are towed along the seabed to target demersal fish species. The mouth of the trawl is spread and held open by a pair of adjacent trawl doors.
Dredge	Dredges consist of rigid structures that target numerous species of shellfish through towing along the seabed. Dredges typically have an open-frame mouth with a collection bag.
Fisheries Industry Representative	Primary contact point within the fishing community, provider of feedback to the Company Fisheries Liaison Officer (CFLO) and OFLO and disseminator of Project information.
Gill nets	Gill nets are nets which hang vertically in the water column which entangle fish as they swim into it.
ICES Rectangle	Defined areas used for the gridding of data. Each rectangle is 30 minute latitude by 1 degree longitude.
Inshore waters (England and Wales)	Mean High Water Springs to 12 nm offshore.
IS Boxes	IS Boxes are used to collect data for the Isle of Man Nest Forms Electronic Daily Scallop Catch Return. There are four IS Boxes per ICES Rectangle.
Kilowatt	Engine power of a fishing vessel. This is used in the calculation of fishing effort for Vessel Monitoring Systems (VMS) data, whereby the time associated with the VMS report is multiplied by the engine power of the fishing vessel. Engine power with gross tonnage determines the size of fishing license require and therefore allowable catch, discards and quotas.
Minimum Landing Size	The smallest measurement of a fish or shellfish species that can be legally sold or landed.
Offshore Fisheries Liaison Officer	Liaison between fishing vessels and clients, using local knowledge and fisheries experience to ensure offshore operations run smoothly and encourage co-operation. Provider of feedback to the CFLO and FIR.
Otter trawl	Otter trawls consist of a pair of otter boards (large rectangular boards) which holds open the mouth of a net.
Pelagic trawl	Pelagic trawls consist of nets which are used to catch fish in the water column, rather than on the seafloor.
Seine nets	Seine nets consist of a large net which is drawn together to surround and enclose a shoal of fish.
Static gear	Gear that is set to catch fish or shellfish. This is a collective term and includes gears such as pots, traps and set nets.

Acronyms

Acronym	Description
AIS	Automatic Identification System
ANIFPO	Anglo-North Irish Fish Producers
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CFLO	Company Fisheries Liaison Officer
CFP	Common Fisheries Policy
DECC	Department of Energy and Climate Change
DEFA	Department of Environment, Food and Agriculture (IoM Government)
EIA	Environmental Impact Assessment
EU	European Union
EU STECF	European Union Scientific, Technical and Economic Committee for Fisheries
FIR	Fisheries Industry Representative
ICES	International Council for the Exploration of the Sea
IoM	Isle of Man
IVMS	Inshore Vessel Monitoring Systems
ISEFPO	Irish South & East Fish Producers Organisation
MFPO	Manx Fish Producers Organisation
MLS	Minimum Landing Size
MMO	Marine Management Organisation
MSAR	Monthly Shellfish Activity Report
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NRW	Natural Resource Wales
NWWAC	North Western Waters Advisory Council
OFLO	Offshore Fisheries Liaison Officer
PEIR	Preliminary Environmental Information Report
SFF	Scottish Fishermen's Federation
SWFPA	The Scottish White Fish Producers Association Ltd
TAC	Total Allowable Catch
UK	United Kingdom
VMS	Vessel Monitoring Systems
WCSP	West Coast Sea Products Ltd
WFA	Welsh Fishermen’s Association
WFC	Whitehaven Fishermen’s Cooperative
WFPO	Western Fish Producers Organisation

Acronym	Description
WG	Welsh Government
WGSCALLOP	The ICES Scallop Assessment Working Group

Units

Unit	Description
£	Pound sterling
ft	Foot (unit)
km	Kilometre
knots	Knots (nautical mile per hour)
kW	Kilowatt (power)
kW/day	Kilowatt days
kWh	Kilowatt hours
m	Meters
nm	Nautical miles (distance; 1 nm = 1.852 km)
t	Tonnes

1 Commercial fisheries technical report

1.1 Introduction

1.1.1.1 This Morgan Offshore Wind Project: Generation Assets (hereafter referred to as the Morgan Generation Assets) commercial fisheries technical report provides a detailed description of commercial fishing activity within the area of the proposed Morgan Generation Assets and the wider, east Irish Sea region. The information within this technical report has been used to inform the Environmental Impact Assessment (EIA). The Morgan Generation Assets is described in detail in Volume 1, Chapter 3: Project description of the Environmental Statement.

1.1.1.2 This technical report has been produced by MarineSpace Ltd on behalf of RPS, the lead EIA consultant for the Morgan Generation Assets by bp/EnBW (hereafter referred to as the Applicant). MarineSpace also provides the role of Company Fisheries Liaison Officer (CFLO) on behalf of the Applicant.

1.1.1.3 This technical report has the following objective:

- To provide a baseline for commercial fishing activity in relation to the Morgan Generation Assets, and wider east Irish Sea region, through a review of official datasets; additional information and knowledge obtained through consultation with fisheries groups; and site-specific surveys.

1.1.1.4 This technical report should be read in conjunction with the following:

- Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement and Volume 4, Annex 3.1: Fish and shellfish ecology technical report of the Environmental Statement
- Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement and Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement
- Volume 2, Chapter 9: Other sea users of the Environmental Statement.

1.1.1.5 Recreational rod and line fishermen, as well as charter-angling operators, are also active in the region, more details can be found in Volume 2, Chapter 9: Other sea users of the Environmental Statement.

1.2 Study area

1.2.1.1 The Morgan Generation Assets is located within the International Council for the Exploration of the Sea (ICES) Division VIIa (Irish Sea) statistical area, which is divided into statistical rectangles for the purpose of recording fisheries landings. The Morgan Array Area is located within ICES Rectangle 36E5, 36E6, 37E5 and 37E6 (illustrated on Figure 1.1 below).

1.2.1.2 A broad Morgan Generation Assets commercial fisheries study area has been defined for the purposes of this technical report, to provide a wider regional context to the current fisheries activity and to ensure that potential effects (e.g. displacement of fishing vessels) from the Morgan Generation Assets on commercial fisheries are fully assessed. Therefore, for the purposes of this technical report, the commercial fisheries study area is defined as ICES Rectangles 36E5, 36E6, 37E5 and 37E6.

1.2.1.3 The Morgan Array Area is located wholly within English waters (see Figure 1.1).

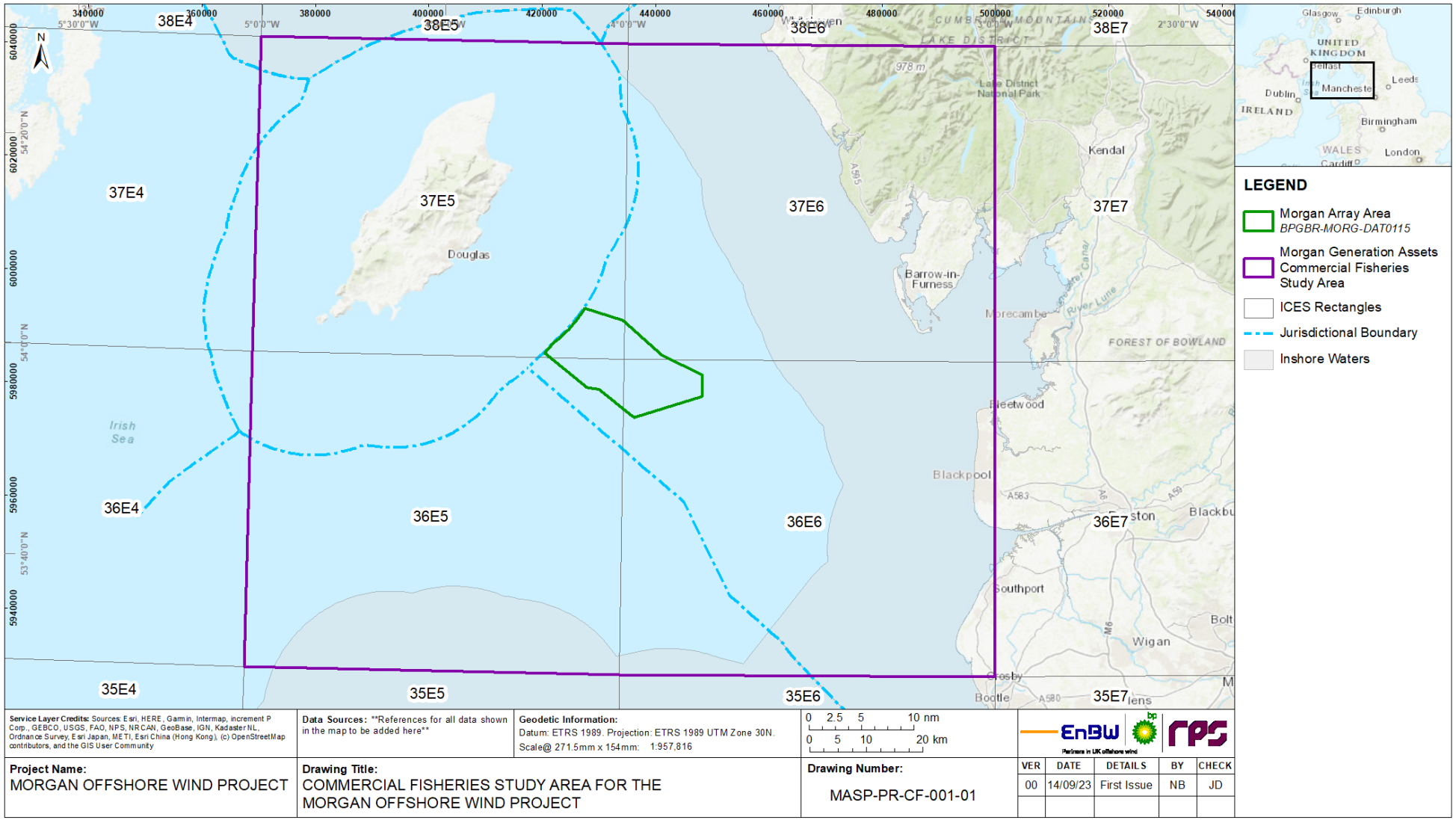


Figure 1.1: The commercial fisheries study area for Morgan Generation Assets.

1.3 Methodology

1.3.1.1 To characterise commercial fishing activity in the Morgan Generation Assets commercial fisheries study area, a range of data sources were collated and reviewed, in addition to feedback from project-specific consultation and site-specific surveys.

1.3.1 Official data sources

1.3.1.1 Information on commercial fisheries within the commercial fisheries study area was collected through a detailed desktop review of existing studies and official datasets, as listed in Table 1.1.

1.3.1.2 To account for trends and seasonal variations in vessel landings and effort, where possible, data has been collated for a 10-year period, as consultation feedback has indicated that the scallop fisheries operating in the vicinity of the Morgan Generation Assets are cyclical, over periods of seven to eight years. The most recently available datasets have been collated from the various sources where possible.

1.3.1.3 There are a range of different limitations and assumptions associated with the data, as summarised in Table 1.1. A confidence level has been assigned to each dataset, informed by the assessment team's expert judgment and based on the various data limitations (e.g. age of dataset, spatial resolution and size of vessels included). Care has been taken when interpreting the data, particularly those with lower confidence levels. Feedback from consultation (discussed further in section 1.3.1 and summarised in Table 1.2) has been used to supplement the official datasets, particularly where there are recognised data limitations.

1.3.1.4 It is also important to note that all the values presented by the official data sources relate to value of landings (i.e. first-sale value at the quayside). Additional value (estimated at up to 60% of landed value) is added to many fish products, especially shellfish such as scallop, crab and lobster, via onshore processing. The onshore processing sector is reliant on the fish products represented in the official data sources and supports a large number of jobs.

Table 1.1: Summary of key official data sources.

Title	Source	Year	Confidence level and limitations
Landing statistics by ICES Rectangle for UK and Isle of Man vessels (all vessel sizes).	Marine Management Organisation (MMO)	2012 to 2022	• High confidence • Finest available level of spatial resolution is by ICES Rectangle • Duplication of species under different common names and grouping at higher taxonomic levels.
Landings statistics by port (all vessel sizes).	MMO	2012 to 2022	• High confidence • Vessels ≤10 m are not required to complete logbooks, so may be under- represented within the data.

Title	Source	Year	Confidence level and limitations
Landings statistics by ICES Rectangle for European Union (EU) vessels (all vessel sizes).	European Union Scientific, Technical and Economic Committee for Fisheries (EU STECF)	2006 to 2016	• Medium confidence • Finest available level of spatial resolution is by ICES Rectangle • Data is provided by Member States - variable levels of confidence • Lack of recent landings data • Vessels ≤10 m are not required to complete logbooks, so may be under- represented within the data • Duplication of species under different common names and grouping at higher taxonomic levels.
Vessel Monitoring Systems (VMS) data for UK and Isle of Man vessels (≥15 m).	MMO	2009 to 2020	• Medium confidence • Finest available level of spatial resolution is by ICES sub-rectangle • Uncertainty in exact position of fishing footprint due to resolution • Processing of the VMS data obtains a proxy of effort based on time, position, and a certain speed. However, vessel speed is not 100% accurate as an indicator of fishing activity, since it does not identify whether fishing is occurring or not • Vessels <15 m are not included within the dataset.
VMS data for European[1] mobile bottom contacting gear vessels (>12 m).	ICES, 2020	2009 to 2020	• Medium confidence • Finest available level of spatial resolution is by ICES sub-rectangle • Uncertainty in exact position of fishing footprint • Processing of the VMS data obtains a proxy of effort based on time, position, and a certain speed. However, vessel speed is not 100% accurate as an indicator of fishing activity since it does not identify whether fishing is occurring or not • Vessels <12 m are not included within the dataset • Data only for mobile bottom contacting gears • Data is provided by Member States - variable levels of confidence • Not inclusive of vessels from the Isle of Man.
UK Inshore Fishing Intensity.	Centre for Environment, Fisheries and Aquaculture Science (CEFAS)	2010 to 2012	• Low level of confidence – based on surveillance and sightings data, so areas which were visited less often would result in lower confidence • Data outdated • Only vessels <15 m included.

[1] This dataset was collated prior to the UK's withdrawal from the EU, so includes data from UK vessels.

Title	Source	Year	Confidence level and limitations
ICES scallop assessment working group.	ICES	2012-2019	• Low-medium confidence • Data sources used by the scallop working group: – VMS data for vessels from England, Wales Scotland, Isle of Man, Guernsey and Jersey from 2009 to 2017 – VMS data for vessels from Northern Ireland from 2012 to 2016 – VMS data for vessels from Ireland for 2012 to 2019 • Polygon data based on VMS data, so activity from vessels <12 m may not be included • Preliminary maps, pending verification by the working group • Towards the periphery of the polygons there may be limited fishing intensity • Some of the defined polygons may have areas within them with zero or low VMS data which is not displayed.
Isle of Man pot hauls	Isle of Man Government, Department of Environment, Food and Agriculture (DEFA), 2023	2010 to 2021	• Medium confidence • Data has a limited spatial extent and limited resolution.
Isle of Man swept area	Isle of Man Government, Department of Environment, Food and Agriculture (DEFA), 2023	2017 to 2023	• Medium confidence • Based on EU VMS data merged with NestForms data • Data has a limited spatial extent.

1.3.2 Informal consultation

1.3.2.1 In addition to the review of official data and relevant studies, informal consultation has been undertaken with key local and regional fisheries stakeholders since June 2021 and will continue beyond the Application submission and throughout the development and implementation of the Fisheries Liaison and Co-existence Plan. This consultation has been arranged by MarineSpace, in its role as CFLO, assisted by the appointed Fisheries Industry Representative (FIR) for the Morgan Generation Assets.

1.3.2.2 A summary of the key matters raised during consultation activities undertaken to date, specific to commercial fisheries, is presented in Table 1.2.

1.3.2.3 Outputs from these consultations that have taken place over the consenting phase have been used to develop further understanding of existing fishing activity in the region and are captured throughout this document, ensuring that all relevant information from fisheries stakeholders is presented within the EIA.

1.3.2.4 Table 1.2 also includes Scoping Opinion responses and Section 42 (S42) consultation responses on the Morgan Generation Assets Preliminary Environmental Information Report (PEIR) which are relevant to the commercial fisheries baseline. Responses to the topics raised and how these have been addressed and incorporated are outlined in Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement.

Table 1.2: Summary of key consultation topics raised during consultation activities undertaken for the Morgan Generation Assets relevant to commercial fisheries.

Date	Consultee and purpose of consultation	Topics raised
June 2021	Individual fishers from Fleetwood and Maryport; Irish South and East Fish Producers Organisation (ISEFPO); Manx Fish Producers Organisation (MFPO); National Federation of Fisherman's Organisations (NFFO); Welsh Fishermen's Association (WFA); Western Fish Producers Organisation (WFPO); and Whitehaven Fishermen's Cooperative (WFC). Introductory meeting to introduce the Morgan Generation Assets team, provide fisheries stakeholders with an overview of the Morgan Generation Assets, outline the 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Queries regarding spacing arrangements of infrastructure and co-existence during the operations and maintenance phase. Scallop vessels would require greater spacing of wind turbines • Queries regarding cumulative and in-combination impacts with other activities and developments in the region • Queries regarding impacts on fish stocks • Long-term datasets should be used where possible, particularly due to the dynamic nature of queen scallop beds • There are seven Irish scallop vessels that are normally active in the area mid-winter to spring.
June 2021	Scottish Fishermen's Federation (SFF); Scottish White Fish Producers Association (SWFPA); and West Coast Sea Products Ltd (WCSP). Introductory meeting to introduce the Morgan Generation Assets team, provide fisheries stakeholders with an overview of the Morgan Generation Assets, outline 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Lease areas (particularly in the west of the lease area) are in key queen scallop grounds and also an important area for king scallop • Discussed existing scallop closures in Irish Sea • Queries regarding spacing arrangements of infrastructure and co-existence during the operations and maintenance phase. Scallop vessels would require greater spacing of wind turbines.
July 2021	Anglo North Irish Fish Producers Organisation (ANIFPO); Northern Ireland Fish Producers' Organisation (NIFPO); and Rederscentrale. Introductory meeting to introduce the Morgan Generation Assets team, provide fisheries stakeholders with an overview of the Morgan Generation Assets, outline the 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Queries regarding spacing arrangements of infrastructure and co-existence during the operations and maintenance phase. Belgian vessels would not fish between wind turbines, so preference for closer spacing to minimise overall area of sea affected by the Morgan Generation Assets • Queries regarding cumulative and in-combination impacts with other activities and developments • Queries regarding impacts on fish stocks • Queries regarding timing of surveys due to herring spawning – request to avoid seismic activity and grab sampling during spawning period • Belgian vessels active in the east parts of the lease areas during winter months.

Date	Consultee and purpose of consultation	Topics raised
July 2021	ANIFPO Email correspondence, following introductory meeting, to discuss the 2021 offshore survey programme.	• Douglas Bank herring closure 21 September to 15 November to protect spawning period. Requested benthic sampling to be completed before the spawning period and geotechnical work to avoid if possible.
July 2021	NFFO Introductory meeting to introduce the Morgan Generation Assets team, provide fisheries stakeholders with an overview of the Morgan Generation Assets, outline the 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Discussion over practicalities of a Regional Fisheries Working Group • Queries regarding spacing arrangements of infrastructure and co-existence during the operations and maintenance phases • Emphasised the importance of early engagement with the fishing industry • Queries regarding cumulative and in-combination impacts with other activities and developments.
December 2021	WCSP Email correspondence regarding value of the fishery.	• Rely on a proportion of the Morgan Array Area for catching queen scallop • West areas of lease areas are more important fishing grounds, but east areas are important for spawning • Queen scallop recruitment is cyclical over seven to eight year periods, so assessments should consider longer-term view, (e.g. major stock biomass during 2010 to 2014) • WCSP vessels typically tow north to south with the tide • Six active vessels, 40 fishers and 100 (onshore) factory staff • Four other queen scallop processors (with multiple vessels) have fished within the area over the last 10 years.
January 2022	WFPO Email correspondence regarding value of the fishery.	• One beam trawl vessel from the WFPO fishes in the commercial fisheries study area during Q1 and Q2 • One whelk vessel fishes in the commercial fisheries study area during Q3 and Q4.
February 2022	Individual fishers from Fleetwood and Maryport; and ISEFPO. Meeting to update on the Morgan Generation Assets 2022 offshore survey programme, PEIR programme and outline of datasets to inform the PEIR.	• Value of cross-referencing official datasets with feedback from consultation • Discussions regarding survey coordination and working around fishing vessels.
February 2022	MFPO, NFFO and WFC. Meeting to update on the Morgan Generation Assets 2022 offshore survey programme, PEIR programme and outline of datasets to inform the PEIR.	• Queries regarding the interconnectivity of scallop stocks in the region and potential impacts • Discussion regarding inter-array cable layout (and burial depth) to allow scallop fishing during operations and maintenance phase.
February 2022	ANIFPO, Rederscentrale and WFPO. Meeting to update on the Morgan Generation Assets 2022 offshore survey programme, PEIR programme and outline of datasets to inform the PEIR.	• Queries regarding cumulative and in-combination impacts with other activities and developments • Queries regarding impacts on fish stocks • Queries regarding VMS data not capturing smaller vessels.

Date	Consultee and purpose of consultation	Topics raised
February 2022	SFF, SWFPA and WCSP. Meeting to update on the Morgan Generation Assets 2022 offshore survey programme, PEIR programme and outline of datasets to inform the PEIR.	• Discussion regarding location of offshore substation to cause least disruption to fisheries • Queries regarding VMS and Automatic Identification Systems (AIS) data not capturing smaller vessels • To minimise the impacts on queen scallop grounds, wind turbines should be micro-sited • Importance of the queen scallop grounds, particularly in the northwest part of the Morgan Array Area • Dogger Bank offshore wind farm is an example of where wind turbine spacing and inter-array cable layout facilitates coexistence • Uncertainties regarding gear penetration depths.
February 2022	Individual charter boat skippers. Email correspondence requesting update on project.	• Requested to be added to future fisheries stakeholder meetings.
April 2022	SFF, SWFPA and WCSP. Response to the Morgan Generation Assets questionnaire on array layout/fisheries co-existence.	• Information on spatial extent of fishing activity, spacing arrangements of infrastructure and cable burial.
April 2022	Rederscentrale Response to the Morgan Generation Assets questionnaire on array layout/fisheries coexistence.	• Information on spatial extent of fishing activity, spacing arrangements of infrastructure and cable burial.
May 2022	MFPO Response to the Morgan Generation Assets questionnaire on array layout/fisheries coexistence.	• Information on spatial extent of fishing activity, spacing arrangements of infrastructure and cable burial.
June 2022	The Planning Inspectorate Scoping opinion.	• Advice on matters to be scoped into the EIA • Assessment of underwater sound and indirect impacts on commercial fisheries • Assessment of the risk of introduction and spread of invasive non-native species and potential impacts on commercial fisheries.
June 2022	Marine Management Organisation (Marine Licensing) Scoping opinion	• Advice on matters to be scoped into the EIA.
November 2022	Individual static gear operator from Fleetwood Consultation meeting.	• Queries regarding noise impacts on whelk • Queries regarding spacing arrangements of infrastructure and potential for co-existence during the operations and maintenance phase. Static gear vessels lay gear in a north – south alignment within the Morgan Array Area. Preference for equally spaced wind turbines in rows and as far apart as possible.
November 2022	SFF, SWFPA and WCSP. Consultation meeting.	• Discussions regarding spacing arrangements of infrastructure and potential for co-existence during the operations and maintenance phase. Noted higher density

Date	Consultee and purpose of consultation	Topics raised
		queen scallop ground in the southwest part of the Morgan Array Area • Discussion regarding arrangement of inter-array cable and burial depth to allow scallop fishing during operations and maintenance phase. Gear penetration can vary between 0.05 to 0.25 m • Queries regarding impacts on scallop stocks as a result of changes to tidal flow from the installation of wind turbines.
November 2022	MFPO Consultation meeting.	• Queries regarding spacing arrangements of infrastructure and potential for co-existence during the operations and maintenance phase. Noted that the Manx fishing vessels only use approximately 100 ft of cable, so are able to fish between wind turbines • Discussion regarding arrangement of inter-array cable layout and burial depth to allow scallop fishing during operations and maintenance phase • Queries regarding impacts on scallop stocks as a result of construction and changes to tidal flow from the wind turbines and foundations.
November 2022	Rederscentrale Consultation meeting.	• Queries regarding spacing arrangements of infrastructure and potential for co-existence during the operations and maintenance phase. Noted that fishing between wind turbines of 1 km is difficult due to safety reasons. Noted that Rederscentrale vessels do not fish within the Morgan Array Area; their fishing activity is mostly to the east of the Morgan Array Area • Discussion regarding arrangement of inter-array cable layout and burial depth. Noted that Rederscentrale's beam trawl vessels that operate within the Irish Sea are using a newer gear technology which does not penetrate as deep into the seabed.
November 2022	ANIFPO, NIFPO, WFA Consultation meeting.	• Queries regarding spacing arrangements of infrastructure and potential for co-existence during the operations and maintenance phase. Orientation of wind turbines in a north to south alignment would be preferable • Queries regarding timings of surveys to minimise impacts on fish stocks • Concerns that VMS data does not capture smaller vessels.
November 2022	ISEFPO Consultation meeting.	• Queries regarding spacing arrangements of infrastructure and potential for co-existence during the operations and maintenance phase • Discussion regarding arrangement of inter-array cable and burial depth and queries regarding snagging risk.
November 2022	Individual fishing operators from Conwy Consultation meeting	• Queries regarding co-existence during the operations and maintenance phase, particularly related to the offshore cable corridor, due to the areas of fishing activity • Discussion regarding spatial squeeze on fishing vessels due to changes in ferry routes as a result of the Morgan Array Area • Queries regarding impacts on fish stocks.

Date	Consultee and purpose of consultation	Topics raised
December 2022	SFF, SWFPA and WCSP. Consultation meeting.	• Discussions regarding spacing arrangements of infrastructure and potential for co-existence. Preference for packed boundary to avoid turbines in queen scallop area, in the central part of the Morgan Array Area • Queries regarding how the turbines will affect the physical processes in the water column and subsequent impacts on fish stocks.
May 2023	Individual fisher from Lytham Public consultation meetings.	• Group of five fishermen in Lytham • Fish for mussels and flat fish from the sea wall at Lytham • Queries regarding impacts on fish stocks during construction.
June 2023	SFF, SWFPA and WCSP S42 Responses (responses received have been grouped here due to similar themes)	• Potential co-existence options: position of turbines and inter-array cables away from tows; north to south routing of inter-array cables; tightly packed turbines around array boundary and fewer larger turbines within the array; cable protection material to be similar to the seabed substrate; phased approach to construction and avoiding queen scallop fishing area • Advised that rock dumping over the cable array layout would be detrimental to the Queen Scallop habitat and would be a challenge to tow Queen Scallop gear. Commented that the backfilling of trenches/cables in this area is restored of sandy/gravelly substrate.
June 2023	Isle of Man (IoM) Government S42 Response	• Commented that not all datasets include vessels <12 m in length, particularly IoM vessels, and noted importance of capturing fishing activity for this group. All IoM mobile gear vessels have VMS fitted. Data for IoM vessels could be obtained from various sources, including IoM Government, MFPO or Manx fishermen directly. Provided examples of data that could be requested from DEFA • While it is not expected to be comprehensive, restricted data presentation should be more thoroughly explained if the reports are to be considered reasonably representative and provide comfort of due consideration • Four-year baseline is not sufficient to assess fisheries given the disruption between 2019 to 2022 resulting from Brexit, Covid-19 and the fuel/energy crisis • Correction to the number of scallop vessels registered in IoM and the number of vessels licenced to fish for scallops in IoM waters (including UK) • Asked for clarification of which datasets include Isle of Man vessels • Commented that data presented doesn't give context for the wider queen scallop fishery areas • Advised for the inclusion of the Isle of Man Offshore Wind Farm and Crogga O&G development in the cumulative impact assessment • Noted that an estimated economic loss to businesses of 5-20% is considered as low magnitude and no mitigation suggested • Suggested that downstream economic multipliers (Type I and Type II) are incorporated into the assessment of impacts

Date	Consultee and purpose of consultation	Topics raised
		on fishing activity, using peer-reviewed economic multiplier analysis where possible, in order to capture to full economic impact. Seafish has done work in this area • Given the inter-array minimum burial depth of 0.5 m and potential for seabed cable protection, it was queried how likely is it that benthic dredging will practically continue within the Morgan Array Area and if monitoring of fishing patters during and post-constriction will be undertaken • Queried what the expected outcome is if monitoring shows a change.
June 2023	Natural England	• Natural England advises that the potential impacts of the Morgan Generation Assets cannot be considered in isolation from its transmission assets.
June 2023	NFFO and WFA S42 Responses	• The PEIR chapter characterised the commercial fishing industry well and effort has been made to describe the fisheries using a variety of sources. Raised some remaining issues with how these data have been interpreted and used to assess the impacts to the diverse fishing fleets that are the current users of the area • Noted spatial squeeze on fisheries in east Irish Sea due to other projects and restrictions on mobile gear within Marine Conservation Zones. Also noted the factors associated with the re-negotiation of the Trade and Cooperation Agreement which will affect fishing opportunities in the region • Noted that an estimated economic loss to businesses of 5-20 % is considered as low magnitude and no mitigation suggested • Whilst there is a commitment to follow FLOWW Guidelines (2014) for liaison and disruption agreements, these are under review, and we would like to see this acknowledged and a commitment made to follow the most up to date guidelines • Queried what are the protocols to be followed are if an effect is observed during monitoring.
June 2023	NIFPO S42 Responses	• Concerns regarding underwater sound impacts to spawning herring and crustaceans • The NIFPO does not considered that the development of a Fisheries Liaison and Co-existence Plan will provide assurances over negligible or minor adverse impacts to commercial fisheries • Queried what additional mitigation is proposed • Queried if displacement to commercial fisheries is only assessed during the construction phase.
June 2023	Mooir Vannin Offshore Wind Limited S42 Responses	• The Mooir Vannin Offshore Windfarm should be screened in to the CEA.
June 2023	Barrow Offshore Windfarm S42 Responses	• Registered their interest in the Morgan Generation Assets and noted any interactions with the Barrow Offshore Windfarm should be noted.

Date	Consultee and purpose of consultation	Topics raised
June 2023	West of Duddon Sands Windfarm S42 Responses (summarised)	• Registered their interest in the Morgan Generation Assets and noted any interactions with the West of Duddon Sands Windfarm should be noted.
June 2023	Individual fishing operator from Lytham S42 Responses (summarised)	• Group of 5 fishermen in Lytham • Fish for mussels and flat fish from the sea wall at Lytham • Queries regarding impacts on stocks during construction.
September 2023	SWFPA and WCSP (SFF invited but did not attend). Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Queries regarding cable laying and if there will be large areas of closure, due to cables being laid down and being buried later • Queries regarding rock protection particularly in an area free of surface infrastructure and the potential impact this would have on the key scallop area within the Morgan Array Area • Noted preference of no cables across an area free of surface infrastructure.
September 2023	TN Trawlers. Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Regarding cable burial depth and fishing gear penetration depth, noted that scallop fishing gear tooth bars are 9-10 inches long • Price of steel has increased costs on gear requirements and maintenance, as well as price of fuel • Noted no major concerns with information presented.
September 2023	MFPO and IoM Government. Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Raised that the proposed construction approach of rolling construction zones around installation vessels may still have potential impacts due to tow directions, wind conditions, tides, etc • Noted that there are seasonal closures within the Isle of Man Territorial Sea for both king and queen scallop to protect spawning periods. King scallop: from 01 June to 31 October; and queen scallop from 01 April to 30 June. A curfew also exists within the Isle of Man Territorial Sea, with fishing for king scallop prohibited between 18:00 and 06:00 • Noted that Brexit has affected costs rather than markets. Peruvian queen scallop market is a factor in prices • Noted that queen scallop vessels fish with nets (not dredgers) and lighter gear, and so are less likely to be impacted than scallop fishers with heavier gear.
September 2023	Rederscentrale. Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Queries raised regarding rock protection in areas where the minimum burial depth of cable has not been achieved within the Morgan Array Area • Confirmed that 90% of the Belgian fleet active within the Morgan Generation Assets commercial fisheries study area deploy beam trawls using SumWing technology • Confirmed that sole is the target species
September 2023	NFFO, NFFO Services, Whitehaven Fishermen's Cooperative, P&M Fishing and the MMO. Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Noted that the rolling construction zones around installation vessels is a step in the correct direction. However, raised a concern to the level of liaison needed for this approach to construction, which needs to be reflected in the Fisheries liaison and co-existence plan • Queries raised regarding displacement through cumulative development within the Irish Sea.

Date	Consultee and purpose of consultation	Topics raised
September 2023	Seafish and individual fishing operators from Blackpool. Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Queries regarding cable burial and the potential for a snagging risk • Queried the type of scour protection being considered and raised that limestone may be incompatible with mussel settlement.
September 2023	Individual fishing operators from Conwy Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Queries raised regarding displacement and spatial squeeze as a result of other projects within the Irish Sea • Noted that prices of production have increased which has an impact on the price of shellfish • Raised a concern regarding noise impacts on fish species and stock.
October 2023	ISEFPO Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Queries raised regarding cable burial, rock protection and the potential for a snagging risk • Agreed to provide additional information on scallop grounds fished by Irish vessels.
October 2023	ANIFPO Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Queries raised in reference to a windfarm off Blackpool, where ANIFPO members were told that they were no longer allowed to fish within the array area • Queries raised regarding the cumulative impact on fisherman, potential displacement and any potential future policy changes that could prevent fishing within the array area. Potential that this could lead to displacement of fishing activity into more confined areas • Queries raised regarding the impact of windfarms on fish species and stocks. Species disappearing from site where they used to be prolific, queries raised of potential impact.
October 2023	NIFPO Consultation meeting – S42 response discussion and update on spacing arrangements of infrastructure.	• Queried whether there is differentiation between dredge or net fishing methods for queen scallop, highlighting that the effects would be different for each.

1.3.3 Site-specific surveys

1.3.3.1 A summary of the surveys used to inform the commercial fisheries baseline is outlined in Table 1.3. A confidence level has been assigned to each dataset, informed by expert judgment and based on the various data limitations (e.g., age of dataset, spatial resolution and size of vessels included); this is described below for each dataset. Care has been taken when interpreting the data, particularly those with lower confidence levels.

1.3.3.2 NASH Maritime was commissioned to undertake two project-specific 14 day marine traffic surveys of the Morgan Array Area, in November 2021 to December 2021 and June 2022 to July 2022 to inform the Navigation Risk Assessment being undertaken as part of wider EIA studies. In addition to visual records collected via these surveys, AIS and radar data was also collected from the same time periods to supplement the

visual observations. AIS data included information on date, average speed, destination, ship name, ship category, length and draft. Radar data included information on vessel type and date. Although this data was collated during different seasons to account for seasonal variation and peak times in marine traffic and fishing activity, it is limited by the short time period captured. Therefore, it has only been used to supplement the official datasets and feedback from consultation with fisheries stakeholders. Data has been assessed with medium confidence.

1.3.3.3 Additional 14 day marine traffic surveys were undertaken by NASH Maritime in May 2023, August 2023 and November 2023, to address concerns raised by shipping and navigation stakeholders. Although the August 2023 survey was undertaken as part of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets and fishing activity was not observed to overlap with the Morgan Array Area during the survey period (03 to 17 August 2023), it has been discussed in this technical report to provide context to fishing activity to the area around the Morgan Generation Assets (section 1.4.9).

1.3.3.4 The 2023 vessel traffic surveys listed in Table 1.3 were undertaken to gather data on interactions between ferry operators and fishing vessels in the area between the Morgan Array Area and the Isle of Man. The data from this survey has been presented in this technical report to provide context to more recent fishing activity within and in proximity to the Morgan Array Area. This data, however, is limited by the short time period captured and has only been used to supplement the official datasets and feedback from consultation with fisheries stakeholders. This data has been assessed with medium confidence.

1.3.3.5 An Offshore Fisheries Liaison Officer (OFLO) was present on the offshore geophysical, environmental and geotechnical survey vessels during the 2021 and 2022 survey operations. During 2021, only the Morgan Array Area, plus a 3 km buffer, was surveyed. During the 2022 surveys, the Morgan Array Area (plus a buffer of varying distances) was surveyed. The OFLO provided a Daily Progress Report with information on the presence of any fishing vessels, fishing vessel type, location of vessel, name of vessel and whether the vessels were transiting or not. This data is only provided as point data, so does not show individual fishing vessel tracks. This data is also limited by the time period captured and the limited areas captured, so has been used to supplement other datasets. This data has been assessed with medium confidence.

1.3.3.6 Locations of static gear were also recorded by the OFLO which have been used to inform the EIA, particularly as static gear vessels are generally not captured within the VMS data due to their size. Exact locations of static gear have not been displayed within this technical report, due to commercial sensitivities. Data has been assessed with low-medium confidence.

1.3.3.7 During the 2022 surveys, where an OFLO was unable to be present on a survey vessel, MarineSpace undertook daily remote fisheries monitoring via the www.marinetraffic.com website. These remote fisheries monitoring observations are limited to vessels which have AIS active, are limited by the time period at which the AIS was monitored and are also limited by the area of capture. MarineSpace was able to observe fishing vessel patterns and add point data which is presented in this technical report to supplement official datasets. Data has been assessed with low-medium confidence.

Table 1.3: Summary of surveys used to inform commercial fisheries.

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
OFLO observations 2021	Commercial fisheries study area plus 10 nm	OFLO onboard the survey vessel recorded observations of fishing vessels and fishing gear present.	NFFO	30 June to 18 September 2021	Refer to Figure 1.66
Winter vessel traffic survey 2021	Morgan Array Area plus 10 nm	AIS and radar.	NASH Maritime	21 November to 04 December 2021	Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement; Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement Section 1.4.9.
Summer vessel traffic survey 2022	Morgan Array Area plus 10 nm	AIS and radar.	NASH Maritime	15 July to 29 July 2022	Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement; Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement Section 1.4.9.
OFLO observations 2022	Commercial fisheries study area plus 10 nm	OFLO onboard the survey vessel recorded observations of fishing vessels and fishing gear present.	NFFO	01 April to 10 July 2022	Section 1.4.9.
MarineSpace observations 2022	Commercial fisheries study area plus 10 nm	Fisheries monitoring using AIS data (via www.marinetraffic.com).	MarineSpace	10 July to 30 November 2022	Section 1.4.9.

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Spring vessel traffic survey 2023	Morgan Array Area plus 10 nm	AIS and radar.	NASH Maritime	04 May to 18 May 2023	Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement; Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement. Section 1.4.9.
Summer vessel traffic survey 2023	Morgan and Morecambe Offshore Wind Farms: Transmission Assets	AIS and radar.	NASH Maritime	03 August to 17 August 2023	Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement; Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement Section 1.4.9.
Morgan Generation Assets top up vessel traffic survey 2023	Morgan Array Area	AIS and radar.	NASH Maritime	11 November to 27 November 2023	Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement; Volume 4, Annex 7.1: Navigational risk assessment of the Environmental Statement Section 1.4.9.

1.4 Baseline environment

1.4.1 Regional overview

1.4.1.1 Commercial fishing in the east Irish Sea region has a wide spatial distribution and targets a number of valuable fisheries for demersal, pelagic and shellfish species. Key shellfish species include; king scallop and queen scallop which are targeted by dredges; and whelk, lobster and crab, which are targeted by pots. The most important demersal target species include bass, sole, thornback ray and plaice, which are typically caught by beam and otter trawlers. Pelagic fish landings from this area are mainly of herring and mackerel, which are predominantly caught by pelagic trawls.

1.4.1.2 Up to 31 December 2020, commercial fisheries within UK waters, including the Irish Sea region were managed through the EU Common Fisheries Policy (CFP), with fisheries of some stocks managed by the North East Atlantic Fisheries Commission and by coastal state agreements. Since the withdrawal of the UK from the EU on the 31 December 2020, the new EU-UK Trade and Cooperation Agreement stipulates that there will be a five-year transition phase, whereby 25% of the EU quota for British waters will be transferred to the UK fishing fleet. Implications on the commercial fisheries baseline are discussed further in section 1.5.

1.4.2 Overview of the commercial fisheries study area

1.4.2.1 Fishing ports in the commercial fisheries study area with the highest value (£) of landings are Fleetwood, Douglas, Peel, Port St Mary and Ramsey. Fishing vessels that are active in the Morgan Generation Assets commercial fisheries study area are also based out of a number of ports across the wider region, including Annan, Douglas, Kilkeel, Kirkcudbright, Maryport and Peel; activity from these vessels is included in this technical report. Within the commercial fisheries study area, Fleetwood had the highest value (£) of landings in England between 2009 and 2020 (MMO, 2021a). There are 16 vessels with Fleetwood as their home port, eight of which are ≤10 m and eight of which are >10 m in length (MMO, 2023b).

1.4.2.2 Within the Morgan Generation Assets commercial fisheries study area, the key commercial fishing fleets identified were:

- Dredging and trawling for king scallop and queen scallop
- Potting for whelk, crab and lobster
- Beam trawling for flatfish and other demersal finfish
- Trawling for herring
- Trawling for *Nephrops* (Norway lobster).

1.4.2.3 Other important fisheries in the region include harvesting for cockles and mussels within the shallow bays and traditional shrimp fisheries targeted by beam trawlers (Walmsley and Pawson, 2007). Harvesting for mussels within Morecambe Bay has been taking place for a number of years, and since 1992, Morecambe Bay has become one of the major sources of seed mussels within the UK.

1.4.2.4 A summary of each of the key regional fisheries is provided below.

Dredging and trawling for king scallop and queen scallop

1.4.2.5 Within the commercial fisheries study area, Isle of Man and UK registered scallop vessels from a variety of English, Welsh, Northern Irish, Scottish and Isle of Man ports are active. Vessels from the Republic of Ireland are also active in this region, targeting both species of scallop, as well as whitefish and shellfish. Dutch vessels also catch king scallop within the commercial fisheries study area. These species are primarily targeted using towed dredges and otter trawls, by vessels ranging in size from <10 m to 25 m length.

1.4.2.6 The scallop industry in the UK is one of the highest value commercial fisheries (Cappell et al., 2018) and a large proportion of landings are caught in the Irish Sea. Scallop are a non-quota species and, therefore, not subject to Total Allowable Catch (TAC) limits (excluding in Isle of Man waters), however there are technical management measures and Minimum Landings Sizes (MLS) in place. There are restrictions on the number of dredges used, which depend on the distance from the coast. Beyond 12 nm, there are no regulatory limits on the maximum number of dredges permitted to be towed behind a vessel. Instead, the number of dredges is limited by the size and engine capacity of the fishing vessels. There are also seasonal closures within the Irish Sea for both king and queen scallop to protect the spawning periods, as outlined in Table 1.4.

Table 1.4: Seasonal closures of the scallop fisheries by administration.

	King scallop closures	Area of closure	Queen scallop closures	Area of closure
England	01 June to 31 October	Irish Sea closed area	01 April to 30 June	ICES area VIIa
Isle of Man	01 June to 31 October	Isle of Man Territorial Sea	01 April to 30 June	ICES area VIIa
Wales	01 May to 31 October	Within 1 nm of the baseline and specified bays	n/a	n/a

1.4.2.7 It has been established through project-specific fisheries consultation that there are approximately 11 vessels based in Kirkcudbright, Scotland, that fish for queen and king scallop within the commercial fisheries study area: most notably for queen scallop within the Morgan Array Area. WCSP is a business based in Kirkcudbright that has six vessels, 40 fishermen and 100 factory staff. There are also Scottish scallop vessels active in the Irish Sea from Annan, and several large (14 m to 24 m) Scottish nomadic vessels (Cappell et al., 2018).

1.4.2.8 Feedback from project specific consultation has established that at the time of writing there are 55 vessels licenced to fish for king scallop in Isle of Man waters (29 of which are Isle of Man registered vessels) and 36 that can fish for queen scallops (25 of which are Isle of Man registered vessels). Due to the size and capacity of the Manx vessels, it is expected that the majority of these vessels will not fish beyond the Manx 12 nm. The majority of these vessels have a licence for both king and queen scallop. There are also multiple businesses on the Isle of Man which process scallops. More information on the spatial distribution of scallop vessels licenced to operate in Manx waters in provided in section 1.4.8.16.

1.4.2.9 A 2018 study found that in the Irish Sea, 59 vessels targeting scallop land into Northern Irish ports (Cappell et al., 2018); however, it is unlikely that all these vessels are active

within the commercial fisheries study area, particularly given that 53% of these vessels are under 12 m in length.

1.4.2.10 It has been established through project specific fisheries consultation that there are also several Irish vessels which are active in the area, predominantly between December to Spring.

1.4.2.11 Welsh vessels based in north Wales/Anglesey are also active in this region at certain times of year, transiting from scallop grounds off the Welsh coast (Cardigan Bay) to this area as/when market forces demand.

1.4.2.12 English scallopers, from as far as the southwest region (Cornwall/Devon), also fish in these areas at times, in a similar, nomadic, fashion to the Welsh vessels.

1.4.2.13 Whereas king scallop grounds are relatively extensive around the UK (WGSCALLOP 2020) the major queen scallop beds are within the Irish Sea. Queen scallop are generally found in sandy gravelly substrates, whereas king scallop can be found in rougher sediments. The biology and behaviour are different between the two species, and this is discussed further in Volume 4, Annex 3.1: Fish and shellfish ecology technical report of the Environmental Statement. Generally, queen scallop is more mobile than king scallop, which influences the gear types used to catch them, as discussed in section 1.4.6. Further information on the spatial extent of these grounds is also discussed within this technical report (sections 1.4.8 and 1.4.9).

Potting for whelk, crab and lobster

1.4.2.14 Potting for whelk, crab (brown and spider crab) and lobster occurs across the commercial fisheries study area (Walmsley and Pawson, 2007).

1.4.2.15 The whelk fishery in the Irish Sea has expanded significantly over the last two decades (Duncan and Emmerson, 2018). Whelk are landed all year around, and vessels operate across the inshore and offshore parts of the commercial fisheries study area. Highest landings in terms of weight and value are generally during the summer months, which may be, partly, due to lower scallop vessel activity as a result of seasonal closures. Whelk operators land into both English and Welsh ports. MMO landings data indicate that a vessel from Jersey, which predominantly targeted whelk, was active within the commercial fisheries study area. However, such activity was observed at a relatively low level (Figure 1.28), and landings within the commercial fisheries study area have not been observed since 2017 (MMO, 2023a).

1.4.2.16 It is evident through project specific consultation that one of the main whelk operators in the region is based out of Fleetwood and has four vessels that are active within the Morgan Array Area.

1.4.2.17 Lobster is generally caught close to the coast in rocky areas. Brown crab is caught within both inshore and offshore parts of the commercial fisheries study area.

1.4.2.18 There are no TACs or quotas for whelk, crab or lobster, however all are subject to an MLS.

Beam trawling for flatfish

1.4.2.19 The Irish Sea has been an important traditional fishing ground for beam trawl vessels for many decades (NWWAC, 2013). Flatfish, specifically sole, is the main catch for these vessels. Through project specific consultation with fisheries stakeholders, it has been established that there are several large Belgian beam trawl vessels, and one vessel from the southwest of England, that are active in the commercial fisheries area.

The grounds targeted for flatfish are generally to the east of the Morgan Array Area and are predominantly fished during the Spring period.

1.4.2.20 There are TACs in place for sole, and ICES stock assessments highlight that sole stocks have increased in size in the Irish Sea, over recent years (ICES, 2021a).

Trawling for herring

1.4.2.21 The Irish Sea herring fishery is located in the region around the Isle of Man. Herring are targeted by a mix of gear types, including mid-water trawls, pelagic trawls, and purse seine nets. Within inshore waters, gillnets may be used to catch herring. Project specific consultation with fisheries stakeholders indicated that there are at least three pelagic trawlers from Northern Ireland, and two from England, that mostly engage in the herring fishery in the commercial fisheries study area.

1.4.2.22 Following the collapse of the herring stocks in the Irish Sea during the 1980s, annual closures have been brought in to protect spawning and nursery grounds (see also Volume 4, Annex 3.1: Fish and shellfish technical report of the Environmental Statement). The Douglas Bank area (south and east of the Isle of Man) is closed between 21 September and 15 November, although gill nets are excluded from this.

1.4.2.23 Herring is subject to TACs, and ICES advice recommends a 15% increase in the TAC for 2022 (ICES, 2021b). Since Brexit, the UK has gained a greater share in the Irish Sea herring quota. Following engagement between the Isle of Man Government, MFPO and the UK Government, a new deal has been agreed that allows for commercially viable quantities of herring to be caught by Isle of Man vessels within Manx territorial waters. The Isle of Man has been allocated 100 t of annual quota for herring from 2023. The Isle of Man has also been allocated a 100 t annual quota for langoustines, from 2024. This agreement will allow the Manx fishery to diversify and become less commercially reliant upon scallop.

Trawling for *Nephrops*

1.4.2.24 The Irish Sea is an important fishing ground for Nephrops (also known as Norway lobster), particularly around the Irish and Cumbrian coast, and is targeted by a mix of both beam and otter trawls. Project-specific consultation with fisheries stakeholders indicated that while there are Nephrops fisheries within the commercial fisheries study area, none have been noted within the Morgan Array Area. The Nephrops fishery is mostly targeted by Northern Irish and Scottish vessels or local English vessels.

1.4.2.25 Nephrops are subject to TACs, based on the aggregate total tonnage of removals recommended by relevant ICES Working Groups for separate ICES Rectangles. There are byelaws which restrict the type of trawl that can be used for catching Nephrops, as well as restrictions on vessel specifications (e.g. engine size and vessel length).

1.4.3 Overview of landings

1.4.3.1 A total of 168,145 t was landed by English, Isle of Man, Northern Irish, Scottish, Welsh and Jersey vessels across the commercial fisheries study area (ICES Rectangles 36E5, 36E6, 37E5 and 37E6), between 2012 to 2022, with Scottish vessels landing the largest proportion of total weight of fish caught by UK vessels (Figure 1.2) (MMO, 2023a).

1.4.3.2 A total of 7,492 t was caught by Belgian, French, Irish and Dutch vessels across the commercial fisheries study area, between 2006 to 2016, with Irish vessels landing the

largest proportion of total weight of fish caught by non-UK vessels (Figure 1.3). The non-UK vessels were active across the commercial fisheries study area, although no nearshore activity was recorded for French vessels in rectangles 36E5, 37E5 and 37E6; and for Dutch vessels in rectangles 36E6, 37E5 and 37E6 (EU STECF, 2017).

1.4.3.3 Data assessed in this study was divided into classes, dependent on the length of the fishing vessel: ≤10 m and >10 m for the MMO data; <10 m, 10 to 15 m and >15 m for the EU STECF data. As expected, for UK and Isle of Man vessels, the largest proportion of vessels was from the >10 m class (Figure 1.2). The smaller vessels (≤10 m) were predominantly from England and Isle of Man, reflecting the closer proximity of home ports to these fleets, with relatively small recordings of landings for Scottish, Welsh and Northern Irish vessels.

1.4.3.4 As expected, no non-UK vessels <10 m were active across the commercial fisheries study area and the largest proportion of vessels was from the >15 m class (Figure 1.3). Relatively small recordings of landed weight for French, Irish and Dutch vessels of the 10 to 15 m size class were observed between 2010 and 2016.

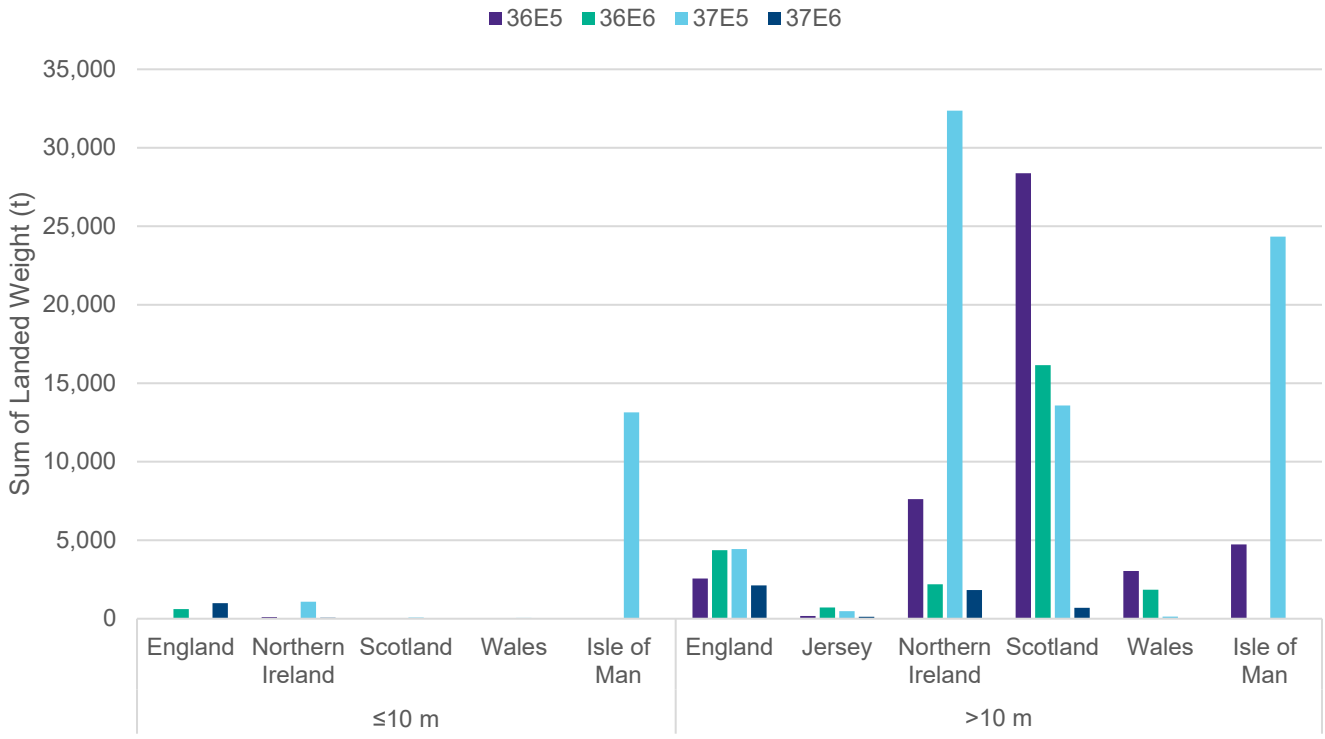


Figure 1.2: Sum of landed weight by vessel size class (2012 to 2022) within the commercial fisheries study area (UK and Isle of Man vessels)[2].

[2] MMO, 2023a

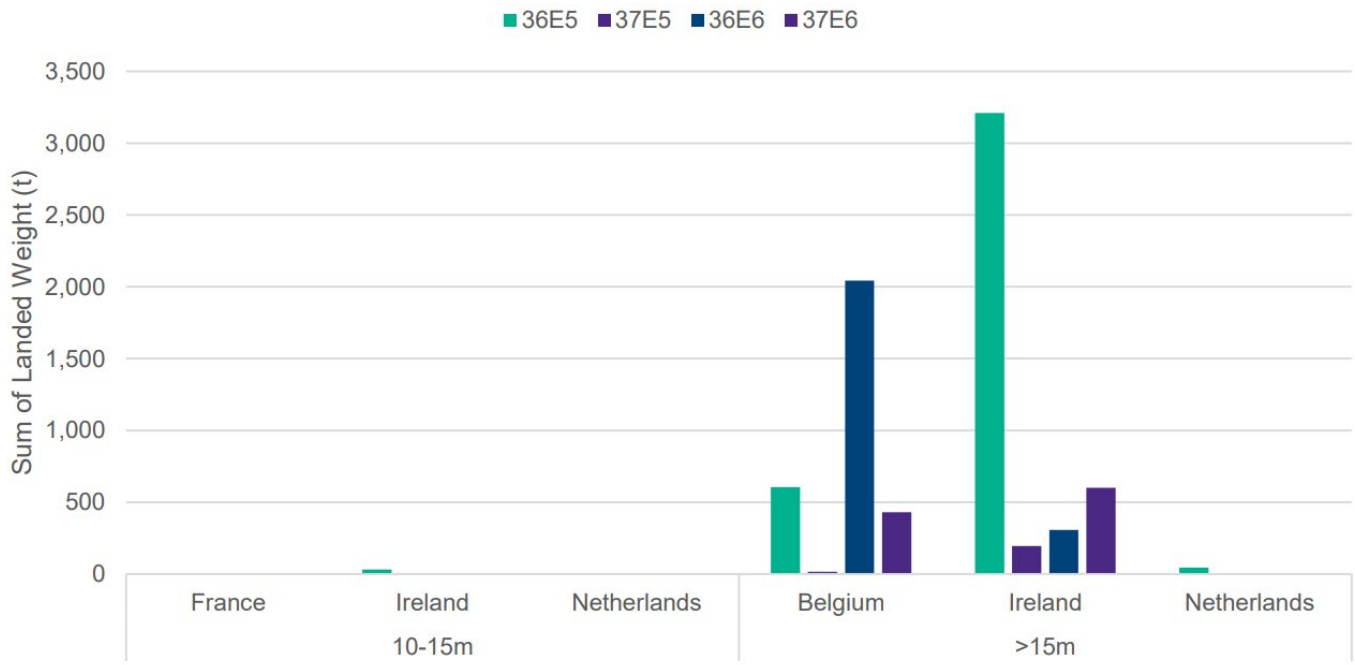


Figure 1.3: Sum of landed weight by vessel size class (2006 to 2016) within the commercial fisheries study area) (non-UK vessels)[3].

1.4.4 Temporal variation

Annual trends

1.4.4.1 The MMO data show that between 2012 to 2022, the sum of landed weight by UK and Isle of Man vessels across from the commercial fisheries study area varied from a minimum of 7,600 t in 2020 to a maximum of 25,842 t in 2012 (Figure 1.4). The sum of landed value varied from a minimum of £11,400,194 in 2020, to a maximum of £26,450,826 in 2016 (Figure 1.5).

1.4.4.2 The EU STECF data shows that between 2006 to 2016, the sum of landed weight across the commercial fisheries study area varied from a minimum of 483 t in 2014 to a maximum of 1,097 t in 2006 (Figure 1.6).

[3] EU STECF, 2017

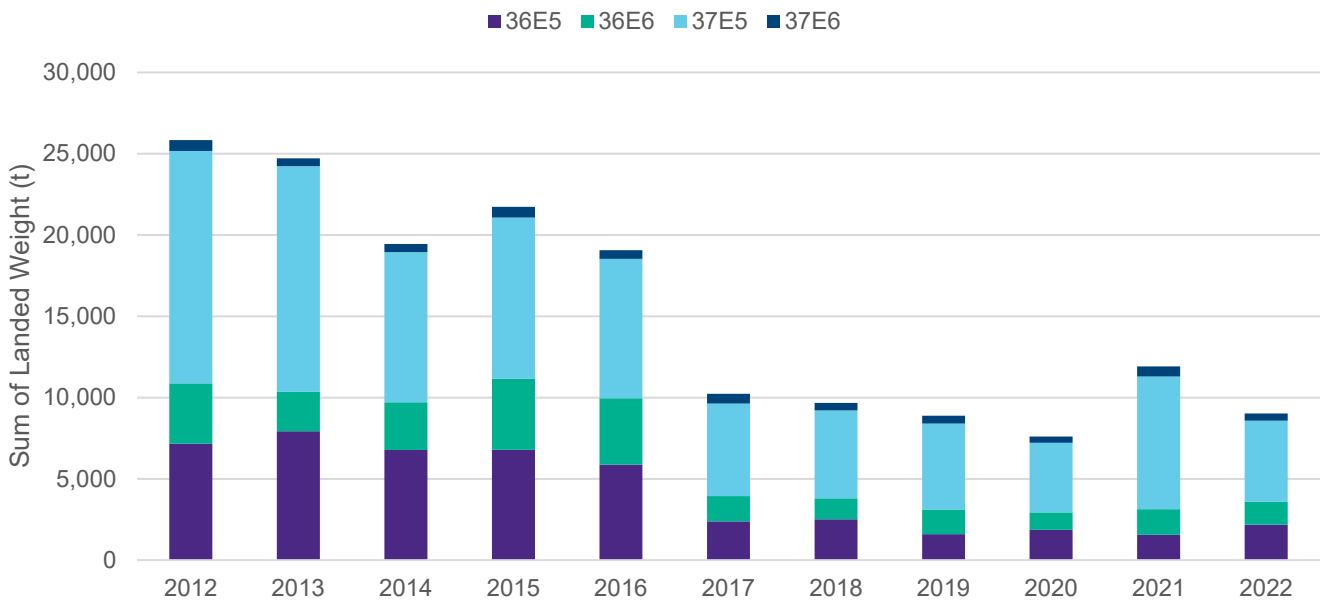


Figure 1.4: Annual trends in landings weight (2012 to 2022) within the commercial fisheries study area (UK and Isle of Man vessels)[4].

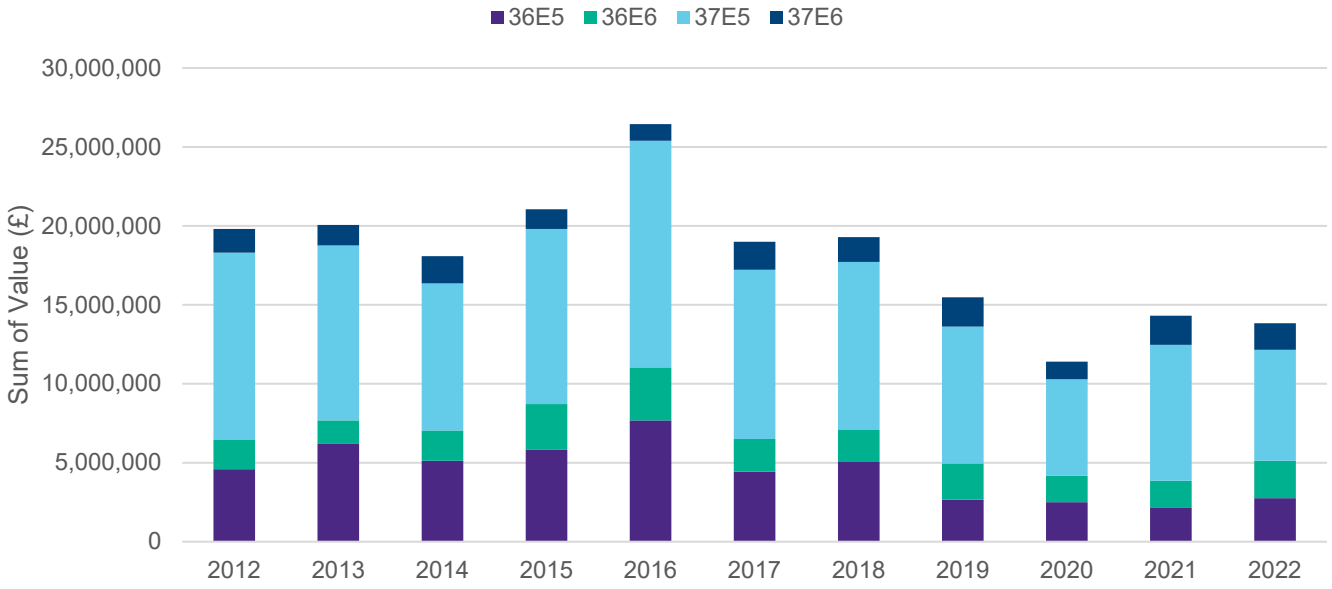


Figure 1.5: Annual trends in sum of landings value (2012 to 2022) within the commercial fisheries study area (UK and Isle of Man vessels)[5].

[4] MMO, 2023a

[5] MMO, 2023a

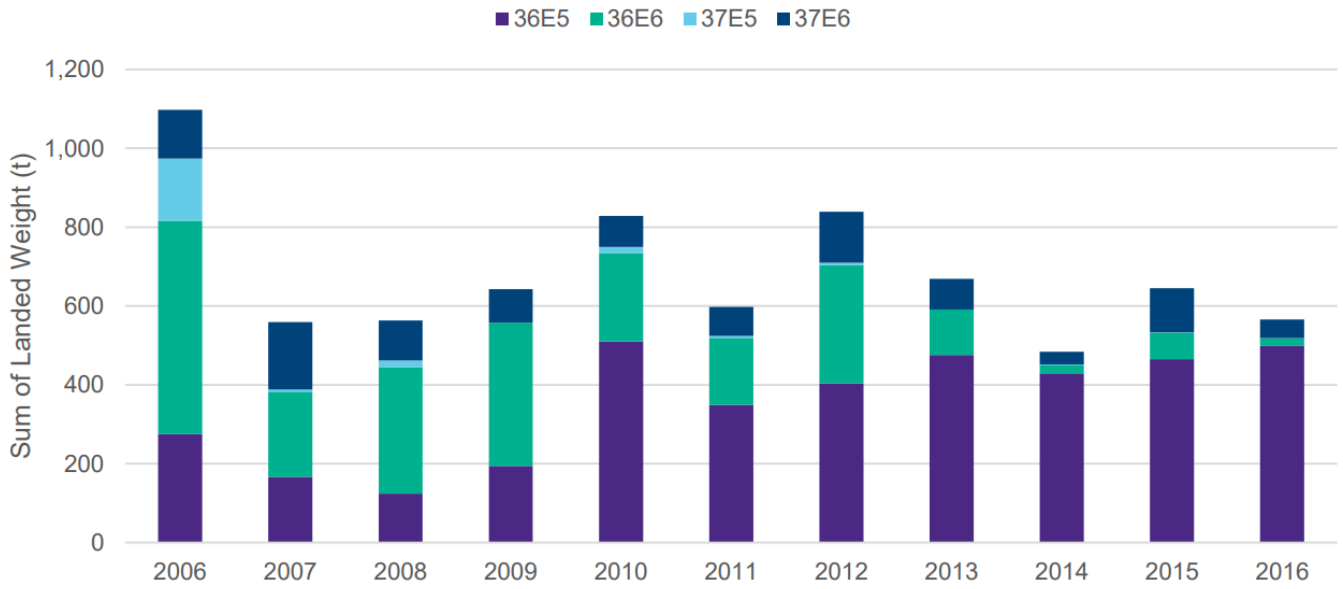


Figure 1.6: Annual trends in sum of landed weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[6].

Seasonal trends

1.4.4.3 Across the commercial fisheries study area, the seasonal (intra-annual) range in landed weight (2012 to 2022) by UK and Isle of Man vessels varied from 7,334 t in June to 32,532 t in September (Figure 1.7).

1.4.4.4 The landed value followed a similar trend for UK and Isle of Man vessels with the minimum value of £8,661,552 in June and maximum value of £26,735,285 in November (Figure 1.8). With respect to individual rectangles, 36E5 and 37E5 mirrored the overall trend, with peak landings in September and November, whereas 36E6 and 37E6 experienced relatively consistent levels of landings throughout all months. There were lower landings by UK vessels during May to June, which is likely due to seasonal queen scallop closures in the area.

1.4.4.5 Across the commercial fisheries study area, the seasonal (intra-annual) range in landed weight (2006 to 2016) by non-UK vessels varied from 838 t during July to September, to 2,615 t during January to March (Figure 1.9). With respect to individual rectangles, 36E5 and 36E6 mirrored the overall trend with peak landings in January to March, April to June and October to December, whereas 37E5 and 37E6 experienced consistently low levels of landings throughout all Quarters. There were lower landings by non-UK vessels during July to September, which was likely due to seasonal scallop closures in the area.

[6] EU STECF,2017

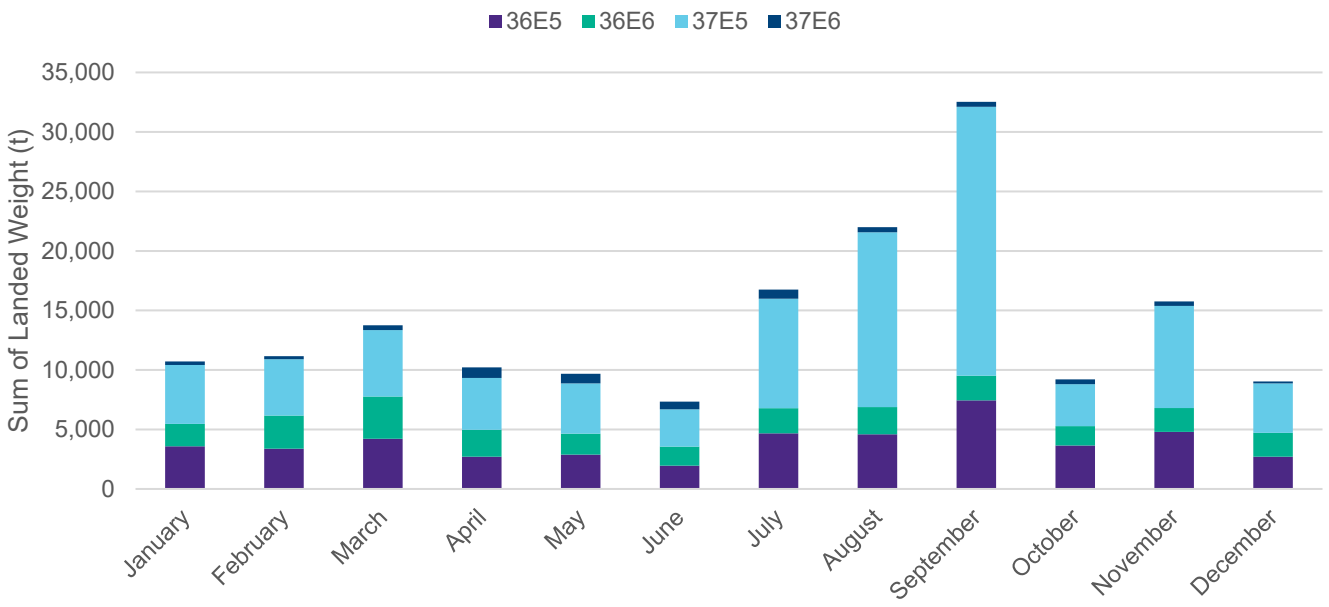


Figure 1.7: Seasonal trends in sum of landed weight (2012 to 2022) within the commercial fisheries study area (UK and Isle of Man vessels)[7].

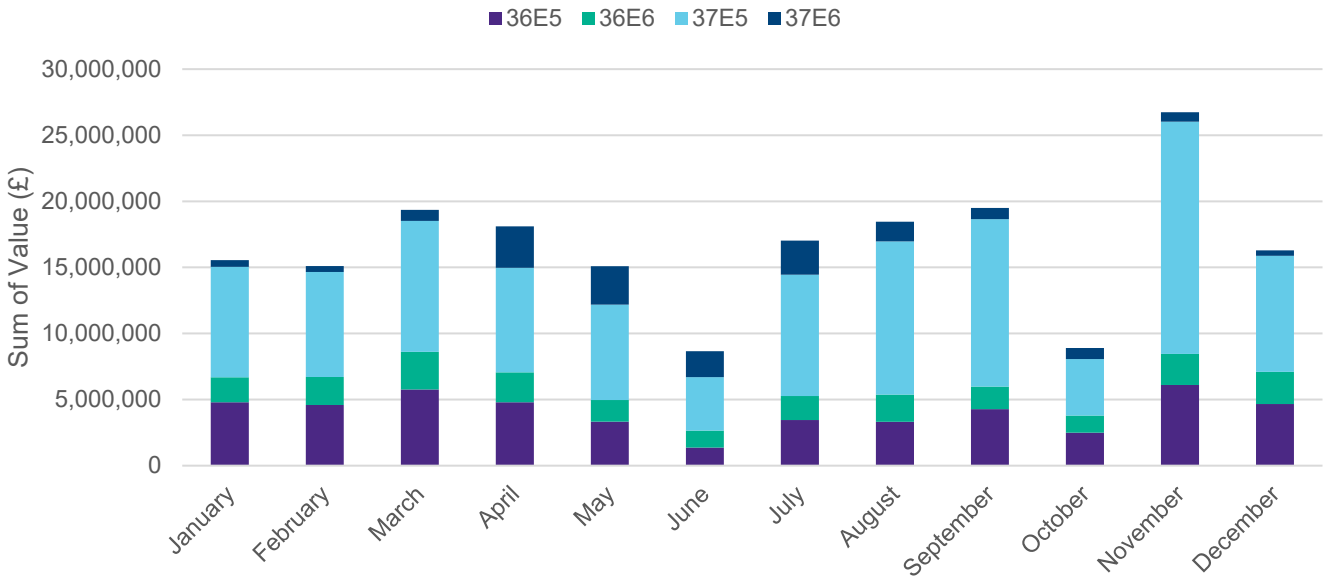


Figure 1.8: Seasonal trends in sum of landed value (2012 to 2022) within the commercial fisheries study area (UK and Isle of Man vessels)[8].

[7] MMO,2023a

[8] MMO, 2023a

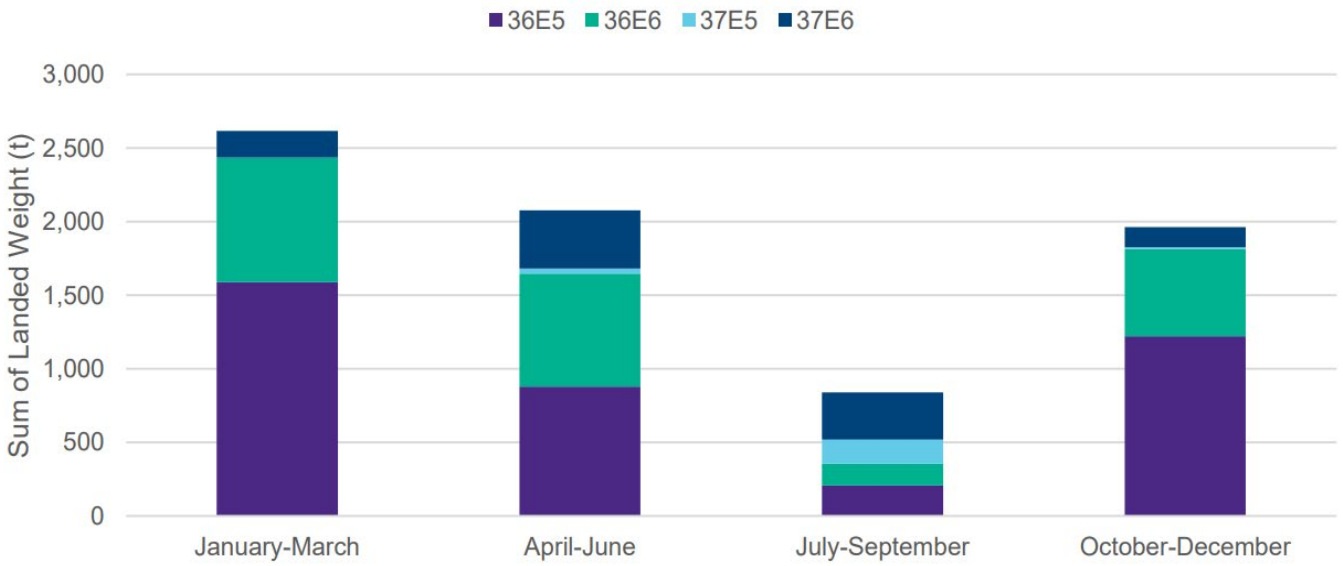


Figure 1.9: Seasonal trends in sum of landed weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[9].

1.4.5 Species

1.4.5.1 The MMO and EU STECF datasets were used to determine the most important species groups and species for UK and Isle of Man, and non-UK vessels in the commercial fisheries study area. Due to the different formats between the two datasets, they are not directly comparable. The EU STECF data does not provide information on species group, so this is only presented for UK and Isle of Man vessels using the MMO data.

Species landed by UK and Isle of Man vessels

1.4.5.2 Shellfish was the most important species group in terms of landed weight and value for UK vessels (Figure 1.10) and Figure 1.11), with the highest landings from ICES Rectangle 37E5. Landings of demersal and pelagic species were significantly lower than shellfish.

[9] EU STECF, 2017

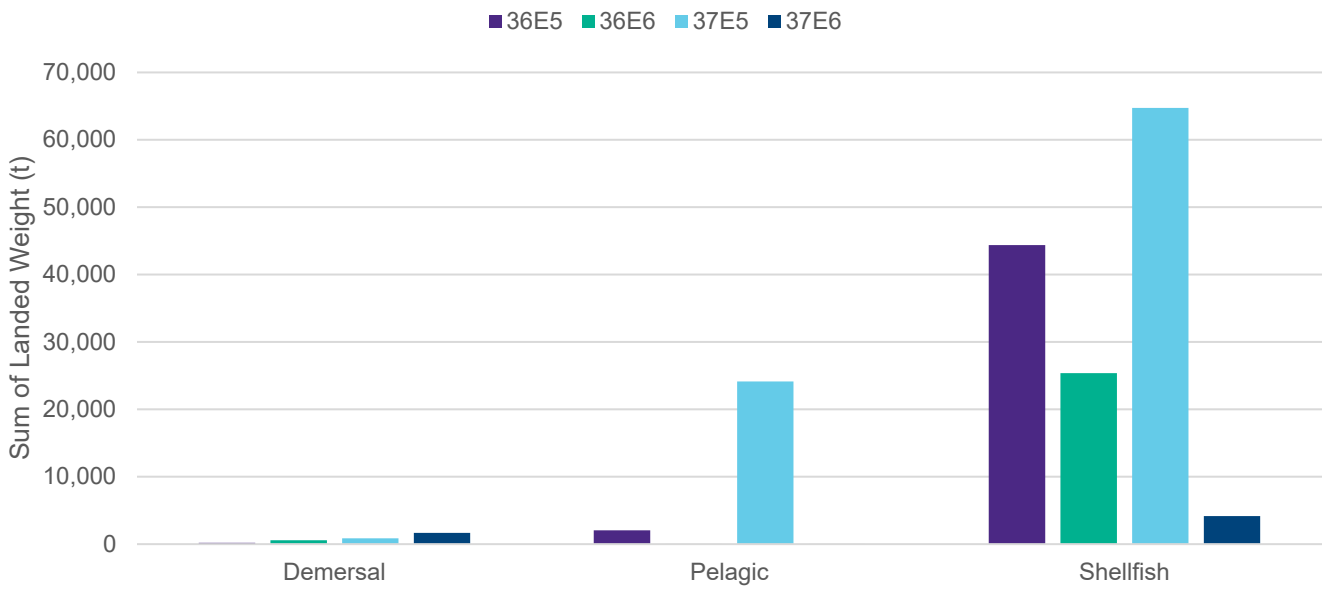


Figure 1.10: Sum of landed weight within the commercial fisheries study area, displayed by species group (2012 to 2022) (UK and Isle of Man vessels)[10].

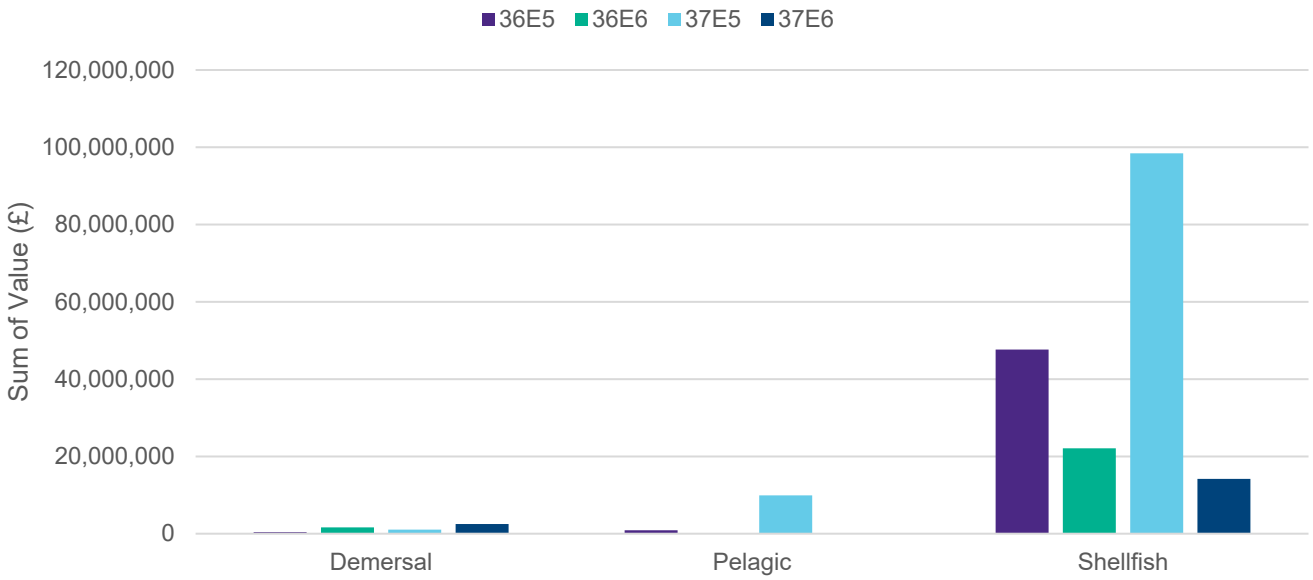


Figure 1.11: Sum of landed value within the commercial fisheries study area), displayed by species group (2012 to 2022) (UK and Isle of Man vessels)[11].

1.4.5.3 The top 15 species (by landed weight) caught by UK and Isle of Man vessels from the commercial fisheries study area are presented in Figure 1.12 (2012 to 2022). Queen scallop, king scallop, Nephrops, whelk and herring were the top five species in terms of both landed weight and landed value. The greatest total weight landed over the time period was from queen scallop, whereas the greatest total value was from king scallop.

1.4.5.4 An overview of the top five species is presented in Table 1.5.

[10] MMO, 2023a

[11] MMO, 2023a

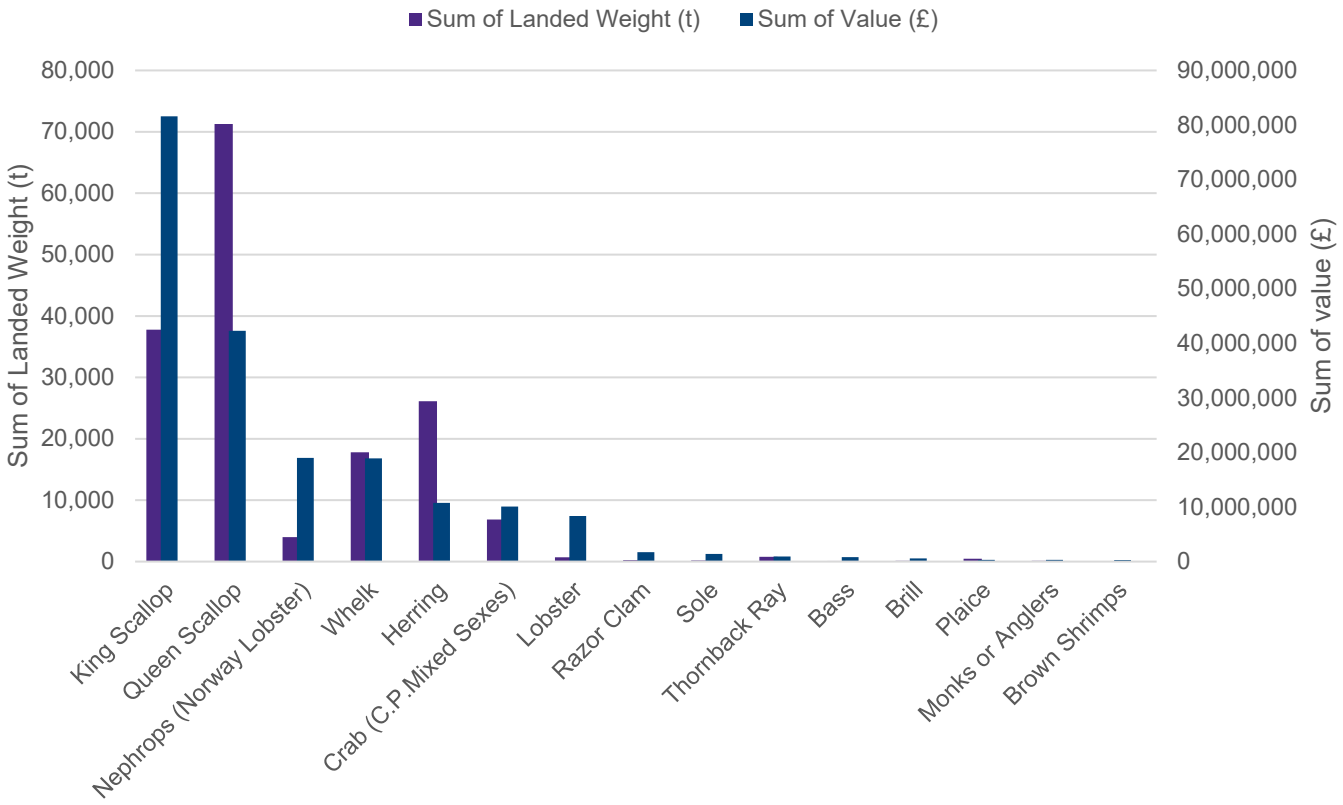


Figure 1.12: Sum of landed weight and value within the commercial fisheries study area for the top 15 species (2012 to 2022) (UK and Isle of Man vessels)[12].

Table 1.5: Overview of key species targeted within the commercial fisheries study area.

Species	Latin name	Gear type	Vessel size	Seasonality
King scallop	*Pecten maximus*	Scallop dredge	>10 m	King scallop landings are generally highest during November. Fishery closed between 01 June and 31 October.
Queen scallop	*Aequipecten opercularis*	Scallop dredge or otter trawl	>10 m	Queen scallop landings are generally highest between July and September. Fishery closed between 01 April and 30 June.
Whelk	*Buccinum undatum*	Pot/trap	>10 m and ≤10 m	Whelk landings are higher in the summer but caught all year around.
Herring	*Clupea harengus*	Pelagic trawls or purse seine nets	>10 m	Herring landings are highest during August to October. Douglas Bank closure 21 September to 15 November.
Norway lobster	*Nephrops norvegicus*	Pot/trap or bottom trawls	>10 m and ≤10 m	Norway lobster landings are higher in the summer but caught all year around.

[12] MMO, 2023a

King scallop

1.4.5.5 King scallop are most commonly found in areas of optimum bivalve feeding conditions, where fine gravel and sand exposed to water currents are present. King scallop achieve reproductive maturity between three to five years, live to 10 to 15 years and are most abundant in depths of 20 to 70 m (Cappell et al., 2018; Howarth and Stewart, 2014; Salomonsen et al. 2015). Recruitment is generally perceived as unpredictable, due to the recruitment's dependency on larval production and spawning, as well as the transportation of larvae to areas optimum for development (Delargy et al., 2019). King scallop fisheries in the UK and Isle of Man are strictly regulated through the utilisation of gear restrictions, minimum legal landing sizes, effort controls and seasonal closures, as described in section 1.4.2.

1.4.5.6 Over the period 2012 to 2022, king scallop landings by weight within the commercial fisheries study area, were greatest from November to May (Figure 1.13), with a landed weight range across these months from 3,528 to 9,168 t. Landed weight of king scallop showed relatively similar seasonal trends across the 2012 to 2022 period. Limited dredging occurred during June to October for all years, due to the king scallop seasonal closure during these months (June to October, Table 1.5).

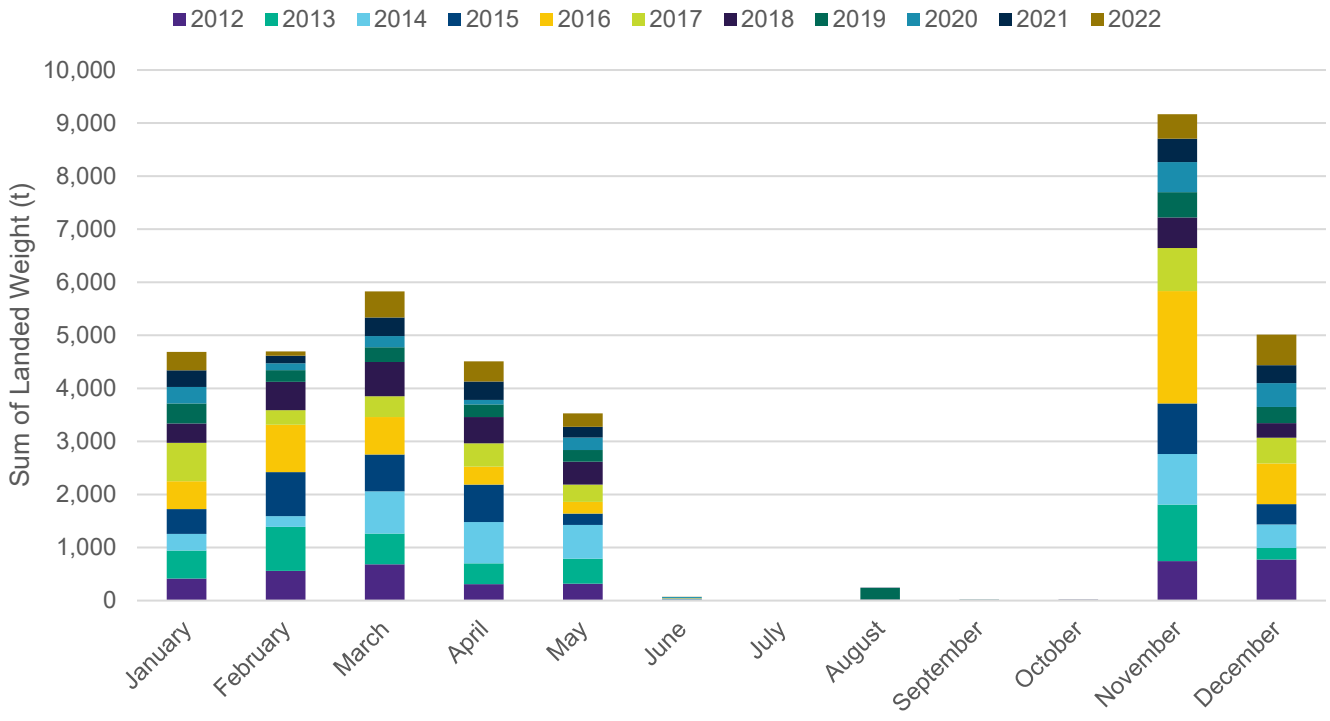


Figure 1.13: Seasonality of landed weight (t) of King scallop within the commercial fisheries study area (2012 to 2022) (UK and Isle of Man vessels)[13].

Queen scallop

1.4.5.7 Queen scallop are fished commercially throughout UK and Isle of Man waters, with particularly commercially important grounds located around the Isle of Man. Queen

[13] MMO, 2020a

scallop can be found in high densities within gravel or sand substrates, at depths of up to 100 m.

1.4.5.8 Key differences can be noted between queen and king scallop, where queen scallop possess two distinctive curved shells, the king scallop's upper shell is almost flat, and queen scallop are typically smaller in size. Landings of queen scallop tend to be less valuable and more variable than king scallop.

1.4.5.9 The most important months for landings of queen scallop during the period 2012 to 2022 were July, August and September, with a landed weight range across these months from 10,089 to 12,069 t (Figure 1.14). Landed weight of queen scallop across the 2012 to 2022 period showed relatively similar seasonal trends to that of king scallop. However, landed weights from 2018 to 2022 were notably lower.

1.4.5.10 The minimum landed weight of queen scallop occurred during May 2016 to 2022, where no landings where recorded, and maximum during July 2013 at 2,642 t. A notable lack of landings can be observed between April to June in recent years, attributed to the 2018 introduction of seasonal closures for queen scallop in the Irish Sea.

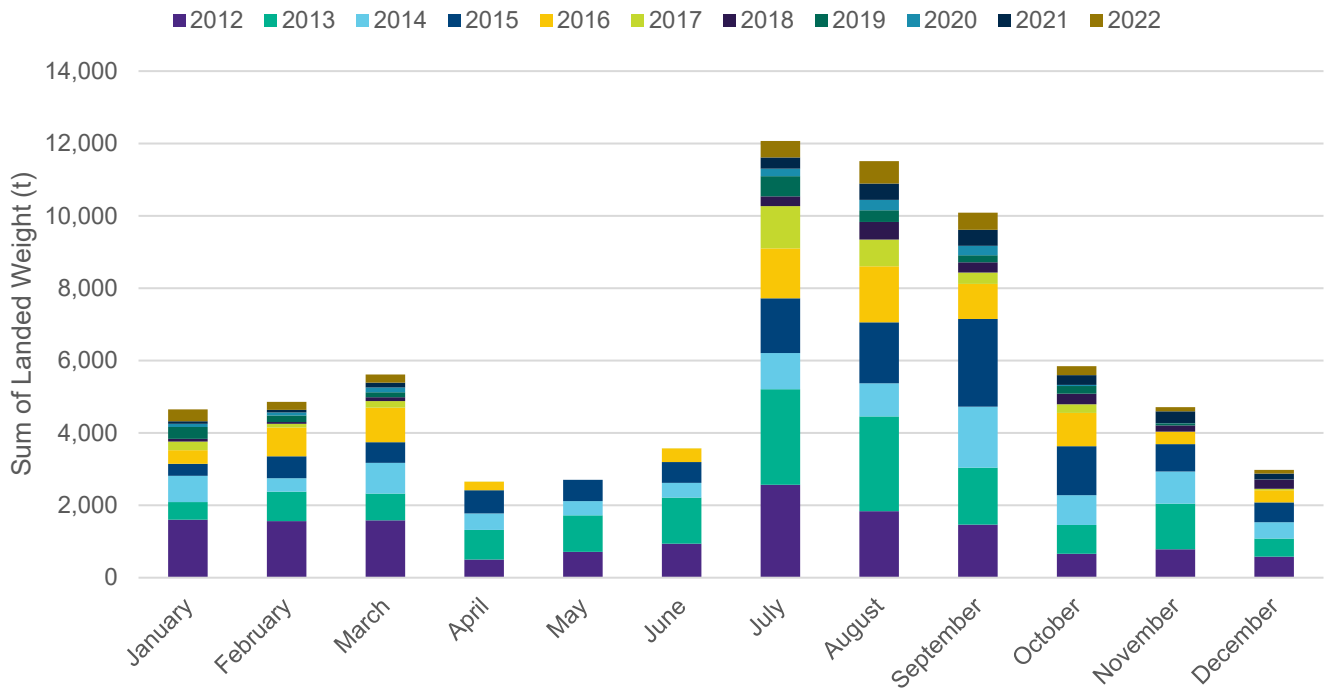


Figure 1.14: Seasonality of landed weight (t) of Queen scallop within the commercial fisheries study area (2012 to 2022) (UK and Isle of Man vessels)[14].

Whelk

1.4.5.11 The whelk is most abundant at water depths between 0 m to 50 m and in habitats of mixed sediments. Depending on their environmental conditions and geographical location, whelk tend to achieve reproductive maturity at two to three years, grow to 150 mm and live for up to 15 years. A whelk's life cycle does not consist of a pelagic

[14] MMO, 2020a

phase, instead internally fertilised eggs are laid upon hard substrates, where juveniles emerge after three to five months.

1.4.5.12 Whelk landings, in terms of weight, over the period 2012 to 2022, were most prominent during April to August inclusive, with a landed weight range across these months of 1,761 to 2,326 t (Figure 1.15). Landed weight of whelk was notably higher during May 2018 (312 t). The minimum landed weight of whelk occurred in December 2012 (19 t) and January 2013 (18 t).

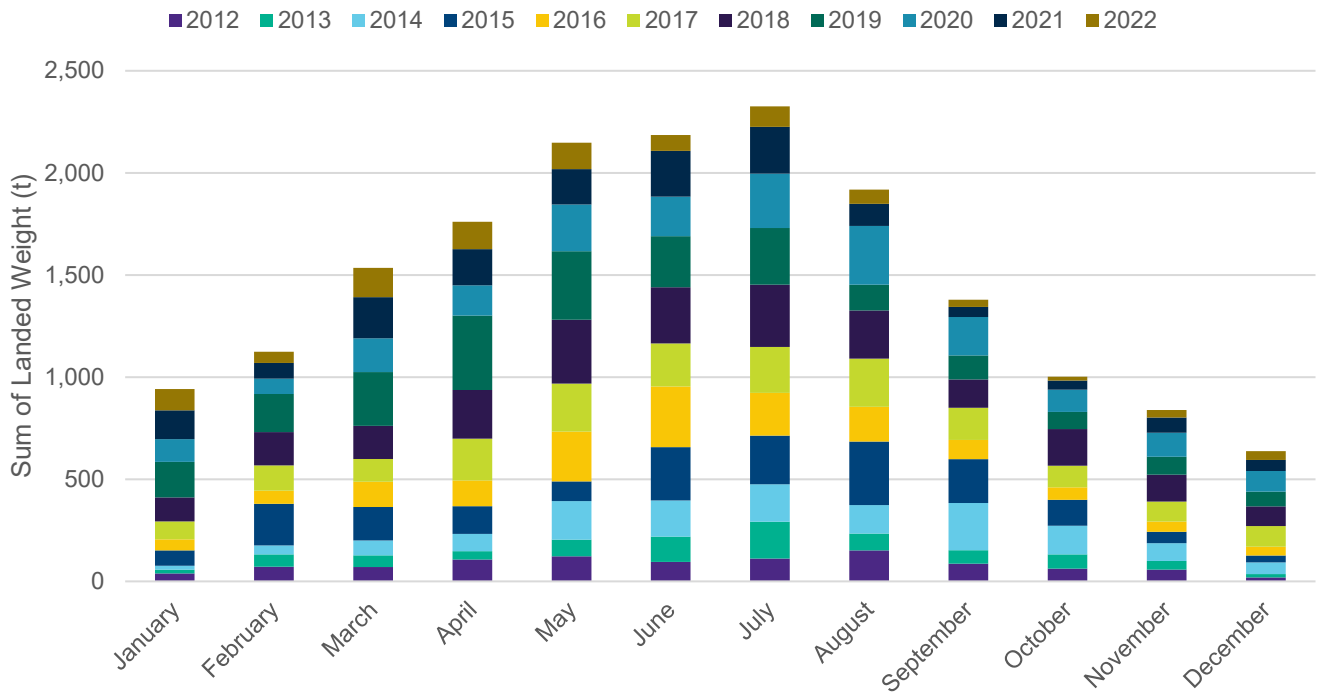


Figure 1.15: Seasonality of landed weight (t) of whelk within the commercial fisheries study area (2012 to 2022) (UK and Isle of Man vessels)[15].

Nephrops (Norway lobster)

1.4.5.13 Nephrops are decapod crustaceans that can typically be found in soft sediments within shallow burrows. Unlike the edible crab, Norway lobster do not undertake large migrations and have displayed territorial behaviour.

1.4.5.14 Nephrops landings, in terms of weight over the period 2012 to 2022, were most prominent during April, May and July, although this species is landed all year round (Figure 1.16). The minimum of 0t occurred in December 2014.

[15] MMO, 2020a

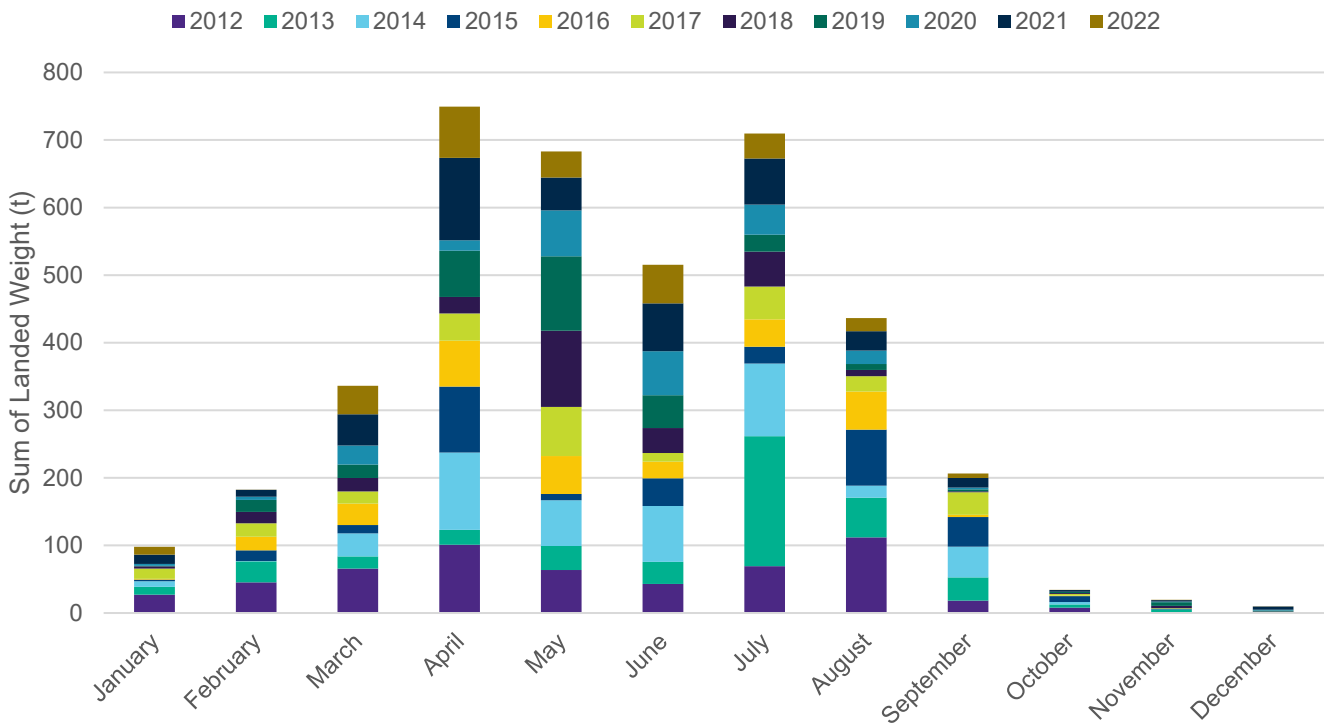


Figure 1.16: Seasonality of landed weight (t) of lobster within the commercial fisheries study area (2012 to 2022) (UK and Isle of Man vessels)[16].

Herring

1.4.5.15 Herring are a planktivorous foraging fish, which spawn in coastal areas within specific benthic habitats consisting of gravel and small stones. Spawning occurs throughout September to November, and there are established spawning grounds north and east of the Isle of Man, and on the west Irish coast (Dickey-Collas *et al.,* 2001). A proportion of the stock in the Irish Sea migrates northwards during the summer months.

1.4.5.16 Landings of herring in the commercial fisheries study area over the period 2012 to 2022 were predominantly during August and September (Figure 1.17). A total of 6,432 t was caught during August and 23,050 t was caught during September across 2012 to 2022. Annual landings of herring fluctuate, depending on ICES advice on the stock (paragraph 1.4.2.23).

[16] MMO, 2020a

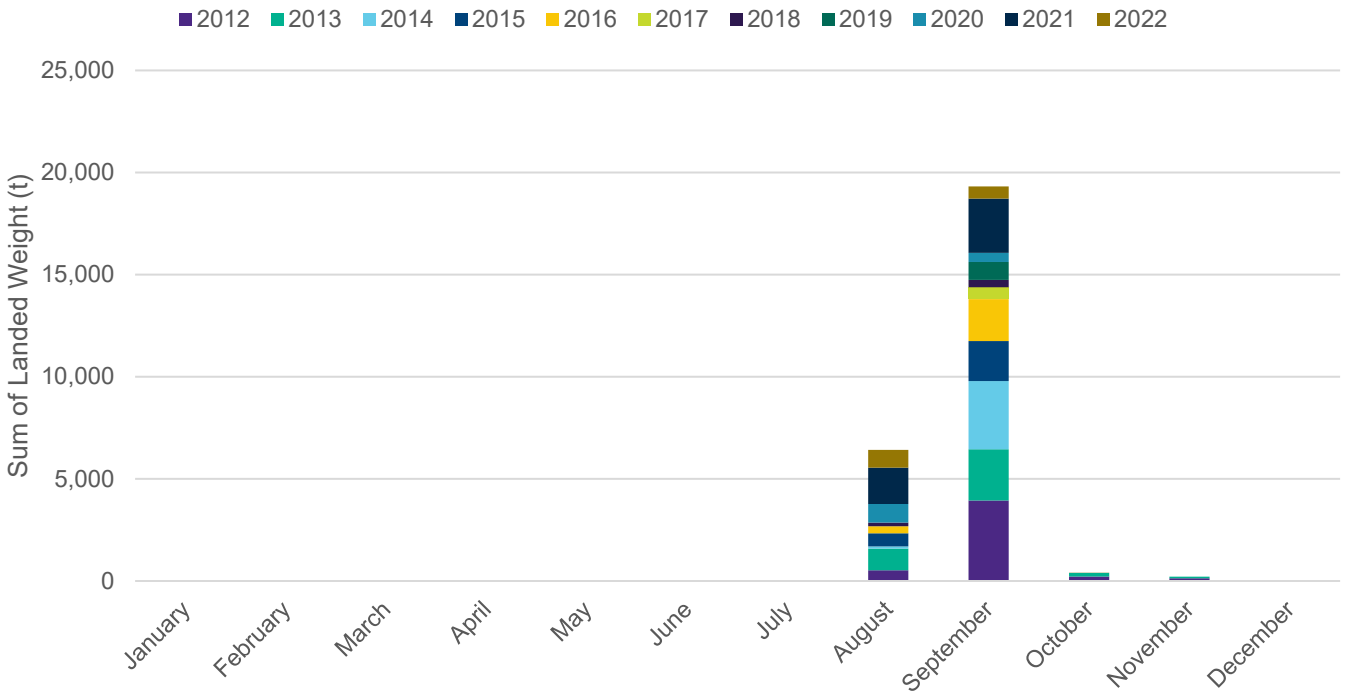


Figure 1.17: Seasonality of landed weight (t) of herring within the commercial fisheries study area (2012 to 2022) (UK and Isle of Man vessels)[17].

Species landed by non-UK vessels

1.4.5.17 A total of 53 species were landed by Belgian vessels over the period 2006 to 2016 from the commercial fisheries study area. The top 20 species (Figure 1.18) constituted approximately 99% of the total Belgian catch landed during the study period (2006 to 2016). The top five species (common sole, European plaice, thornback ray, rays and skates and brill) constituted approximately 85% of the total Belgian tonnage landed from the region. Data from Belgian vessels shows that the fleet's main targets were demersal species from ICES Rectangle 36E6, and similar species were caught in all other associated rectangles (36E5, 37E5 and 37E6).

1.4.5.18 There was a large variety of species caught by the Belgian fleet and, given the understanding that the Belgian fleet almost exclusively uses beam trawls (section 1.4.6), this suggests that other species may have been caught as bycatch during fishing for the main target species.

[17] MMO, 2020a

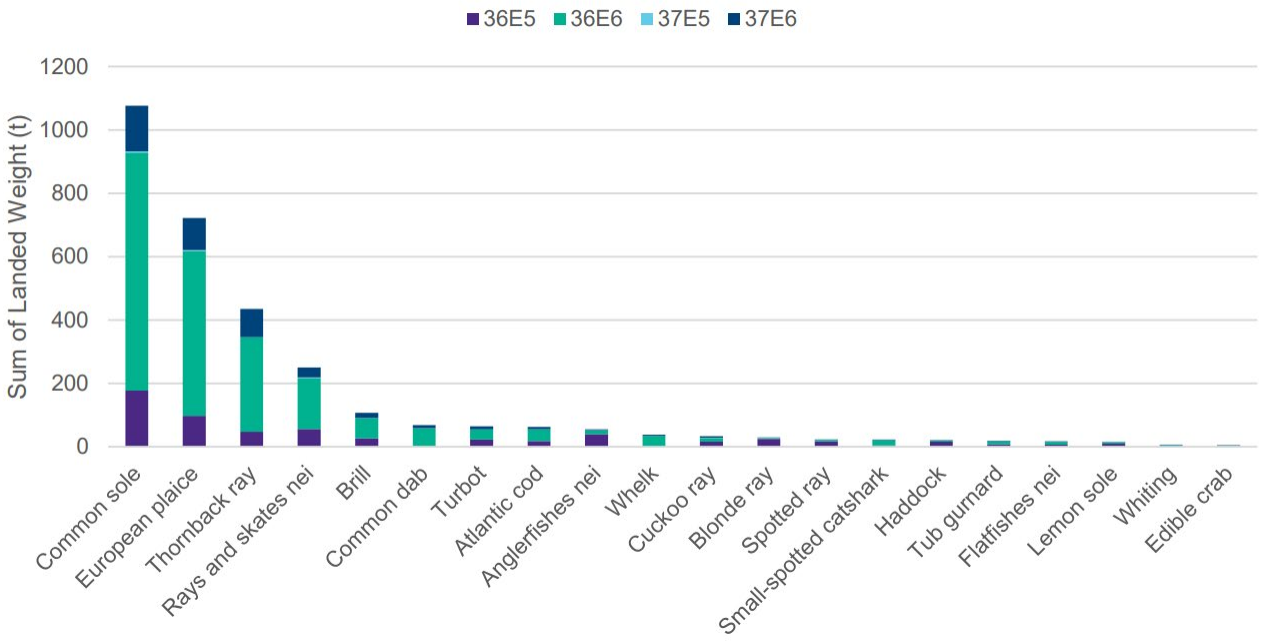


Figure 1.18: Total landings (t) from Belgian vessels within the commercial fisheries study area displayed for the top 20 species (2006 to 2016)[18].

1.4.5.19 A total of 35 species were landed by Irish vessels over the period 2006 to 2016 within the commercial fisheries study area. The top 20 species in terms of landed weight are displayed in Figure 1.19. The top species (king scallop) constituted approximately 68% of the total Irish catch landed during the monitoring period, with landings predominantly within ICES Rectangle 36E5. King scallop landings are significantly higher than other species landed by Irish vessels, indicating the significant importance of this species to Irish vessels active in the region.

[18] EU STECF, 2017

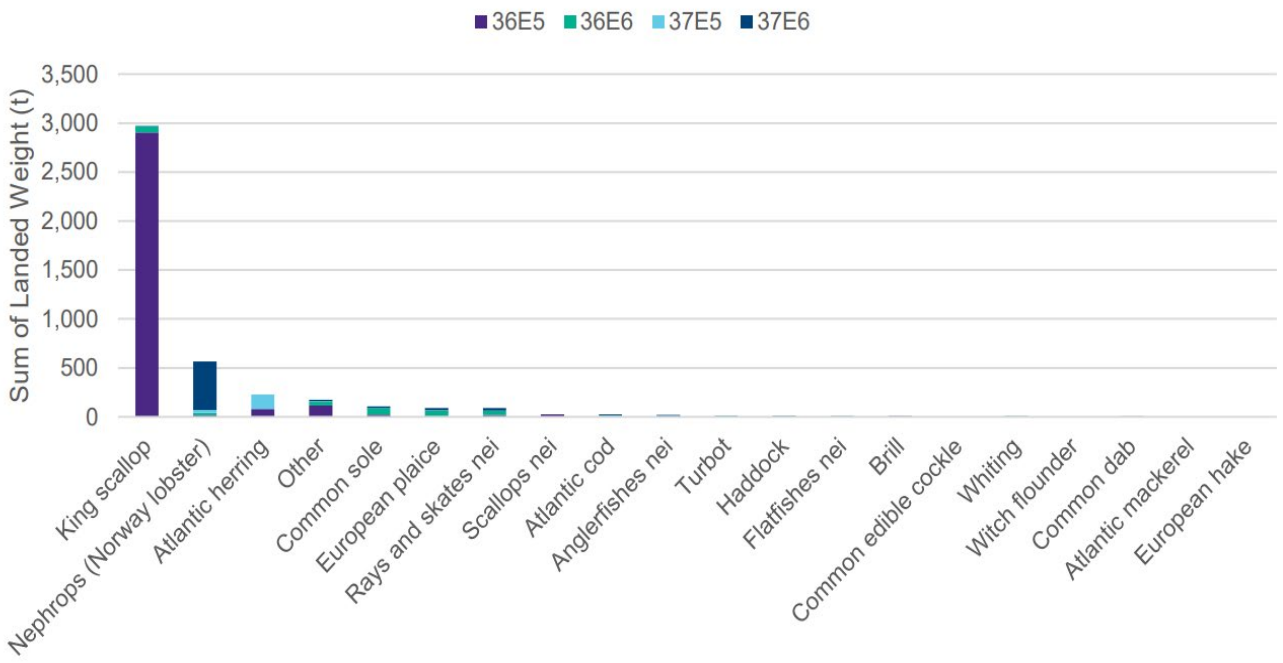


Figure 1.19: Total landings (t) from Irish vessels within the commercial fisheries study area displayed for the top 20 species (2006 to 2016)[19].

1.4.5.20 Only one species (edible crab) was landed by French vessels during 2006-2016 within the commercial fisheries study area (Figure 1.20), and only from within Rectangle 36E6.

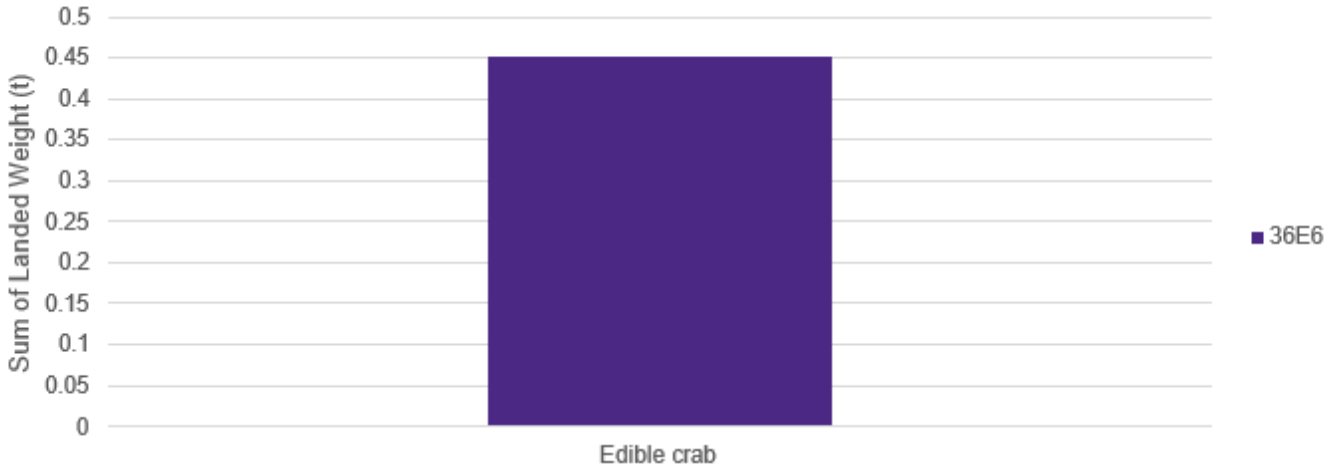


Figure 1.20: Total landings (t) from French vessels within the commercial fisheries study area displayed by species (2006 to 2016)[20].

1.4.5.21 A total of four species were landed by Dutch vessels over the period 2006 to 2016 (Figure 1.21) within the commercial fisheries study area.

[19] EU STECF, 2017

[2020] EU STECF, 2017a

1.4.5.22 There were no landings by Dutch vessels within ICES Rectangle 37E5. The top two species, king scallop and European sprat, constituted approximately 58% and 37%, respectively, of the total Dutch catch landed during the monitoring period. The remainder of the total Dutch tonnage landed from the region was constituted of jack and horse mackerel (2.5%) and common sole (2.5%). Data from Dutch vessels shows that the fleet targets the majority of landings from ICES Rectangle 36E5.

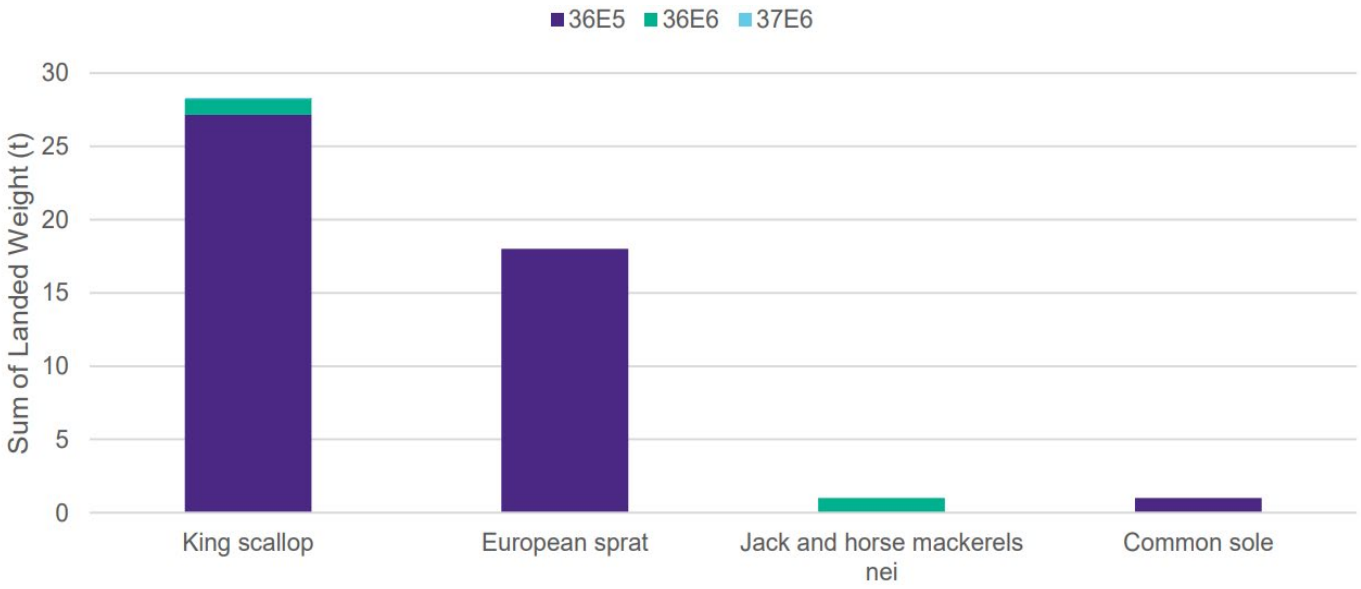


Figure 1.21: Total landings (t) from Dutch vessels within the commercial fisheries study area, displayed by species (2006 to 2016)[21].

1.4.5.23 The EU STECF species data were analysed further, allowing a closer look at the temporal variation of the top 15 most commercially important species for non-UK vessels. Overall, king scallop, common sole, European plaice, Nephrops and thornback ray were the dominant species caught by all non-UK vessels in terms of landed weight across all years and ICES rectangles (Figure 1.22). King scallop appeared to be of particular importance in terms of landed weight during 2010 to 2016, and less so during prior years, which aligns with feedback from project-specific consultation indicating that the fishery is cyclical.

[21] EU STECF, 2017

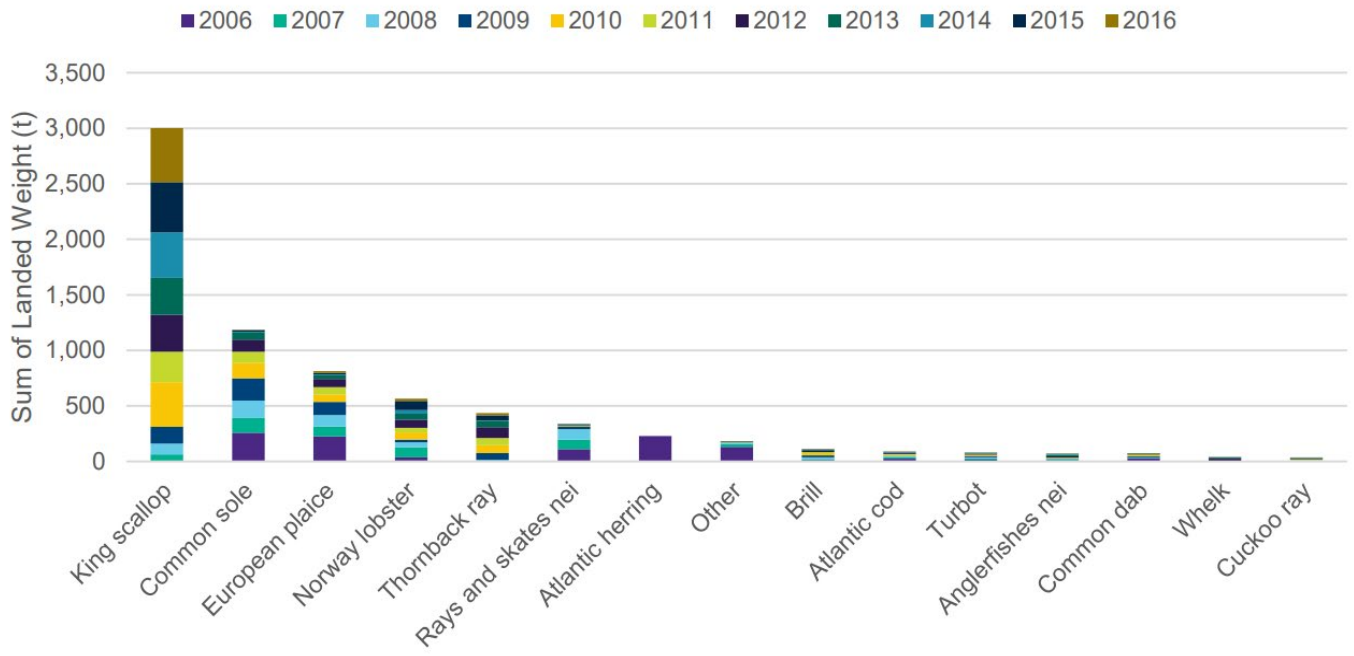


Figure 1.22: Annual trends in the top 15 species by total landings weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[22].

1.4.5.24 Figure 1.23 shows the seasonality for the top 15 species by landed weight from the non-UK vessels across the region. The landings data illustrate that over the period 2006 to 2016, January to March and October to December were the most productive periods of the year in terms of landings for king scallop; July-September was the least productive period, which is when the fishery is closed to protect spawning. Common sole was caught predominantly during the first half of the year, as also indicated by fisheries stakeholders. Highest landings of European plaice were caught during January to March. April to September was the most productive time of the year for Nephrops. Notably, Atlantic herring was only caught between July to September.

[22] EU STECF, 2017

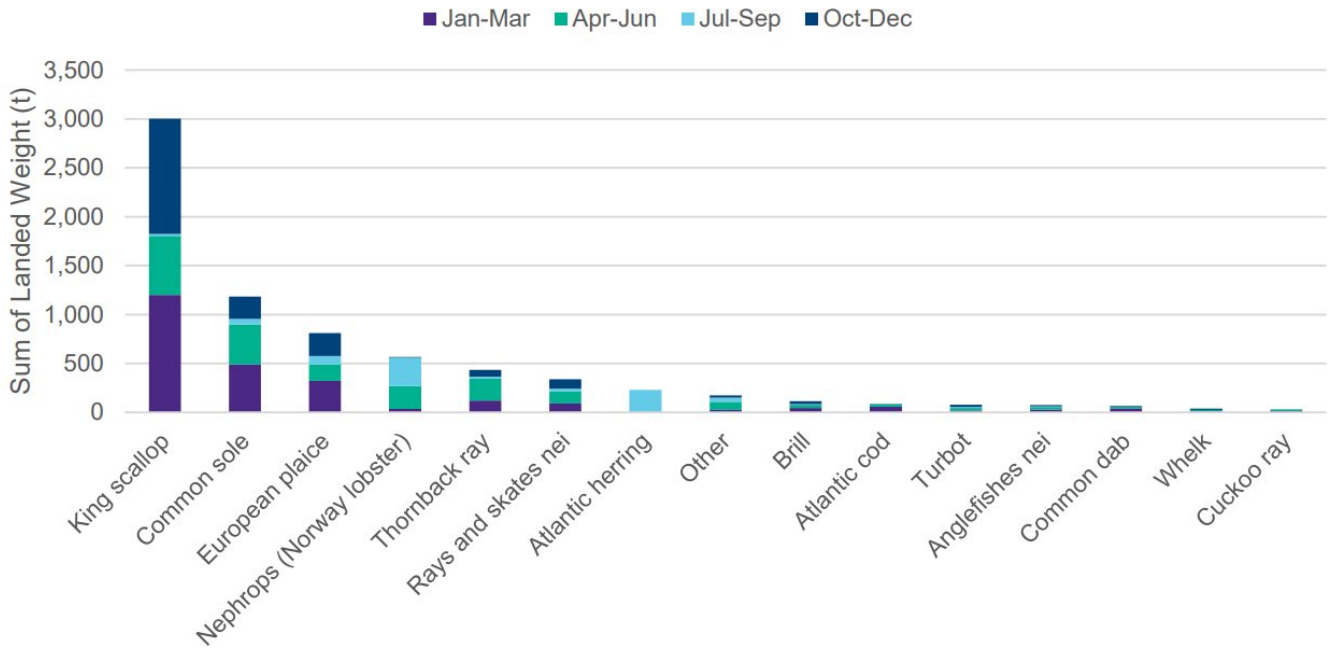


Figure 1.23: Seasonal trends in the top 15 species by total landings weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[23].

1.4.6 Gear types

1.4.6.1 The data interrogated in this study provides information on the types of fishing gear used by the UK, Isle of Man and non-UK fleets in the commercial fisheries study area. Data has been collated for the most recently available 10-year time period: 2012 to 2022 for the MMO data (UK and Isle of Man vessels), and 2006 to 2016 for the EU STECF data (non-UK vessels).

1.4.6.2 The data shows that 12 identifiable gear types were recorded as being used to target fish stocks by UK and Isle of Man vessels, specifically: demersal trawl/seine, pots and traps, otter trawl, pelagic trawl, demersal trawl, beam trawl, drift and fixed nets, gears using hooks, handlines, other mobile gears and other passive gears (MMO, 2023a).

1.4.6.3 A total of eight gear types was recorded for non-UK vessels: beam trawls; demersal seines, dredges, gill nets, longlines, otter trawls, pelagic trawls and pots (EU STECF, 2017).

1.4.6.4 Dredges accounted for approximately 54% of total landings by UK and Isle of Man vessels from the commercial fisheries study area (Figure 1.24). This indicates the importance of the scallop fishery (see section 1.4.5). Demersal trawl/seine (targeting demersal dwelling species) were also of notable importance in the commercial fisheries study area and consisted mostly of vessels >10 m in length.

1.4.6.5 For the non-UK vessels, beam trawls and dredges accounted for a large proportion of total landings from the commercial fisheries study area Figure 1.25.Similarities in gear types can be observed with the UK and Isle of Man vessels, which predominantly used dredges. The spatial distribution of vessels using the different gear types within the respective ICES Rectangles is discussed in section 1.4.8.

[23] EU STECF, 2017

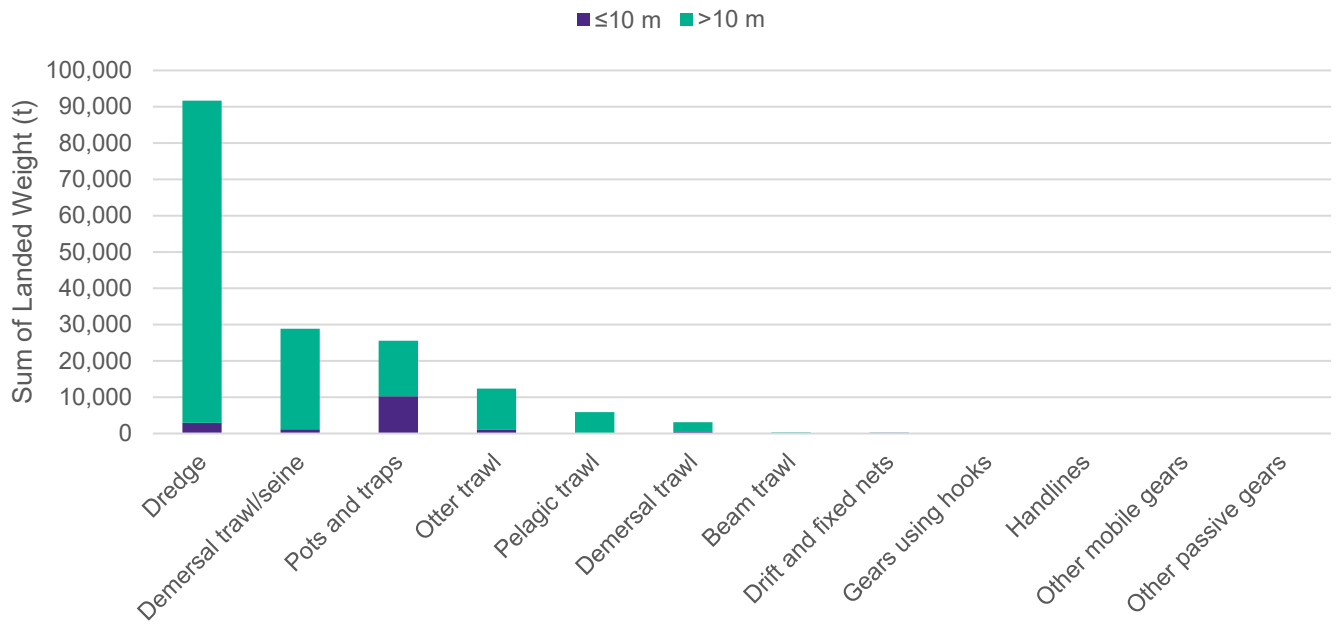


Figure 1.24: Total landings weight by gear type within the commercial fisheries study area (2012 to 2022) (UK and Isle of Man vessels)[24].

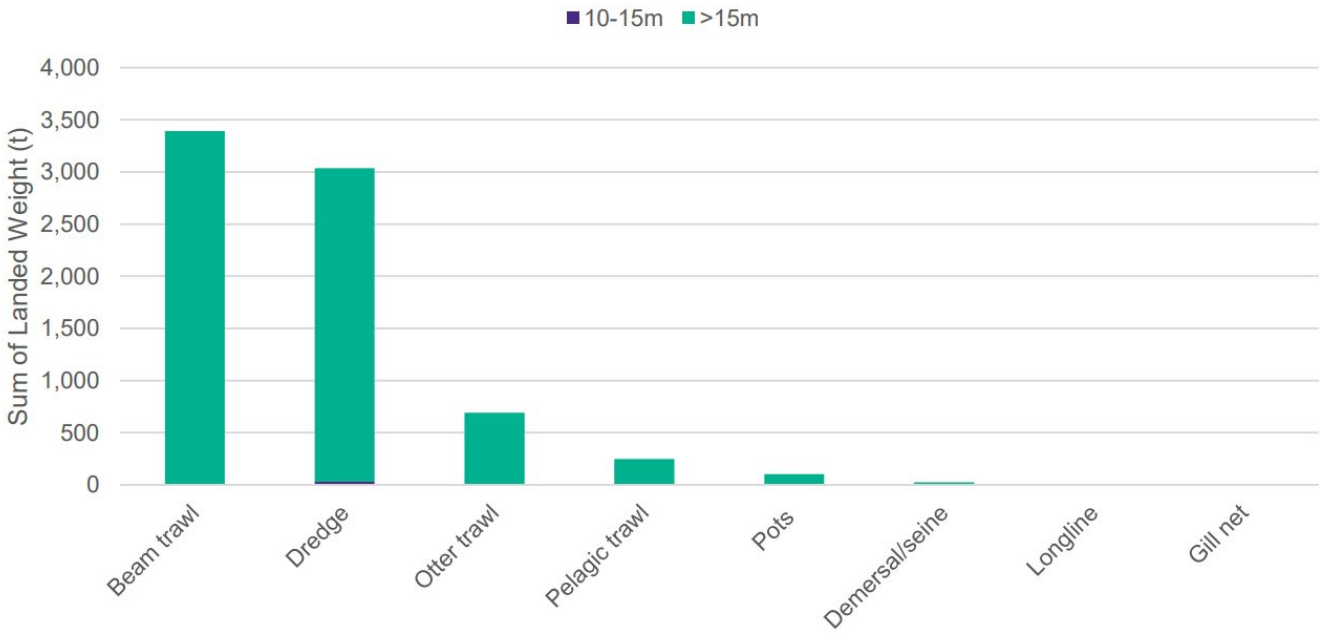


Figure 1.25: Total landings weight by gear type (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[25].

1.4.6.6 The data indicates that English vessels utilised a variety of gear types across the commercial fisheries study area (Figure 1.26). Of the gear types, the use of pots, traps and dredges was most dominant. The data also indicates that ICES rectangle 36E6 was of significant importance to English fleets utilising pots and traps; this likely reflects

[24] MMO, 2023a

[25] EU STECF, 2017

the whelk fishery, particularly vessels operating out of Fleetwood, which is discussed in sections 1.4.1, 1.4.5 and 1.4.7.

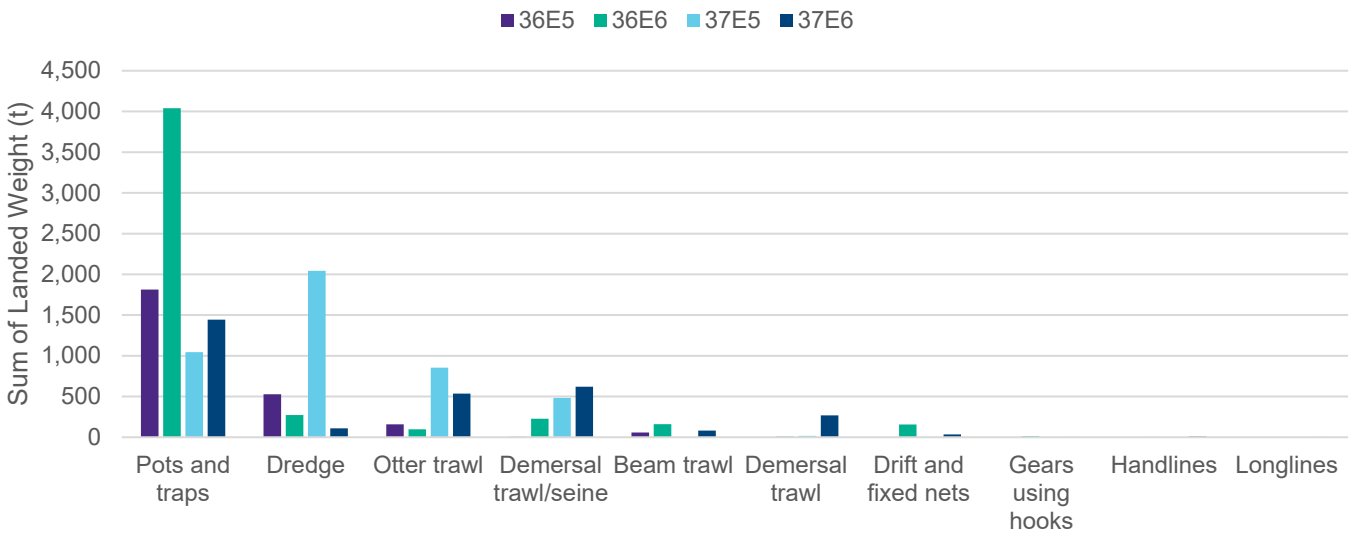


Figure 1.26: Total landings weight from English vessels by gear type within the commercial fisheries study area (2012 to 2022)[26].

1.4.6.7 As expected, Figure 1.27 illustrates that fleets from the Isle of Man were mostly active within ICES Rectangle 37E5 which overlaps with Manx waters. Dredges (targeting king and queen scallop) and pots and traps (targeting crab, lobster and whelk) accounted for the majority of landings. Other notable gear types used by the Manx fleet within the commercial fisheries study area were demersal trawl/seine and otter trawl.

[26] MMO, 2023a

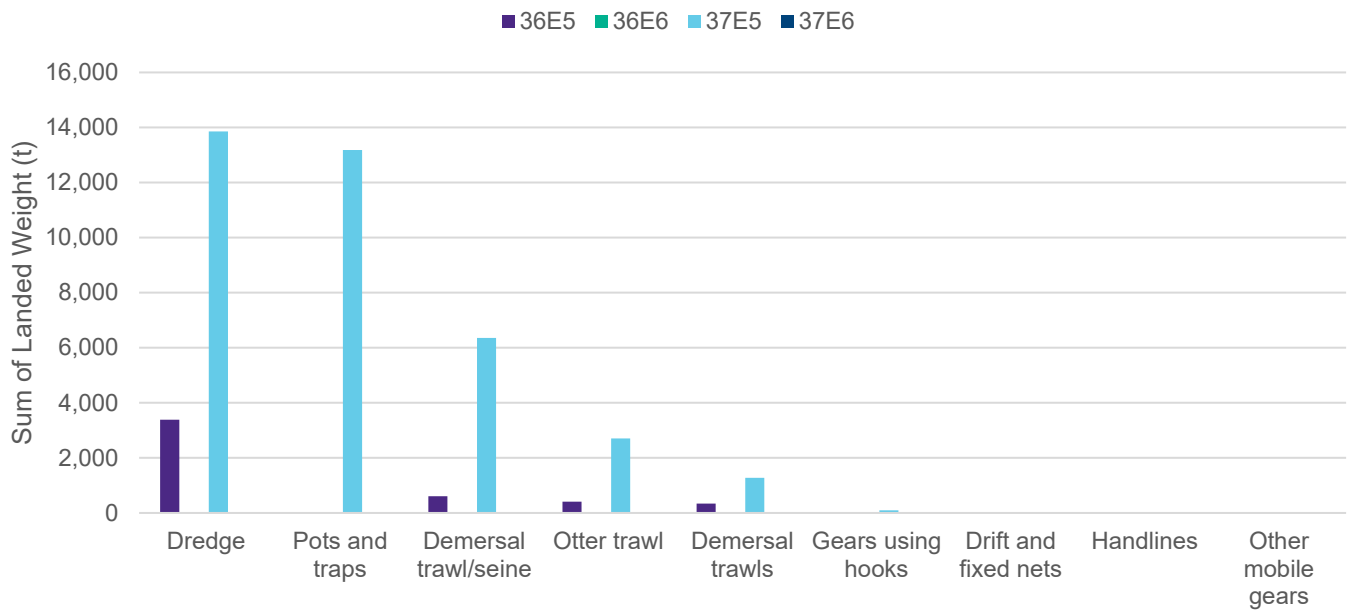


Figure 1.27: Total landings weight from Isle of Man vessels by gear type within the commercial fisheries study area (2012 to 2022)[27].

1.4.6.8 A Jersey based vessel showed significantly less variety of deployed gear types than English and Isle of Man vessels (Figure 1.28). Data shows that the Jersey vessel caught a relatively low landed weight (t), in comparison to other UK and Isle of Man vessels and only utilised pots and traps within the commercial fisheries study area.

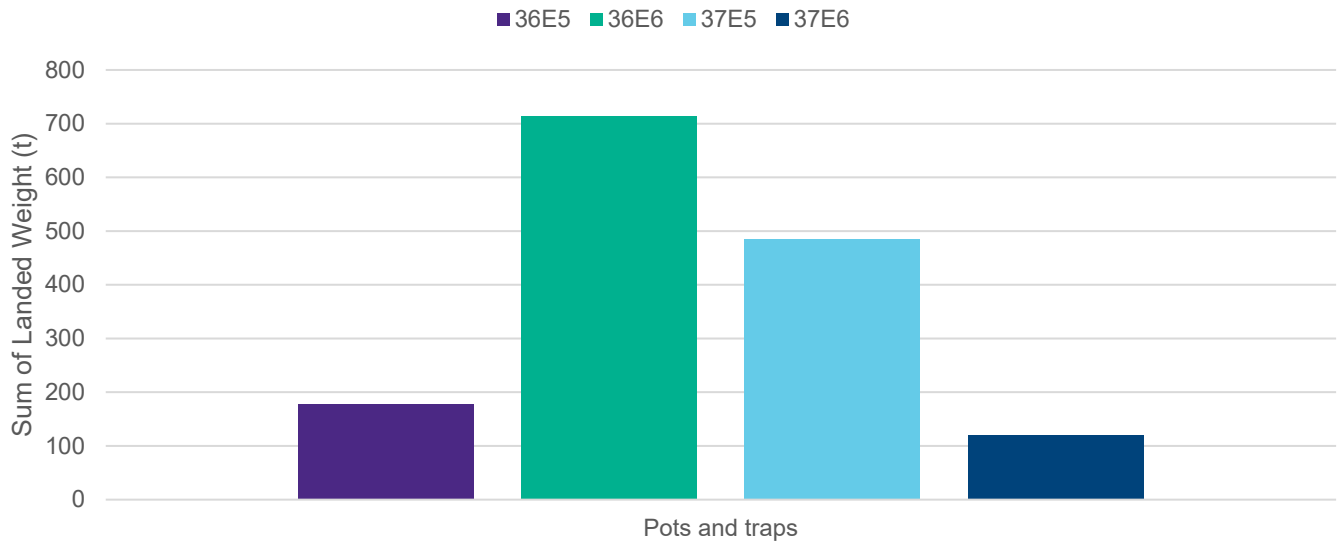


Figure 1.28: Total landings weight from a Jersey vessel by gear type within the commercial fisheries study area (2012 to 2022)[28].

[27] MMO, 2023a

[28] MMO, 2023a

1.4.6.9 Similar to vessels from the Isle of Man, Northern Irish vessels were mostly active within ICES Rectangle 37E5. Of the gear types, demersal trawl/seine, dredge and otter trawl were most dominant (Figure 1.29).

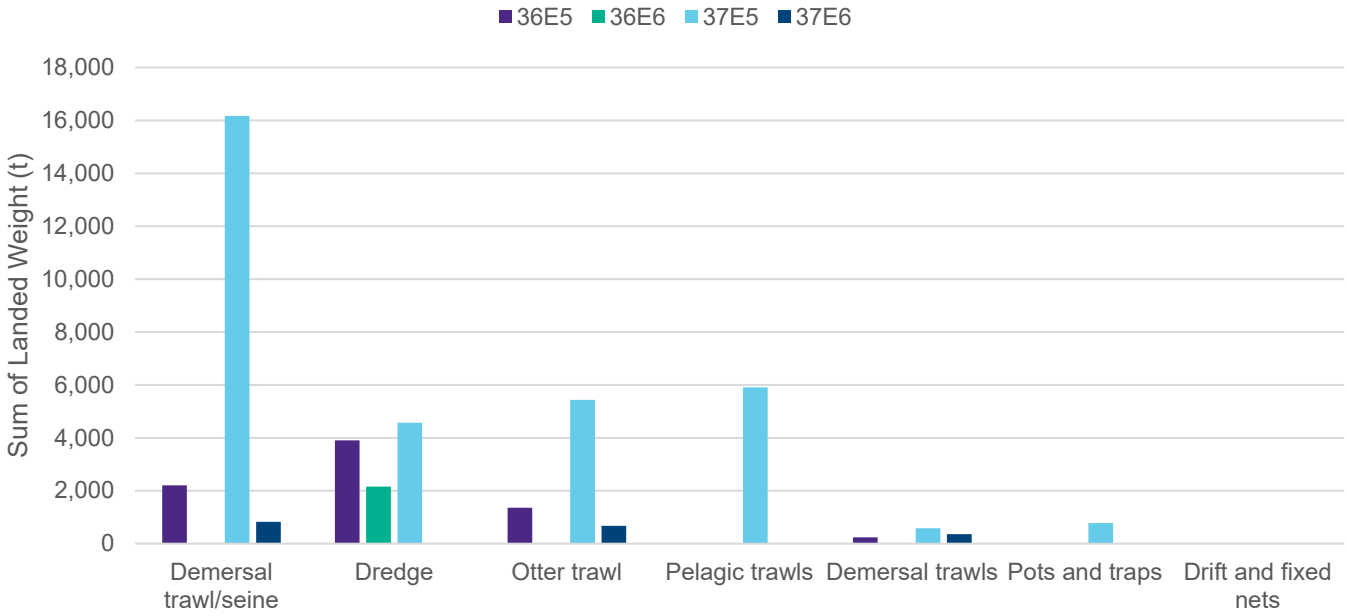


Figure 1.29: Total landings weight from Northern Irish vessels by gear type within the commercial fisheries study area (2012 to 2022)[29].

1.4.6.10 Dredge vessels accounted for the majority of landings for the Scottish fleet active within the commercial fisheries study area (Figure 1.30). Scottish vessels landed a significantly greater weight than vessels from other parts of the UK, particularly within Rectangles 36E5, highlighting the commercial importance of the region for Scottish vessels targeting king and queen scallops.

[29] MMO, 2023a

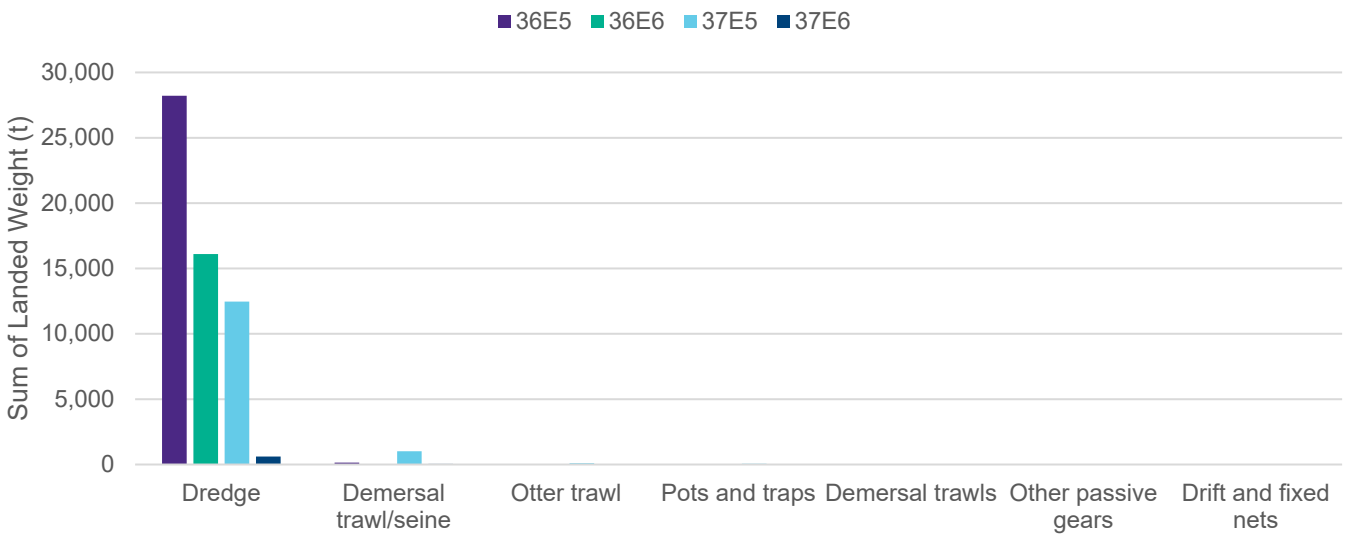


Figure 1.30: Total landings weight from Scottish vessels by gear type within the commercial fisheries study area (2012 to 2022)[30].

1.4.6.11 Pots and traps and dredges were the dominant gear type used by the Welsh fleet across ICES Rectangles, notably within Rectangle 36E5, where Anglesey is located (Figure 1.31).

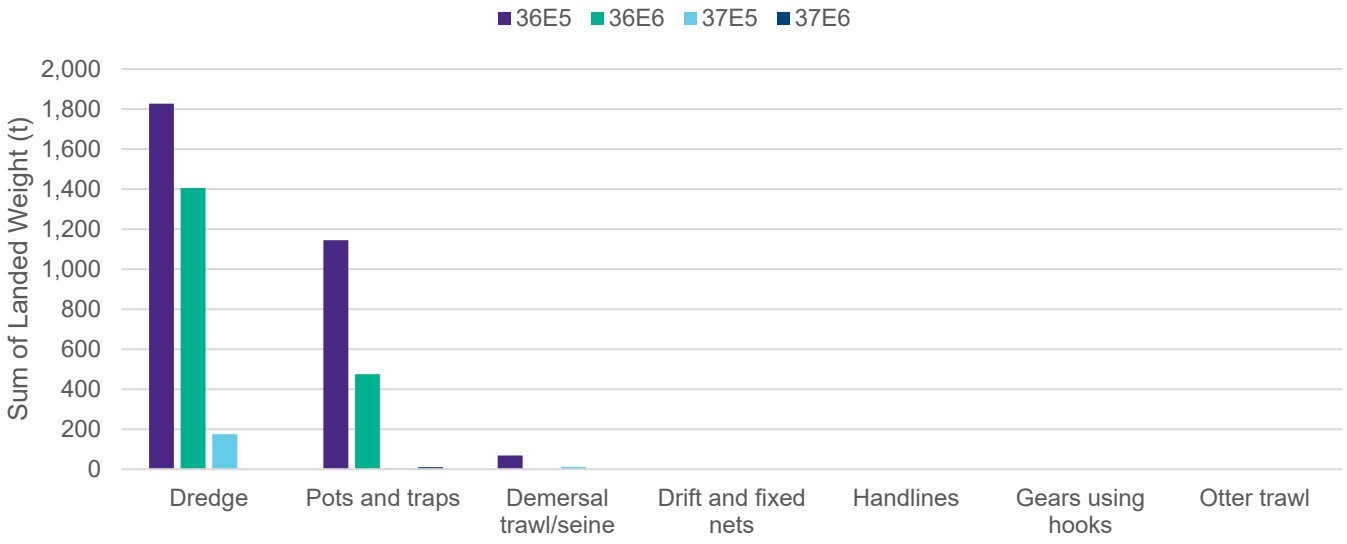


Figure 1.31: Total landings weight from Welsh vessels by gear type within the commercial fisheries study area (2012 to 2022)[31].

[30] MMO, 2023a

[31] MMO, 2023a

1.4.6.12 The data indicates that Belgian vessels almost exclusively utilised beam trawls across the commercial fisheries study area (Figure 1.32), suggesting that the Belgian fleet is targeting demersal species. Beam trawls are known to catch a wide variety of bottom dwelling fish which would result in a varied catch containing flatfish, gadoids, and cartilaginous species, aligning with findings of Belgian landing weights by species in section 1.4.5.

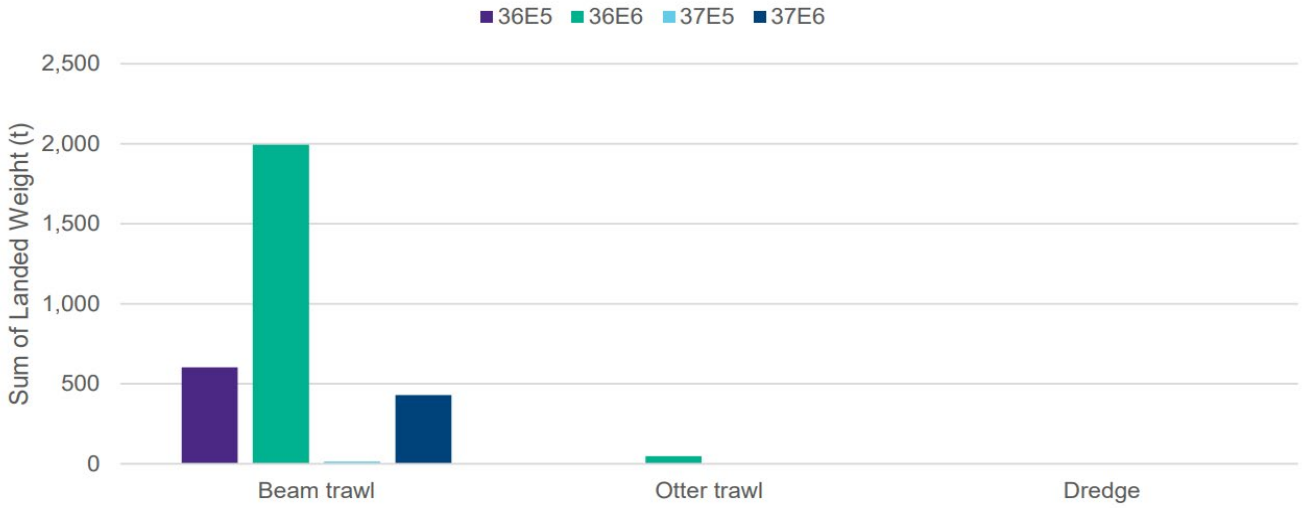


Figure 1.32: Total landings weight from Belgian vessels by gear type (2006 to 2016) within the commercial fisheries study area[32].

1.4.6.13 French vessels caught a very low weight (t) of fish in comparison to other non-UK vessels. Data shows that French vessels only utilise pots within the commercial fisheries study area and are only active in ICES Rectangle 36E6 (Figure 1.33).

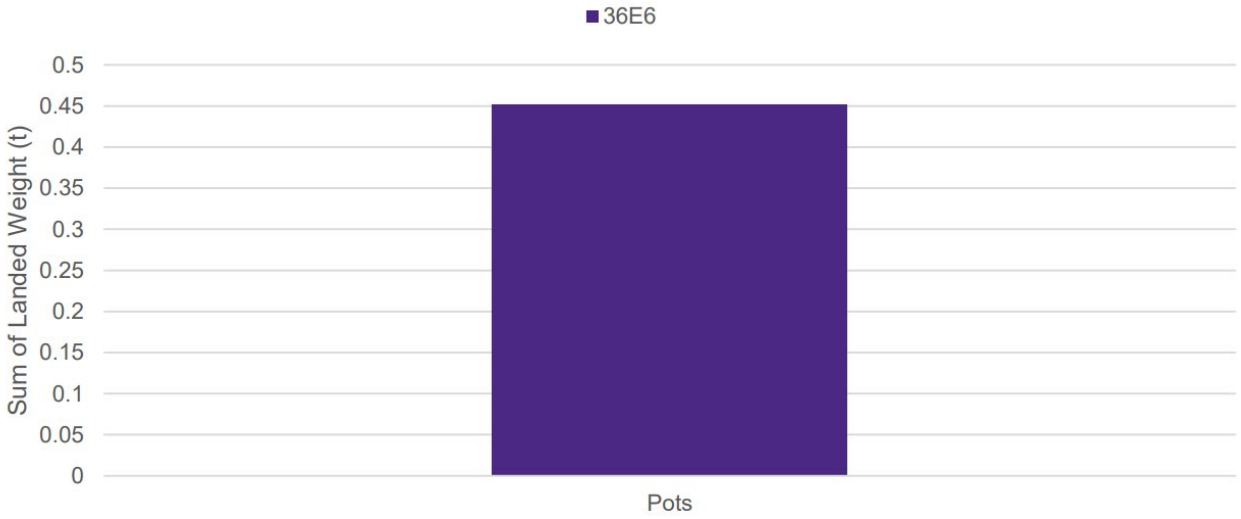


Figure 1.33: Total landings weight from French vessels by gear type (2006 to 2016) within the commercial fisheries study area[33].

[32] EU STECF, 2017

[33] EU STECF, 2017

1.4.6.14 The Irish fleet showed a variety of gear types, with the utilisation of dredges (targeting king and queen scallops) in ICES Rectangle 36E5 being the most prominent (Figure 1.34). Otter trawl, beam trawl, demersal seine, pelagic trawl and pots were also used by the Irish fleet within the commercial fisheries study area.

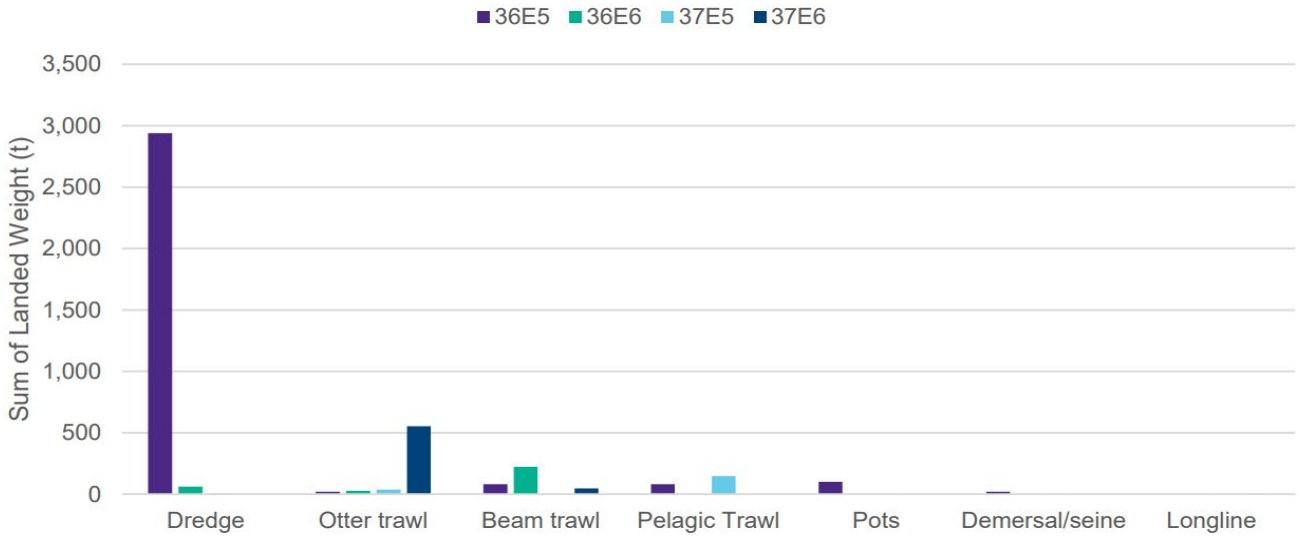


Figure 1.34: Total landings weight from Irish vessels by gear type (2006 to 2016) within the commercial fisheries study area[34].

1.4.6.15 The total landings caught by Dutch vessels in the commercial fisheries study area were significantly lower in comparison to Belgian and Irish vessels. Dredges and pelagic trawls were the dominant gear type used by the Dutch fleet, notably within ICES Rectangle 36E5 (Figure 1.35). No activity was recorded in ICES Rectangle 37E5.

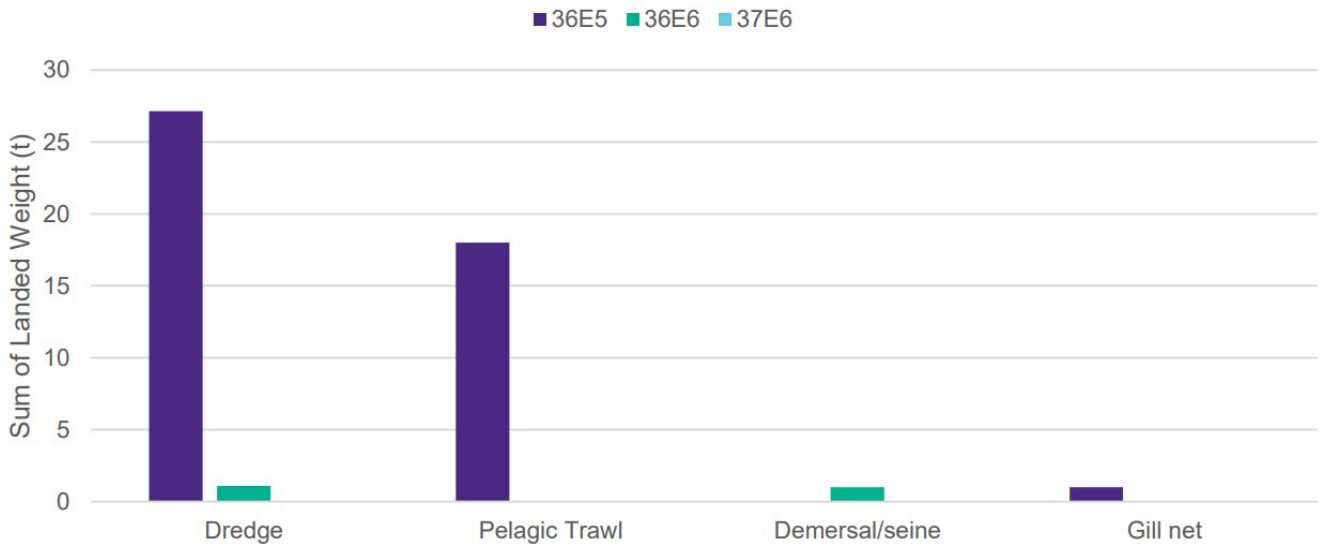


Figure 1.35: Total landings weight from Dutch vessels based on gear type (2006 to 2016) within the commercial fisheries study area[35].

[34] EU STECF, 2017

[35] EU STECF, 2017

1.4.6.16 It is worth commenting on the general implications of the results of the gear type analysis. The use of dredges and the predominance of landings using fishing vessels >10 m in length, indicates that the seabed supports a range of species that live on or just above the seabed, and the region is important for demersal fish and shellfish. Additionally, use of these gear types suggests that the seabed across the region has areas of seabed whose character is conducive to towing bottom fishing gear (i.e. sediment rather than rock).

1.4.6.17 As is evident from the landings data for UK, Isle of Man and non-UK vessels, there is a range of fleets targeting different fisheries across the commercial fisheries study area. The highest proportion of landings by weight from UK and Isle of Man vessels are caught by dredges, and pots and traps. For non-UK vessels, the highest proportion of landings by weight are caught by beam trawls and dredges. Further details on the gear types and vessels used within the key fisheries and fleets that operate across the commercial fisheries study area are described throughout the following sections.

Dredge

1.4.6.18 Dredges consists of rigid structures that target numerous species of shellfish through towing along the seabed (Figure 1.36 and Figure 1.37). Within the commercial fisheries study area, queen and king scallop are both caught by vessels deploying dredges, although due to the differences in behaviour between the two species, slightly different gear types may be used for them.

1.4.6.19 Scallop dredging is generally undertaken by larger vessels (>10 m in length), due to the engine capacity required to tow such a gear type along the seabed. Scallop are also caught by otter trawl vessels, as discussed in 1.4.6.26.

1.4.6.20 Restrictions on dredging activity differ between regional and national authorities and with distance of the activity from the shore. Vessels operating inshore are limited to the number of dredges, whereas vessels operating offshore may use a high number of dredges.

1.4.6.21 King scallop are generally fished by vessels operating Newhaven dredges which comprise a triangular frame with a toothed lead bar that penetrates the seabed to scare or flip king scallop up and into a collecting bag behind. A number of these dredges are pulled behind a spreading bar either side of a vessel. Scallop vessels operating within the area have been observed to have between approximately 12 to 36 dredges in total.

1.4.6.22 Generally, queen scallop outside of Isle of Man waters are targeted using skid dredges (or otter trawls as discussed in 1.4.6.26), which operate in a similar way as the toothed dredges targeting king scallop. However, with the skid dredges, a tooth bar is replaced with a ‘tickler chain’ which disturbs queen scallop resting on the seafloor, causing them to swim upwards into the water column where they can be caught by the dredge.

1.4.6.23 Tow directions are influenced by a range of factors, including the tide and weather. Within the Morgan Array Area, tows by dredge vessels are generally north to south (established via project-specific consultation). MacNab and Nimmo (2021) found that within the Irish Sea region, dredge vessels typically tow their gear at a speed of two to six knots and have a vessel length of 10 m to 25 m.

1.4.6.24 The penetration depth of a typical Newhaven dredge is approximately 3 to 30 cm, but this varies with sediment type (Kaiser et al., 1996; Grieve et al., 2014; Eigaard et al., 2016). MarineSpace, on behalf of the Applicant, engaged with fisheries groups via questionnaires on their gear penetration depth within the commercial fisheries study area. Results found that skid dredges targeting queen scallop have a maximum

penetration depth of 0.2 m, whereas dredges targeting king scallop have a maximum penetration depth of 0.3 m (although this is dependent on seabed substrate).

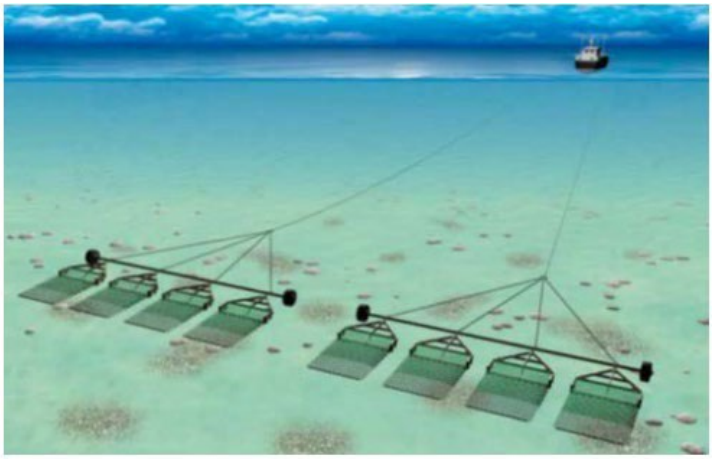


Figure 1.36: Typical dredge gear configuration[36].

Figure 1.37: Scallop dredge vessel example[37].

Demersal trawls

1.4.6.25 Demersal trawls consist of cone-shaped nets that are towed along the seabed to target demersal fish species (Figure 1.38 and Figure 1.39). The mouth of the trawl is spread and held open by a pair of adjacent trawl doors that possess bridles. These bridles are located between the wing-end of the net and the trawl doors, allowing for great areas of seabed to be trawled. These bridles can range from 0 m to 300 m in length, depending upon the seabed substrate and the target species. Demersal fish species are encouraged in-between the trawl doors, into the mouth of the trawl and along a

[36] Seafish 2022

[37] Marine Traffic 2022

funnel into the end (the 'cod-end') of the net. A range of net mesh sizes can be utilised to target different demersal species.

1.4.6.26 Otter trawl gears are used to target queen scallop, particularly by vessels from the Isle of Man. This method, similar to skid dredges, targets queen scallop which are more active swimmers than king scallop. Queen scallop are generally caught during the summer months when water temperatures are higher and they are most active (Jenkins et al., 2003). The typical towing speed varies with ground, tidal and weather conditions, but is generally between two to three knots (Bloor et al., 2015).

1.4.6.27 MacNab and Nimmo (2021) found that within the Irish Sea region, vessels deploying otter trawls typically tow their gear at a speed of two to six knots, while the majority of vessels have a vessel length of <10 m.

1.4.6.28 MarineSpace, on behalf of the Applicant, engaged with fisheries groups via questionnaires on their gear penetration depth within the commercial fisheries study area. Results found that vessels using otter trawls have a penetration depth ranging from approximately 0.05 m to 0.1 m.

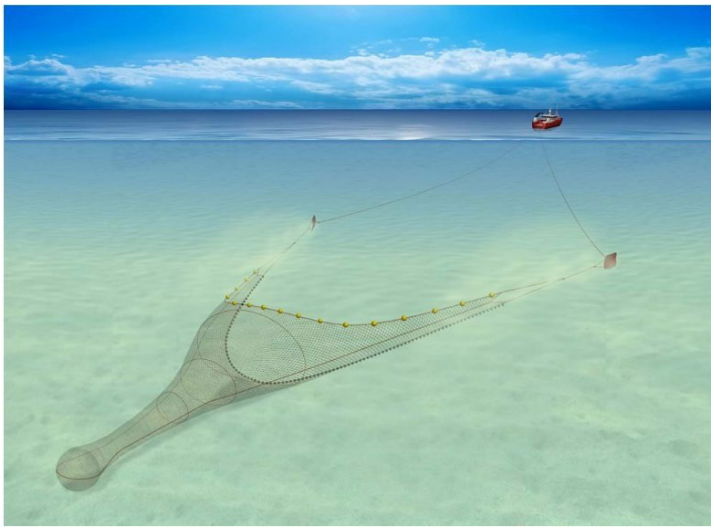


Figure 1.38: Typical demersal trawl gear configuration[38].

Figure 1.39: Example demersal trawl vessels[39].

[38] Seafish 2022

[39] Marine Traffic 2022

Pots and traps

1.4.6.29 The shape, size and number of pots and traps used by vessels, varies depending on the target species, size of vessel and seabed substrate. Surface markers used include cans, buoys and flagged dhans buoys (Figure 1.40).

1.4.6.30 Pots used to catch whelk often comprise a weighted plastic drum (Figure 1.41). The number of whelk pots deployed is, generally, higher than for crab and lobster on a like-for-like basis but depends on the exact area fished and vessel size. Whelk vessels operating offshore (Figure 1.41) in the commercial fisheries study area may be working strings of approximately 100 pots, whereas vessels targeting crab and lobster, will have strings of approximately 25 to 50 pots.

1.4.6.31 Parlour pots are generally utilised for the capture of crab and lobster. The design of these pots typically consists of a steel rod, D-shaped in sections enclosed in netting and protected with rubber strips.

1.4.6.32 MacNab and Nimmo (2021) found that within the Irish Sea region, vessels deploying pots and traps typically haul their gear at a speed of 0 to 9 knots and have vessel lengths of both >10 m and ≤10 m.

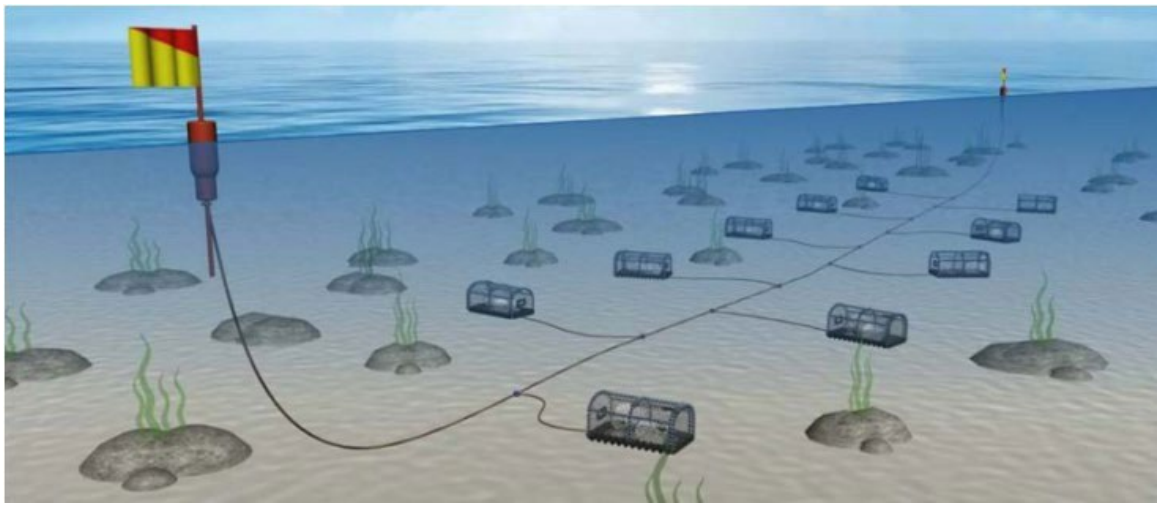


Figure 1.40: Typical potting gear configuration[40].

Figure 1.41: Typical whelk pot and whelk vessel[41].

Beam trawls

1.4.6.33 Beam trawls consist of nets that are held open by a heavy tubular steel beam, which is towed along the seabed. Most beam trawls tow two beams at a time (Figure 1.42). Beam trawling catches a wide range of bottom dwelling species and has the potential to catch a variety of non-target by-catch.

1.4.6.34 Beam trawls may use tickler chains, which are attached at the front of the net and slide along the seabed to disturb species of fish within its path, encouraging them to rise up into the net behind.

[40] Seafish 2022

[41] Seafish, 2022 and MarineTraffic, 2022

1.4.6.35 MacNab and Nimmo (2021) found that within the Irish Sea region, vessels deploying beam trawls typically tow their gear at a speed of 3.5 to 8 knots, while the majority of vessels have a vessel length of <10 m (Figure 1.43).

1.4.6.36 Towing directions vary depending on a range of factors, including tidal and weather conditions.

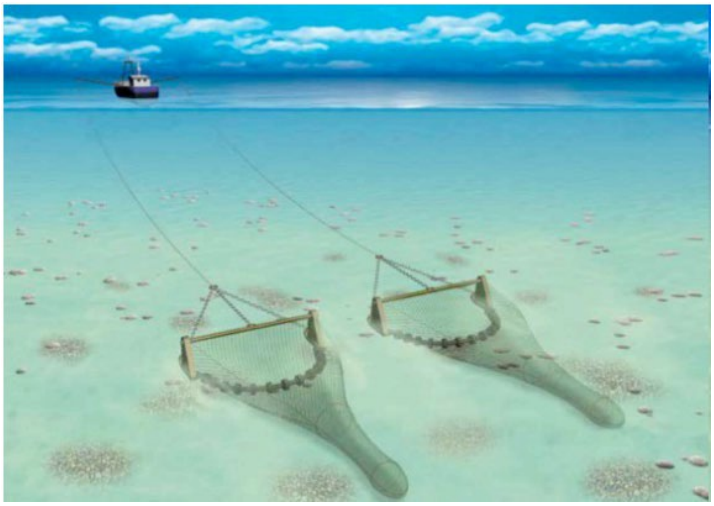


Figure 1.42: Typical beam trawl gear configuration[42].

Figure 1.43: Beam trawl vessel example[43].

1.4.7 Ports

1.4.7.1 Figure 1.44 shows fish landings by value (£) into UK and Isle of Man regional ports between 2009 to 2020 (MMO, 2021b). Within the commercial fisheries study area, Fleetwood had the highest value of landings in England between 2009 and 2020; landings into other English ports fluctuated across the time period; landings into the Isle of Man were also high, notably for Douglas, Peel, Port St Mary and Ramsey.

[42] Seafish 2022

[43] Seafish 2022

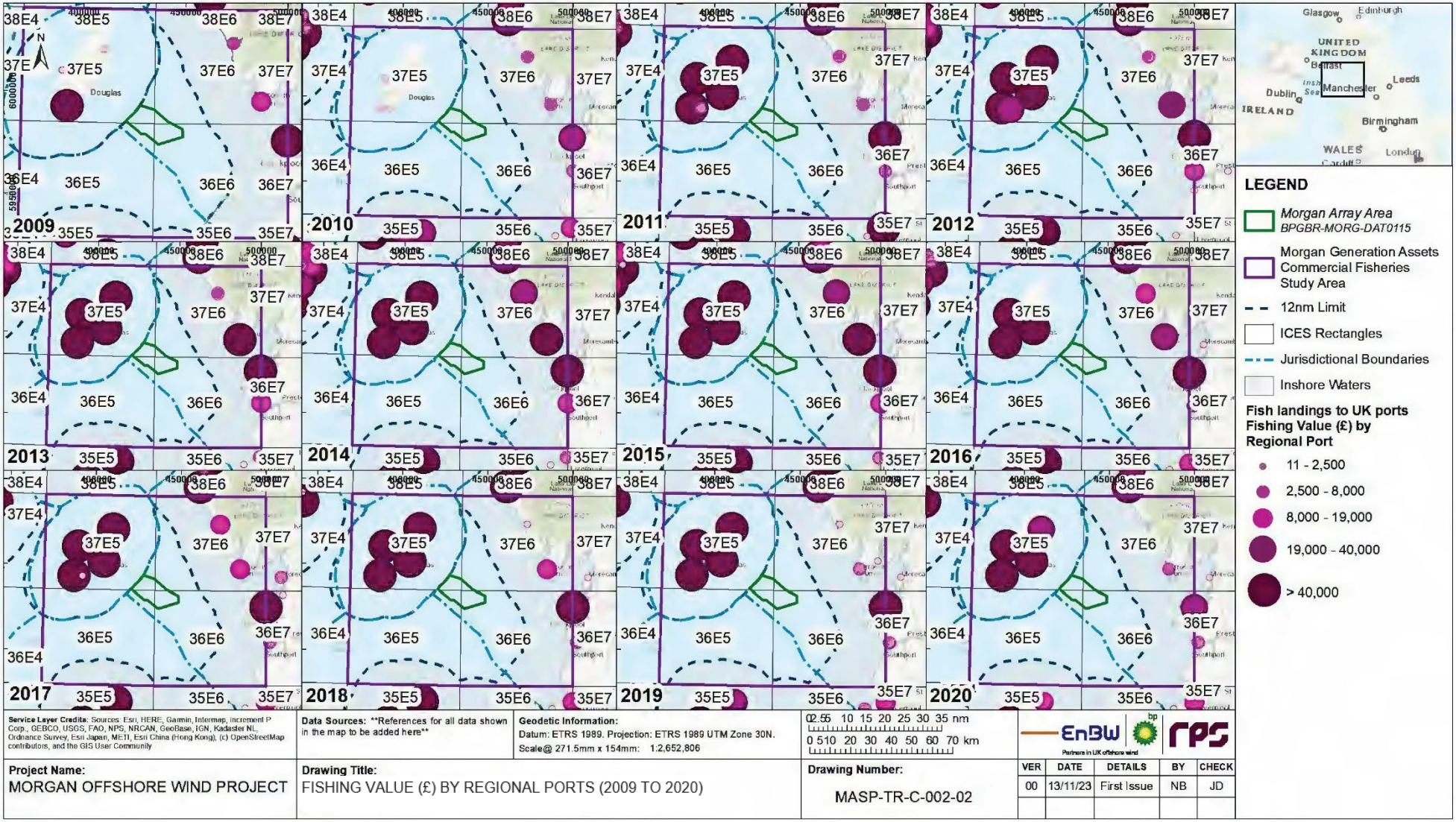


Figure 1.44: Fishing value (£) by regional ports (2009 to 2020)[44].

[44] MMO, 2021a

1.4.7.2 Landings data compiled by the MMO (MMO, 2023b) was reviewed for the period 2012 to 2022 and filtered to just show landings into ports within the commercial fisheries study area. The landings dataset provides summaries of fishing activity for both UK commercial fishing vessels landing into the UK and abroad, as well as foreign registered commercial fishing vessels landing into the UK, that are deemed to have been fishing within a specified calendar year.

1.4.7.3 Feedback from project specific consultation with fisheries stakeholders indicated that a large proportion of the shellfish caught within the Morgan Array Area, and wider region, is landed into Fleetwood and Douglas. Therefore, landings into Fleetwood and Douglas have been analysed in this section.

1.4.7.4 Data was sorted by port and filtered to analyse details within different vessel size class, species group and nationality of vessels. The data was further sorted by species to then analyse the most important commercial species, in terms of landed weight and value, into each port. This enabled a more detailed analysis of fishing activity from ports within the commercial fisheries study area which are most likely to be affected by the Morgan Generation Assets.

Fleetwood

1.4.7.5 Vessels >10 m were dominant, in terms of landed weight, at the port of Fleetwood. Shellfish was the key species group landed into Fleetwood, with a total landed weight between 2012 and 2022 of 6,372 t (Figure 1.45). English vessels landed the majority of shellfish species (Welsh and Scottish vessels also made notable landings of shellfish species). Vessels >10 m from England also landed demersal species into Fleetwood, but total landed weights between 2012 to 2022 were significantly less than those of shellfish species.

1.4.7.6 Landed weights in the ≤10 m vessel size class were lower, with demersal and shellfish species landed mostly by English vessels. For both vessel size categories, the pelagic species group was the least dominant by weight and value of landings. No landings of pelagic species were recorded between 2012 to 2022 for vessels >10 m in length.

1.4.7.7 A total of 51 species were landed at Fleetwood during 2012 to 2022, with whelk the dominant species in terms of landed weight and value (total value of £6,973,434) (Figure 1.46). This reflects the role of the whelk fishery which operates out of Fleetwood and aligns with feedback from consultation. The next top species in terms of landed weight were lesser spotted dogfish, plaice, thornback ray and crab.

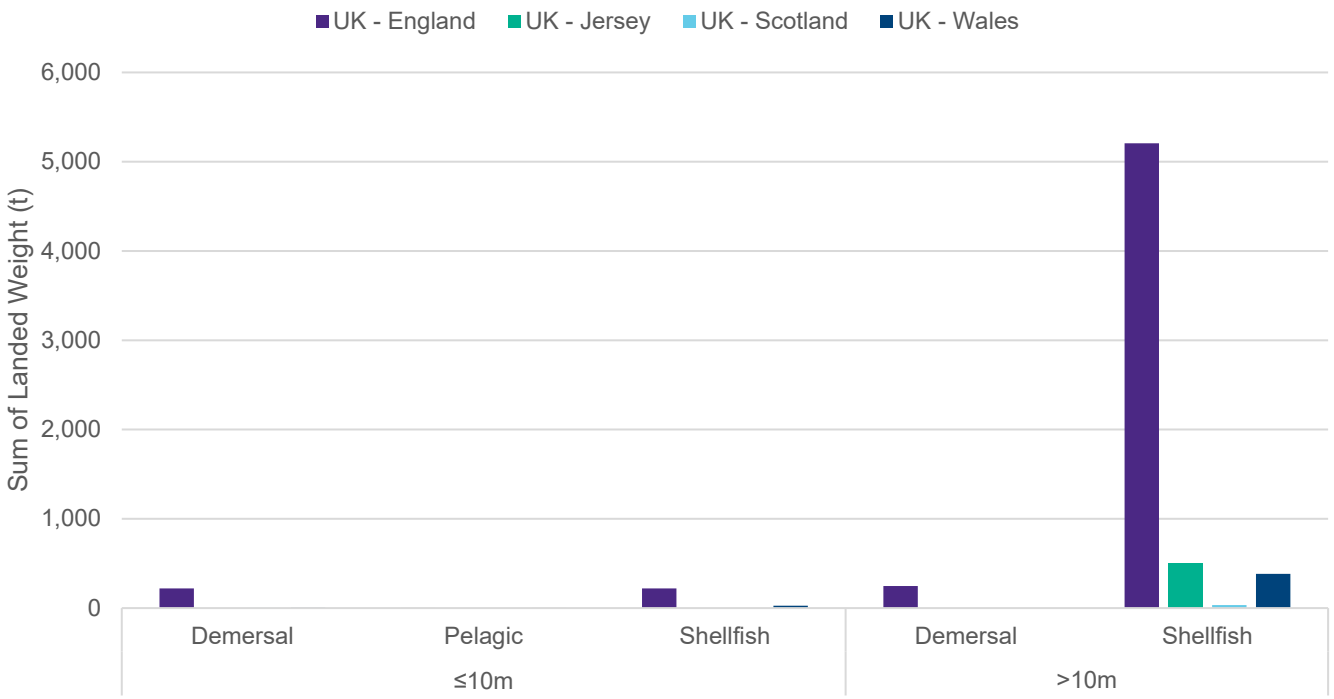


Figure 1.45: Total landings into Fleetwood (2012 to 2022) displayed by species group, vessel length and nationality[45].

Figure 1.46: Total weight and value of landings into Fleetwood port (2012 to 2022) displayed by the top 10 species by weight[46].

[45] MMO 2023b

[46] MMO 2023b

Douglas

1.4.7.8 Scottish and Isle of Man vessels >10 m dominated the landed weight at the port of Douglas. Shellfish was the key species group landed into Douglas, with a total landed weight between 2012 and 2022 of 29,766 t (Figure 1.47); landings of demersal and pelagic species were low. Isle of Man vessels dominated the ≤10 m shellfish landings into Douglas. For the >10 m landings into Douglas, the highest landings were by Isle of Man vessels, followed by Scottish vessels. English, Northern Irish and Welsh vessels also landed shellfish species into Douglas, but total landed weights between 2012 to 2022 were significantly less.

1.4.7.9 A total of 47 species were landed at Douglas during 2012 to 2022. Queen scallop were the dominant species in terms of landed weight and value (Figure 1.48), followed by king scallop and whelk: these three species made up 99% of the landed weight into Douglas. This reflects the role of the scallop and whelk fisheries which operate out of Douglas and within the commercial fisheries study area, which aligns with feedback from consultation. The next top species in terms of landed weight were crab, lobster, lesser spotted dogfish, mackerel, unidentified dogfish, squid and pollack.

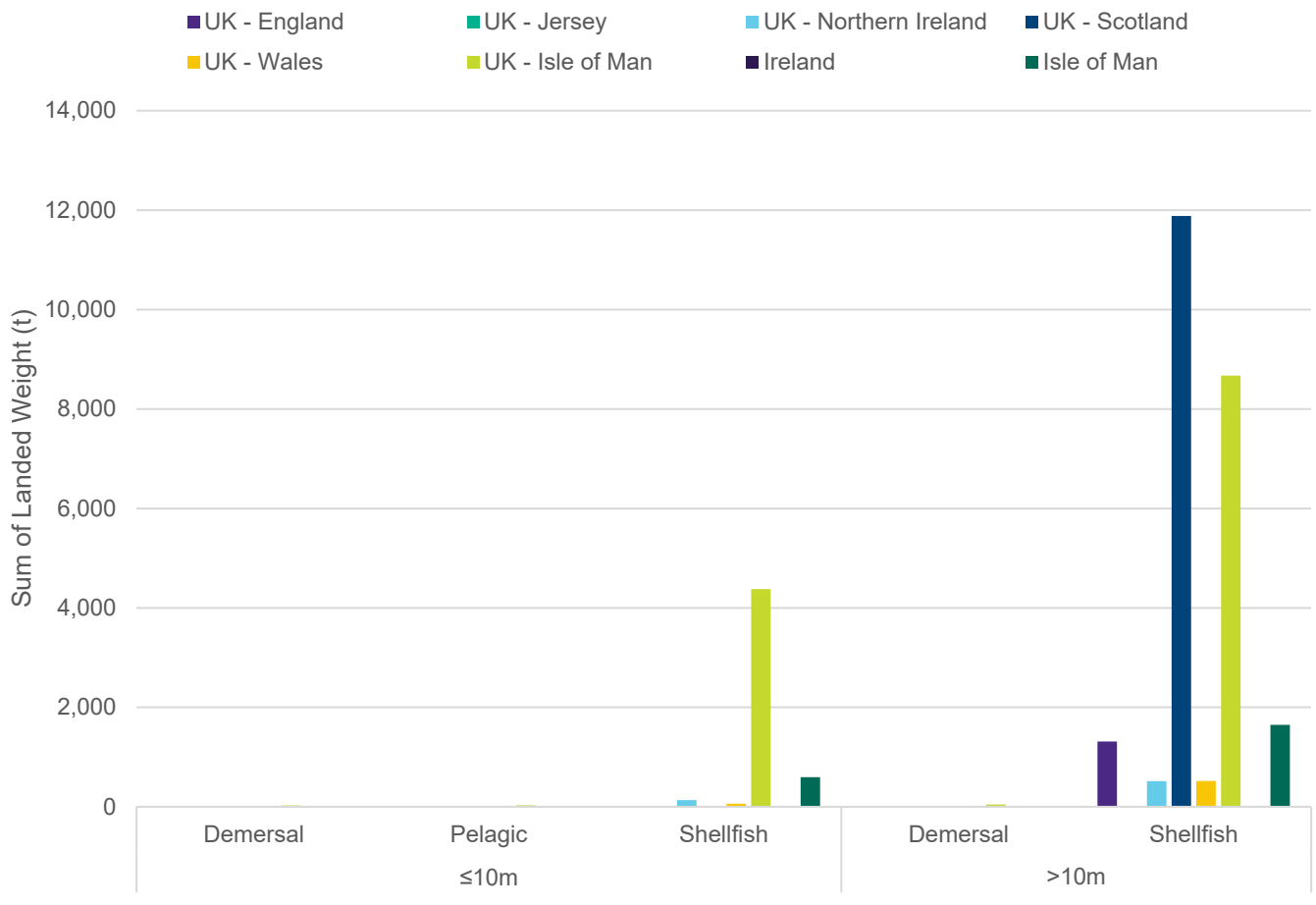


Figure 1.47: Total landings into Douglas (2012 to 2022) displayed by species group, vessel length and nationality[47].

[47] MMO 2023b

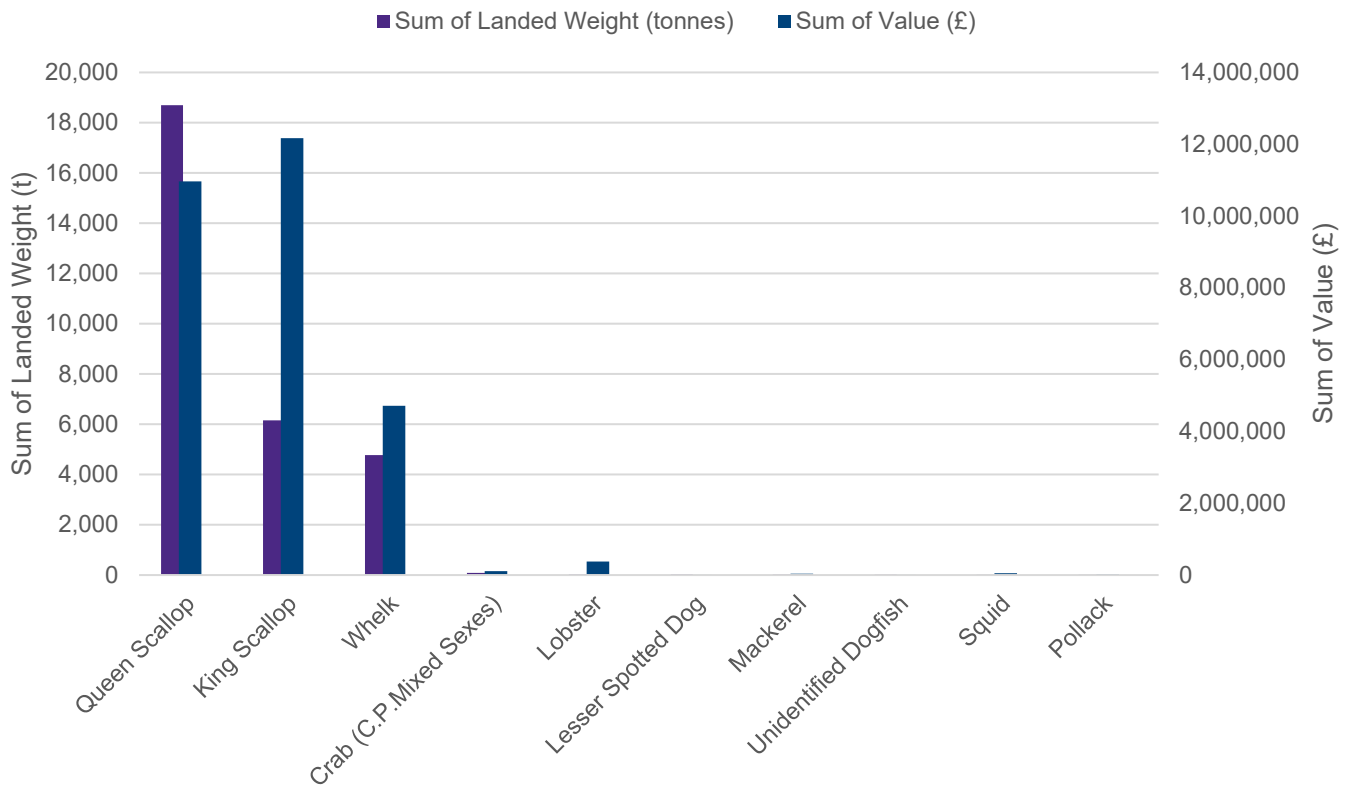


Figure 1.48: Total weight and value of landings into Fleetwood port (2012 to 2022) displayed by the top 10 species by weight[48].

1.4.8 Spatial distribution of fishing activity

VMS data by gear type

1.4.8.1 VMS data between 2009 to 2020 was collated from the MMO and ICES to provide an overview of the spatial extent of fishing activity within the commercial fisheries study area. The MMO dataset only captures data for ≥15 m vessels and the ICES dataset is from vessels >12 m in length. Smaller vessels are not captured within these datasets, so additional datasets have been used to provide a context for their activity. Fishing effort was provided in kWh, which has been calculated by multiplying the time associated with each VMS report, by the engine power of the vessel concerned at the time of activity.

1.4.8.2 Both the MMO and ICES datasets are split by the ICES subrectangle and have been categorised into aggregated gear groups (Figure 1.49 to Figure 1.52). The ICES data was only for mobile bottom contacting gear types, so pots and traps were not included. MMO data by gear type for pots has been analysed, but data were only available for the period 2016 to 2020.

1.4.8.3 Figure 1.49 illustrates that potting vessels (≥15 m) were active across the commercial fisheries study area. Higher intensities of potting activity were observed between Barrow-in-Furness and the English-Welsh maritime boundary, and north of the Isle of Man. Within the commercial fisheries study area, levels of potting were generally

[48] MMO, 2020b

higher in the east. Feedback from project specific consultation with fisheries stakeholders has suggested that this activity is mostly from whelk vessels. Potting activity fluctuated across the time period studied. Activity by <15 m static gear vessels is included in Figure 1.55, Figure 1.61, Figure 1.62, Figure 1.66, the landings data and stakeholder feedback.

1.4.8.4 Over the period 2009 to 2020, beam trawl (vessels >12 m) activity within the commercial fisheries study area was focused within two discrete areas (Figure 1.50). One of these areas was located southwest of the Isle of Man. The other area was between the 12 nm limit of England and the Morgan Array Area, and sporadically overlapped with the east part of the Morgan Array Area. Consulted fisheries stakeholders have indicated that beam trawl vessels from the southwest of the UK, and from Belgium, are active within the Morgan Array Area and the wider region during the Spring, with these vessels predominantly targeting sole. Beam trawl activity fluctuated across the time period studied.

1.4.8.5 Figure 1.51 illustrates that dredge vessels (>12 m) were active across the commercial fisheries study area. These dredge vessels are largely from Ireland, the Isle of Man, Northern Ireland and Scotland (section 1.4.6). Highest intensities of these vessels were observed within the Isle of Man 12 nm limit, and to the southwest of the Morgan Array Area; high levels of activity overlapped with the west part of the Morgan Array Area. This is supported by feedback from project-specific consultation which highlighted that the west corner of the Morgan Array Area is a particularly important queen scallop fishing ground. It is evident that dredge activity and intensity varies by year, which also corroborates information from fisheries stakeholders, suggesting that the fishery is cyclical over seven to eight year periods.

1.4.8.6 Figure 1.52 illustrates that activity by otter trawl vessels (>12 m) was highest in the west and northeast parts of the commercial fisheries study area, with an area of moderate otter trawl activity also located within the east part of the Isle of Man territorial waters. Activity within the Morgan Array Area was generally limited to the northwest part, which is likely Isle of Man vessels targeting scallop. The higher intensity area off the Cumbrian coast shows the Nephrops grounds (Figure 1.52), which do not overlap with the Morgan Array Area. Otter trawl vessels from Belgium, England, Isle of Man, Northern Ireland, Scotland and Wales were active within the commercial fisheries study area (section 1.4.6). Otter trawl activity fluctuated across the time period studied. Feedback from consultation suggested that otter trawl vessels from the Isle of Man target queen scallop, generally between July and October.

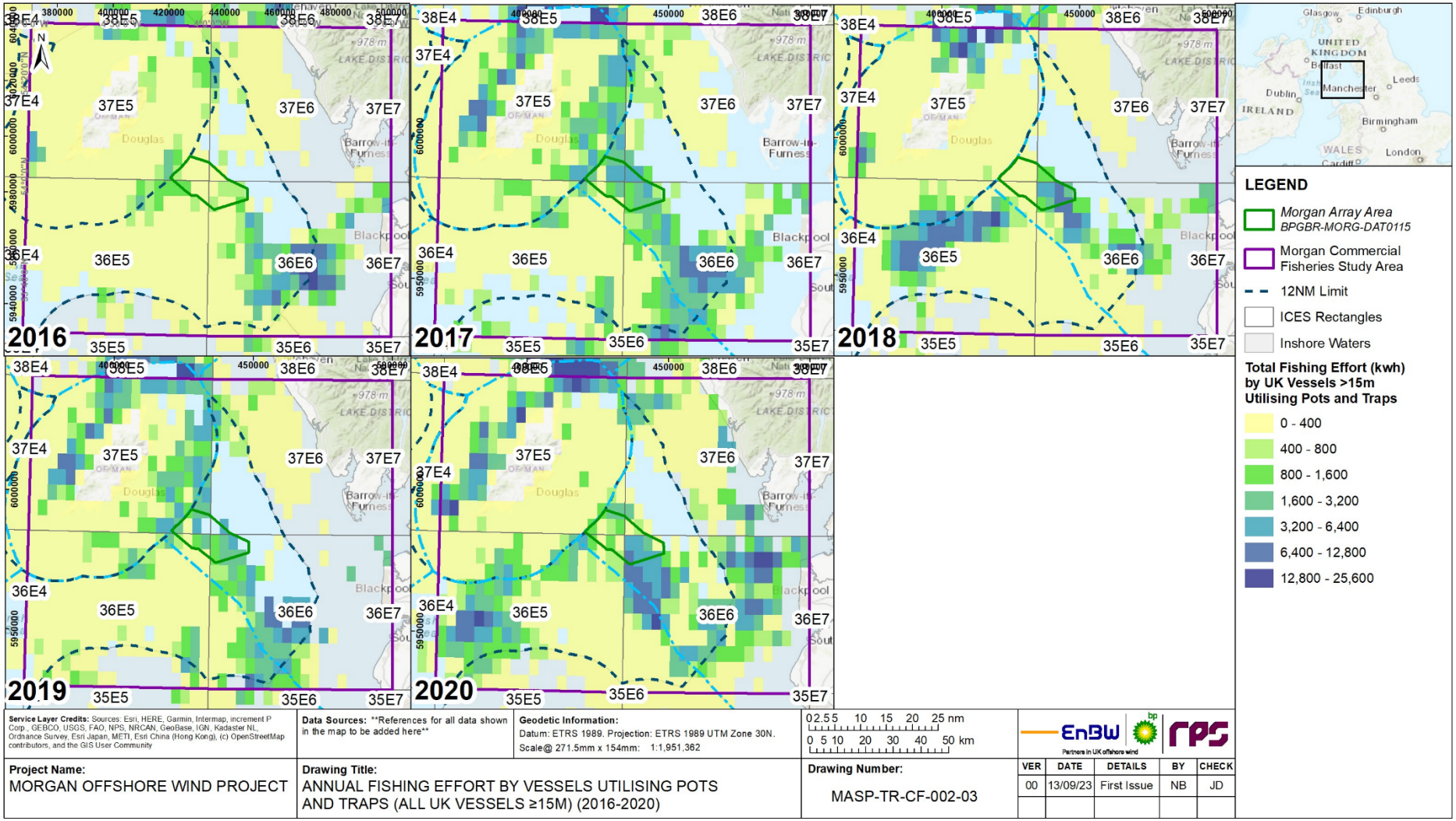


Figure 1.49: Annual fishing effort by vessels utilising pots and traps gear (UK vessels ≥15 m and Isle of Man vessels) (2016 to 2020)[49].

[49] MMO, 2021b

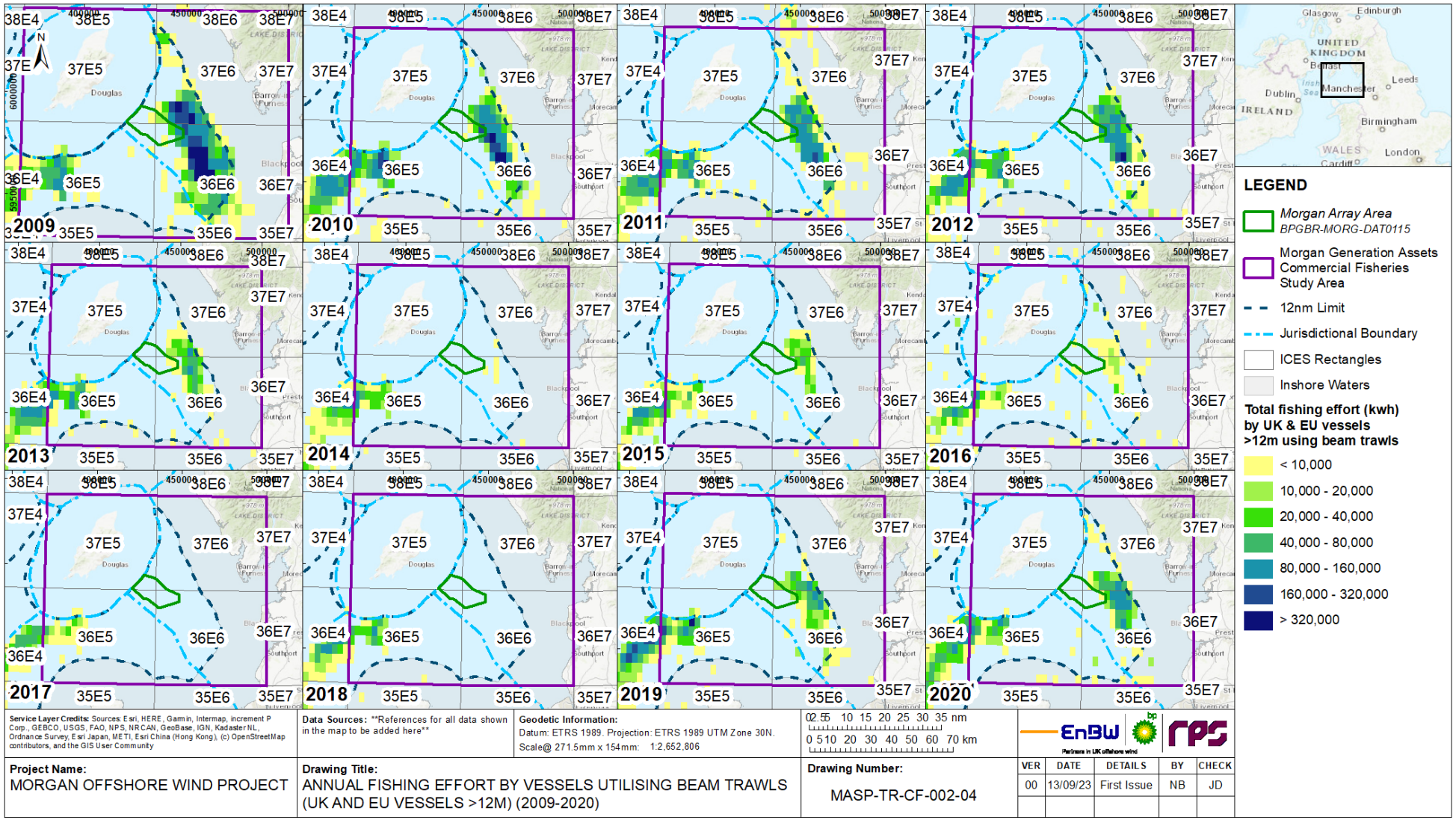


Figure 1.50: Annual fishing effort by vessels utilising beam trawls (UK and EU vessels >12 m) (2009 to 2020)[50].

[50] ICES, 2020

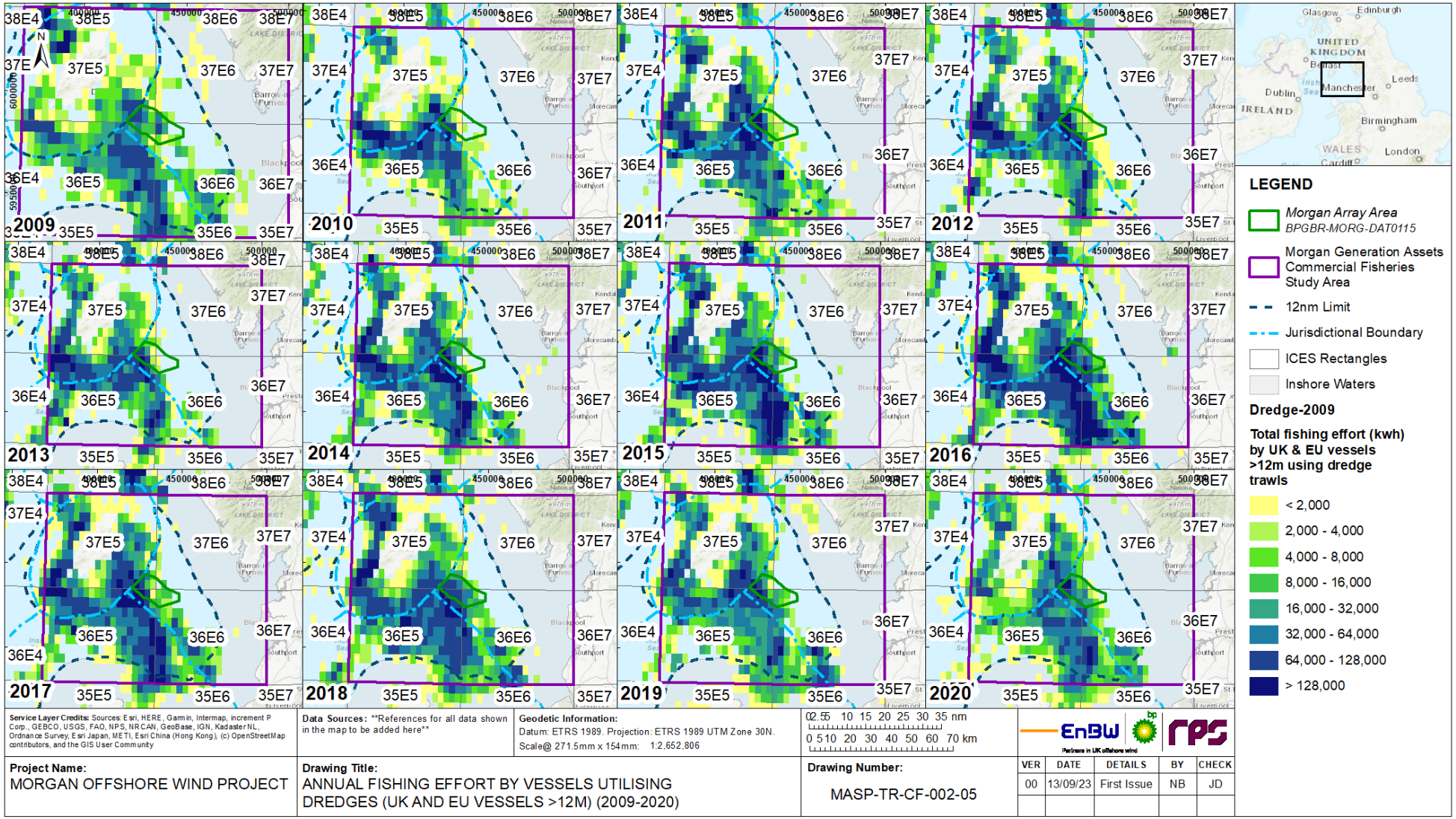


Figure 1.51: Annual fishing effort by vessels utilising dredges (UK and EU vessels >12 m) (2009 to 2020)[51].

[51] ICES, 2020

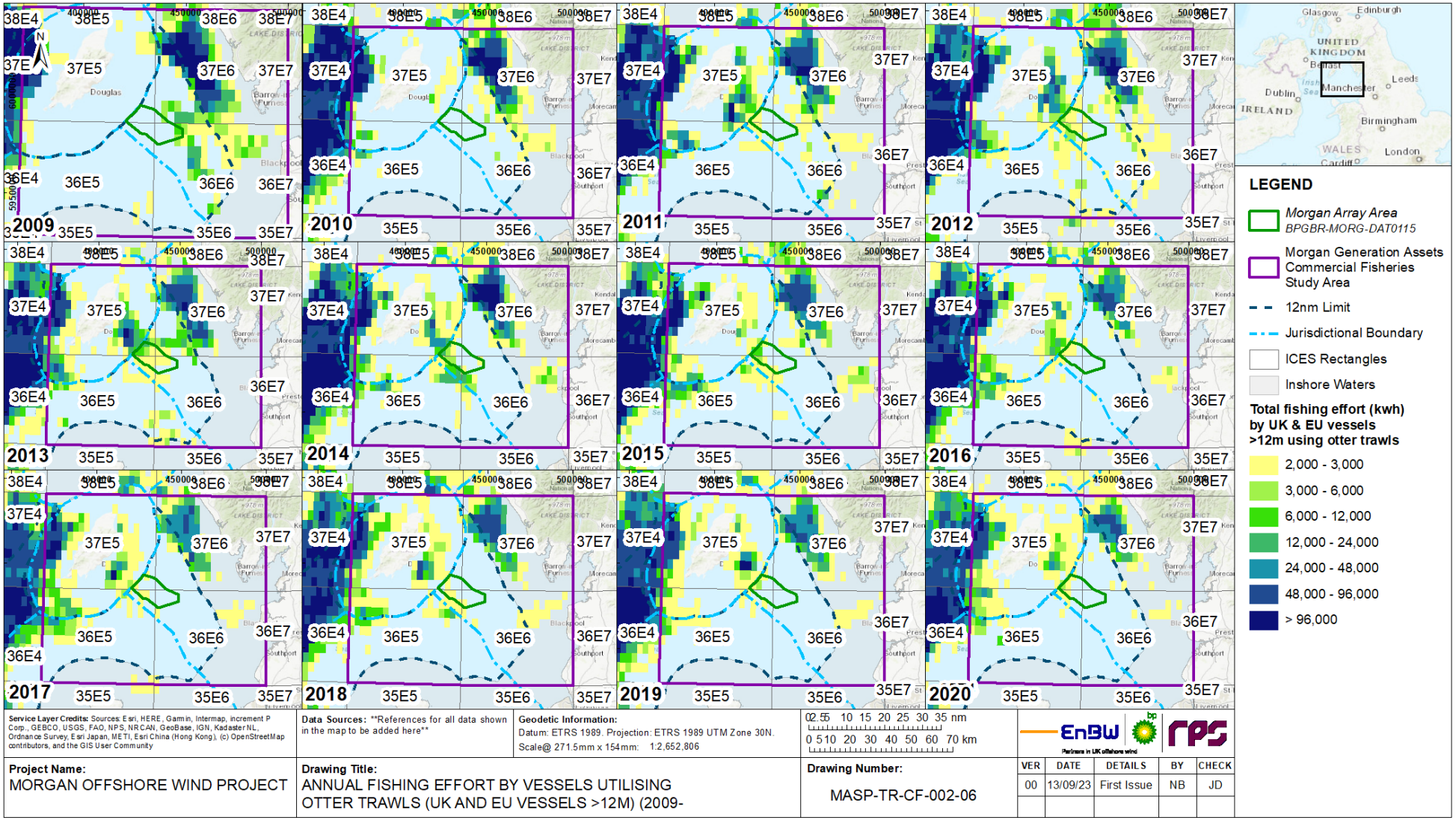


Figure 1.52: Annual fishing effort by vessels utilising otter trawls (UK and EU vessels >12 m) (2009 to 2020)[52].

[52] ICES, 2020

Scallop grounds – ICES Scallop Assessment Working Group and consultation feedback

1.4.8.7 The ICES Scallop Assessment Working Group (WGSCALLOP) is one of numerous technical fisheries Working Groups established by ICES. WGSCALLOP specifically seeks to develop and improve stock assessment methods for scallop and increase understanding of scallop populations and fisheries.

1.4.8.8 WGSCALLOP mapped king scallop fishing activity in the Irish Sea based on VMS data from 2009 to 2019; the data displayed is preliminary, and in the process of being verified by ICES, so has been used to supplement VMS data. This information includes historical data, so may include areas where there is limited fishing intensity (particularly on the edges of the polygons). The VMS data analysed included information on vessels from England, Guernsey, Ireland Jersey, Isle of Man, Scotland and Northern Ireland. This data has been interpreted with care due to the low-medium confidence assigned.

1.4.8.9 Figure 1.53 indicates that the king scallop fishery in the Irish Sea overlaps with a large proportion of ICES Rectangles 36E5 and 37E5, the southwest part of 36E6 and only a small part of the southwest part of 37E6. Vessels engaging in the king scallop fishery from the UK showed the largest spatial extent of activity and overlapped with the west part of the Morgan Array Area. Irish vessels overlapped with the west part of the Morgan Array Area. There was a minor overlap of Northern Irish vessel activity within a discrete area of the northwest part of the Morgan Array Area.

1.4.8.10 This information is generally consistent with feedback from project specific consultation, which suggested that the king scallop grounds cover a larger area than the queen scallop grounds in the commercial fisheries study area (discussed below).

1.4.8.11 VMS data and feedback from fisheries stakeholders (from Scotland and the Isle of Man) indicates that the west part of the Morgan Array Area is the most important area for vessels targeting queen scallop; these areas are displayed in Figure 1.54 which has been produced through close liaison with Scottish fisheries stakeholders and is presented as a guide to inform this technical report. Other parts of the Morgan Array Area and areas beyond the boundary to the north west are of lesser importance for commercial queen scallop fishing but are recognised as important spawning areas.

1.4.8.12 Further information on the ecology of scallop is detailed in Volume 4, Annex 3.1: Fish and shellfish ecology technical report of the Environmental Statement.

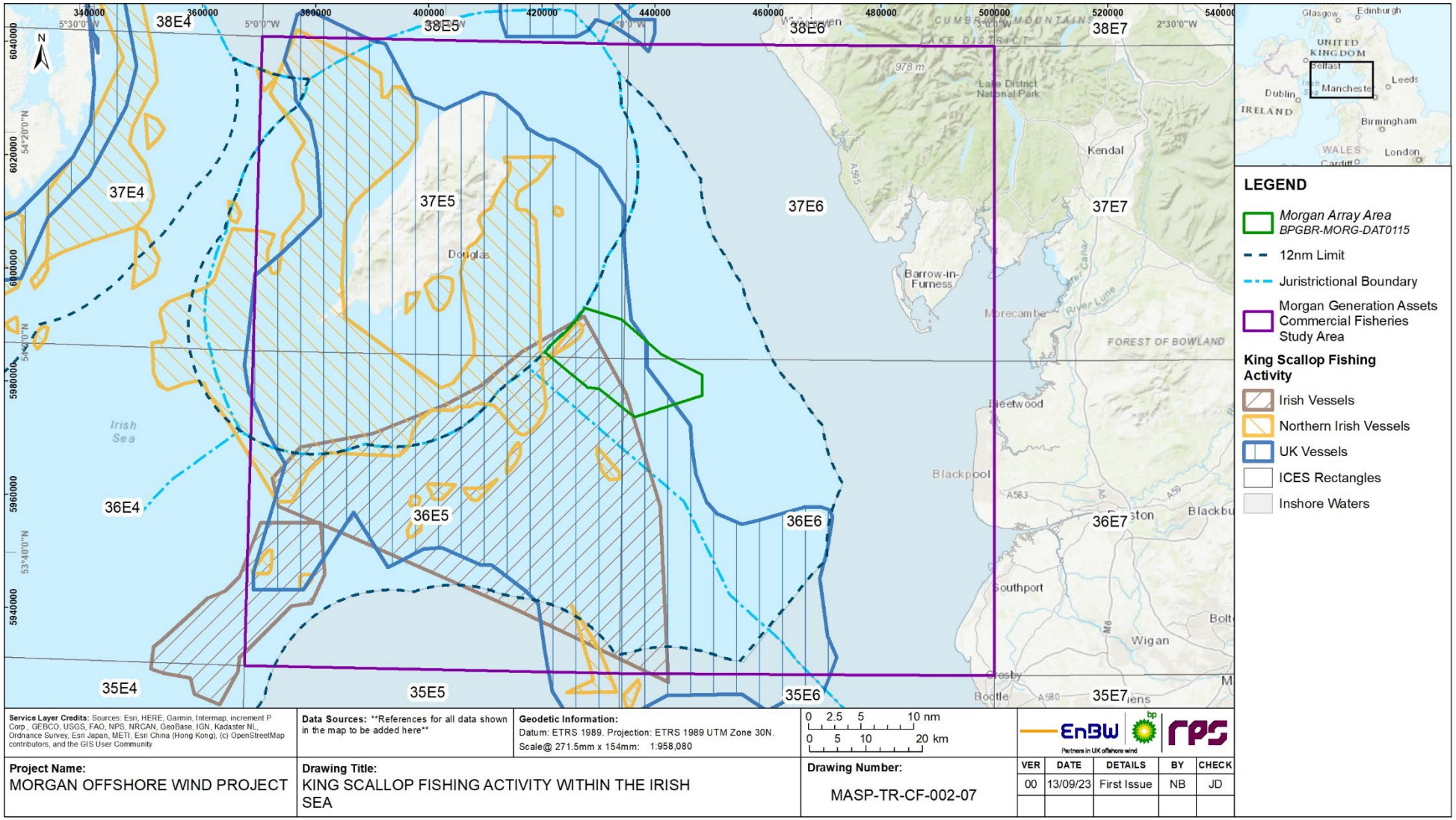


Figure 1.53: King scallop fishing activity within the Irish Sea[53].

[53] ICES (2020a)

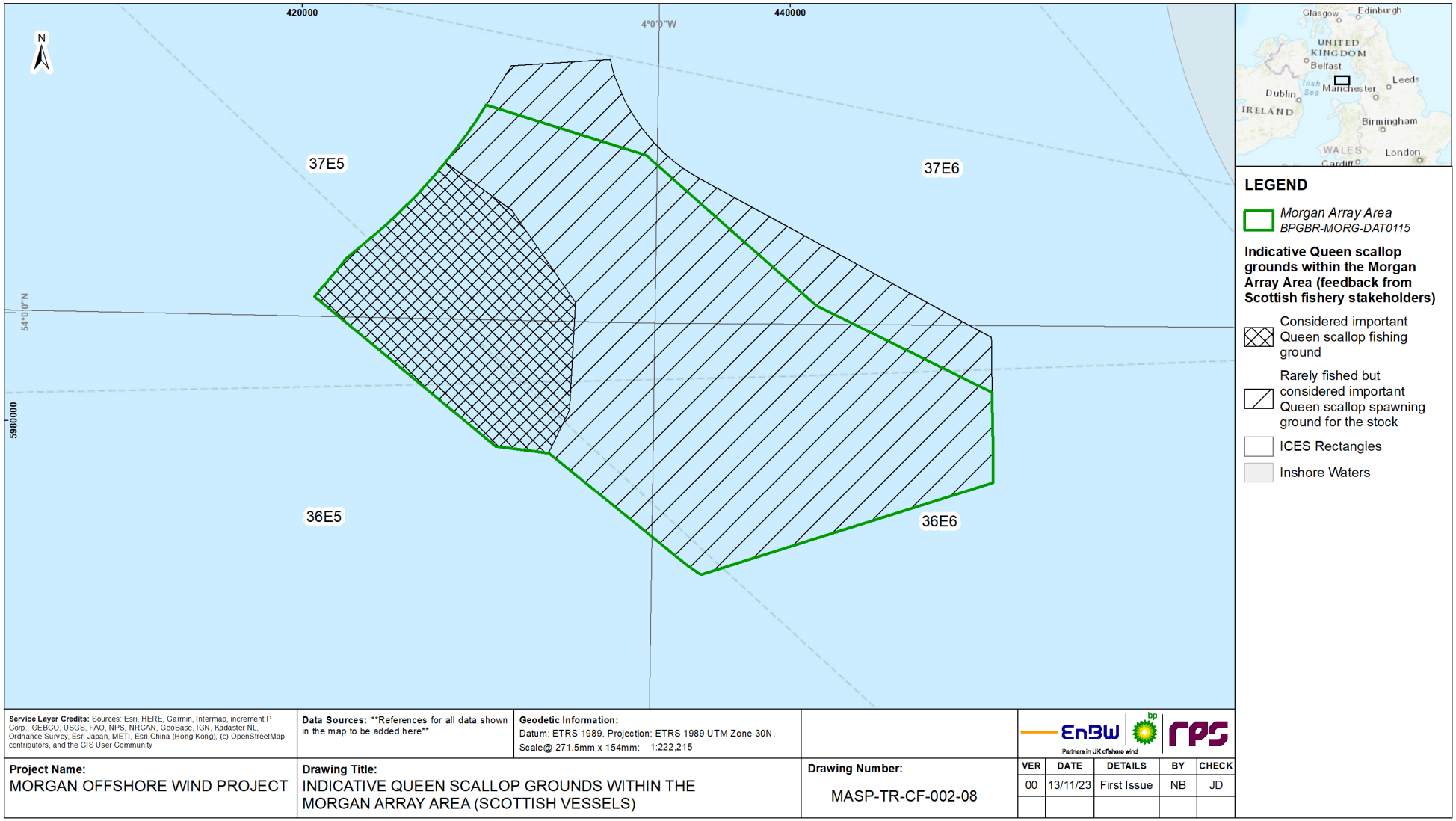


Figure 1.54: Indicative Queen scallop grounds fished by Scottish vessels within the Morgan Array Area[54].

[54] WCSP (2022)

UK inshore fishing intensity

1.4.8.13 Cefas undertook a study between 2010 and 2012 to provide an improved understanding of inshore fisheries activity (vessels <15 m), with input from the Inshore Fisheries and Conservation Authorities, Welsh Government and the MMO. The dataset is based on sightings and surveillance effort. The various limitations of the data are outlined in section 1.3.1. The maps are purely indicative in nature but have been used to supplement the VMS data which does not capture smaller fishing vessels. The indicative fishing activity illustrated has been cross-referenced with knowledge of the local fleets gathered through informal consultations.

1.4.8.14 Figure 1.55 indicates that static gear activity (<15 m vessels) was relatively low within the inshore parts of the commercial fisheries study area. This generally aligns with feedback from project-specific consultation and information collected through site-specific surveys (section 1.4.9).

1.4.8.15 Figure 1.56 indicates that mobile gear activity (<15 m vessels) within the inshore areas was highest off the Cumbrian coast and the Welsh coast, which is also evident within the VMS data.

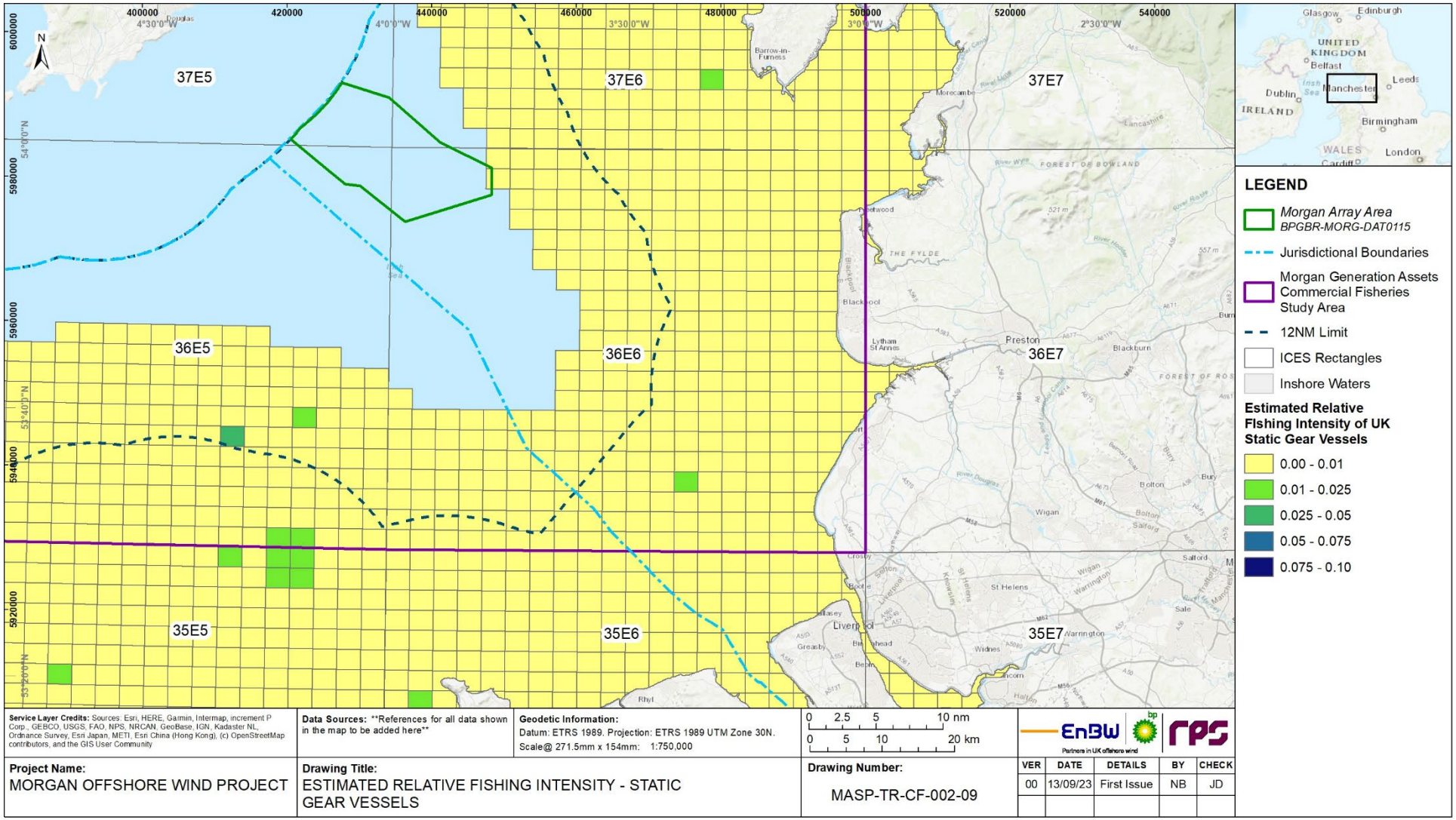


Figure 1.55: Estimated relative fishing intensity – static gear vessels[55].

[55] CEFAS, 2014

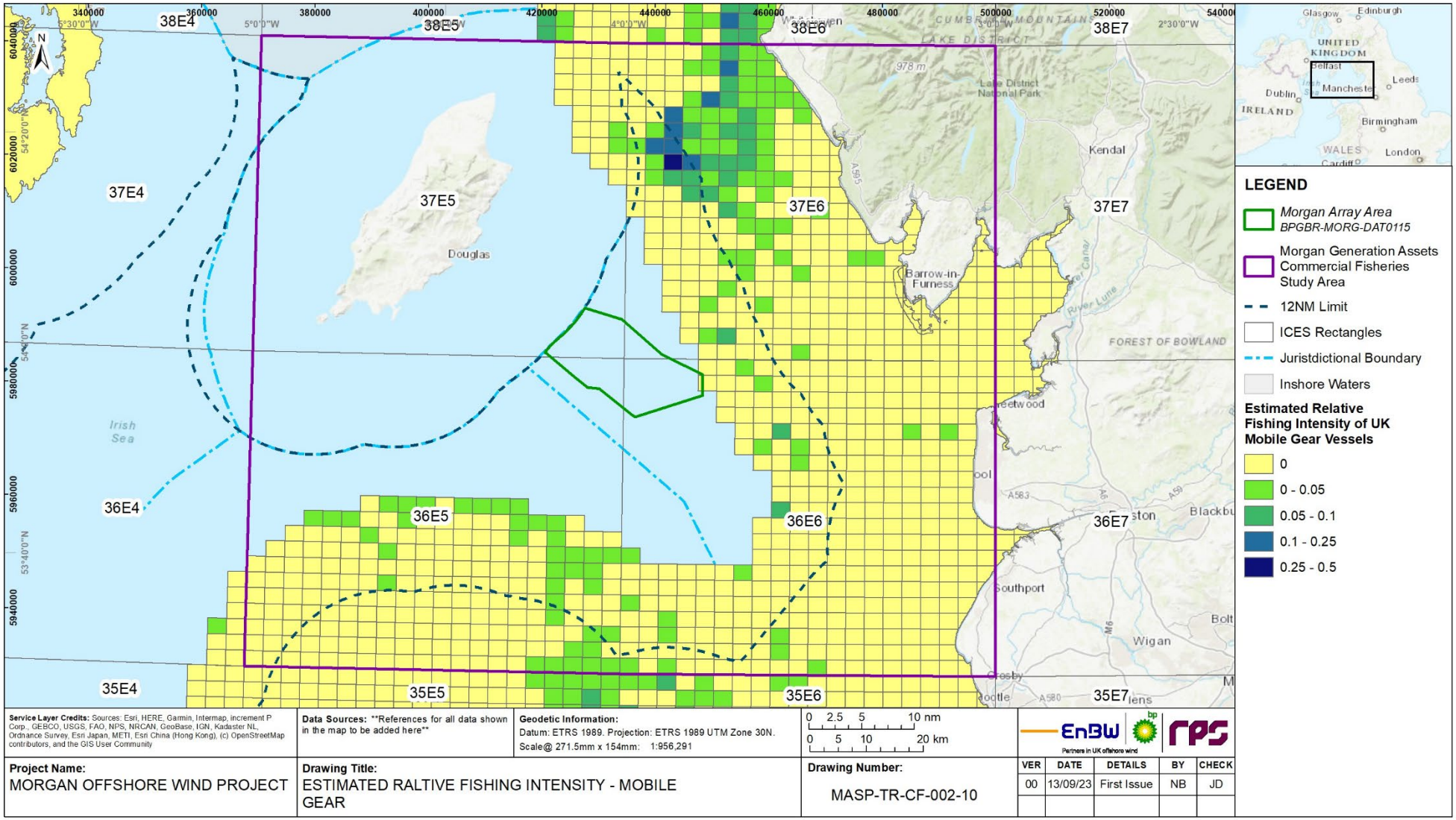


Figure 1.56: Estimated relative fishing intensity – mobile gear vessels[56].

[56] CEFAS, 2014

Isle of Man king scallop dredge and queen scallop trawl/dredge swept area data

1.4.8.16 King scallop and queen scallop swept area (km^2) data between 2017 to 2023 was collated from the Isle of Man Government to provide an overview of the spatial extent of fishing activity within and around Manx territorial waters. All licenced scallop fishing vessels, regardless of size and country of origin, are required to operate a VMS system in Manx Territorial Waters. As such, data for all king scallop (dredge) and queen scallop (otter trawl/dredge) vessel sizes are available, with the dataset not being limited to vessels >15 m, or >12 m in length. The dataset provided are split by IS Boxes, which are used to collect data for the Isle of Man Nest Forms Electronic Daily Scallop Catch Return.

1.4.8.17 Figure 1.57 illustrates that dredge vessels targeting king scallop were active across the Manx Territorial Sea, at varying intensities (2017 to 2023). Highest intensities can generally be observed within the Isle of Man 12 nm limit and to the west of the Morgan Array Area; high levels of activity overlapped with the northwestern part of the Morgan Array Area. Lowest levels of activity can be observed beyond the Isle of Man 12 nm limit. It is evident that dredge activity and intensity varies by year, which also corroborates information from fisheries stakeholders, suggesting that the fishery is cyclical over seven to eight year periods.

1.4.8.18 Figure 1.58 illustrates that activity by dredge and otter trawl vessels targeting queen scallop was generally highest in the south eastern section of ICES Rectangle 37E5, overlapping with the northwestern part of the Morgan Array Area (2018 to 2022). Other areas of relatively high activity can be observed within the Isle of Man Territorial Sea, particularly in areas to the north and south of the Isle of Man. Lowest levels of activity can be observed beyond the Isle of Man 12 nm limit. Activity fluctuated across the time period studied.

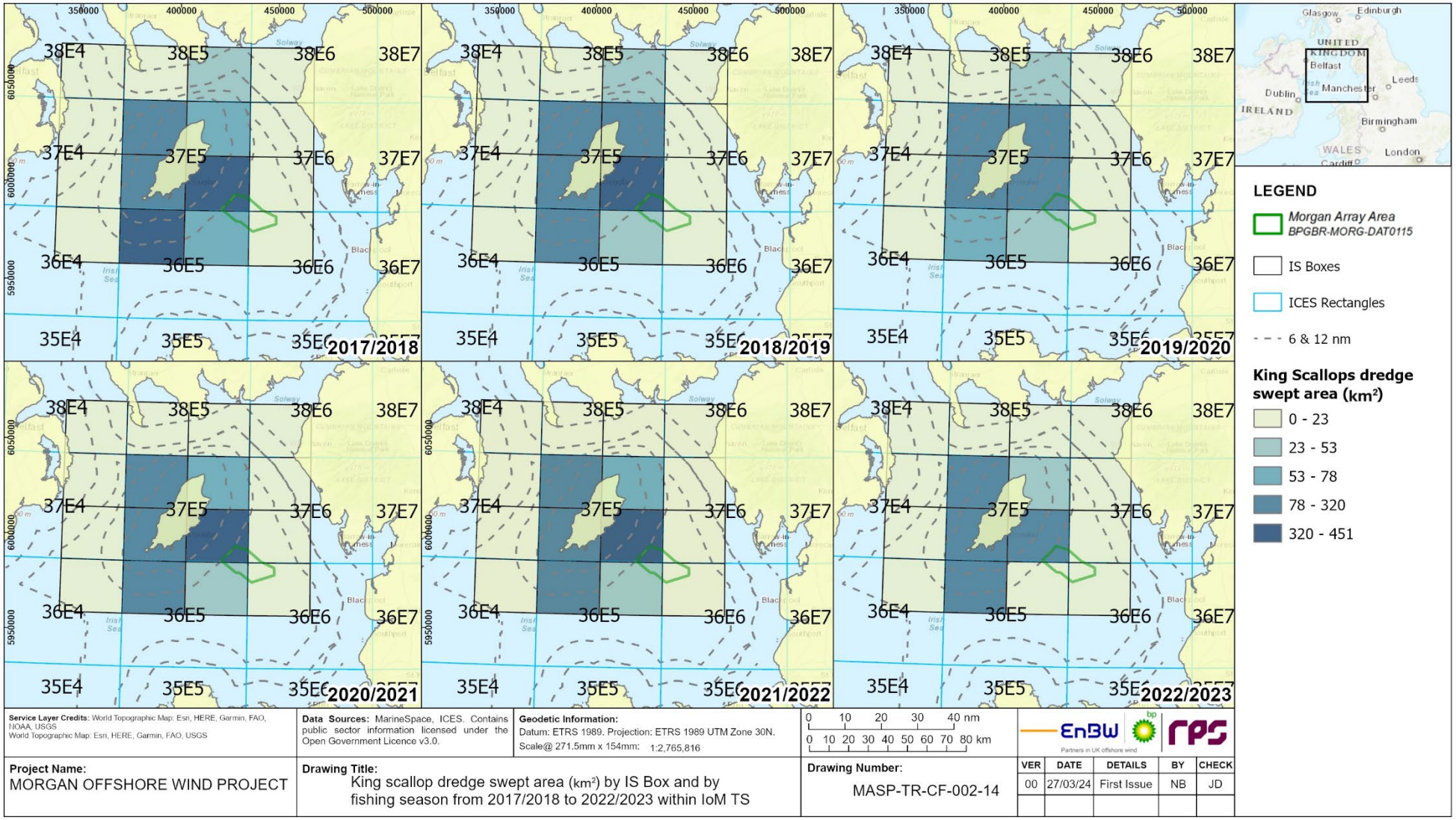


Figure 1.57: King scallop dredge swept area (km^2) by IS Box within and around the Isle of Man Territorial Sea (2017/18 to 2022/23)[57]

[57] DEFA, 2023

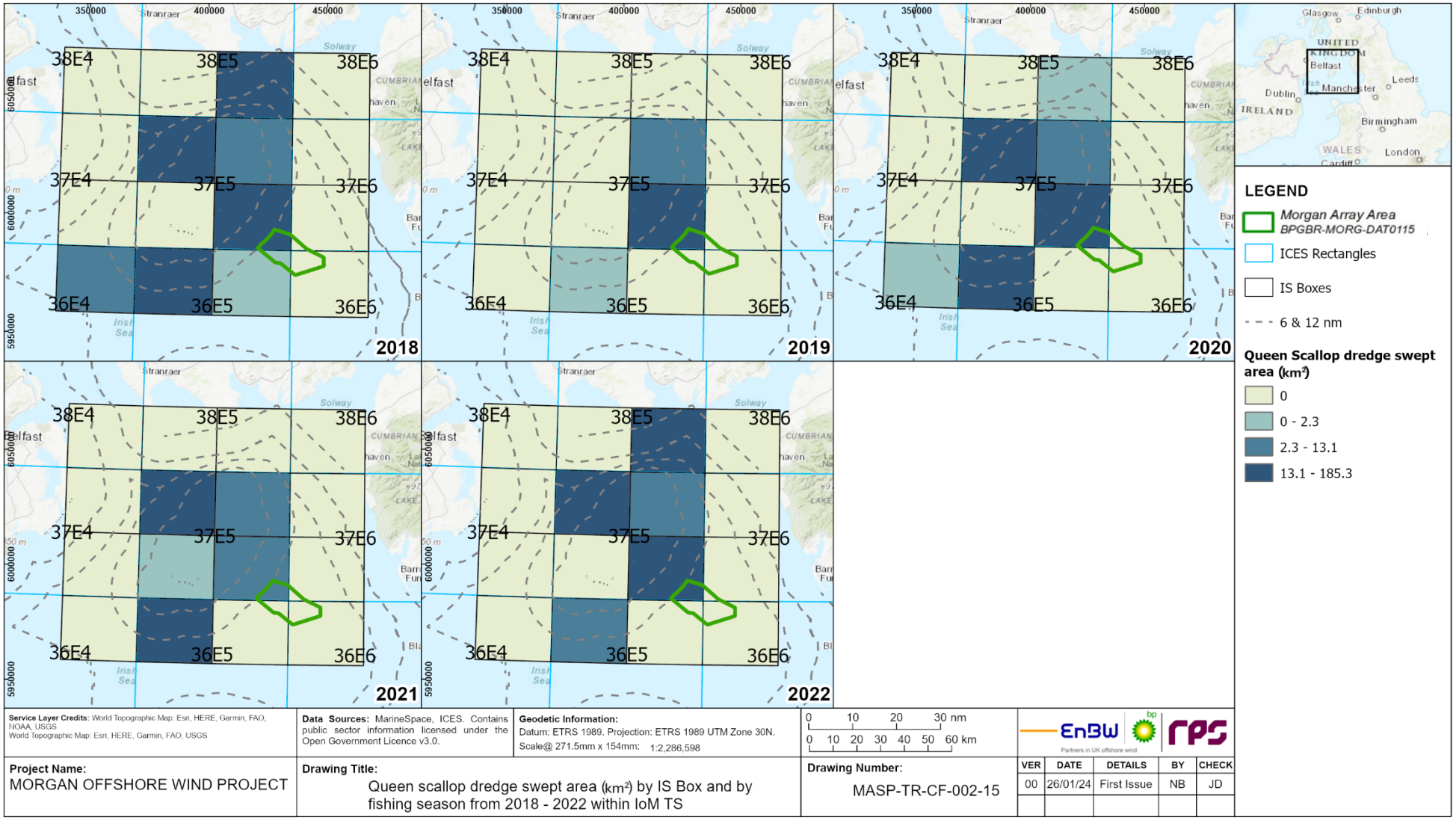


Figure 1.58: Queen scallop swept area (km²) by IS Box within and around the Isle of Man Territorial Sea (2018 to 2022)[58]

[58] DEFA, 2023

Isle of Man crab, lobster and whelk pot haul data

1.4.8.19 Combined total crab and lobster pot haul, and whelk pot haul data was collated from the Isle of Man Government. The data was provided at Monthly Shellfish Activity Report (MSAR) square level for 2010 to 2021. MSAR squares only report on activity within ICES Rectangle 37E5, for all Manx registered vessels.

1.4.8.20 Figure 1.59 illustrates that Isle of Man registered static gear vessels, targeting crab and lobster, were active across ICES Rectangle 37E5 at varying degrees (2010 to 2021). Higher intensities of crab and lobster pot haul effort were observed to the south and west of the Isle of Man, within the Manx 6 nm limit. Lower levels of activity can generally be observed to the west of the Isle of Man and beyond the Manx 6 nm limit. An overlap of crab and lobster pot haul effort can be observed with the Morgan Array Area, although this is at a relatively low level.

1.4.8.21 Figure 1.60 illustrates that Isle of Man registered static gear vessels, targeting whelk, were active across ICES Rectangle 37E5 at varying degrees (2010 to 2021). Higher intensities of whelk pot haul effort were observed within the Manx 6 nm limit particularly in areas to the south east of the Isle of Man. Lower levels of activity can generally be observed in all areas of ICES Rectangle 37E5 beyond the Manx 6 nm limit. An overlap of whelk pot haul effort can be observed with the Morgan Array Area, although this is at a relatively low level.

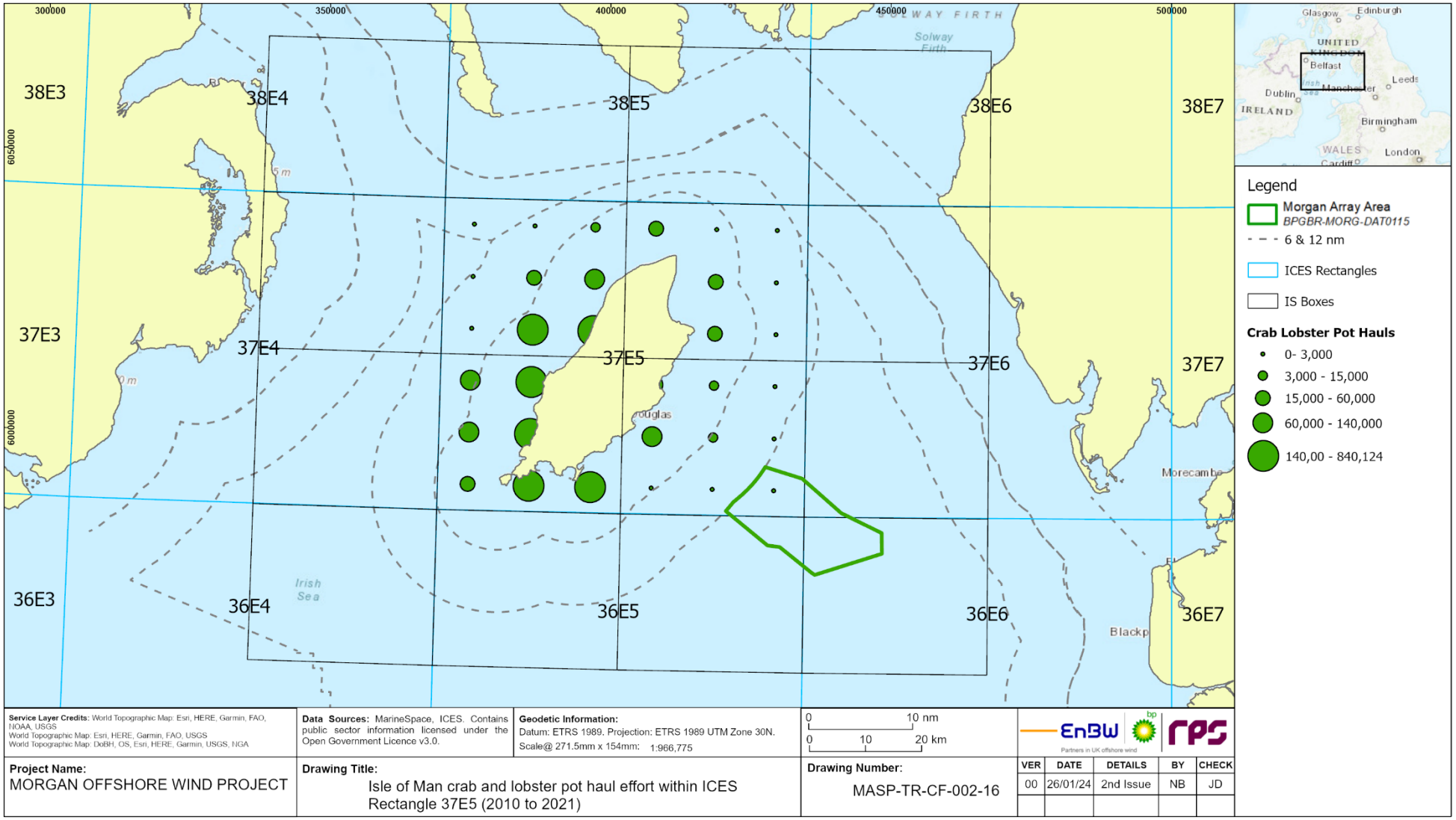


Figure 1.59: Isle of Man crab and lobster pot haul effort within ICES Rectangle 37E5 (2010 to 2021)[59]

[59] DEFA, 2023

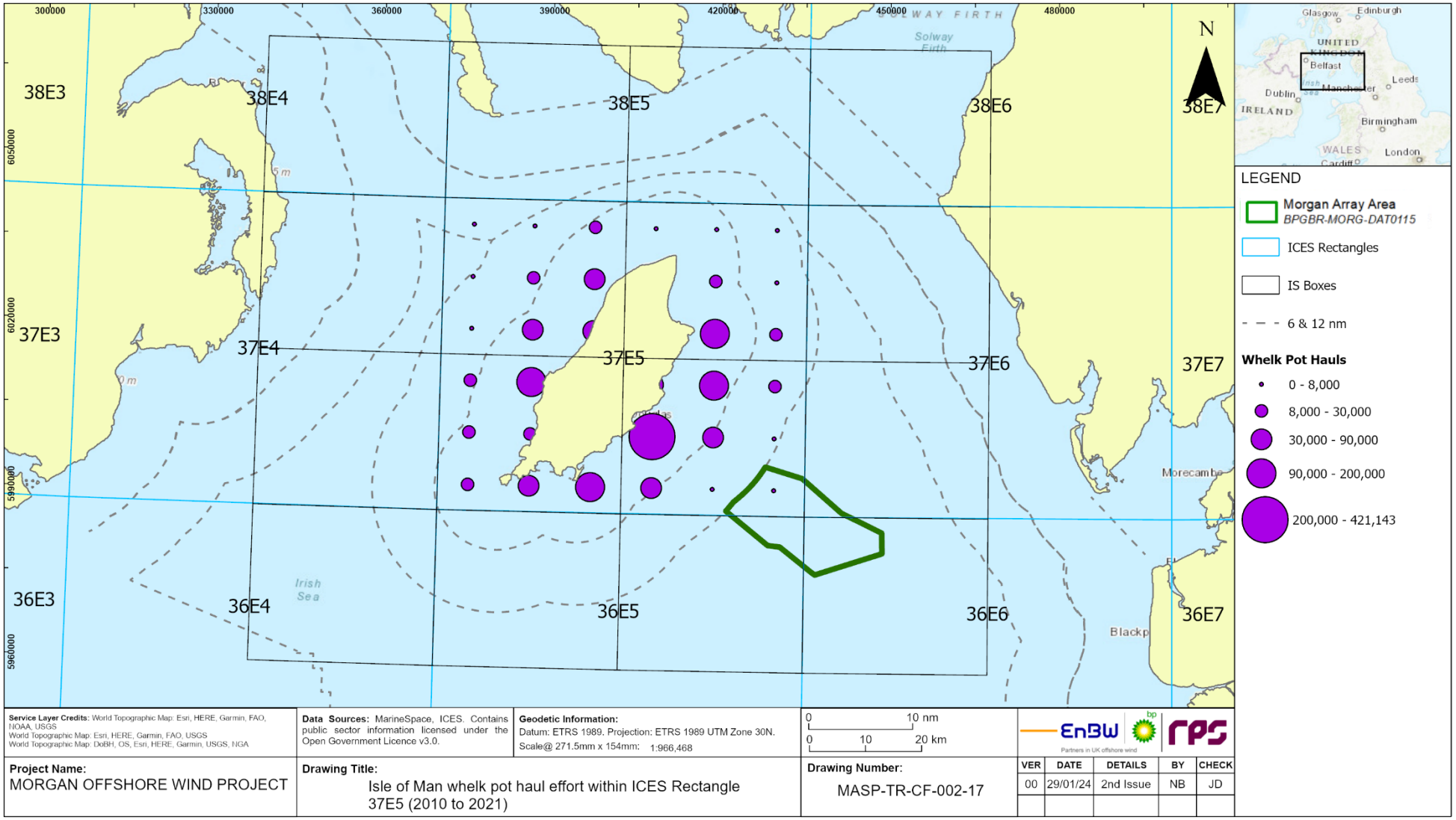


Figure 1.60: Isle of Man whelk pot haul effort within ICES Rectangle 37E5 (2010 to 2021)[60]

[60] DEFA, 2023

1.4.9 Site-specific surveys

1.4.9.1 To complement the official commercial fisheries landings and activity data described in the previous sections, the following section provides additional information on commercial fishing activity in the Morgan Generation Assets commercial fisheries study area.

Vessel traffic surveys

1.4.9.2 A summary of the fishing vessels identified during the three Morgan Array Area specific vessel traffic surveys (Winter 2021, Summer 2022 Spring 2023 and November 2023) is presented in Table 1.6. Table 1.6 also includes fishing vessels identified during the Summer 2023 vessel traffic survey undertaken for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets. Names and sizes of vessels were only captured by the AIS data, so there may have been additional fishing vessels active in the commercial fisheries study area that are not listed here[61]. Figure 1.61 also displays fishing vessel tracks which were detected by radar from the same time periods as the vessel traffic surveys, however information is not provided on the individual fishing vessels.

Table 1.6: Summary of fishing vessels identified during the Morgan Generation Assets vessel traffic surveys 21 November to 04 December 2021, 15 to 29 July 2022, 04 to 18 May 2023, 03 to 17 August 2023 and 11 to 27 November 2023.

Length (m)	Time period	Vessel type	Nationality
9.95	December 2021	Scallop vessel (trawler)	Isle of Man
13.2	December 2021	Static gear vessel	UK
16	December 2021	Scallop vessel (dredge)	UK
18.25	December 2021	Guard vessel	UK
20.5	December 2021	Scallop vessel (dredge)	UK
20.5	December 2021	Guard vessel	UK
23	December 2021	Scallop vessel (dredge)	UK
30.57	December 2021	Scallop vessel (dredge)	UK
34.1	December 2021	Scallop vessel (dredge)	UK
13.2	July 2022	Static gear vessel	UK
15	July 2022	Scallop vessel (dredge)	UK
16	July 2022	Guard vessel	UK
38	May 2023	Beam trawler	Belgium
21.3	May 2023	Scallop vessel (dredge)	UK
16	May 2023	Beam trawler	UK
16	May 2023	Static gear vessel (pots)	UK

[61] It has been observed that some scallop vessels which fish in the area turn off their AIS during fishing, so may only be captured during steaming.

Length (m)	Time period	Vessel type	Nationality
16	May 2023	Otter trawler	UK
16	May 2023	Otter trawler	UK
15	May 2023	Otter trawler	UK
15	May 2023	Scallop vessel (dredge)	UK
15	May 2023	Scallop vessel (dredge)	UK
14	May 2023	Otter trawler	UK
13	May 2023	Scallop vessel (dredge)	UK
13	May 2023	Otter trawler	UK
13	May 2023	Otter trawler	UK
12	May 2023	Otter trawler	UK
10	May 2023	Static gear vessel/ Otter trawler	UK
38	August 2023	Beam trawler	Belgium
13	August 2023	Static gear vessel	UK
n/a	August 2023	Unidentified	n/a
24	November 2023	Scallop vessel (dredge)	UK
34	November 2023	Scallop vessel (dredge)	UK
23	November 2023	Scallop vessel (dredge)	UK
21.3	November 2023	Scallop vessel (dredge)	UK
23.66	November 2023	Scallop vessel (dredge)	UK
23	November 2023	Scallop vessel (dredge)	UK
24	November 2023	Scallop vessel (trawler)	UK
n/a	November 2023	Unidentified	n/a
n/a	November 2023	Unidentified	n/a

1.4.9.3 During the winter survey, nine fishing vessels were identified from the AIS data, six of which were scallop vessels, two were providing guard vessel services and one was a static gear vessel (Table 1.6). Of the nine vessels, seven were >18 m in length, one was 13.2 m and one was 10 m. The static gear vessel and the scallop vessel (trawler) would not have been captured within the VMS data, which includes vessels ≥15 m. Eight of the fishing vessels identified were UK registered and the scallop vessel (trawler) was from the Isle of Man.

1.4.9.4 Out of the nine vessels detected by AIS data during the winter survey, only three were active within the Morgan Array Area during this time period, all of which were scallop vessels. The three scallop vessels generally appeared to be fishing within the northwest part of the Morgan Array Area, adjacent to the Isle of Man territorial sea but not within it (Figure 1.61); they were assumed to be fishing as they showed an average speed of approximately 2.9 to 3.6 knots. Figure 1.61 also indicates that scallop vessels were transiting through the west part of the Morgan Array Area, likely transiting between Scotland and fishing grounds south or west of the Morgan Array Area: speed of these vessels was generally over 7 kn. This information aligns with feedback from project-specific consultation and analysis of VMS data that the west corner of the Morgan Array Area is the most important area for commercial fishing vessels targeting scallop (for example, see Figure 1.54).

1.4.9.5 The radar data collected during the winter survey indicated that there was a high level of fishing activity within the Isle of Man territorial sea, approximately 7 to 14 km northwest of the Morgan Array Area (Figure 1.61). This is likely to be an area that is targeted for scallop by Isle of Man vessels, and the VMS data for otter trawl vessels aligns with this area (Figure 1.52).

1.4.9.6 During the summer survey, three fishing vessels were identified from the AIS data, one of which was also observed during the winter survey. Of the three vessels, one was a guard vessel (16 m in length), one was a static gear vessel (13.2 m in length) and one was a scallop vessel (15 m in length) (Table 1.6). All fishing vessels identified were UK registered.

1.4.9.7 Of the three fishing vessels detected by AIS during the summer survey, the guard vessel and static gear vessel were identified within the Morgan Array Area, within the northeast part (Figure 1.62). The scallop vessel was assumed to be fishing as its speeds were between approximately 2.5 to 4.8 kn; it was observed fishing in a northwest to southeast direction, approximately 3.8 km west of the Morgan Array Area.

1.4.9.8 The radar data collected during the summer survey showed a fishing vessel operating out of Douglas on the Isle of Man, steaming to beyond the Isle of Man territorial sea and appeared to be towing within the northwest part of the Morgan Array Area (Figure 1.62).

1.4.9.9 During the Spring 2023 survey, 15 fishing vessels were identified from the AIS data, four of which were scallop vessels, seven were otter trawl vessels, two were beam trawl vessels, one was a static gear vessel and one was a static gear/otter trawl vessel (Figure 1.63). Of the 15 vessels, nine were ≥15 m and six were <15 m in length. The fishing vessels under the smaller size category would not have been captured within the VMS data, as this includes vessels ≥15 m. 14 of the fishing vessels identified were UK registered and the beam trawl (38 m in length) was from Belgium.

1.4.9.10 Out of the 15 vessels detected by AIS data during the Spring 2023 survey, only four were active within the Morgan Array Area during this time period, two of which were scallop vessels, one was an otter trawl vessel and one was a static gear vessel/scallop vessel. The four identified vessels appeared to be fishing within the central and north most part of the Morgan Array Area, adjacent to the Isle of Man territorial sea, and within it (Figure 1.63). This information aligns with feedback from project-specific consultation and analysis of VMS data that the west corner of the Morgan Array Area is the most important area for commercial fishing vessels targeting scallop (for example, see Figure 1.54).

1.4.9.11 The radar data collected during the Spring 2023 survey indicated that there was a high level of fishing activity within the Isle of Man territorial sea (Figure 1.63). This is likely to be an area that is targeted for scallop by Isle of Man vessels, and the VMS data for otter trawl vessels and the Isle of scallop trawl/dredge swept area data aligns with this area (Figure 1.63).

1.4.9.12 During the Summer 2023 survey, three fishing vessels were observed from the AIS data, one of which was a Belgian beam trawler, another a UK registered static gear vessel and one that was unidentified during the survey. No fishing activity was observed to overlap with the Morgan Array Area, all vessel tracks were observed to the south east of the Morgan Array Area. It is noted, however, that this survey was undertaken to inform the Morgan and Morecambe Offshore Wind Farms: Transmission Assets.

1.4.9.13 During the Winter 2023 survey, seven fishing vessels were identified from the AIS and radar data, all of which were scallop vessels (six scallop dredge and one scallop

trawler). Two other fishing vessel tracks were recorded during the Winter 2023 survey, however the vessel type was unidentified. The identified scallop vessels appeared to be fishing within the central and western part of the Morgan Array Area and in a north to south orientation (Figure 1.65). This information aligns with feedback from project-specific consultation and analysis of VMS data (for example, see Figure 1.54).

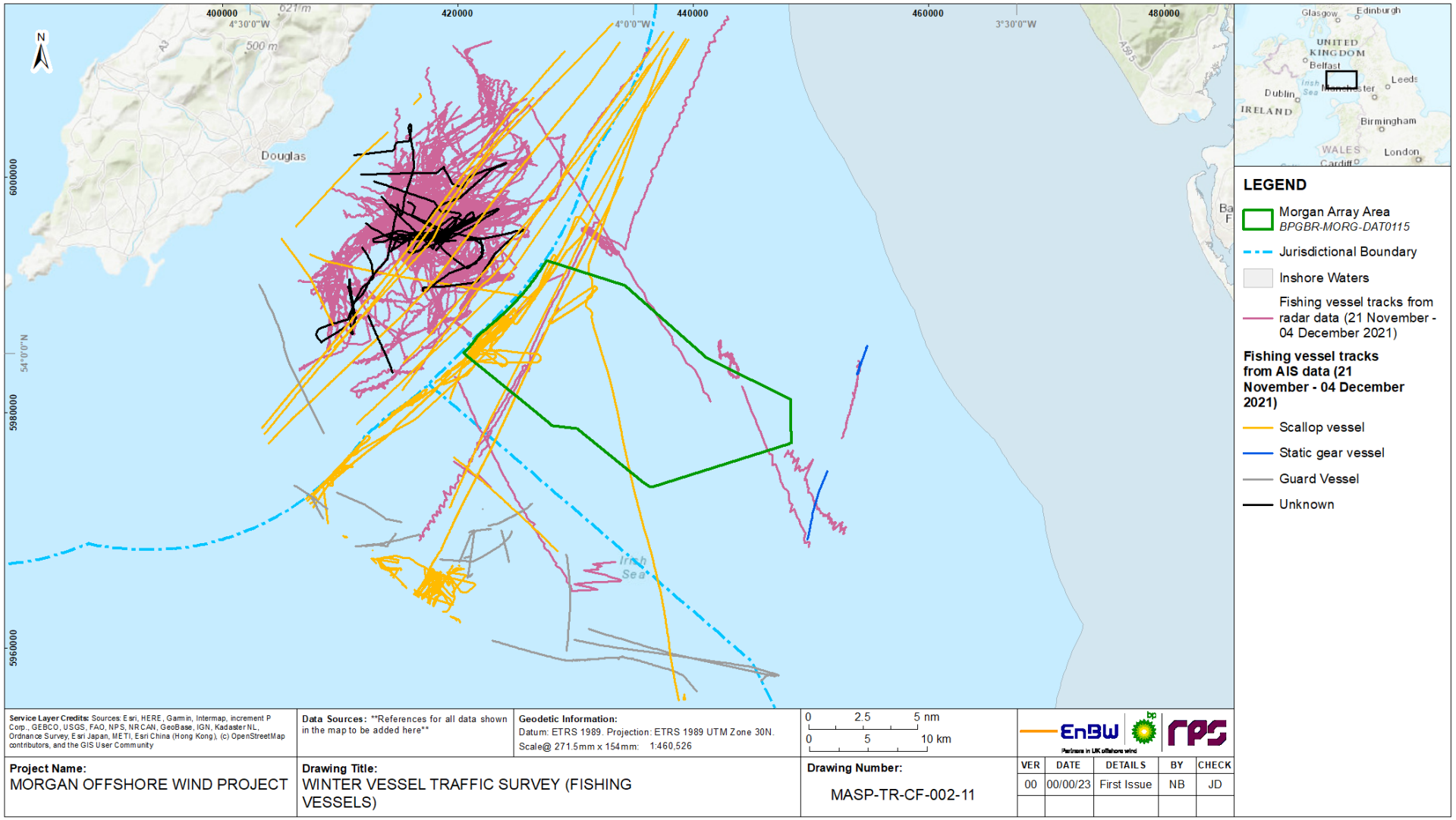


Figure 1.61: AIS fishing vessel track data from 21 November to 04 December 2021[62].

[62] NASH Maritime, 2021

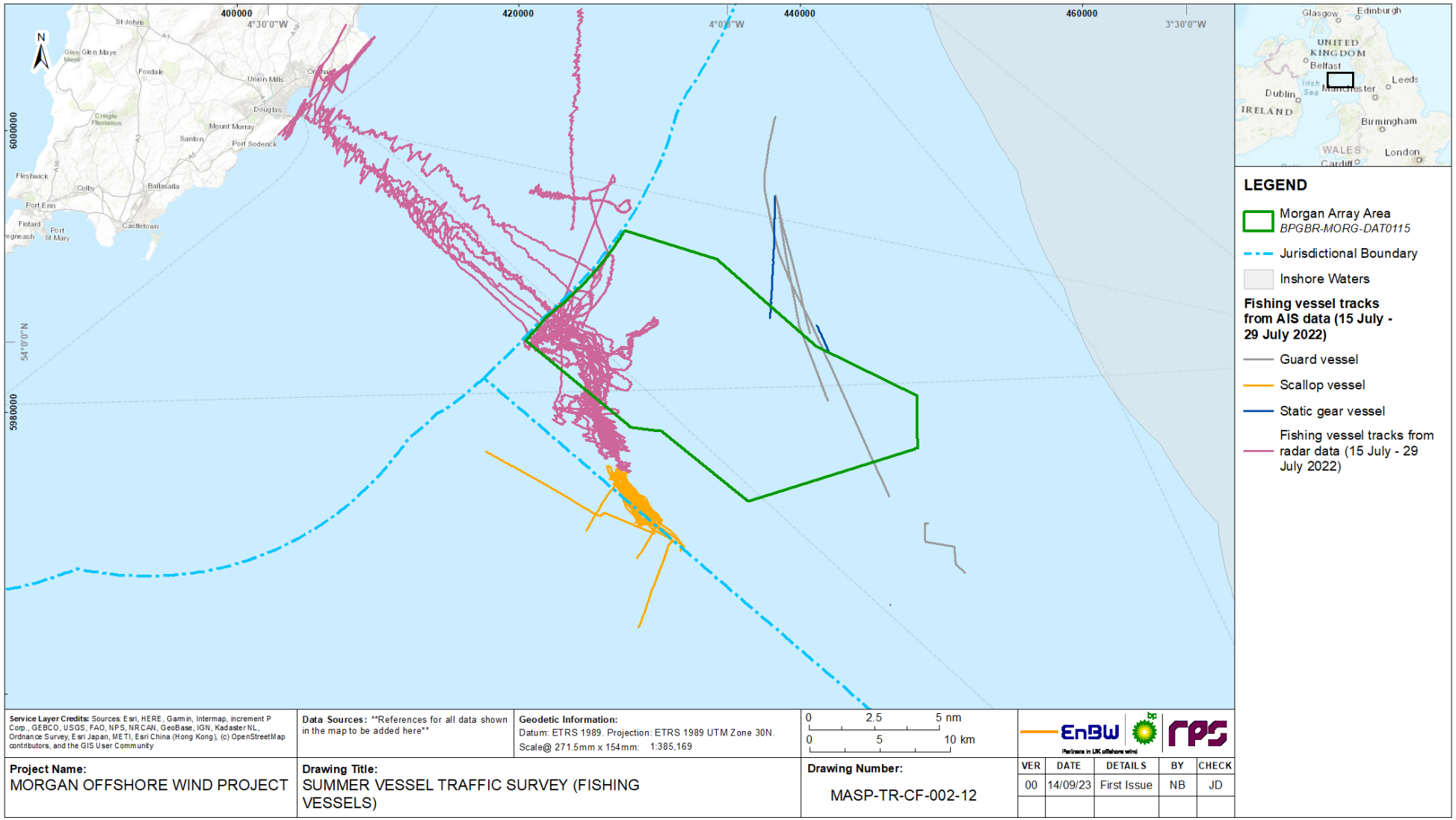


Figure 1.62: AIS fishing vessel track data from 15 to 29 July 2022.[63]

[63] NASH Maritime, 2022

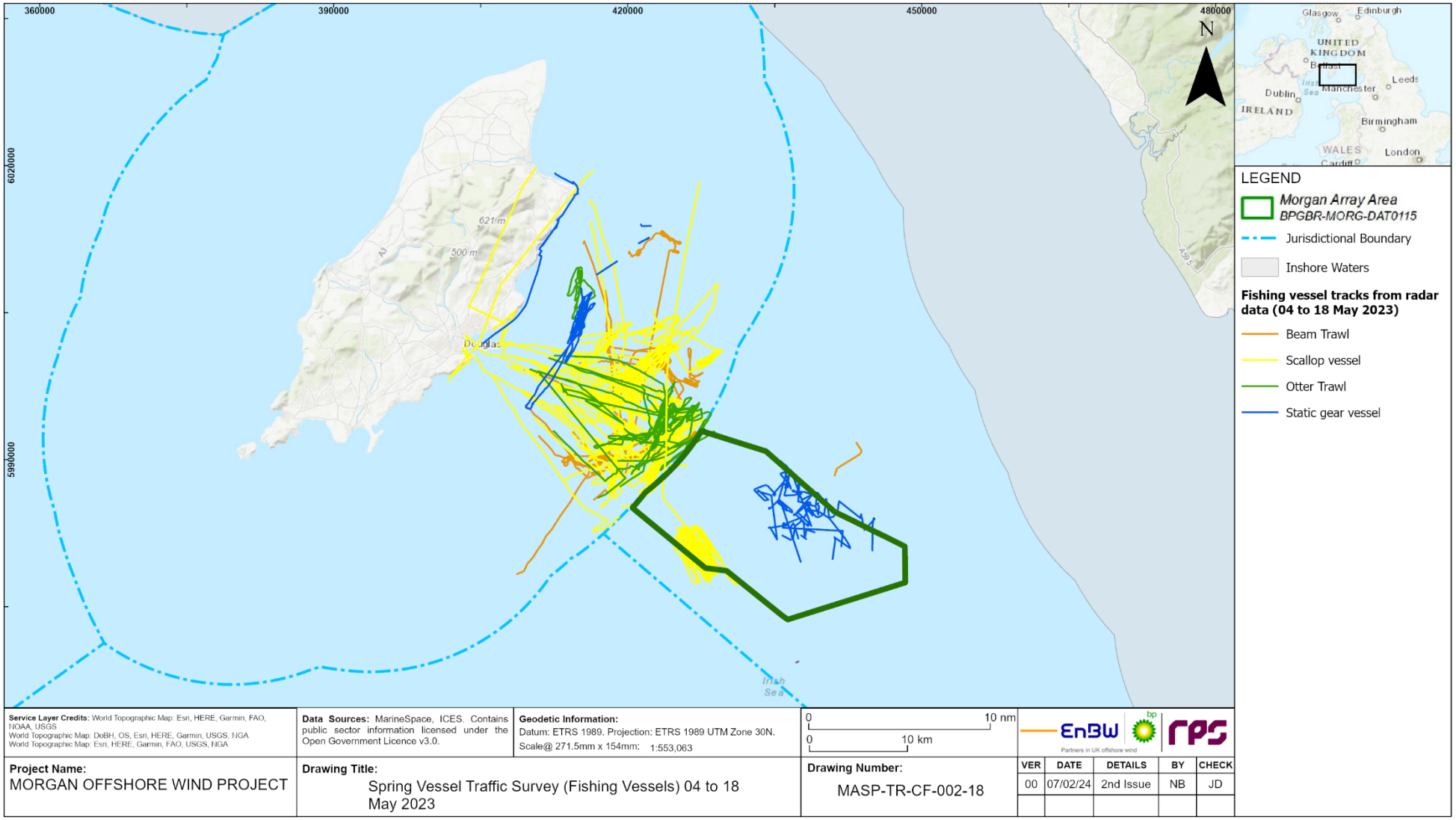


Figure 1.63: AIS fishing vessel track data from 04 to 18 May 2023[64].

[64] NASH Maritime, 2023

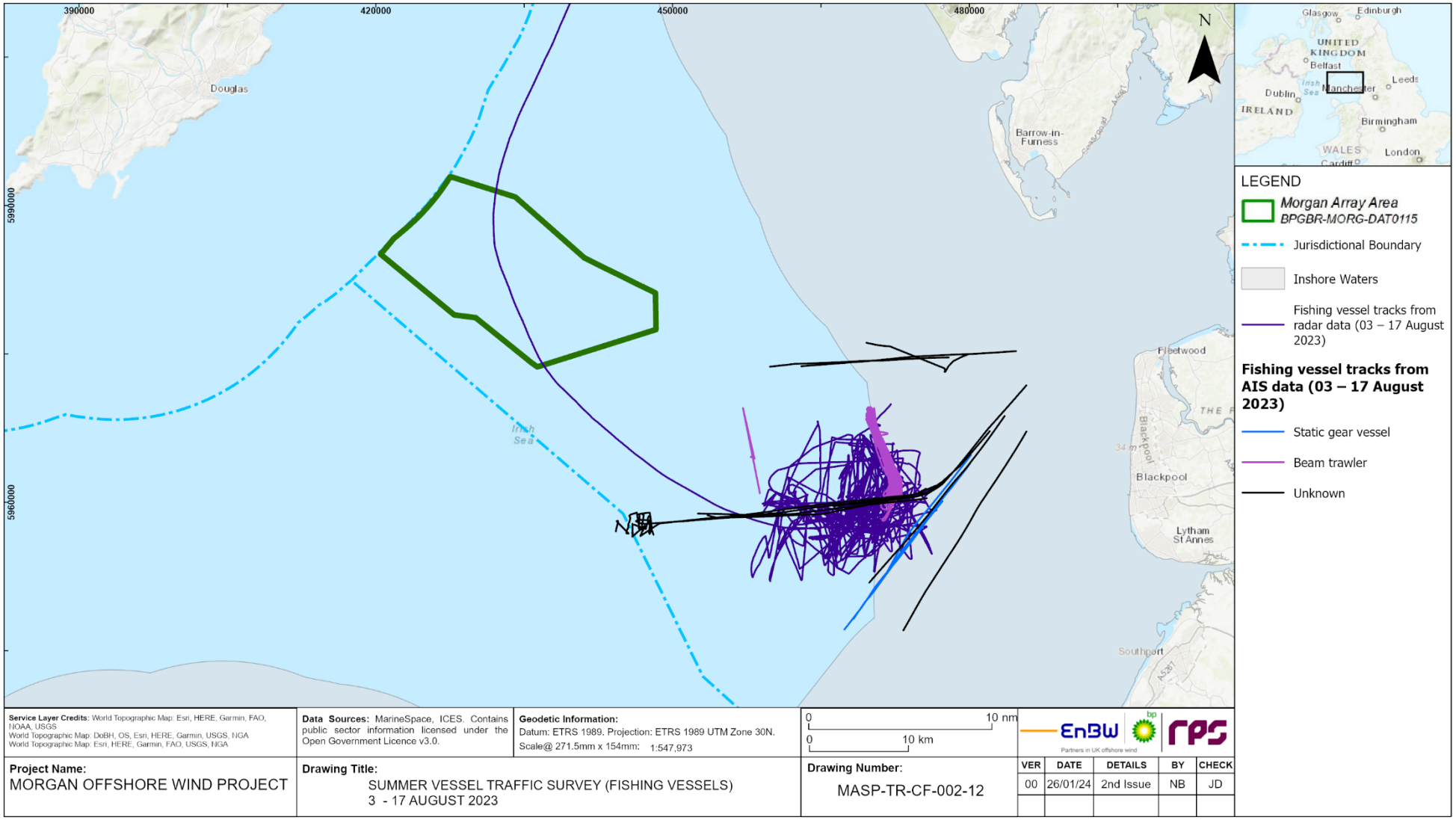


Figure 1.64: AIS fishing vessel track data from 03 to 17 August 2023[65].

[65] NASH Maritime, 2023

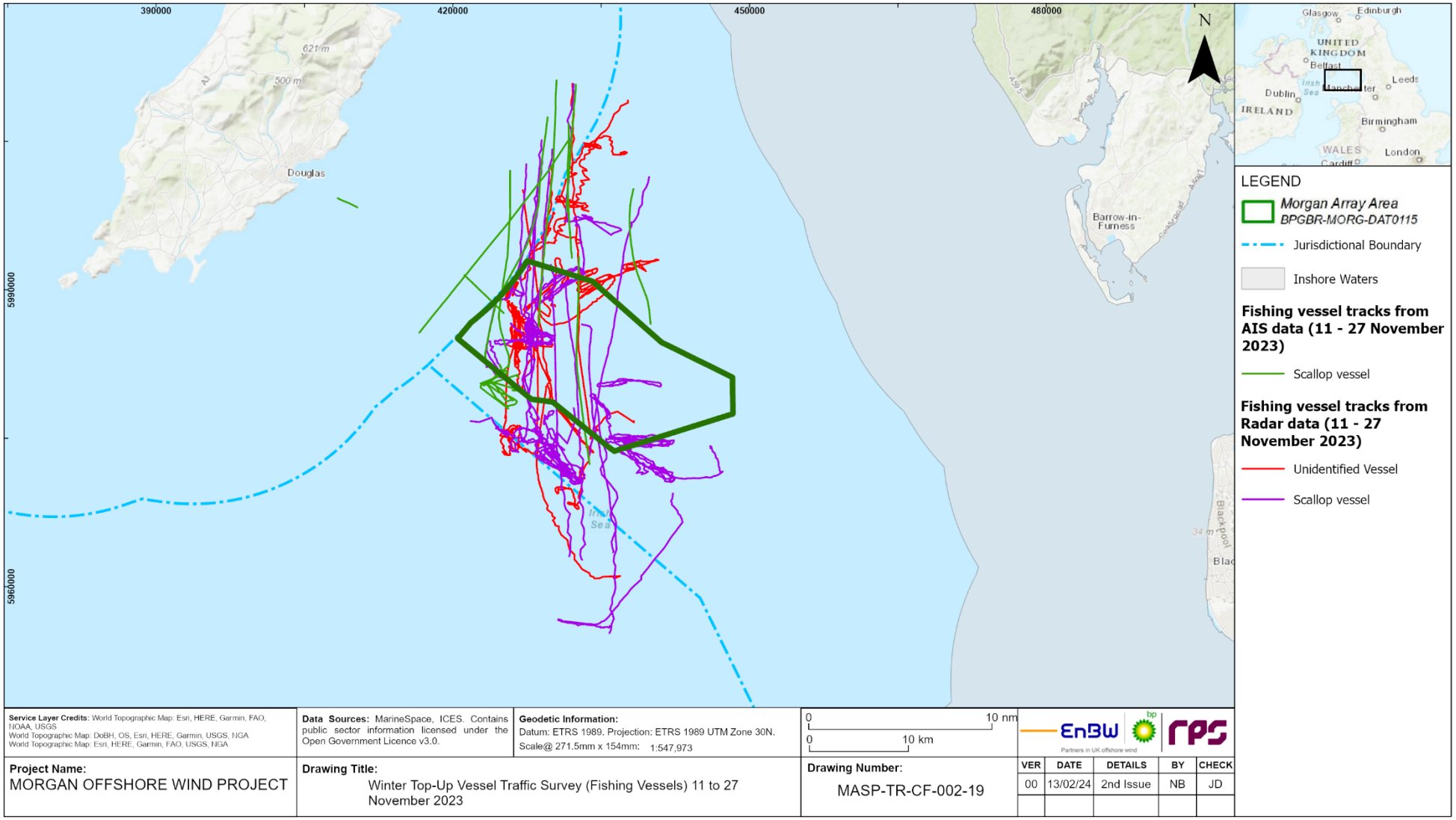


Figure 1.65: AIS fishing vessel track data from 11 to 27 November 2023[66].

[66] NASH Maritime, 2023

OFLO and MarineSpace observations

1.4.9.14 A summary of the fishing vessels identified by the OFLO present during the offshore geophysical, environmental and geotechnical surveys undertaken in 2021 and 2022 is presented in Table 1.7. OFLO observations were recorded during the periods 30 June to 18 September 2021 and 01 April to 10 July 2022 and MarineSpace undertook fisheries monitoring fisheries observations until 30 November 2022. Data is not fully representative of fishing activity in the commercial fisheries study area, particularly inside the 12 nm boundary, where survey vessels were not present. This data has been interpreted with care due to the low-medium confidence assigned, as discussed in section 1.3.1.

1.4.9.15 Figure 1.66 displays all the observations recorded by the OFLO and MarineSpace, however it is important to note that not all vessels were observed within the commercial fisheries study area or within the Morgan Array Area. Table 1.7 outlines the fishing vessels which were identified within the commercial fisheries study area, and notes which vessels were identified within the Morgan Array Area.

Table 1.7: Summary of fishing vessels identified by the OFLO and MarineSpace during offshore surveys.

Length (m)	Vessel type	Nationality	Commercial fisheries study area	Morgan Array Area
No information	Scallop vessel (dredge)	UK	Y	N
No information	Otter trawler	UK	Y	N
No information	Scallop vessel (dredge)	UK	Y	Y
No information	Trawler	UK	Y	N
No information	Otter trawler	France	Y	N
No information	Scallop vessel (dredge)	UK	Y	N
10	Static gear vessel	UK	Y	N
10	Otter trawler	Isle of Man	Y	N
11.6	Unknown	UK	Y	N
11.95	Otter trawler	UK	Y	N
11.99	Scallop vessel (dredge)	UK	Y	N
12	Static gear vessel	UK	Y	Y
13.09	Otter trawler	UK	Y	N
13.2	Static gear vessel	UK	Y	Y
13.39	Static gear vessel	UK	Y	Y
13.4	Trawler	UK	Y	N
13.97	Scallop vessel (dredge)	UK	Y	N
14	Otter trawler	Isle of Man	Y	Y

Length (m)	Vessel type	Nationality	Commercial fisheries study area	Morgan Array Area
14	Trawler	Isle of Man	Y	N
14	Otter trawler	Isle of Man	Y	N
14.11	Otter trawler	UK	Y	N
14.5	Otter trawler	UK	Y	N
14.73	Scallop vessel (dredge)	UK	Y	Y
14.95	Otter trawler	UK	Y	N
14.96	Scallop vessel (dredge)	UK	Y	Y
14.98	Otter trawler	UK	Y	N
15	Scallop vessel (dredge)	UK	Y	N
15	Scallop vessel (dredge)	UK	Y	N
15.7	Otter trawler	UK	Y	N
16	Otter trawler	UK	y	N
16	Scallop vessel (dredge)	UK	Y	Y
16	Scallop vessel (dredge)	Isle of Man	Y	N
16.4	Static gear vessel	UK	Y	Y
16.77	Scallop vessel (dredge)	UK	Y	N
16.89	Otter trawler	UK	Y	N
17	Otter trawler	UK	Y	N
17.13	Static gear vessel	UK	Y	Y
17.13	Static gear vessel	UK	Y	N
17.6	Otter trawler	UK	Y	N
17.99	Trawler	UK	Y	N
18	Otter trawler	UK	Y	N
18.5	Otter trawler	UK	Y	N
19	Otter trawler	UK	Y	N
19.27	Trawler	Canada	Y	N
19.35	Trawler	UK	Y	N
19.9	Otter trawler	UK	Y	N
20	Scallop vessel (dredge)	UK	Y	N
20.5	Otter trawler	UK	Y	N
20.6	Trawler	UK	Y	N
20.86	Otter trawler	UK	Y	N
21	Otter trawler	UK	Y	N

Length (m)	Vessel type	Nationality	Commercial fisheries study area	Morgan Array Area
22.4	Trawler	UK	Y	N
22.78	Trawler	UK	Y	N
22.8	Otter trawler	UK	Y	N
22.94	Scallop vessel (dredge)	UK	Y	Y
23.09	Otter trawler	UK	Y	N
23.6	Otter trawler	UK	Y	N
29.86	Beam trawler	UK	Y	N
34	Beam trawler	Belgium	Y	Y
34.1	Trawler	UK	Y	Y
37	Beam trawler	Belgium	Y	N
37	Beam trawler	Belgium	Y	N
38	Beam trawler	Belgium	Y	Y
38	Beam trawler	Belgium	Y	N
38.9	Beam trawler	Belgium	Y	N
40	Beam trawler	Belgium	Y	N
43.51	Trawler	UK	Y	N

1.4.9.16 During the offshore surveys a total of 67 fishing vessels were observed by the OFLO and MarineSpace within the commercial fisheries study area, 14 of which were observed within the Morgan Array Area. The majority of vessels observed within the commercial fisheries study area were from the UK, with vessels also from Belgium, Canada, France and the Isle of Man. Offshore static gear vessels showed the largest spatial extent, with activity across the commercial fisheries study area. Scallop vessels were active across the commercial fisheries study area. The high density of points inside the 12 nm and within ICES rectangle 37E6 clearly shows the Nephrops fishing grounds. Relatively high densities of beam trawl vessels were observed southeast of the Morgan Array Area, beyond the 12 nm.

1.4.9.17 Within the Morgan Array Area, the only non-UK vessels observed were from Belgium and the Isle of Man. However, it is unclear whether these vessels were actively fishing, or transiting through the area. This generally aligns with the information presented in section 1.4.3 and with feedback from consultation. Four scallop dredge vessels and five static gear vessels were recorded within the Morgan Array Area. There was a cluster of static gear points in the east part of the Morgan Array Area.

1.4.9.18 Static gear (crab and whelk pots) was also recorded and observed within the Morgan Array Area, but the exact locations of this gear are not shown here due to commercial sensitivities.

1.4.9.19 Figure 1.66 indicates that fishing vessels may transit through the Morgan Array Area, for example between Fleetwood and fishing grounds within the wider Irish Sea region.

1.4.9.20 Few scallop vessels were observed by the OFLO during the 2021 and 2022 offshore surveys. This is likely due to the surveys overlapping with the seasonal closures for both queen and king scallop in the Irish Sea and vessels working in other areas to avoid interactions with the survey vessels; this has been considered when interpreting the data. Some scallop vessels were also observed transiting towards the fishing grounds within the Morgan Array Area but turning AIS off once they started fishing.

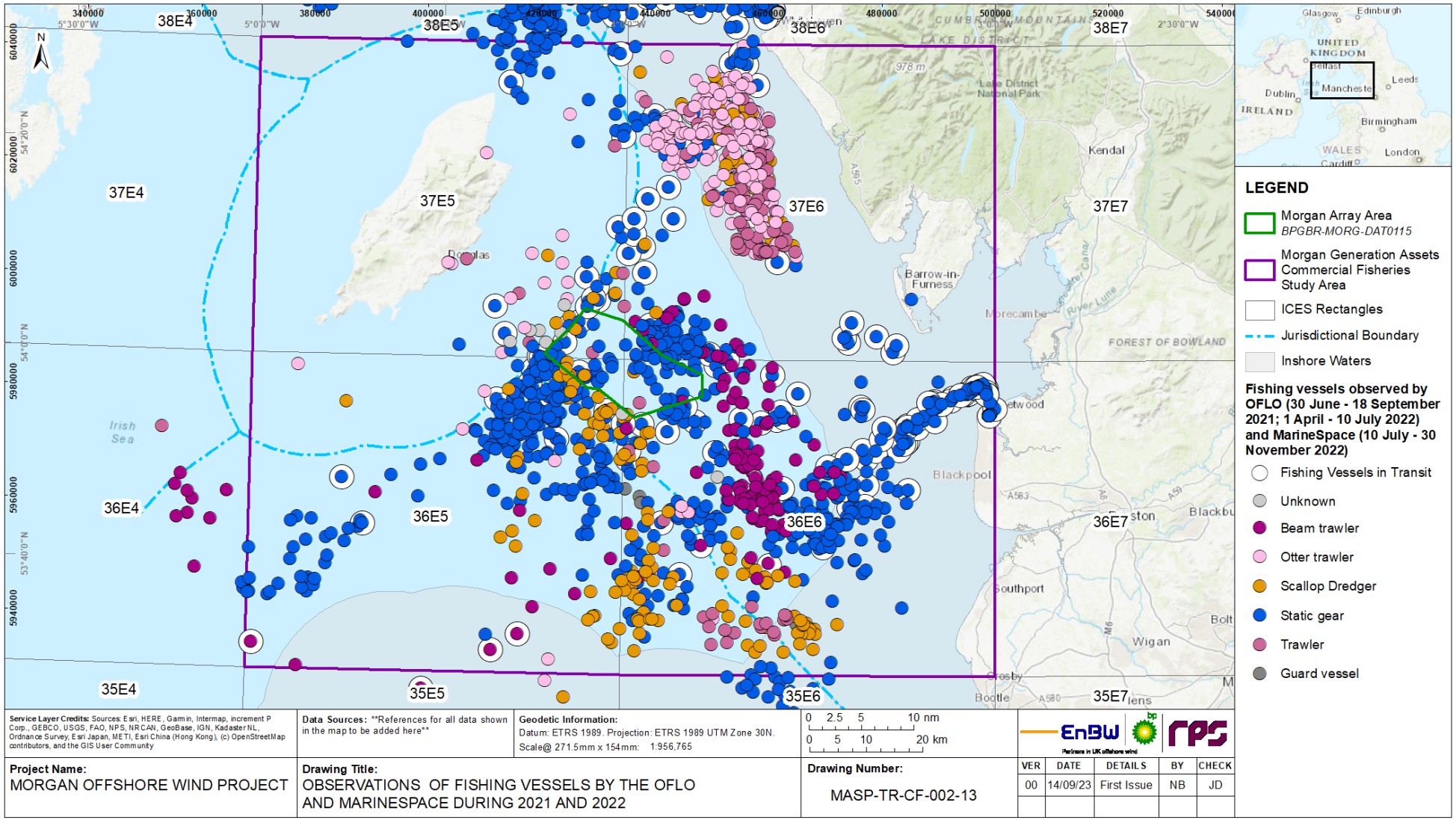


Figure 1.66: Observations of fishing vessels by the OFLO (30 June to 18 September 2021 and 01 April to 10 July 2022) and MarineSpace (10 July to 30 November 2022).

1.5 Future baseline

1.5.1.1 The baseline environment for commercial fisheries is constantly evolving, as the fishing industry is dynamic, with frequent and sometime unpredictable changes which affect activity, such as changes in fish abundance and distribution, climatic conditions, management regulations and fuel costs (DECC, 2016). A review by the Irish Sea Maritime Forum highlighted that legislative and policy changes from 'Brexit', overfishing and spatial conflict are considered key future issues for the fishing industry (Salthouse, 2021).

1.5.1.2 The baseline was described using the most recent datasets available over at least a four-year time period and, where possible, using a 10-year time period. This should account for variations within the different fisheries, for example the scallop fishery within the commercial fisheries study area is cyclical over seven to eight year periods, as established in consultation with commercial fisheries stakeholders. Feedback from project specific consultation indicated that reduced levels of queen scallop were observed between 2017 to 2020, so the next few years are expected to see higher catches and, therefore, a higher level of activity. The future baseline scenario is expected to reflect the cyclical nature of the fisheries which is observed in the datasets analysed.

1.5.1.3 Within the commercial fisheries study area, the impacts of 'Brexit' on the commercial fisheries baseline are uncertain. Fisheries within UK waters were managed through the EU CFP prior to the withdrawal of the UK in 2021. Under the new EU-UK Trade and Cooperation Agreement there is a five-year transition period, whereby 25% of the EU quota for British waters will be transferred to the UK fishing fleet, phased across the five years until 2025. As a result, the UK will receive higher quota shares for some stocks, as outlined in Table 1.8 for species within the Irish Sea. However, a large proportion of landings within the commercial fisheries study area are from non-quota shellfish species, so will not be affected by the quota changes. Quota allocations for 2026 and beyond are likely to be the same as for 2025 and access to EU/UK waters will be subject to annual negotiations. The introduction of the Catch Certificate and other supporting documents, as well as changes to tariffs could act as a barrier to the UK fishing fleet exporting landings to the EU.

Table 1.8: Quota share changes by 2026 for the UK, for species within the Irish Sea[67].

Stock	2020 UK share of EU quota	2026 UK share of EU/UK quota or TAC	UK quota absolute increase
Herring	73.97%	99.01%	25%
Plaice	41.15%	51.11%	10%
Haddock	47.91%	56.02%	8%
Whiting	38.70%	61.00%	22%
Cod	28.79%	44.80%	16%
Sole	21.01%	23.30%	2%

[67] ABPmer 2021

1.5.1.4 New herring quota for the Isle of Man was introduced in July 2023. Fishing businesses may be able to diversify, rather than relying on king and queen scallop which are seasonal fisheries.

1.5.1.5 Irish and Belgian vessels are the main non-UK vessels that are active within the commercial fisheries study area. At present, it is not clear how their activity will change post 2026, as they predominantly catch species which are subject to quota allocations. Inshore UK vessels in the commercial fisheries study area generally target non-quota shellfish species, but they could be affected by potential tariff and non-tariff barriers if exporting to the EU.

1.5.1.6 Other pressures on the fishing industry, such as rising fuel costs or potential designations of marine protected areas could affect the commercial fisheries baseline. The impact of the Covid-19 pandemic may not yet be seen in the official datasets, but there could be changes within the fishing industry due to adapting to, and recovering from, the pandemic.

1.5.1.7 Cumulative impacts on commercial fisheries, including those from proposed offshore developments, are considered in Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement.

1.6 Summary

1.6.1.1 A description of baseline fishing activity in the region of the Morgan Array Area has been undertaken via a review of official landings and fishing activity data, feedback from fisheries stakeholders and site-specific surveys.

1.6.1.2 Within the commercial fisheries study area, the key commercial fishing fleets identified were:

- Dredging and trawling for king scallop and queen scallop
- Potting for whelk, crab and lobster
- Beam trawling for flatfish and other demersal finfish
- Trawling for herring
- Trawling for *Nephrops.*

1.6.1.3 Shellfish account for the largest proportion of landings in the commercial fisheries study area and dredges dominant UK and Isle of Man vessel landings, whereas beam trawl and dredge vessels dominated non-UK vessel landings. This reflects the importance of the king scallop, queen scallop and whelk fisheries in this region, particularly within the west parts of the Morgan Array Area.

1.6.1.4 Whereas the king scallop grounds are relatively extensive, the queen scallop grounds within the far west part of the Morgan Array Area are much more discrete and are heavily relied on by both UK and non-UK fleets. The scallop fisheries are seasonal due to existing closures in the Irish Sea.

1.6.1.5 The whelk fishery within the commercial fisheries study area, including the Morgan Array Area, comprises a range of vessel sizes; there are several UK commercial fisheries operators which are able to operate all year round.

1.6.1.6 Beam trawling for flatfish is undertaken predominantly by several vessels from Belgium and the southwest of England. These vessels are generally active in the commercial fisheries study area during the spring, and overlap with the east part of the Morgan Array Area.

1.6.1.7 Trawling and netting for herring is mostly undertaken by several vessels from Northern Ireland and England; this fishery is very seasonal and occurs mainly during June and July.

1.6.1.8 Trawling for Nephrops within the commercial fisheries study area mostly occurs off the Cumbrian coast during the summer months but does not generally overlap with the Morgan Array Area.

1.6.1.9 Within the commercial fisheries study area, fishing activity occurs at lower levels around the coast and activity is generally from static gear vessels. Within the Morgan Array Area, there are several smaller static gear vessels that are active, which operate out of Fleetwood.

1.6.1.10 A full impact assessment of commercial fisheries receptors has been undertaken and presented in Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement.

1.7 References

ABPmer (2021) EU-UK Trade and Cooperation Agreement. Thoughts on fisheries from a UK perspective. White Paper.

Bloor, I., Dignan, S., Murray, L., and Kaiser, M. (2015) Bycatch Survey – Isle of Man Queen Scallop Otter Trawl Fishery Summer 2014. Fisheries & Conservation Report, Bangor University, 67, 14.

Cappell, R., Huntington, T., Nimmo, F., and MacNab, S. (2018) UK Scallop Fishery: Current Trends, Future Management Options and Recommendations. Report produced by Poseidon Aquatic Resource Management Ltd. 2-45.

DECC (Department of Energy and Climate Change). (2016) Offshore Energy Strategic Environmental Assessment 3 (OESEA 3). Available at: https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-3-oesea3. Accessed August 2023.

DEFA (Department of Environment, Food and Agriculture) (2023) Isle of Man Government Data on vessel pot hauls and swept area.

Delargy, A., Hold, N., Lambert, G., Murray, L., Hinz, H., Kaiser, M., McCarthy, I., and Hiddink, J. (2019) Welsh waters scallop surveys and stock assessment. Bangor University, Fisheries and Conservation Report, 75, 48.

Dickey-Collas, M., Nash, R.D.M., and Brown, J. (2001) The location of spawning Irish Sea herring (Clupea harengus). Journal of the Marine Biological Association of the United Kingdom, 81, 713–714.

Duncan, P.F., and Emmerson, J. (2018) Commercial Fisheries & Sea Angling. In: Manx Marine Environmental Assessment (2nd Ed.). Isle of Man Government. 71.

Eigaard, O.R., Bastardie, F., Breen, M., Dinesen, G.E., Hintzen, N.T., Laffargue, P., Mortensen, L.O., Nielsen, J.R., Nilsson, H.C., O'Neill, F.G., Polet, H., Reid, D.G., Sala, A., Sko¨ld, M., Smith, C., Sorensen, T.K., Tully, O., Zengin, M., and Rijnsdorp, A.D. (2016). Estimating seabed pressure from demersal trawls, seines, and dredges based on gear design and dimensions. – ICES Journal of Marine Science, 73: i27–i43.

EU STECF (Scientific, Technical and Economic Committee for Fisheries) (2017) Fisheries Dependent Information: Landings and effort (hours fished) data 2018. Available at: [redacted]essed August 2023.

Grieve, C., Brady, D.C., and Polet, H. (2014) Best practices for managing, measuring and mitigating the benthic impacts of fishing. Part 1. Marine Stewardship Council Science Series. 2: 18 – 88.

Howarth, L., and Stuart, B. (2014) The dredge fishery for scallops in the United Kingdom (UK): effects on marine ecosystems and proposals for future management. Marine Ecosystem Management Report, University of York, 5, 54.

ICES (2017) Interim Report of the Scallop Assessment Working Group (WGSCALLOP).

ICES (2020) Spatial Data Layers of Fishing Intensity/Pressure per Gear Type for Surface and Subsurface Abrasion, for the Years 2009 to 2017 in the OSPAR Regions (ver. 2, 22 January 2019): ICES data product release, Available at: [redacted] August 2023.

ICES (2021a) ICES Advice on fishing opportunities, catch and effort. Celtic Sea ecogregion. Sole (Solea solea) in Division 7.a (Irish Sea). Version 2.

ICES (2021b) ICES Advice on fishing opportunities, catch and effort. Celtic Sea ecogregion. Herring (Clupea harengus) in Division 7.a North of 53 °30'N (Irish Sea).

Jenkins, S., Lart, W., Vause, B., and Brand, A. (2003) Seasonal swimming behaviour in the queen scallop (Aequipecten opercularis) and its effect on dredge fisheries. Journal of Experimental Marine Biology and Ecology, 289(2), 163-179.

Kaiser, M.J., Hill, A.S., Ramsay, K., Spencer, B.E., Brand, A.R., Veale, L.O., Prudden, K., Rees, E.I.S., Munday, B.W., Ball, B., and Hawkins, S.J. (1996) Benthic disturbance by fishing gear in the Irish Sea: a comparison of beam trawling and scallop dredging. Aquatic Conservation: Marine and Freshwater Ecosystems, 6(4), 269-285.

MacNab, S., and Nimmo, F. (2021) Awel y Môr Offshore Wind Farm Commercial Fisheries Baseline Report. Report, Poseidon Aquatic Resources Management Ltd.

MarineTraffic (2022) Global Ship Tracking Intelligence. Available at: www.marinetraffic.com. Accessed August 2023.

MMO (Marine Management Organisation). (2023a) UK fleet landings by ICES Rectangle (2012 to 2022). Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report. Accessed August 2023.

MMO (Marine Management Organisation). (2023b) UK fleet landings and foreign fleet landings into the UK by port (2012 to 2022). Available at: https://www.gov.uk/government/statistical-data-sets/uk-fleet-landings-and-foreign-fleet-landings-into-the-uk-by-port. Accessed August 2023.

MMO (Marine Management Organisation). (2021a) Fish Landings to UK Ports. Available at: https://www.gov.uk/government/publications/uk-and-foreign-vessels-landings-by-uk-port-and-uk-vessel-landings-abroad-provisional-data Accessed August 2023.

MMO (Marine Management Organisation). (2021b) Fishing activity for UK vessels 15m and over, using Vessel Monitoring Systems data (2016-2020). Available at: https://environment.data.gov.uk/portalstg/home/item.html?id=14ac59f006494c2ebaf62b9aa13247ef. Accessed August 2023.

MMO (Marine Management Organisation). (2023) October 2023 Fishing Vessel List. Available at: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation. Accessed November 2023.

NASH Maritime, 2021. Project Morgan: Marine vessel traffic survey results.

NASH Maritime, 2022. Project Morgan: Marine vessel traffic survey results.

NASH Maritime, 2023. Project Morgan: Marine vessel traffic survey results.

NWWAC (2013) The Irish Sea Sole-Stock: A ''Sole'' Belgian Problem? Working Document for the NWW RAC, Working Group 4-Irish Sea (bijdrage Vanhaecke Hilde, Moreau Kelle, Nimmegeers Sofie, Torreele Els). 1-23.

Office for National Statistics (2022) Official Labour Market Statistics – UK Business Counts. Available at: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation. Accessed August 2023.

Salomonsen, H., Lambert, G., Murray, L. and Kaiser, M. (2015). The spawning of King scallop, Pecten maximus, in Welsh waters – A preliminary study. Fisheries & Conservation report, Bangor University, 57, 21

Salthouse, C. (2021) The Future and Changing Context of the Irish Sea in 2020s. Irish Sea Maritime Forum, 9-87.

Seafish. (2022) Basic Fishing Methods. Available at: [redacted]

Walmsley, S., and Pawson, M. (2007) The coastal fisheries of England and Wales, Part V: a review of their status 2005-6. Sci. Ser. Techn. Rep. CEFAS Lowestoft, 140, 6-78.

WCSP (2022) Indicative queen scallop grounds produced using VMS data, plotter data from fisheries stakeholders and discussions with fisheries stakeholders. Per Comm.

WG Scallop (2020) Scallop Assessment Working Group (WGSCALLOP). ICES Scientific Reports, 111(2), 57.