Partners in UK offshore wind

MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS

Preliminary Environmental Information Report

Volume 4, annex 11.1: Commercial fisheries technical report

Image of an offshore wind farm

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FINAL

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Prepared by:	Prepared for:
RPS	**Morgan Offshore Wind Ltd.**

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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.
Fishing Industry Representative	Primary contact point within the fishing community, provider of feedback to the Company Fisheries Liaison Officer (CFLO) and OFLO and disseminator of information.
Gill nets	Gill nets are nets which hang vertically in the water column which entangle fish as they swim into them.
ICES Rectangle	Defined areas used for the gridding of data. Each rectangle is 30 minute latitude by one degree longitude.
Inshore waters (England and Wales)	Mean High Water Springs (MHWS) to 12nm offshore.
Kilowatt days	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 licence 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	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
Otter trawl	Otter trawls consist of a pair of otter boards (large rectangular boards) which hold 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	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 (TACs) are generally expressed in tonnes of live weight.
Vessel Monitoring System	Satellite tracking system using a device on vessel which transmits the location, speed and course of the vessel.

Acronyms

Acronym	Description
AIS	Automatic Identification System
ANIFPO	Anglo-North Irish Fish Producers Organisation
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CFLO	Company Fisheries Liaison Officer
CFP	Common Fisheries Policy
DECC	Department of Energy and Climate Change
DPR	Daily Progress Report
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
IVMS	Inshore Vessel Monitoring Systems
ISEFPO	Irish South & East Fish Producers Organisation
MFPO	Manx Fish Producers Organisation
MHWS	Mean High Water Spring
MLS	Minimum Landing Size
MMO	Marine Management Organisation
NEAFC	North East Atlantic Fisheries Commission
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NRA	Navigation Risk Assessment
NRW	Natural Resources Wales
NWWAC	North Western Waters Advisory Council
OFLO	Offshore Fisheries Liaison Officer

Acronym	Description
SFF	Scottish Fishermen's Federation
SWFPA	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

Units

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

1 COMMERCIAL FISHERIES TECHNICAL REPORT

1.1 Introduction

1.1.1.1 This commercial fisheries technical report provides a detailed description of commercial fishing activity within the area of the proposed Morgan Offshore Wind Project: Generation Assets, hereafter referred to as the Morgan Generation Assets[1], and the wider, east Irish Sea region. This information will be used to inform the Environmental Impact Assessment (EIA) being undertaken as part of the consenting process for the Morgan Generation Assets. The Morgan Generation Assets is described in detail in volume 1, chapter 3: Project description of the PEIR.

1.1.1.2 This technical report has been produced by MarineSpace Ltd on behalf of RPS, which has been appointed as 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 8: Fish and shellfish ecology of the PEIR
- Volume 2, chapter 12: Shipping and navigation of the PEIR
- Volume 2, chapter 14: Other sea users of the PEIR
- Volume 4, annex 8.1: Fish and shellfish ecology technical report of the PEIR
- Volume 4, annex 12.1: Navigational risk assessment.

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 14: Other sea users of the PEIR.

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 (illustrated in Figure 1.1 below) will be located within ICES Rectangles 36E5, 36E6, 37E5 and 37E6 (also illustrated in Figure 1.1 below).

1.2.1.2 A broad 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 impacts (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).

[1] In instances within this chapter where the Morgan Generation Assets is referred to spatially, the “Morgan Array Area” will be used.

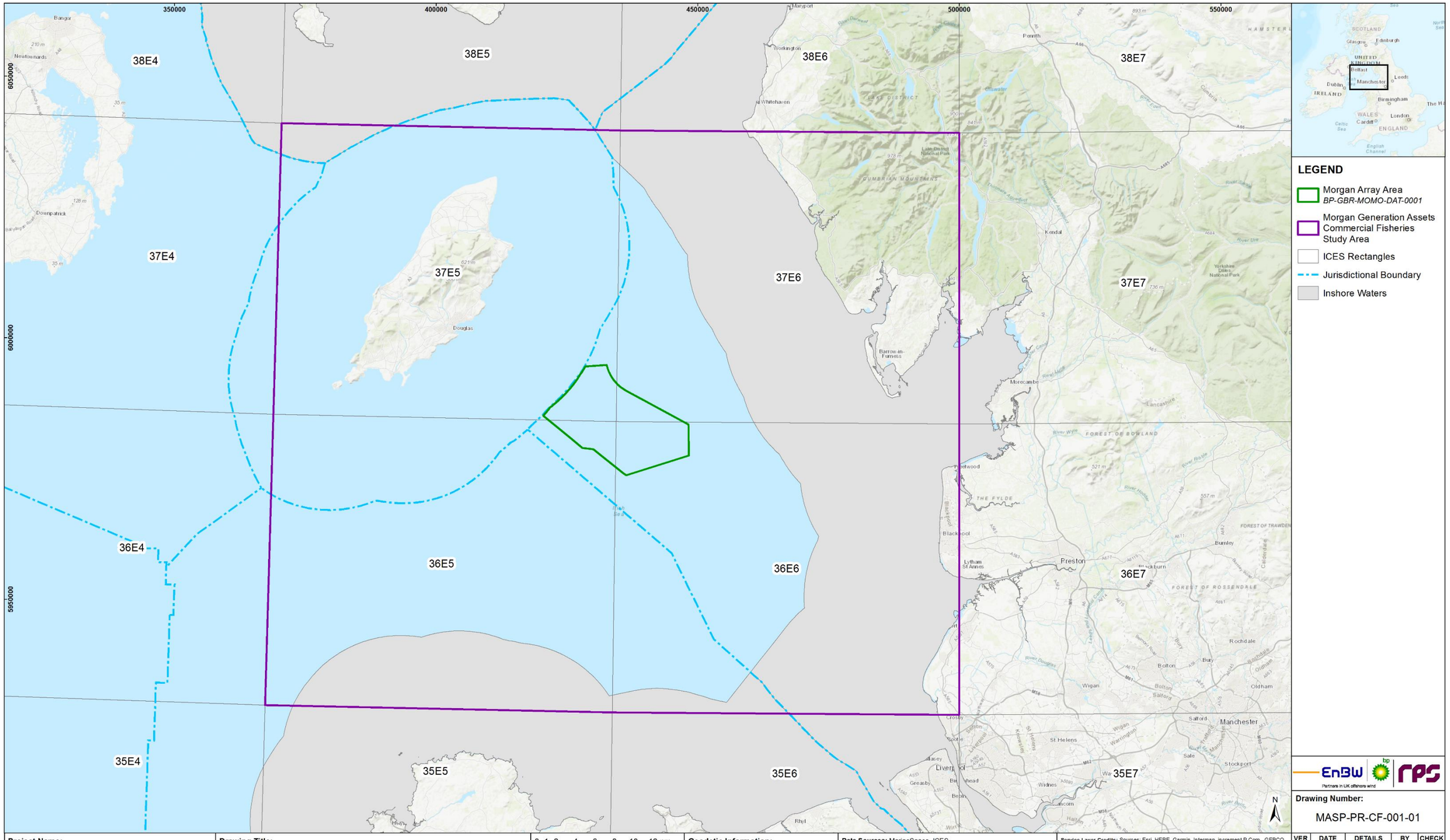


Figure 1.1: Commercial fisheries study area for the Morgan Generation Assets.

1.3 Methodology

1.3.1.0 To characterise commercial fishing activity in the 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. This is summarised in Table 1.1.

1.3.1.2 To account for trends and seasonal variations in vessel landings and effort, data over at least a four year time period has been assessed. Where possible, data has been collated for a 10-year period, as consultation feedback has indicated that the scallop fisheries in the area of the Morgan Array Area are cyclical, over periods of seven to eight years. The most recently available datasets have been collated from the various sources.

1.3.1.3 There is a range of different limitations and assumptions associated with the data, as summarised in Table 1.1. Feedback from consultation (discussed further in section 1.3.2 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	Limitations
Landing statistics by ICES Rectangle for UK and Isle of Man vessels.	Marine Management Organisation (MMO)	2010 to 2020	• Finest available level of spatial resolution is by ICES Rectangle • Vessels ≤10m 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.	MMO	2010 to 2020	• Vessels ≤10m are not required to complete logbooks, so may be under-represented within the data.
Landings statistics by ICES Rectangle for European Union (EU) vessels.	EU Scientific, Technical and Economic Committee for Fisheries (EU STECF)	2006 to 2016	• Finest available level of spatial resolution is by ICES Rectangle • Data is provided by Member States - variable levels of confidence • Vessels ≤10m 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 (≥15m).	MMO	2009 to 2020	• Finest available level of spatial resolution is by ICES subrectangle • 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 <15m are not included within the dataset.
VMS data for European mobile bottom contacting gear vessels (>12m).	ICES, 2020	2009 to 2020	• Finest available level of spatial resolution is by ICES subrectangle • 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 <12m are not included within the dataset • Data only for mobile bottom contacting gears • Data is provided by Member States – variable levels of confidence.
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 <15m included.

Title	Source	Year	Limitations
ICES scallop assessment working group.	ICES	2019	• Polygon data based on VMS data, so activity from vessels <10m may not be included (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.

1.3.2 Informal consultation

1.3.2.1 In addition to the review of official data and relevant studies, informal consultation has also been undertaken with key local and regional fisheries stakeholders, since June 2021, to date. This consultation has been arranged by MarineSpace, in its role as CFLO, assisted by the appointed Fisheries Industry Representative (FIR) for the Morgan Offshore Wind Project, Tom Watson.

1.3.2.2 A summary of the key issues 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 have been used to develop further understanding of existing fishing activity in the region and are captured throughout this document. It is intended that these consultations will continue over the consenting phase of the Morgan Offshore Wind Project, to ensure that all relevant information from fisheries stakeholders is presented within the EIA.

1.3.2.4 Table 1.2 also includes Scoping Opinion responses which are relevant to commercial fisheries.

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 Offshore Wind Project, provide fisheries stakeholders with an outline of the 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Concerns regarding array layout and coexistence during the operations and maintenance phase. Scallop vessels would require greater spacing of wind turbines • Concerns regarding cumulative and in-combination impacts with other activities and developments in the region • Concerns 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 December to April.
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 Offshore Wind Project, provide fisheries stakeholders with an outline of the 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Array areas (particularly western parts) are in key queen scallop grounds and also an important area for king scallop • Discussed existing scallop closures in Irish Sea • Concerns regarding array layout and coexistence 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 Offshore Wind Project, provide fisheries stakeholders with an outline of the 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Concerns regarding array layout and coexistence 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 • Concerns regarding cumulative and in-combination impacts with other activities and developments • Concerns regarding impacts on fish stocks • Concerns 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 pre-2021 survey meeting, following introductory meeting, to discuss the 2021 offshore survey programme.	• Douglas Bank herring closure - annually 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 Offshore Wind Project, provide fisheries stakeholders with an outline of the 2021 offshore survey programme and discuss potential impacts on fisheries stakeholders.	• Discussion over practicalities of a Regional Fisheries Working Group • Concerns regarding array layout and coexistence during the operations and maintenance phase • Emphasised the importance of early engagement with the fishing industry • Concerns 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 • Western areas of lease areas are more important fishing grounds, but eastern 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 2021	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 Project's 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 Project's 2022 offshore survey programme, PEIR programme and outline of datasets to inform the PEIR.	• Concerns 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 Project's 2022 offshore survey programme, PEIR programme and outline of datasets to inform the PEIR.	• Concerns regarding cumulative and in-combination impacts with other activities and developments • Concerns regarding impacts on fish stocks • Issues with VMS data not capturing smaller vessels.
February 2022	SFF, SWFPA and WCSP. Meeting to update on the Project's 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 • Issues with 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.	• Requested to be added to future fisheries stakeholder meetings.
March 2022	Welsh Government (WG) Meeting to update on the Project's 2022 offshore survey programme, PEIR programme and outline of datasets to inform the PEIR.	• Concerns that not all Welsh fishers are represented by the WFA • Belgian beam trawl vessels active out of Holyhead • Issues with VMS data not capturing smaller vessels. IVMS data from inshore vessels will not be available prior to PEIR submission. Therefore, smaller static gear vessels will not be represented in official datasets.
April 2022	SFF, SWFPA and WCSP. Response to the Project's questionnaire on array layout/fisheries coexistence.	• Information on spatial extent of fishing activity, array layout (wind turbine spacing and inter-array cable layout) and cable burial.

Date	Consultee and Purpose of Consultation	Topics Raised
April 2022	Rederscentrale Response to the Project's questionnaire on array layout/fisheries coexistence.	• Information on spatial extent of fishing activity, array layout (wind turbine spacing and inter-array cable layout) and cable burial.
May 2022	MFPO Response to the Project's questionnaire on array layout/fisheries coexistence.	• Information on spatial extent of fishing activity, array layout (wind turbine spacing and inter-array cable layout) 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.	• Concerns regarding sound impacts on whelk. • Concerns regarding array layout and 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.	• Concerns regarding array layout and co-existence during the operations and maintenance phase. Noted higher density queen scallop ground in the southwest part of the Morgan Array Area. • Discussion regarding inter-array cable layout and burial depth to allow scallop fishing during operations and maintenance phase. Gear penetration can vary between 5-25cm. • Concerns regarding impacts on scallop stocks as a result of changes to tidal flow from the installation of wind turbines.

Date	Consultee and Purpose of Consultation	Topics Raised
November 2022	MFPO Consultation meeting.	• Queries regarding array layout and co-existence during the operations and maintenance phase. Noted that the Manx fishing vessels only use approximately 100ft of cable, so are able to fish between wind turbines. • Discussion regarding inter-array cable layout and burial depth to allow scallop fishing during operations and maintenance phase. • Concerns 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 array layout and co-existence during the operations and maintenance phase. Noted that fishing between wind turbines of 1km 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 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.	• Concerns regarding array layout and co-existence during the operations and maintenance phase. Orientation of wind turbines in a north-south alignment would be preferable. • Concerns 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 array layout and co-existence during the operations and maintenance phase. • Discussion regarding inter-array cable layout and burial depth and concerns regarding snagging.
November 2022	Individual fishing operators from Conwy	• Queries regarding co-existence during the operations and maintenance phase. • Concerns regarding spatial squeeze on fishing vessels due to changes in ferry routes as a result of the Morgan Array Area. • Concerns regarding impacts on fish stocks.

1.3.3 Site-specific surveys

1.3.3.1 NASH Maritime was commissioned to undertake two 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 (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.

1.3.3.2 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 3km 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 (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. These data were only provided as point data, so do not show individual fishing vessel tracks. These data are also limited by the time period captured and will be used to supplement other datasets. Locations of static gear were also recorded by the OFLO which have been used to inform this assessment, 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.

1.3.3.3 During the 2022 surveys, where an OFLO was unable to be present on a survey vessel, MarineSpace undertook daily remote fisheries monitoring; these observations are limited to vessels which have AIS active and the time at which the AIS was monitored. MarineSpace was able to observe fishing vessel patterns and add point data which is presented in this report to supplement official datasets.

1.3.3.4 A summary of the surveys used to inform the commercial fisheries baseline is outlined in Table 1.3.

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 10nm	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 2021 to 18 September 2021	n/a
Winter vessel traffic survey	Morgan Array Area plus 10nm	AIS and radar	NASH Maritime	21 November 2021 to 04 December 2021	Volume 2, chapter 12: Shipping and navigation of the PEIR; volume 4, annex 12.1: Navigational risk assessment of the PEIR.
Summer vessel traffic survey	Morgan Array Area plus 10nm	AIS and radar.	NASH Maritime	15 July 2022 to 29 July 2022	Volume 2, chapter 12: Shipping and navigation of the PEIR; volume 4, annex 12.1: Navigational risk assessment of the PEIR.
OFLO observations 2022	Commercial fisheries study area plus 10nm	OFLO onboard the survey vessel recorded observations (from AIS, radar, visual observations and radio communications) of fishing vessels and fishing gear present.	NFFO	01 April 2022 to 10 July 2022	n/a
MarineSpace observations 2022	Commercial fisheries study area plus 10nm	Fisheries monitoring using AIS data (via www.marinetraffic.com).	MarineSpace	10 July 2022 to 30 November 2022	n/a

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 (NEAFC) 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 fishing efforts are Fleetwood, Douglas, Peel, Port St Mary and Ramsey. Fishing vessels that are active in the commercial fisheries study area are also based out of a number of ports across the wider region, including Annan, Kilkeel, Kirkcudbright and Maryport: activity from these vessels is included in this technical report. There are 16 vessels with Fleetwood as their home port, eight of which are ≤10m and eight of which are >10m in length (MMO, 2022).

1.4.2.2 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* (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, 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 commercial fisheries study area.

1.4.2.6 These species are primarily targeted using towed dredges and otter trawls, by vessels ranging in size from <10 to 25m length.

1.4.2.7 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 12nm, 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	Five closed areas	01 April to 30 June	ICES area VIIa
Wales	01 May to 31 October	Within 1nm of the baseline and specified bays	n/a	n/a

1.4.2.8 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 to 24m) Scottish nomadic vessels (Cappel *et al.*, 2018).

1.4.2.9 Feedback from project-specific consultation has established that at the time of writing there are 33 scallop vessels registered in the Isle of Man, however, due to the size and capacity of the Manx vessels, it is expected that the majority of these vessels will not fish beyond the 12nm Manx territorial sea. Fisheries monitoring has recorded two Manx vessels large enough to fish outside of the 12nm Manx territorial sea. 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 scallop.

1.4.2.10 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 commercial fisheries study area, particularly given that 53% of the vessels are <12m in length.

1.4.2.11 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 and Spring (March to May).

1.4.2.12 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 commercial fisheries study area as and when market forces demand.

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

1.4.2.14 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 4, annex 8.1: Fish and shellfish ecology technical report of the PEIR. Generally, queen scallop are 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

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

1.4.2.16 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; there are also vessels from Jersey that target whelk, crab and lobster in the commercial fisheries study area.

1.4.2.17 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.

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

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

Beam trawling for flatfish

1.4.2.20 The Irish Sea has been an important traditional fishing ground for beam trawl vessels for many decades (NWWAC, 2013). Flatfish, specifically sole, are 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 study area. The grounds targeted for flatfish are generally to the east of the Morgan Array Area, but with some overlap, and are fished during the Spring period (March to May).

1.4.2.21 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 herring

1.4.2.22 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.

1.4.2.23 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 8.1: Fish and shellfish ecology technical report of the PEIR). 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 closure.

1.4.2.24 Herring are subject to TACs, and ICES advice recommends a 15% increase in the TAC for 2022 (ICES, 2021b).

Trawling for *Nephrops*

1.4.2.25 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.

1.4.2.26 *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 190,683t 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 2010 and 2020, with Scottish vessels landing the largest proportion of total weight of fish caught by UK vessels (Figure 1.2) (MMO, 2020a).

1.4.3.2 A total of 7,492t was caught by Belgian, French, Irish and Dutch vessels across the commercial fisheries study area, between 2006 and 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 (STECF, 2017).

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

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

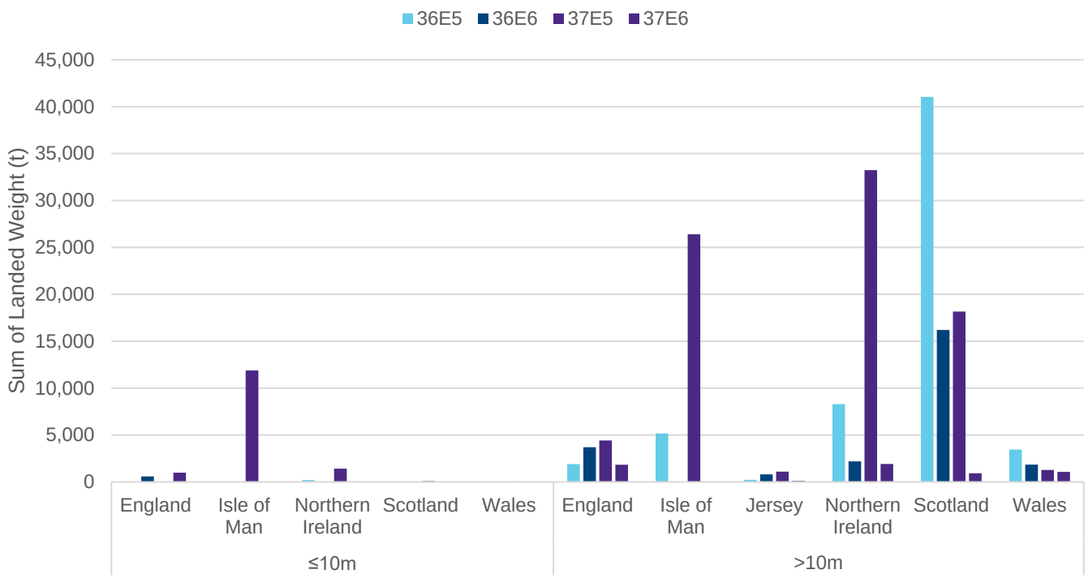


Figure 1.2: Sum of landed weight by vessel size class (2010 to 2020) within the commercial fisheries study area (UK vessels)[2].

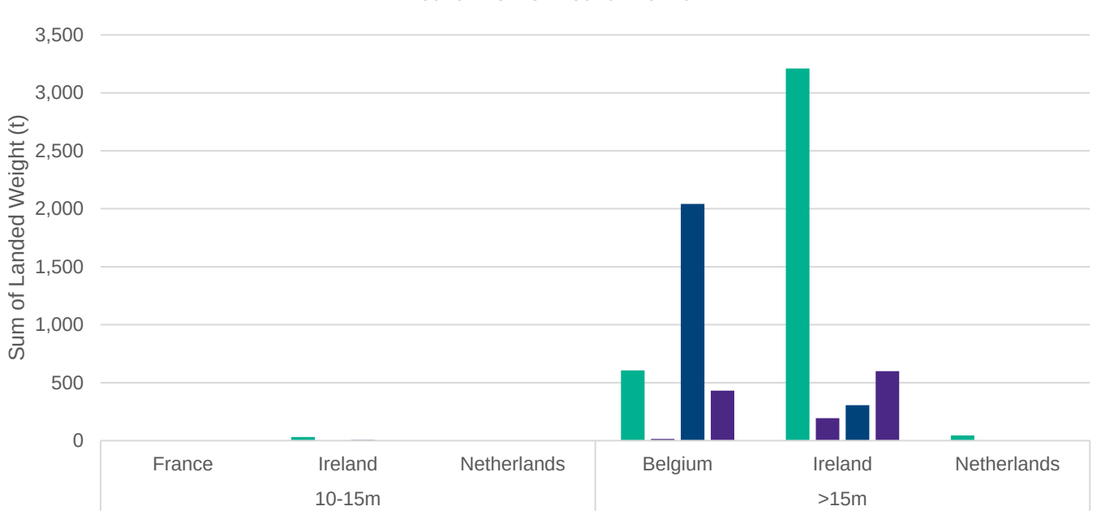


Figure 1.3: Sum of landed weight by vessel size class (2006 to 2016) within the commercial fisheries study area) (non-UK vessels)[3].

[2] MMO, 2020a

[3] EU STECF, 2017

1.4.4 Temporal variation

Annual trends

1.4.4.1 The MMO data shows that between 2010 and 2020, the sum of landed weight by UK vessels from the commercial fisheries study area varied from a minimum of 7,600t in 2020 to a maximum of 28,082t in 2011 (Figure 1.4Figure 1.4). The sum of landed value varied from a minimum of £11,383,479 in 2010, to a maximum of £26,450,826 in 2016 (Figure 1.5).

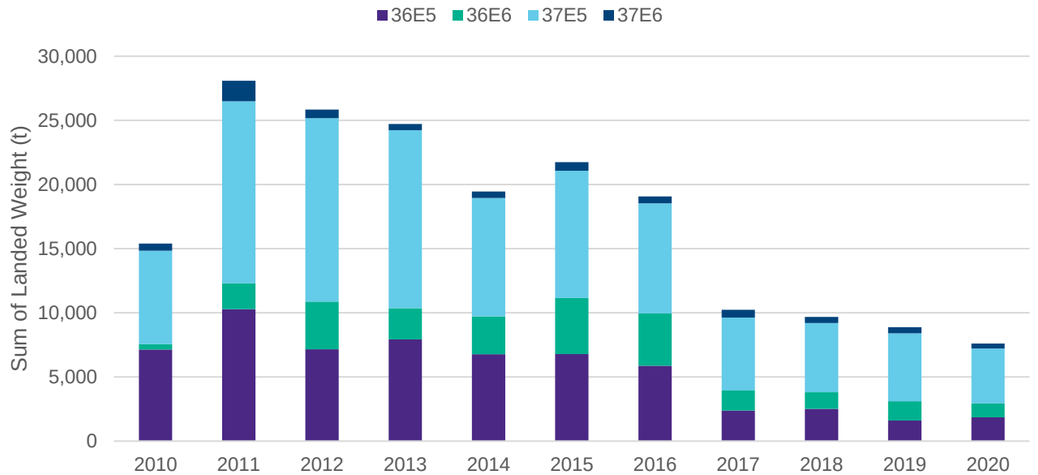


Figure 1.4: Annual trends in landings weight (2010 to 2020) within the commercial fisheries study area (UK vessels)[4].

[4] MMO, 2020a

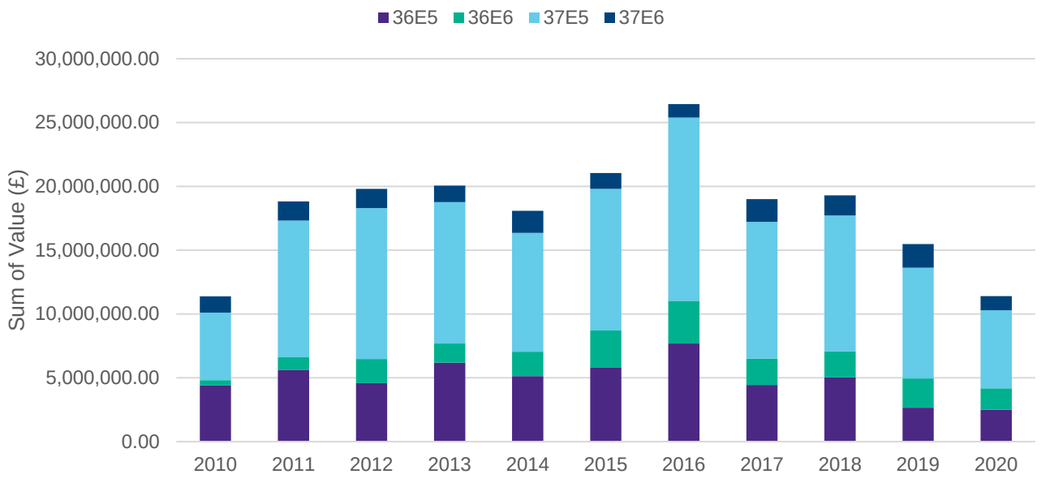


Figure 1.5: Annual trends in sum of landings value (2010 to 2020) within the commercial fisheries study area (UK vessels)[5].

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

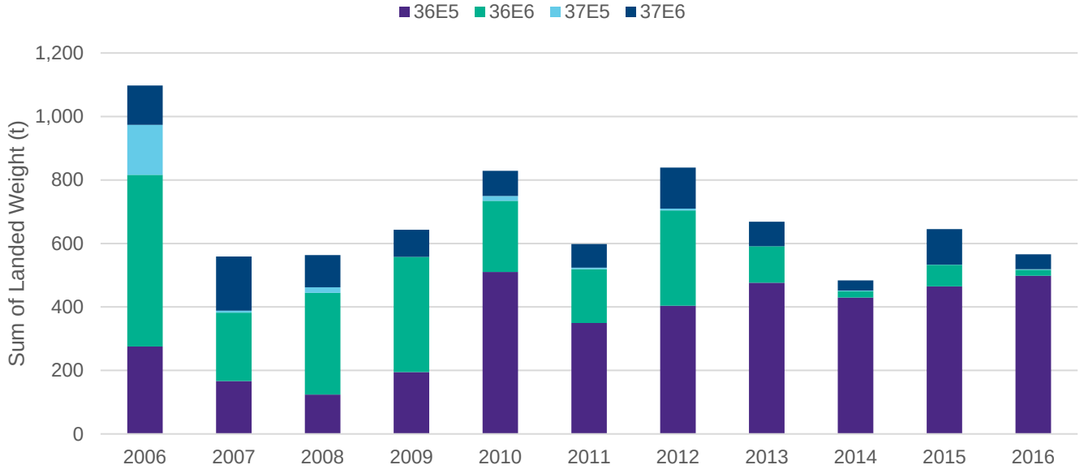


Figure 1.6: Annual trends in sum of landed weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[6].

[5] MMO, 2020a

[6] EU STECF, 2017

Seasonal trends

1.4.4.3 Across the commercial fisheries study area, the seasonal (intra-annual) range in landed weight (2010 to 2020) by UK vessels varied from 10,487t in May to 36,034t in September (Figure 1.7). The landed value followed a similar trend for UK vessels with the minimum value of £8,758,969 in October and maximum value of £27,211,517 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.

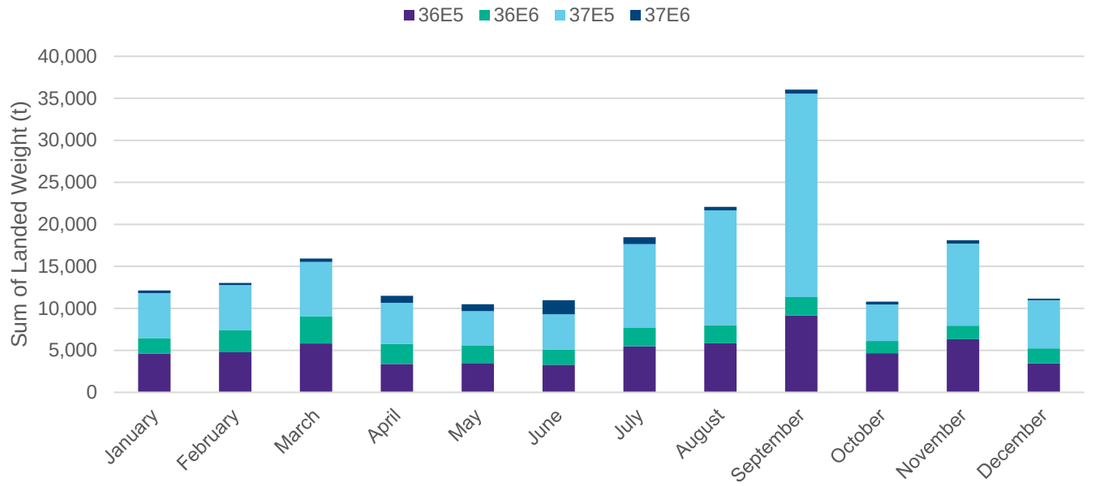


Figure 1.7: Seasonal trends in sum of landed weight (2010 to 2020) within the commercial fisheries study area (UK vessels)[7].

[7] MMO, 2020a

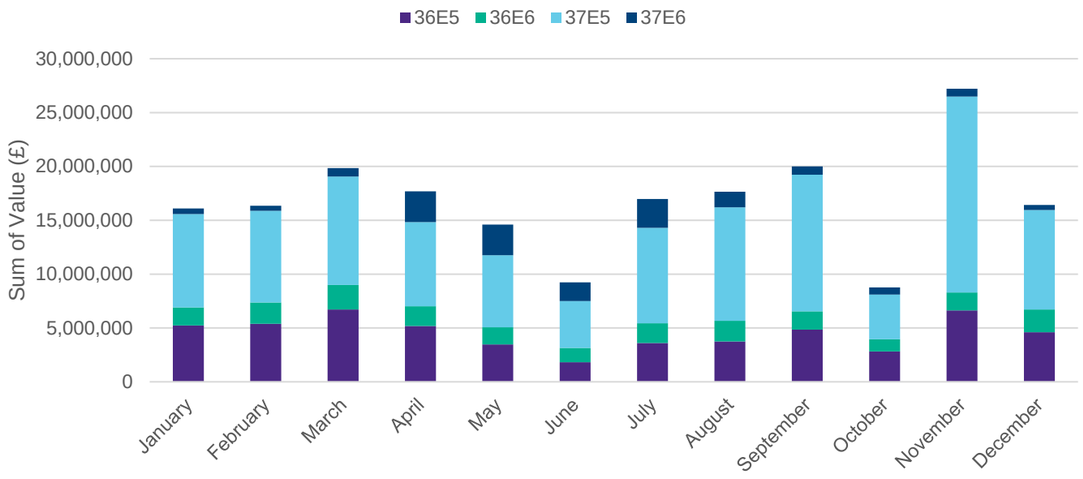


Figure 1.8 Seasonal trends in sum of landed value (2010 to 2020) within the commercial fisheries study area (UK vessels)[8].

1.4.4.4 Across the commercial fisheries study area, the seasonal (intra-annual) range in landed weight (2006 to 2016) by non-UK vessels varied from 838t during July to September, to 2,615t 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.

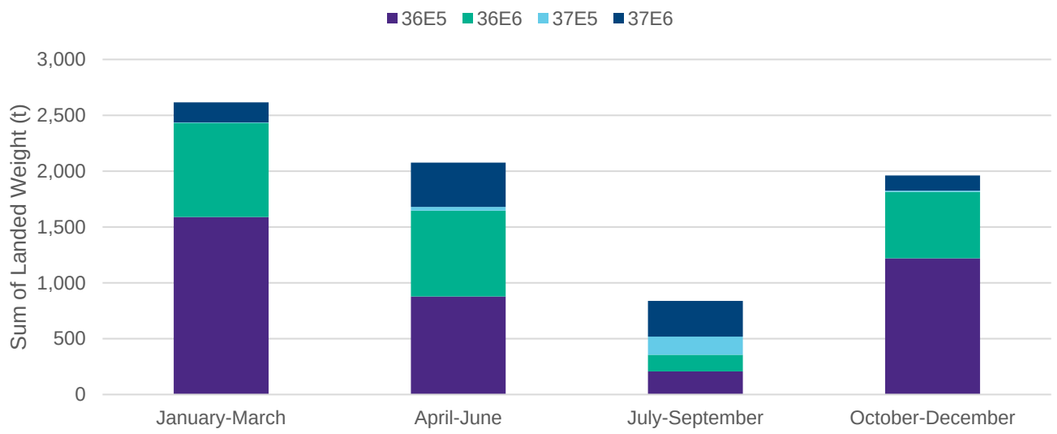


Figure 1.9: Seasonal trends in sum of landed weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[9].

1.4.5 Species

1.4.5.1 The MMO and STECF datasets were used to determine the most important species groups and species for UK 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 STECF data does not provide information on species group, so this is only presented for UK vessels.

Species landed by UK 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.

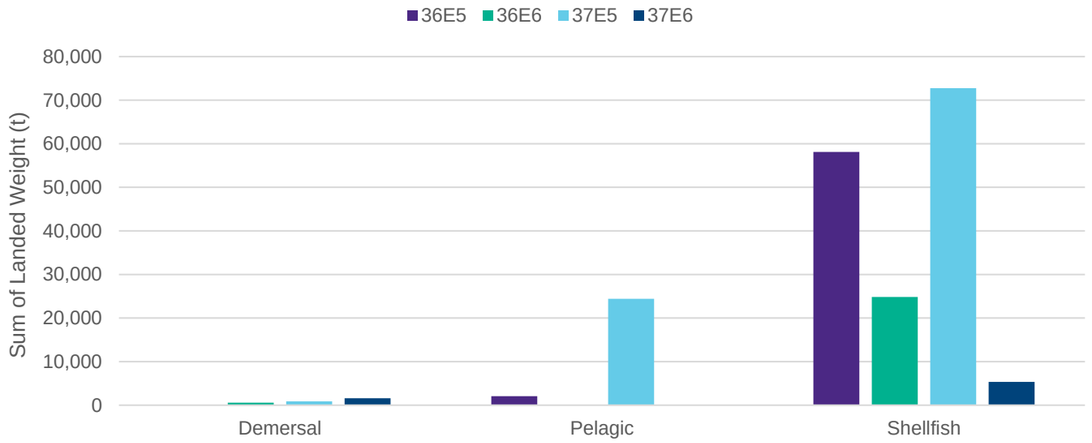


Figure 1.10: Sum of landed weight within the commercial fisheries study area, displayed by species group (UK vessels)[10].

[8] MMO, 2020a

[9] EU STECF, 2017

[10] MMO, 2020a

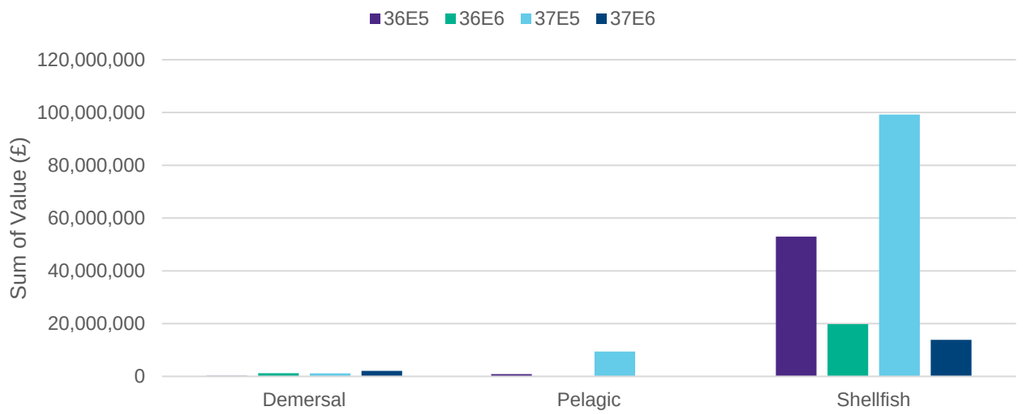


Figure 1.11: Sum of landed value within the commercial fisheries study area), displayed by species group (UK vessels)[11].

1.4.5.3 The top 15 species (by landed weight) caught by UK vessels from the commercial fisheries study area are presented in Figure 1.12. 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. An overview of the top five species is presented in Table 1.5.

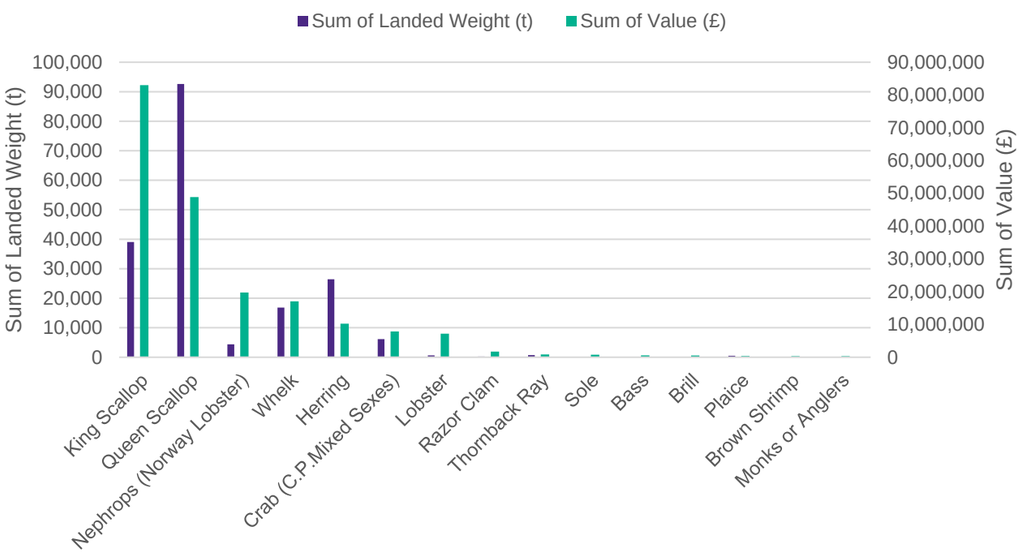


Figure 1.12: Sum of landed weight and value within the commercial fisheries study area for the top 15 species (UK vessels)[12].

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	>10m	King scallop landings are generally highest during November. Fishery closed between 01 June and 31 October.
Queen scallop	*Aquapecten opercularis*	Scallop dredge or otter trawl	>10m	Queen scallop landings are generally highest between July and September. Fishery closed between 01 April and 30 June.
Norway lobster	*Nephrops norvegicus*	Pot/trap or bottom trawls	>10m and ≤10m	Norway lobster landings are higher in the summer but caught all year around.
Whelk	*Buccinum undatum*	Pot/trap	>10m and ≤10m	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.

King scallop

1.4.5.4 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 70m (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 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.

1.4.5.5 Over the period 2010 to 2020, 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 3,311 to 9,373t. Landed weight of king scallop showed relatively similar seasonal trends across the 2010 to 2020 period, but with a slightly earlier peak during 2011. Limited dredging occurred during July to October for all years, due to the king scallop seasonal closure during these months (June to October).

[11] MMO, 2020a

[12] MMO, 2020a

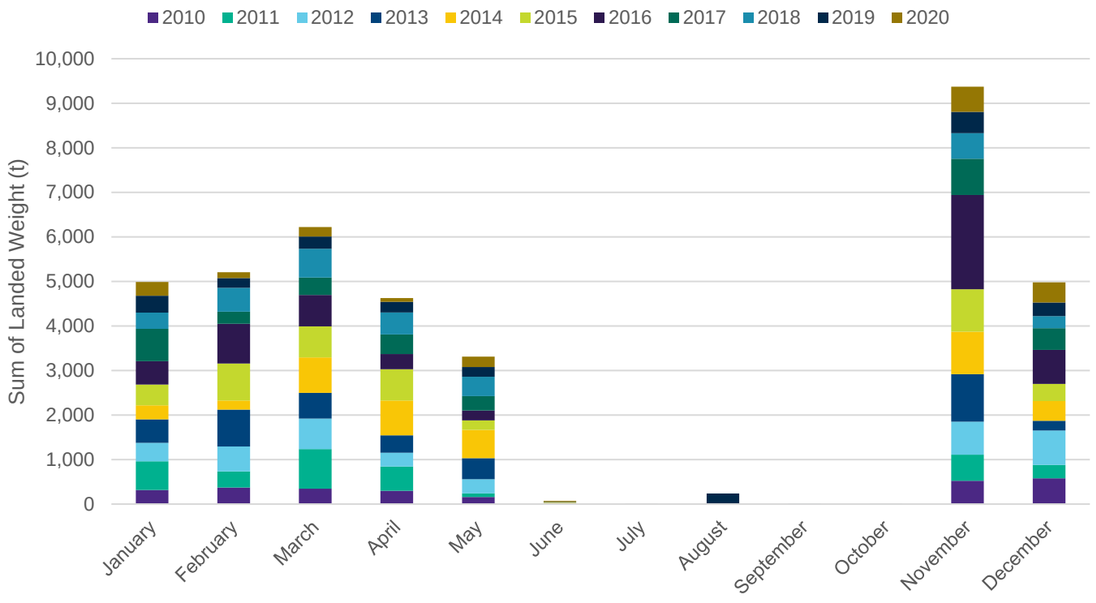


Figure 1.13: Seasonality of landed weight (t) of king scallop (2010 to 2020) within the commercial fisheries study area (UK vessels)[13].

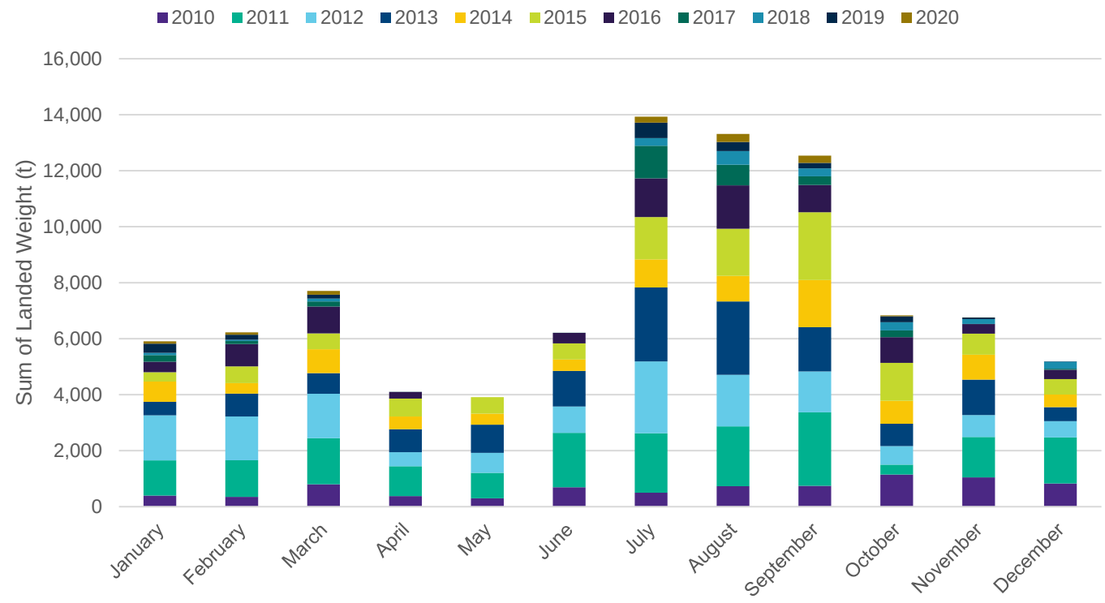


Figure 1.14: Seasonality of landed weight (t) of queen scallop (2010 to 2020) within the commercial fisheries study area (UK vessels)[14].

Queen scallop

1.4.5.6 Queen scallop 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 100m.

1.4.5.7 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 in the UK tend to be less valuable and more variable than king scallop.

1.4.5.8 The most important months for landings of queen scallop during the period 2010 to 2020 were July, August and September, with a landed weight range across these months from 12,541 to 13,929t (Figure 1.14). Landed weight of queen scallop across the 2010 to 2020 period showed relatively similar seasonal trends to that of king scallop. However, in 2011 the landed weight peak of queen scallop occurred slightly later in the year, and landed weights from 2018 to 2020 were notably lower.

1.4.5.9 The minimum landed weight of queen scallop occurred during May 2018, May 2019 and May 2020, where no landings where recorded, and maximum during July 2013 at 2,642t. A notable lack of landings can be observed between April and June in recent years, attributed to the 2018 introduction of seasonal closures for queen scallop in the Irish Sea.

Whelk

1.4.5.10 Whelk are most abundant at water depths between 0 to 50m 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 150mm and live for up to 15 years. A whelk's 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.

1.4.5.11 Whelk landings, in terms of weight, over the period 2010 to 2020, were most prominent during April to September inclusive, with a landed weight range across these months of 1,422 to 2,217t (Figure 1.15). Landed weight of whelk was notably higher during May 2018 (312t). The minimum landed weight of whelk occurred in February 2010 (0t) and March 2010 (6t).

[13] MMO, 2020a

[14] MMO, 2020a

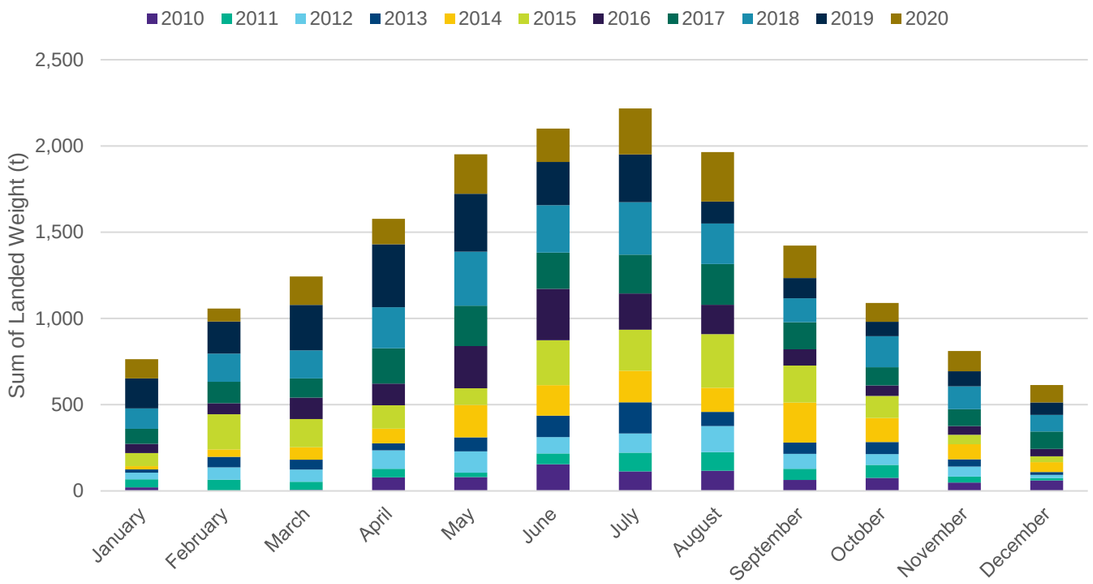


Figure 1.15: Seasonality of landed weight (t) of whelk (2010 to 2020) within the commercial fisheries study area (UK vessels)[15].

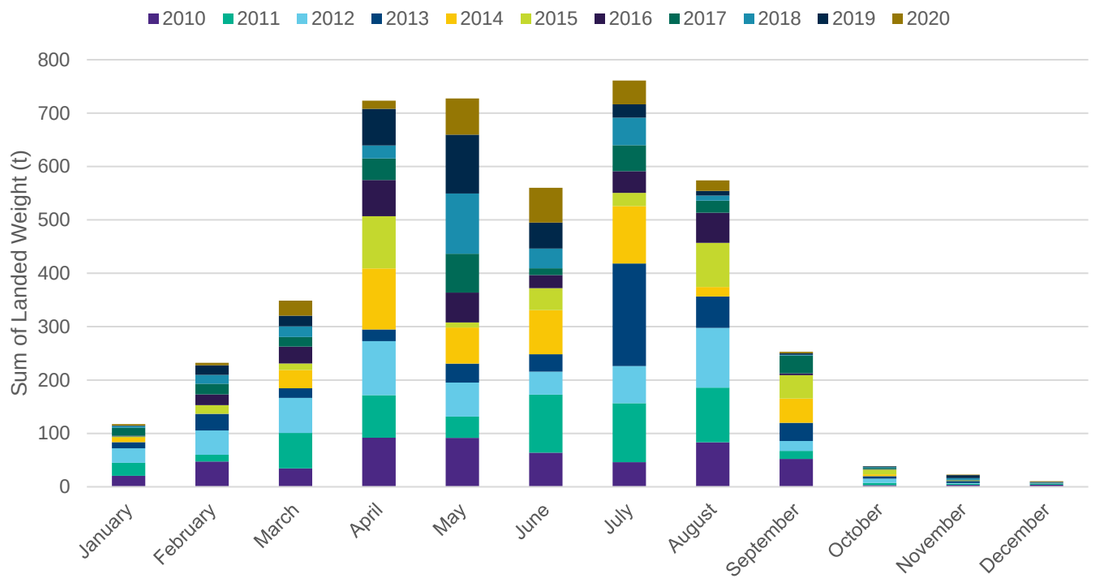


Figure 1.16: Seasonality of landed weight (t) of *Nephrops* (Norway lobster) (2010 to 2020) within the commercial fisheries study area (UK vessels)[16].

Nephrops (Norway lobster)

1.4.5.12 *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.

1.4.5.13 *Nephrops* landings, in terms of weight over the period 2010 to 2020, 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.

Herring

1.4.5.14 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.

1.4.5.15 Landings of herring in the commercial fisheries study area over the period 2010 to 2020 were predominantly during August and September (Figure 1.17). 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 4,655t was caught during August and 20,389t was caught during September across 2010 to 2020. Annual landings of herring fluctuate, as the ICES advice sets the TAC which in turn controls the landings.

[15] MMO, 2020a

[16] MMO, 2020a

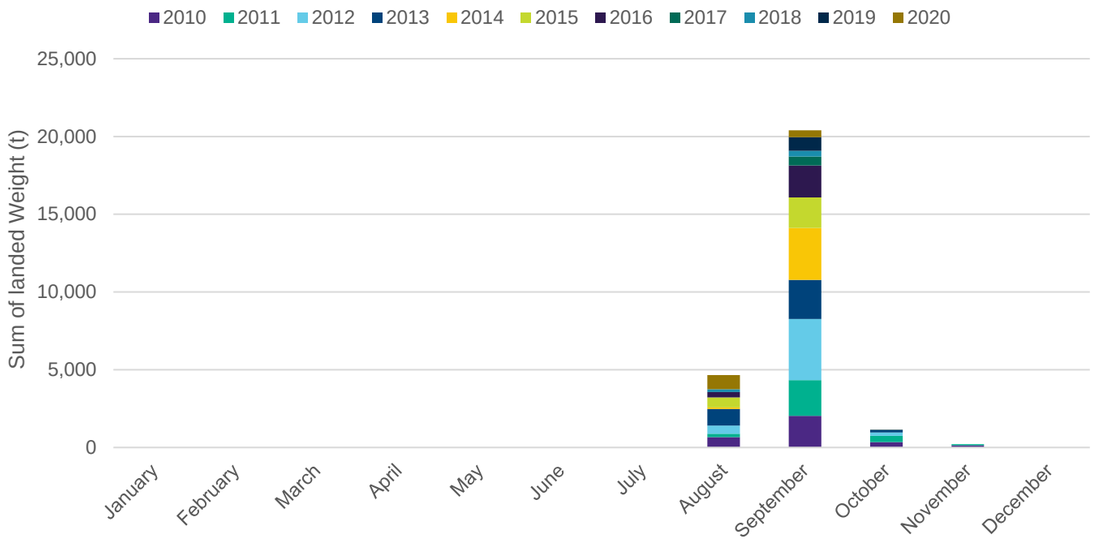


Figure 1.17: Seasonality of landed weight (t) of herring (2010 to 2020) within the commercial fisheries study area (UK vessels)[17].

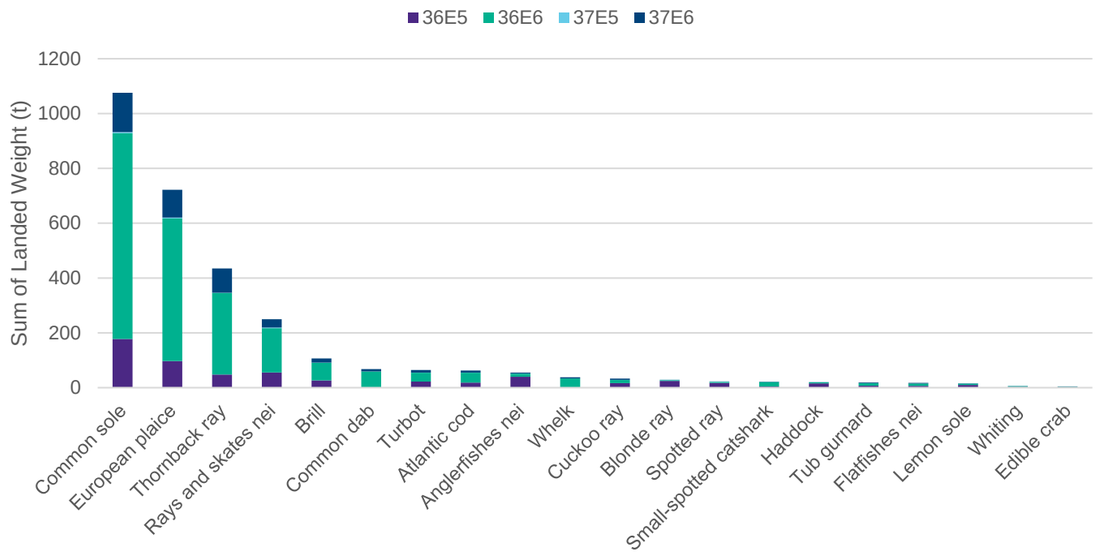


Figure 1.18: Total landings (t) from Belgian vessels within the commercial fisheries study area displayed for the top 20 species[18].

Species landed by non-UK vessels

1.4.5.16 A total of 53 species were landed by Belgian vessels over the period 2006 to 2016 from the commercial fisheries study area. Of these 53 species, the top 20 species (Figure 1.18) 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) 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).

1.4.5.17 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.

1.4.5.18 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 from ICES Rectangle 36E5. King scallop landings were significantly higher than other species landed by Irish vessels, indicating the significant importance of this species to Irish vessels active in the region.

[17] MMO, 2020a

[18] EU STECF, 2017

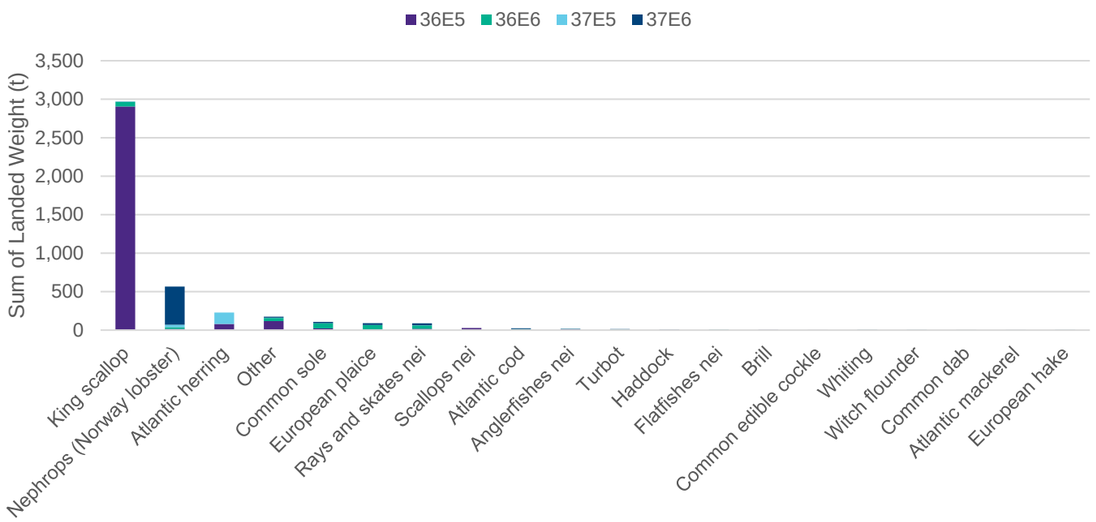


Figure 1.19: Total landings (t) from Irish vessels within the commercial fisheries study area displayed for the top 20 species[19].

1.4.5.19 Only one species (edible crab) was landed by French vessels during 2006 to 2016 within the commercial fisheries study area (Figure 1.20), and only from Rectangle 36E6.

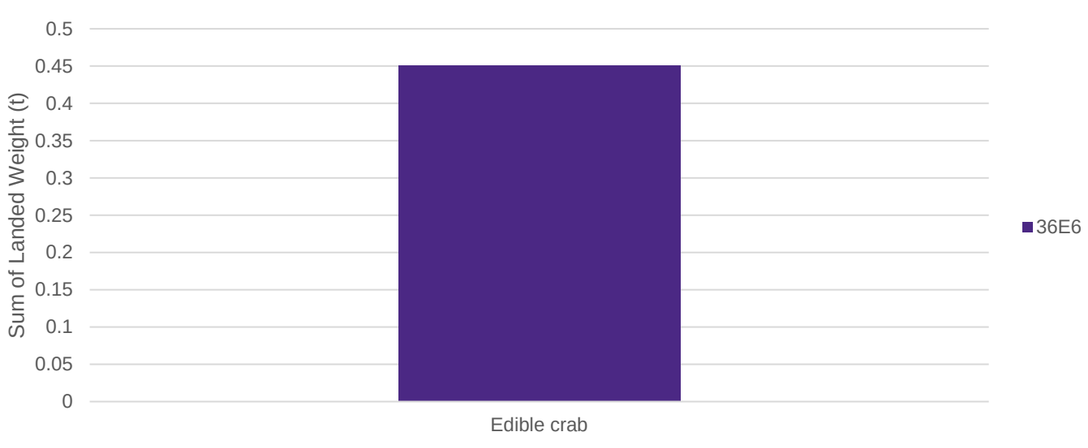


Figure 1.20: Total landings (t) from French vessels within the commercial fisheries study area displayed by species[20].

1.4.5.20 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. 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%) and common sole (2%). Data from Dutch vessels shows that the fleet targets the majority of landings from ICES Rectangle 36E5.

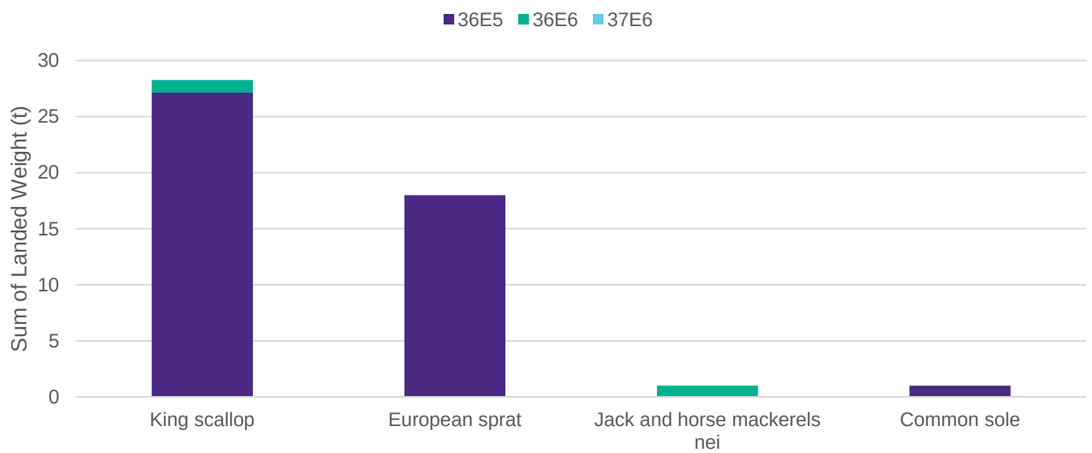


Figure 1.21: Total landings (t) from Dutch vessels within the commercial fisheries study area, displayed by species[21].

1.4.5.21 The STECF 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 (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.

[19] EU STECF, 2017

[20] EU STECF, 2017

[21] EU STECF, 2017

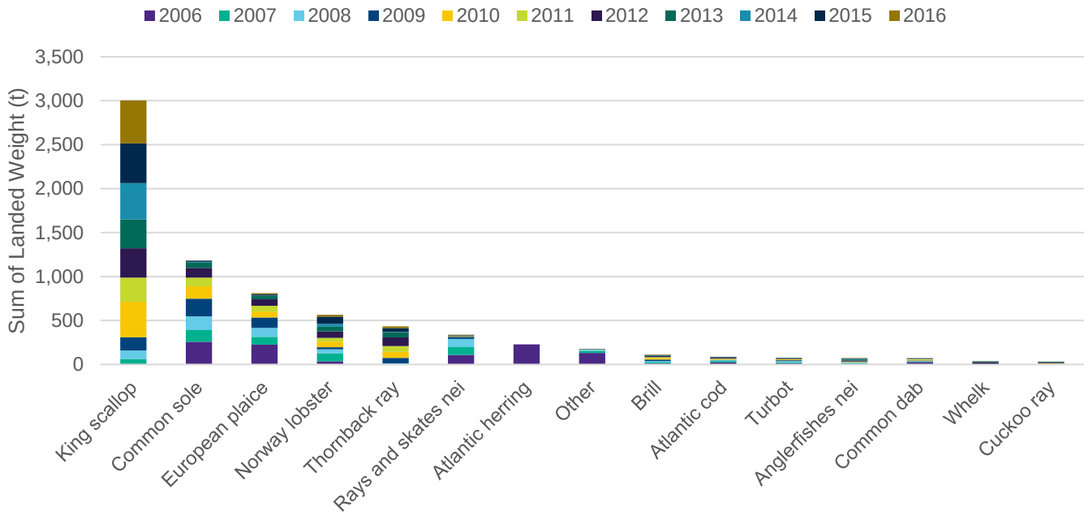


Figure 1.22: Annual trends in the top 15 species by total landings weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[22].

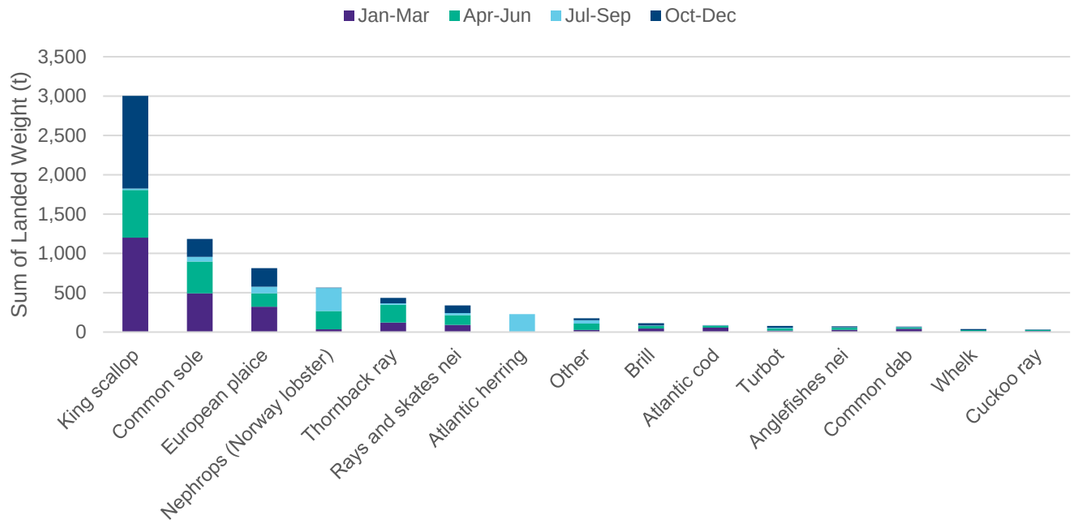


Figure 1.23: Seasonal trends in the top 15 species by total landings weight (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[23].

1.4.5.22 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 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. 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.

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 and non-UK fleets in the commercial fisheries study area. Data has been collated for the most recent 10 year time period: 2010 to 2020 for the MMO data (UK vessels), and 2006 to 2016 for the STECF data (non-UK vessels).

1.4.6.2 The data shows that eight identifiable gear types were recorded as being used to target fish stocks by UK vessels, specifically beam trawls, demersal trawls/seines, dredges, drift and fixed nets, gears using hooks, other mobile gears, otter trawl, and pots and traps (MMO, 2020).

1.4.6.3 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 (STECF, 2017).

1.4.6.4 Dredges accounted for approximately 59% of total landings by UK 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 >10m 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 UK vessels, which predominantly used dredges. The

[22] EU STECF, 2017

[23] EU STECF, 2017

spatial distribution of vessels using the different gear types within the respective ICES Rectangles is discussed in section 1.4.8.

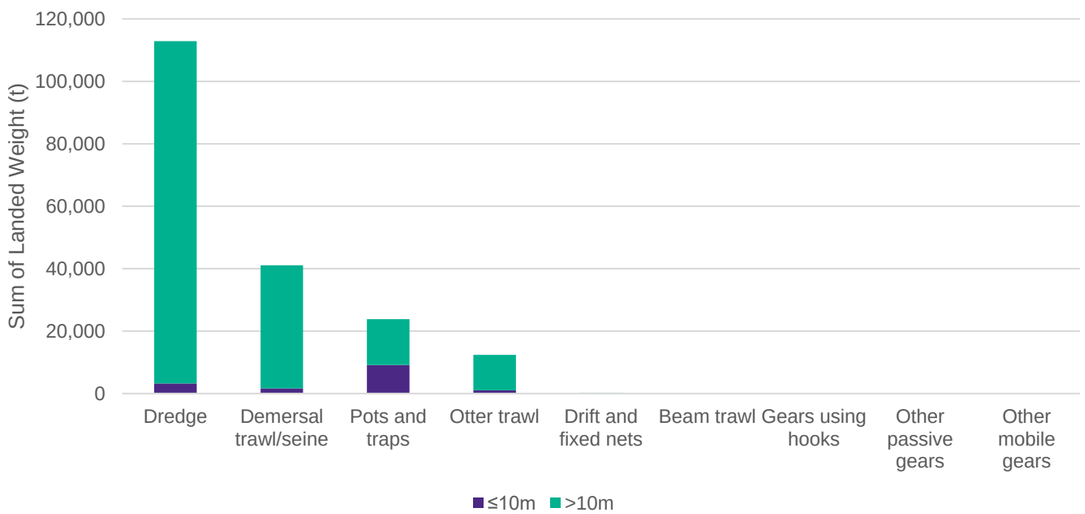


Figure 1.24: Total landings weight by gear type (2010 to 2020) within the commercial fisheries study area (UK vessels)[24].

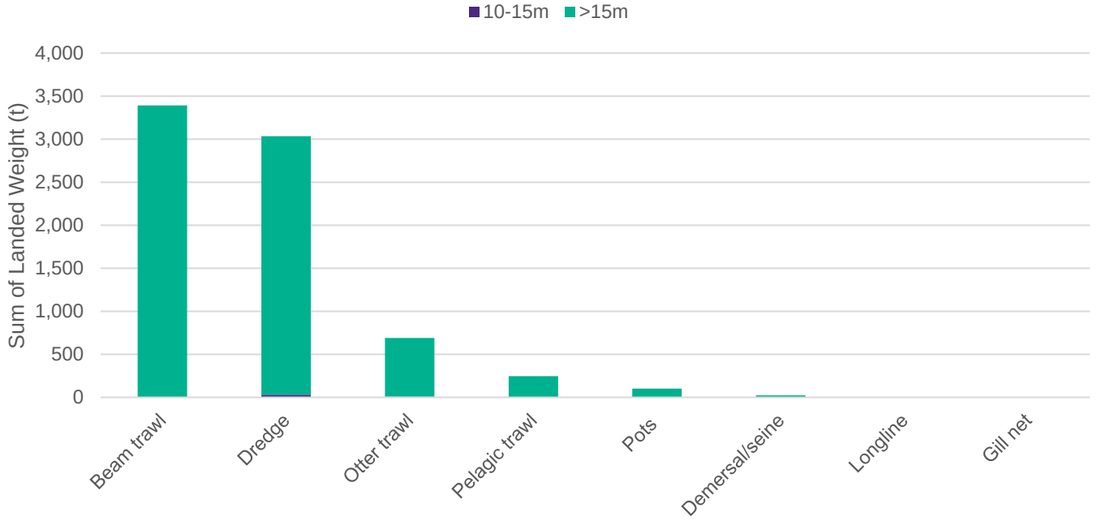


Figure 1.25: Total landings weight by gear type (2006 to 2016) within the commercial fisheries study area (non-UK vessels)[25].

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 the whelk fishery, particularly vessels operating out of Fleetwood, which is discussed in sections 1.4.1, 1.4.5 and 1.4.7.

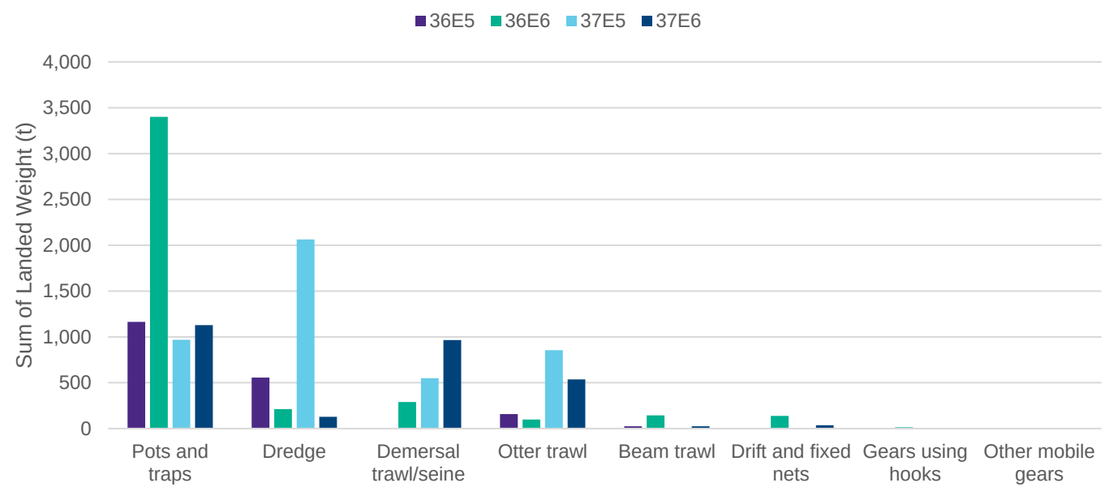


Figure 1.26: Total landings weight from English vessels by gear type (2010 to 2020) within the commercial fisheries study area[26].

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 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 commercial fisheries study area were demersal trawl/seine and otter trawl.

[24] MMO, 2020a

[25] EU STECF, 2017

[26] MMO, 2020a

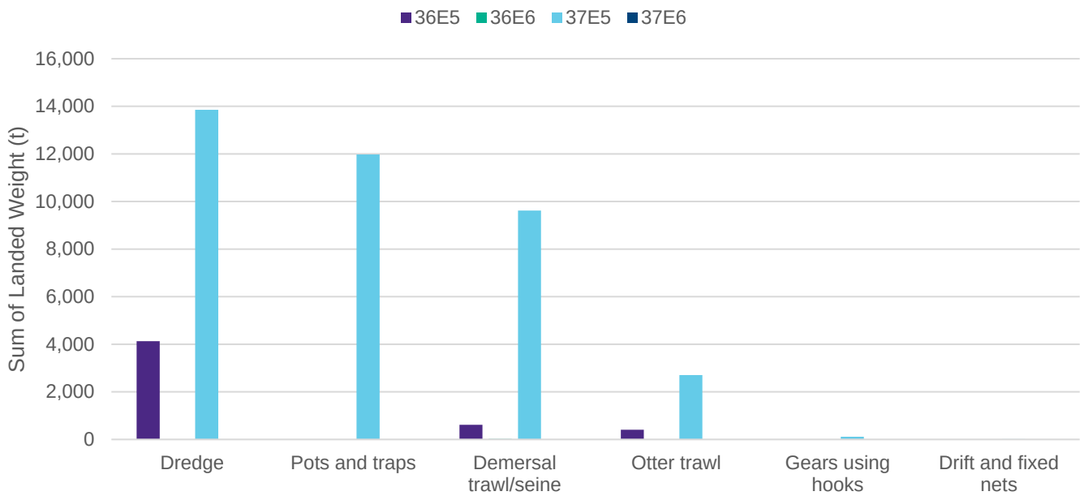


Figure 1.27: Total landings weight from Isle of Man vessels by gear type (2010 to 2020) within the commercial fisheries study area[27].

1.4.6.8 Jersey-based vessels showed significantly less variety of gear types than English and Isle of Man vessels (Figure 1.28). Data shows that Jersey vessels caught a relatively low landed weight (t) in comparison with other UK vessels, and only utilised pots and traps within the commercial fisheries study area.

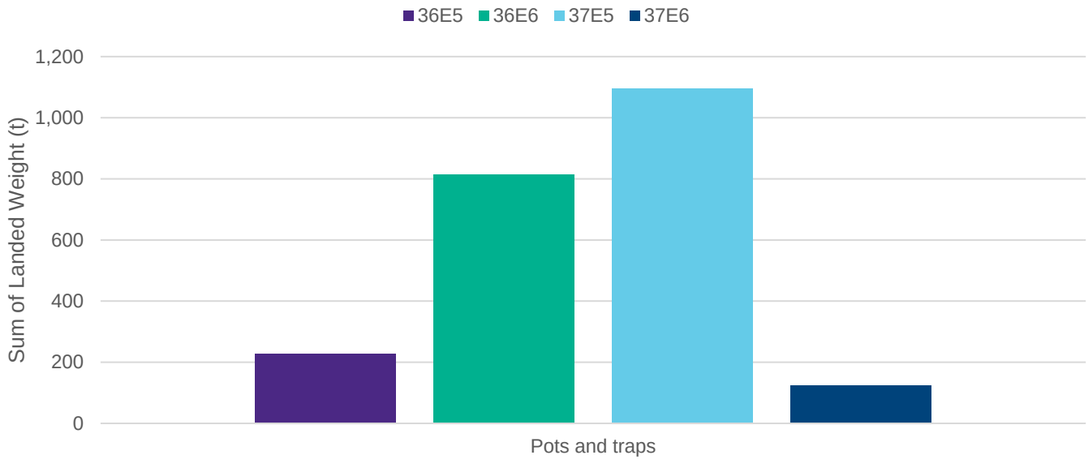


Figure 1.28: Total landings weight from Jersey vessels by gear type (2010 to 2020) within the commercial fisheries study area [28].

1.4.6.9 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).

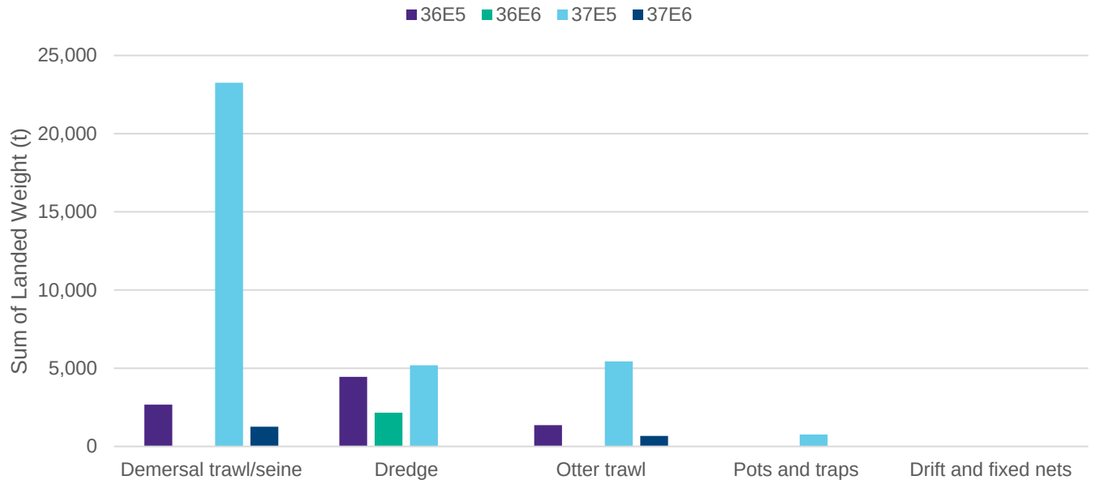


Figure 1.29 Total landings weight from Northern Irish vessels by gear type (2010 to 2020) within the commercial fisheries study area [29].

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 scallop.

[27] MMO, 2020a

[28] MMO, 2020a

[29] MMO, 2020a

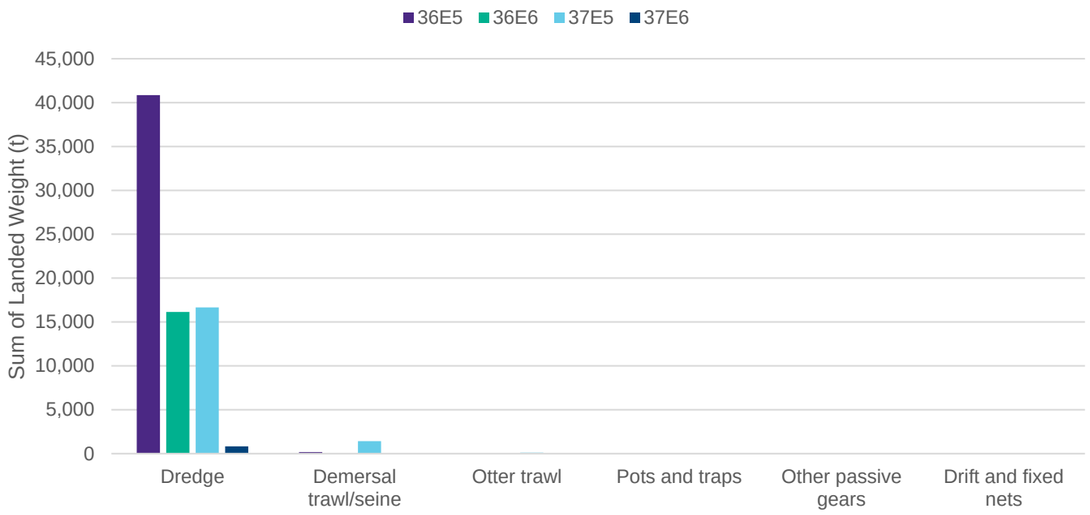


Figure 1.30: Total landings weight from Scottish vessels by gear type (2010 to 2020) within the commercial fisheries study area[30].

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, which is north of Anglesey (Figure 1.31).

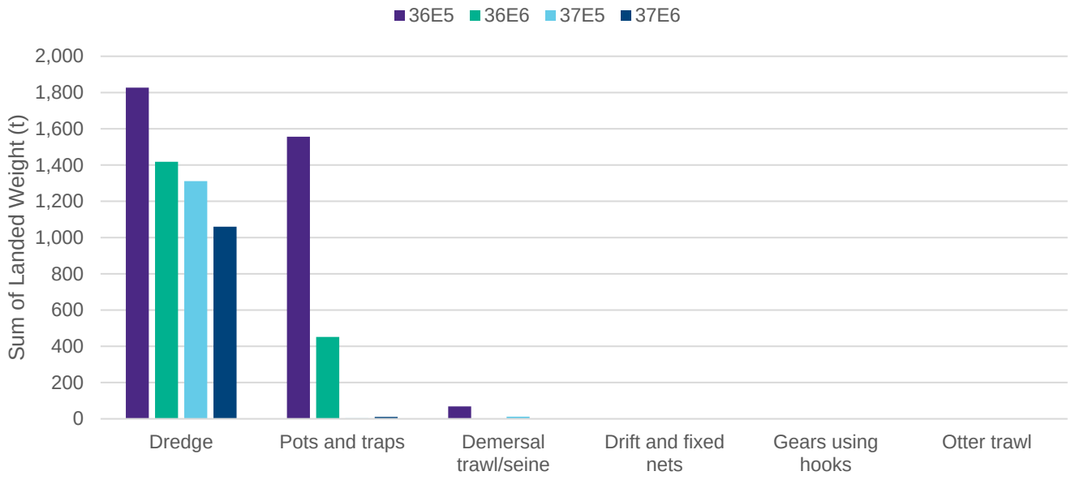


Figure 1.31: Total landings weight from Welsh vessels by gear type (2010 to 2020) within the commercial fisheries study area[31].

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.

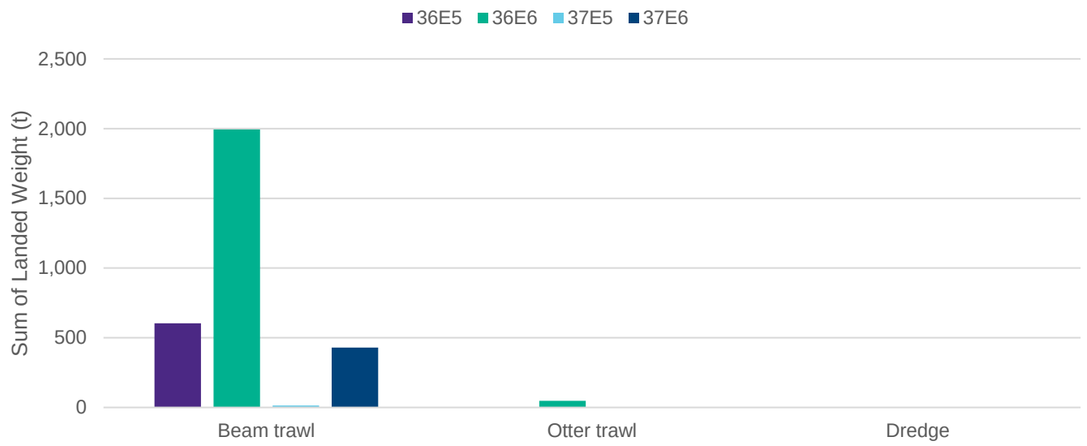


Figure 1.32: Total landings weight from Belgian vessels by gear type (2006 to 2016) within the commercial fisheries study area[32].

1.4.6.13 French vessels caught a very low weight (t) of fish in comparison with 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).

[30] MMO, 2020a

[31] MMO, 2020a

[32] EU STECF, 2017

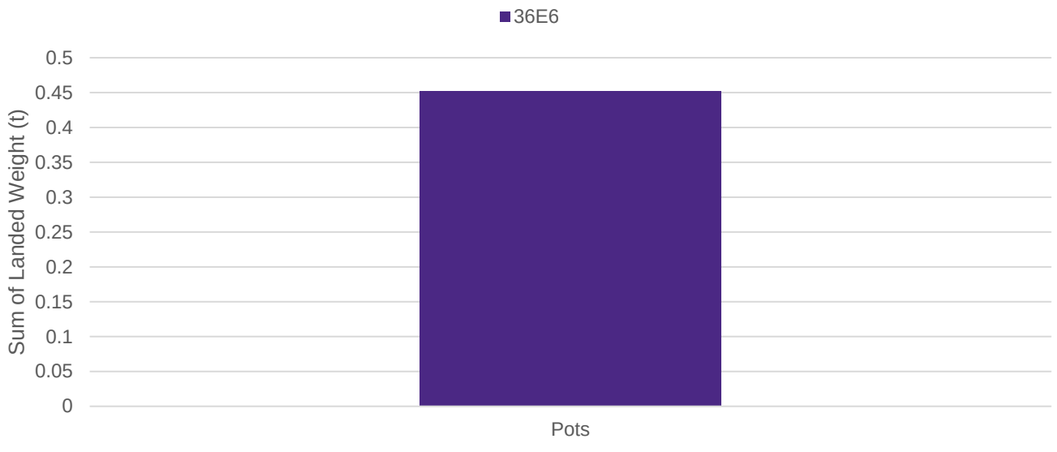


Figure 1.33: Total landings weight from French vessels by gear type (2006 to 2016) within the commercial fisheries study area [33].

1.4.6.14 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 1.34). Otter trawl, beam trawl, demersal seine, pelagic trawl and pots were also used by the Irish fleet within the commercial fisheries study area.

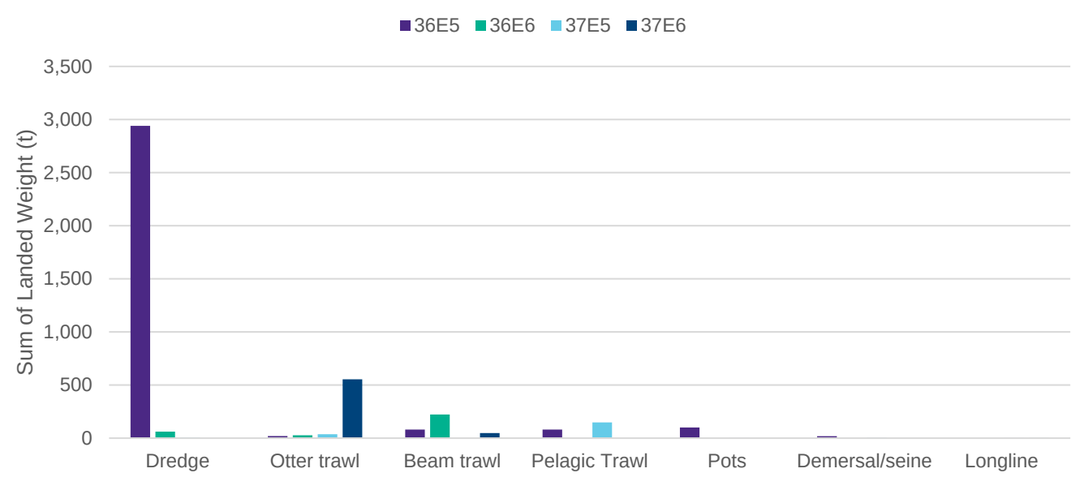


Figure 1.34: Total landings weight from Irish vessels by gear type (2006 to 2016) within the commercial fisheries study area[34].

1.4.6.15 The total landings 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.

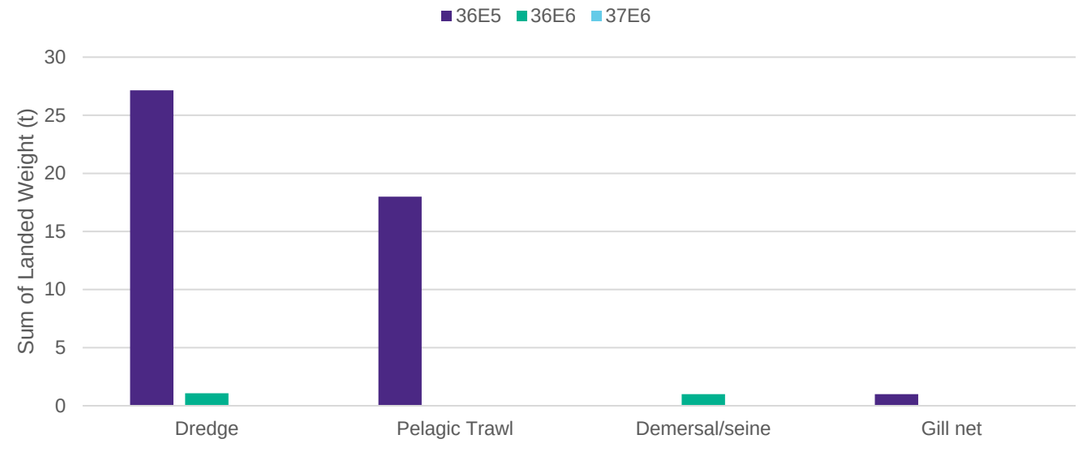


Figure 1.35: Total landings weight from Dutch vessels based on gear type (2006 to 2016) within the commercial fisheries study area[35].

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 >10m 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 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 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 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,

[33] EU STECF, 2017

[34] EU STECF, 2017

[35] EU STECF, 2017

slightly different gear types may be used for them. Scallop dredging is generally undertaken by larger vessels (>10m 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 below.

1.4.6.19 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.

1.4.6.20 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 8 and 36 dredges in total.

1.4.6.21 Generally, queen scallop are targeted using skid dredges (or otter trawls as discussed below), 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.

1.4.6.22 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 southeast to northwest. McNab and Nimmo (2021) found that within the Irish Sea region, dredge vessels typically tow their gear at a speed of 2 to 6kn and have a vessel length of 10m to 25m.

1.4.6.23 The penetration depth of a typical Newhaven dredge is approximately 0.03 to 0.3m, 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 0.2m, whereas dredges targeting king scallop have a maximum penetration depth of 0.3m (although this is dependent on seabed substrate).

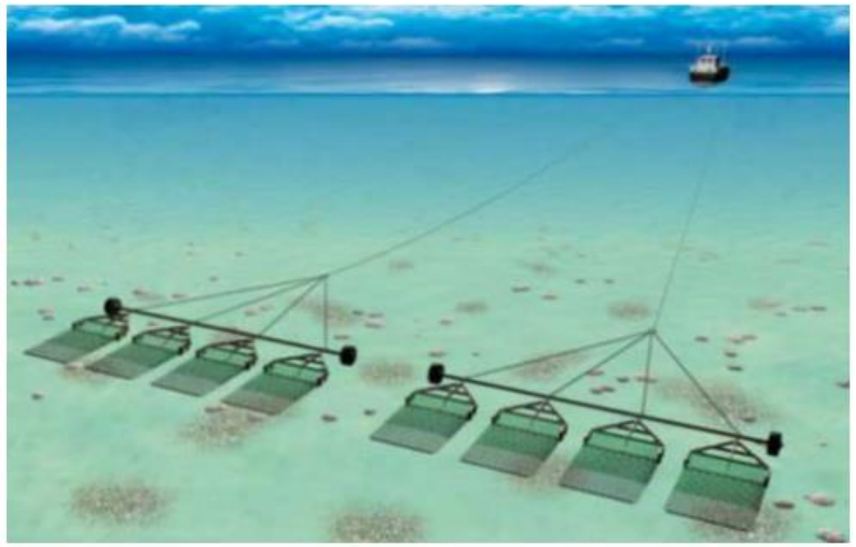


Figure 1.36: Typical dredge gear configuration[36].

Figure 1.37: Scallop dredge vessel example[37].

[36] Seafish, 2022

[37] MarineTraffic, 2022

Demersal trawls

1.4.6.24 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 to 300m 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 'cod-end' of the net. A range of net mesh sizes can be utilised to target different demersal species.

1.4.6.25 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 3kn (Bloor *et al.*, 2015).

1.4.6.26 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 6kn, while the majority of vessels have a vessel length of <10m.

1.4.6.27 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 to target scallops have a penetration depth ranging from approximately 0.05 to 0.1m.

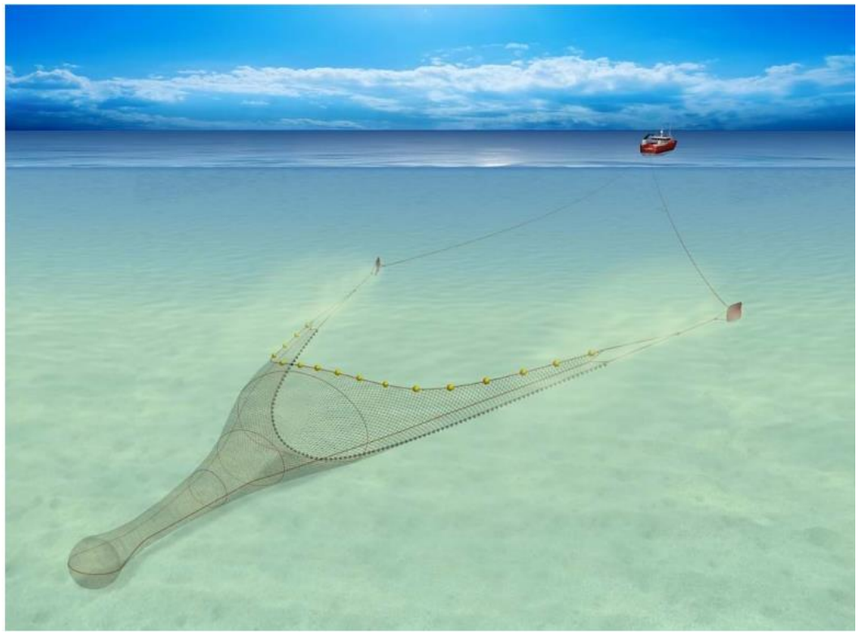


Figure 1.38: Typical demersal trawl gear configuration[38].

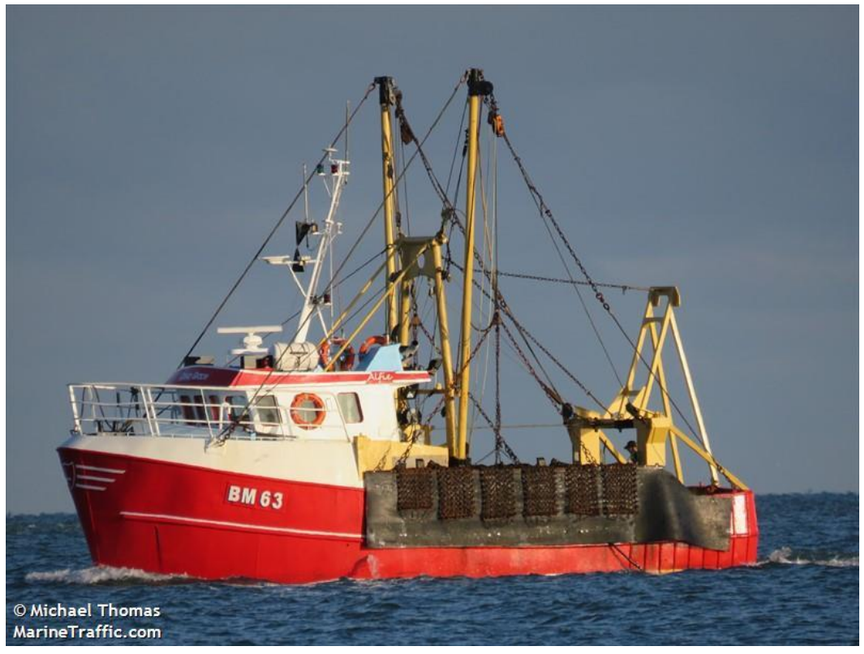


Figure 1.39: Example demersal trawl vessels[39].

[38] Seafish, 2022

[39] MarineTraffic, 2022

Pots and traps

1.4.6.28 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 (Figure 1.40).

1.4.6.29 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.

1.4.6.30 Parlour pots are generally ued 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.

1.4.6.31 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 9kn and have vessel lengths of both >10m and ≤10m.

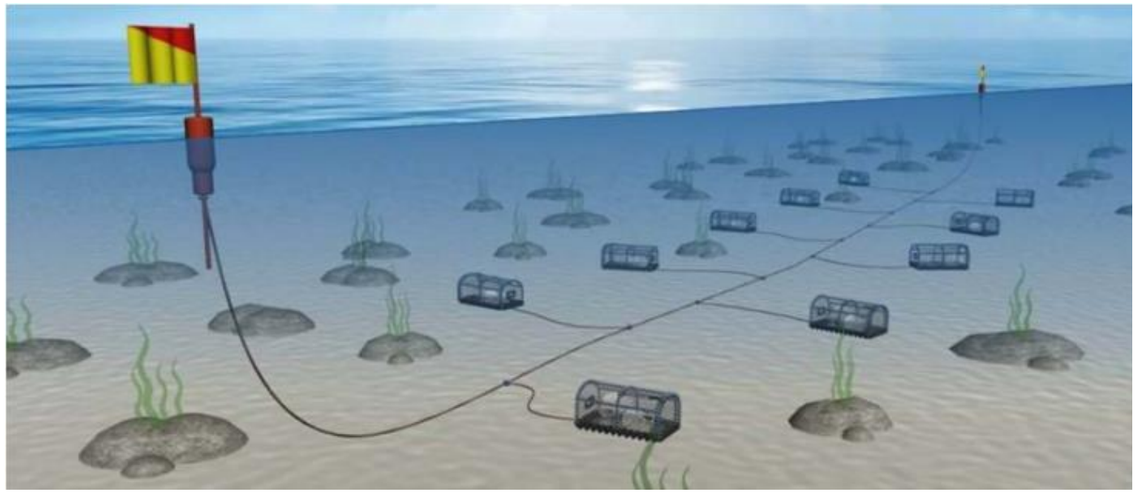


Figure 1.40: Typical potting gear configuration[40].

Figure 1.41: Typical whelk pot and whelk vessel[41].

Beam trawls

1.4.6.32 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 1.42). Beam trawling catches a wide range of bottom dwelling species and has the potential to catch a variety of non-target by-catch.

1.4.6.33 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 up into the net behind.

1.4.6.34 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 8kn, while the majority of vessels have a vessel length of <10m (Figure 1.43).

1.4.6.35 Towing directions vary depending on a range of factors, including tidal and weather conditions.

[40] Seafish, 2022

[41] Seafish, 2022 and MarineTraffic, 2022.

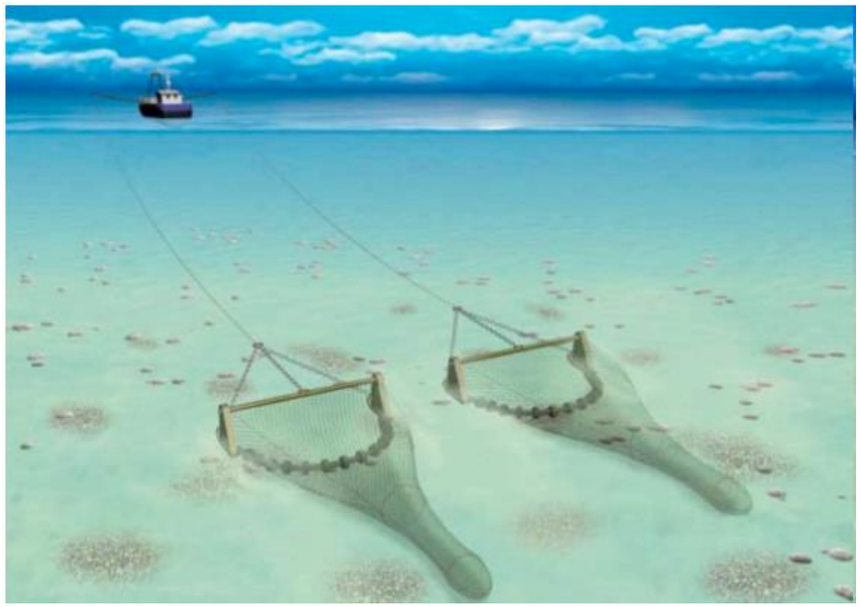


Figure 1.42: Typical beam trawl gear configuration[42].

Figure 1.43: Beam trawl vessel example[43].

1.4.7 Ports

1.4.7.1 Figure 1.44 shows fishing effort (kW/days) in relation to key ports in the region, between 2009 and 2020 (MMO, 2021b). Within the commercial fisheries study area, Fleetwood had the highest fishing effort 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

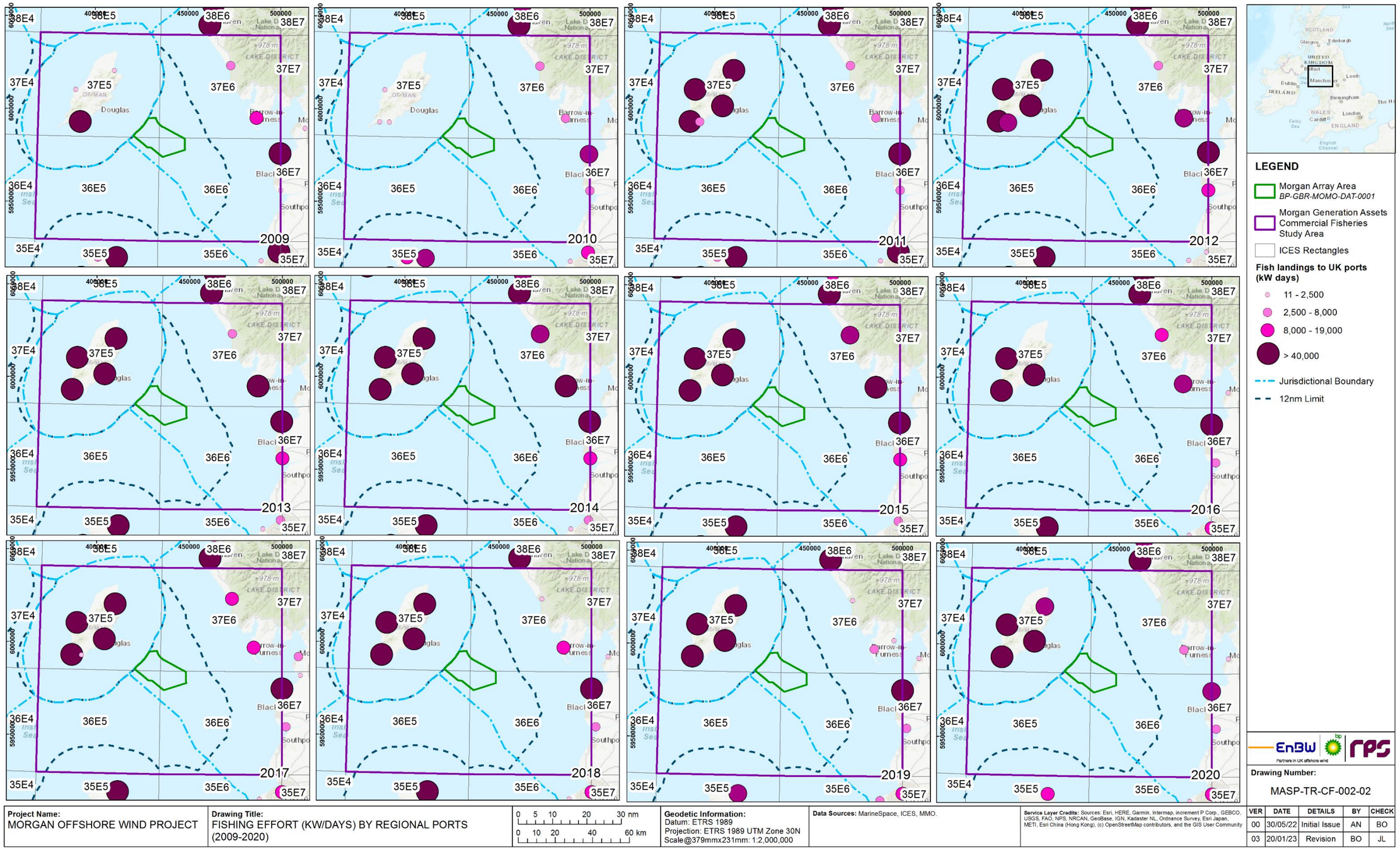


Figure 1.44: Fishing effort (kW/days) by regional ports (2009 to 2020)[44].

[44] MMO, 2021a

1.4.7.2 Landings data compiled by the MMO (MMO, 2020b) was reviewed for the period 2009 to 2020 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. It is noted that landings were only available between 2011 and 2019 for Douglas.

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 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 >10m 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 2009 and 2020 of 5,465t (Figure 1.45). English vessels landed the majority of shellfish species (Jersey, Welsh and Scottish vessels also made notable landings of shellfish species). Vessels >10m from England also landed demersal species into Fleetwood, but total landed weights between 2009 to 2020 were significantly less than those of shellfish species.

1.4.7.6 Landed weights in the ≤10m 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.

1.4.7.7 A total of 62 species were landed at Fleetwood during 2009 to 2020, with whelk the dominant species in terms of landed weight and value (total value of £4,549,566) (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 plaice, scallop, thornback ray and lesser spotted dogfish.

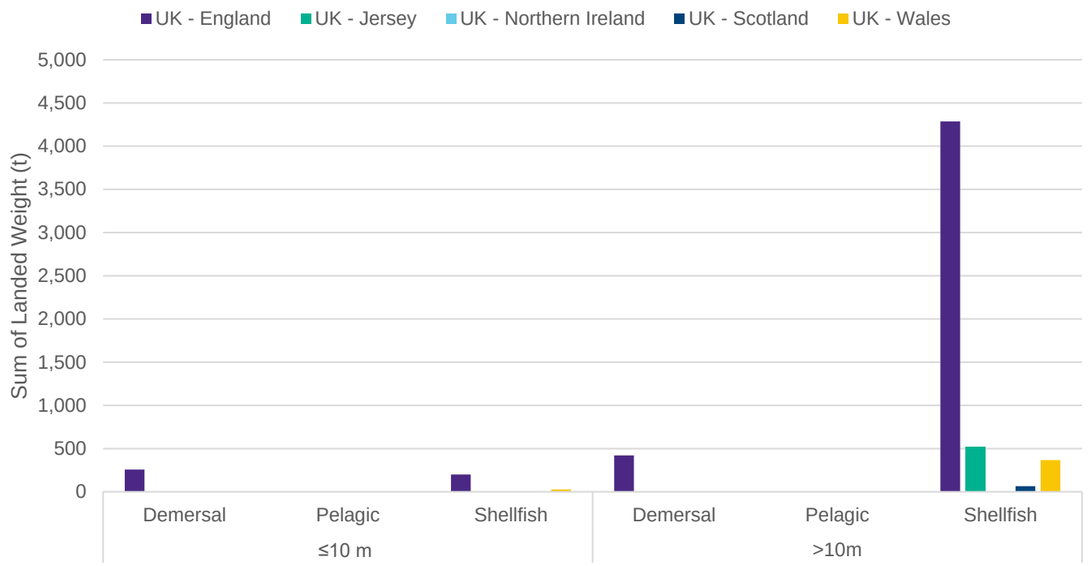


Figure 1.45: Total landings into Fleetwood (2009 to 2020) displayed by species group, vessel length and nationality[45].

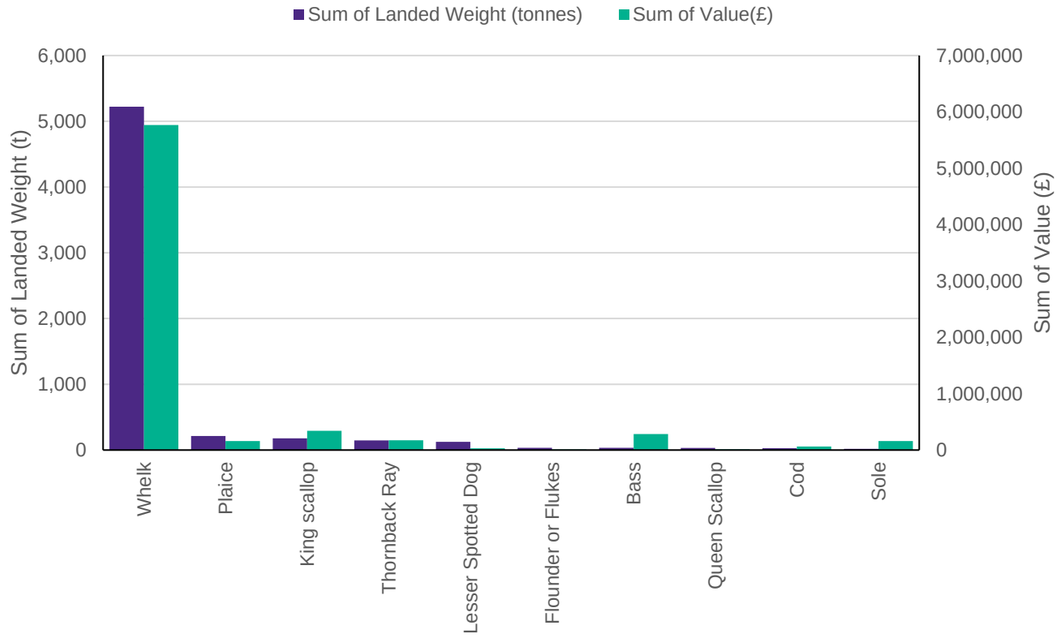


Figure 1.46: Total weight and value of landings into Fleetwood port (2009 to 2020) displayed by the top 10 species by weight[46].

[45] MMO, 2020b

[46] MMO, 2020b

Douglas

1.4.7.8 Scottish and Isle of Man vessels >10m dominated the landed weight at the port of Douglas. Shellfish was the key species group landed into Douglas, with a total landed weight between 2011 and 2019 of 30,822t (Figure 1.47); landings of demersal and pelagic species were low. Isle of Man vessels dominated the ≤10m shellfish landings into Douglas. For the >10m landings into Douglas, the highest landings were by Scottish vessels, followed by Isle of Man vessels. English, Northern Irish and Welsh vessels also landed shellfish species into Douglas, but total landed weights between 2011 to 2019 were significantly less.

1.4.7.9 A total of 47 species were landed at Douglas during 2011 to 2019. 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, mackerel, lobster, lesser spotted dogfish, squid, unidentified dogfish and pollack.

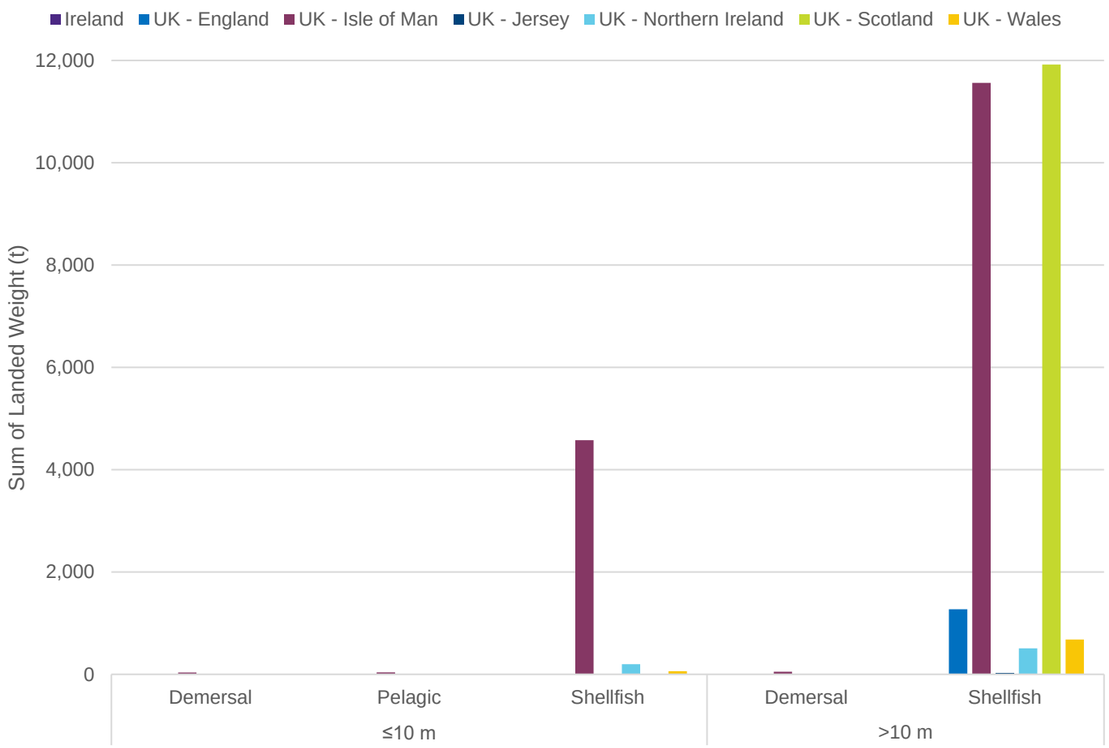


Figure 1.47: Total landings into Douglas (2011 to 2019) displayed by species group, vessel length and nationality[47].

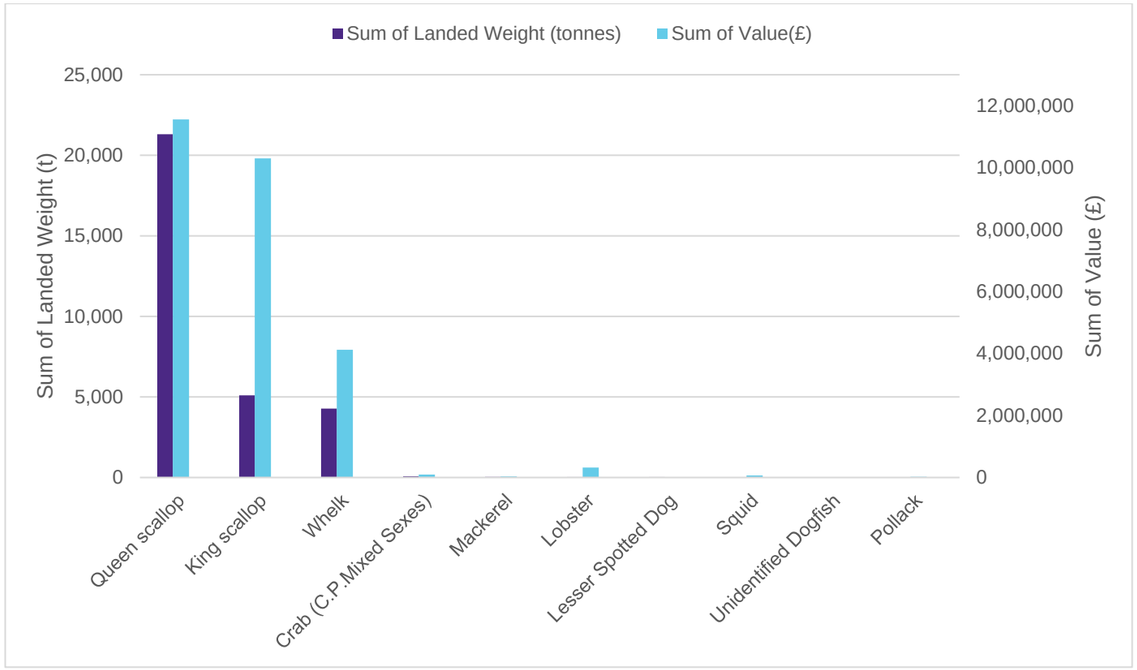


Figure 1.48: Total weight and value of landings into Douglas port (2011 to 2019) displayed by the top 10 species by weight[48].

[47] MMO, 2020b

[48] MMO, 2020b

1.4.8 Spatial distribution of fishing activity

VMS data by gear type

1.4.8.1 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 commercial fisheries study area. The MMO dataset only captures data for ≥15m vessels and the ICES dataset is from vessels >12m 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.

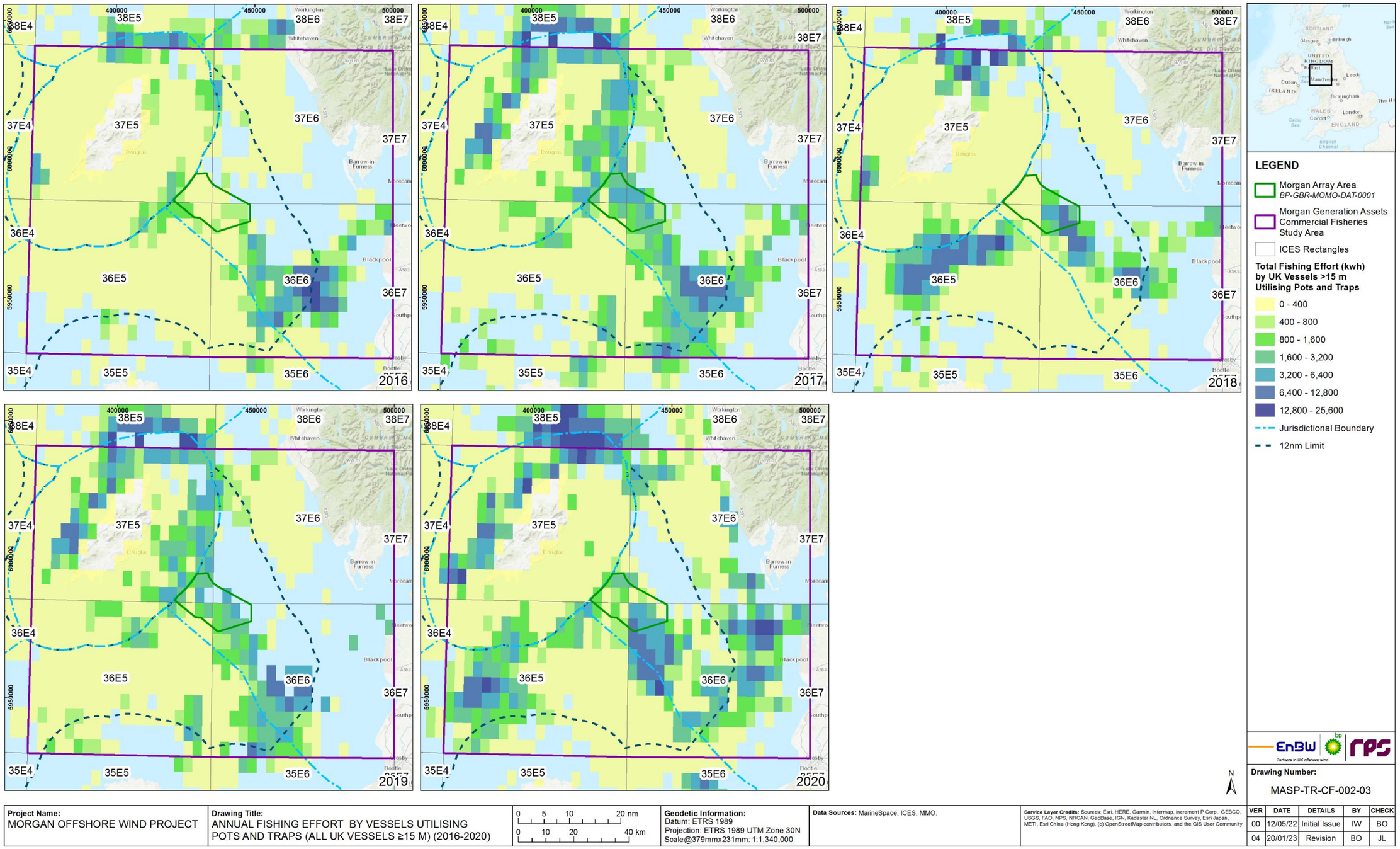
1.4.8.2 Both the MMO and ICES datasets are split by the ICES subrectangle and have been categorised into aggregated gear groups (Figure 1.49 to Figure 1.52). The ICES data was only for mobile bottom contacting gear types, so pots and traps were not included. MMO data by gear type for pots has been analysed, but data were only available for the period 2016 to 2020.

1.4.8.3 Figure 1.49 illustrates that potting vessels (≥15m) were active across the commercial fisheries 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. Within the Morgan Array Area, levels of potting were generally higher in the east. Feedback from project-specific 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.

1.4.8.4 Over the period 2009 to 2020, beam trawl (vessels >12m) 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 12nm limit of England and the Morgan Array Area, and sporadically overlapped with the east part of the Morgan Array Area. Fisheries stakeholders consulted as part of this assessment 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 (>12m) 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 12nm 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 (>12m) 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.



Project Name:	Drawing Title:	Geodetic Information:	Data Sources:	Service Layer Credits:
MORGAN OFFSHORE WIND PROJECT	ANNUAL FISHING EFFORT BY VESSELS UTILISING POTS AND TRAPS (ALL UK VESSELS ≥15 M) (2016-2020)	Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N Scale@379mmx231mm: 1:1,340,000	MarineSpace, ICES, MMO.	Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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00	12/05/22	Initial Issue	IW	BO
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Figure 1.49: Annual fishing effort by vessels utilising pots and traps gear (UK vessels ≥15m) (2016 to 2020)[49].

[49] MMO, 2021b

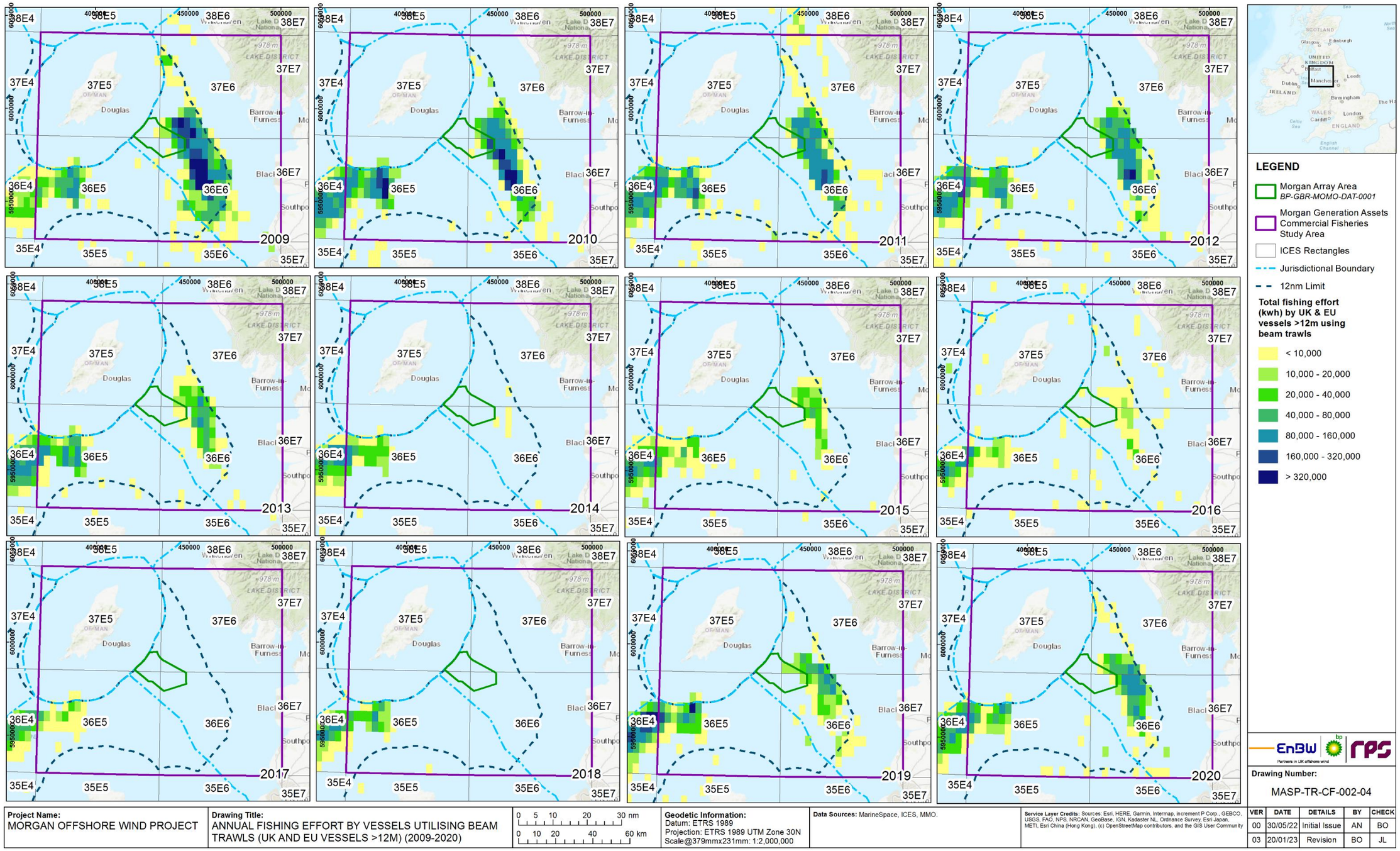


Figure 1.50: Annual fishing effort by vessels utilising beam trawls (UK and EU vessels >12m) (2009 to 2020)[50].

[50] ICES, 2020

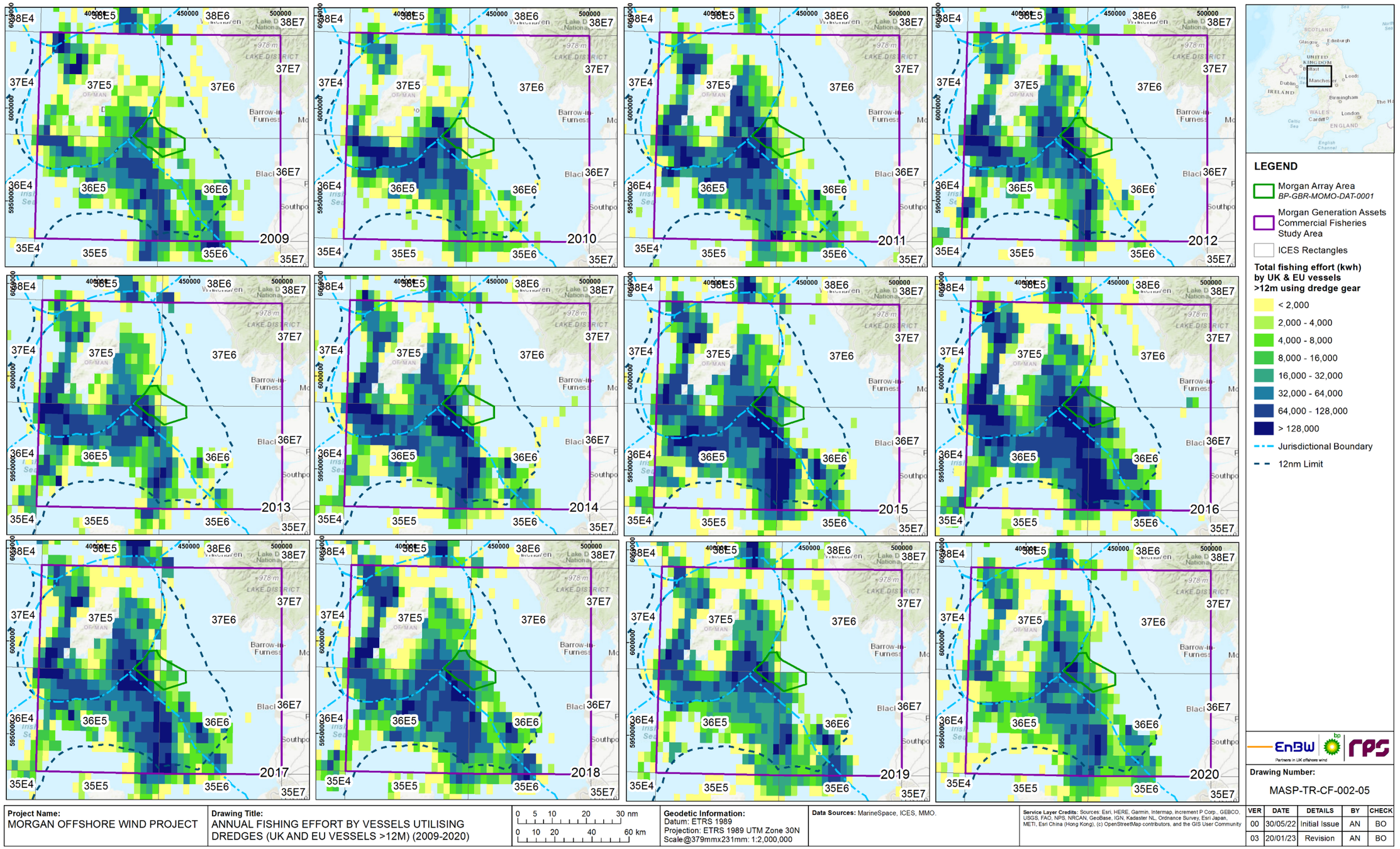


Figure 1.51: Annual fishing effort by vessels utilising dredges (UK and EU vessels >12m) (2009 to 2020)[51].

[51] ICES, 2020

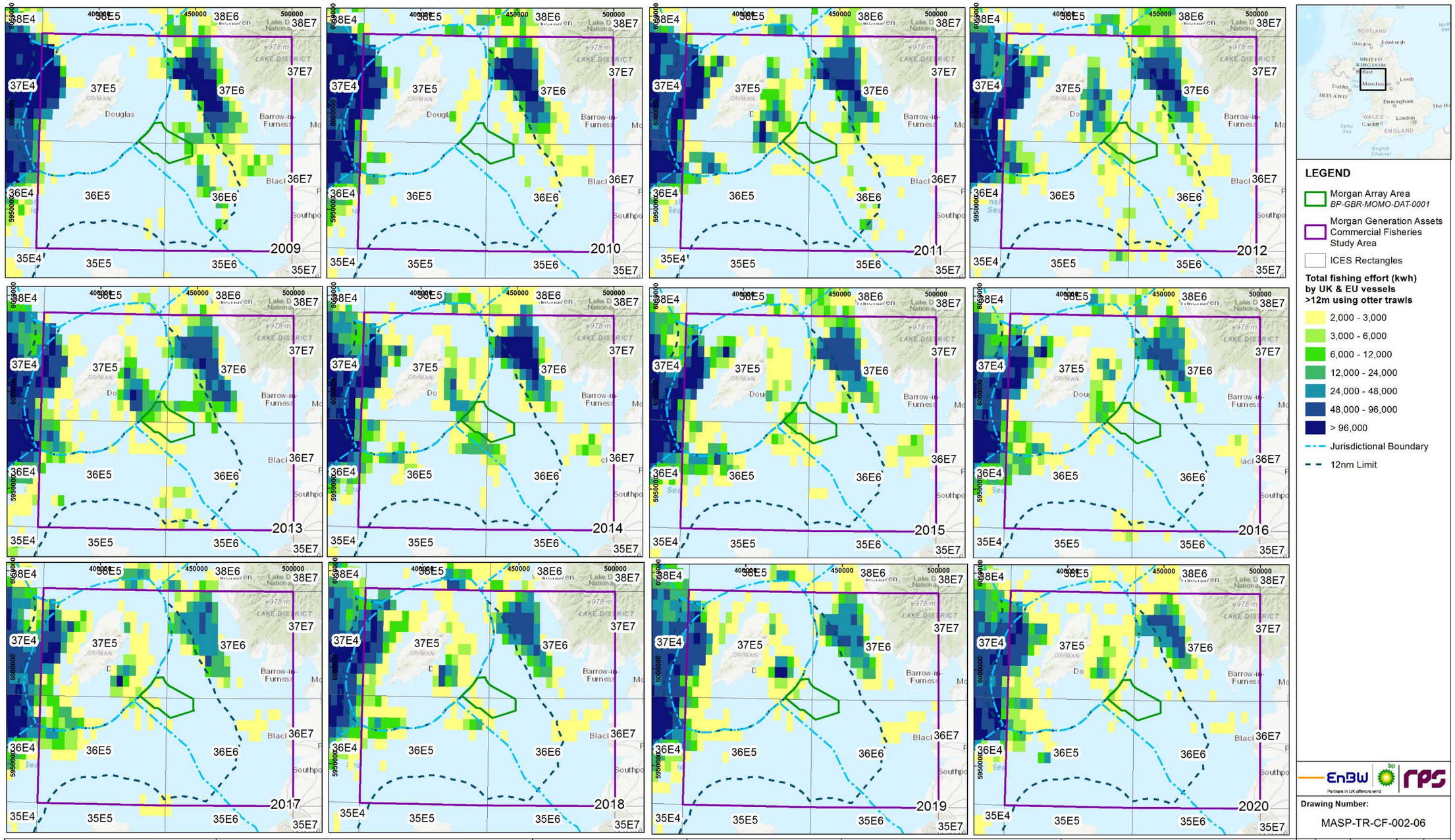


Figure 1.52: Annual fishing effort by vessels utilising otter trawls (UK and EU vessels >12m) (2009 to 2020)[52].

[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 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, the Republic of Ireland, Jersey, Isle of Man, Scotland and Northern Ireland.

1.4.8.9 Figure 1.53 shows 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 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 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 8.1: Fish and shellfish ecology technical report of the PEIR.

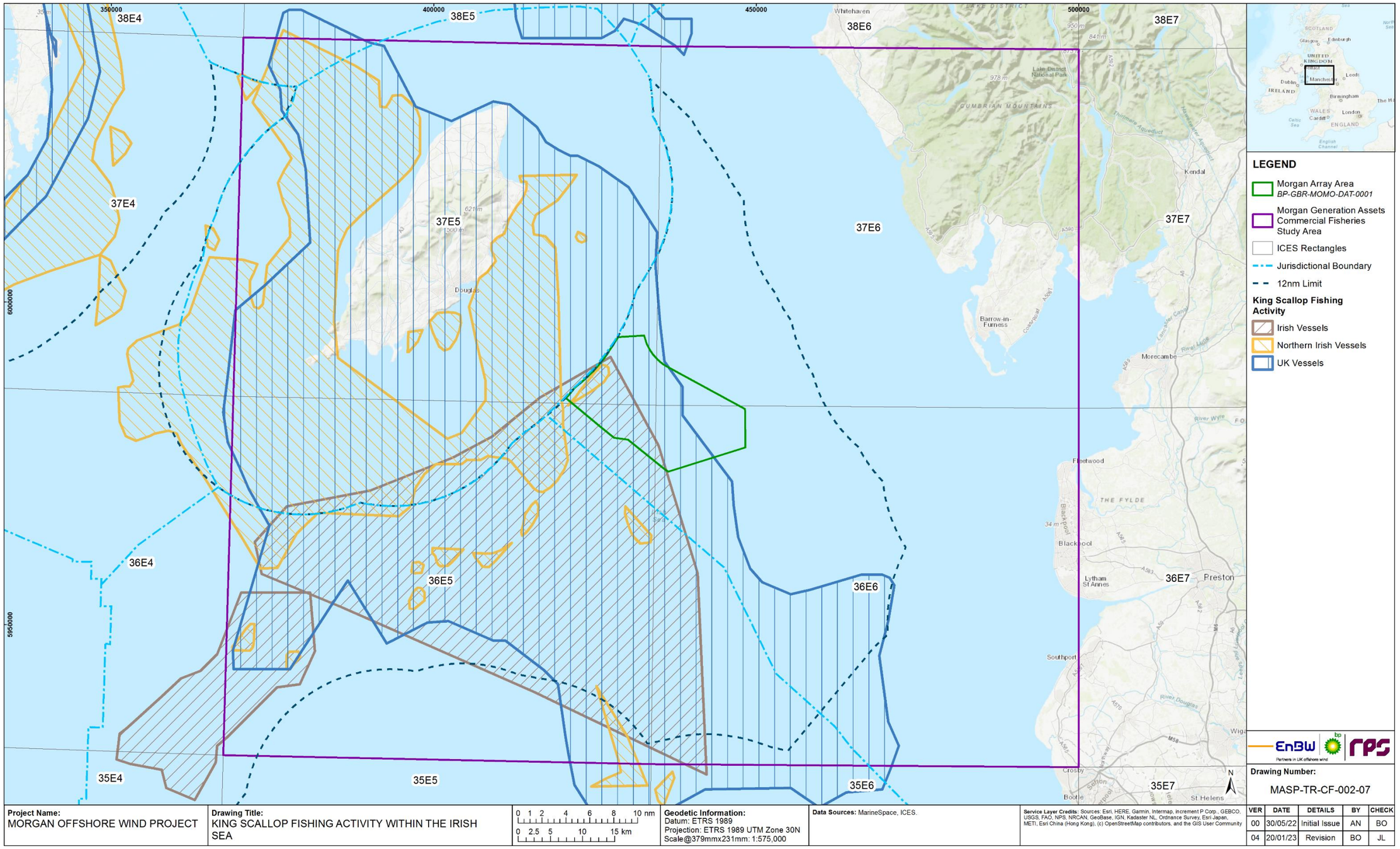


Figure 1.53: King scallop fishing activity within the Irish Sea[53].

[53] ICES (2017)

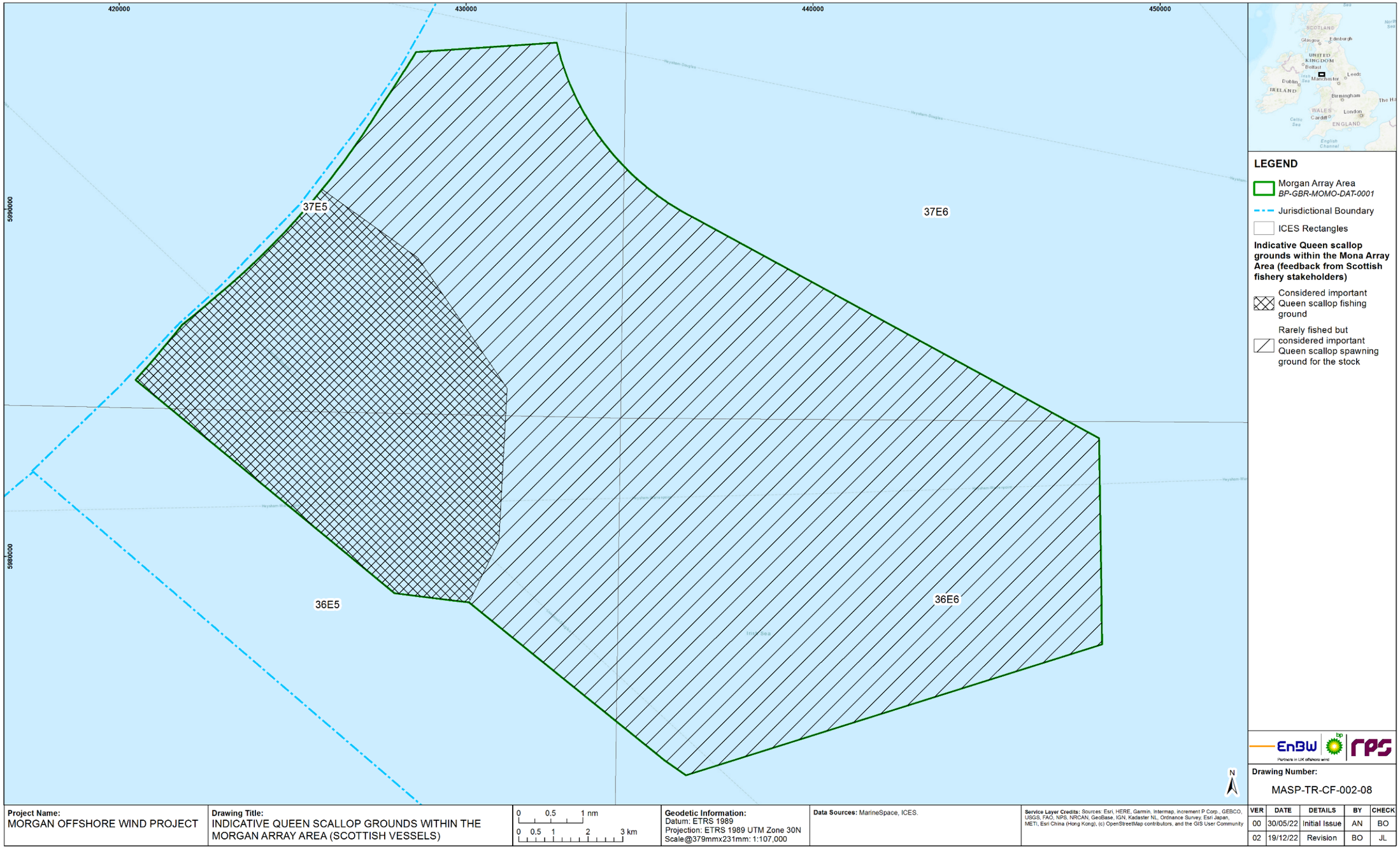


Figure 1.54: Indicative queen scallop grounds within the Morgan Array Area (Scottish vessels)[54].

[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 <15m), 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, based on feedback from informal consultations.

1.4.8.14 Figure 1.55 indicates that static gear activity (<15m 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 (<15m vessels) within the inshore areas was highest off the Cumbrian coast and the Welsh coast, which is also evident within the VMS data.

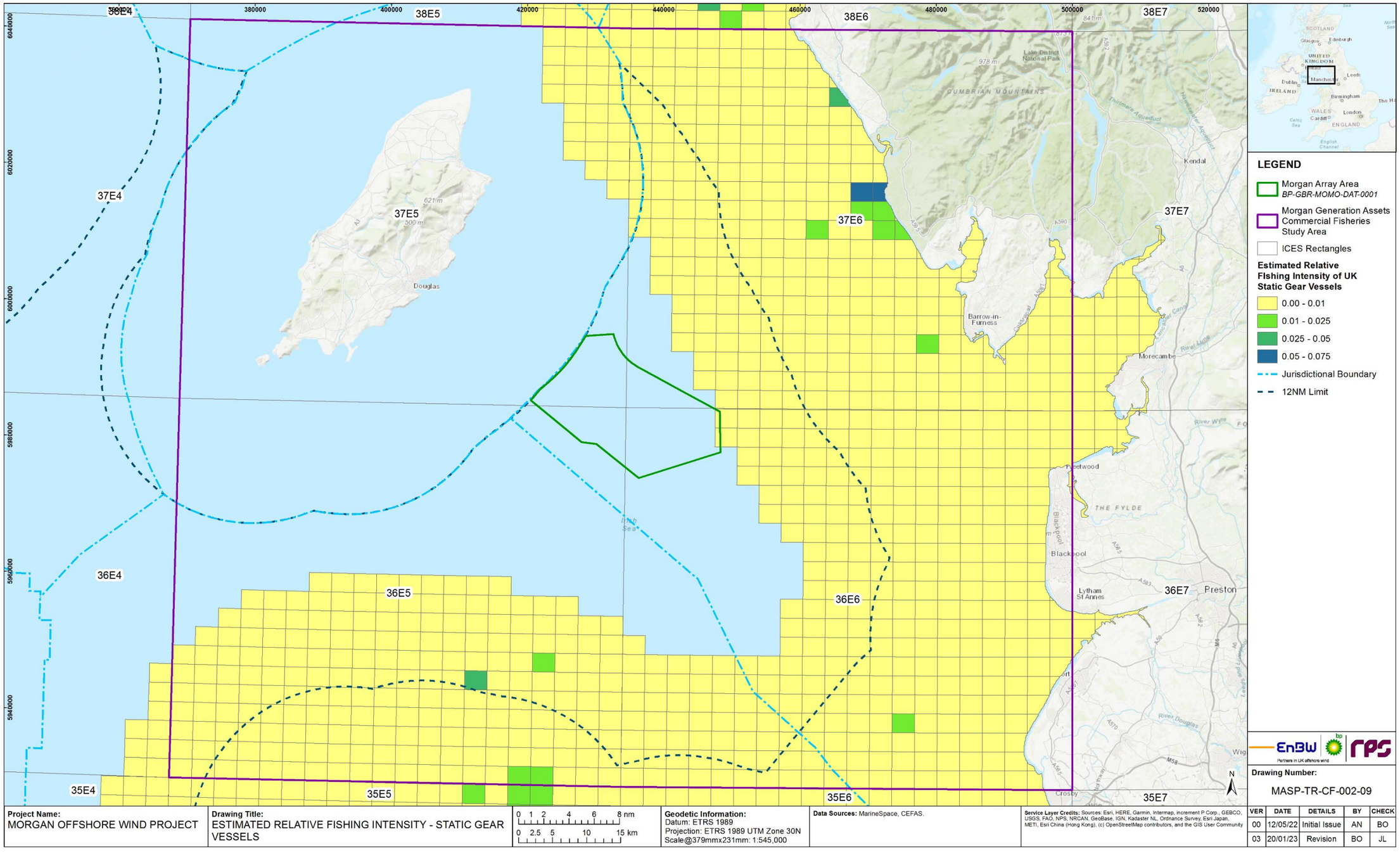


Figure 1.55: Estimated relative fishing intensity – static gear vessels[55].

[55]CEFAS, 2014

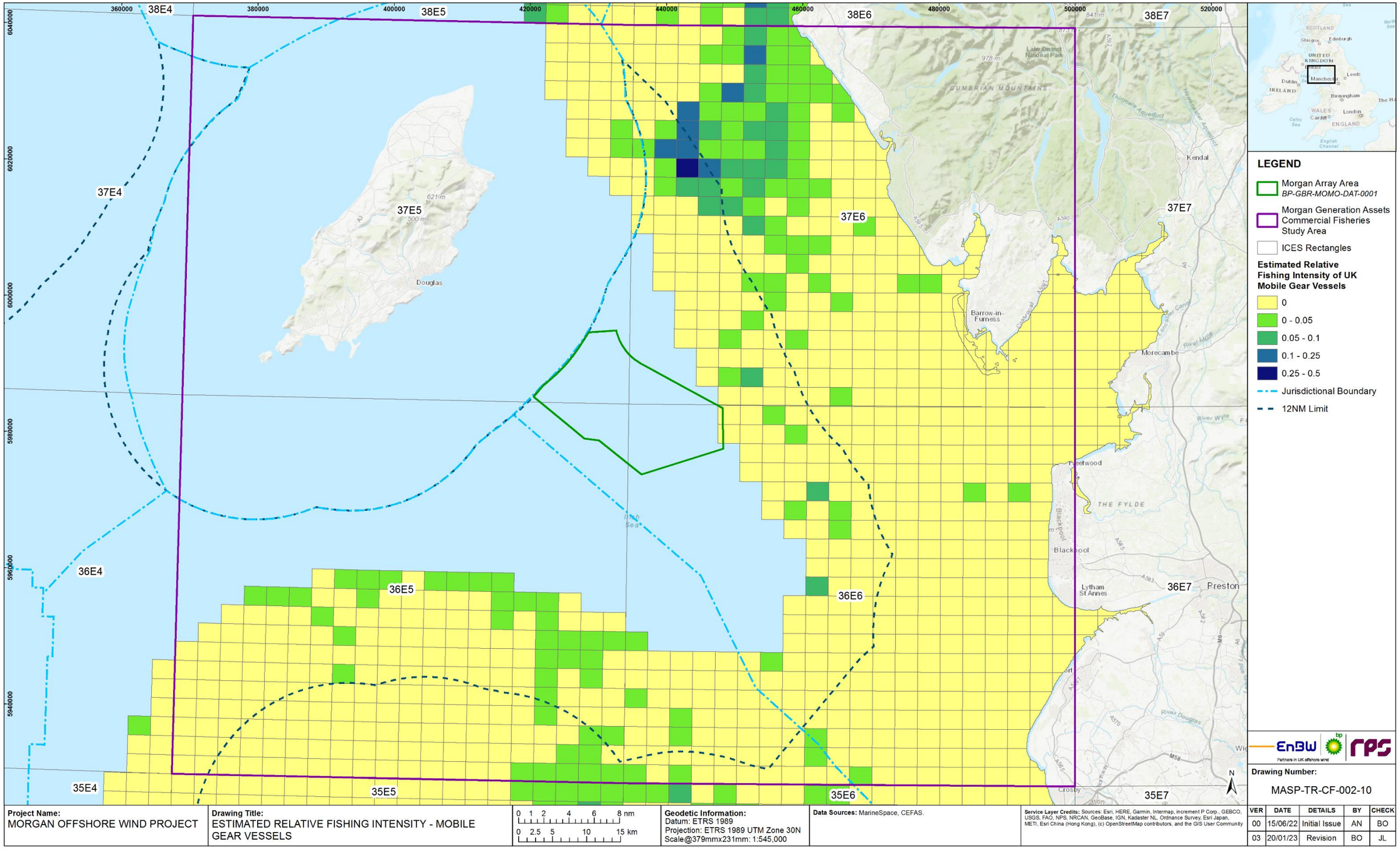


Figure 1.56: Estimated relative fishing intensity – mobile gear vessels[56].

[56]CEFAS, 2014

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 sections provide additional information on commercial fishing activity in the commercial fisheries study area.

Vessel traffic surveys

1.4.9.2 A summary of the fishing vessels identified during the two project-specific vessel traffic surveys (winter and summer) 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 commercial fisheries study area that are not listed here[57]. Figure 1.57 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 vessel traffic surveys 21 November 2021 to 04 December 2021 and 15 July 2022 to 29 July 2022.

Length (m)	Time Period	Vessel type	Nationality
9.95	December 2021	Scallop vessel (trawler)	Isle of Man
13.2	December 2021 and July 2022	Static gear vessel	UK
15	July 2022	Scallop vessel (dredge)	UK
16	December 2021	Scallop vessel (dredge)	UK
16	July 2022	Guard vessel	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

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 >15m in length, one was 13.2m and one was 10m. The static gear vessel and the scallop vessel (trawler) would not have been captured within the VMS data, which includes vessels ≥15m. 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 1.57); they were assumed to be fishing as they showed an average speed of approximately 2.9 to 3.6kn. Figure 1.57 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 7kn. This information aligns with feedback from project-specific consultation and analysis of VMS data that the western 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 14km northwest of the Morgan Array Area (Figure 1.57). 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 (16m in length), one was a static gear vessel (13.2m in length) and one was a scallop vessel (15m 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 1.58). The scallop vessel was assumed to be fishing as its speeds were between approximately 2.5 to 4.8kn; it was observed fishing in a northwest to southeast direction, approximately 3.8km 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 1.58).

[57] 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.

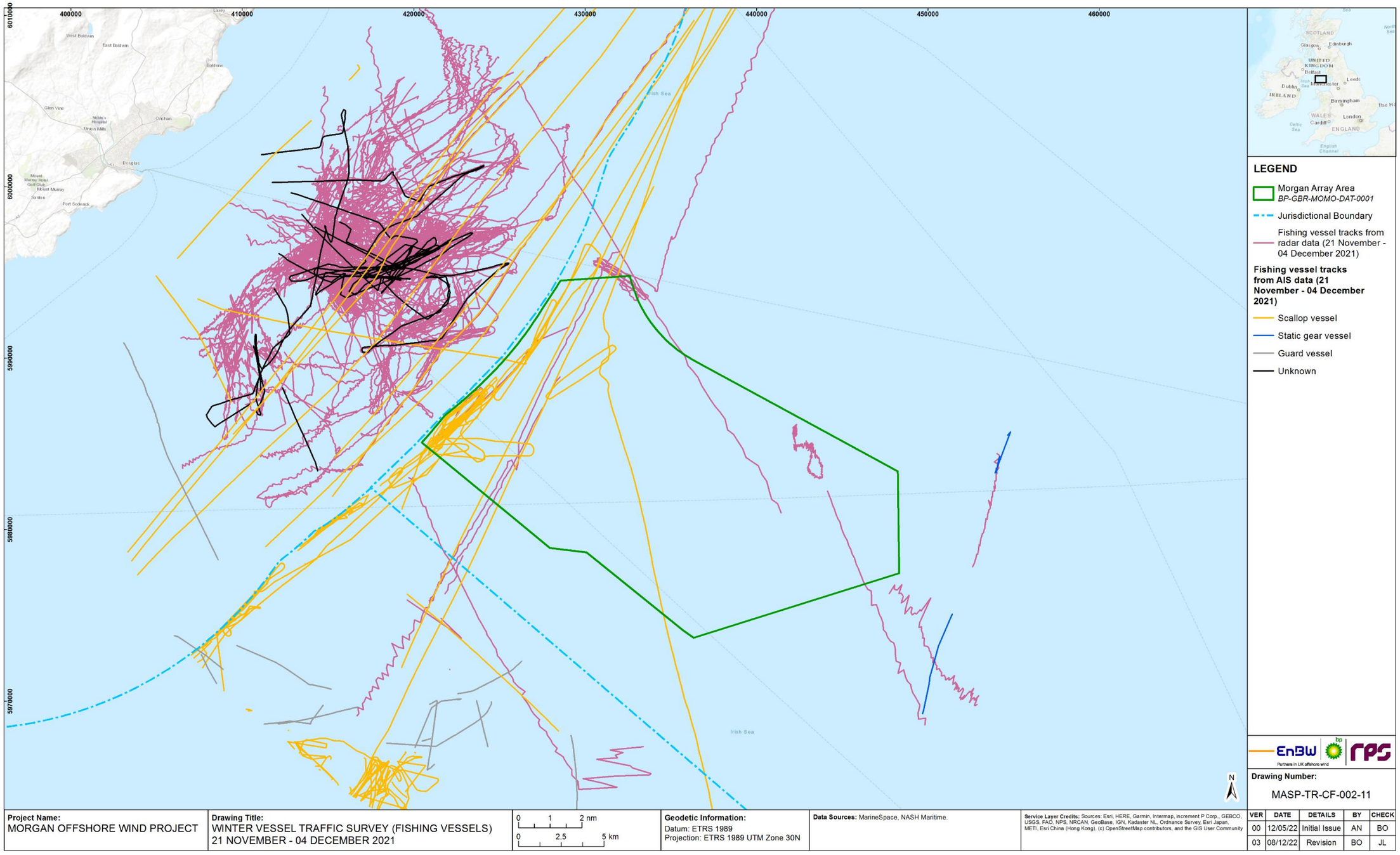


Figure 1.57: Winter vessel traffic survey (fishing vessels) 21 November 2021 to 04 December 2021[58].

[58] NASH Maritime, 2021

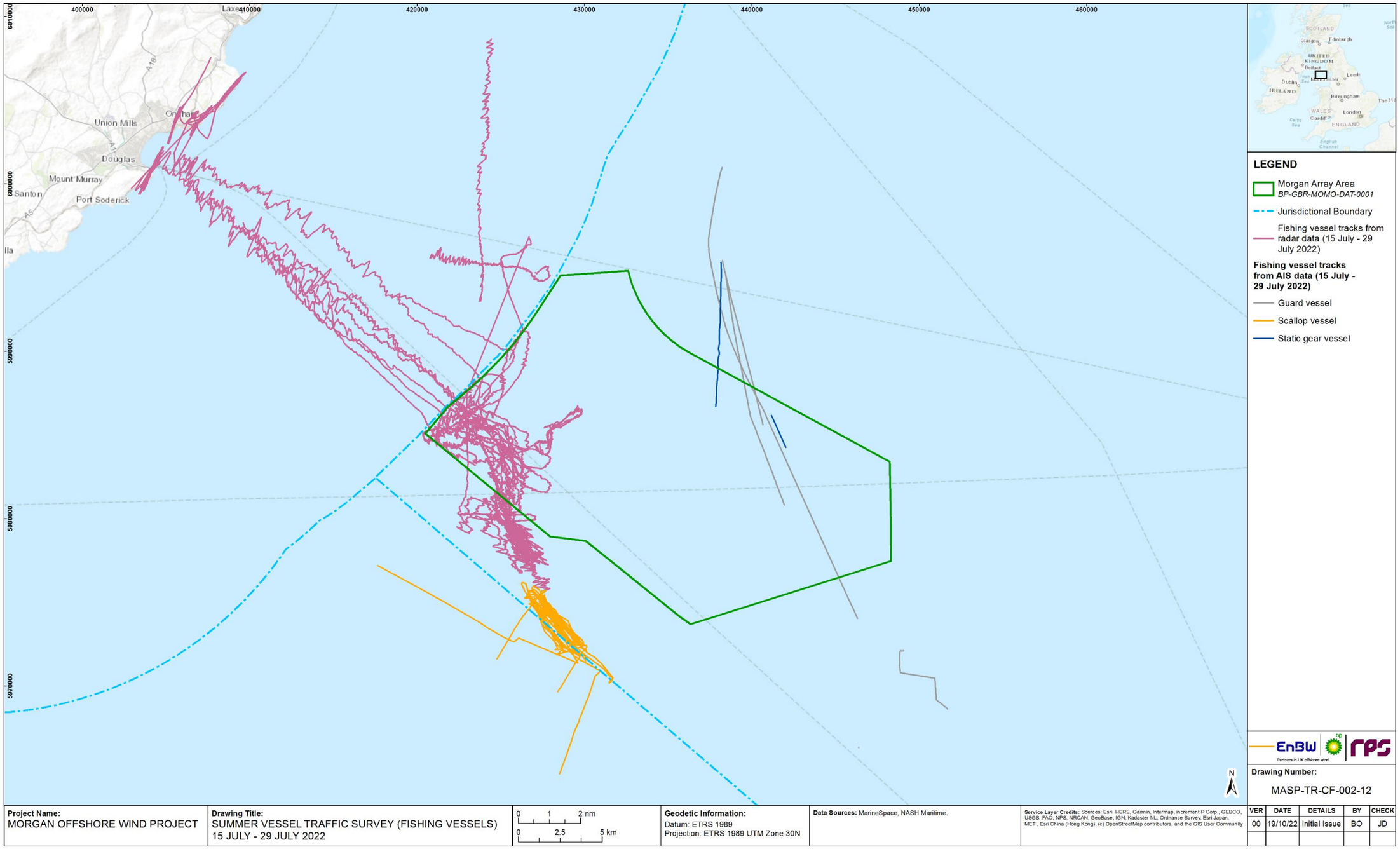


Figure 1.58: Summer vessel traffic survey (fishing vessels) 15 July 2022 to 29 July 2022.[59]

[59] NASH Maritime, 2021

OFLO and MarineSpace observations

1.4.9.9 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 30 June 2021 to 18 September 2021 and 01 April 2022 to 10 July 2022 and MarineSpace undertook fisheries monitoring fisheries observations until 30 November 2022.

1.4.9.10 Figure 1.59 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 within the commercial fisheries study area.

Length (m)	Vessel type	Nationality	Commercial fisheries study area	Morgan Array Area
No information	Scallop vessel (dredge)	UK	Y	
No information	Otter trawler	UK	Y	
No information	Scallop vessel (dredge)	UK	Y	Y
No information	Trawler	UK	Y	
No information	Otter trawler	France	Y	
No information	Scallop vessel (dredge)	UK	Y	
10	Static gear vessel	UK	Y	
10	Otter trawler	Isle of Man	Y	
11.6	Unknown	UK	Y	
11.95	Otter trawler	UK	Y	
11.99	Scallop vessel (dredge)	UK	Y	
12	Static gear vessel	UK	Y	Y
13.09	Otter trawler	UK	Y	
13.2	Static gear vessel	UK	Y	Y
13.39	Static gear vessel	UK	Y	Y
13.4	Trawler	UK	Y	
13.97	Scallop vessel (dredge)	UK	Y	
14	Otter trawler	Isle of Man	Y	Y
14	Trawler	Isle of Man	Y	
14	Otter trawler	Isle of Man	Y	
14.11	Otter trawler	UK	Y	
14.5	Otter trawler	UK	Y	
14.73	Scallop vessel (dredge)	UK	Y	Y
14.95	Otter trawler	UK	Y	
14.96	Scallop vessel (dredge)	UK	Y	Y
14.98	Otter trawler	UK	Y	
15	Scallop vessel (dredge)	UK	Y	
15	Scallop vessel (dredge)	UK	Y	
15.7	Otter trawler	UK	Y	
16	Otter trawler	UK	y	
16	Scallop vessel (dredge)	UK	Y	Y
16	Scallop vessel (dredge)	Isle of Man	Y	
16.4	Static gear vessel	UK	Y	Y
16.77	Scallop vessel (dredge)	UK	Y	
16.89	Otter trawler	UK	Y	
17	Otter trawler	UK	Y	
17.13	Static gear vessel	UK	Y	Y
17.13	Static gear vessel	UK	Y	
17.6	Otter trawler	UK	Y	
17.99	Trawler	UK	Y	
18	Otter trawler	UK	Y	
18.5	Otter trawler	UK	Y	
19	Otter trawler	UK	Y	
19.27	Trawler	Canada	Y	
19.35	Trawler	UK	Y	
19.9	Otter trawler	UK	Y	
20	Scallop vessel (dredge)	UK	Y	
20.5	Otter trawler	UK	Y	
20.6	Trawler	UK	Y	
20.86	Otter trawler	UK	Y	
21	Otter trawler	UK	Y	
22.4	Trawler	UK	Y	
22.78	Trawler	UK	Y	

Length (m)	Vessel type	Nationality	Commercial fisheries study area	Morgan Array Area
22.8	Otter trawler	UK	Y	
22.94	Scallop vessel (dredge)	UK	Y	Y
23.09	Otter trawler	UK	Y	
23.6	Otter trawler	UK	Y	
29.86	Beam trawler	UK	Y	
34	Beam trawler	Belgium	Y	Y
34.1	Trawler	UK	Y	Y
37	Beam trawler	Belgium	Y	
37	Beam trawler	Belgium	Y	
38	Beam trawler	Belgium	Y	Y
38	Beam trawler	Belgium	Y	
38.9	Beam trawler	Belgium	Y	
40	Beam trawler	Belgium	Y	
43.51	Trawler	UK	Y	

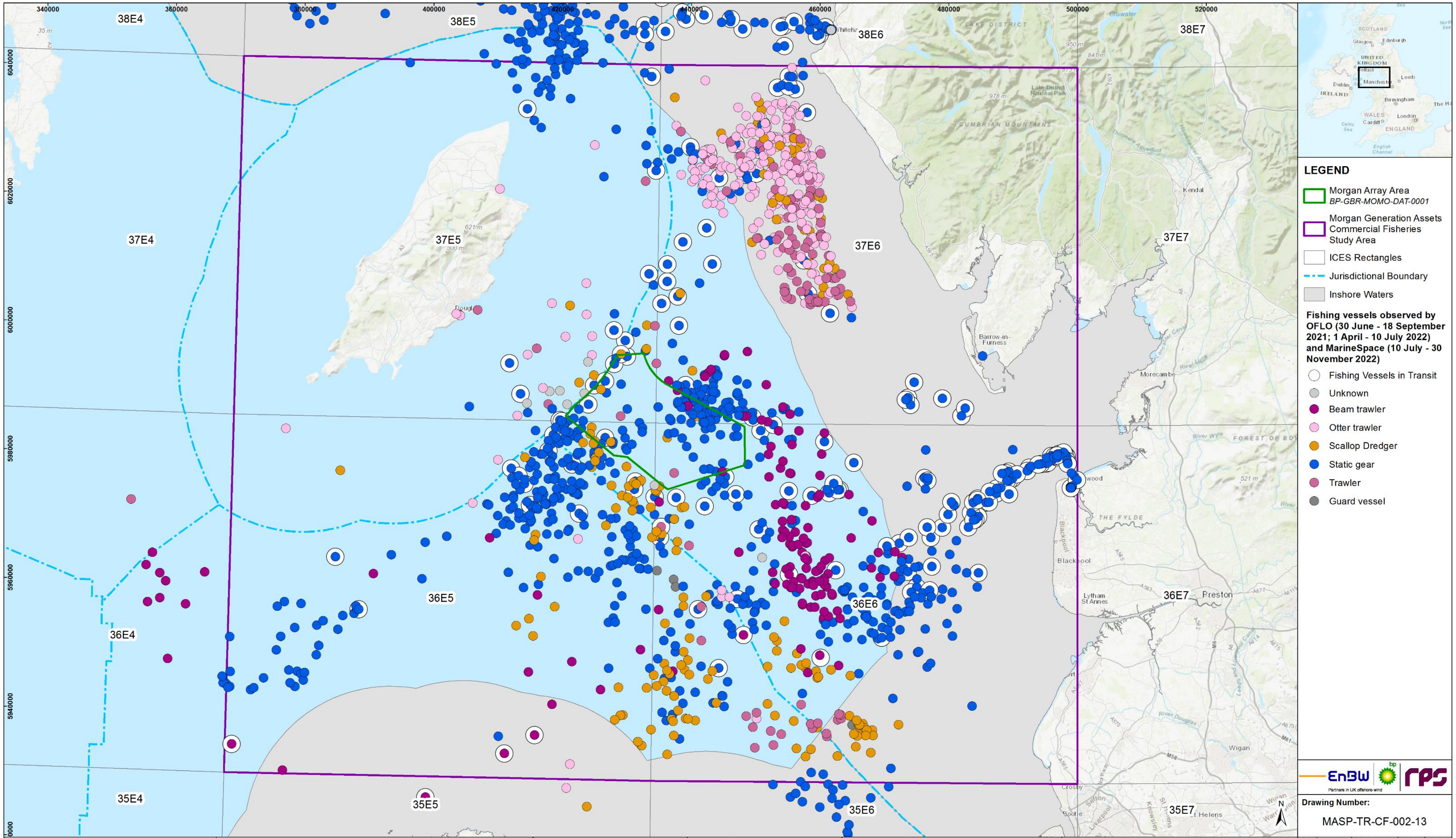
1.4.9.11 During the offshore surveys a total of 67 fishing vessels were observed by the OFLO and MarineSpace within the commercial fisheries study area, 14 of which were observed within the Morgan Array Area. The majority of vessels observed within the commercial fisheries study area were from the UK, 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 12nm and within ICES rectangle 37E6 clearly shows the *Nephrops* fishing grounds. Relatively high densities of beam trawl vessels were observed south east of the Morgan Array Area, beyond the 12nm.

1.4.9.12 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 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 eastern part of the Morgan Array Area.

1.4.9.13 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.

1.4.9.14 Figure 1.59 indicates that fishing vessels may transit through the Morgan Array Area, for example between Fleetwood and fishing grounds within the wider Irish Sea region.

1.4.9.15 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 Morgan Array Area but turning AIS off once they started fishing.



Project Name:	Drawing Title:	Scale	Geodetic Information:	Data Sources:	Service Layer Credits:
MORGAN OFFSHORE WIND PROJECT	OBSERVATIONS OF FISHING VESSELS BY THE OFLO AND MARINESPACE DURING 2021 AND 2022	0 1 2 4 6 8 10 nm; 0 2.5 5 10 15 km	Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N Scale@379mmx231mm: 1:600,000	MarineSpace.	Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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00	12/05/22	Initial Issue	BO	IW
03	20/01/23	Revision	BO	JL

Figure 1.59: Observations of fishing vessels by the OFLO (30 June 2021 to 18 September 2021 and 01 April 2022 to 10 July 2022) and MarineSpace (10 July 2022 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 sometimes 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 '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. Feedback from project-specific consultation indicated that reduced levels of queen scallop were observed between 2017 and 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 change by 2026 for the UK, for species within the Irish Sea[60]

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%

1.5.1.4 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.

1.5.1.5 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 (most recent two years of data is not currently available), but there could be changes within the fishing industry due to adapting to, and recovering from, the pandemic.

1.5.1.6 Cumulative impacts on commercial fisheries, including those from proposed offshore developments, are considered in volume 2, chapter 11: Commercial fisheries of the PEIR.

1.6 Summary

1.6.1.1 A description of baseline fishing activity in the region of the Morgan Generation Assets 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. Dredge vessels dominated UK vessel landings, whereas beam trawl and dredge vessels dominated non-UK vessel landings. This reflects the importance of the commercial king scallop and queen scallop fishery 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

[60] ABPmer, 2021

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 by both static and mobile gear vessels. Within the inshore areas, there are several static gear vessels that are active and which operate out of Fleetwood.

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