

Outer Dowsing Offshore Wind Preliminary Environmental Information Report Volume 2, Appendix 14.1: Commercial Fisheries Baseline Technical Report

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Abbreviations

Acronym	Expanded name
AIS	Automatic Identification System
DCF	Data Collection Framework
ECC	Export Cable Corridor
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
FLO	Fisheries Liaison Officer
GIS	Geographic Information System
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries and Conservation Authority
MAP	Multi Annual management Plan
MCRS	Minimum Conservation Reference Size
MMO	Marine Management Organisation
NFFO	National Federation Of Fishermen's Organisation
NRA	Navigational Risk Assessment
PEIR	Preliminary Environmental Information Report
PLN	Port Letter and Number
SAR	Swept Area Ratio
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
TCA	Trade and Cooperation Agreement
UK	United Kingdom
UKFEN	UK Fisheries Economic Network
VE	Five Estuaries Offshore Windfarm
VMS	Vessel Monitoring System

Units

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

Terminology

Term	Definition
Array area	The area offshore within the PEIR Boundary within which the generating stations (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling are positioned.
Beam trawl	A method of bottom trawling with a net that is held open by a beam, which is generally a heavy steel tube supported by steel trawl heads at each end. Tickler chains or chain mats, attached between the beam and the ground rope of the net, are used to disturb fish and crustaceans that rise up and fall back into the attached net.
Bycatch	Catch which is retained and sold but is not the target species for the fishery.
Demersal	Living on or near the sea bed.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Environmental Impact Assessment (EIA) Regulations, including the publication of an Environmental Statement (ES).
Fish stock	Any natural population of fish which an isolated and self-perpetuating group of the same species.
Fishery	A group of vessel voyages which target the same species or use the same gear.
Fishing ground	An area of water or sea bed targeted by fishing activity.
Fishing mortality	Mortality due to fishing; death or removal of fish from a population due to fishing.
Fleet	A physical group of vessels sharing similar characteristics (e.g. nationality).
Gear type	The method / equipment used for fishing.
ICES statistical rectangles	ICES standardise the division of sea areas to enable statistical analysis of data. Each ICES statistical rectangle is '30 min latitude by 1 degree longitude' in size (approximately 30 x 30 nautical miles). A number of rectangles are amalgamated to create ICES statistical areas.
Landings	Quantitative description of amount of fish returned to port for sale, in terms of value or weight.
Maximum Sustainable Yield	Maximum sustainable yield (MSY) is the largest yield (catch, in tonnes) that can be taken from a specific fish stock over an indefinite period under constant environmental conditions. Fishing at MSY levels should ensure the capacity of the stock to continue to produce this level in the long term.

Term	Definition
Metier	A homogenous subdivision, either of a fishery by vessel type or a fleet by voyage type.
Minimum Landing Size (MLS)	Is a technical measure that limits the size of fish or shellfish species that can be legally landed and sold. The MLS varies per species. With the implementation of the Landings Obligation, the existing MLS are changed into minimum conservation reference sizes (MCRS), but they will remain largely the same.
Otter trawl	A net with large rectangular boards (otter boards) which are used to keep the mouth of the trawl net open. Otter boards are made of timber or steel and are positioned in such a way that the hydrodynamic forces, acting on them when the net is towed along the seabed, pushes them outwards and prevents the mouth of the net from closing.
Preliminary Environmental Information Report (PEIR)	The PEIR is written in the style of a draft Environmental Statement (ES) and provides information to support and inform the statutory consultation process in the pre-application phase. Following that consultation, the PEIR documentation will be updated to produce the Project's ES that will accompany the application for the Development Consent Order (DCO).
Pelagic	Of or relating to the open sea.
Pelagic trawl	A net used to target fish species in the mid water column.
Quota	A proportion of the Total Allowable Catch for a fish stock.
Recruitment	Recruitment can be defined as the number of fish surviving to enter the fishery or to some life history stage such as settlement or maturity.
Scallop dredge	A method to catch scallop using steel dredges with a leading bar fitted with a set of spring loaded, downward pointing teeth. Behind this toothed bar (sword), a mat of steel rings is fitted. A heavy net cover (back) is laced to the frame, sides and after end of the mat to form a bag.
Spawning	The act of releasing or depositing eggs (fish).
Spawning stock biomass	The combined weight (in tonnes) of all the fish of one specific stock that are old enough to spawn. It provides an indication of the status of the stock and the reproductive capacity of the stock.
Stock assessment	An assessment of the biological stock of a species and its status in relation to defined references points for biomass and fishing mortality.
String	A series of static fishing gear (pots) joined together to form a single deployable linear line of pots.
The Project	Outer Dowsing Offshore Wind including proposed onshore and offshore infrastructure
Total Allowable Catch (TAC)	TACs are catch limits, expressed in tonnes or numbers, that are set for some commercial fish stocks.

Term	Definition
Vessel Monitoring System (VMS)	A system used in commercial fishing to allow environmental and fisheries regulatory organizations to monitor, minimally, the position, time at a position, and course and speed of fishing vessels.

14 Commercial Fisheries Technical Report

14.1 Introduction

Overview and Purpose of this Report

- 14.1.1 This document has been prepared by Poseidon Aquatic Resource Management Ltd (Poseidon) to support the Environmental Impact Assessment (EIA) of the Outer Dowsing Offshore Wind (hereafter referred to as the Project).
- 14.1.2 The information on commercial fisheries activity presented in this document is intended to inform the EIA for the Project by providing a detailed understanding of the commercial fisheries baseline, against which the potential impacts of the Project can be assessed. An overview of the information presented in this Technical Report is provided in Volume 1, Chapter 14: Commercial Fisheries of the Preliminary Environmental Information Report (PEIR).
- 14.1.3 This document describes commercial fisheries activity, defined as fishing activity legally undertaken where the catch is sold for taxable profit. A description of charter angling activity, defined as fishing for marine species where the purpose is recreation and not sale or trade, is provided in Volume 1, Chapter 18: Infrastructure and Other Marine Users. The ecology of the fish and shellfish species targeted by commercial fishing activity is described in Volume 1, Chapter 10: Fish and Shellfish Ecology.

Report Structure

- 14.1.4 This report is structured as follows:
- Section 1 – introduces the report and outlines its purpose;
 - Section 2 – presents the methodology and data sources applied to characterise the baseline environment;
 - Section 3 – presents the characterisation of the existing environment for the commercial fisheries assessment;
 - Section 4 – presents the characterisation of the future baseline environment; and,
 - Section 5 – summarises the findings of this Report.

14.2 Methodology

Approach

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

14.2.2 This quantitative data has been augmented by qualitative information gained through the Project site surveys (see 'Data Sources' below), direct consultation with the fishing industry (see Volume 1, Chapter 14, Section 14.3), and communication and discussion between the onshore Fisheries Liaison Officer (FLO) and the fishing industry (see Volume 1, Chapter 14, Section 14.3).

Study Area

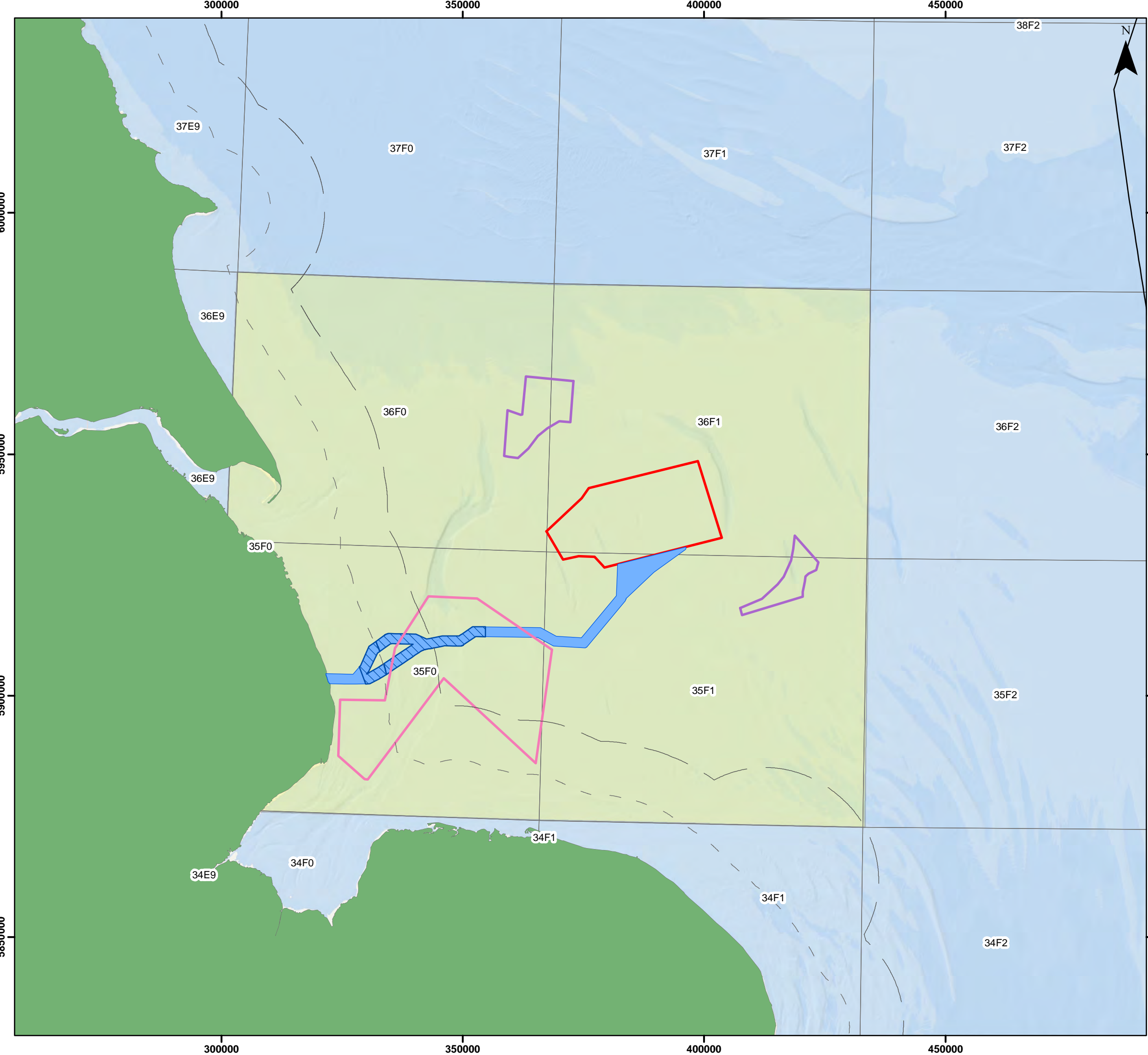
14.2.3 The Project is located across the boundary of ICES Divisions 4b (central North Sea) and 4c (southern North Sea), within the UK Exclusive Economic Zone (EEZ) waters, with the array area located outside the 12 nautical mile (NM) limit. For the purpose of recording fisheries landings, ICES Divisions are divided into statistical rectangles¹ which are consistent across the UK, Norway and European Union Member States operating in the North Sea.

14.2.4 The Project array area is located within ICES rectangles 36F1 and 35F1. The offshore Export Cable Corridor (ECC) is within rectangles 35F1 and 35F0, as shown in Figure 14.1.

14.2.5 Since the westernmost array area boundary lies outside of but immediately adjacent to ICES rectangle 36F0, the commercial fisheries study area has been defined as ICES rectangles 36F0, 36F1, 35F0 and 35F1. The Project array area occupies approximately 7% of rectangles 36F1 and 35F1. The offshore ECC occupies approximately 2% of rectangles 36F1, 35F1 and 35F0.

14.2.6 The compensation areas shown in Figure 14.1 will be assessed within the Environmental Statement (ES) and considered in an updated version of this document following refinement of the proposed areas and once details of the works to be undertaken have been finalised.

¹ ICES standardise the division of sea areas to enable statistical analysis of data. Each ICES statistical rectangle is '30 min latitude by 1-degree longitude' in size (approximately 30 x 30 nautical miles). A number of rectangles are amalgamated to create ICES statistical areas.

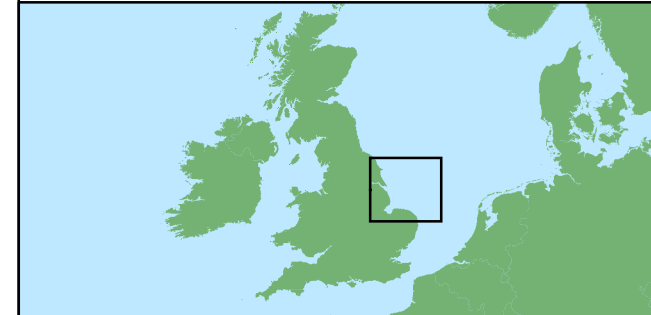
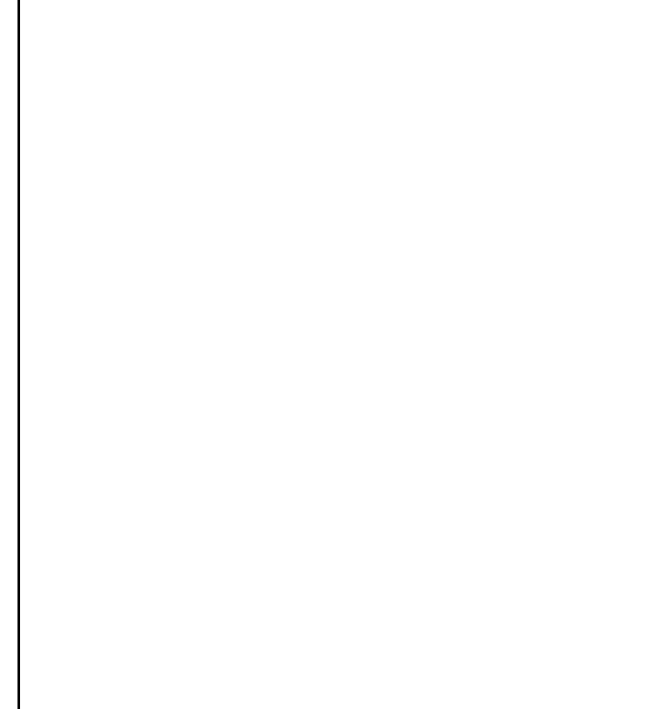


Legend

- PEIR Site Boundary
- ORCP Search Area
- Offshore ECC Boundary
- Artificial Nesting Structure Search Area
- Biogenic Reef Restoration Search Area
- Commercial Fisheries Study Area
- ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM



Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:750,000

Preliminary Environmental Impact Report

Commercial fisheries study area, incorporating ICES rectangles 36F1, 35F1, 36F0 and 35F0

Figure 14.1



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Data Sources

- 14.2.7 A range of data sources have been analysed and presented within this Technical Report; these are listed in Table 14.1.
- 14.2.8 Data has been sourced from ICES, the EU Data Collection Framework (DCF), the UK Marine Management Organisation (MMO) and the European Maritime Safety Agency (EMSA).
- 14.2.9 Where data sources allow, a five-year trend analysis has been undertaken, using the most recent annual datasets available at the time of writing. The temporal extent of this five-year period is dependent on each data source analysed, e.g. 2012 to 2016 or 2017 to 2021, as annotated in Table 14.1.
- 14.2.10 Relevant literature from a number of sources has also been reviewed in the preparation of this Technical Report. A full list of references is provided at the end of this document and are cited within the text where appropriate. Information on fishing activity across the Project has also been provided by the project Fisheries Liaison Officer; this includes the findings of scouting surveys. Supplementary information is also provided by the Project's marine traffic surveys undertaken in 2022.

Table 14.1: Data sources used to inform this Technical Report

Country	Data	Time period	Source
Landings statistics			
UK	Landings statistics data for UK-registered vessels, with data query attributes for: landing year; landing month; vessel length category; ICES rectangle; vessel/gear type; port of landing; species; live weight (tonnes); and value. These landings statistics are published annually by the MMO and include vessels registered to the following UK administrations and British crown dependencies.	2017 to 2021	MMO
All Europe	Landings statistics for EU registered vessels with data query attributes for: landing year; landing quarter; ICES rectangle; vessel length; gear type; species; and, landed weight (tonnes).	2012 to 2016	European Union (EU) Data Collection Framework (DCF) database
Spatial data			
UK	VMS data for UK registered vessels ≥ 15 m length. Note that UK vessels ≥ 12 m in length have VMS on board, however, to date, the MMO provide amalgamated VMS datasets for ≥ 15 m vessels only. VMS data sourced from MMO displays the first sales value (£) of catches.	2016 to 2019	MMO
All Europe	VMS data for EU registered vessels ≥ 12 m length.	2017 to 2020	ICES

Country	Data	Time period	Source
	VMS data sourced from ICES displays the surface Swept Area Ratio (SAR) of catches by different gear types and covers EU (including UK) registered vessels 12m and over in length. Surface SAR indicates the number of times in an annual period that a fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity.		
All Europe	Fishing vessel route density, based on vessel Automatic Information System (AIS) positional data. AIS is required to be fitted on fishing vessels ≥15m length.	2019 to 2022	European Maritime Safety Agency (EMSA)
Site survey data			
UK - The Project's data	The Project's marine traffic (AIS and radar) survey data.	Summer 2022 and Winter 2023	Anatec
UK - The Project's data	The Project's fisheries scouting survey data, noting fishing gear and vessel observations.	2021 and 2022	NFFO Services

Data Limitations and Uncertainties

- 14.2.11 A range of different data limitations and uncertainty exist for all of the commercial fisheries datasets assessed within this Technical Report. The level of uncertainty and confidence of each data set is defined in Table 14.2 based on judgement of the assessment team.
- 14.2.12 Limitations of landings data include the spatial size of ICES rectangles which can misrepresent actual activity across the Project and care is therefore required when interpreting these data.

- 14.2.13 It is noted that all commercial landings by UK registered vessels are subject to the Register of Buyers and Sellers legislation and therefore landings by UK vessels of all lengths are recorded within the MMO iFISH database. While it is recognised that there is no statutory requirement for owners of vessels 10m and under to declare their catches, registered buyers are legally required to provide sales notes of all commercially sold fish and shellfish under the Registration of Fish Buyers and Sellers and Designation of Fish Auction Sites Regulations 2005 due to the 2005 Registration of Buyers and Sellers of First-Sale Fish Scheme (RBS legislation). The RBS legislation is applicable to licenced fishing vessels of all lengths and requires name and PLN (port letter and number) of the vessel which landed the fish to be recorded in relation to each purchase. For the 10 metre and under sector, landing statistics are recorded on sales notes provided by the registered buyers (MMO, 2021). Information that may not be formally recorded on the sales note, such as gear and fishing area, is added by coastal staff based on local knowledge of the vessels they administer - for example, from observations of the vessel during inspections at ports or from air and sea surveillance activities as well as discussions with the owner and/or operator of the vessel (MMO, 2021). There are occasions when fish are not subject to the RBS legislation and therefore are not represented within the MMO landings statistics database, for instance when purchases of first sale fish direct from a fishing vessel are wholly for private consumption, and less than 25kg is bought per day.
- 14.2.14 Lack of recent landings statistics for EU (non-UK) fleets is also recognised as a data limitation; based on the most recent European Commission data call, more recent landings data (2017-2019) is no longer available by ICES rectangle. Data at a scale of ICES division (e.g., the whole of the southern North Sea) is less useful to understand fishing activity specific to the area overlapping the Project.
- 14.2.15 All UK and EU fishing vessels (i.e., fishing vessels flying the flag of the UK or an EU Member State), and third-party fishing vessels operating in UK and EU waters that are ≥ 12 m in length are required to have a Vessel Monitoring System on board. This reports the vessels' position to fisheries management authorities, which in the case of EU fishing vessels, is every two hours. Since 1st January 2012, this obligation has applied to vessels that are ≥ 12 m in length. Limitations of publicly available VMS data are primarily focused on the coverage being limited to larger vessels 15 m and over for UK fishing vessels. It is important to be aware that where mapped VMS data may appear to show inshore areas as having lower (or no) fishing activity compared with offshore areas, this is not necessarily the case because VMS data do not include vessels typically operating in inshore area (i.e., which typically comprises of vessels <15m in length). To assist in mitigating the risk of under-representing smaller inshore vessels, site-specific marine traffic survey data comprising information on vessel movements gathered by Automatic Identification System (AIS) and radar has been analysed alongside VMS data (Anatec, 2022 and 2023). Consultation with individual fishermen active in the study area has also been key in determining the extent and distribution of activity by the <12 m fleet.

Table 14.2: Data limitations and uncertainty (the uncertainty and confidence levels are defined based on judgement and are intended to inform the appropriateness of data used to inform the EIA)

Data Source	Type of Data	Limitations and uncertainty
Landings statistics		
MMO	Landings statistics (2017-2021) data for UK-registered vessels.	The data is recorded from sales notes and landing declarations for all vessel lengths. Due to the UK legislation of Registration of Buyers and Sellers data is considered accurate and verifiable. <ul style="list-style-type: none"> Data assessed with: low uncertainty and high confidence.
EU DCF	Landings statistics (2012-2016) data for all EU landings by country, species and gear type.	The data is submitted by individual member states and therefore limitations vary per country. Vessels under 10m may be omitted or mis-represented by the data. Accuracy is likely to be greater for landings from larger vessels. <ul style="list-style-type: none"> For UK vessels under 10m length data is assessed with: high uncertainty and low confidence. For all other EU vessels data is assessed with: low uncertainty and high confidence.
Spatial data		
MMO	UK VMS data for vessels ≥ 15 m length.	The data is only available for 15m and over vessels, so is not representative of <15 m vessels. <ul style="list-style-type: none"> Data assessed with: medium uncertainty and medium confidence.
ICES	EU SAR data for vessels ≥ 12 m length.	The data is only available for 12m and over vessels, so is not representative of <12 m vessels. <ul style="list-style-type: none"> Data assessed with: medium uncertainty and medium confidence.
EMSA	AIS data for fishing vessels ≥ 15 m length.	The data is only available for 15m and over vessels, so is not representative of <15 m vessels. <ul style="list-style-type: none"> Data assessed with: medium uncertainty and medium confidence.
Anatec	Marine traffic (AIS and radar) survey data (2022 and 2023).	An assessment undertaken into fishing vessel activity to inform the Navigational Risk Assessment (NRA) undertaken for the Project Based on a 14-day AIS and radar survey in summer 2022 and in winter 2023. <ul style="list-style-type: none"> Data assessed with: low uncertainty and high confidence.
NFFO Services	Fisheries scouting survey (2021 and 2022).	Fishing gear observations made from scouting survey vessel during scouting surveys undertaken across the array area and offshore ECC from summer 2021 to summer 2022. <ul style="list-style-type: none"> Data assessed with: low uncertainty and high confidence.

14.3 Baseline Environment

Landings Overview

- 14.3.1 The annual average value of landings by UK-registered from the four ICES rectangles that comprise the study area is shown in Figure 14.2 below.
- 14.3.2 Of the four rectangles, landings across the five-year period have been consistently of greatest value in inshore ICES rectangle 36F0 within which no Project infrastructure will be located. The average annual value of landings from ICES rectangle 36F0 from 2017 to 2021 was £11.6 million whilst equivalent values across the other three rectangles ranged between £1.9 million and £2.5 million.
- 14.3.3 Landings are dominated by shellfish species. Over 92% of all landings by UK vessels from the study area are made by vessels registered in England, with remaining landings accounted for by Scottish-registered vessels.

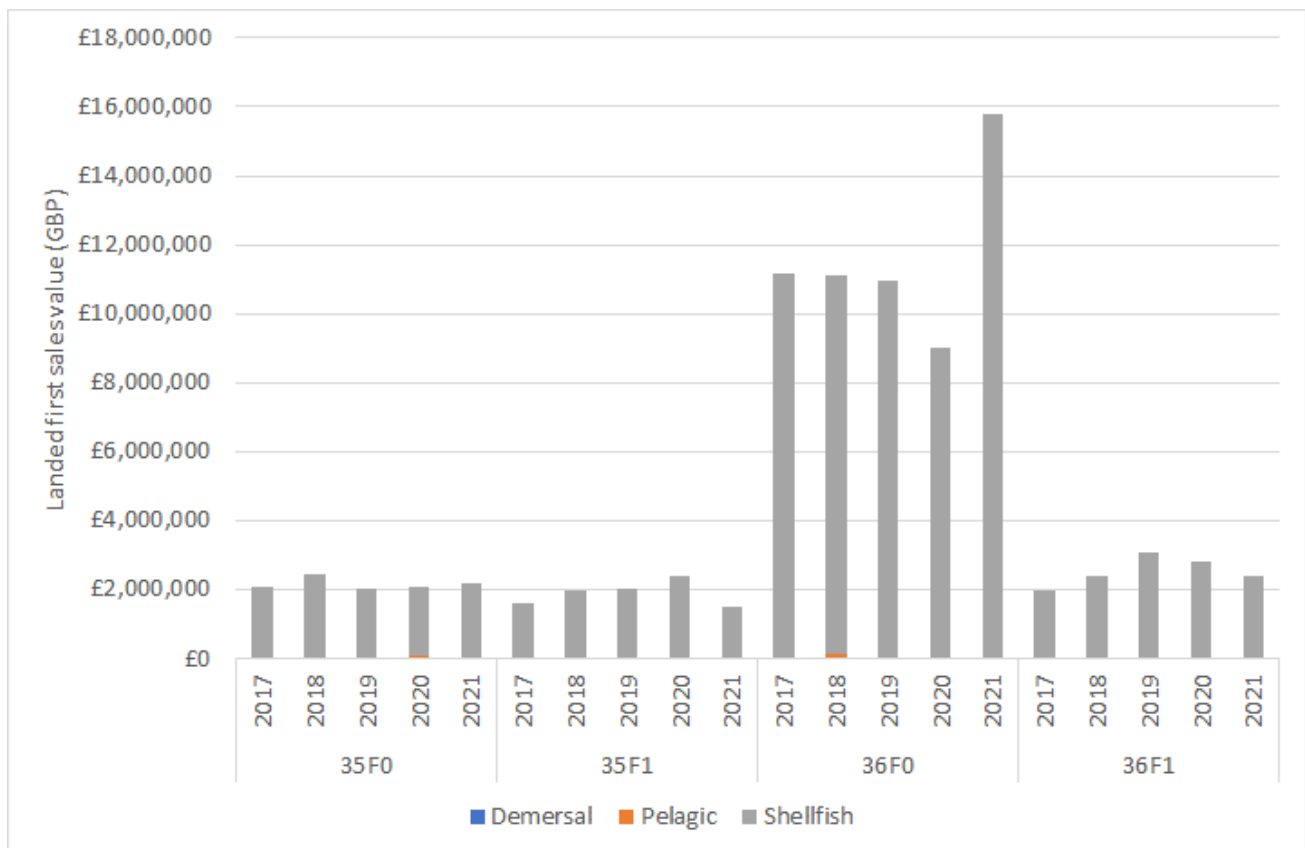


Figure 14.2: Value of landings (2017 to 2021) from the study area by ICES rectangle and species group (Source: MMO, 2022)

- 14.3.4 Focusing in on those ICES rectangles where the array area and offshore ECC are located, Figure 14.3 indicates that the key species landed from ICES rectangle 35F0 (inshore portion of offshore ECC) are cockles *Cerastoderma edule*, brown crabs *Cancer pagurus*, whelks *Buccinum undatum*, brown shrimps *Crangon crangon* and lobsters *Homarus gammarus*. A brown shrimp beam trawl fishery and hand-worked cockle fishery are both focused on The Wash, to the south of the offshore ECC. The key species landed from ICES rectangle 35F1 (outermost portion of offshore ECC) are whelks, lobsters and brown crabs. Key species landed from ICES rectangle 36F1 (array area) are brown crabs, lobsters and whelks.
- 14.3.5 By both weight and value, landings from all rectangles have shown some fluctuation across the five-year time series but have been relatively consistent overall.

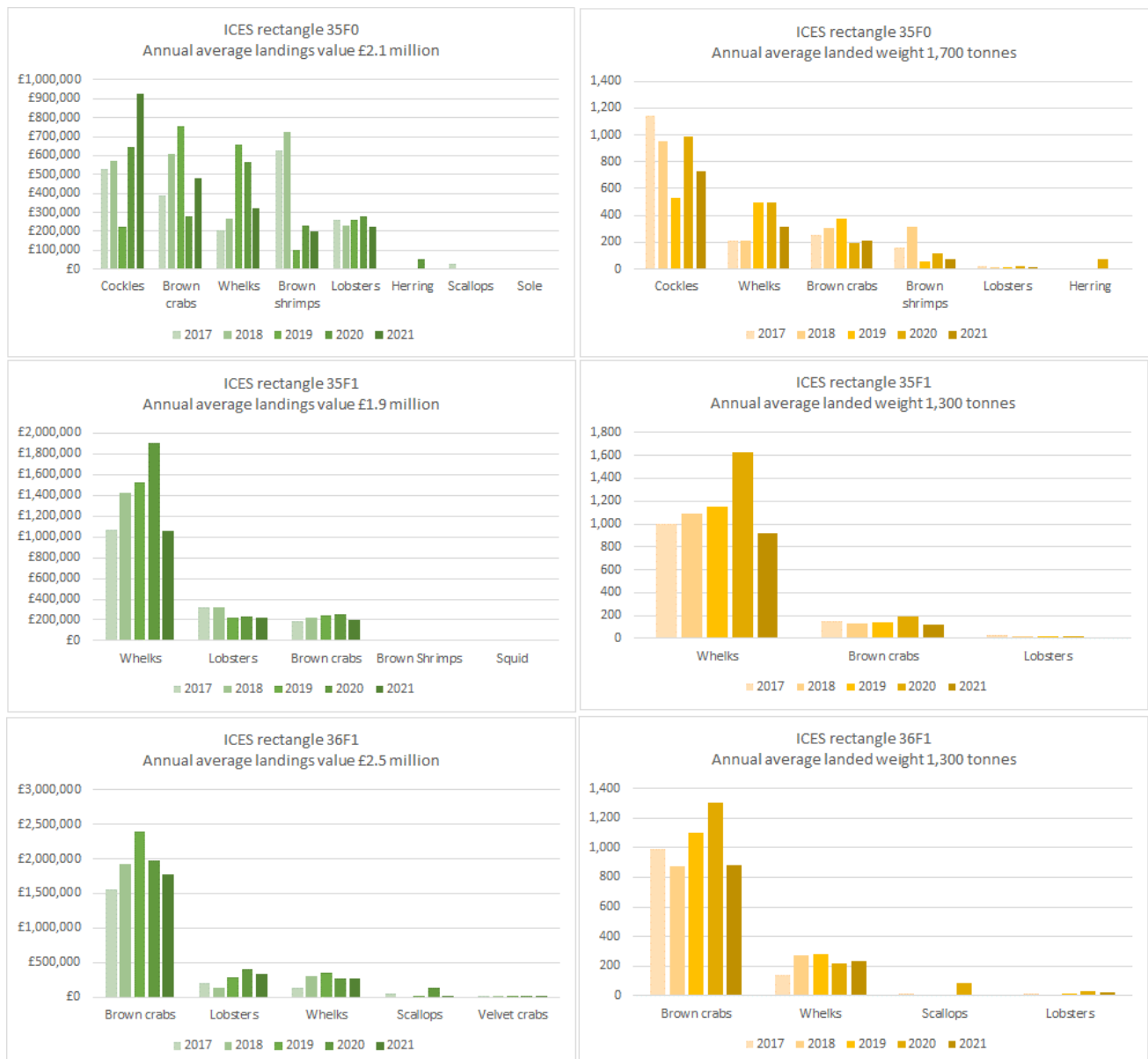


Figure 14.3: Key species by annual landed value (GBP) and weight (tonnes) (2017 to 2021) from ICES rectangles 35F0, 35F1 and 36F1 (Source: MMO, 2022)

- 14.3.6 Within the UK exclusive economic zone, fishing activity from the shore to 6NM is only permissible for UK-registered vessels. A number of restrictions are in place based on byelaws set by English Inshore Fisheries and Conservation Authorities that control fisheries out to 6NM. From 6NM to 12NM, non-UK vessels may fish if they have acquired historical rights to do so. Outside 12NM, international vessels are permitted to fish subject to quota allocation and other EU level restrictions including technical gear measures and effort restrictions such as days at sea.
- 14.3.7 Landings data sourced from the EU DCF database indicates that there is likely to be some non-UK fishing activity in the study area. In ICES rectangles 35F0 and 35F1 (offshore ECC), the majority of landings are made by UK-registered vessels, with EU landings data indicating some presence of French otter trawlers and Dutch beam trawlers. In ICES rectangle 36F1 (array area), data indicates the presence of French and Danish otter trawlers, and Belgian and Dutch beam trawlers, though most recent data again indicates that the majority of landings from this rectangle are made by UK-registered vessels. Non-UK fishing vessels active in the study area primarily target plaice *Pleuronectes platessa*, sole *Solea solea* and other demersal species, with evidence of sporadic pelagic trawl activity, targeting mackerel *Scomber scomber* and herring *Clupea harengus*. Historically, a Danish sandeel *Ammodytes marinus* fishery was active in the study area, which has declined substantially since its peak in 2004.

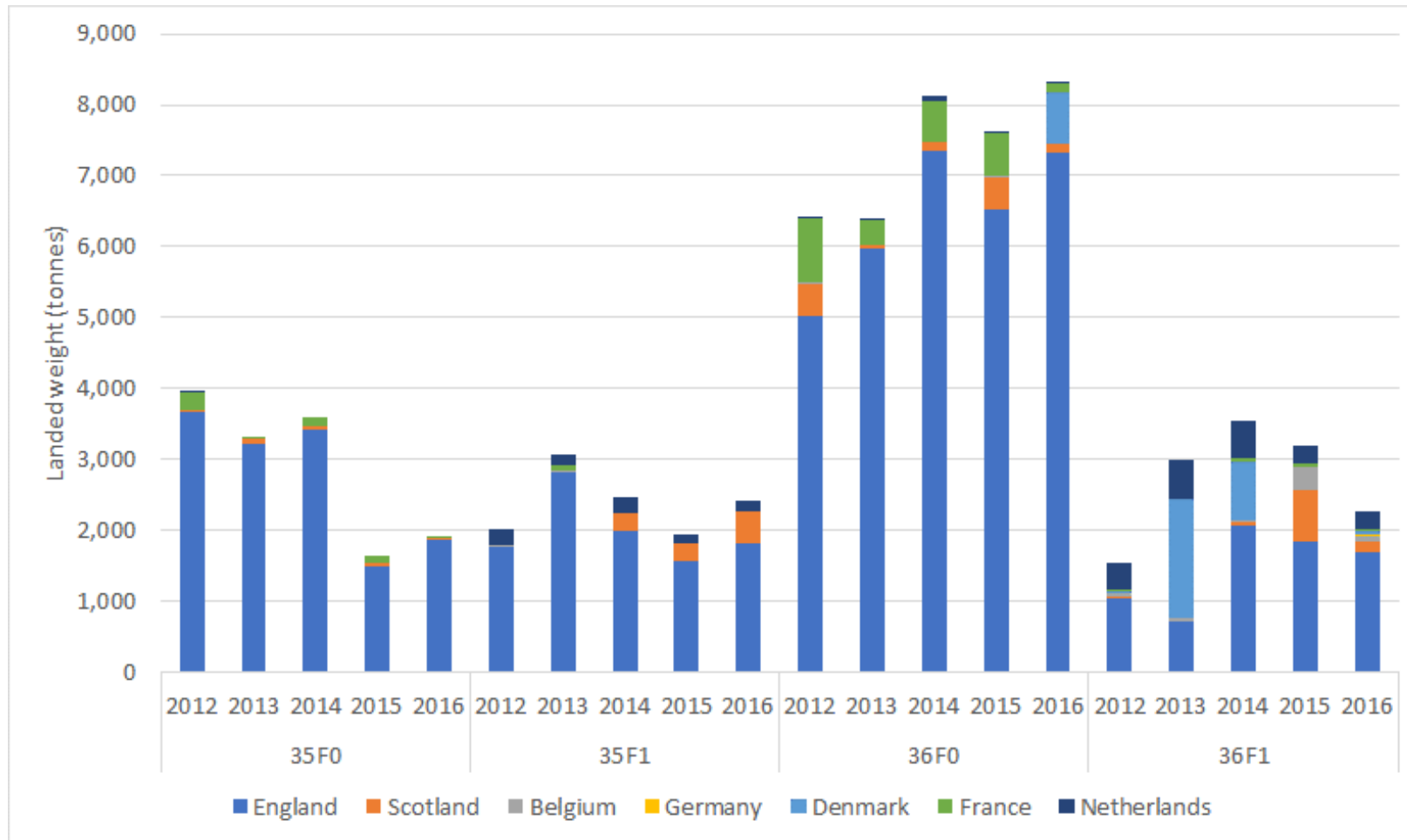


Figure 14.4: Average annual landed weight (tonnes) landed by all UK and EU countries from the study area (2012 to 2016²) (Source: EU DCF, 2022)

² From 2017 onwards landings data in the EU DCF database by country are not available by ICES rectangle, hence the presentation of data from 2012 to 2016 to ensure focus on the commercial fisheries study area.

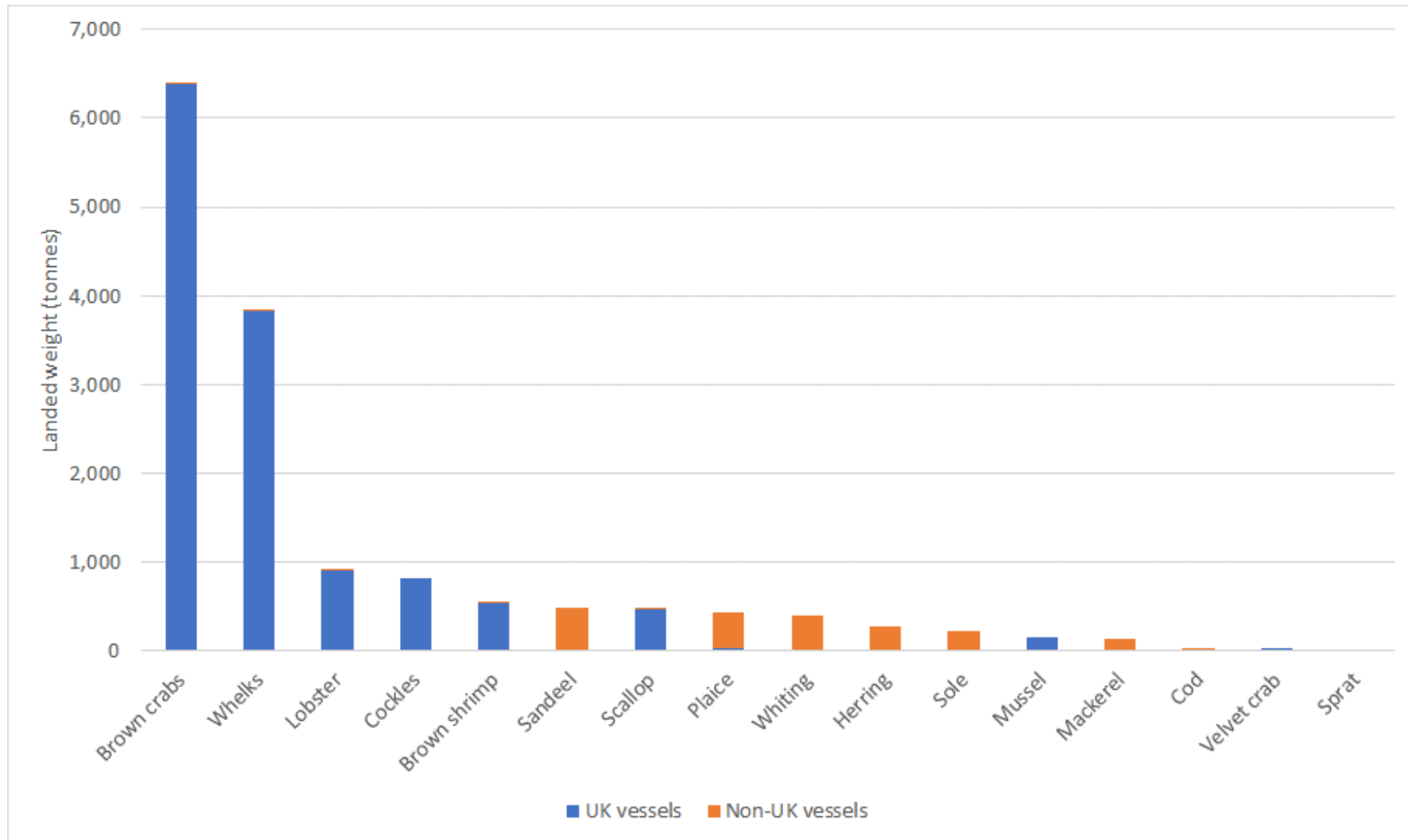


Figure 14.5: Average annual landed weight (tonnes) landed by species by UK and EU vessels from the study area (2012 to 2016) (Source: EU DCF, 2022)

Key Fishing Gears

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

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

14.3.9 A range of fleets are active across the study area, as indicated by landings statistics for registered vessel nationality and gear type (Figure 14.8). UK-registered vessels deploying pots clearly dominate landings in terms of both landed weight and value. Vessel and gear types within the key fleets and fisheries that operate across the study area are described within this section.

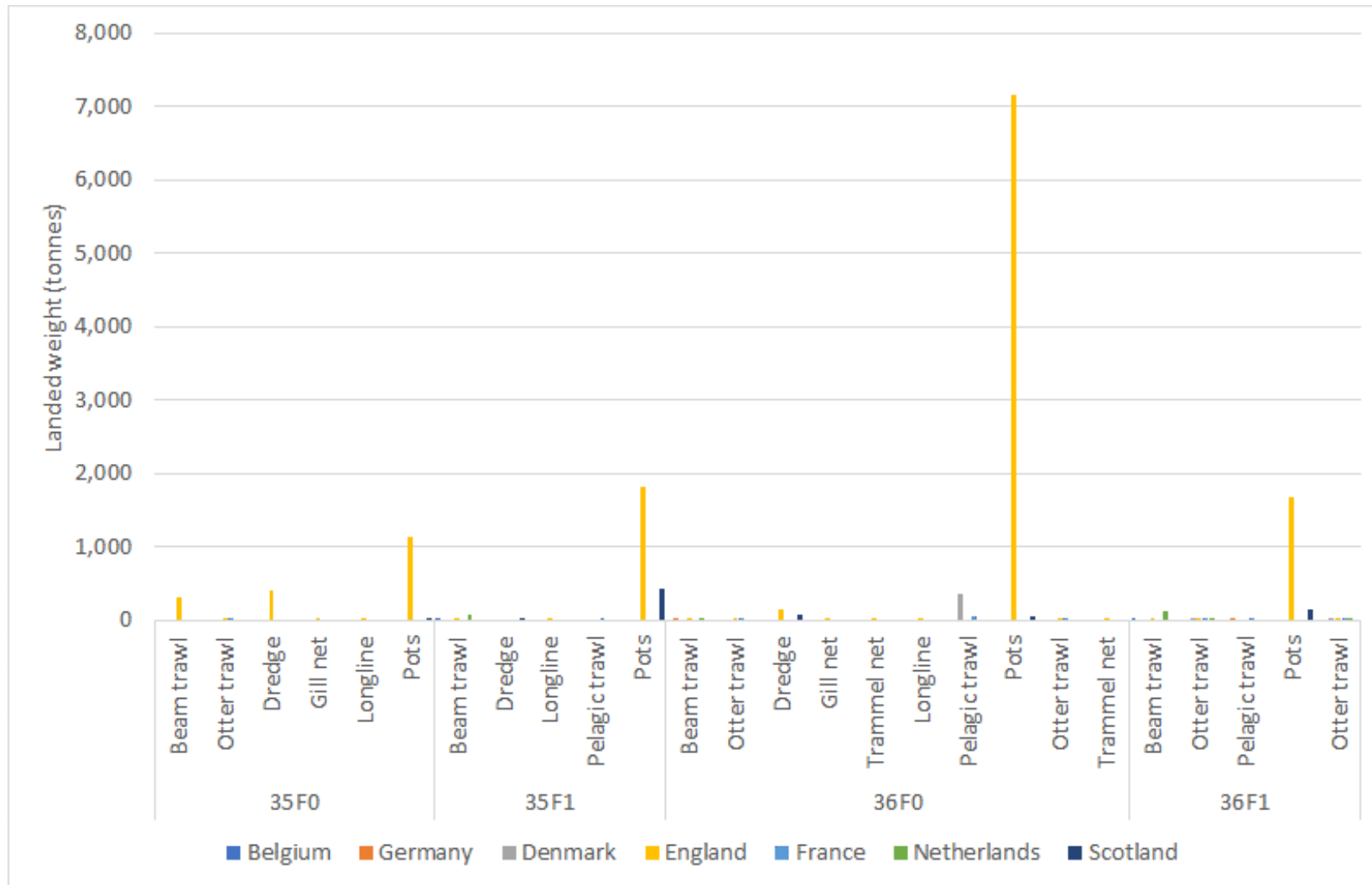


Figure 14.6: Landed weight in 2016 by gear type and vessel origin for the study area (Source: EU DCF, 2022)

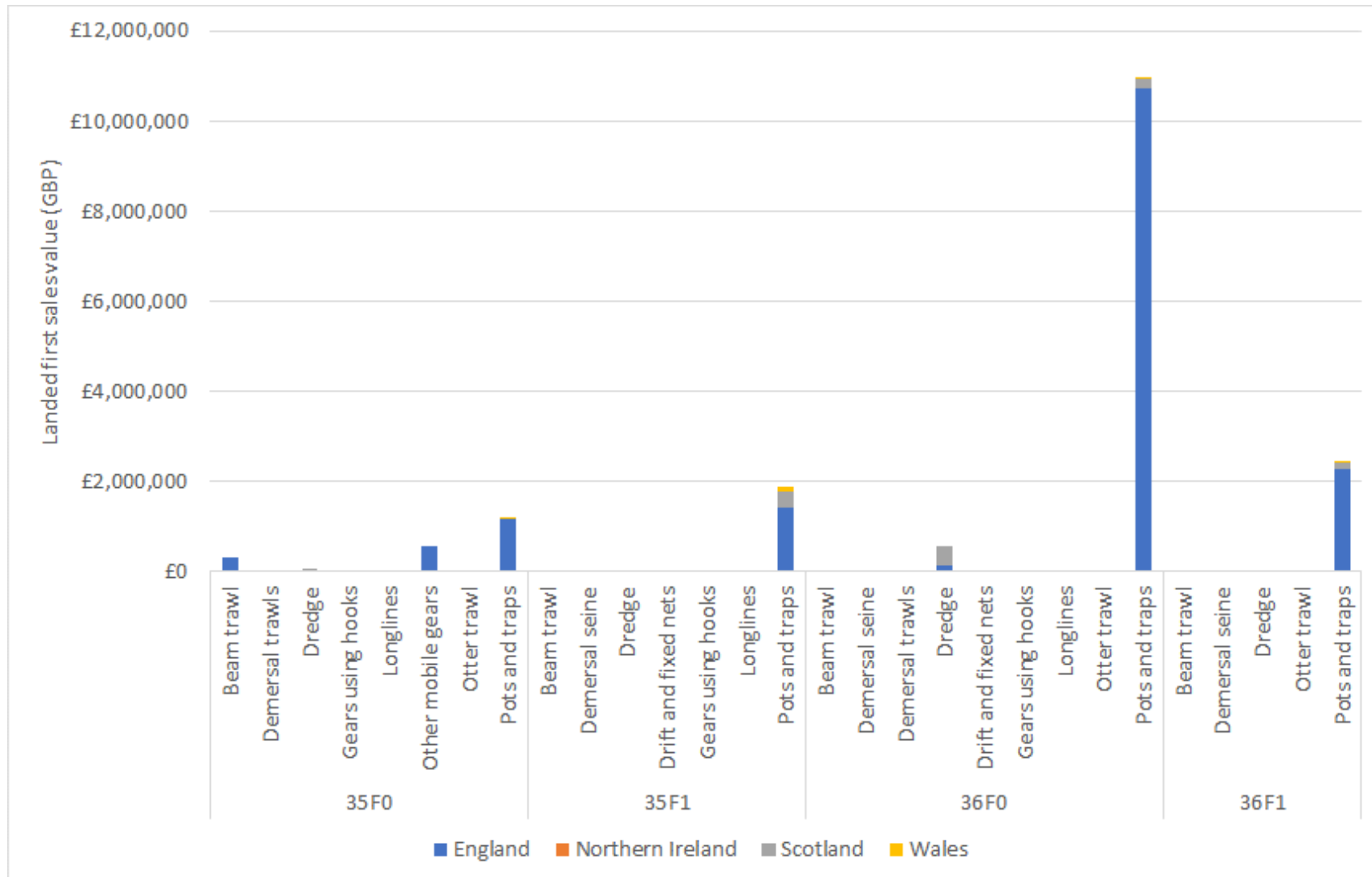


Figure 14.7: Annual average landings value 2016 to 2020 by gear type and UK vessel origin for the study area (Source: MMO, 2022)

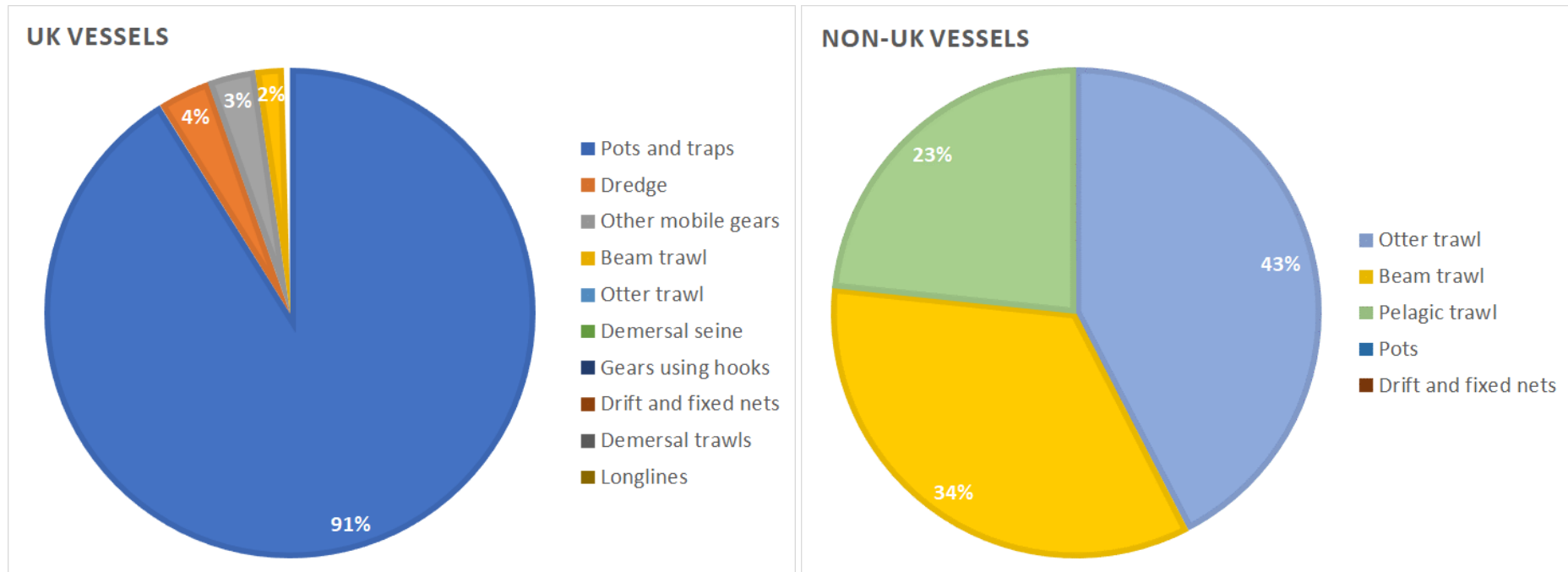


Figure 14.8: Proportion of landings from the study area by gear type for UK (left; based on 2017 to 2021 landings data) and non-UK (right; based on 2012 to 2016 landings data) fishing vessels (Source: MMO, 2022 and EU DCF, 2022)

Pots and Traps

- 14.3.10 Figure 14.9 and Figure 14.10 show typical potting vessels, gear and the configuration of set pots and Table 14.3 describes the profile of potting vessels active across the study area.
- 14.3.11 Vessels predominately target crab and lobster with mainly parlour (two chambered) pots (or creels), but also standard (single chambered) pots, both of which are side opening. Whelks are targeted with top opening plastic pots. Some vessels will operate fleets of crab and lobster pots and whelk pots simultaneously.
- 14.3.12 When targeting brown crab and lobster, parlour pots are favoured for more offshore locations. Vessels may operate 1,000 to 3,500 pots in total, with 20 to 30 pots per string for a typical vessel, and up to 50 per string for larger vessels; pots are spaced approximately 15 fathoms apart. Pots are shot away with the tide; one string can cover up to 0.3NM. Soak time is commonly 24 to 48 hours before pots are hauled. Catch is sorted at sea, with any undersize or poor-quality individuals returned immediately, whilst the remainder is sold to processors, restaurant outlets and local fishmongers once landed.
- 14.3.13 Whelk fishing activity is driven by market prices; when the price goes up, vessels will focus on whelk. Whelk are predominately targeted in muddy habitats, and not generally found on mobile sand or rocky ground. Commercial vessels within the EIFCA jurisdiction, within which the nearshore portion of the offshore ECC is located, are limited to 500 pots with an internal volume of 30 litres per vessel, as per the Whelk Permit Byelaw. All whelk pots must have a minimum of two escape holes at least 24 mm in diameter per pot and must be tagged with EIFCA supplied tags. There are no pot limits outside 6 NM; when targeting whelk, vessels operating outside 6NM may deploy up to 1,500 to 2,000 pots, with 50 to 100 pots per string and 8 to 10 fathoms between pots. Vessels fish out to 30 NM for whelk, with steaming time ranging from 20 minutes to several hours depending on grounds being targeted.
- 14.3.14 Historically, the potting fishery was an inshore mixed species creel fishery operating within 2NM of the coastline, primarily due to limitations of the vessels and equipment. The introduction of larger vessels and the capability to store and transport live animals in subsequent years has increased the range in which potters operate, enabling fishing grounds further afield to be utilised. The potting fleet today is comprised of vessels with a range of varying capabilities; a significant number still fish in close proximity to the shore on the historic fishing grounds while many of the fishers have replaced their traditional open-decked cobbles and skiffs with larger boats, targeting both inshore and offshore grounds.

Table 14.3: Profile of typical potting vessels active across the study area

Parameter	Indicative details
Main target species	Brown crabs, lobsters, whelks
Vessel nationality	English, some Scottish
Vessel length	Under 10m and over 10m; vivier crab vessels up to 24m
Horsepower	60hp to 200hp
Typical speed when shooting and hauling gear	0 to 9 knots
Typical soak time	1 to 2 days, up to a week
Seasonality of activity	Brown crab landings peak autumn and winter Lobster landings peak later summer

Parameter	Indicative details
Typical gear configuration	<p>Whelk landings peak spring and summer</p> <p>Fleets of baited pots are placed on the seabed. Pots are typically hauled every week but may be left for a number of weeks.</p> <p>Generally, day boats, but also includes a vivier fleet (crabs stored live in water tanks).</p>

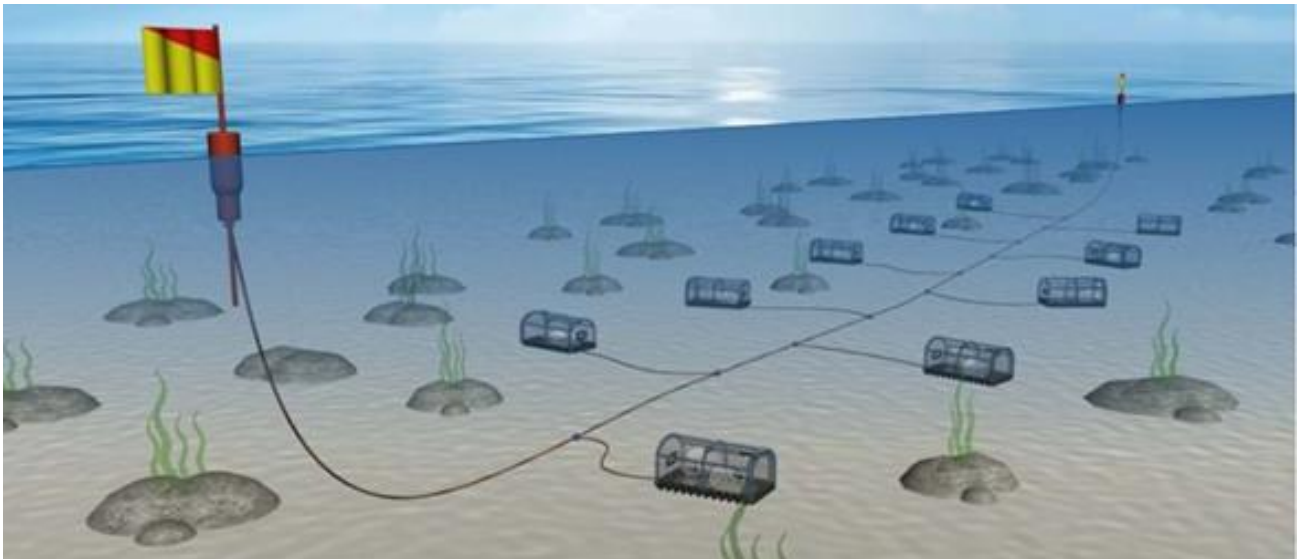


Figure 14.9: Typical potting gear configuration (Source: Seafish, 2015)



Figure 14.10: Example of potting vessels, including larger vivier crabber (left) and smaller inshore potter (right) (Source: MarineTraffic, 2022)

Dredge

- 14.3.15 Dredges are rigid structures that are towed along the seabed to target various species of shellfish. In the study area, they are used to primarily target scallop.
- 14.3.16 A typical scallop dredging vessel is shown in Figure 14.12 and Table 14.4 describes the profile of scallop dredging vessels active across the study area. Scallop dredgers fish as the tooth bar of each dredge rakes through the sediment lifting out scallops and the spring-loaded tooth bar swings back, allowing the dredge to clear obstacles on the seabed. The dredges are held in a series on two beams, which are fished on each side of the vessel. Generally, queen scallop are targeted using skid dredges. Skid dredges operate in much the same way as toothed dredges which target king scallop, but the tooth bar is replaced with a “tickler chain” which disturb queen scallops resting on the seafloor, causing them to swim upwards into the water column where they can be caught by the dredge.
- 14.3.17 UK scallop dredgers operate around the entire coastline of the UK. A number of scallop vessels are nomadic, fishing one location before moving to another and returning to grounds when they have recovered. In this way, most of the suitable grounds around the UK are fished. Vessels targeting scallop locally typically land their catch into Hartlepool.
- 14.3.18 Scallop dredging is an activity which is generally engaged by larger (>10m vessel length) vessels due to the engine capacity required to tow this heavy fishing gear.

Table 14.4: Profile of typical dredging vessels active across the study area

Parameter	Indicative details
Main target species	King scallops
Vessel nationality	English, Scottish
Vessel length	Over 15m
Horsepower	200hp to 400hp
Typical speed when shooting and hauling gear	2 to 6 knots
Seasonality of activity	Spring peak
Typical gear configuration	Up to 10 dredges per side of vessel. Each dredge consists of a triangular frame leading to an opening, a tooth bar with spring-loaded teeth, and a bag of steel rings and netting back.

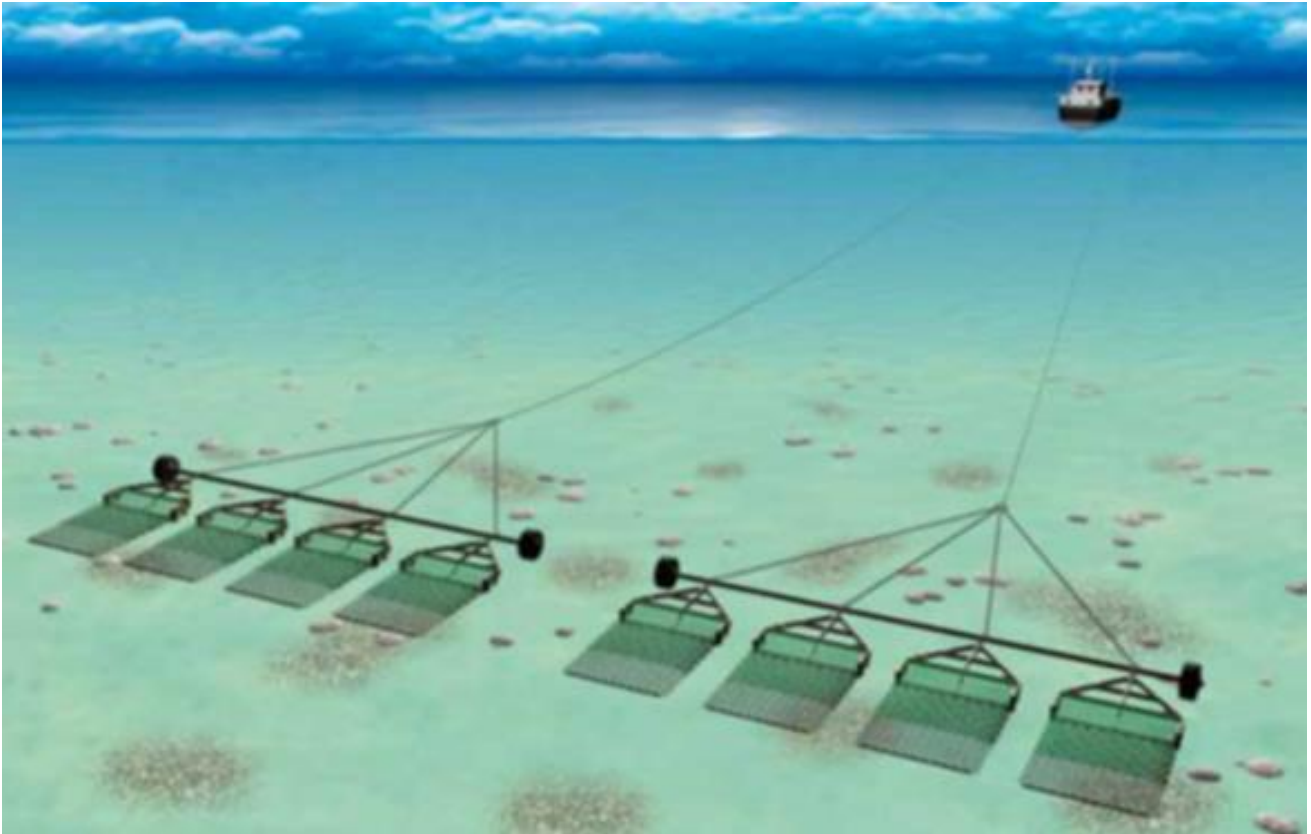


Figure 14.11: Typical dredge gear configuration (Source: Seafish, 2015)



Figure 14.12: Example of scallop dredge vessel (Source: MarineTraffic, 2022)

Beam Trawl

- 14.3.19 Figure 14.14 shows a typical beam trawler and associated gear and Table 14.5 describes the profile of beam trawling vessels active across the study area.
- 14.3.20 Beam trawl gear is used to target flatfish such as sole and plaice, which are often somewhat buried in the seabed. Beam trawl nets are held open by a heavy steel beam which is towed along the seabed on a line approximately three times the depth of the water. Some beam trawls include tickler chains, which drag along the seabed in front of the net, disturbing fish in its path and encouraging them to rise into the net. Beam trawls can range in length from 4m to 14m and each trawlers tows two beam trawls at a time from derricks on either side of the vessel.
- 14.3.21 Catches with beam trawl form a significant portion of annual landings from the study area. Fishing effort for the target flatfish species is spread over a wide area and across various grounds throughout the North Sea.

14.3.22 UK beam trawlers active in the study area are primarily associated with the brown shrimp fishery in The Wash, recognised as a nationally important fishery representing over 90% of UK North Sea brown shrimp landings. Brown shrimp trawl gear operates as described for beam trawlers targeting flatfish, though vessels operate principally in inshore waters, normally from 0 to 6NM and are from 7m to 18m in length, using lighter gear. Shrimp beam trawling activity predominantly occurs in The Wash embayment, and to a lesser extent along the North Norfolk coast. Shrimp trawling can be carried out in water depths up to 50m, however, brown shrimp trawling is primarily carried out in waters of 0 to 10m depth, often following the submerged edges of sandbanks, and channels between sandbanks. For many vessels a trip will consist of a single tidal cycle (12 hours) but some of the larger vessels have the capacity to undertake fishing trips of several days. All catch is graded at the two processing facilities in Kings Lynn.

Table 14.5: Profile of typical beam trawl vessel active across the study area

Parameter	Indicative details
Main target species	Plaice and sole Brown shrimp
Vessel nationality	English, Dutch, Belgian
Vessel length	25m to 45m for flatfish 7m to 18m for brown shrimp
Horsepower	500hp to 2,000hp for flatfish 50hp to 300hp for brown shrimp
Typical speed when shooting and hauling gear	3.5 to 8 knots 1 to 3 knots for brown shrimp
Seasonality of activity	Spring peak
Typical gear configuration	Twin beam, max length 12m each beam. Each beam weighing <10 tonnes (~two tonnes for brown shrimp). Chain matting or individual chains attached to underside.

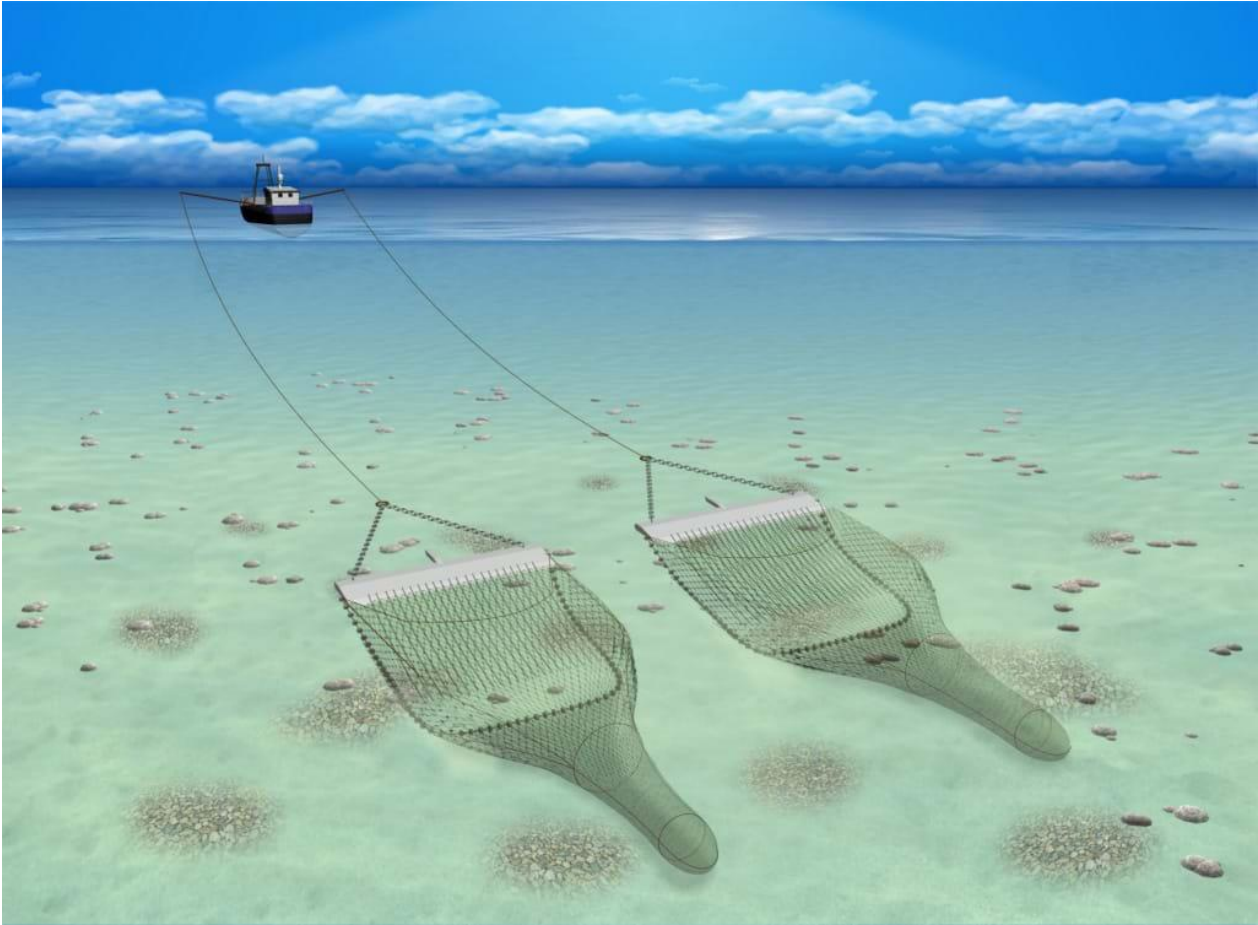


Figure 14.13: Typical beam trawl gear configuration (Source: Seafish, 2015)



Figure 14.14: Example of beam trawl vessels (Source: MarineTraffic, 2022)

Otter Trawl

- 14.3.23 Otter trawling uses a cone-shaped net which is held open by water pressure on two otter boards. The net is towed either across the seabed or within the water column. Fish are herded between the boards into the mouth of the trawl and then forced along a funnel into the end of the net. Net mesh sizes can be altered to target different fish species. Light otter trawling can be conducted by smaller boats using small doors.
- 14.3.24 Within the study area, English trawlers of under 10m length are active inshore, whilst larger Belgian and French trawlers of up to ~35m length are active offshore.
- 14.3.25 Figure 14.16 shows a typical otter trawler and associated gear and Table 14.6 describes the profile of otter trawling vessels active across the study area.

Table 14.6: Profile of typical otter trawl vessel active across the study area

Parameter	Indicative details
Main target species	Whiting, mackerel, sprat
Vessel nationality	Danish, French
Vessel length	16m to 35m
Horsepower	300hp to 850hp
Typical speed when shooting and hauling gear	2 to 6 knots
Seasonality of activity	Autumn and winter peak
Typical gear configuration	Demersal otter trawl. Possible twin or multi-rig bottom trawl. Two trawl doors Various forms of ground gear depending on target species. Various forms of ground gear depending on target species.

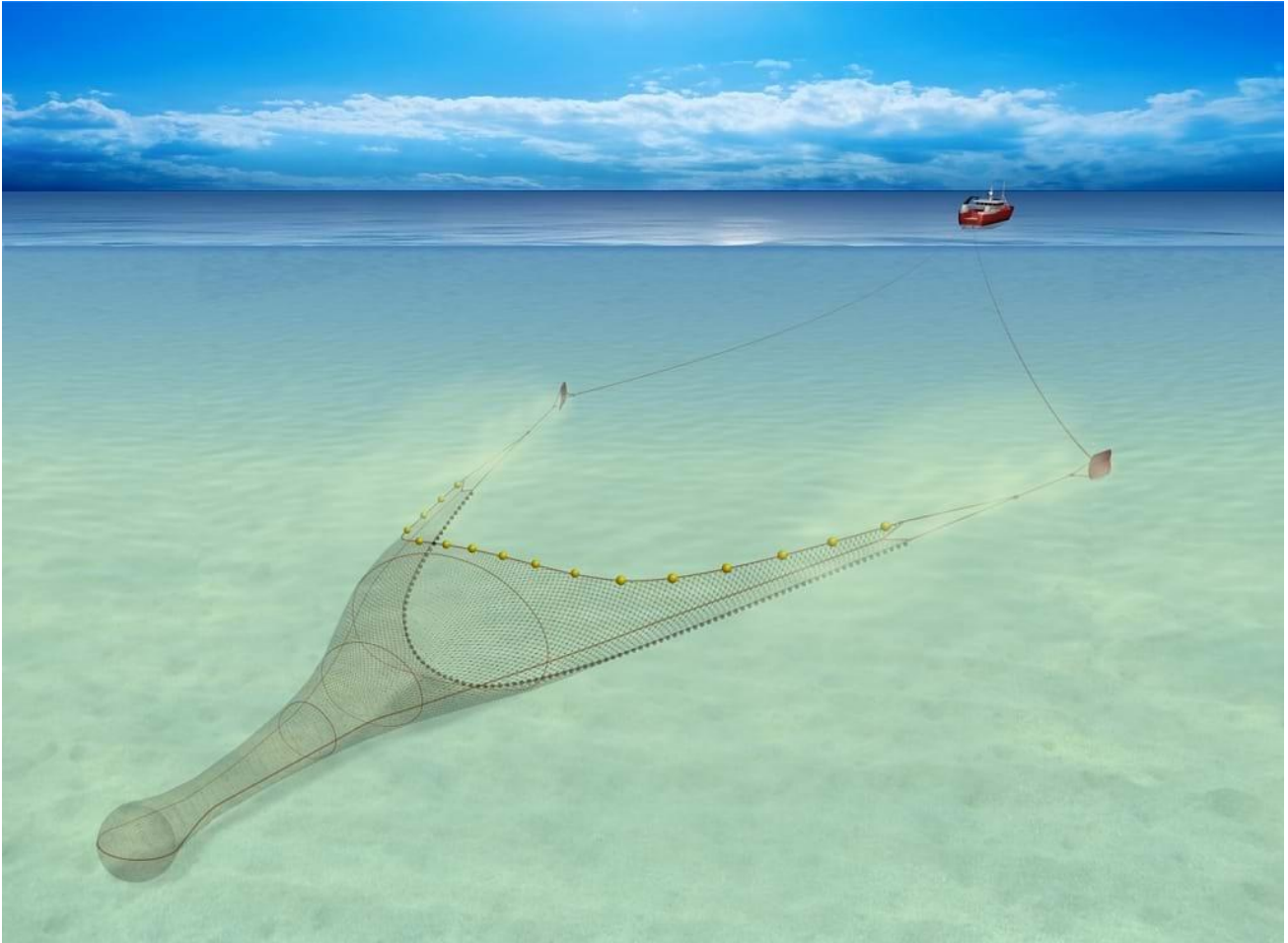


Figure 14.15: Typical otter trawl gear configuration (Source: Seafish, 2015)



Figure 14.16: Example of otter trawl vessel (Source: MarineTraffic, 2022)

Pelagic Trawl

14.3.26 Table 14.7 describes the profile of pelagic trawl vessels active across the regional commercial fisheries study area.

14.3.27 Pelagic or mid-water trawls are towed at the appropriate level in the water column to intercept shoaling fish such as herring and sprat. The location of the shoals is determined by sonar or vertical sounder echoes.

Table 14.7: Profile of typical pelagic trawl vessel active across the study area

Parameter	Indicative details
Main target species	Herring
Vessel nationality	Danish, French
Vessel length	Over 30m
Horsepower	500hp to 1200hp
Typical speed when shooting and hauling gear	2 to 5 knots

Parameter	Indicative details
Typical gear configuration	Pair or single pelagic (mid-water) trawling. Little or no bottom contact occurs, and ground ropes are not required. Net depth is changed by altering either warp (rope) length or towing speed.

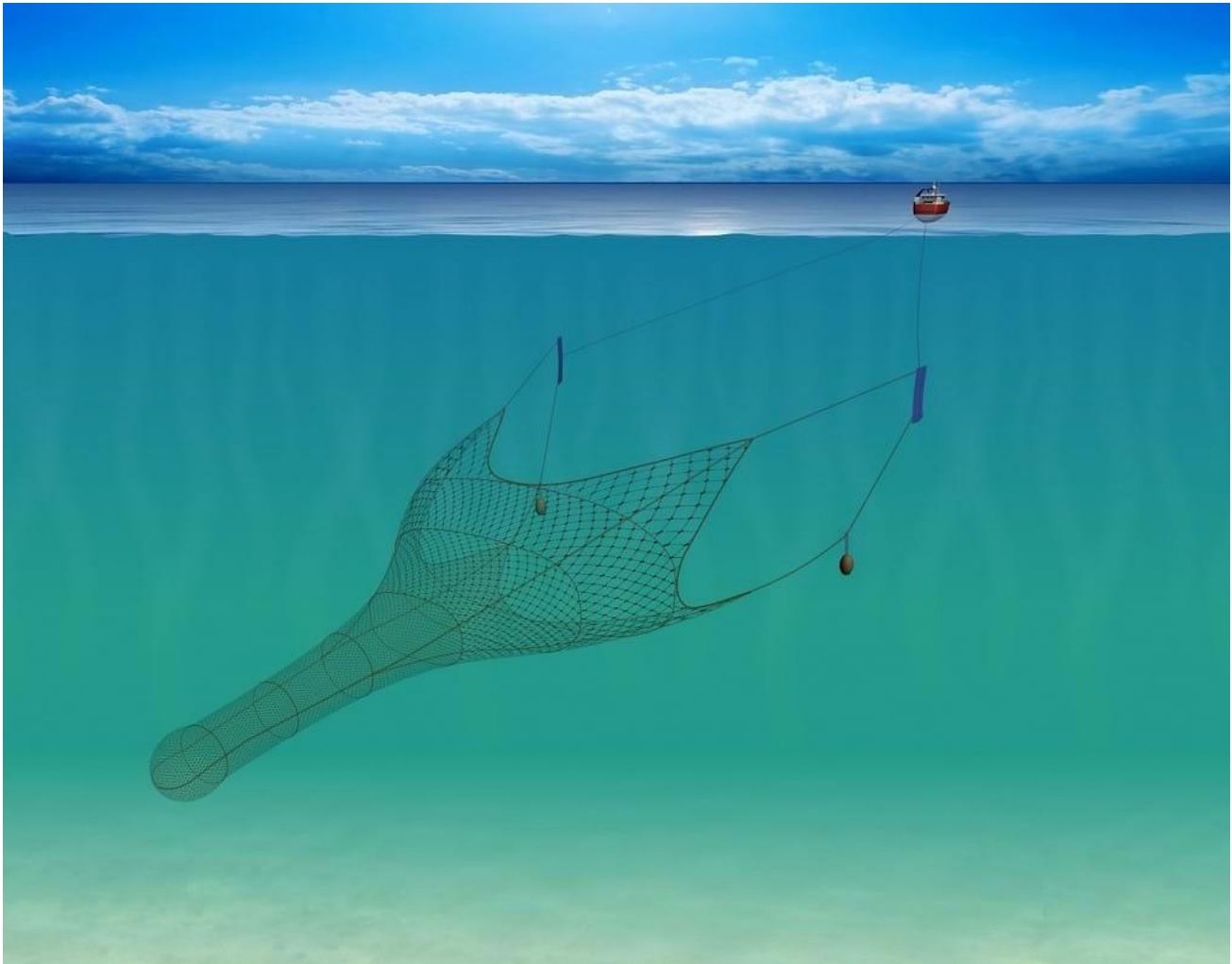


Figure 14.17: Typical pelagic trawl gear configuration (Source: Seafish, 2015)



Figure 14.18: Example of pelagic trawl vessel (Source: MarineTraffic, 2022)

Other Gear Types

14.3.28 Fixed nets include gill, tangle and trammel nets. They are typically used by small English-registered inshore vessels which target bass, sole and rays. The nets are usually fished in groups (or fleets) with the end of each fleet attached by bridles to a heavy weight, or anchor, on the seabed. Each weight, or anchor, is attached to a marker buoy or dhan flag, on the surface, by a length of rope equal to about twice the depth of water. Net lengths can vary significantly; individual nets can vary from 50m to 200m. The soak times, the time that a fleet is left fishing for, can range from a six-hour tidal soak up to 72 hours. Smaller vessels under 10m length are typically engaged in netting and may work both pots and nets, alternating between gears seasonally. Net catches can provide bait for pots.

- 14.3.29 A hand-worked cockle fishery exists in The Wash. The hand-worked cockle fishery is accessed from the sea, using vessels that dry out on the intertidal cockle beds in The Wash at low water. It is common practice for cockle hand-workers to prepare the area to be fished by manoeuvring the fishing vessel in shallow water in such a manner as to displace the upper layer of sediment from the substratum, effectively bringing cockles to the surface of the seabed. The Eastern IFCA manages the cockle fisheries in The Wash under the Wash Fishery Order 1992, which will expire in January 2023 and be replaced with a new byelaw. Given the location of the cockle beds, there is not expected to be any cockle fishery activity in the Project boundaries.
- 14.3.30 Demersal seine netting (also referred to as flyseine) is a fishing method involving use of long weighted ropes to herd fish into the mouth of a trawl to target demersal species which live or feed on or near the seabed. Flyseine activity in the Channel and southern North Sea is understood to be increasing, involving a relatively small number of powerful vessels, which are either purpose-built or converted beam trawlers (Defra, 2022). MMO landings data validates this trend, with 2021 landings data showing a rapid increase in landings by demersal seine, with target species including squid *Loligo*, mullets *Mugilidae* and whiting.

Key Target Species

Key Species Landed by Pots

Brown Crabs

- 14.3.31 Brown crab (also known as edible crab) is one of the most economically important crab species in UK waters. Along the coast of Lincolnshire and North Norfolk brown crab is primarily targeted by the UK potting fleet under the jurisdiction of the EIFCA within the 6NM limit and the MMO between 6 and 12NM. Traditionally this fishery is mixed with crab and lobster caught together.
- 14.3.32 This decapod crustacean is benthic and is found in a wide range of habitats ranging from soft mud to rocky substrata. Activity tends to be higher at night when foraging occurs although smaller crabs are known to be equally active during both day and night (Scott *et al.*, 2018). Post larval settlement is generally in inshore areas and juvenile crabs are more commonly associated with the inshore shallower intertidal zones whereas the adults are commonly found at depths of 6 – 40m but have been known to occur at 100 m.
- 14.3.33 Peak mating period is July to September usually at night and after the female has moulted (Brown and Bennet, 1980). Eggs are attached to the female pleopods and take around 7-8 months to hatch, during which time the female does not feed but remains hidden and is unlikely to be captured in baited pots (Ondes *et al.*, 2019). In the North Sea females tend to move offshore to release the planktonic larvae then move back inshore to feed. The period from hatching to recruitment into the fishery takes approximately 4 years and adults move into deeper water as they grow and mature.
- 14.3.34 Adult crabs are known to undertake extensive migrations, although previous studies have indicated that there were no migratory exchanges between the North Sea and English Channel (Bannister, 2009). Adult females have shown a migratory movement northward along the east coast from Norfolk to Yorkshire and Humberside (Bannister, 2009).

- 14.3.35 The main fishing season for brown crab in the region commences in March, peaks over the summer months and then drops off through to late October/November (Bridges, 2020). Although potting activity occurs throughout the EIFCA district, it is particularly prevalent along the North Norfolk coast. The majority of vessels fishing for crab are under 10m although with the development of new markets for shellfish the number of over 10m offshore boats has increased to target crab in deeper waters.
- 14.3.36 Both crab and lobster are caught using pots and both species have no TACs or quotas in place. Management is principally through a minimum landing size, as well as limited regulations around effort, gear or catch controls. Compared to other areas, brown crab in the EIFCA district has a smaller average size and as a result there is a dispensation in the regulations on minimum landing size (MLS) allowed. Nationally this is set at 130mm carapace length (Council Regulation 850/98 ANNEX XII) but there is a derogation given for the EIFCA district (between 0 – 6NM) of 115 mm carapace length ((Undersized Edible Crabs Order 2000 (2000 No 2029)) (Bridges, 2019).
- 14.3.37 A stock assessment of crab undertaken by the EIFCA in 2019 identified that local brown crab stocks across the district as a whole, are stable and recruitment is sufficient to replace annual depletion from fishing (Bridges, 2020).

Lobsters

- 14.3.38 As a mixed fishery, both European lobster and brown crab are important species for the fishing industry operating within the Eastern IFCA district, from Saltfleet in Lincolnshire, through Norfolk and down to the southern limits of the District in Harwich. European lobster forms an important economic element of potted catch in the district. Landings are generally only 8 – 10% those of brown crab, however due to the value per kilo for lobster it is a highly important target species for the potting fishery (Bridges, 2021).
- 14.3.39 The main focus of lobster potting activity is along the North Norfolk coast. Historically the potting fleet was a mixed species creel fishery which fished within 2NM of the coast but with improved technology, improved storage facilities on board and new markets the fleet has moved further offshore. There is now a range of vessels in the fleet such as those remaining close to shore, some remain within the inshore 6NM limits while larger more powerful vessels travel offshore, and these vessels include under 10m catamarans. The majority of lobster potting vessels within the EIFCA district are under 10m.
- 14.3.40 European lobster is a long-lived, large decapod crustacean. Lobster breed once per year in the summer and newly berried females begin to appear from September to December. Juveniles or adult lobsters do not undertake any significant migrations and juveniles in the first 3 to 4 years of life may be particularly sedentary. From hatching it takes approximately five years for a lobster to recruit to the fishery.
- 14.3.41 Lobsters typically inhabit rocky reef and rough ground sheltering in crevices between rocks and boulders. The availability of suitable habitat is considered to influence the carrying capacity and size structure of lobster populations (Seitz *et al.*, 2014; Welby, 2015). The Norfolk lobster population is understood to be comprised of individuals that are on average smaller than those found in other areas and this is thought to be due to habitat limitations (Welby, 2015).

- 14.3.42 Unlike crab, which at times move appreciable distances, lobsters tend to be more sessile which reduces the area in which a lobster fishery can occur. The North Norfolk lobster season begins in mid-May or June, with landings peaking in June and July and falling through autumn and winter (Welby, 2015). There are no TACs or quotas in place for shellfish. Primary management is through the technical measure of an MLS of 87mm carapace length for lobster (Council Regulation 850/98) although the quantities permitted to be landed are not restricted.
- 14.3.43 To ensure sustainable exploitation of commercial fish populations, the EIFCA initiated a crustacean stock assessment programme in 2013 with a focus on brown crab and lobster. A stock assessment of lobster undertaken by the EIFCA identified that District-wide Landings Per Unit Effort (LPUE) values for the data reporting period of 2012-2019 are stable, suggesting local European lobster stocks across the district as a whole are stable and recruitment is sufficient to replace annual depletion from fishing (Bridges, 2021).

Whelks

- 14.3.44 Common whelk is a gastropod mollusc that inhabits mixed sediment from the low water mark down to 1,200m, being most common in water depths between 0 and 50m. Most are caught in depths of 40-60m. Whelk reach reproductive maturity at different sizes depending on their geographical location and environmental conditions. Whelks grow to 150mm and live for up to 15 years, reaching maturity at 2 to 3 years. European populations are understood to breed from autumn to winter. Eggs are fertilised internally and laid on hard benthic substrata, with juveniles emerging after approximately 3 to 5 months. The life cycle therefore has no pelagic phase, leading to limited dispersal between populations.
- 14.3.45 Due to the limited dispersal of whelk juveniles it is thought that there is limited connectivity between populations which could have implications for management and may make the species susceptible to local depletion and longer recovery rates (Blue Marine Foundation (BMF), 2018).
- 14.3.46 Whelk pot fisheries have been expanding around the UK in recent years as prices have increased and export to non-EU countries has grown. Within the UK, whelk are often considered to be a suitable alternative to seasonal fishing especially for the crab and lobster fleet as well as for vessels targeting more regulated fisheries.
- 14.3.47 No TAC or quotas are in place for whelk. The current EU-wide MLS for whelks is 45mm, noting that around the UK, whelks typically reach maturity between 45mm and 78mm. The Whelk Fishery Flexible Permit Byelaw 2020 requires IFCA's to review flexible permit conditions not less than once every three years; in the EIFCA district an MLS of 55 mm (shell height) has been set with a pot limit of 500. The EIFCA has identified that, as a result of increased fishing effort in 2019, a stock assessment is required as well as a review of permit conditions (EIFCA, 2020).

Key Species Landed by Dredges

King Scallops

- 14.3.48 King scallop *Pecten maximus* (hereon referred to as scallop) are most common in water depths of 20 to 70m, in areas of clean firm sand and fine gravel exposed to water currents, which provide good feeding conditions for this bivalve mollusc. Scallops reach reproductive maturity at a minimum size of 60mm and will be fully mature between 3 to 5 years. Their lifespan can be up to 20 years. Recruitment is usually unpredictable as it depends not only on successful spawning and larval production but also on retention of larvae or transport of larvae into areas suitable for settlement. Settlement in a particular area may be unpredictable leading to an unstable age structure. As a consequence of this, scallop beds frequently show a regional separation of year classes and spatial variability in age structure.
- 14.3.49 Scallop are targeted almost exclusively in this area by UK-registered dredgers and there are no TACs or quotas in place with this species, therefore this species is primarily managed by a MLS of 100mm (Council Regulation 850/98). National legislation limits the number of licenses for scallop vessels >10m. The English Scallop Order applies in England to British vessels and places spatial restrictions on the number of dredges that can be employed at any one time and specifies technical measures defining the type of dredge that can be used. Landings in this area fluctuate throughout the year but tend to be higher in quarters one and two (Lawler and Nawri, 2021).
- 14.3.50 Regionally, key scallop grounds are located to the north of the Project and study area, in the central North Sea. In their most recent scallop stock assessment, Cefas (Lawler and Nawri, 2021) identify two main scallop beds, one of which is located within the study area in ICES rectangle 36F0. This bed, referred to in the Cefas report as 4.b.2, does not overlap with Project boundaries. Stock surveys have been undertaken since 2017, noting that some in bed 4.b.2 have been hindered due to the presence of static fishing gear. No conclusions have been reached for bed 4.b.2 regarding harvest rates relative to maximum sustainable yield (MSY) and further survey and assessment will be required.

Key Species Landed by Trawls

Sole and Plaice

- 14.3.51 Sole is caught in a mixed fishery with other flatfish, namely plaice, as well as gadoids. Sole is a flatfish and belongs to the family of flatfishes known as Soleidae. It spawns in spring and early summer in shallow coastal water, from April to June in the southern North Sea and from May to June off the coast of Ireland and southern England. The larvae remain in shallow inshore nursery areas such as estuaries, tidal inlets and shallow sandy bays, moving to join the spawning adult population at 2 to 3 years old. Adults are usually found at a depth range of between 10 and 60m; in winter adults move further offshore and can reach depths of up to 120m. The juveniles can undertake extensive migrations, although once they reach maturity, will only carry out seasonal migrations from deeper water to shallower spawning habitat. They can reach 70cm in length but are commonly between 30 and 40cm.

- 14.3.52 Catches of sole have declined since the mid-1990s. The latest ICES stock assessment observes that spawning stock biomass is estimated to be above the maximum sustainable yield trigger point (ICES, 2022a). Sole are subject to a North Sea TAC (set at 15,330 tonnes in 2022 and advised to be less than 10,000 tonnes in 2023) and technical measures are applicable to the mixed demersal beam-trawl fishery (relevant to both sole and plaice), namely a minimum mesh size of 80mm. A minimum conservation reference size of 24cm is in place.
- 14.3.53 Plaice is a bottom-dwelling flatfish. It spawns in the early months of the year (January to March) and sometimes makes long spawning migrations. They grow to around 50 to 60cm in length but have been recorded up to 90cm. Plaice are most commonly found on sandy bottoms but can live on gravel or mud. They are active at night and remain stationary during the day, usually buried within the sediment leaving only the eyes protruding. They have been recorded from between 0 and 200m depth but are mostly between 10 and 50m.
- 14.3.54 The North Sea plaice stock is in a healthy state and fishing pressure is considered sustainable (ICES, 2022b). The TAC in recent years have been set in line with advice, and catches are usually below TACs, owing to limited market demand. The fishery is subject to technical measures including minimum net mesh sizes and a minimum conservation reference size of 27cm.
- 14.3.55 Sole and plaice are typically targeted by vessels deploying beam trawl gear. In the North Sea, the greatest proportion of landings of these two species are made by Dutch vessels. Prior to its prohibition in July 2021 (EU 2019/1241), fishing with electric pulse trawl was also undertaken, including in the southern part of the southern North Sea. The prohibition of pulse trawl gear may result in vessels reverting to previous fishing grounds further north using towed demersal beam trawl gear (ICES 2020b).

Brown Shrimps

- 14.3.56 Brown shrimp is the most commonly encountered shrimp of sandy bays and estuaries. It is a long thin animal, mottled brown in colour, narrowing from a wide anterior end to a fanned tail reaching up to 8.5cm in length and living up to 3 years. Brown shrimp is found on sandy and muddy ground and is often buried with only the eyes and antennae above the sediment surface. Brown shrimp is a common food item for a wide range of species including crustacea, fish, birds and mammals and therefore is pre-adapted to constant high mortality.
- 14.3.57 Brown shrimp is widely distributed in coastal areas of the North Sea. Approximately 95% of brown shrimp fished in UK waters are landed into King's Lynn. This employs a fleet of up to 50 small inshore fishing vessels, mostly based in the Wash ports of King's Lynn and Boston, which fish for shrimp using light beam trawls. The Wash and North Norfolk brown shrimp fishery is a year-round fishery but effort and landings typically peak from September to November.

- 14.3.58 Management of the shrimp fishery is implemented at national and local IFCA level. National and local IFCA regulations have been subsumed within The Wash Brown Shrimp Management Plan 2020 - 2023 which was drawn up by the shrimp fishing industry, and all brown shrimp vessels are signatories to The Wash Shrimp Fishery Code of Practice. Key elements of The Wash Brown Shrimp Management Plan include the definition of reference points and associated harvest control rules (HCRs), a suite of measures to minimise bycatch, habitat and ecosystem interactions and regular monitoring. In addition to the HCR, there are restrictions on vessel size, a maximum engine capacity of 221kW, a mesh size (currently 24mm) significantly higher than required under UK legislation, mandatory use of a 70mm veil net, and aggregate beam length is restricted to 18m.
- 14.3.59 The Shrimp Permit Byelaw 2018 was confirmed by the Secretary of State in May 2022. The measures encompassed by the Shrimp Permit Byelaw aim to prevent increases in shrimp fishing effort on the ground and to prevent impacts of towed gear on marine features through introduction of an effort limitation scheme. Effort will be limited through a Total Allowable Effort set annually by Eastern IFCA.
- 14.3.60 The Management Plan is informed by stock assessments. The latest assessment concluded that the brown shrimp stock in The Wash was not overfished (stock biomass was not below biomass reference points) and that overfishing was not occurring (the annual estimated fishing mortalities were below natural mortality rates).

Whiting

- 14.3.61 Whiting are widely distributed both inshore and offshore throughout the North Sea. Whiting are commonly found on mud and gravel bottoms, but also on sand and rock. Whiting spawn between January and July with spikes in their breeding activity during the spring. Juveniles inhabit inshore nursery areas for their first year and then they migrate to deeper waters offshore.
- 14.3.62 ICES stock assessments indicate that catches of whiting have decreased since the late 1970s, and whilst the spawning stock has fluctuated significantly, it is presently considered by ICES to be above maximum sustainable yield with the stock not subject to overfishing (ICES, 2022d).
- 14.3.63 Whiting stocks are subject to a TAC, which is set for stock across both the North Sea and Norwegian Sea. Whiting is also subject to technical management measures, including an EU minimum conservation reference size of 27cm and a minimum mesh size of 80mm is applied to gears specifically targeting whiting.
- 14.3.64 Whiting are targeted by EU demersal otter trawlers as part of targeted and mixed demersal fisheries. UK landings data indicates a notable increase in landings of whiting by demersal seine vessels in 2021.

Herring

- 14.3.65 The North Sea herring stock, which collapsed in the 1970s and was closed to fishing for several years, subsequently recovered, and although it fell back in the mid-1990s, it has again been rehabilitated. Since 1998 spawning stock biomass has been above maximum sustainable yield and fishing pressure has remained below the maximum sustainable yield benchmark (ICES, 2022), though there are concerns that future low recruitment could alter this trend. Applicable to directed herring fisheries in the North Sea there is a Minimum Conservation Reference Size of 20cm (3cm above the size of maturity). Catches below this size must be landed but can't be sold for human consumption, and so are less valuable.
- 14.3.66 Herring schools move between spawning and wintering grounds in coastal areas and feeding grounds in open water. Herring populations are known to use traditional spawning grounds, many of which are along shallow coastal areas (15 to 40m depth), or on offshore banks down to 200m. Spawning usually occurs on gravel or rock bottoms.
- 14.3.67 Herring form distinct breeding stocks, known as races, categorised by their separate spawning grounds and some distinguishing features. The race most proximate to the study area is the Banks or dogger group, spawning in the central North Sea and off the eastern English coast from August to October . Herring schools move between spawning and wintering grounds in coastal areas and feeding grounds in open water.
- 14.3.68 Herring are caught using nets in inshore waters and pelagic trawls further offshore.

Mackerel

- 14.3.69 Mackerel are a pelagic species that live near the surface of the sea in large shoals. North Sea mackerel overwinter in the deep water, to the east and north of Shetland and on the edge of the Norwegian Deep. In the springtime, they migrate south to spawn in the central part of the North Sea from May until July.
- 14.3.70 Current fishing pressure is considered to be below the maximum sustainable yield, though spawning stock biomass has been in decline since 2015. In terms of fisheries management measures, a TAC is in place that covers all northeast Atlantic fisheries and in North Sea waters and latest ICES advice proposes a reduction in catch allowances. A minimum conservation reference size of 30cm is in place.

Sprats

- 14.3.71 Sprat *Sprattus sprattus* is a short-lived clupeoid species with large inter-annual fluctuations in stock biomass, mainly driven by recruitment variability. Sprat in the North Sea has a prolonged spawning season ranging from early spring to the late autumn and is triggered by the water temperature.
- 14.3.72 The majority of the sprat landings are taken in highly targeted trawl fisheries with juvenile herring; landings of sprat are typically limited by herring bycatch restrictions. The North Sea and Norwegian Sea sprat stock is considered to be above target levels, though fishing mortality has been high in recent years. ICES advises that catches in the period from 1 July 2022 to 30 June 2023 should be no more than 68,690 tonnes; a significant decline on advice in previous years (ICES, 2022f).

Sandeel

- 14.3.73 Lesser sandeel is a short-lived species. Sandeels are small, eel-like fish which form large shoals and spend a large part of their life buried in seabed sediments. The larvae drift with currents before settling on suitable areas of coarse sand with low silt content. This requirement for a highly specific sediment type results in patchy distributions. They remain buried throughout the diel cycle in winter, except during spawning around new-year. However, in early spring they start to emerge on a daily basis to feed and become one of the most abundant fish species in the water column of the North Sea for the following three to four months.
- 14.3.74 Sandeel in the North Sea has historically been targeted by an industrial fishery. Annual catches peaked in the 1980s and 1990s exceeding one million tons in some years. Sandeel are taken by trawlers using small-mesh demersal otter trawl gear.
- 14.3.75 From 2010 onwards, ICES has presented advice for the North Sea sandeel divided into seven management areas, based on the assumption that this will better reflect the stock structure and enable improved management avoiding local depletion. The area relevant to the study area is referred to as 'SA1r'. In SA1r, spawning stock biomass has been recovering from low values in 2019. Catches of sandeel from this area have fluctuated, showing an overall declining trend since the early-2000s. ICES data indicates the presence of sandeel fishery activity in this area up to 2021. ICES advice recommends zero catch in SA1r in 2022.

Key Species Landed by Other Fishing Methods

Bass

- 14.3.76 Bass *Dicentrarchus labrax* are a streamline bodied fish with a large head and mouth. They have small silver scales covering their body and two dorsal fins, the front one having 8-9 sharp spiny rays. Spines are also noticeable on the lower part of the gill plate. Bass are found subtidally down to around 100m around most of the UK. Young fish are often found schooling in shallow waters, estuaries and the lower reaches of rivers.
- 14.3.77 Larger adult bass are found in deeper water but come closer inshore to warmer waters from March to mid-June. Bass are a relatively slow growing species with males reaching minimum landing size at a mean age of 4 years and females from 5 years in the UK.
- 14.3.78 Bass spawning stock biomass has historically declined since 2005, showing signs of slow increase in recent years (ICES, 2022e), and fishing pressure has been reduced by a series of management measures, developed since 2015 when emergency measures were brought into force (e.g. increasing the MLS to 42 cm from 36 cm, stopping the offshore pelagic trawl fishery on spawning aggregations in 2015). Further measures were introduced in 2020, and in the North Sea commercial fishing for bass can only take place at certain times of the year with authorisation from the Marine Management Organisation. Fishing for bass is prohibited during February and March (spawning season). Bass are not subject to EU TACs or quotas, but locally catch limits are in place.
- 14.3.79 Bass are targeted seasonally using fixed gillnets and gears with hooks.

Cockles

- 14.3.80 Cockles are small edible molluscs which live buried in sandy sediments. They have a thick equivalve shell, roughly heart shaped in profile, which can be up to 5cm in length. Cockles feed by extending a siphon through which they extract plankton and other organic matter from the water column.
- 14.3.81 Cockles reproduce by mass spawning events in late spring with spat reaching approximately 10mm length by the first winter. Generally found buried up to 5cm below the surface of clean sand, muddy sands and muddy gravel; on middle to lower intertidal and subtidal sediments.
- 14.3.82 The intertidal cockle stocks in The Wash provide an important resource for the local fishing industry, particularly to the ports of Boston and King's Lynn. In addition to supporting the hand-picked fishery, these stocks also provide an essential food resource for the internationally important communities of birds that reside or over-winter in The Wash. It is important, therefore, for both the wildlife communities and the sustainability of the fishery, to ensure the fishery is managed and targeted in a responsible manner that does not result in a crash in the stocks. Since 2008, cockle stocks have suffered unusually high mortality rates, with the cause of this yet to be determined, and recent stock assessments indicate continued decline in stocks
- 14.3.83 Various management measures are in place in relation the cockle fishery. The Wash Fishery Order 1992 (WFO), under which Eastern IFCA current manages The Wash shellfish fisheries, will expire in January 2023. The IFCA intend to replace WFO with a byelaw (to manage the wild capture cockle and mussel fisheries) and a Several Order (to manage the private fisheries). Current fishery management measures include closed areas, limits on vessel lengths and fishing gear, minimum landings sizes and TACs (EIFCA, 2019).

Mussels

- 14.3.84 Mussels *Mytilus edulis* are bivalve molluscs, very common all around the coast of the British Isles, with large commercial beds in the Wash, Morecambe Bay, Conway Bay and the estuaries of south-west England, north Wales, and west Scotland. Length varies, with specimens usually ranging from 5 -10cm although some populations never attain more than 2-3cm, and the largest specimens may reach 15 -20cm.
- 14.3.85 The intertidal mussel stocks in The Wash have traditionally provided a valuable resource for the local fishing industry with the fishery a combination of harvesting adult stock from mussel beds and the collection of seed mussel to 'stock' areas of suitable ground, locally referred to as 'lays'. Whilst harvesting took place within The Wash, fishermen prospected for seed mussel throughout the wider Wash region on sublittoral beds found along the Lincolnshire and Norfolk coasts and from The Wash.
- 14.3.86 Following significant declines in mussel stock, the mussel fishery has declined substantially over the past ten years.

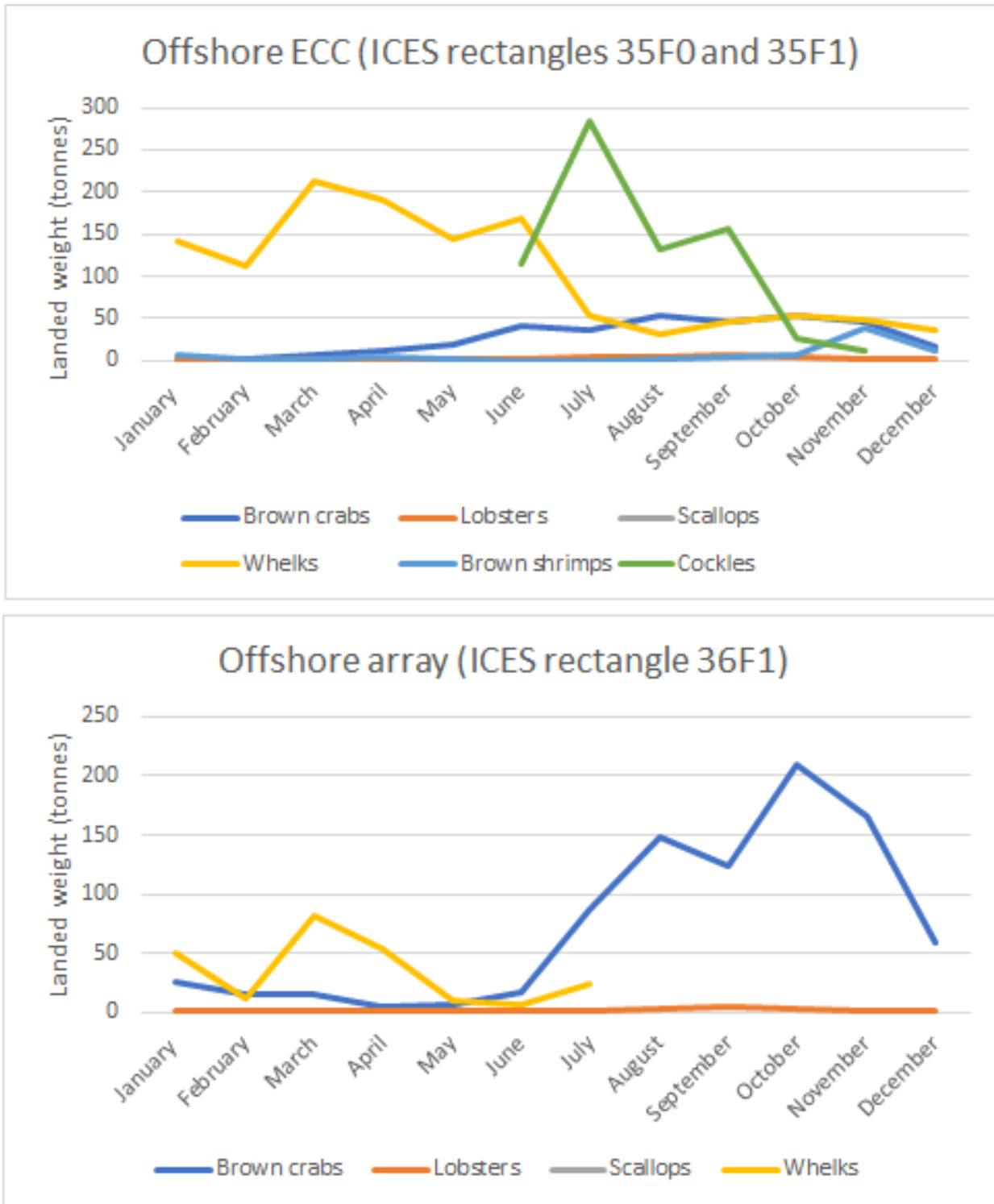


Figure 14.19: Seasonality of landings of shellfish species based on landed weight (tonnes) in 2021 from UK vessels (MMO, 2021)

Fishing Restrictions

Total Allowable Catch (TAC) and Quotas

14.3.87 As per EU Council Regulations, TACs and quotas are in place for many commercial fish species based on their stock distribution across ICES Divisions. The TACs set for a species across ICES Division 4 (North Sea) for example, allow countries that have been allocated a quota from this TAC to fish within ICES Divisions 4a, 4b, 4c. TACs and quotas per country are presented in Table 14.8 for key species landed from the commercial fisheries study area including sole, plaice, mackerel, herring and whiting. It is noted that the TAC for sandeel and sprat in 2022 was set at zero due to the status of the stock, and that there is no internationally agreed TAC for mackerel.

Table 14.8: Total allowable catch and quotas in tonnes by country for the key species landed in the regional fisheries study area in 2022 (EU, 2022)

Species	ICES Division	TAC (tonnes)	Netherlands	Belgium	France	Denmark	UK	Germany	Sweden	Norway
Cod	2a, 4	13,246	1,102	339	419	1,951	5,934	1,236	13	2,252
Herring	4c, 7d	427,628	20,055	8,736	11,326	909	5,419	594	-	-
Plaice	2a, 4	125,692	30,258	4,841	908	15,734	33,268	4,539	-	8,798
Sole	2a, 4	5,270	3,587	398	80	182	705	318	-	10
Whiting	2a, 4	26,636	1,244	498	3,234	2,152	16,131	560	4	2,664

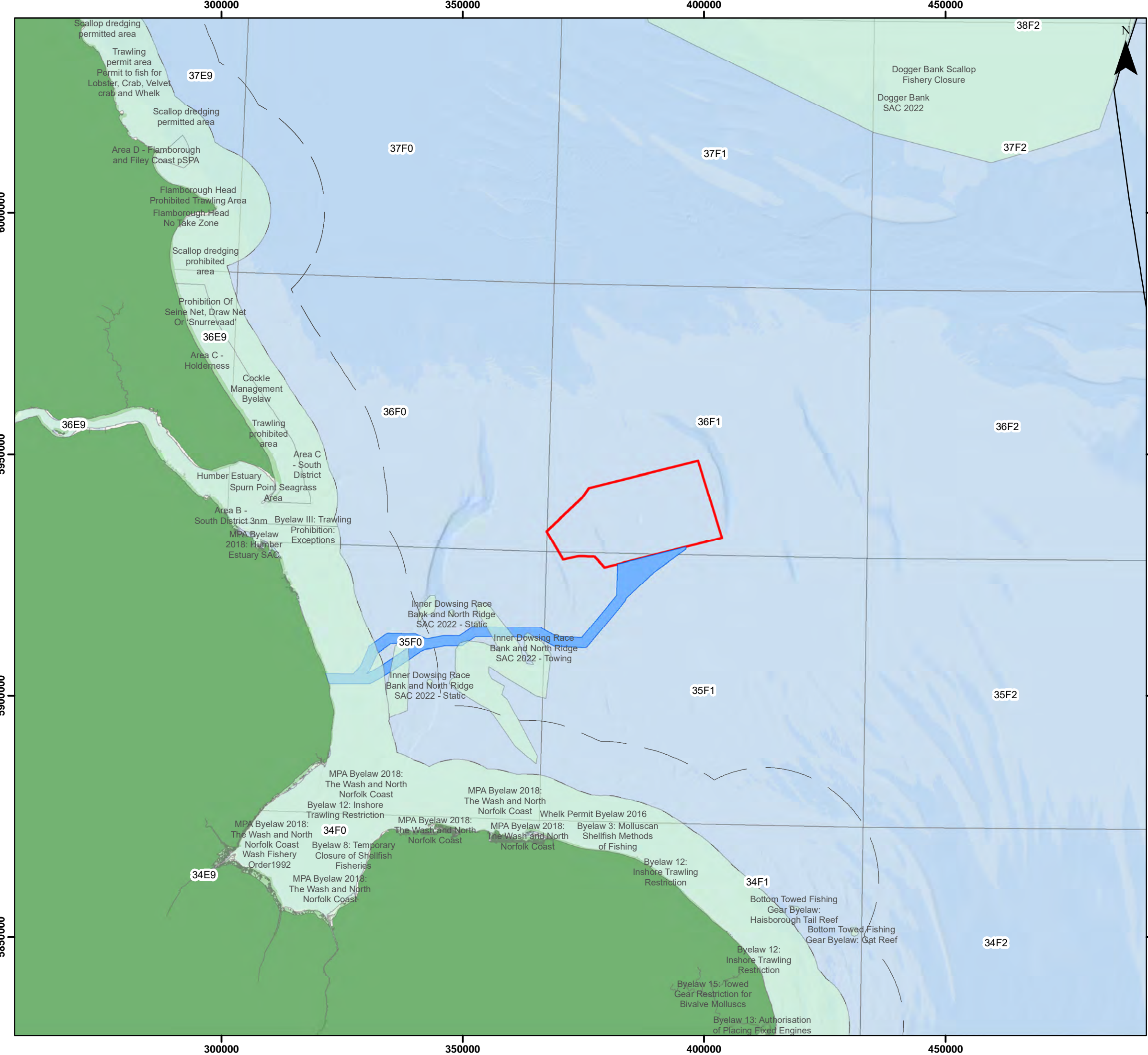
Byelaws, Technical Measures and Spatial Closures

14.3.88 In addition to limits on catch volumes, a number of restrictions are in place based primarily on fisheries byelaws, intended to protect fish stocks and their habitats. These restrictions include limits on minimum landings sizes, technical measures relating to fishing gear design and use, limits on fishing effort, and temporary and permanent fishery closures.

14.3.89 Within the study area several spatial restrictions are in place that are relevant to the Project offshore ECC. These include (Figure 14.20):

- Eastern IFCA Byelaw 3 – molluscan shellfish methods of fishing, prohibiting fishing for oysters, mussels, cockles, clams, king or queen scallops unless holding the appropriate certificate;
- Eastern IFCA Byelaw 12 – inshore trawling restriction, prohibiting fishing vessels over 15.24 m length from using towed nets within 3NM of the coast;
- Eastern IFCA Byelaw 15 – towed gear restriction for bivalve molluscs, prohibiting fishing vessels over 14m length from fishing for molluscs using any type of towed gear;

- Eastern IFCA Whelk Permit Byelaw 2016 – a person must not use fishing gear other than a whelk pot in fishing for whelk and must not set whelk pots unless the whelk pots are marked with valid whelk permit tags provided by the Authority;
- MMO Byelaw Inner Dowsing Race Bank and North Ridge Special Area of Conservation (SAC) 2022 - a person must not use bottom towed fishing gear in a specified area of reef or a specified area of sandbank; and
- MMO Byelaw Inner Dowsing Race Bank and North Ridge SAC 2022 – a person must not use static fishing gear in a specified area of reef.

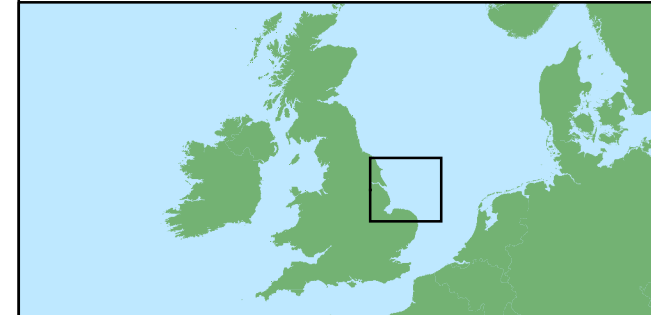


Legend

- ▭ PEIR Site Boundary
- ▭ Offshore ECC Boundary
- ▭ Fishing Restrictions
- ▭ ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM



Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:750,000

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Fishing Restrictions
(Kingfishery Information Service, 2022)

Figure 14.20



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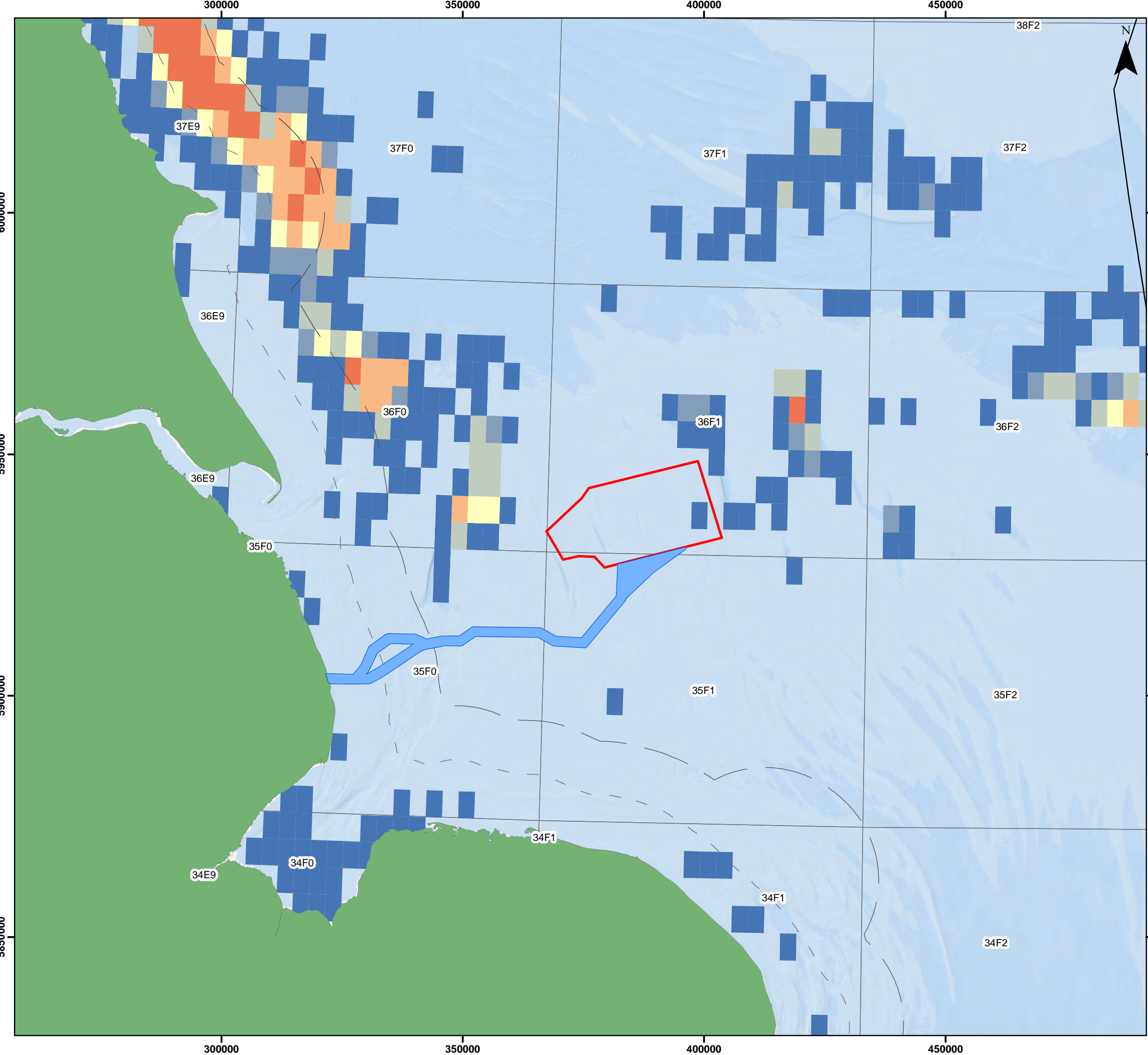
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Fishing Activity Assessment

Fishing Intensity Based on VMS Data

- 14.3.90 VMS data sourced from ICES displays the surface SAR of catches by different gear types and covers EU (including UK) registered vessels 12m and over in length. Surface SAR indicates the number of times in an annual period that a fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity.
- 14.3.91 VMS data sourced from the MMO displays the value of catches for UK registered vessels 15m and over in length.
- 14.3.92 Figures presented below depict the following:
- Dredge fishing activity for EU (including UK) vessels and UK-only vessels (Figure 14.21, Figure 14.22 and Figure 14.23);
 - Beam trawl fishing activity for EU (including UK) vessels and UK-only vessels (Figure 14.24, Figure 14.25 and Figure 14.26);
 - Otter trawl fishing activity for EU (including UK) vessels and UK-only vessels (Figure 14.27, Figure 14.28 and Figure 14.29);
 - Pelagic trawl fishing activity for UK-only vessels (Figure 14.30); and
 - Pots and traps fishing activity for UK-only vessels (Figure 14.31).
- 14.3.93 Data indicates dredge activity within the study area, with some potential for dredging within the array area but with key target grounds for scallop located to the north of the Project. Data indicates a concentration of UK beam trawl activity in and around The Wash, associated primarily with the brown shrimp fishery, with some potential for activity to overlap with the inshore portion of the offshore ECC. EU beam trawl activity is focused outside of the array area with key EU demersal fish grounds located to the southeast of the study area. Data indicates some EU otter trawl activity in the study area with potential for some overlap with the offshore ECC, though key fishing grounds are located to the north and east of the study area. Data indicates an absence of UK pelagic trawling activity, though it is understood that any sporadic pelagic activity would be associated with EU fleets. Data indicates high levels of UK potting activity in the study area by over 15m length vessels, with the outer portion of the offshore ECC and array area located in fishing grounds of these larger vessels.



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

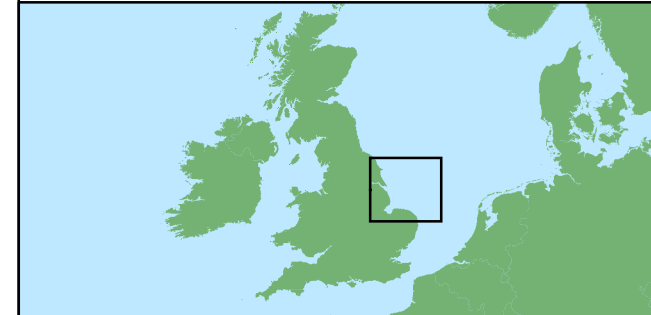
Fishing Limits

- 6 NM
- 12 NM
- 200 NM

Dredge SAR_mean

- 0.00 - 0.10
- 0.11 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 2.00
- 2.01 - 3.77

* Including VMS data for the following countries: Belgium, Denmark, France, Germany, Ireland, the Netherlands, Norway, Sweden and UK



Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:750,000

Preliminary Environmental Impact Report

Dredge Surface Swept Area Ratio (SAR)

5-year average (2016-2020)

EU including UK fishing vessels 12m and over

Data Source: ICES, 2021

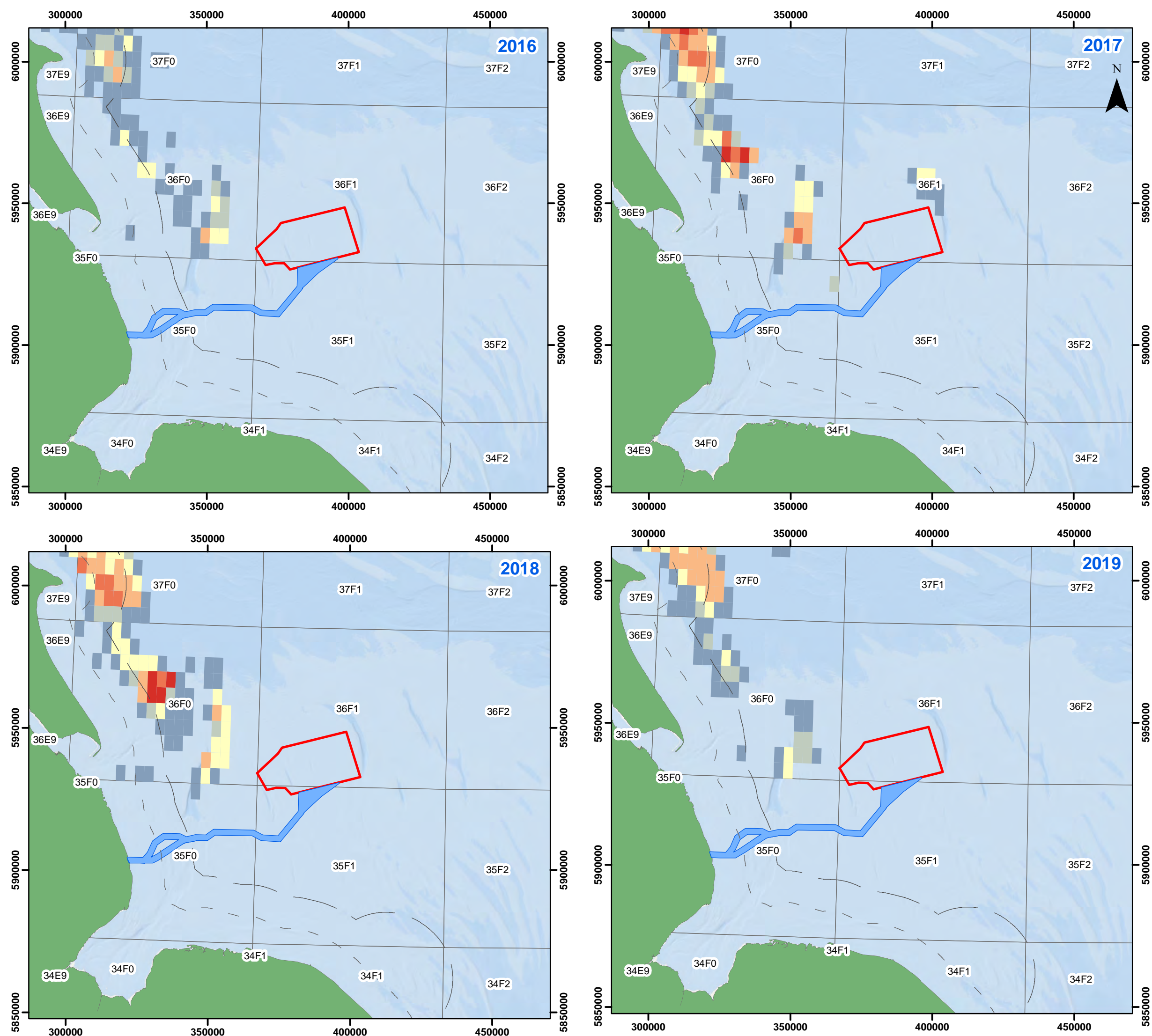
Figure 14.21



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Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

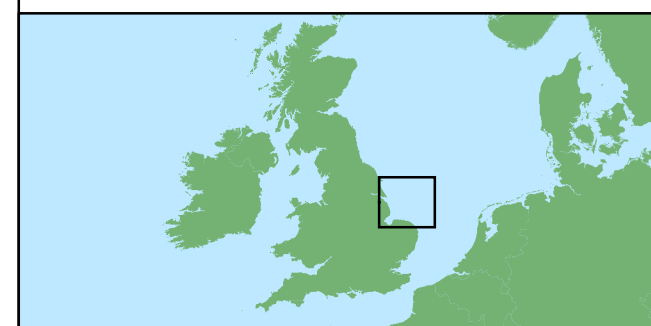
Fishing Limits

- 6 NM
- 12 NM
- 200 NM

UK Dredge value (£)

Total value, £

- £0.91 - £5,000.00
- £5,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £114,000.00



Coordinate System: WGS 1984 UTM Zone 31N

0 40 80 km

Scale: 1:1,250,000

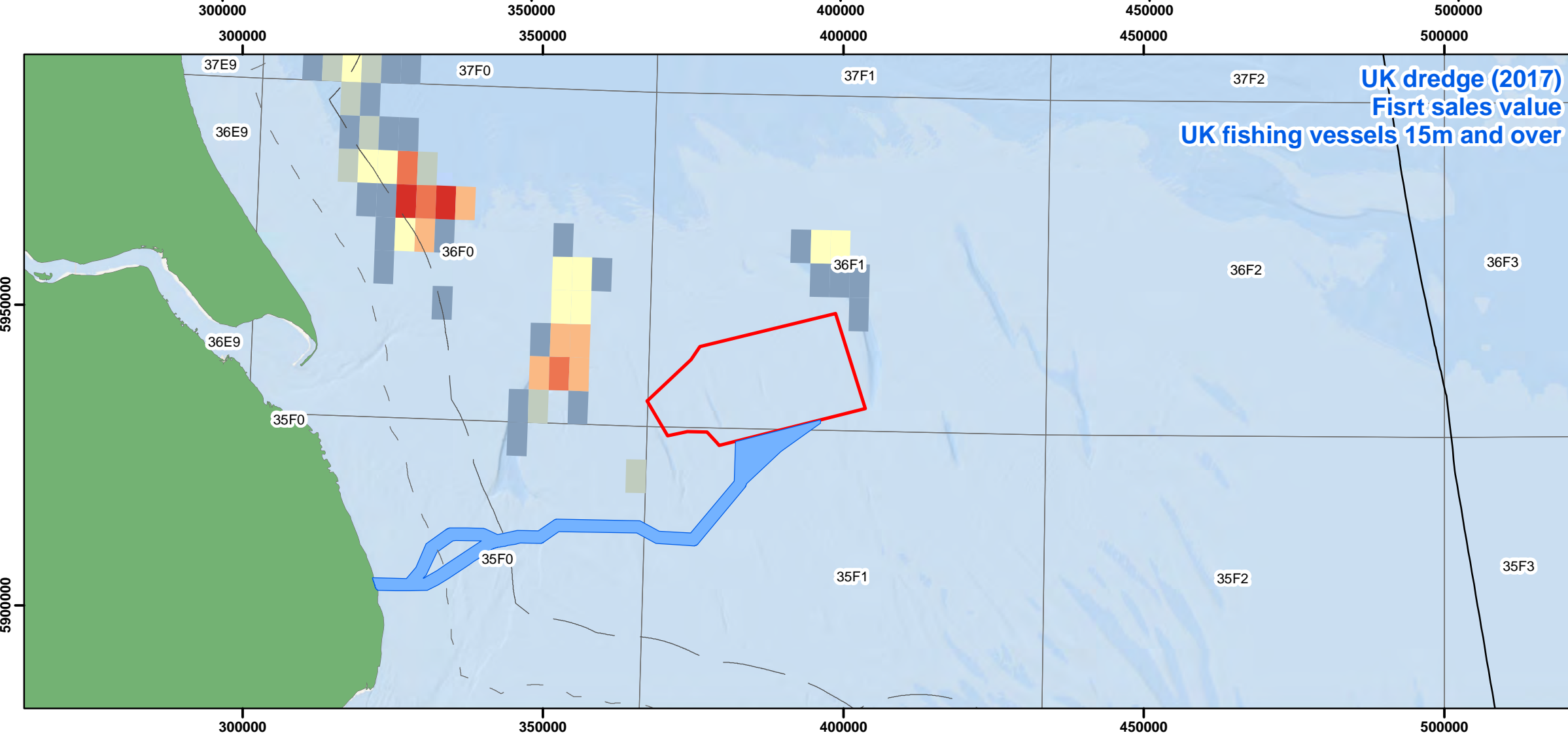
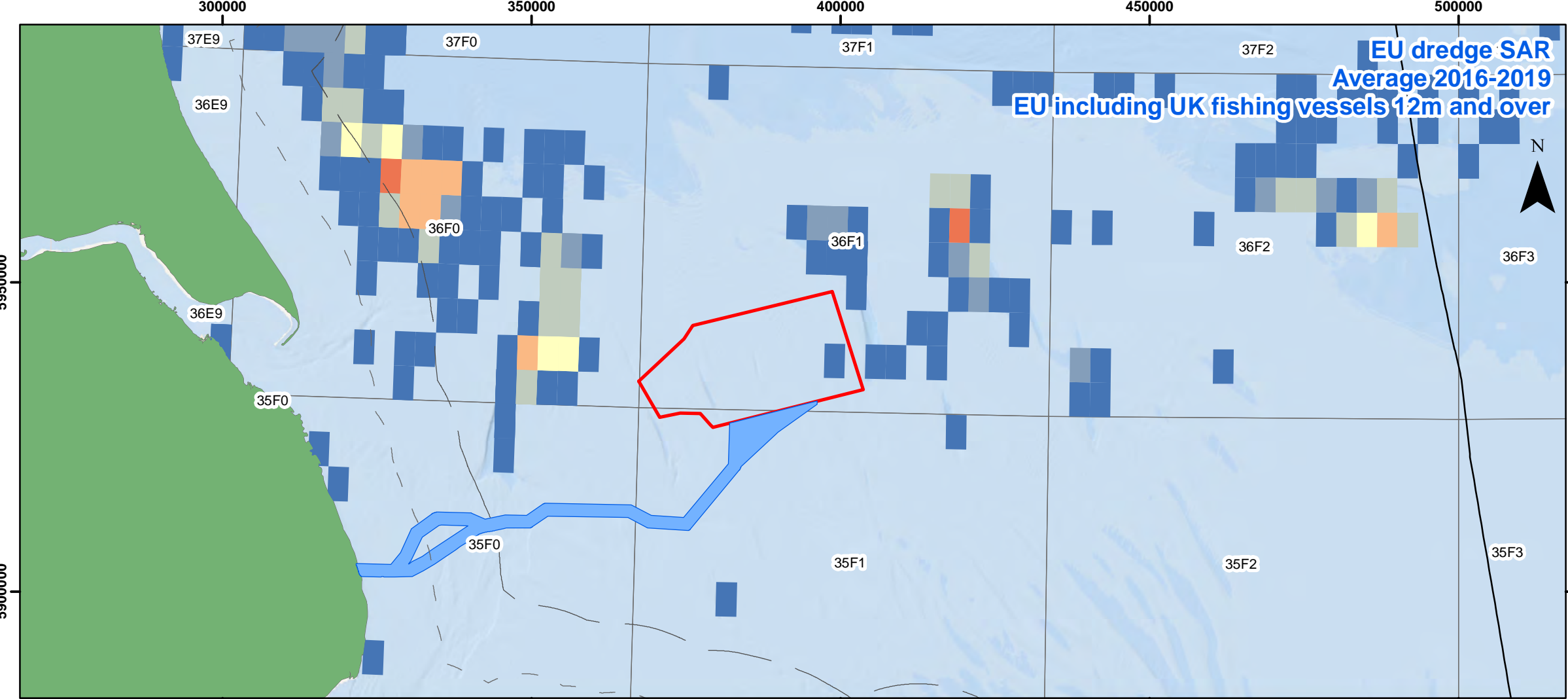
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VMS data for UK dredge vessels
Annual data (from 2016 to 2019)
UK fishing vessels 15m and over
Data Source: MMO, 2021
Figure 14.22

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Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM

Top Map

Dredge SAR_mean

- 0.00 - 0.10
- 0.11 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 2.00
- 2.01 - 3.77

Bottom Map

UK Dredge, 2017

Total value, £

- £1 - £5,000.00
- £5,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £280,000.00

* Including VMS data for the following countries: Belgium, Denmark, France, Germany, Ireland, the Netherlands, Norway, Sweden and UK

Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:800,000

Preliminary Environmental Impact Report

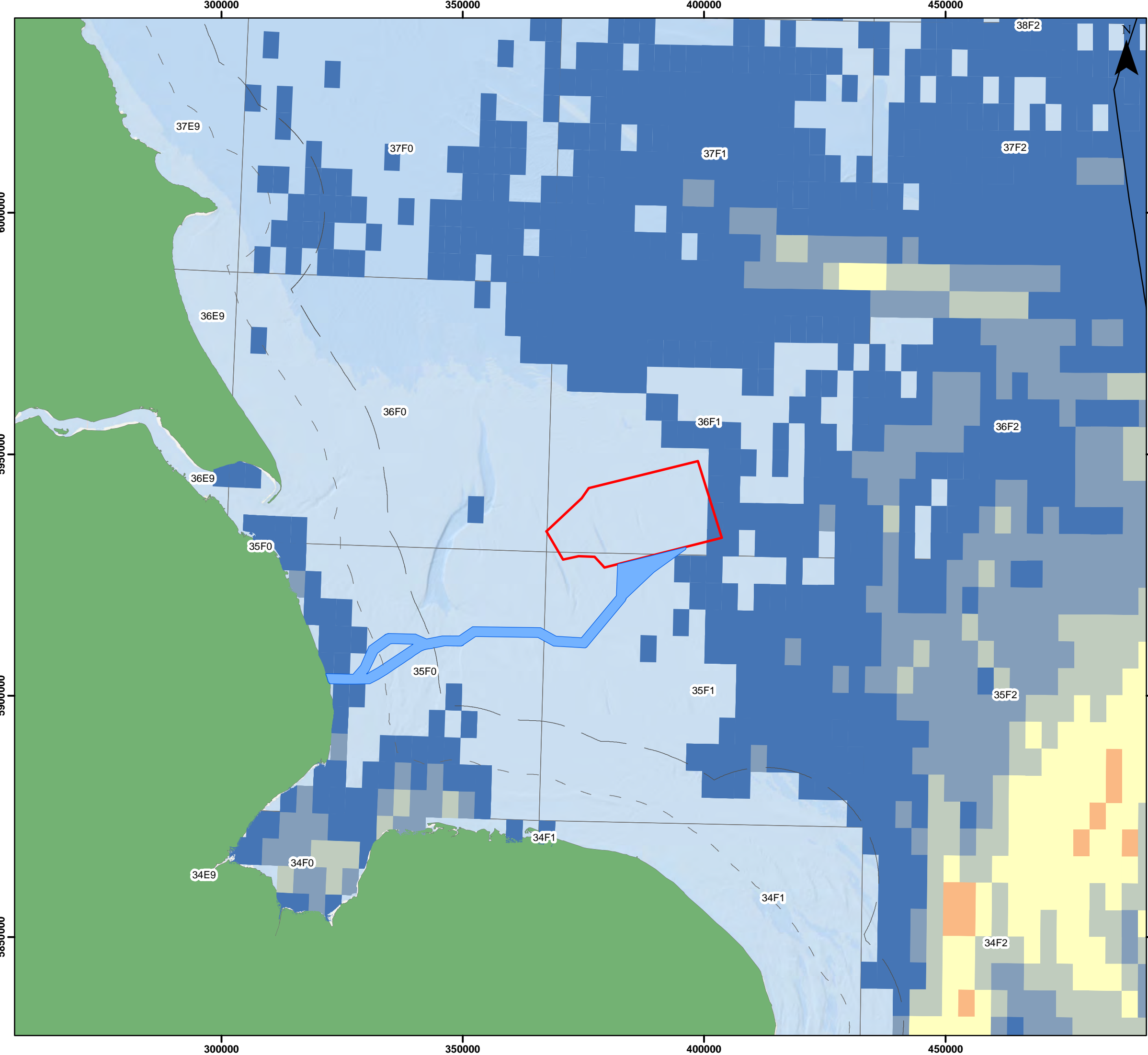
Top: EU Dredge Surface Swept Area Ratio
Bottom: UK Dredge first sales value
Data Source: ICES, 2021; MMO, 2022

Figure 14.23

Date: 26/04/2023
Produced By: FN
Revision: 0.1

Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

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Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM

Beam trawl SAR_mean

- 0.0 - 0.4
- 0.5 - 1.0
- 1.1 - 1.7
- 1.8 - 3.0
- 3.1 - 5.0
- 5.1 - 9.0
- 9.1 - 24.0

* Including VMS data for the following countries: Belgium, Denmark, France, Germany, Ireland, the Netherlands, Norway, Sweden and UK

Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

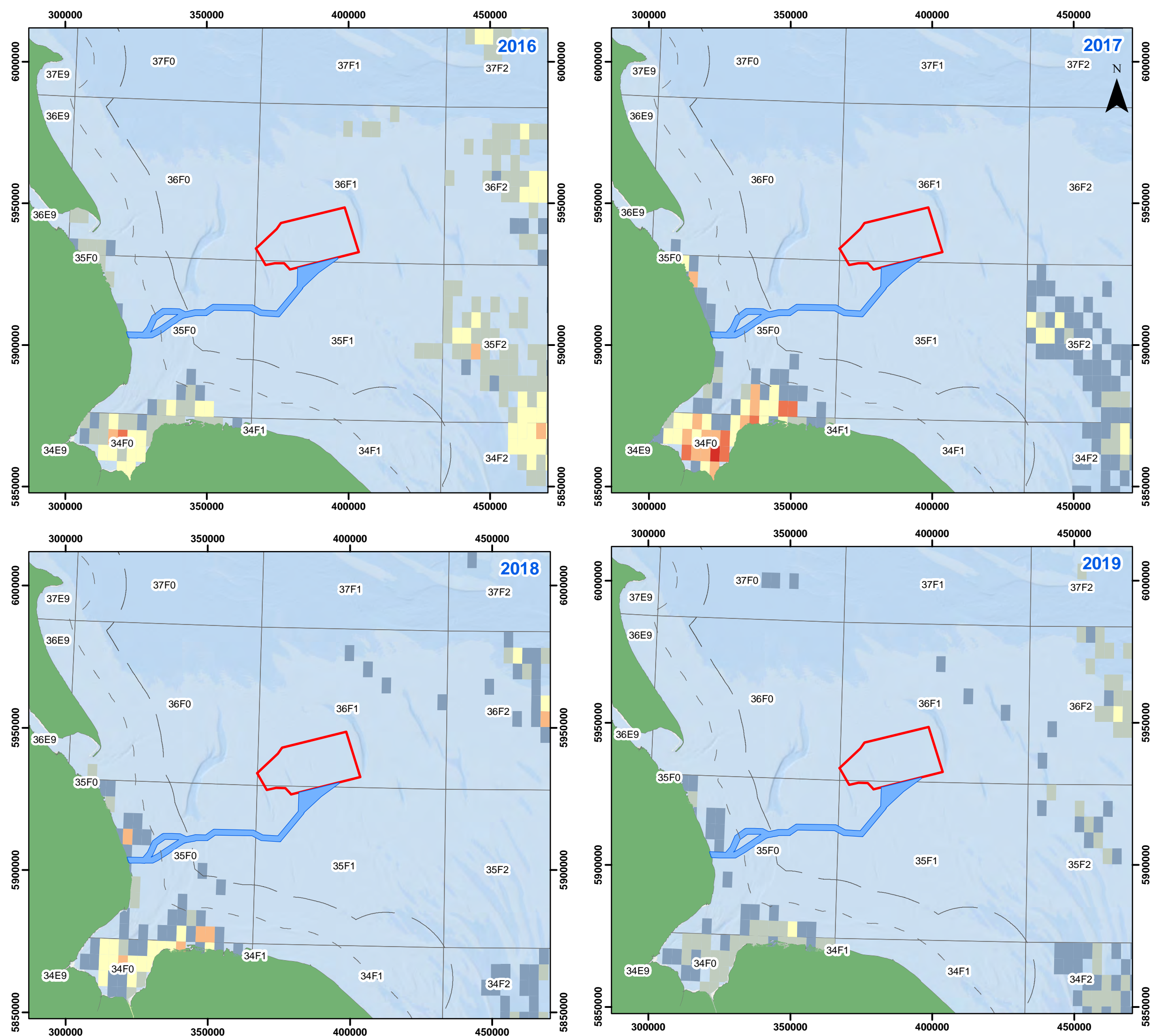
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Preliminary Environmental Impact Report
 Beam Trawl Surface Swept Area Ratio (SAR)
 5-year average (2016-2020)
 EU including UK fishing vessels 12m and over
 Data Source: ICES, 2021
 Figure 14.24

Date: 26/04/2023
 Produced By: FN
 Revision: 0.1

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Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

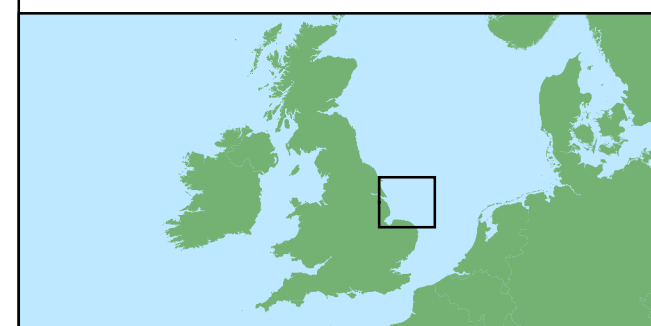
Fishing Limits

- 6 NM
- 12 NM
- 200 NM

UK Beam trawl value (£)

Total value, £

- £0.02 - £1,000.00
- £1,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £86,138.54



Coordinate System: WGS 1984 UTM Zone 31N

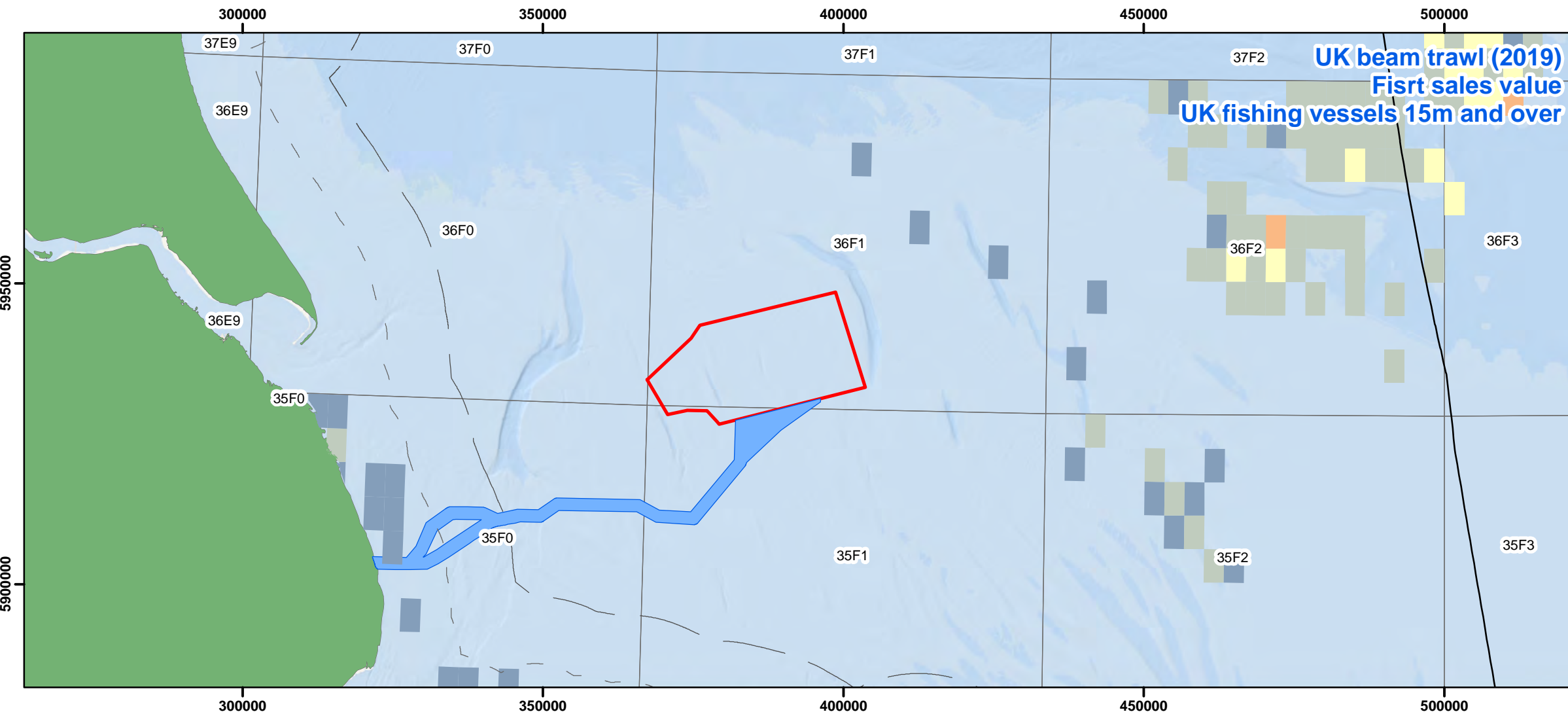
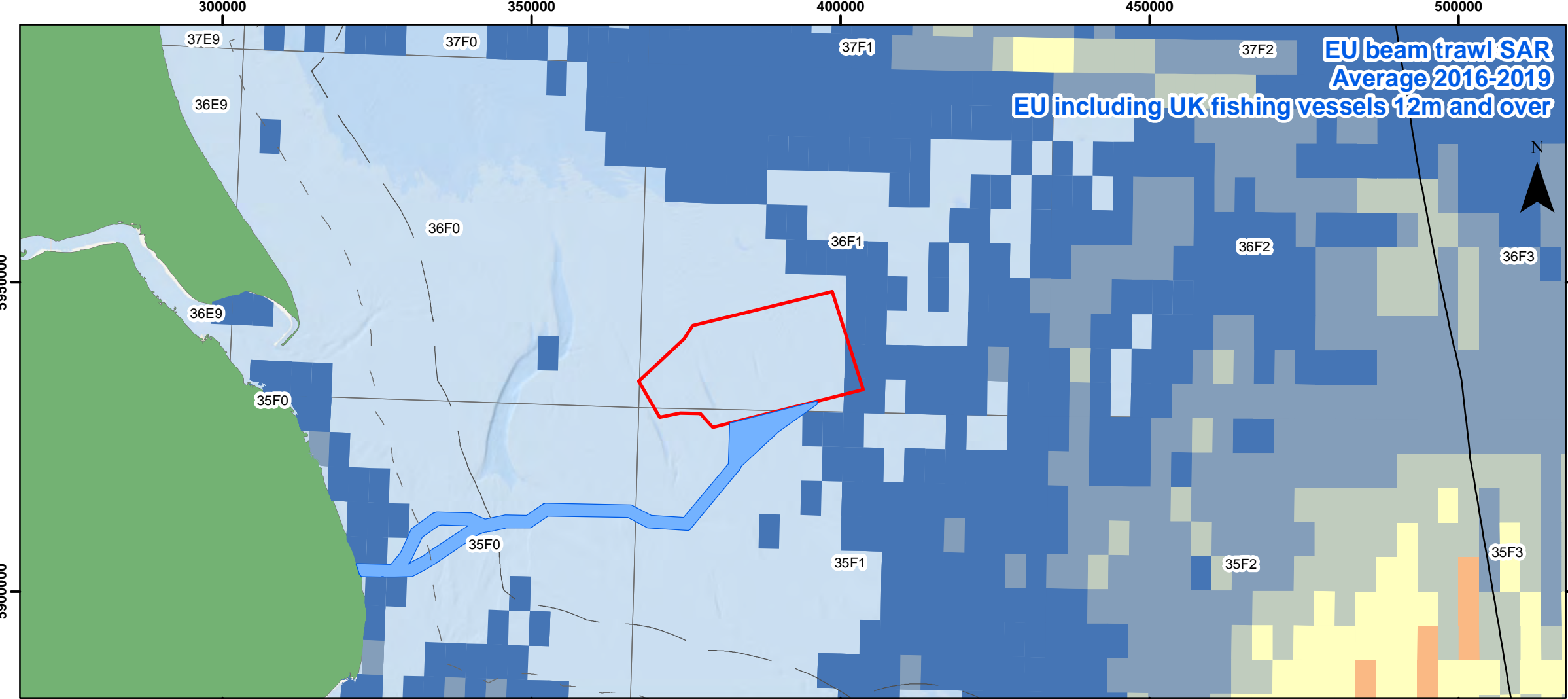
0 40 80 km

Scale: 1:1,250,000

Preliminary Environmental Impact Report
 VMS data for UK beam trawl vessels
 Annual data (from 2016 to 2019)
 UK fishing vessels 15m and over
 Data Source: MMO, 2021
 Figure 14.25

Date: 26/04/2023
 Produced By: FN
 Revision: 0.1

Contains ESRI Basemapping;
 Esri, Garmin, GEBCO, NOAA
 NGDC, and other contributors



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM

Top Map

Beam trawl SAR_mean

- 0.0 - 0.4
- 0.5 - 1.0
- 1.1 - 1.7
- 1.8 - 3.0
- 3.1 - 5.0
- 5.1 - 9.0
- 9.1 - 24.0

Bottom Map

UK beam trawl

Total value, £

- £0.02 - £1,000.00
- £1,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £45,987.96

* Including VMS data for the following countries: Belgium, Denmark, France, Germany, Ireland, the Netherlands, Norway, Sweden and UK

Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:800,000

Preliminary Environmental Impact Report
 Top: EU Beam trawl Surface Swept Area Ratio
 Bottom: UK Beam trawl first sales value
 Data Source: ICES, 2021; MMO, 2022

Figure 14.26

Date: 26/04/2023
 Produced By: FN
 Revision: 0.1

Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Document Path: D:\Projects\1705 ODOV Outer Dowsing\PEIR\PEIR.mxd; Date: 26 April 2023; OD: 0152; CF: TR_14.26; EU and MMO beam trawl.mxd

300000

350000

400000

450000

6000000

5950000

5900000

5850000



Legend

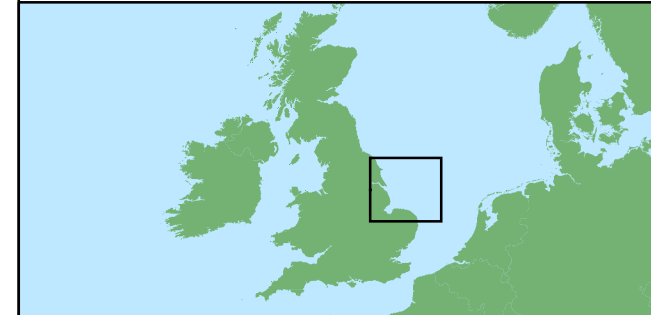
- ▭ PEIR Site Boundary
- ▭ Offshore ECC Boundary
- ICES Statistical Rectangles

- Fishing Limits
- 6 NM
 - 12 NM
 - 200 NM

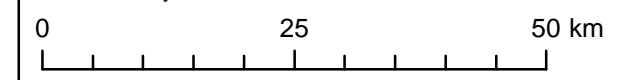
Demersal otter trawl SAR_mean

- 0.0 - 0.6
- 0.7 - 1.3
- 1.4 - 1.9
- 2.0 - 2.6
- 2.7 - 3.2
- 3.3 - 3.9
- 4.0 - 4.5
- 4.6 - 5.1
- 5.2 - 5.8
- 5.9 - 6.4
- 6.5 - 7.1
- 7.2 - 7.7
- 7.8 - 8.4
- 8.5 - 9.0
- 9.1 - 23.2

* Including VMS data for the following countries: Belgium, Denmark, France, Germany, Ireland, the Netherlands, Norway, Sweden and UK



Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:750,000

Preliminary Environmental Impact Report
 Otter Trawl Surface Swept Area Ratio (SAR)
 5-year average (2016-2020)
 EU including UK fishing vessels 12m and over
 Data Source: ICES, 2021
 Figure 14.27

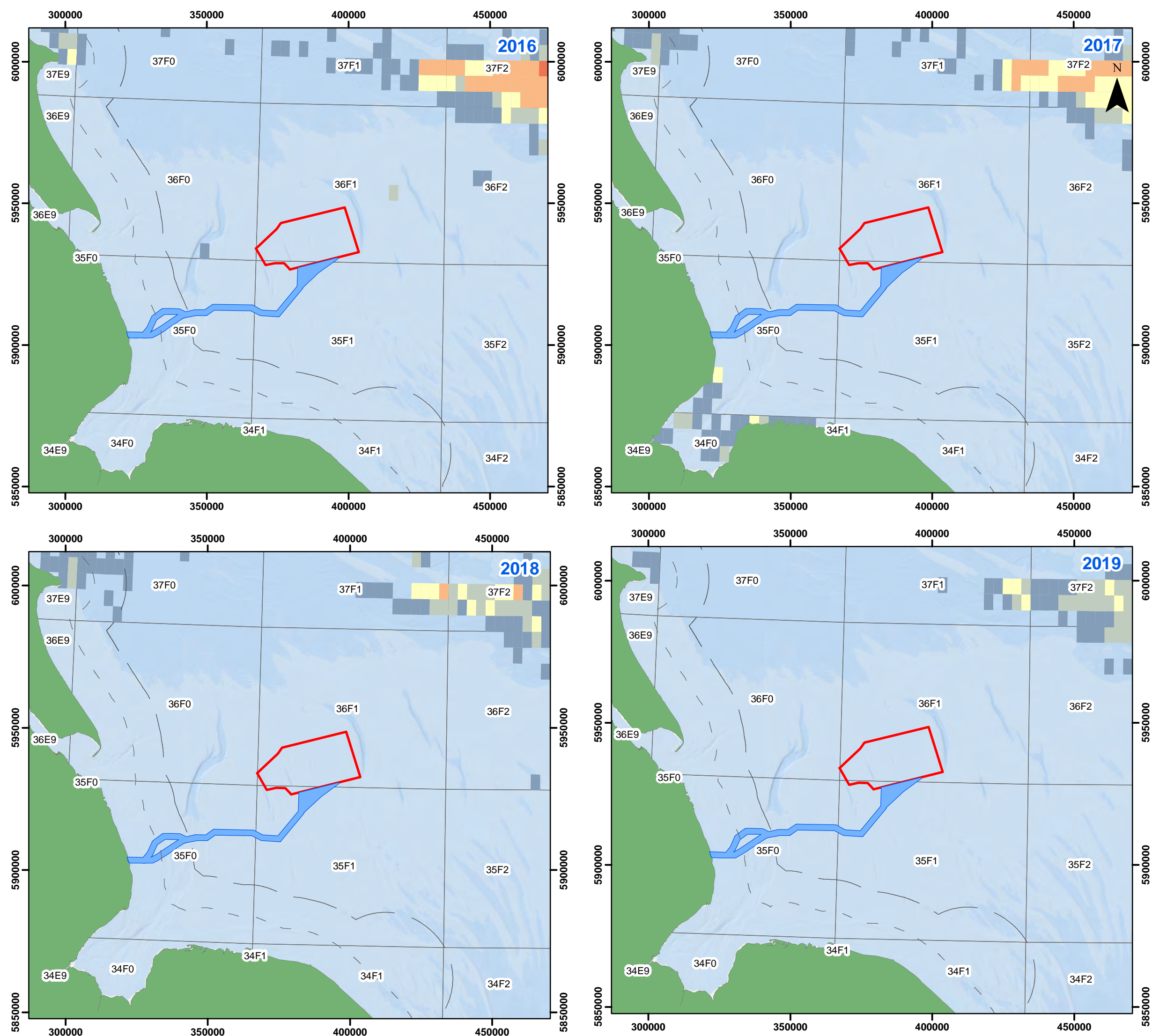


Date: 26/04/2023
 Produced By: FN
 Revision: 0.1



Contains ESRI Basemapping;
 Esri, Garmin, GEBCO, NOAA
 NGDC, and other contributors

Document Path: D:\Projects\1705 ODOV Outer Dowsing\PEIR\PEIR.mxd; 26 April 2023\OD_0152_CF_TR_14.27_EU otter trawl.mxd



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

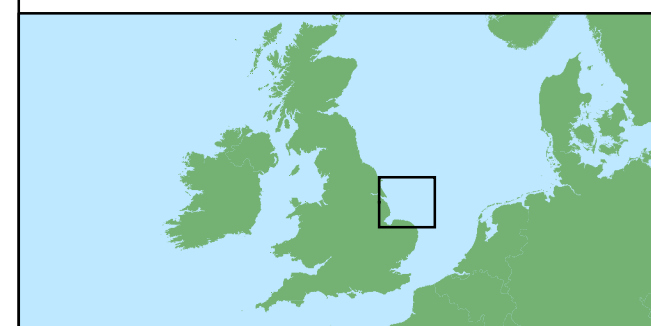
Fishing Limits

- 6 NM
- 12 NM
- 200 NM

UK demersal otter trawl value (£)

Total value, £

- £0.02 - £5,000.00
- £5,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £100,000.00



Coordinate System: WGS 1984 UTM Zone 31N

0 40 80 km

Scale: 1:1,250,000

Preliminary Environmental Impact Report

VMS data for UK demersal otter trawl vessels

Annual data (from 2016 to 2019)

UK fishing vessels 15m and over

Data Source: MMO, 2021

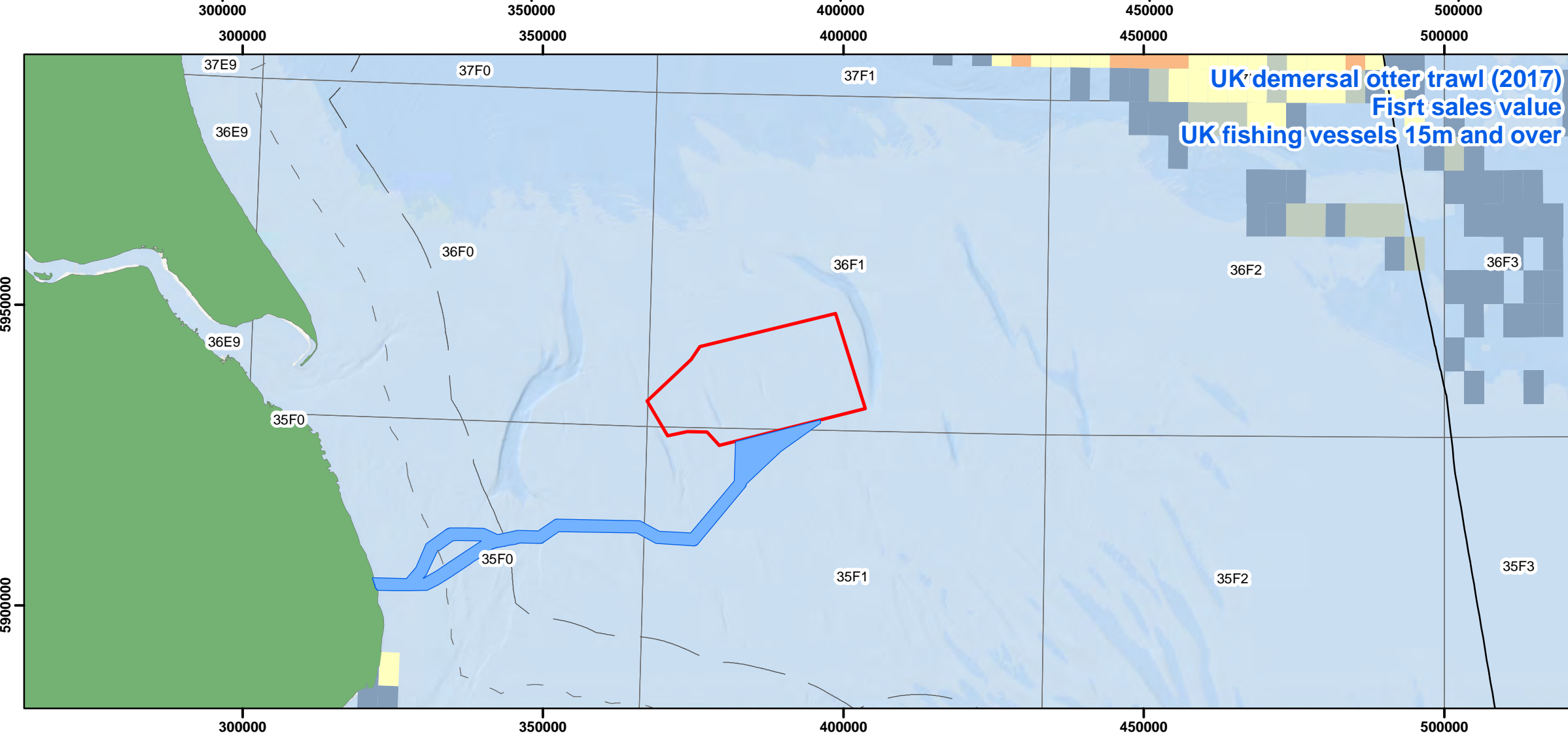
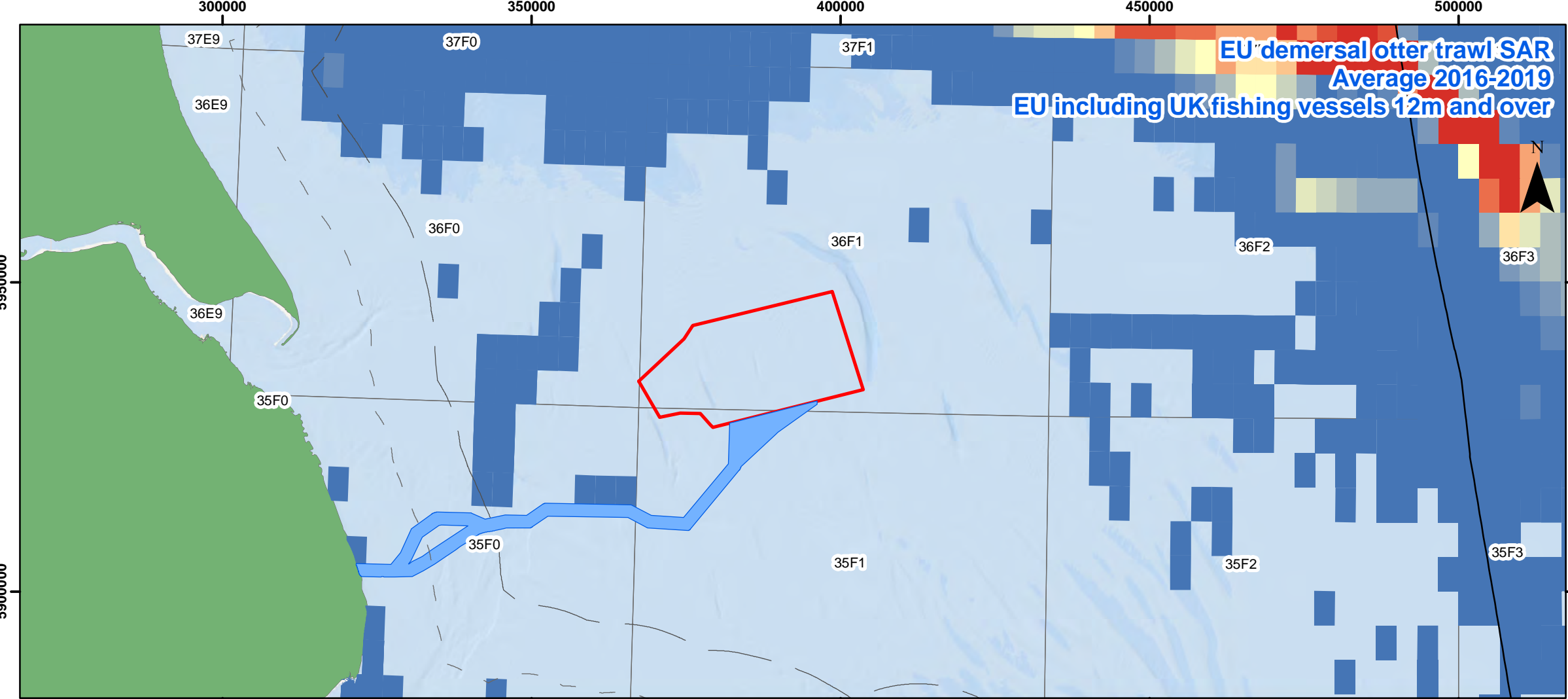
Figure 14.28



Date: 26/04/2023
 Produced By: FN
 Revision: 0.1

Gobe

Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM

Top Map

Demersal otter trawl SAR_mean

0.0 - 0.6
0.7 - 1.3
1.4 - 1.9
2.0 - 2.6
2.7 - 3.2
3.3 - 3.9
4.0 - 4.5
4.6 - 5.1
5.2 - 5.8
5.9 - 6.4
6.5 - 7.1
7.2 - 7.7
7.8 - 8.4
8.5 - 9.0
9.1 - 23.2

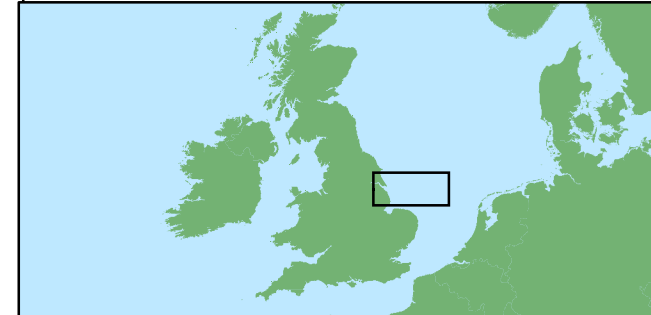
Bottom Map

UK demersal trawl

Total value, £

£0.02 - £5,000.00
£5,000.01 - £10,000.00
£10,000.01 - £25,000.00
£25,000.01 - £50,000.00
£50,000.01 - £75,000.00
£75,000.01 - £97,000.00

* Including VMS data for the following countries: Belgium, Denmark, France, Germany, Ireland, the Netherlands, Norway, Sweden and UK



Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:800,000

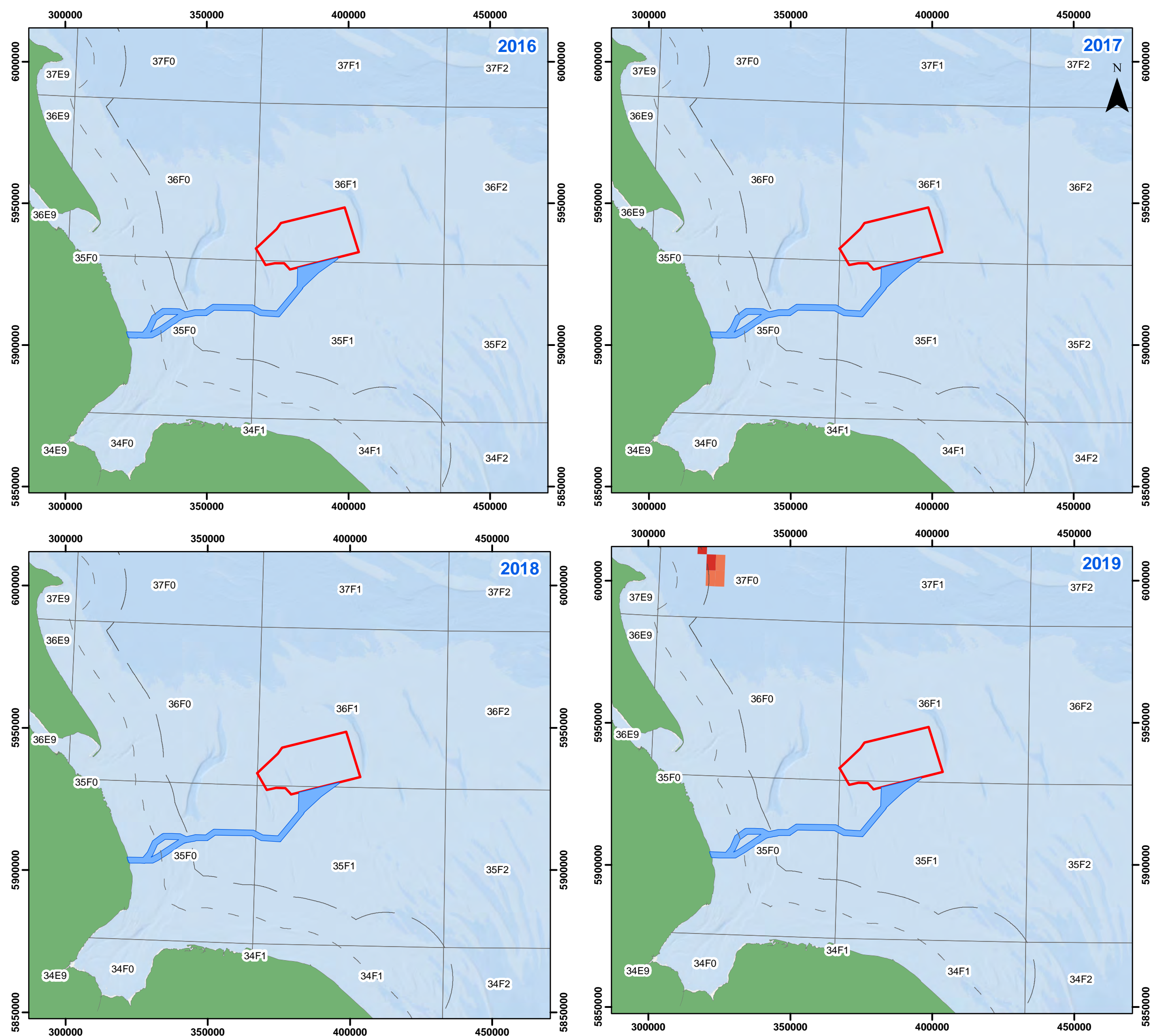
Preliminary Environmental Impact Report
 Top: EU Demersal otter trawl Surface Swept Area Ratio
 Bottom: UK Demersal otter trawl first sale value
 Data Source: ICES, 2021; MMO, 2022

Figure 14.29



Date: 26/04/2023
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 Revision: 0.1

Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

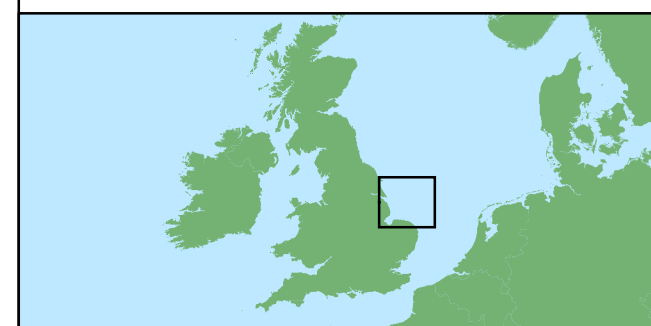
Fishing Limits

- 6 NM
- 12 NM
- 200 NM

UK pelagic trawl

Total value, £

- £0.02 - £5,000.00
- £5,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £242,000.00



Coordinate System: WGS 1984 UTM Zone 31N

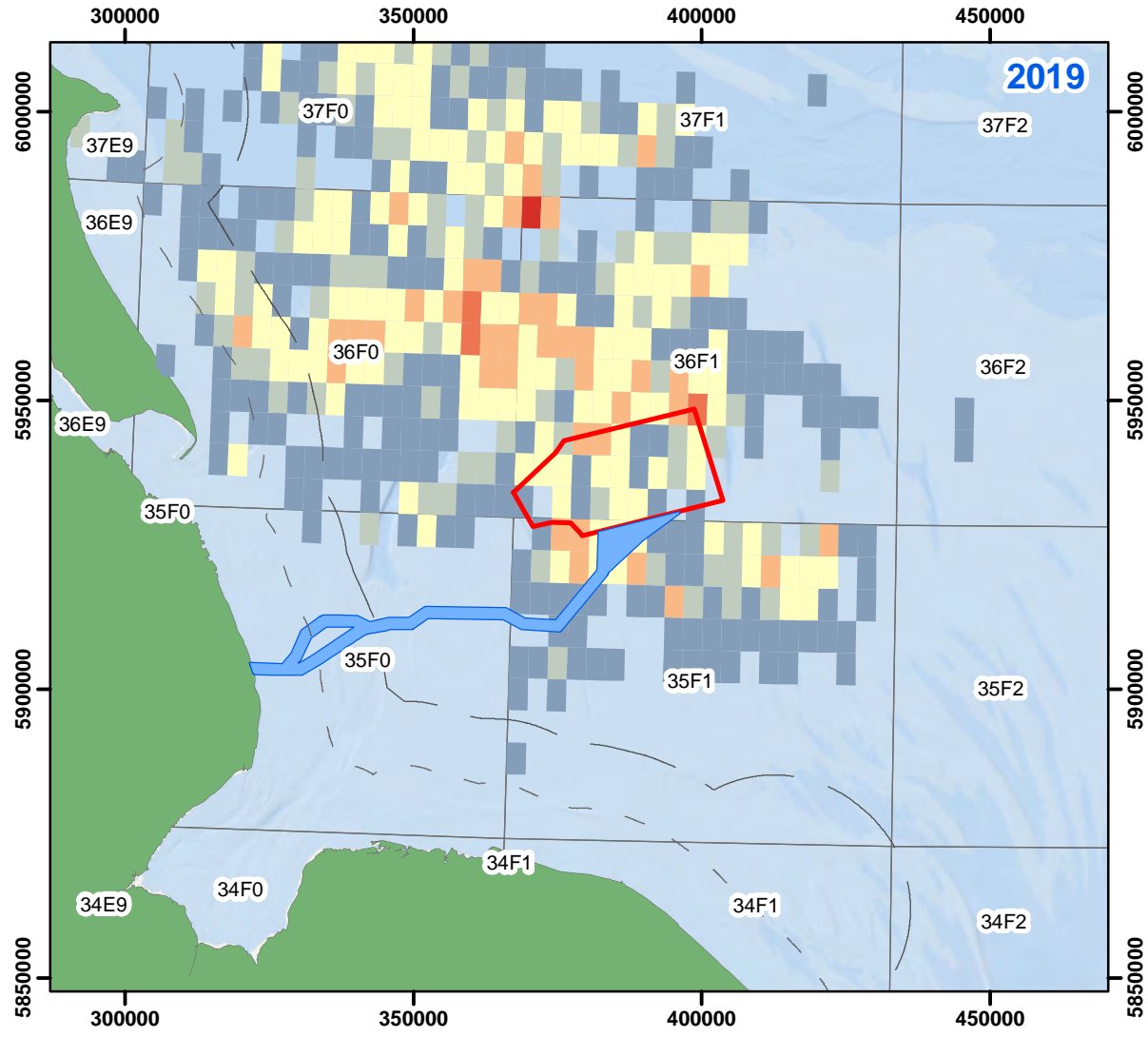
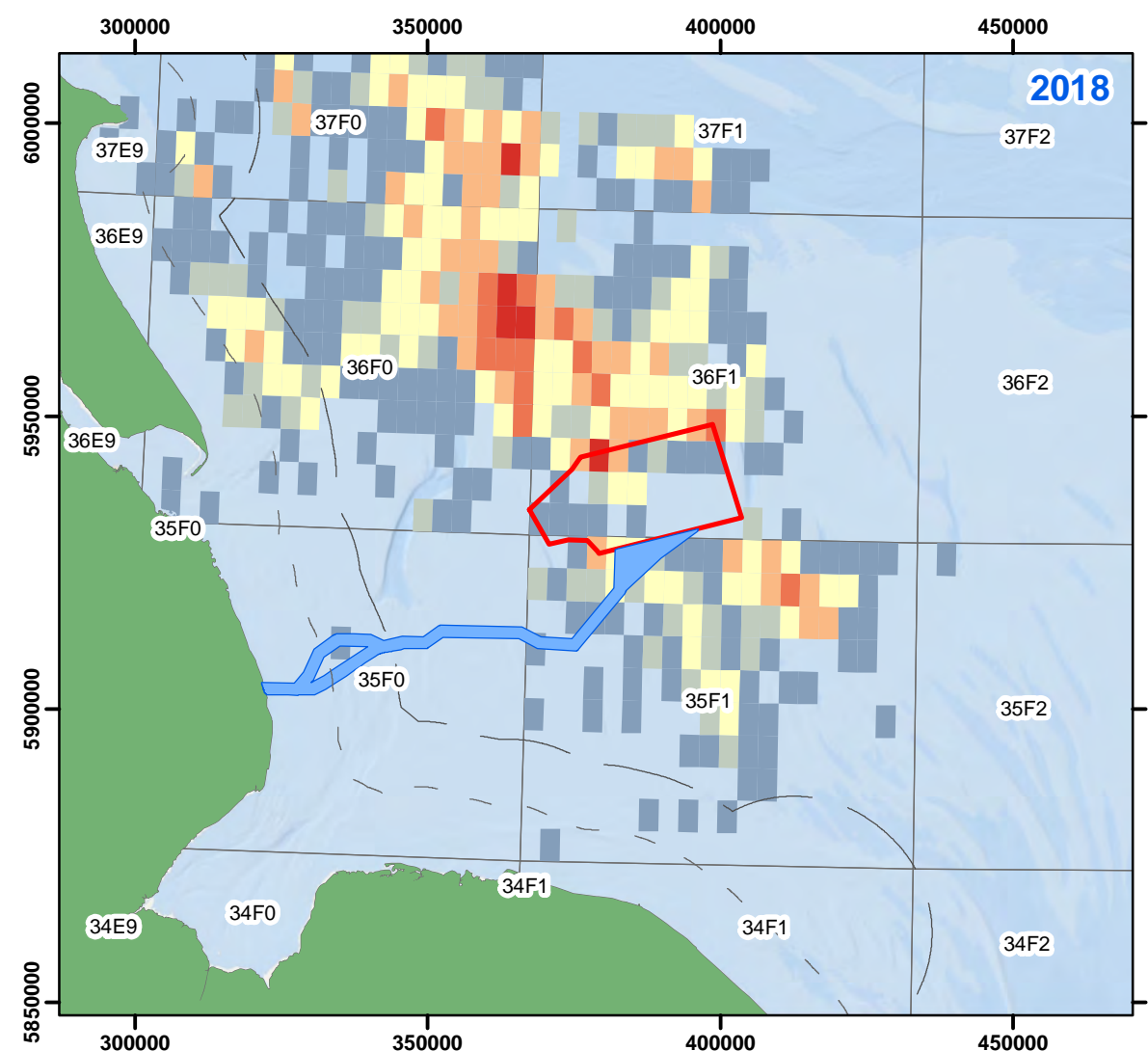
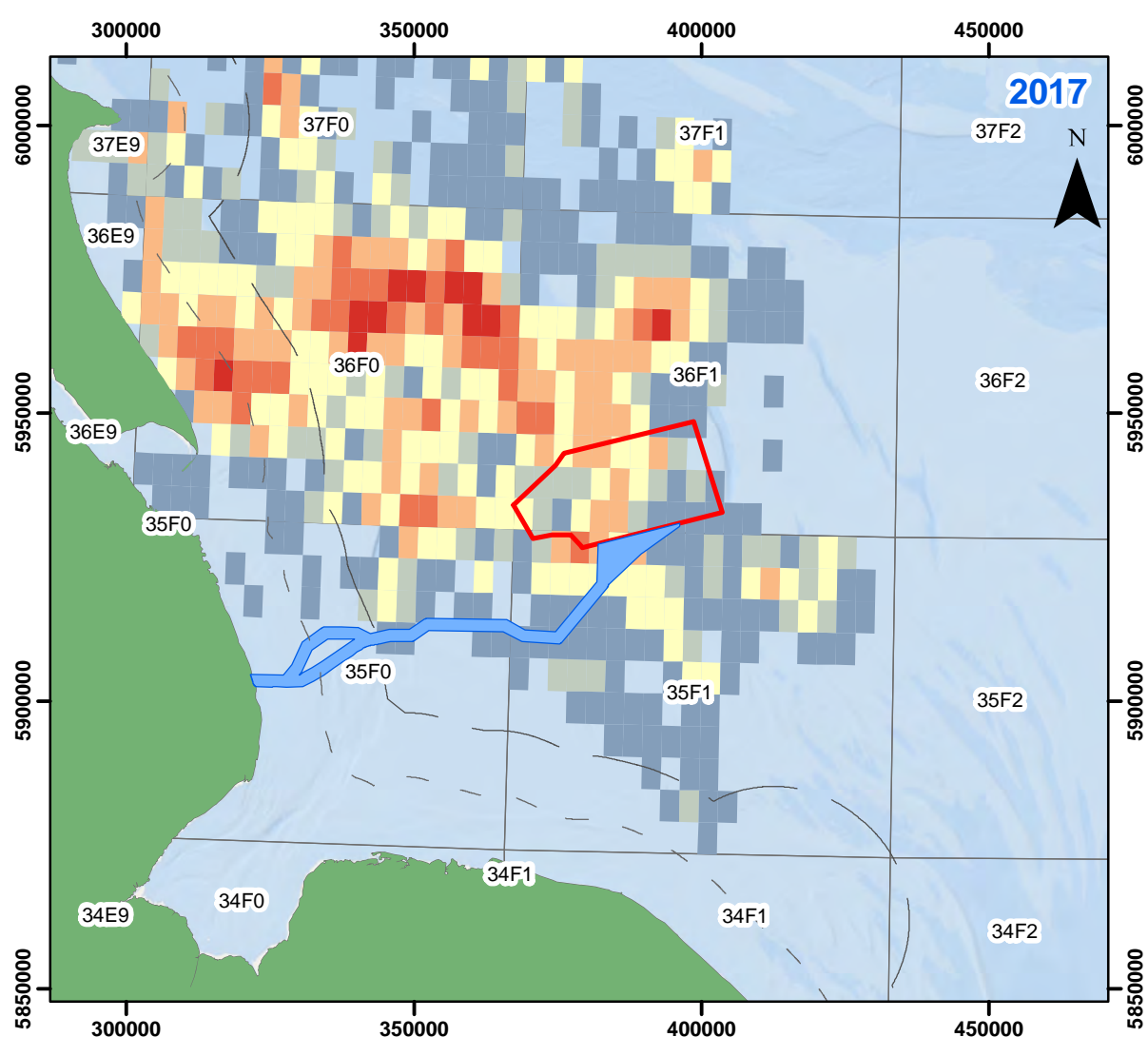
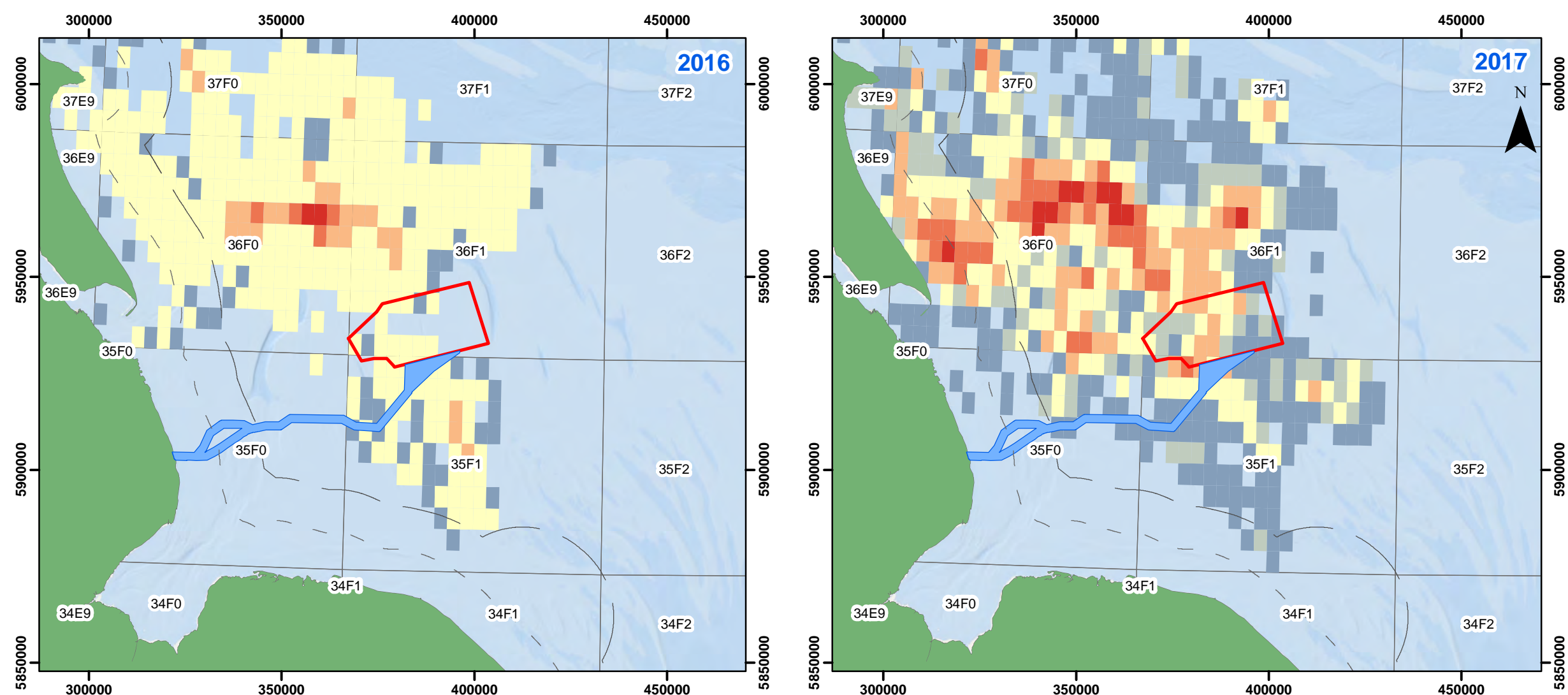
0 40 80 km

Scale: 1:1,250,000

Preliminary Environmental Impact Report
 VMS data for UK pelagic trawl vessels
 Annual data (from 2016 to 2019)
 UK fishing vessels 15m and over
 Data Source: MMO, 2021
 Figure 14.30

Date: 26/04/2023
 Produced By: FN
 Revision: 0.1

Contains ESRI Basemapping;
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 NGDC, and other contributors



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

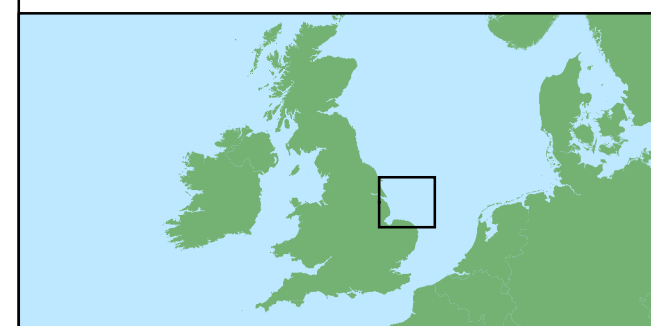
Fishing Limits

- 6 NM
- 12 NM
- 200 NM

UK Potting value (£)

Total value, £

- £0.01 - £1,000.00
- £1,000.01 - £1,000.00
- £1,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £101,000.00



Coordinate System: WGS 1984 UTM Zone 31N

0 40 80 km

Scale: 1:1,250,000

Preliminary Environmental Impact Report

VMS data for UK potting vessels

Annual data (from 2016 to 2019)

UK fishing vessels 15m and over

Data Source: MMO, 2021

Figure 14.31

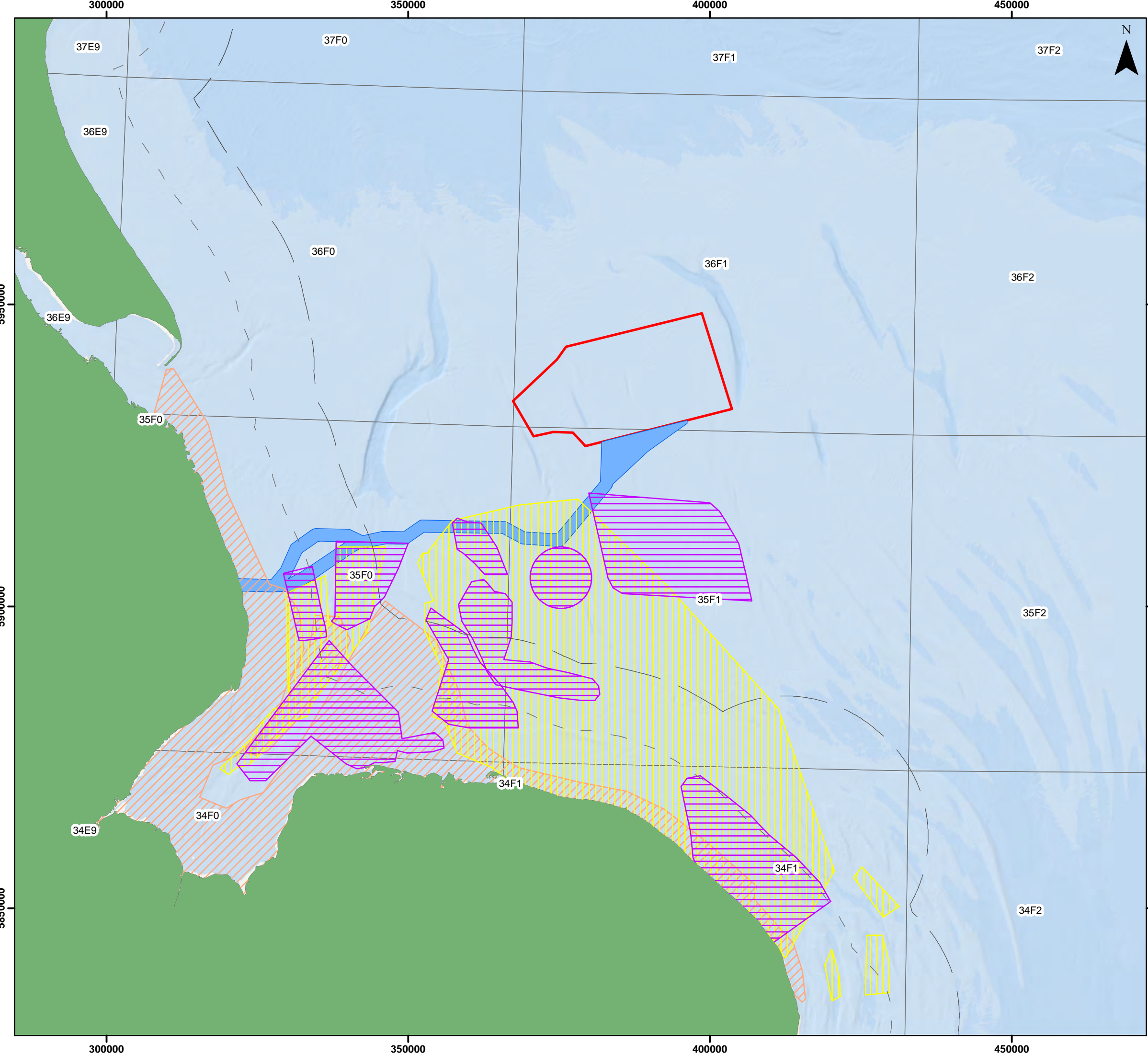
Date: 26/04/2023
Produced By: FN
Revision: 0.1

Contains ESRI Basemapping;
Esri, Garmin, GEBCO, NOAA
NGDC, and other contributors

Document Path: D:\Projects\1705 ODOV Outer Dowsing\PEIR\PEIR.mxd; Date: 26 April 2023; User: G.F.; Title: 14.31_MMO potting.mxd

Fishing Activity Based on Inshore Fishery Ground Mapping

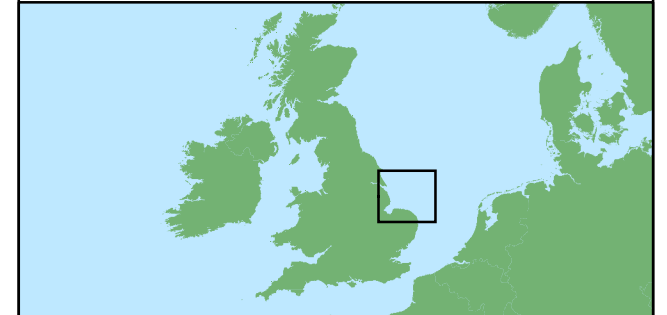
14.3.94 A mapping project undertaken by the EIFCA in 2010 described the spatial coverage of fishing for shellfish species for all vessels in the UK fleet. Figure 14.32 presents the shellfish fishing grounds which indicates that in 2010 whelk, crab and lobster and brown shrimp fishing grounds overlapped with some areas of the offshore ECC. It is understood that the 2010 mapping is based on targeted interviews with a sample of fishermen (~12) active at that time and is therefore not representative of the entire fleet or current activity. It is also not reflective of activity outside of the mapped areas.



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical
- Fishing Limits
- 6 NM
- 12 NM
- 200 NM
- Whelk fishing grounds
- Crab & lobster fishing
- Shrimp fishing grounds

Note: Does not represent fishing grounds north of the mapped whelk fishing grounds. Based on Eastern IFCA information for fleets active in the Eastern IFCA district. Does not represent activity for fleets in other IFCA districts



Coordinate System: WGS 1984 UTM Zone 31N
 0 20 40 km
 Scale: 1:600,000

Preliminary Environmental Impact Report
 Eastern Inshore Fisheries and Conservation Authority (IFCA)
 Inshore Mapping Project
 Eastern IFCA, 2010
 Figure 14.32



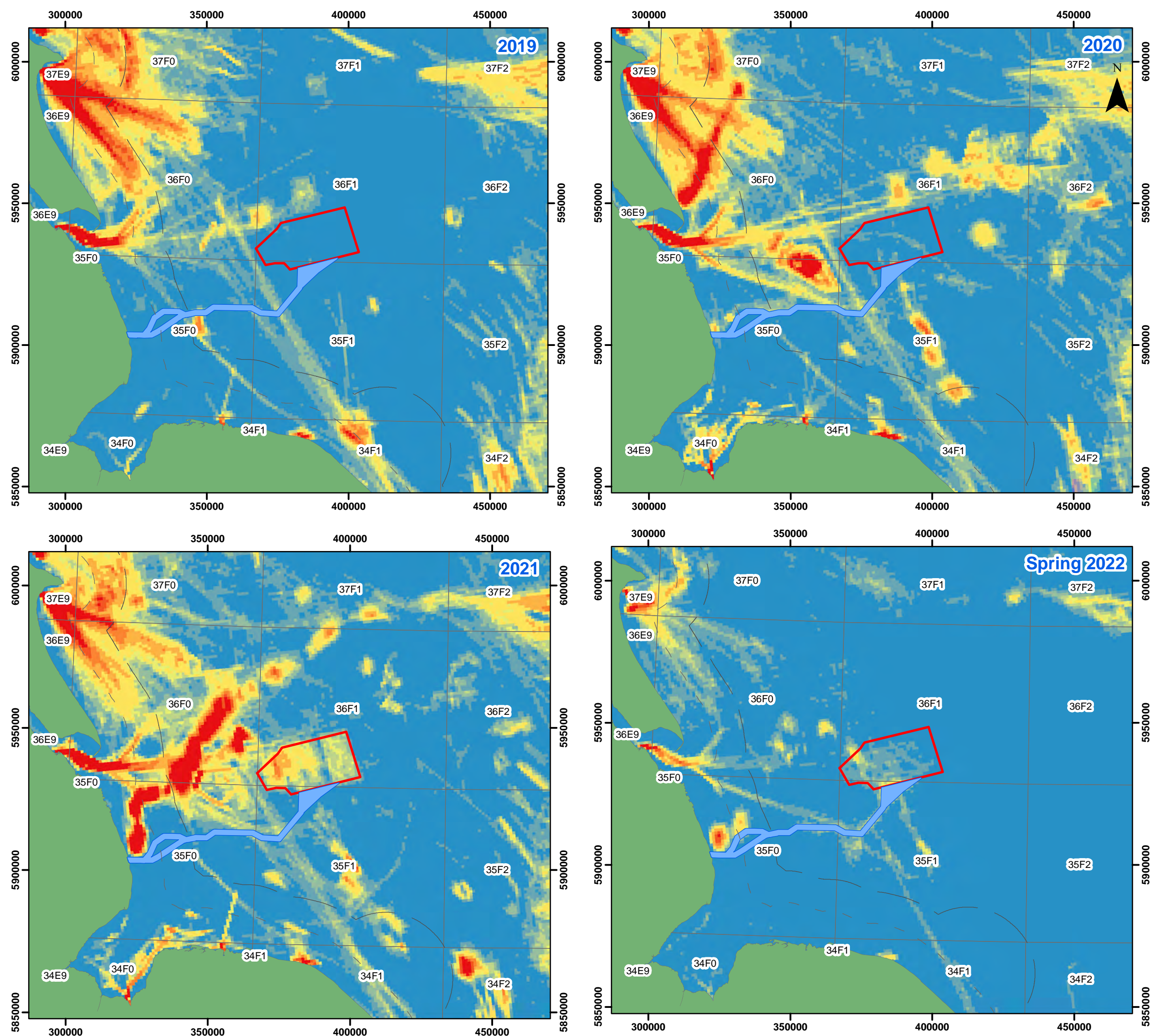
Date: 26/04/2023
 Produced By: FN
 Revision: 0.1

Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Document Path: D:\Projects\1705 ODOW Outer Dowsing\PEIR\PEIR.mxd; Date: 26 April 2023; 01:52; CF_TR_14.32_IFCA Inshore.mxd

Fishing Intensity Based on AIS Data

14.3.95 Fishing vessel route density, based on vessel AIS positional data is shown in Figure 14.33. AIS is required to be fitted on fishing vessels $\geq 15\text{m}$ length. The data is specific to fishing vessels and indicates the route density per square km per year. This data does not distinguish between transiting vessels and active fishing but does provide a useful source to corroborate fishing grounds. Data indicates sustained fishing vessel presence in the study area, with evidence of vessel activity along the offshore ECC and within the array area.



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM

Fishing Vessel Route Density
(Routes per Square km per year)

0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 100
101 - 150
151 - 200
201 - 250
251 - 15,661

Coordinate System: WGS 1984 UTM Zone 31N

0 40 80 km

Scale: 1:1,250,000

Preliminary Environmental Impact Report
Fishing Vessel Route Density
2019-2022
Routes per Square km per year
Data Source: EMSA, 2022
Figure 14.33

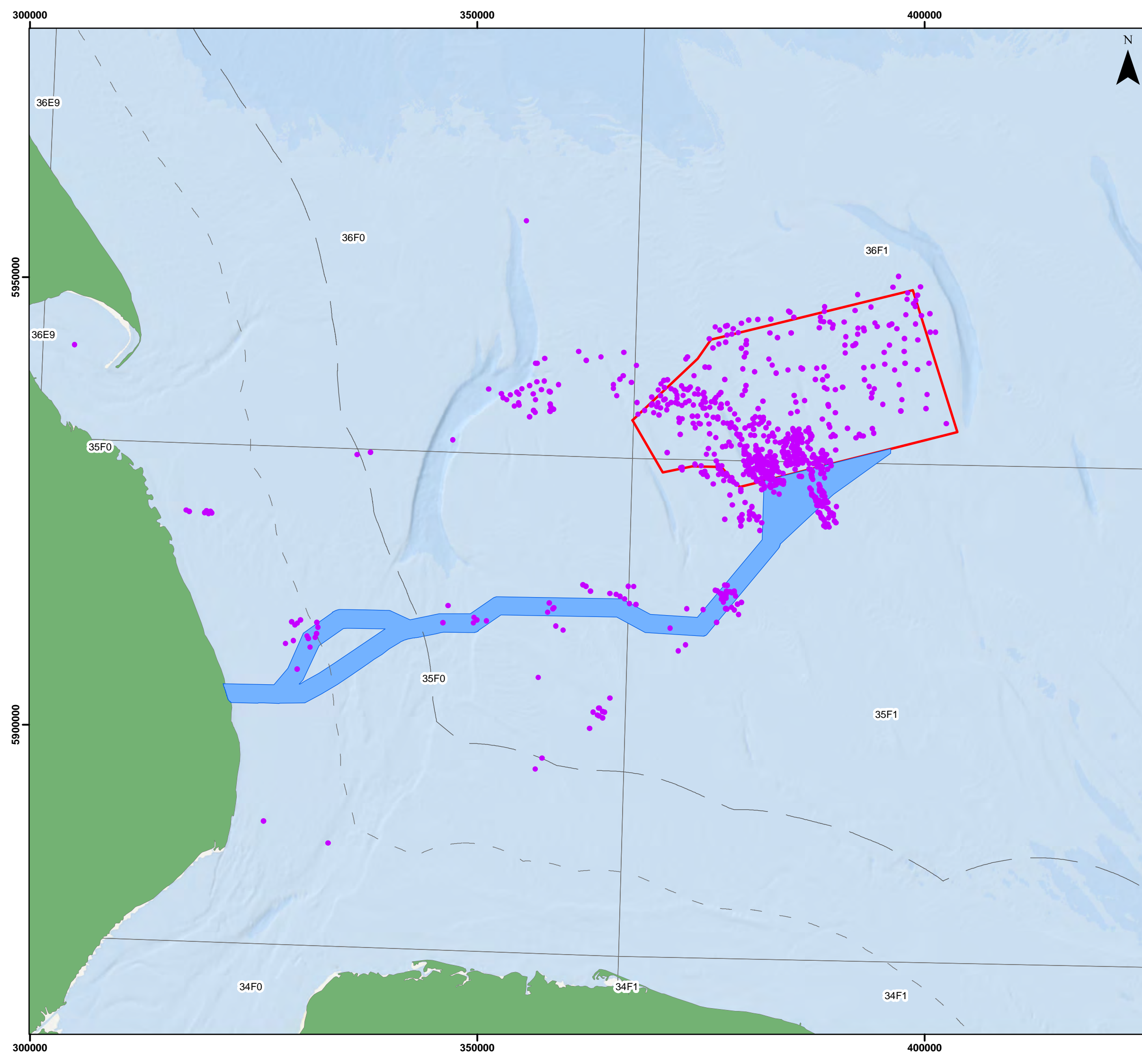
OUTER DOWSING
OFFSHORE WIND

Date: 26/04/2023
Produced By: FN
Revision: 0.1

Contains ESRI Basemapping;
Esri, Garmin, GEBCO, NOAA
NGDC, and other contributors

Gobe

Document Path: D:\Projects\1705 ODOV Outer Dowsing\PEIR\PEIR.mxd; Date: 26 April 2023; User: G:\Users\G\Documents\1705 ODOV Outer Dowsing\PEIR\PEIR.mxd; File Size: 26 April 2023; 01:52; CF: TR: 4.33; EMSA AIS.mxd



Legend

- PEIR Site Boundary
- Offshore ECC Boundary
- ICES Statistical Rectangles

Fishing Limits

- 6 NM
- 12 NM
- 200 NM
- Gear observations

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:400,000

Preliminary Environmental Impact Report

Commercial fisheries gear observation

Data Source: Scout vessel observations, 2022

Figure 14.34

OUTER DOWSING
OFFSHORE WIND

Date: 25/05/2023
Produced By: FN
Revision: 0.1

Gobe

Contains ESRI Basemapping;
Esri, Garmin, GEBCO, NOAA
NGDC, and other contributors

Document Path: D:\Projects\1705 ODOO Outer Dowsing\PEIR\PEIR.mxd; Date: 26 April 2023; OD_0152_CF_14.34_Scouting survey.mxd

Fishing Intensity Based on Marine Traffic Survey Data

- 14.3.96 Project-specific marine traffic survey was undertaken in summer 2022 and winter 2023 (See Volume 1, Chapter 15: Shipping and Navigation for additional detail), using AIS and radar tracking and visual observations to record vessel activity across the array area.
- 14.3.97 During the summer survey, approximately two fishing vessels per day were recorded in the wider study area. Fishing vessels were seen both in transit (43%) and engaged in fishing activity (57%). Vessels were primarily in the northern section of the study area. Those vessels engaged in fishing that could be associated with a fishing gear type were all potters/whelkers. All vessels were registered in the UK.
- 14.3.98 During the winter survey, approximately two fishing vessels per day were recorded in the wider study area. Fishing vessels were seen both in transit and engaged in fishing activity. Vessels were primarily in the centre of the study area, and so within the array area, with these vessels being those most likely engaged in fishing activity. Vessels in transit were seen to the southwest of the study area and to the north and east of the array, all on common vessel routes. Those vessels that could be associated with a fishing gear type were mostly potters/whelkers (68%) with demersal trawlers (14%), dredgers (11%), and pelagic trawlers (7%) also present. Vessels engaged in likely fishing activity were deemed to be all potter/whelkers. All fishing vessels within the study area that could be associated with a registered county were mostly registered with the UK (93%) as well as The Netherlands (7%).

Fishing Activity Based on Fisheries Scouting Surveys

- 14.3.99 Fisheries scouting surveys were conducted between July 2021 and June 2022 across the array area and offshore ECC. The aim of these surveys was to identify potting areas and gear within the offshore ECC and array area, enabling liaison with relevant operators ahead of site investigation survey.
- 14.3.100 The surveys recorded static potting gear in distinct locations along the offshore ECC and throughout the array area, with a notable abundance of gear in the southwest portion of the array area and easternmost extent of the offshore ECC, as shown in Figure 14.34, understood to be associated with whelk grounds.

UK Fisheries Activity Assessment

- 14.3.101 UK fisheries activity is described below. Activity in the Array Area (located predominantly within ICES rectangle 36F1) and Offshore Export Cable Corridor (located within ICES rectangles 35F1 and 35F0) is separately detailed. With no Project infrastructure to be located in ICES rectangle 36F0, activity in that rectangle is not further described in this section but has been previously considered in Section 14.3.

Array Area

- 14.3.102 The trends in landed value by UK-registered vessels from ICES rectangle 36F1 are presented in Figure 14.35 for species and Figure 14.36 for gear type.
- 14.3.103 UK landings from the array area are almost entirely dominated by vessels of over 10m length targeting crabs, lobsters and whelks with pots. The average annual (2017 to 2021) first sales value of brown crabs landed from ICES rectangle 36F1 was £1.9 million. Equivalent values for lobster and whelk were approximately £270,000.

14.3.104 Some landings of king scallop, targeted by UK dredgers of over 10m length, are recorded from ICES rectangle 36F1. The average annual (2017 to 2021) first sales value of scallops landed from ICES rectangle 36F1 was £50,000. Landings show significant year-on-year fluctuation, peaking in 2017 and 2020 and being very limited in 2018, 2019 and 2021, reflecting the cyclical nature of scallop fisheries.

14.3.105 Based on the landings data presented here and spatial data presented above, UK-registered vessels active in the array area are primarily targeting crab, lobster and whelk with pots. Occasional scallop dredge activity may take place, though is not a sustained fishery within the array area.

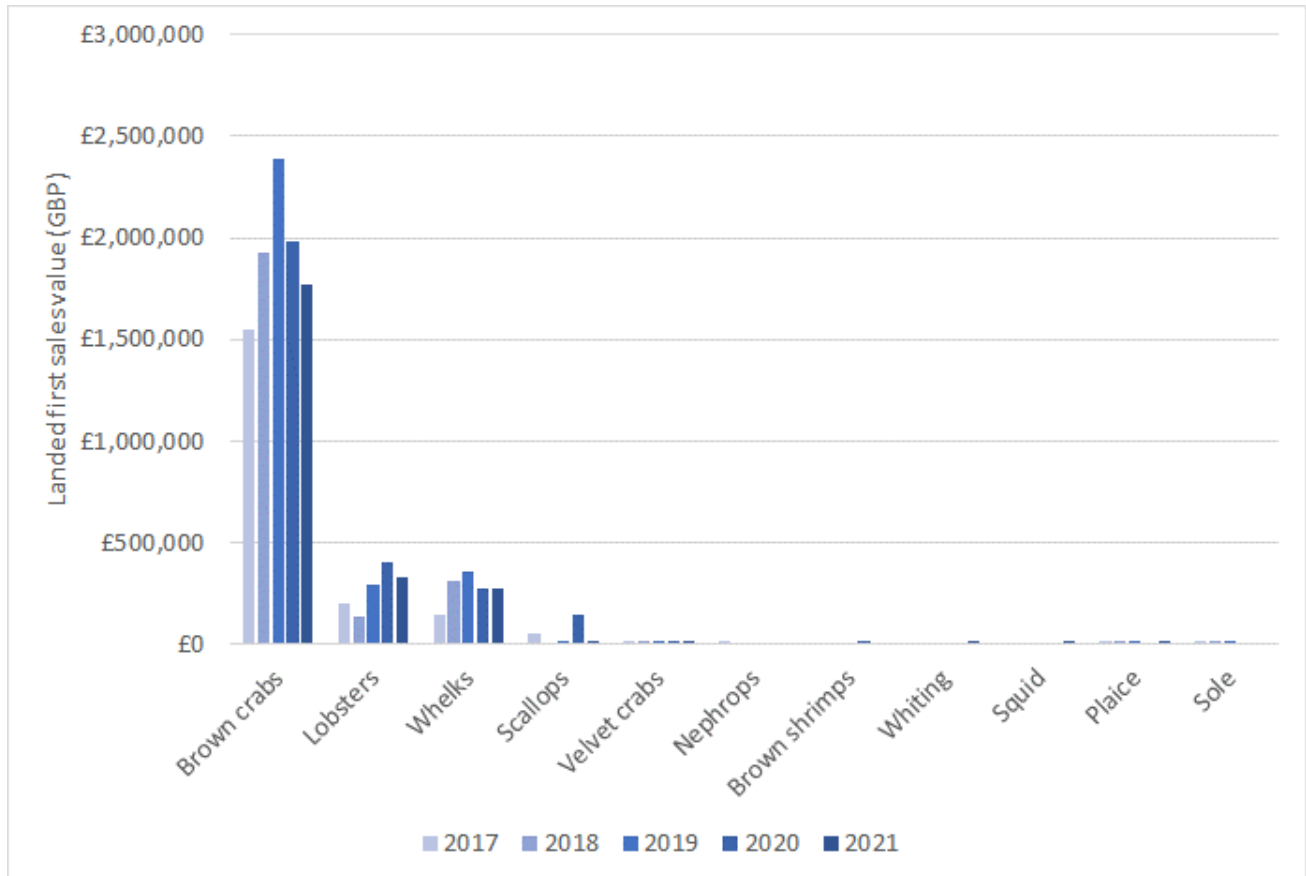


Figure 14.35: Landed value of all landings by UK registered vessels from ICES rectangle 36F1 indicating species (MMO, 2021)

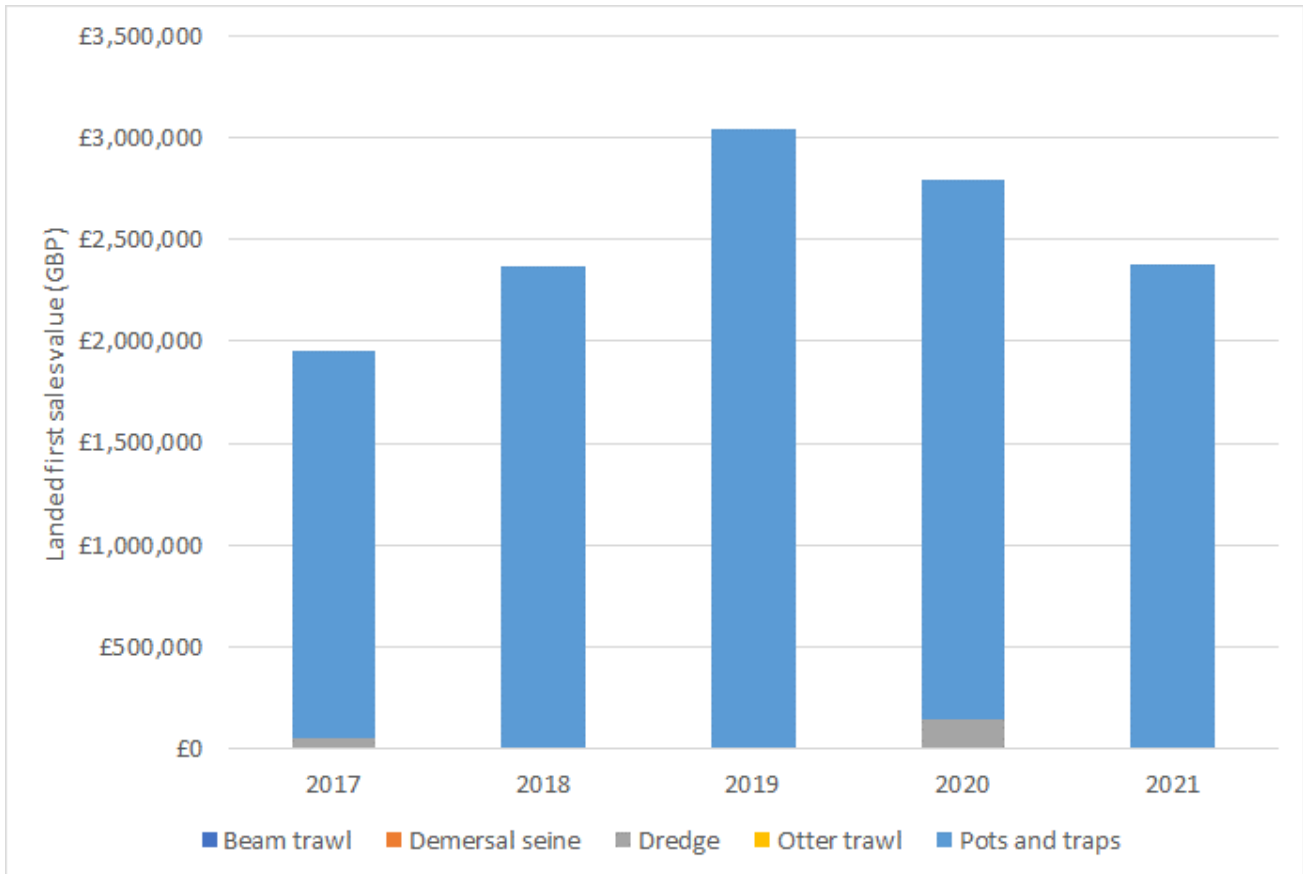


Figure 14.36: Landed value of all landings by UK registered vessels from ICES rectangle 36F1 indicating gear type (MMO, 2021)

Offshore Export Cable Corridor

14.3.106 The trends in landed value by UK-registered vessels from ICES rectangles 35F0 and 35F1 are presented in Figure 14.37 for species and Figure 14.38 for gear type.

14.3.107 UK landings from the offshore ECC are dominated by vessels of varying lengths targeting crabs, lobsters and whelks with pots. The average annual (2017 to 2021) first sales value of whelks landed from ICES rectangles 35F0 and 35F1 was £1.8 million. Equivalent values for crab were £725,000, for cockle were £560,00 and for lobster were £515,000. Some fishers targeting whelk, crab and lobster with pots are understood to target multiple species during fishing trips.

14.3.108 UK beam trawlers of over 10m length land brown shrimp from ICES rectangles 35F0 and 35F1. Landings values have declined over the study period, averaging £380,000 annually. Landings associated with the ‘other mobile gears’ category shown in Figure 14.38 are of cockle in The Wash. Landings data indicates a limited amount of UK otter trawl (brown shrimp) and netting (demersal species including sole, plaice, rays and bass) activity.

14.3.109 Based on the landings data presented here and spatial data presented above, UK-registered vessels active in the offshore ECC are primarily targeting crab, lobster and whelk with pots. Some beam trawl activity associated with the brown shrimp fishery may take place across the inshore portion of the offshore ECC. Occasional activity using otter trawl and netting gears may be present.

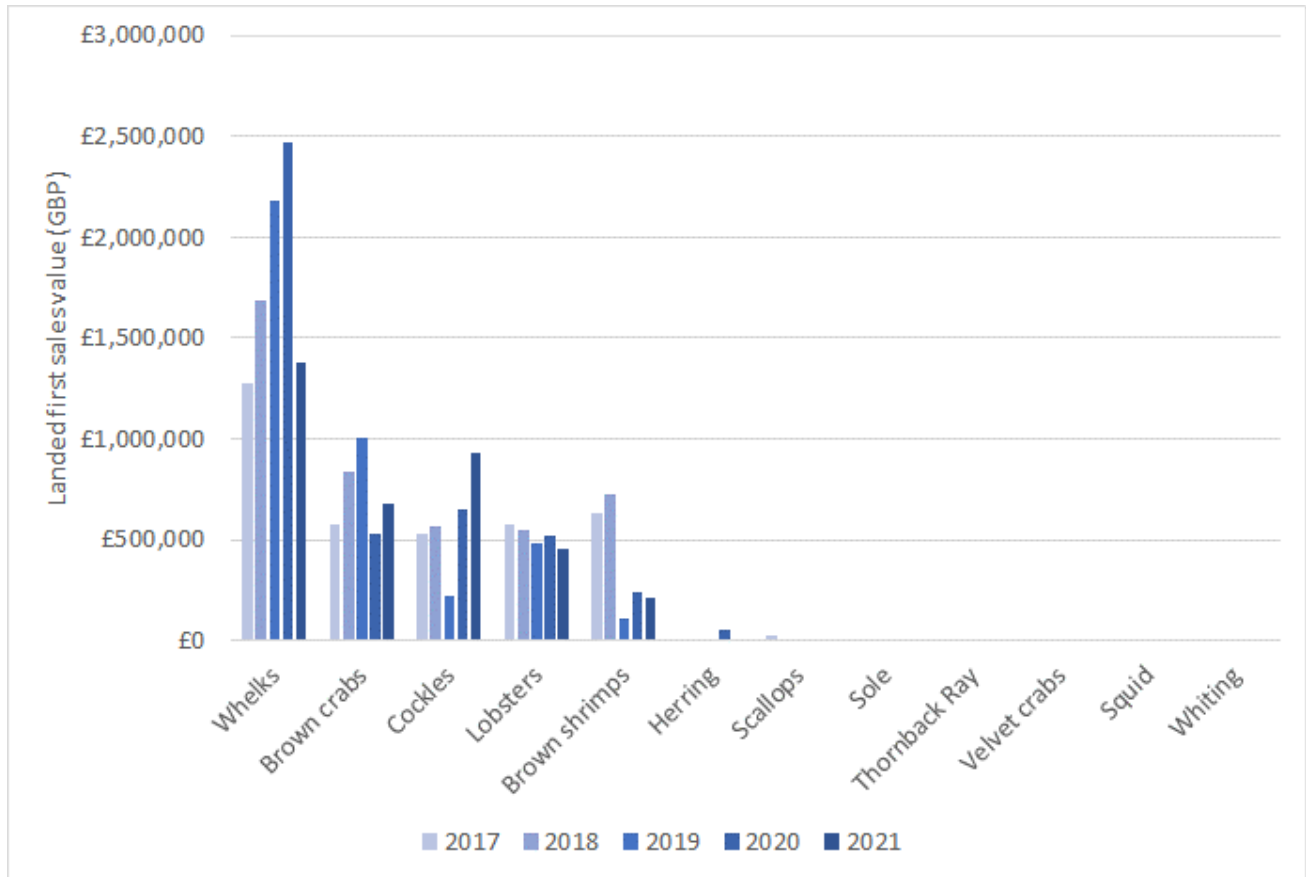


Figure 14.37: Landed value of all landings by UK registered vessels from ICES rectangles 35F0 and 35F1 indicating species (MMO, 2021)

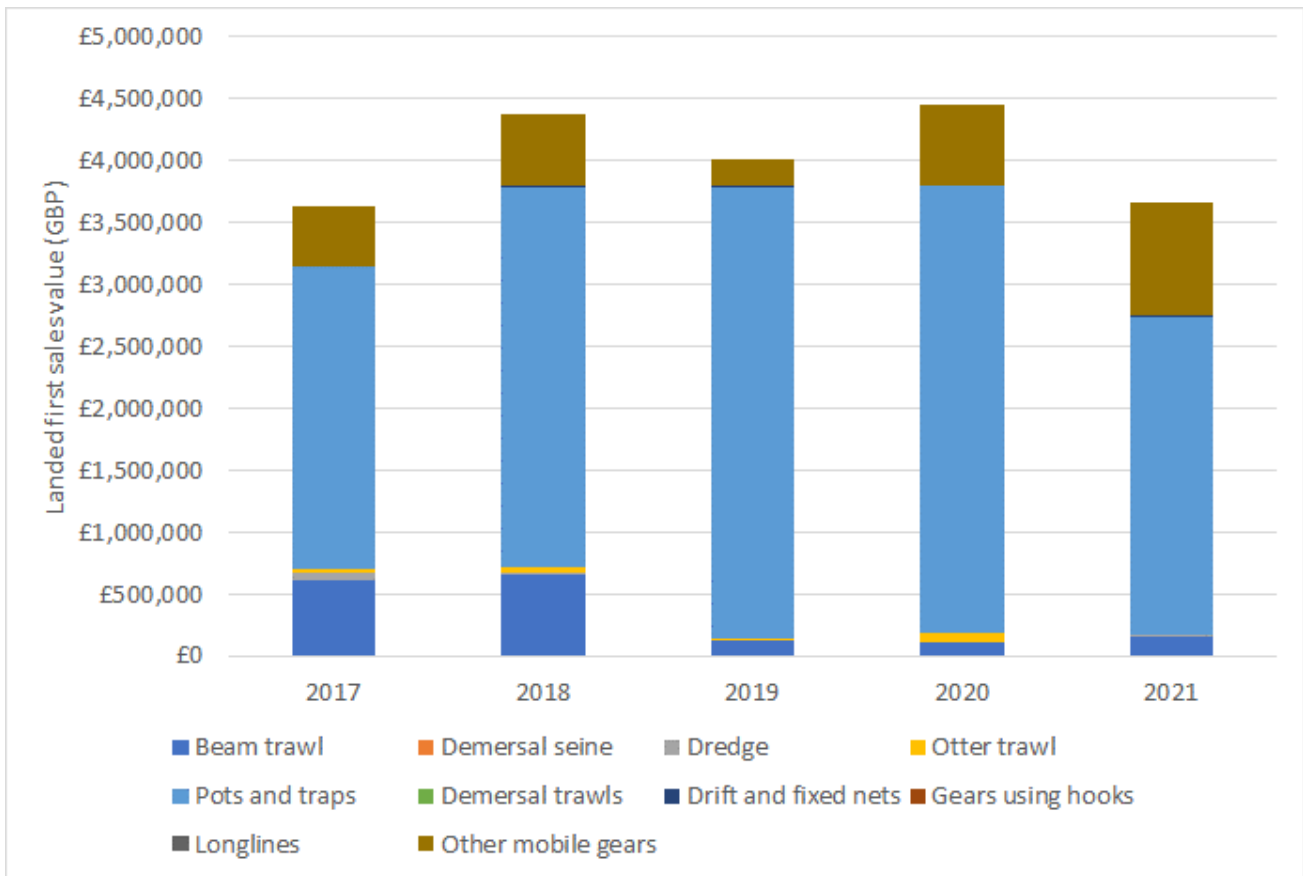


Figure 14.38: Landed value of all landings by UK registered vessels from ICES rectangles 35F0 and 35F1 indicating gear type (MMO, 2021)

14.3.110 Recent stock assessments for brown crab and lobster (Bridges, 2020; 2021) provide further information on local UK potting fleet effort and landings from inshore ICES rectangles within the EIFCA district. Data presented in the stock assessments indicates that ICES rectangle 35F0, within which the inshore portion of the offshore ECC is located, is the second most fished area for crab and lobster landed into the EIFCA district with >38% of reported landed weight in crab from this rectangle. ICES statistical rectangle 35F1, within which the outermost portion of the offshore ECC is located, represents a relatively small contribution to overall annual landings when compared with the more heavily fished ICES rectangles 34F1 and 35F0. The stock assessments note that ICES rectangle 35F1 is further offshore, beyond the inshore fishery focused on ICES rectangle 34F1 and is targeted mainly by larger vessels with the capacity to reach the offshore fishing grounds

Year	Effort (number of pot hauls)	Crab Landings (kg)	LPUE (kg/pot haul)	Year	Effort (number of pot hauls)	Crab Landings (kg)	LPUE (kg/pot haul)
2012	230,984	223,260	0.97	2012	127,598	57,476	0.58
2013	154,140	189,884	1.23	2013	50,810	40,458	0.69
2014	188,190	231,334	1.23	2014	95,745	78,531	0.77
2015	217,602	345,760	1.59	2015	45,860	50,054	0.92
2016	143,405	258,786	1.8	2016	60,980	80,538	1.15
2017	127,221	198,342	1.56	2017	51,705	62,401	1.05
2018	113,055	172,606	1.53	2018	37,890	49,977	1.28
2019	162,684	354,462	2.18	2019	19,980	29,717	1.54

Figure 14.39: EIFCA brown crab stock assessment summary statistics for ICES rectangle 35F0 (left) and 35F1 (right) (Source: Bridges, 2020)

Year	Effort (number of pot hauls)	Lobster Landings (tonnes)	LPUE (kg/pot haul)	Year	Effort (number of pot hauls)	Lobster Landings (tonnes)	LPUE (kg/pot haul)
2012	215,743	32	0.15	2012	124,078	9.8	0.11
2013	143,260	20.3	0.14	2013	45,910	3.5	0.09
2014	168,820	22.5	0.13	2014	87,200	10.2	0.12
2015	203,612	32.4	0.15	2015	34,975	5.9	0.15
2016	137,895	20.1	0.15	2016	52,360	6.6	0.12
2017	135,501	18.5	0.15	2017	49,745	6.4	0.11
2018	125,565	18.3	0.16	2018	33,000	3.4	0.09
2019	149,030	12.2	0.09	2019	15,955	1.5	0.1

Figure 14.40: EIFCA lobster stock assessment summary statistics for ICES rectangle 35F0 (left) and 35F1 (right) (Source: Bridges, 2021)

14.3.111 EIFCA information of the spatial distribution of the whelk fishery within the district indicates that between 2015 and 2020, the focus of whelk fishing effort and greatest landings were The Wash and the North Norfolk inshore area, located to the south of the offshore ECC, located in whelk management areas 1 and 2 shown in Figure 14.41.

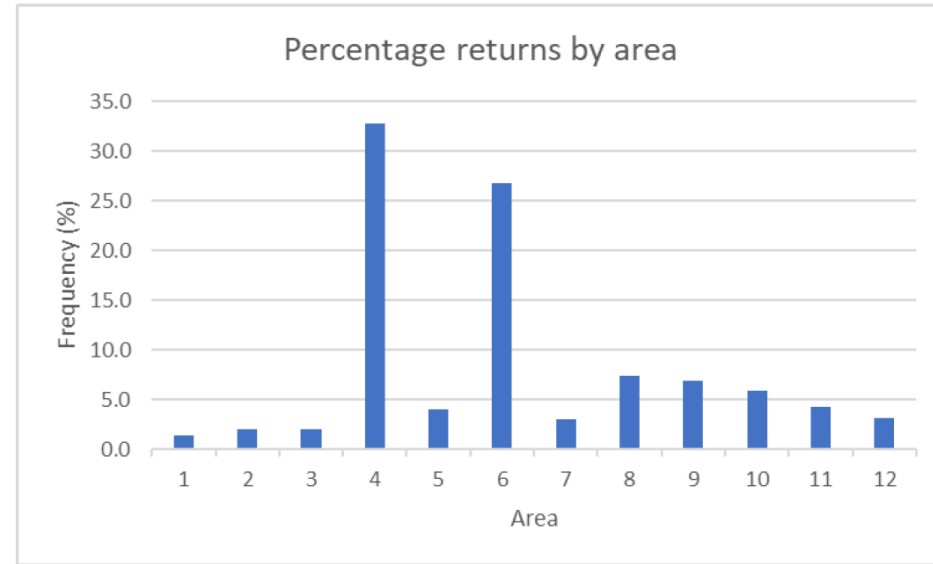
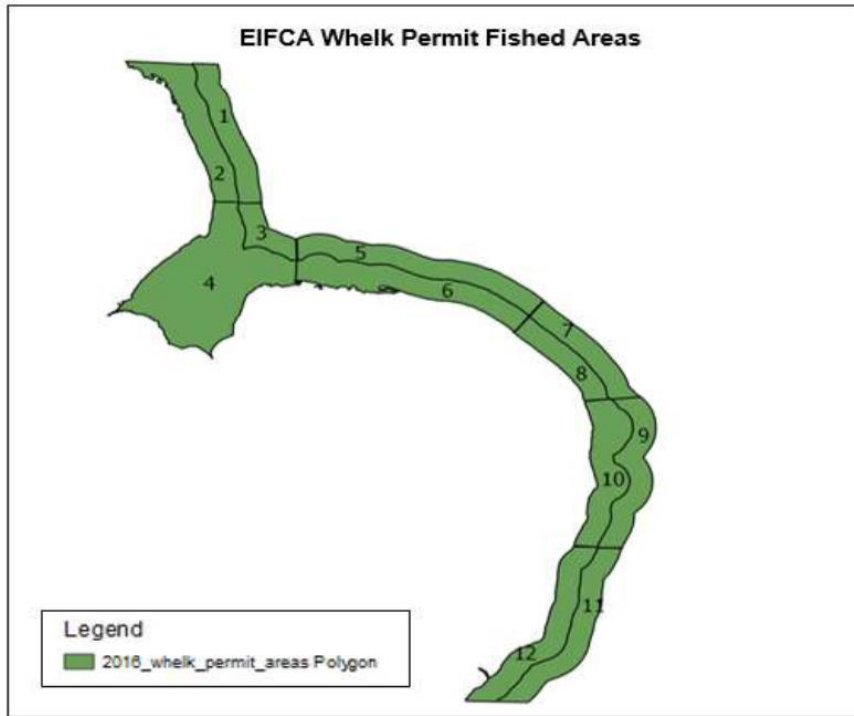


Figure 14.41: EIFCA district whelk fished areas, and percentage of landings returns that were received from each area between 2015 and 2020 (Source: EIFCA, 2020)

Ports and Vessel Fleets

14.3.112 Vessels of 10m or more length accounted for approximately 71% of landings by UK vessels from ICES rectangles 35F0, 35F1 and 36F1 across 2016 to 2020. These larger vessels include potters targeting crab, whelk and lobster, beam trawlers targeting shrimp and dredgers targeting scallop. Smaller under 10m length vessels operating further inshore deploying pots.

14.3.113 The MMO provides 2021 landings statistics by port of landing attributed to specific ICES rectangles, allowing linkage of the location of fishing to the specific port the catch is landed into, as shown in Figure 14.43. Key ports and fleets targeting fisheries in ICES rectangles 35F0, 35F1 and 36F1 include:

- Potting fleet targeting brown crabs, lobster and whelks landing into Grimsby, Wells and Bridlington;
- Potting fleet targeting whelks landing into Kings Lynn; and
- Beam trawl fleet landing brown shrimps into Kings Lynn, Boston and Leigh-on-Sea.

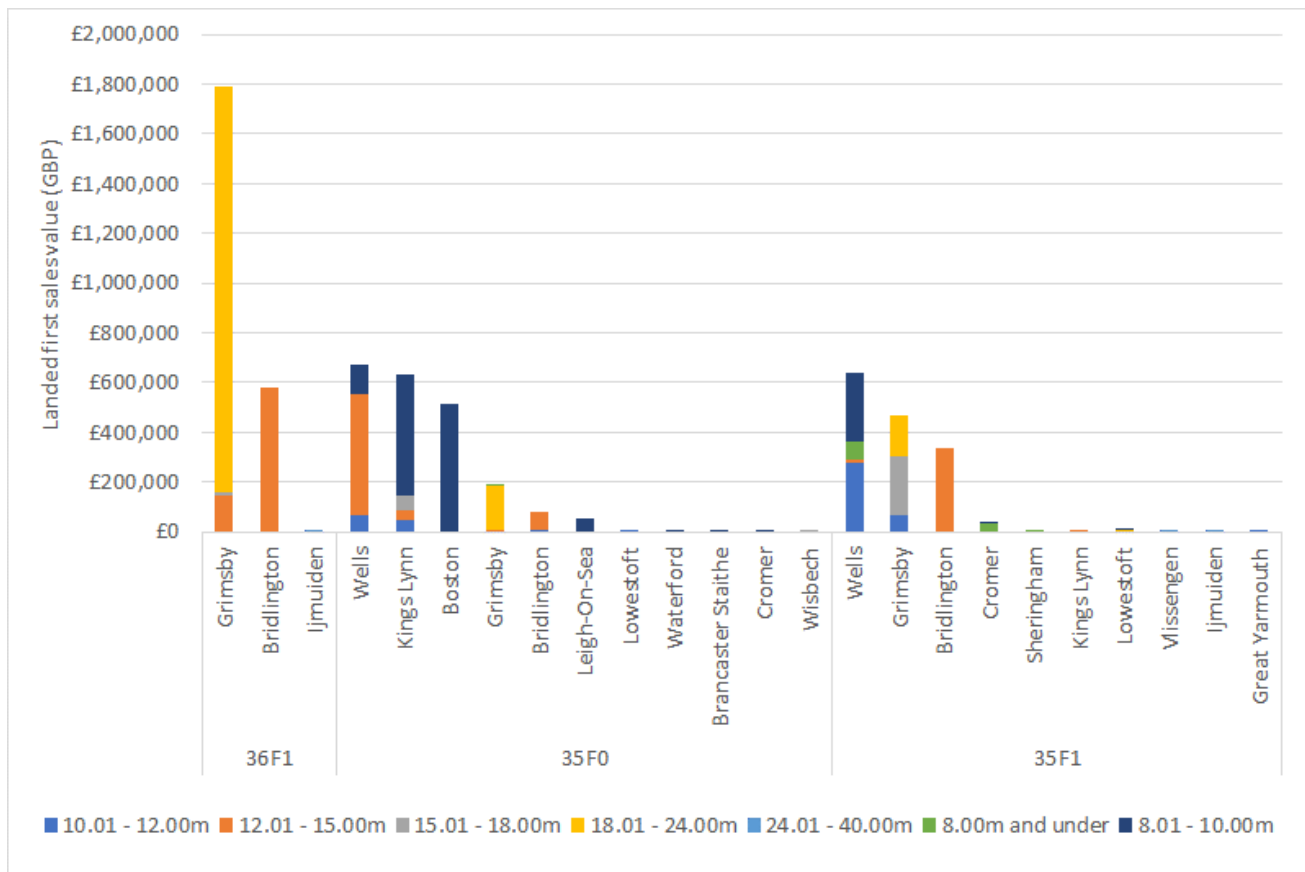


Figure 14.42: Value of landings from ICES rectangles 35F0, 35F1 and 36F1 by UK registered vessels by port of landing and vessel length in 2021 (Source: MMO, 2022)

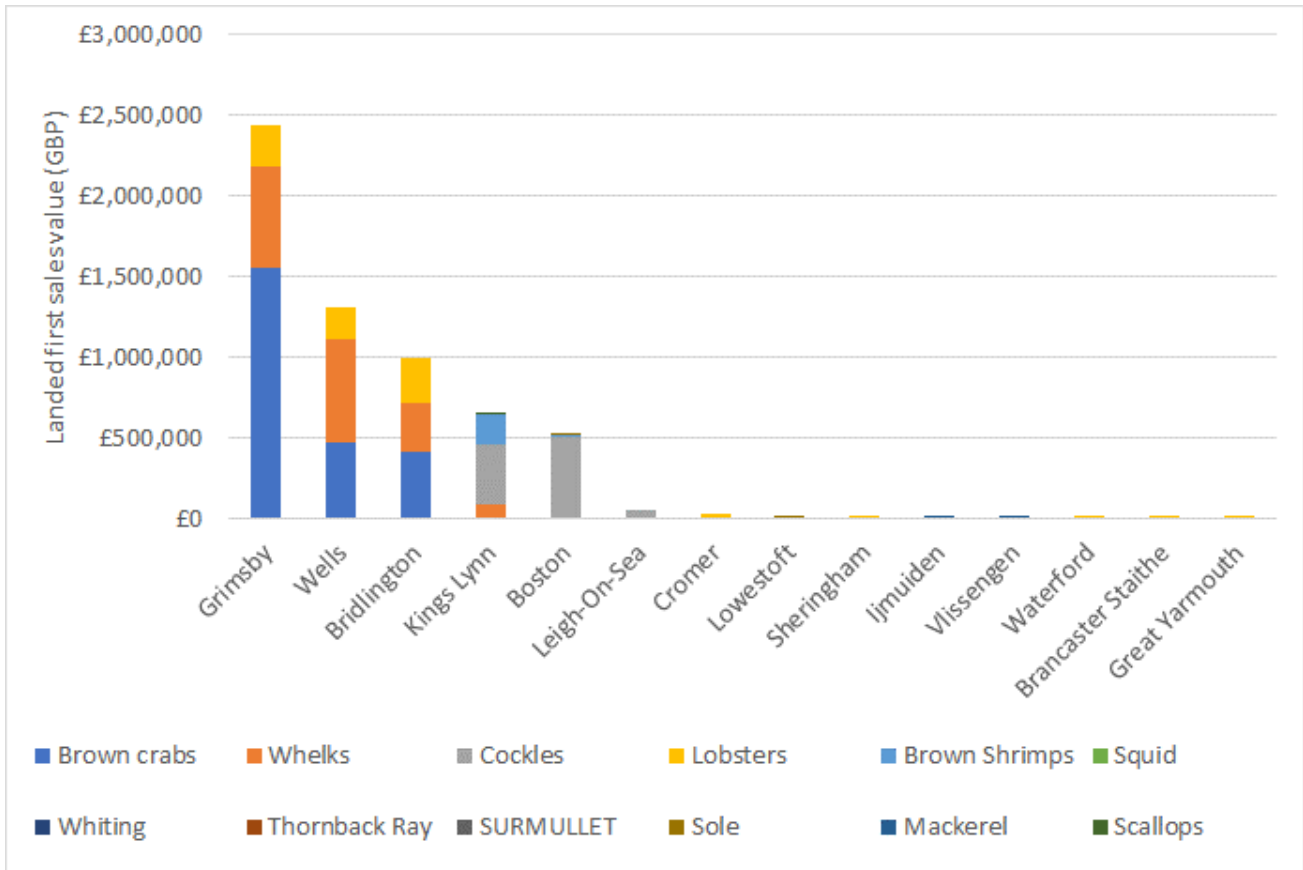


Figure 14.43: Value of landings from ICES rectangles 35F0, 35F1 and 36F1 by UK registered vessels by port of landing and key species in 2021 (Source: MMO, 2022)

EU Fisheries Activity Assessment

Dutch Fishing Activity

- 14.3.114 Dutch registered vessels operate within the study area. Landings are predominately by large beam trawlers targeting plaice and sole (Figure 14.44). Whilst not specific to the study area, data capturing landings from 2016 onwards by the Dutch beam trawl fleet indicates a decline in plaice and sole landings between 2016 and 2020 (Wageningen website, 2022; Figure 14.45), following the trend also depicted in EU landings data (Figure 14.44).
- 14.3.115 Dutch fishing vessels have no historic fishing rights within the 6 and 12 NM limit and so their activity is focused across the outermost extent of the offshore ECC and the array area. VMS data indicate that Dutch beam trawling occurs at moderate to high levels across wide sections of the Southern North Sea. VMS data indicates very limited EU beam trawl activity within Project boundaries.
- 14.3.116 Dutch vessels active in the study area are understood to land their catch in a number of ports including Ijmuiden, Harlingen, Urk and Scheveningen.

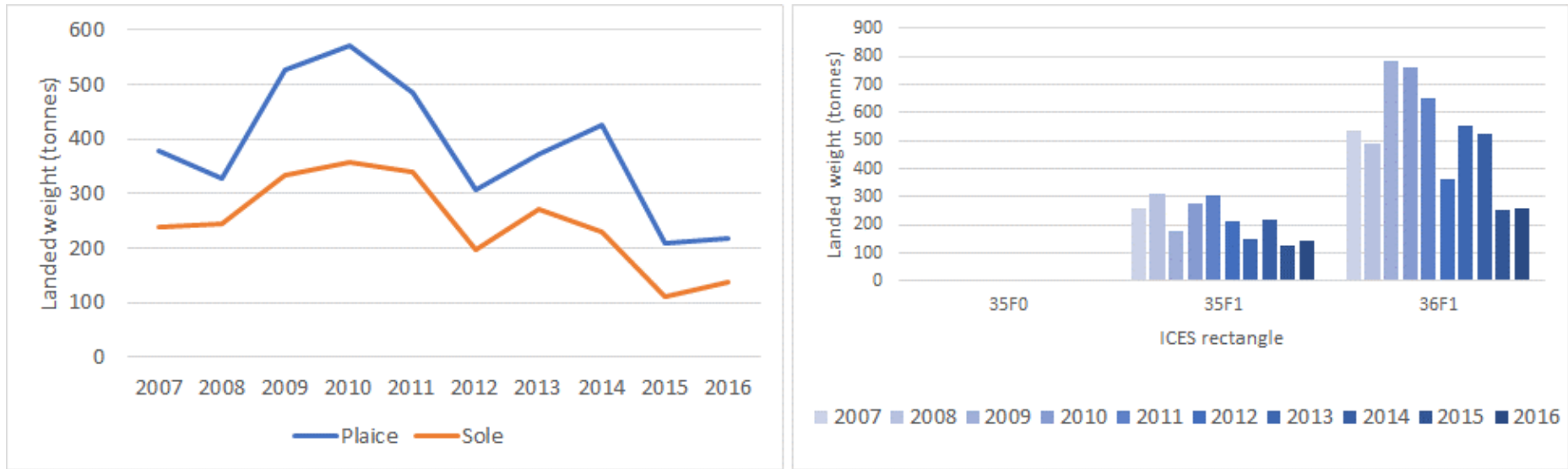


Figure 14.44: Landed weight of key species by Dutch registered vessels from ICES rectangles 35F0, 35F1 and 36F1 (Source: EU DCF, 2022)

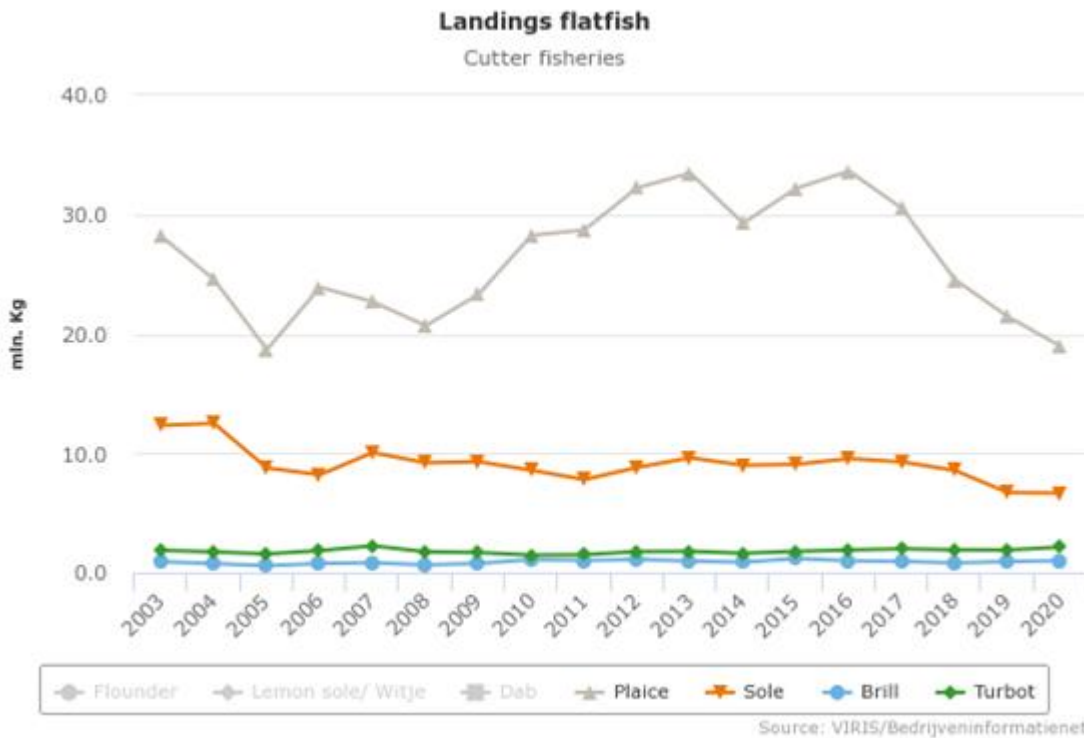


Figure 14.45: Landed revenue of key species by the Dutch beam trawl fleet (Wageningen, 2022)

Belgian Fishing Activity

- 14.3.117 The principal methods used by the Belgian fleet in the study area are beam trawling and to a lesser extent demersal otter trawling. It is understood that some vessels are able to operate both gears. Belgian vessels in this area target a range of species, but primarily sole and plaice (Figure 14.46).
- 14.3.118 Belgian vessels have historic fishing rights in the study area between the UK's 6 and 12NM limits. VMS data indicates that Belgian beam and otter trawlers have wide operational ranges, targeting grounds in the southern North Sea, the English Channel, the Celtic Sea and the Irish Sea. VMS data indicates very limited EU beam trawl activity within Project boundaries.
- 14.3.119 Belgian vessels active in the study area are understood to land their catch in a number of ports including Zeebrugge, Oostende and Nieuwport.

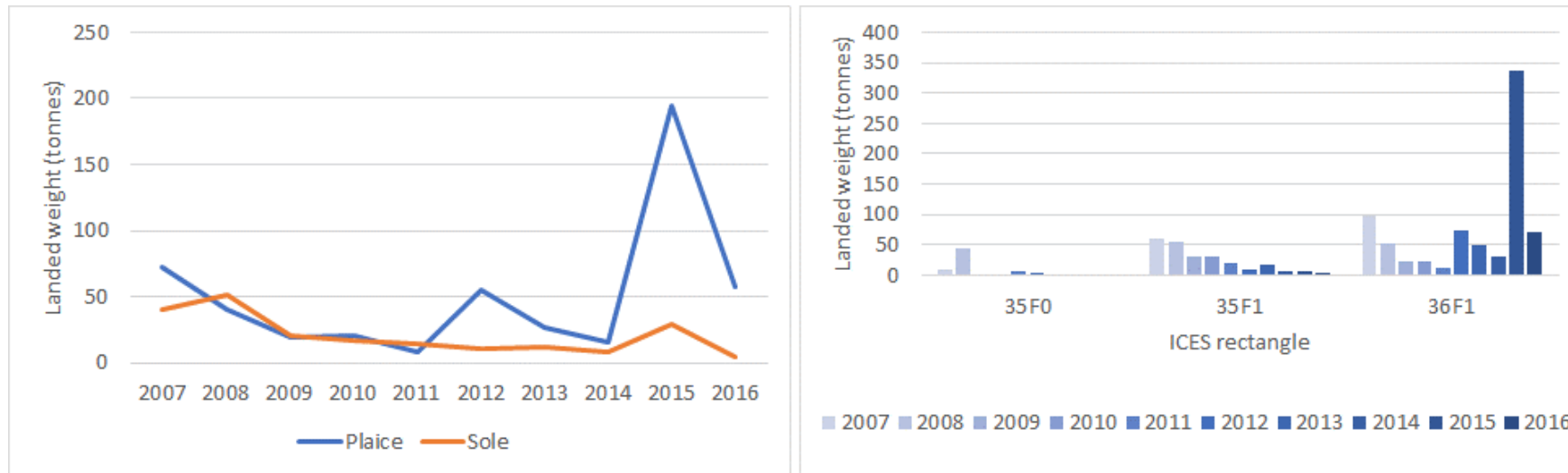


Figure 14.46: Landed weight of key species by Belgian registered vessels from ICES rectangles 35F0, 35F1 and 36F1 (Source: EU DCF, 2022)

French Fishing Activity

- 14.3.120 In the study area, French vessels have fishing rights to fish between the UK's 6 and 12NM limit. French vessels active in the area are understood to be predominantly demersal otter trawlers, with some pelagic trawl activity. Vessels are primarily targeting whiting and mackerel, with occasional catches of herring. VMS data indicates some EU otter trawling in the vicinity of the offshore ECC.
- 14.3.121 French fishing vessels active in the area are understood to primarily be based out of Boulogne and Etaples, predominantly active in spring and summer months.

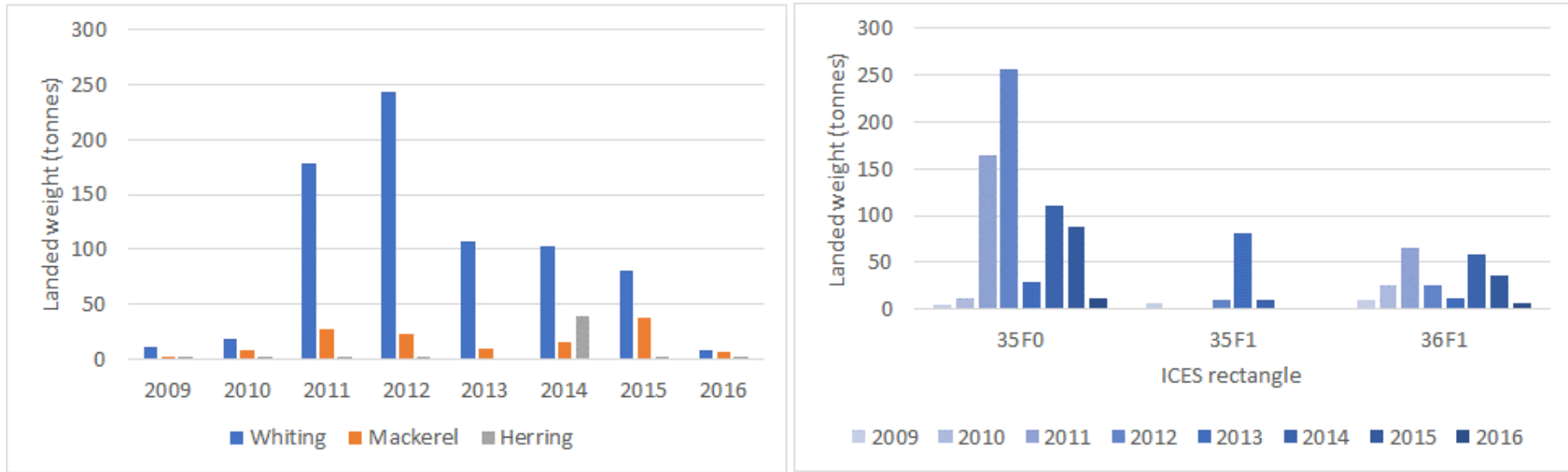


Figure 14.47: Landed weight of key species by French registered vessels from ICES rectangles 35F0, 35F1 and 36F1 (Source: EU DCF, 2022)

Danish Fishing Activity

14.3.122 There has been a historical fishery for sandeel and sprat by Danish vessels in the North Sea, with previously targeted key sandeel grounds understood to be located to the northeast of the study area. A significant sandeel fishery was targeted in this area between 2003 and 2004. The value of landings fell significantly from 2004 onwards (Figure 14.48), and both landings and spatial data indicate limited potential for associated fishing activity in the study area

14.3.123 The Total Allowable Catch for sandeel and sprat in the North Sea was set at zero for 2023, limiting Danish fishing opportunities, but negotiations in March 2023 have resulted in a TAC of 33,969 tonnes of sandeel in ICES division 4. Over 93% of this TAC is allocated to Danish fisheries, with just under 3% allocated to UK fisheries (European Commission, 2023).

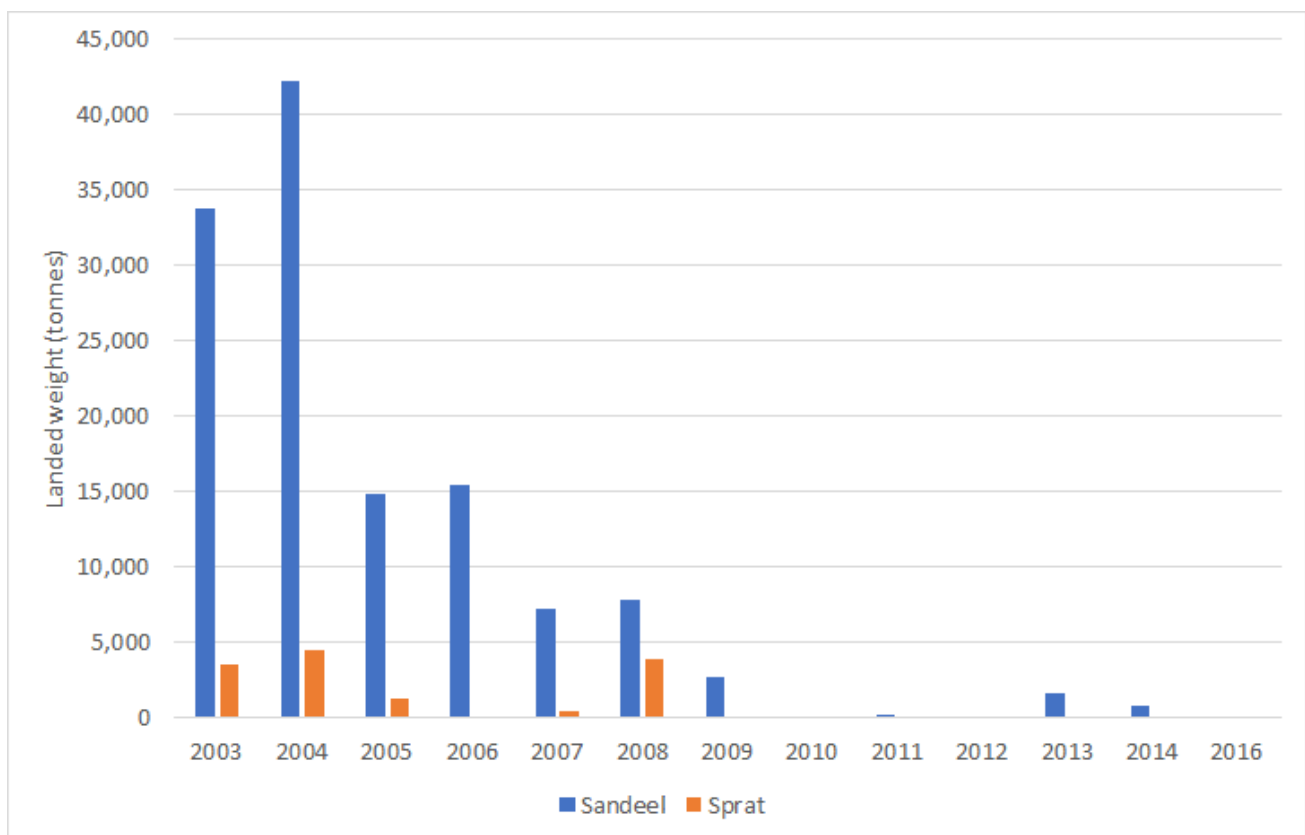


Figure 14.48: Long term trend in Danish landings of sandeel and sprat from the study area (Source: EU DCF, 2022)

14.4 Future Baseline Environment

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

- Market demand: commercial fishing fleets respond to market demand, which is impacted by a range of factors, including the 2020 to 2021 COVID pandemic;

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

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

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

14.4.4 25% of the EU's fisheries quota in UK waters will be transferred to the UK over the five-year transition period; most of this quota has already been transferred and distributed across the four nations of the UK. After the five-year transition there will be annual discussions on fisheries opportunities. Across the study area, where UK fisheries primarily target non-quota shellfish species, it is expected that fleets are unlikely to be impacted by quota transfers. It is possible that UK vessels will seek to exploit additional quota-species opportunities, but vessels would need to access quota holdings. There has been limited change in the overall UK share for plaice and sole, the key fisheries targeted by non-UK vessels, notably Dutch and Belgian beam trawlers.

- 14.4.5 Market changes have the potential to impact fishing activity in the study area; some of the catch landed by UK vessels is exported to EU markets (e.g., brown crab) and potential tariff/non-tariff barriers could affect which species are targeted and to what extent. A key species landed by potters in the area, is whelk, which is primarily exported to non-EU countries, including Korea, Taiwan and Singapore. The trade in UK landed whelk has therefore not been as affected by the Brexit process and associated implications on shellfish exports in comparison to other species. In terms of future baseline scenarios, it is therefore possible, for example, that the UK fleet will more heavily target whelk given that prices have increased in recent years and they are exported to non-EU countries.
- 14.4.6 In relation to EU access to UK territorial waters, provision has been made for EU vessels with a track record of fishing between 6 NM and 12 NM to be issued with licences to continue fishing. This licencing process is ongoing and it is unknown how many EU vessels this is applicable to. Therefore, fishing activity within the study area is likely to remain consistent with the current baseline in terms of the fleets and Member States in operation.

14.5 Summary

- 14.5.1 The key fleet métiers operating across the study area include (in no particular order):
- UK potters targeting brown crab, lobster and whelk, operating across the offshore ECC and array area;
 - UK scallop dredgers targeting scallop, operating north of the offshore ECC and array area;
 - UK beam trawlers targeting brown shrimp, operating across the inshore portion of the offshore ECC;
 - Dutch beam trawlers targeting plaice and sole, operating primarily to the east of the array area;
 - Belgian beam trawlers targeting sole and plaice, operating primarily to the east of the array area;
 - French demersal trawlers targeting whiting, operating primarily to the north and east of the Project; and
 - Danish demersal trawlers targeting sandeel throughout the North Sea with occasional effort within the commercial fisheries study area; and
 - EU pelagic trawlers targeting highly mobile species (herring and/or mackerel) that consistently move/shoal throughout the wider North Sea with potential for very occasional effort within the commercial fisheries study area.

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