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**Phase 1 Commercial Fisheries
 Technical Report**

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**Round 3 Zone 2
 Firth of Forth
 Offshore Wind Farm Development**

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1 Glossary of Terms

BMM – Brown and May Marine Limited

BWEA – British Wind Energy Association

Cefas – Centre for Environment, Fisheries and Aquaculture Science

CFP – Common Fisheries Policy

CSV – Comma separated variable

Defra – Department for Environment, Food and Rural Affairs

DFO – District Fishery Officer

EC – European Commission

EIA – Environmental Impact Assessment

EU – European Union

FEPA – Food and Environment Protection Act 1985

FIN – Fisheries Information Network

FIR – Fishing Industry Representative

FMA – Fishermen's Mutual Association Ltd. (Pittenweem)

FTOWDG – Forth and Tay Offshore Wind Developers Group

hp – horsepower

ICES – International Council for the Exploration of the Seas

IFG – Inshore Fisheries Group

MAGP - Multi Annual Guidance Programme

MHW – Mean High Water

MMO – Marine Management Organisation

MPA – Marine Protected Area

MSS – Marine Scotland Science

NESFO - North East of Scotland Fishermen's Organisation

NFPO - Northern Fisheries Producers Organisation

nm – nautical mile

RSS – Registry of Shipping and Seamen

SA – Scallop Association

SFF – Scottish Fishermen’s Federation

SFO - Scottish Fishermen’s Organisation

SI – Statutory Instrument

TAC – Total Allowable Catch

VCU – Vessel Capacity Unit

VMS – Vessel Monitoring System (satellite tracking data)

UK – United Kingdom

UWTV - Underwater Television

12nm limit – Territorial waters of EU Member States extend to 12nm. Member States manage these waters exclusively within these limits

6nm limit – exclusive access to UK vessels only within 6nm

6nm-12nm limit – some access to certain EU Member States in identified areas around the UK coast, based upon historic access

Under-10m –Category of fishing vessels that are less than 10m in length

10-15m – Category of fishing vessels that are between 10m and 15m in length

Over-15m – Category of fishing vessels that are greater than 15m in length

Creeling – The Scottish designation for potting

Demersal – Activities or species located near or on the sea bed

Pelagic – Activities or species located in the water column

Quota – A measure of the quantity of a species that can legally be landed within a set period

Development – Firth of Forth Round 3, Zone 2, Phase 1 Offshore Wind Farms Development

2 Introduction

Given below is the commercial fishing baseline assessment for the Firth of Forth Round 3, Zone 2, Phase 1 proposed offshore wind farms development, in the Forth and Tay area. The compilation of this report takes into account the requirements of the Marine Licence (replacing Section 5 Part II of the Food and Environmental Protection Act 1985 (FEPA), 1985 and Section 34 of Coast Protection Act, 1949); Department for Environment, Food and Rural Affairs (Defra) and Centre for Environment, Fisheries and Aquaculture Science (Cefas) as specified in the 2004 Guidelines (Cefas) and British Wind Energy Association (BWEA) 2004 Recommendations (BWEA 2004).

An Environmental Impact Assessment (EIA) will subsequently be undertaken that considers the development of the two offshore wind farms, Seagreen Alpha and Seagreen Bravo, within Phase 1 (hereafter referred to as 'the development') relative to any commercial fishing activities that occur within the area, and aids with mitigation strategies, if required.

Currently, there is no single data source or recognised model for establishing commercial fisheries baselines in discrete sea areas such as offshore wind farm sites. The following baseline has therefore been derived using data and information from a number of sources.

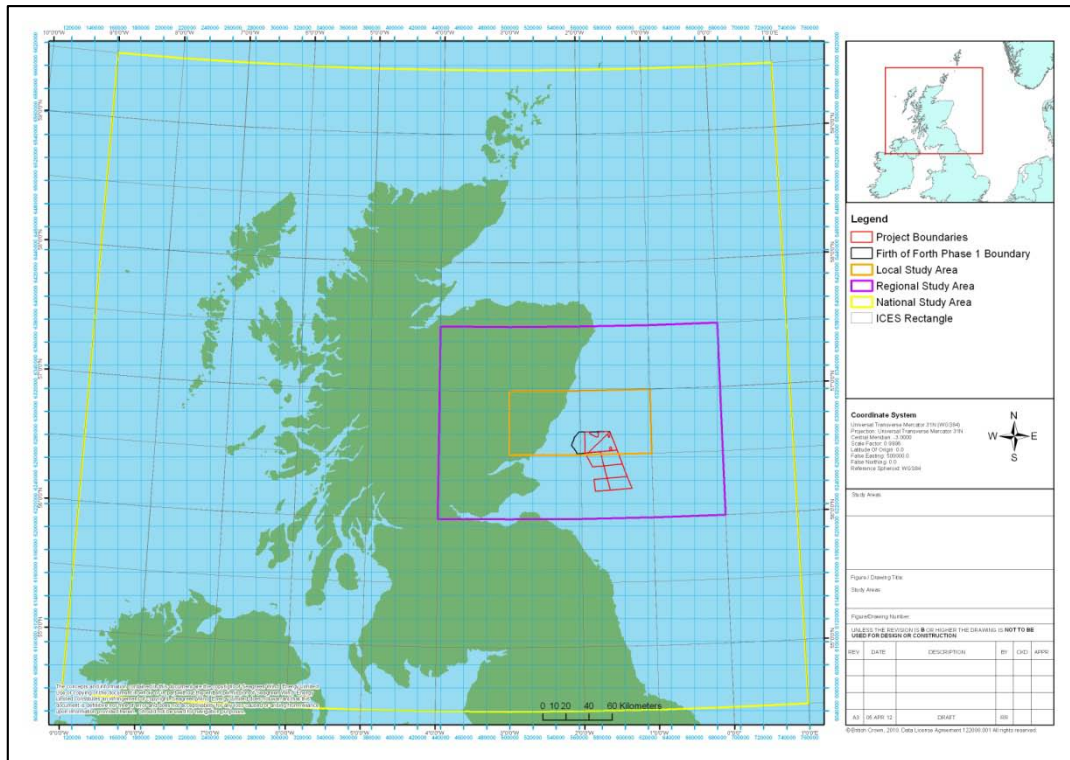
Establishing a fisheries baseline is complicated by the fact that fishing activities are not constant and may change over time. Fluctuations in landings, changes in legislation, economic constraints (i.e. fuel costs and crew availability) and environmental restrictions (i.e. weather) can contribute to variations in fishing activities and practices as a result.

This Report should be read in conjunction with the Commercial Fisheries Baseline Assessment Report for the Phase 1 Offshore Wind Farms Export Cable Route (Ref: A4MR-SEAG-Z-DEV210-CRP-093).

3 Study Area

The study area for the assessment of commercial fishing intensity and values is shown in Figure 3.1 below. The approach has been to provide a national overview allowing fishing grounds in the general area of the development to be described within a national context. The regional study area has been defined to ensure sufficient coverage of those areas surrounding the development. The local study area is the smallest spatial unit available for the collation of fisheries statistics. Where possible, fishing activities in the specific area of the development have also been described.

Figure 3.1 Study areas



4 Methodology

As mentioned previously, there is no single data source or recognised model for establishing fisheries baselines. Therefore an approach is required that incorporates a number of different data and information sources, each subject to varying sensitivities and limitations, as described in Section 5. The aim is to describe in progressive detail commercial fishing activities by building upon the sources and analysis described below:

4.1 MMO Fisheries Statistics (Landings Values and Effort Datasets)

Fisheries statistical data over a ten year period (2000 to 2009) has been collected and provided to Brown and May Marine Ltd. (BMM) by the Marine Management Organisation (MMO). The data include information on landings (weight and value) and effort (days fished). The fisheries statistics have been analysed to identify:

- Species targeted;
- Fishing methods used;
- Vessels by category (under-10 metres, 10-15 metres, over 15-metres and non-UK);
- Annual variations;
- Seasonal variations;
- Landings values and effort by port.

4.2 MMO Fisheries Surveillance Sightings Data

Fisheries surveillance sightings data record sightings of all fishing vessels in United Kingdom (UK) waters by fishing method and nationality and have been provided by the MMO. Although there are limitations to the use of this dataset (Section 5.2.2), the data is useful for the purpose of assessing the spatial distribution of fishing vessels in UK waters.

4.3 MMO Satellite Tracking (VMS) Data (over-15m vessels)

The MMO has also provided satellite tracking data (VMS) for the years 2005 to 2008 (inclusive). The 2009 dataset was released by Marine Scotland in a different format from the 2005 to 2008 dataset and is therefore separately analysed. The categorisation of the 2005 to 2008 data was unreliable and therefore the dataset has not been broken down in this way; however, the densities of recorded position plots of the 2009 data are shown in a larger grid format and vessels have been accurately categorised and the datasets have been classified by fishing method.

4.4 Marine Scotland Data Analysis

Marine Scotland has provided BMM with additional charts which illustrate the spatial densities of the over-15 metre fleet relative to recorded landings. This information supplements the data analysis already undertaken.

4.5 Fishery Specific Information

Information provided by fishermen and their representatives assists in the identification of the fisheries that occur in the regional and local areas relative to the development, and the vessels that target those fisheries. The information has been collated through ongoing consultation and liaison with fishing organisations, fishermen and their representatives.

4.6 Future Fisheries

Research and consultation were undertaken by BMM in order to identify potential future changes to the existing baseline relevant to the timeframe of the development. It should be recognised that this assessment is limited by the ongoing and proposed changes to the management of commercial fisheries.

5 Data and Information Sources, Sensitivities and Qualifications

The principal sources of data and information used were:

- International Council for the Exploration of the Seas (ICES);
- Marine Management Organisation (MMO);
- Marine Scotland;
- Marine Scotland Science (MSS);
- District Fishery Officers (DFO);
- The Scottish Fishermen's Federation (SFF);
- Fishermen and their representatives.

Consultation with local fishermen was principally undertaken by BMM, in association with the SFF and the Fishing Industry Representatives (FIRs) appointed on behalf of the Forth and Tay Offshore Wind Developers Group (FTOWDG).

It should be noted that in some instances fishing terminology varies by dataset. Specifically, the use of static gear to target crustaceans is known as 'potting' in England and 'creeling' in Scotland and some parts of northern England.

Analysis of the data and information sources are subject to the following qualifications, limitations, sensitivities and gaps.

5.1 International Council for the Exploration of the Seas (ICES)

ICES statistical rectangles are the smallest spatial unit used for the collation of fisheries statistics by the European Commission (EC) and Member States. The boundaries of ICES rectangles align to 1° of longitude and 30' of latitude. As shown in Figure 3.1 previously, the area of an ICES rectangle is relatively larger than the development, which is predominantly situated in ICES rectangle 42E8, and to a lesser extent 42E7. Furthermore, the distribution of fishing activity in an ICES rectangle is unlikely to be evenly distributed and analysis of fisheries statistics by ICES rectangles should take into account the small proportion of a statistical area that the development covers and the variation in the levels of activity within the development.

5.2 MMO Datasets

5.2.1 MMO Fisheries Statistics

The MMO collects and collates fisheries data for the whole of the UK by ICES rectangle. The primary source of data comes from the EC daily log sheets that the over-10 metre fleet must complete and submit.

As mentioned previously, it is unlikely that the spread of fishing activities are equal throughout the rectangles and therefore the limitations of this data source should be recognised and taken into consideration.

Currently, vessels under-10 metres in length are not required to submit daily log sheets, although voluntary submissions can be made. Local fisheries officers also undertake dockside checks on the under-10 metre fleet. To facilitate further collection of fisheries data from the under-10 metre fleet, two schemes have been introduced: The Shellfish Entitlement Scheme (2004), which is discussed further in Section 6.4, and the 'Registration of Buyers and Sellers of First Sale Fish and Designation Auction Site Scheme' (2005). Due to the relatively recent introduction of these schemes, it must be noted that prior to 2005 the MMO fisheries statistics for the under-10 metre fleet may, to some extent, underestimate the true levels of fishing in the area where a large percentage of the activity is by vessels in this category.

Vessels referred to as 'non-UK' in the MMO fisheries statistics only include foreign vessels landing into UK ports and therefore do not take into account non-UK vessels fishing in the area but landing into non-UK ports. The values given for the non-UK fleet derived from the analysis of this dataset should therefore take this into account and not be considered as a true indication of the total foreign activity in the area.

5.2.2 MMO Surveillance Sightings

To manage fisheries legislation, fishery protection boats and aircraft record surveillance sightings of all vessels in UK waters. This data is used to give an indication of the distribution of fishing activity by method and nationality, however it should not be used for quantitative assessments of activity due to the low frequency of flights over an area, which are generally once a week and only during daylight hours.

5.2.3 MMO UK Satellite Tracking (VMS) Data

Satellite tracking currently applies to all European Union (EU) registered fishing vessels over-15 metres in length. A vessel's position is transmitted approximately once every two hours via satellite link to the MMO and other national EU control centres. The MMO receives information from all UK vessels, and all non-UK vessels in UK waters. Information about non-UK vessels in UK waters cannot be disclosed by the MMO without prior permission from the vessels' Member State regulating body. It should be noted that satellite data does not differentiate between vessels steaming and vessels fishing and vessels stationary in port have not been included. The disclosure of independent UK vessels' identities is restricted under the Data Protection Act (1998).

A recent change in UK and EU policy has led to an alteration in the way satellite tracking data is released (2009 onwards). Vessel coordinates can no longer be released and instead the number of vessels by type is given in a grid of rectangles,

each approximately 70nm². These are then broken down by density of gear type, which was not possible with the 2005 to 2008 datasets. Due to the differences in format, the 2009 data has been independently analysed from the 2005 to 2008 dataset.

5.3 Marine Scotland Data Analysis

Charts have been derived by MSS and provided to BMM to assist in the establishment of a commercial fisheries baseline in the Forth and Tay area. The charts were produced by applying VMS records to the Fisheries Information Network (FIN), which is the Scottish Government's sea fisheries database. FIN holds information on voyages (catches, gear, and mesh size) and landings (weight, price at sale). Both the VMS records and FIN database use the *Registry of Shipping and Seamen (RSS)* number, which identifies vessels (this identifier is otherwise protected information) as a common denominator. *Logtime* (the date and time of each VMS transmission) identifies each vessel's voyage and enables the location of a vessel during each trip to be linked to the gear used and the weight of the landings.

In order to distinguish between vessels steaming and fishing, the speed of the vessel at the time of each VMS transmission has been used as a filter. It has been assumed that vessels travelling at speeds of over five knots would be steaming as opposed to fishing. The information provided in the charts below describes the landings of each fishing trip. A fishing trip generally comprises of a number of fishing events, however information on catches per fishing event are not available and due to this multiple fishing events all contribute to the overall landings weight for the fishing trip. All information provided in the charts below is anonymous and as has been previously stated, the VMS records are limited due to the inclusion of over-15 metre vessels only.

5.4 Fishermen and Fishermen's Representatives

Consultation has been undertaken with individual skippers and their representatives. Despite extensive consultation through open and advertised fisheries stakeholder meetings, comprehensive field work, and through the forum of the Inshore Fisheries Group (IFG), it is possible that certain individuals and some unaffiliated stakeholders may not have been included in the assessment. In the event that additional information is provided before the completion of the EIA, the assessment will be revised to reflect this.

6 Fisheries Control and Legislation

Whilst the international aspect of European fisheries management, such as the setting of quotas remains a reserved power, the implementation of fisheries regulations are devolved to the Scottish Government and administered by Marine Scotland.

6.1 Fishing Vessel Licenses

All fishing vessels must hold a valid license. A fishing license is a permit for the boat to be legally engaged in valid commercial fishing activities (i.e. to be entitled to catch fish and sell for profit). The current licensing scheme is designed to prevent increases in fleet numbers and catching capacities through the use of vessel capacity units (VCUs). Since 1983, the EU Common Fisheries Policy (CFP) has primarily dictated the structure and capacity of the UK and Scottish fishing fleets. Between 1997 and 2002, a Multi Annual Guidance Programme (MAGP) was devised within the CFP to manage fleet structures and fishing by method was restricted by capacity limits and effort reduction targets. When the MAGP ended in 2002, it was replaced by Member State level controls which implement a system of exit/entry restrictions to impose effort level limits. Essentially, a fleet capacity cannot be increased and vessels can only enter the fleet when an equivalent or larger capacity has exited.

The most significant reduction schemes upon the Scottish fleet in recent years have been the successive decommissioning schemes in 2001/2002 and 2003/2004, which removed 165 vessels from the national demersal fleet.

In 2010 the License Parking scheme was introduced by the Scottish Government to assist the fleet in adjusting to current restrictive conditions. The purpose of the scheme is to enable the licenses of multiple vessels to be combined and placed upon one vessel, therefore reducing both the long and short term fixed and variable costs through vessel sharing. The inactive vessels become 'parked', although this process is reversible. There is also the possibility that the effort generated by those vessels wishing to leave the industry can be bought and concentrated on the remaining vessels (this is not currently possible under licensing rules alone). Currently, over 40 vessels have applied and been accepted for the License Parking scheme. Ministers have also introduced a publicly funded (co-funded by the European Fisheries Fund) fleet resilience grant scheme through consultation with industry stakeholders and the Scottish Fisheries Council. This scheme is designed to dispose of those vessels that have been made dormant through License Parking.

6.2 Territorial Limits

The territorial fishing limits of an independent nation extend out to 12nm. Access within 6nm of the coast is generally restricted to the vessels of that country. Access to fishing grounds between the 6 to 12nm limit is only granted to vessels from other

Member States on the basis of historic rights. In Scotland's 6 to 12nm limit off the east coast, there are no historic rights for other EU vessels. Outside this limit (including the area of the development), any vessel from the EU could potentially fish the grounds.

6.3 Quota Restrictions

Quota for fish stocks, activities of fishing vessels and fishing effort (days at sea) in Scottish waters are managed and controlled by the Scottish Government¹. These controls and regulations have direct and indirect impacts on existing and future commercial fishery baselines.

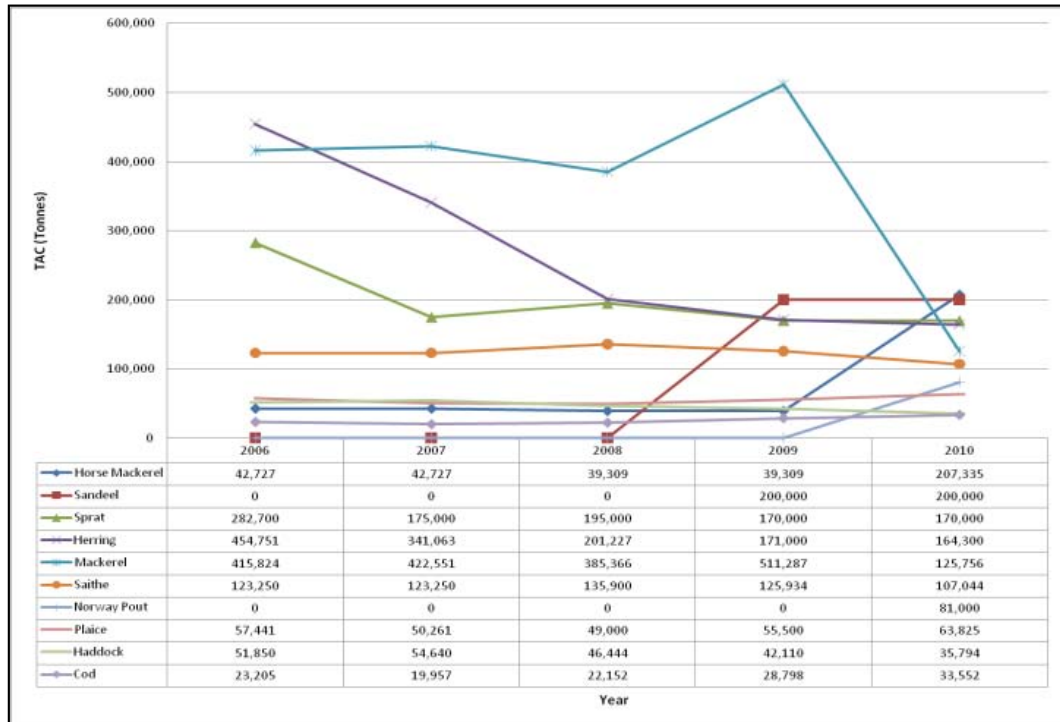
The primary responsibility of the CFP, since its ratification in the early 1980s, is the long-term conservation of fish stocks in EU waters. The CFP aims to protect pressure stocks (species identified as requiring management) through a system of quotas by ICES area and sub-area. A quota is measured as the quantity of landed fish and does not count discards. Total Allowable Catches (TACs) are calculated annually and allocated for each pressure stock by area or sub-area.

Figure 6.1 shows the TACs for ICES area IV (North Sea) for the top ten species (excluding blue whiting) for all countries. Blue whiting has been excluded due to its proportionally high quota allocation. It is targeted in deep, offshore waters and the TAC for this species is not limited to ICES area IV.

Figure 6.2 shows the TACs for the UK only in ICES area IV. It can be seen that herring currently has the largest TAC, although it has significantly decreased over the five year period. Demersal species such as haddock, plaice, anglerfish (monks), saithe, whiting and cod constitute a significant proportion of TACs for the UK. Nephrops, a shellfish, is also a species of national importance in the North Sea.

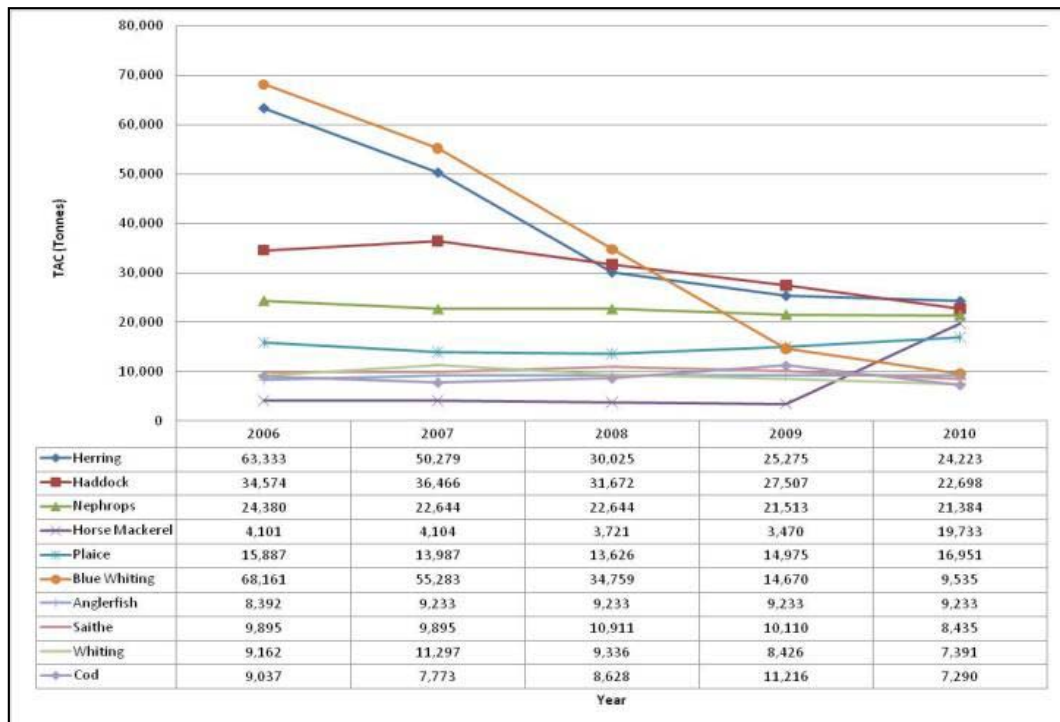
¹ The Scottish Government, Fisheries Section: <http://www.scotland.gov.uk/Topics/Fisheries/Sea-Fisheries>

Figure 6.1 Combined national TACs (top ten species) in ICES area IV (North Sea), 2006 to 2010 (excluding blue whiting)



(source: MMO)

Figure 6.2 TACs (top ten species) in ICES area IV (North Sea), UK only, 2006 to 2010



(source: MMO)

The TAC system has been heavily criticised by some in the industry because it is considered that the system encourages the discarding of either undersized or over-quota fish at sea. As of 2009, due to these concerns, the CFP has been undergoing review and therefore fisheries management policies and legislation could change significantly in the future. It is envisaged that the reform proposals will be adopted by the College of Commissioners (who implement new EU laws) in 2011².

6.3.1 Over-10 Metre Fleet

National, regional and individual quotas for the over-10 metre fleet are assigned on the basis of historical rights. Vessel quotas are tangible assets which are eligible to be sold or leased, and national quotas may be exchanged between Member States.

6.3.1.1 Effort (Days at Sea) Restrictions

In addition to quota restrictions, the over-10 metre fleet are subject to days at sea restrictions. This is part of the ECs policy which aims to reduce fishing effort in EU waters (one of the foundations of the CFP). The regulation itself (Annex V, EU Regulation 2287/2003) is somewhat complex, relating to gear type, mesh size and elected management periods, but effectively the measures included within the regulation effectively restricts vessels using demersal whitefish gears to the equivalent of 14 to 15 days a month at sea.

6.3.2 Under-10 Metre Fleet

In Scotland over two thirds of the fleet are under-10 metres³, although the sector receives only approximately 3% of the TAC. The under-10 metre fleet is also subject to sea area and quota restrictions for certain species. Restrictions on the nephrops fishery for the under-10 metre fleet were introduced in 1999 as catch limits. The aim of these restrictions is to maintain the integrity of recorded landings and manage the quota of the stock. All vessel owners are required to submit a NEP1 form to the local Fishery Office⁴ on a weekly basis if they land more than 12kg of nephrops (Category A (10 metre and under) License: Conditions (91) Non Sector). Table 6.1 lists the North Sea under-10 metre quota allocations for the past four years.

² Synthesis of the Consultation on the Reform of the Common Fisheries Policy (2010) *European Commission*

³ Natural Scotland (2010) Scottish Sea Fisheries Statistics 2009. *Scottish Government*

⁴ Day to day management of fishing activities is the responsibility of regional Fishery Officers

Table 6.1 Under-10 metre final quota allocations in the North Sea

Species	2007 quota (tonnes)	2008 quota (tonnes)	2009 quota (tonnes)	2010 quota (tonnes)
Nephrops	1587.3	1267.2	1078.8	882.0
Cod	281.0	403.1	561.3	588.0
Haddock	175.2	131.6	80.5	127.9
Sole	278.1	342.1	275.7	110.5
Plaice	43.3	54.2	40.7	40.4
Whiting	660.6	89.8	355.5	321.9
Skate & Rays	209.3	265.1	106.3	103.1
Lemon Sole & Witches	62.6	72.6	23.2	22.2
Turbot & Brill	22.7	17.9	15.0	10.6
Dab & Flounder	17.6	18.7	18.9	19.4

(source: MMO)

6.4 Shellfish Entitlements

In 2004, shellfish entitlements were issued to owners of licensed vessels with a track record (between 1st January 1998 and 31st March 2004) of landing over a particular weight of these species per year (200kg lobster and 750kg crab). This entitlement allowed unrestricted amounts of crab and lobster to continue to be caught. Vessels that are under-10 metres and have a shellfish entitlement must submit weekly log sheets for crab and lobster landings to the local Fishery Office.

6.5 Scallop Dredging Restrictions

The scallop fishery is managed in the main through minimum landing sizes (100mm shell width), restrictions on dredge numbers and seasonal closures. There are no other limits in the form of catch or effort quota. Restrictions on the number of dredges that can be used depend upon the distance the vessel is operating from the coast. In Scottish waters, vessels are allowed up to eight dredges per (vessel) side inside 6nm; ten dredges per side between 6 and 12nm and 14 dredges per side outside 12nm.

6.6 Regional and Local Fishing Restrictions

In Scottish waters, in addition to restrictions placed upon fishing activities transposed from EU and UK law, there are Scottish specific legislations, known as Statutory Instruments (SIs). SIs are a form of secondary legislation in Scotland, created by the Scotland Act (1998) and used to exercise devolved powers.

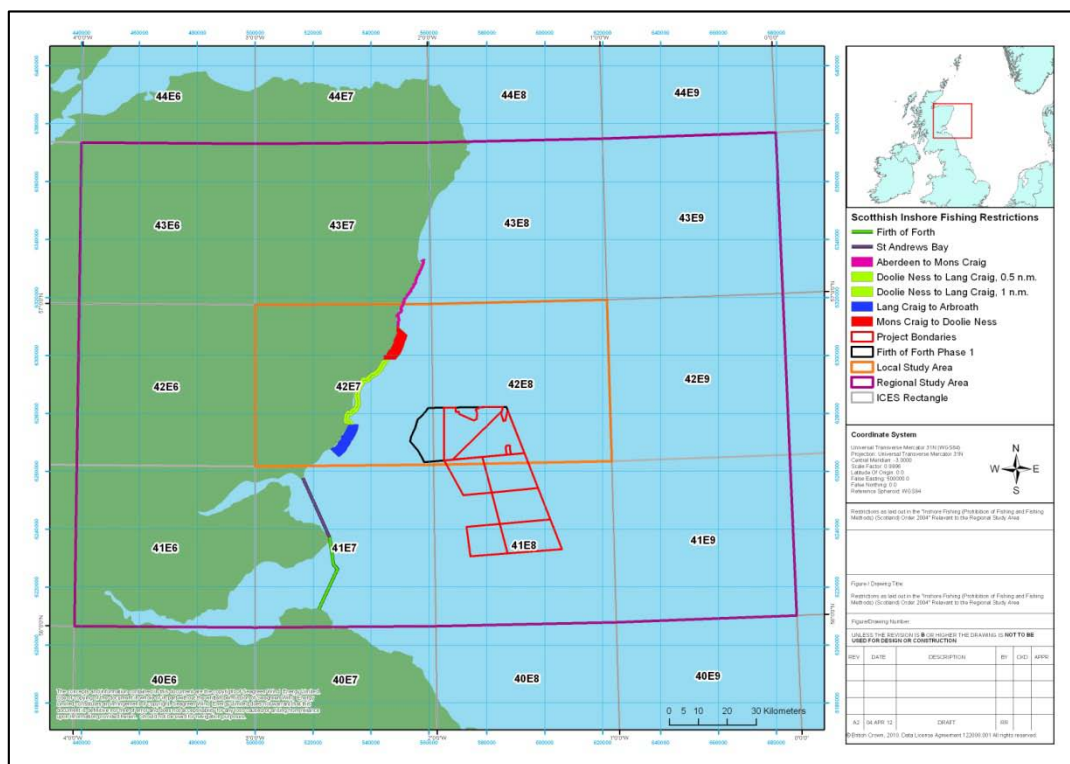
Figure 6.3 shows the SIs in the regional study area, there are several SIs in the Forth and Tay area. SIs are contained within the Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order 2004, No. 276 SI.

The restriction in St. Andrews Bay applies to the area inshore of the line drawn between Buddon Ness and Fife Ness. Use of mobile and active gear is prohibited all year.

The restriction in the Firth of Forth applies to the area inshore of the line drawn between Fife Ness Lighthouse and North Ness on the Isle of May, along the coast of the Isle of May to South Ness and on to the mainland at Tantallon Castle. Vessels operating demersal gear with a length of over 16.77m are prohibited from fishing entirely. Any category of vessel fishing pelagic (mid water) species is permitted.

All mobile gear is prohibited in the area of water within two miles of the Mean High Water (MHW) mark from Lang Craig to Arbroath. Between Doolie Ness and Lang Craig, all mobile gear is prohibited between 1st October and 31st March each year within one mile of the MHW mark, and between 1st April and 30th September within one half mile of the MHW mark. The use of mobile gear is prohibited all year in the area of water within two miles of the MHW mark, bounded by a line drawn from Mons Craig to Doolie Ness.

Figure 6.3 Restrictions upon inshore fisheries activities relevant to the regional study area



(source: Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order 2004, No. 276 SI)

7 MMO Fisheries Statistics (Landings Values and Effort Datasets)

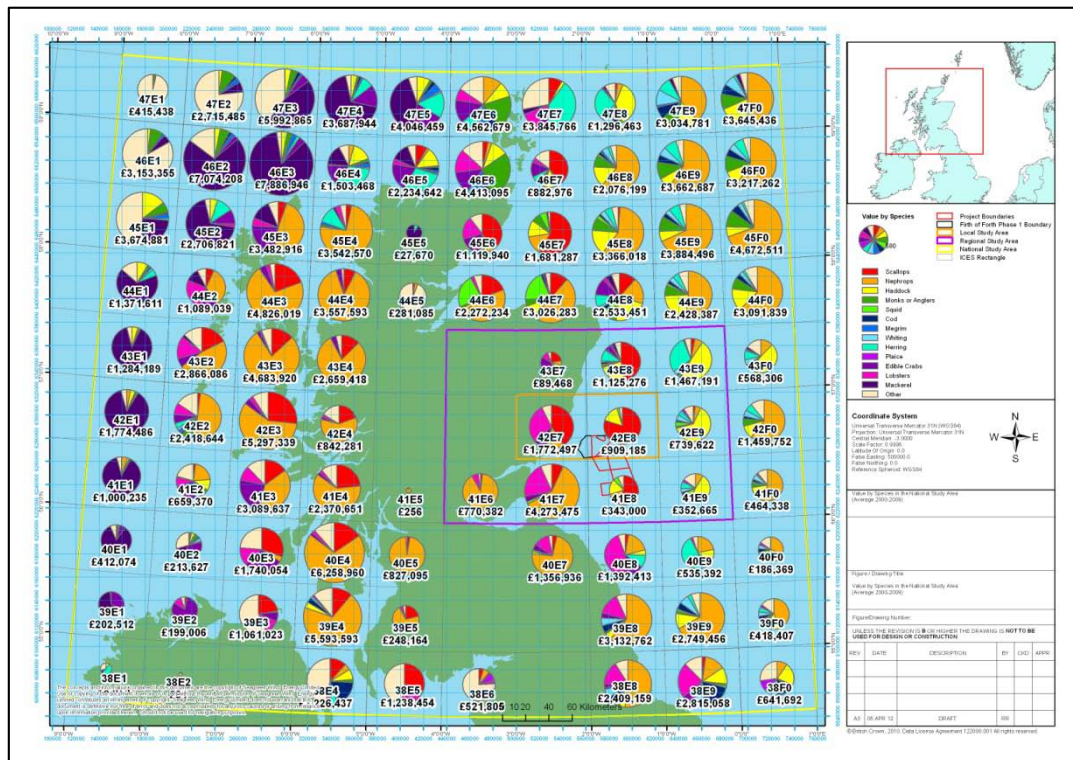
7.1 Landings Values

7.1.1 National Overview

Figure 7.1 and Figure 7.2 display the total landings values (averaged 2000 to 2009) by species and method, respectively, in the national study area. The figures demonstrate that ICES rectangles 42E7 and 42E8 within which the development is located contain fishing grounds that are of low importance on a national scale. The majority of landings in 42E8 are comprised of boat dredged King scallops, while the landings in 42E7 are comprised of creel caught shellfish and boat dredged scallops.

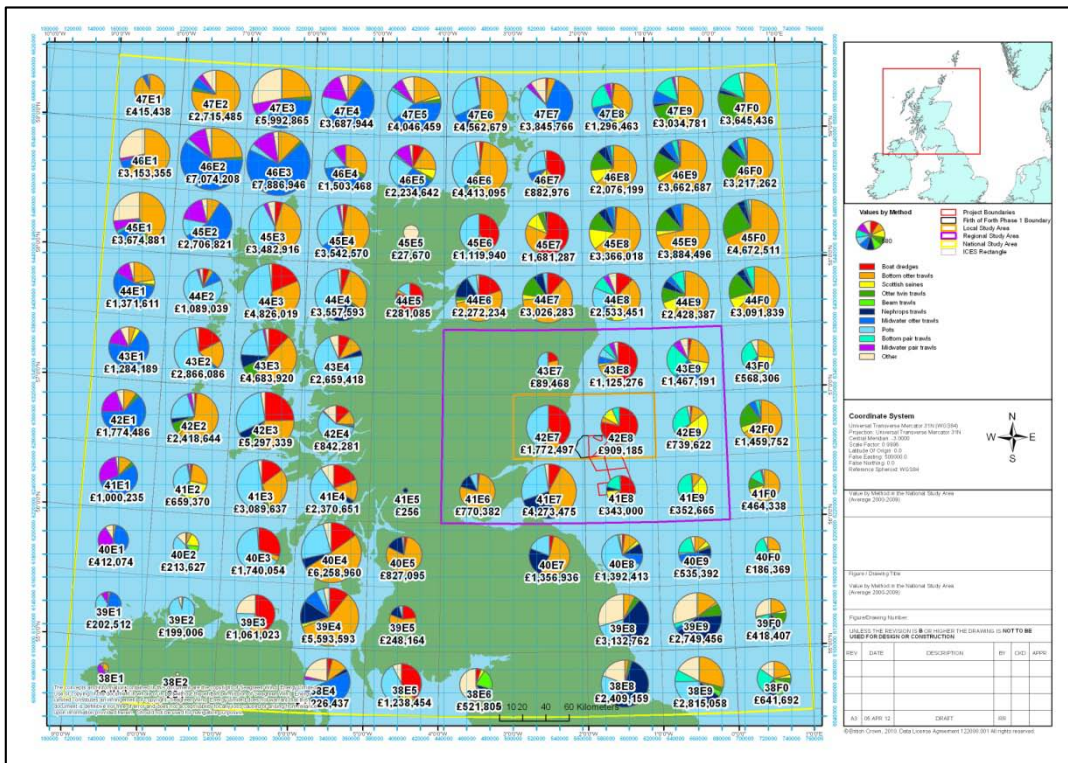
Figure 7.3 shows scallop landings on a national scale. It can be seen that scallop landings in rectangles 42E7 and 42E8 are comparable to rectangles recording the highest values in the Moray Firth and slightly lower than values recorded on the west coast.

Figure 7.1 Landings values by species (average 2000 to 2009) in the national study area



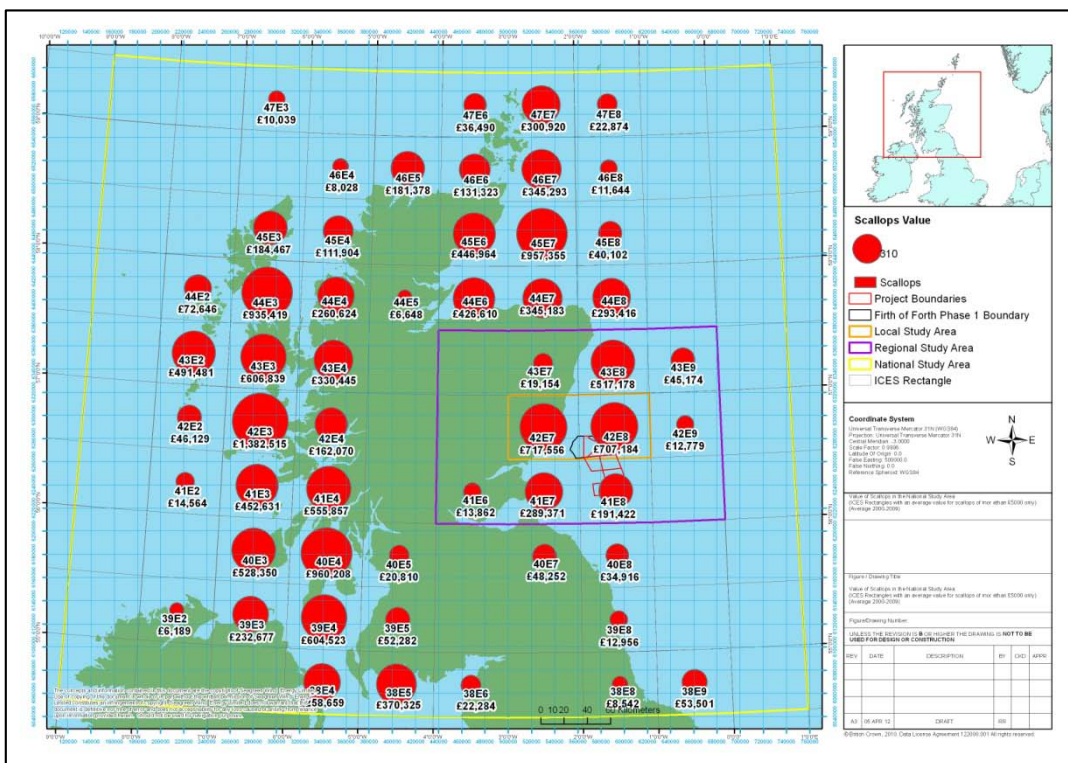
(source: MMO)

Figure 7.2 Landings values by method (average 2000 to 2009) in the national study area



(source: MMO)

Figure 7.3 Landings values of scallops (average 2000 to 2009) in the national study area



(source: MMO)

7.1.2 Regional Study Area

Figure 7.4 and Figure 7.5 show landings values in the regional study area (averaged 2000 to 2009) by species and method, respectively.

Dredging for King scallops is the principal activity in central (north-south) and north western rectangles.

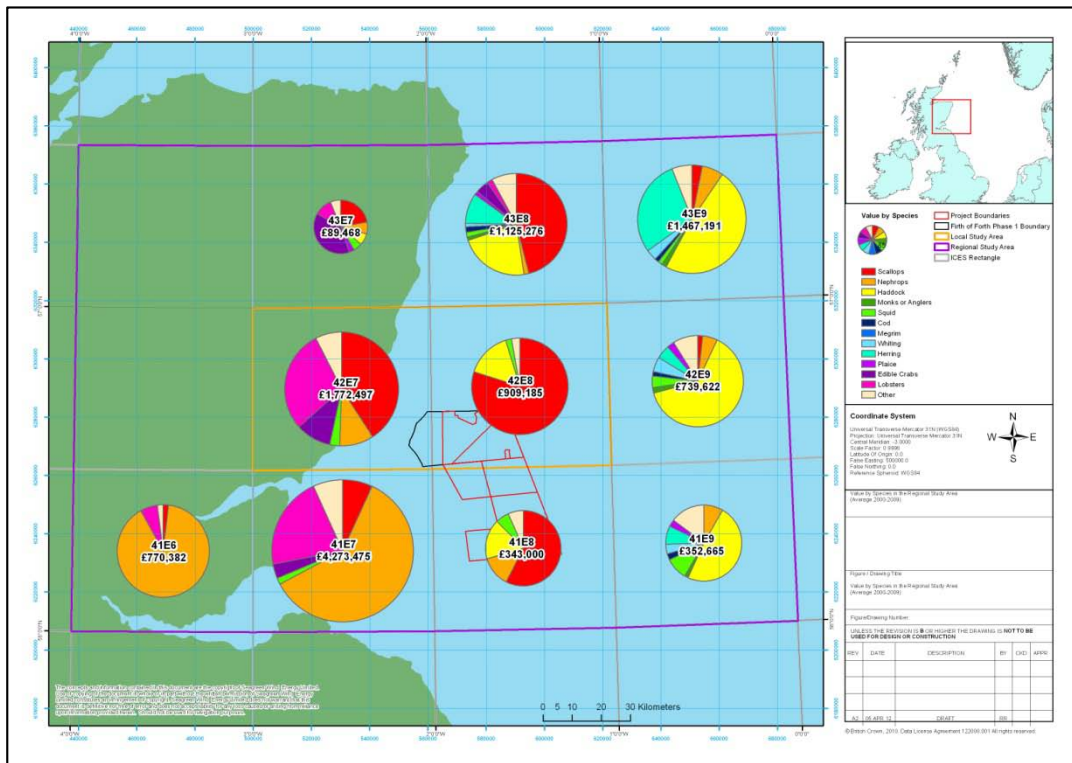
Landings for nephrops are high in the south east of the regional area and are principally targeted by demersal otter trawlers. In the dataset provided by the MMO, trawlers for nephrops are variously listed as demersal otter trawlers and nephrops trawlers (the same category of vessel), as well as by twin rigs (demersal otter trawlers configured to tow two nets). Static gear vessels operating creels in inshore waters also target nephrops, but this method produces considerably lower recorded levels of landings.

Whitefish, such as haddock and cod, record moderate landings further offshore, and to a lesser extent in the central rectangles. The whitefish fishery is targeted by demersal otter trawlers and Scottish seine netters.

There are relatively high landings of crustaceans targeted by static gear vessels in coastal rectangles, the majority of which comprise of lobster, although edible and velvet crabs are also landed.

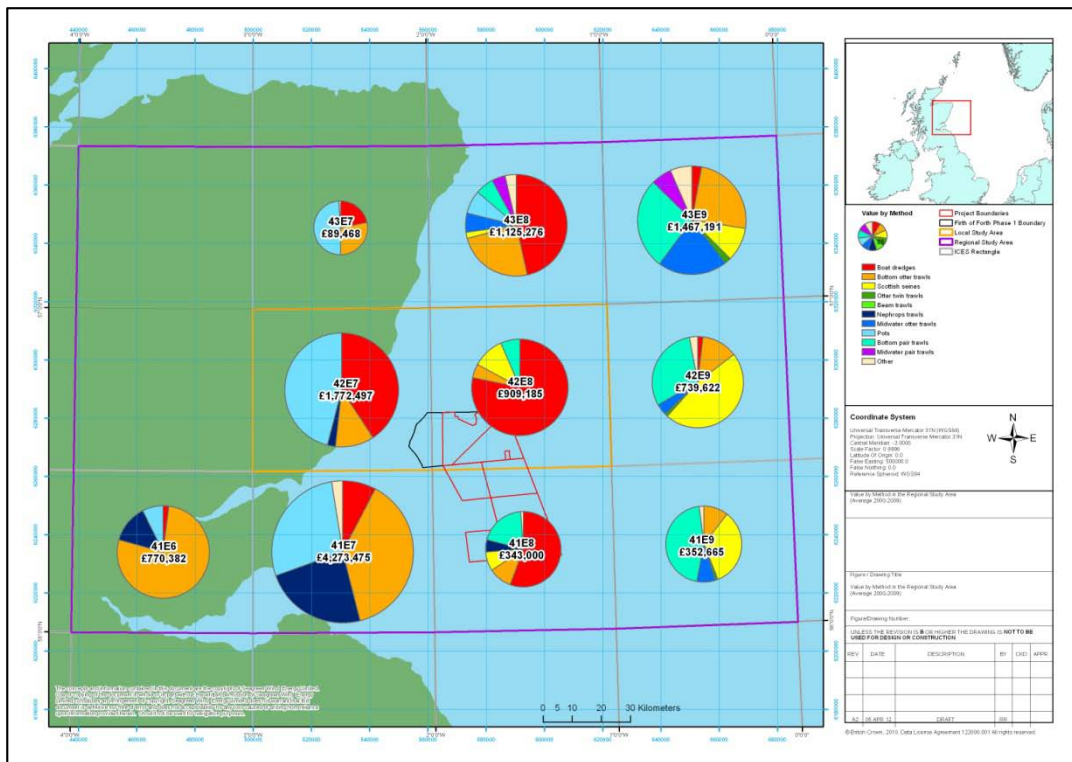
Figure 7.6 shows that the majority of the vessels in the regional study areas are over-15 metres in length and therefore VMS tracked. Lower levels of activity are undertaken by vessels of 10-15 metres and under-10 metres, with the under-10 metre fleet predominantly being recorded in coastal rectangles. There is negligible recorded foreign vessel activity.

Figure 7.4 Landings values by species (average 2000 to 2009) in the regional study area



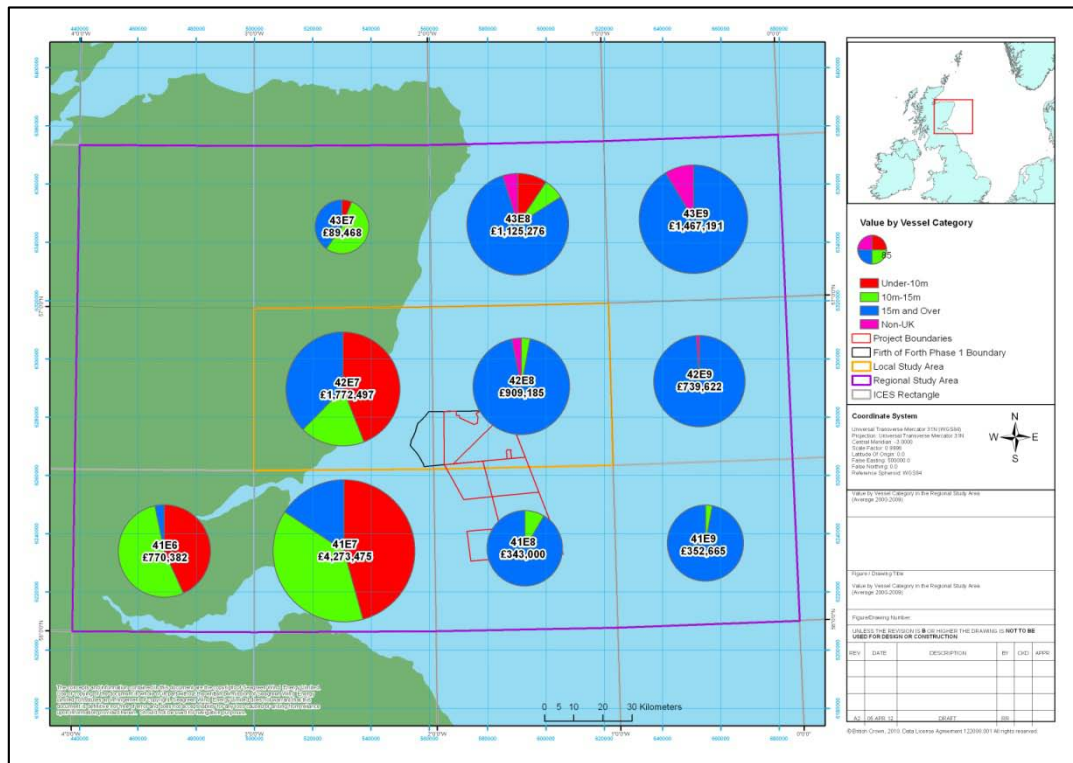
(source: MMO)

Figure 7.5 Landings values by methods (average 2000 to 2009) in the regional study area



(source: MMO)

Figure 7.6 Landings values by vessel category (average 2000 to 2009) in the regional area



(source: MMO)

7.1.3 Local Study Area (ICES Rectangles 42E7 and 42E8)

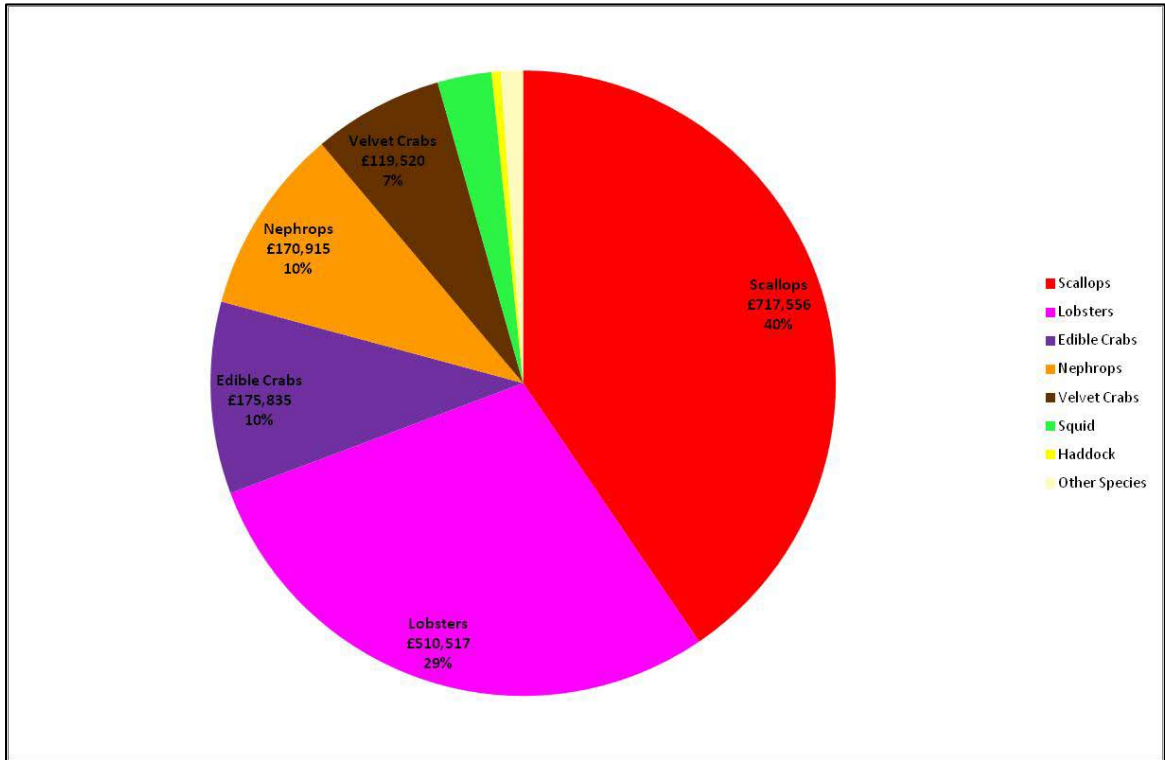
Figure 7.7 illustrate that scallops represent the highest landings values in rectangle 42E7 (£717,556; 40% of the total). Lobsters are also an important species targeted in rectangle 42E7 and represent 29% (£510,517) of the total average landings values. The remainder of landings values are principally comprised of edible crabs (£175,835; 10%), nephrops (£170,915; 10%) velvet crabs (£119,520; 7%) and squid (£49,567; 3%).

Figure 7.8 indicates that scallops represent the highest landings values in rectangle 42E8 (£707,184; 78% of the total). The remainder of landings values are principally comprised of haddock (£135,528; 15%), squid (£17,517; 2%) and lemon sole (£10,556; 1%).

Figure 7.9 and Figure 7.10 show that boat dredges are the sole fishing method targeting scallops. Crustaceans, including lobster and edible and velvet crabs, are targeted by creels. Bottom otter trawlers (including nephrops trawlers) principally target nephrops. Squid and haddock are targeted by demersal otter trawl vessels (including pair trawlers), although haddock is also targeted by Scottish seine netters. Other whitefish, including plaice, lemon sole and whiting are targeted offshore by demersal otter trawlers and Scottish seine netters.

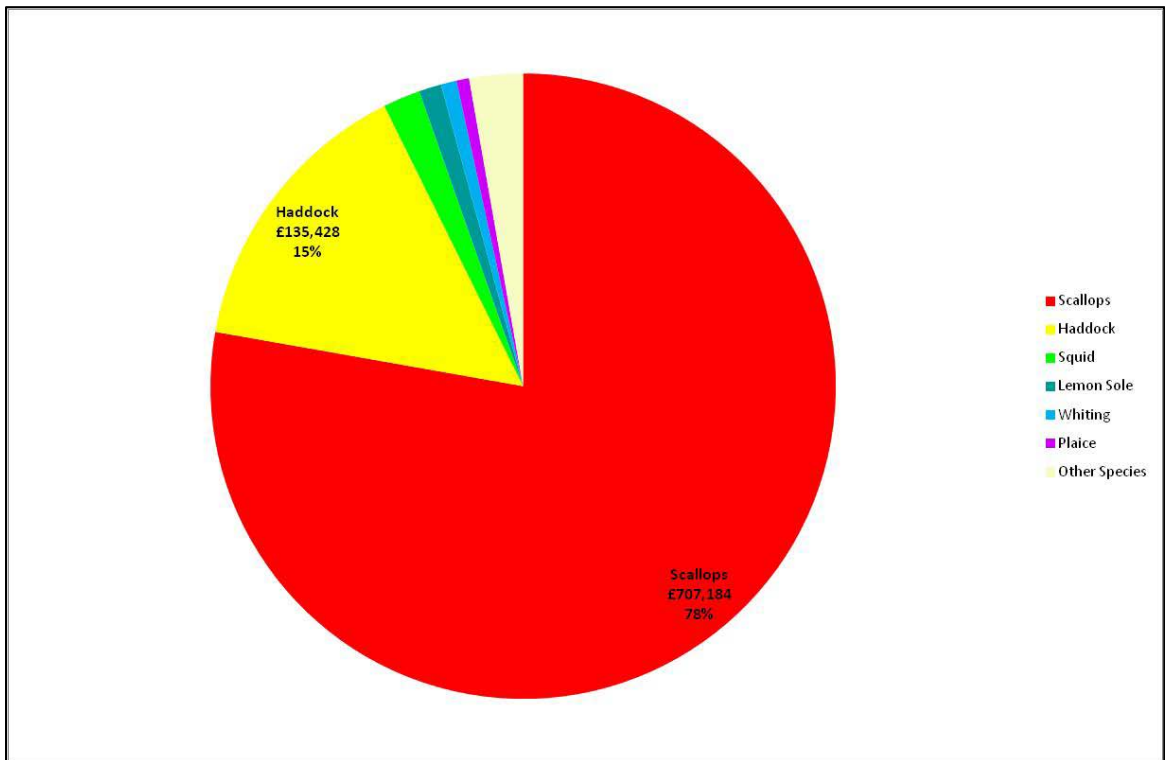
Figure 7.11 and Figure 7.12 demonstrate that the large majority of scallop dredges are over-15 metres in length, although a small percentage in rectangle 42E7 are between 10 and 15 metres. Figure 7.11 illustrates that the majority of creelers are under-10 metres in length, although a small percentage are between 10 and 15 metres. Demersal trawl vessels in rectangle 42E7 are utilised, in the main, by the over-15 and 10-15 metre fleets, although a small percentage are employed by the under-10 metre fleet. Figure 7.12 shows that the majority of Scottish seine netters and demersal trawlers in 42E8 are over-15 metres in length. A negligible proportion of the scallop dredge fleet is recorded, in both rectangles, as being non-UK.

Figure 7.7 Percentage distribution of landings values by species in ICES rectangle 42E7



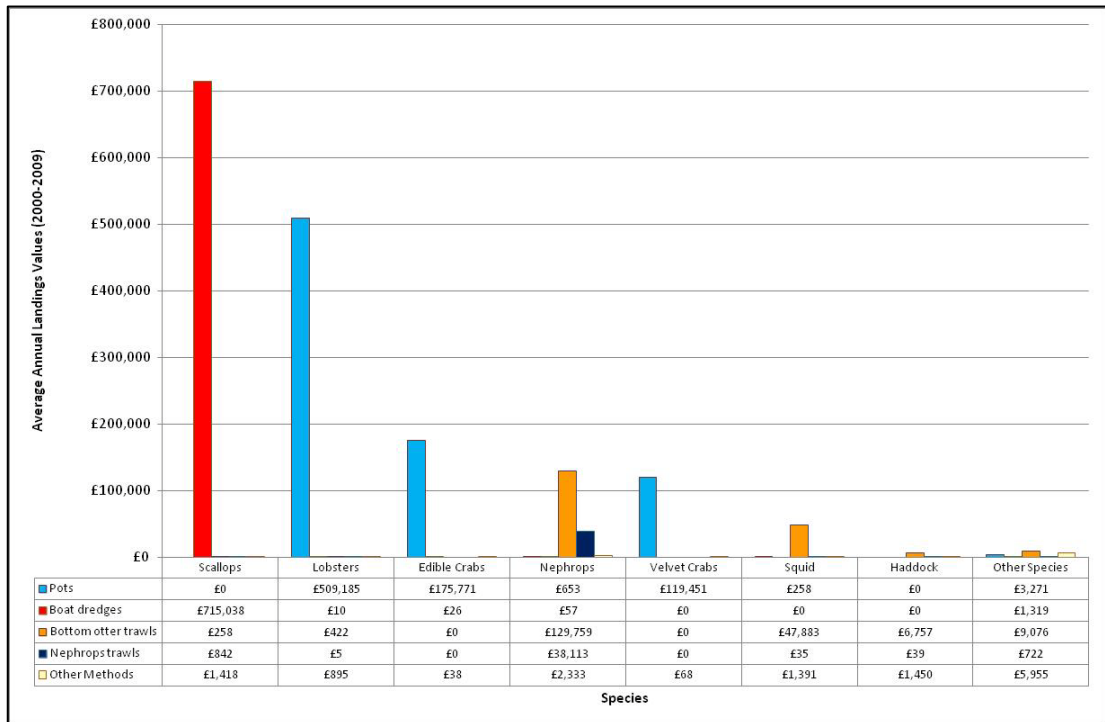
(source: MMO)

Figure 7.8 Percentage distribution of landings values by species in ICES rectangle 42E8



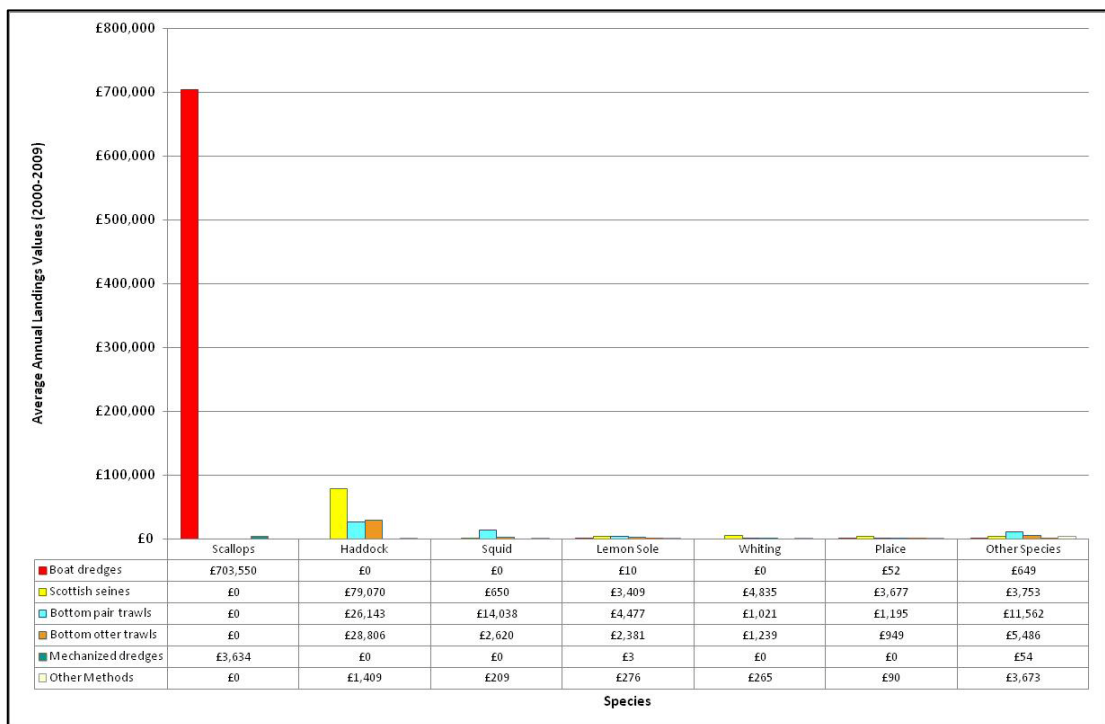
(source: MMO)

Figure 7.9 Average annual landings values (average 2000 to 2009) by species and methods in ICES rectangle 42E7



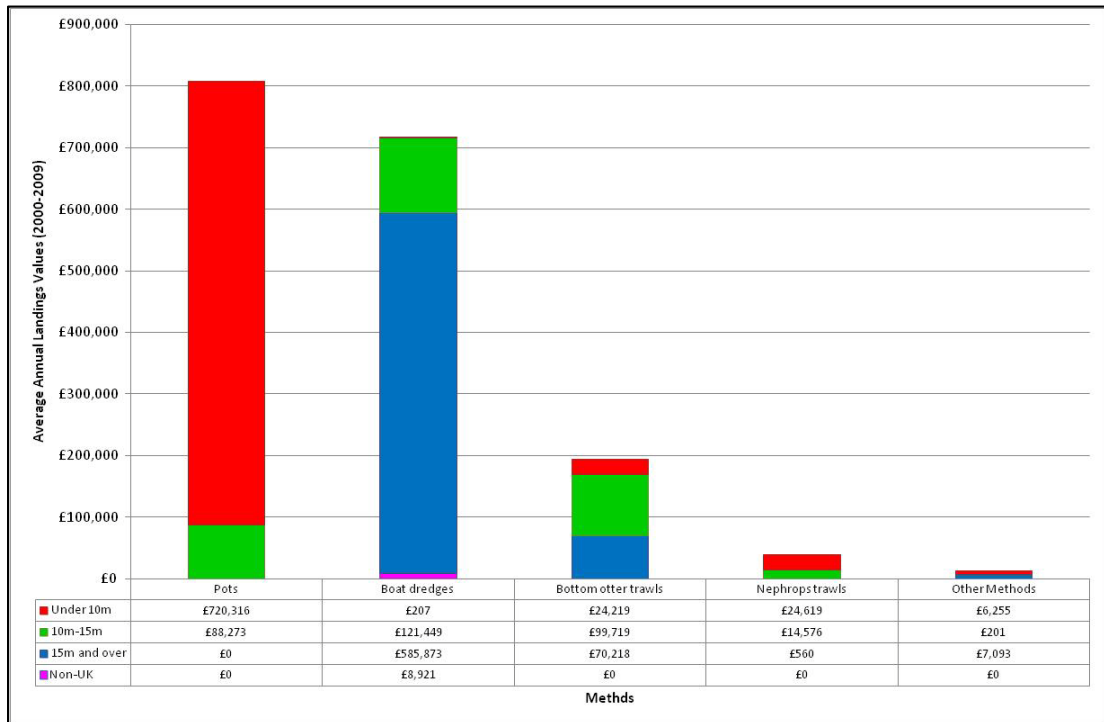
(source: MMO)

Figure 7.10 Average annual landings values (average 2000 to 2009) by species and methods in ICES rectangle 42E8



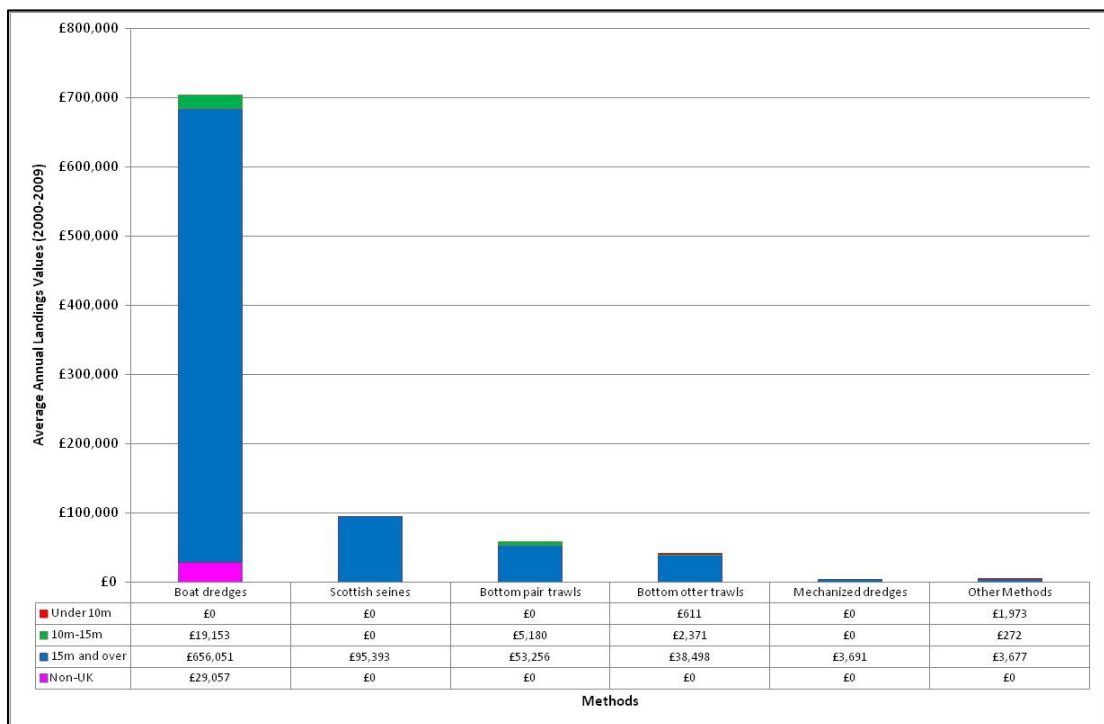
(source: MMO)

Figure 7.11 Average annual landings values (average 2000 to 2009) by methods and vessel lengths in ICES rectangle 42E7



(source: MMO)

Figure 7.12 Average annual landings values (average 2000 to 2009) by methods and vessel lengths in ICES rectangle 42E8



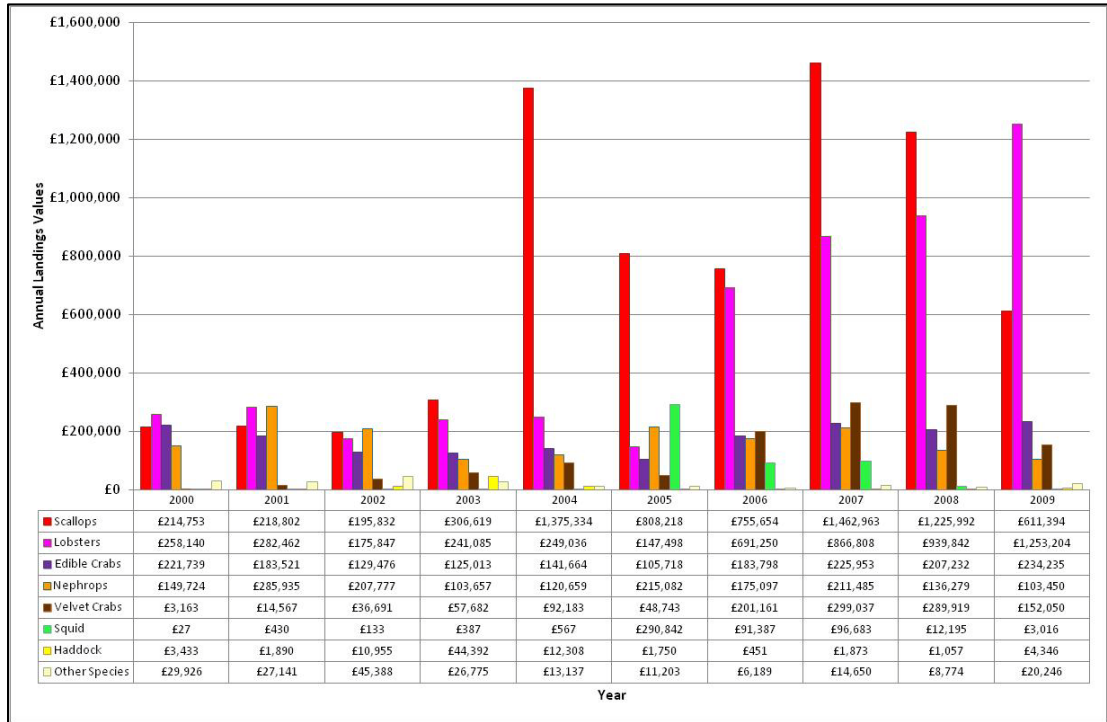
(source: MMO)

7.1.3.1 Annual Landings

Figure 7.13 shows the annual variations in landings values by species in rectangle 42E7. Since 2004, the values for the majority of commercial species landed from rectangle 42E7 have increased. Landings of scallops increased in 2004, although since then the landings values have varied significantly, from £611,394 in 2009 to £1,462,963 in 2007. Landings of lobsters show a pattern of significantly increased values since 2006, likely as a result of regulations introduced to record landings for the under-10 metre fleet. Landings values of edible crabs have remained roughly stable over the ten year period, with a slight decline between 2002 and 2005. Landings of velvet swimming crab have shown an increase, from £3,163 in 2000 to £299,037 in 2007. Squid landings, since 2005, have recorded substantial variations in values, from £3,016 in 2009 to £290,842 in 2005. Landings of nephrops and haddock have remained relatively stable over the ten year period.

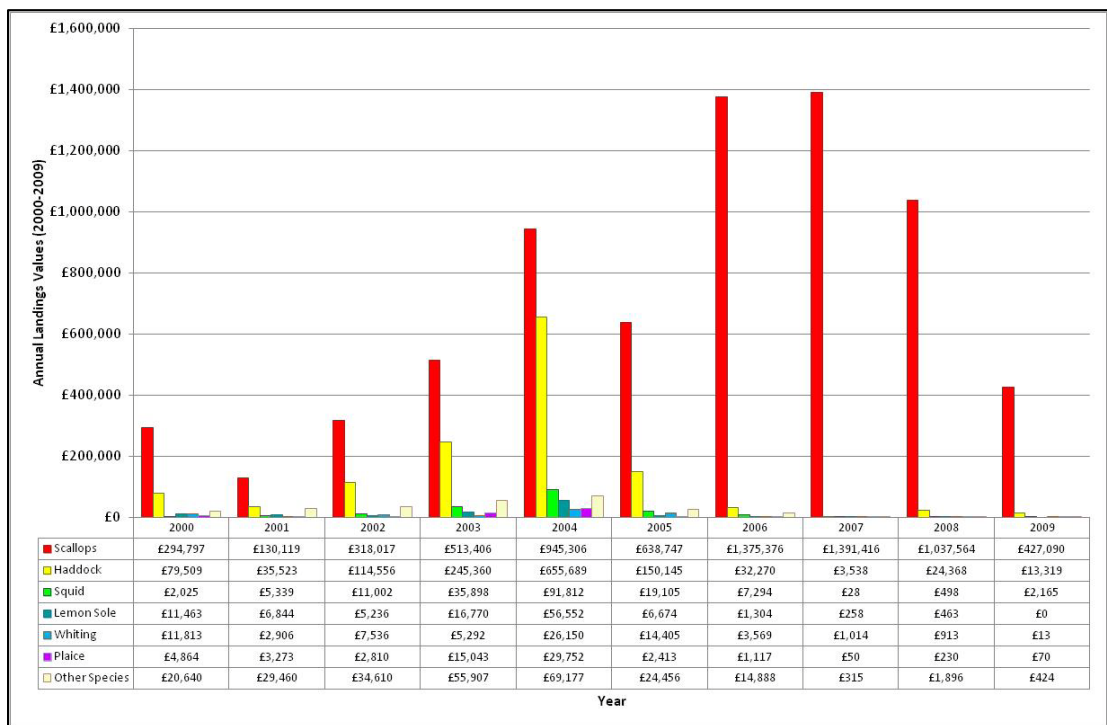
Figure 7.14 illustrates the annual variations in landings values by species in rectangle 42E8. Landings values fluctuate over the ten year period and are largely dependent on the activity of scallop dredges. Landings values of scallops increased from £130,119 in 2001 to £1,391,416 in 2007, although there was a decline during 2005. Since 2007 however, landings values have declined, recording a low of £427,090 in 2009. Landings values of haddock increased from £35,523 in 2001 to £655,869 in 2004, although since then values have decreased, with only £13,319 worth of haddock landed in 2009. The squid, lemon sole, whiting and plaice fisheries all experienced a relative peak in values during 2004, although it should be noted that these landings values are comparatively low.

Figure 7.13 Annual variations in landings values of species in ICES rectangle 42E7



(source: MMO)

Figure 7.14 Annual variations in landings values of species in ICES rectangle 42E8



(source: MMO)

7.1.3.2 Seasonality

Figure 7.15 illustrates the seasonal trend of landings for all species in rectangle 42E7. It can be seen that total landings are broadly highest in late summer, between July and October, with the highest values recorded in August and September (£283,984 and £235,628, respectively). Moderate values are recorded between March and June, and the lowest during February (£94,695).

Figure 7.16 to Figure 7.18 show the seasonal variations in landings values for the top three species recorded in rectangle 42E7; scallops, lobsters and edible crabs.

Figure 7.16 shows that scallop landings values fluctuate slightly throughout the year. Lower values are recorded during late autumn (October and November) and July. Landings values are highest during September (£87,511), with moderate values recorded in the remainder of the year.

Figure 7.17 shows the average seasonality of lobsters. High landings values are recorded during the summer and early autumn (July, August, September and October), with values in the rest of the year being comparatively lower.

Figure 7.18 illustrates the average seasonality of edible crabs. It is of note that catches are more consistent throughout the year than that of lobsters. The highest landings values are recorded during late summer and into autumn (August to November, inclusive). The lowest landings values are recorded during February and March, with moderate values recorded in the remainder of the year.

Figure 7.19 illustrates the seasonal trend of landings for all species in rectangle 42E8. It can be seen that total landings are the highest during spring and early summer (April to June, inclusive). The lowest landings are recorded during the autumn and winter months (September to February, inclusive), with moderate values recorded in the remainder of the year.

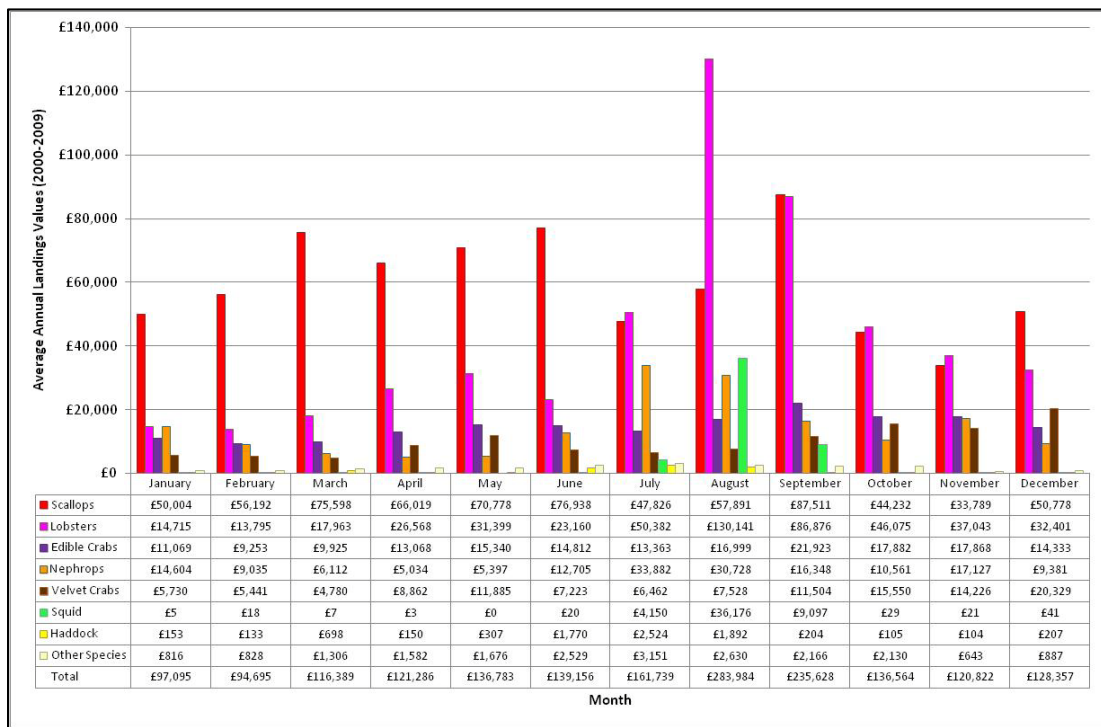
Figure 7.20 to Figure 7.22 show the seasonal variations in landings values for the top three species recorded in rectangle 42E8: scallops, haddock and squid.

Figure 7.20 shows the average seasonality of scallops. It is of note that landings vary considerably throughout the year, in contrast to the relatively steady landings recorded in 42E7. Landings peak in spring (March to June, inclusive). Lower landings values are recorded in the autumn (September to November, inclusive) and during January. Moderate values are recorded in the remainder of the year.

Figure 7.21 illustrates the average seasonality of haddock. Landings peak in summer (May to August, inclusive) with relatively low values recorded in the remainder of the year.

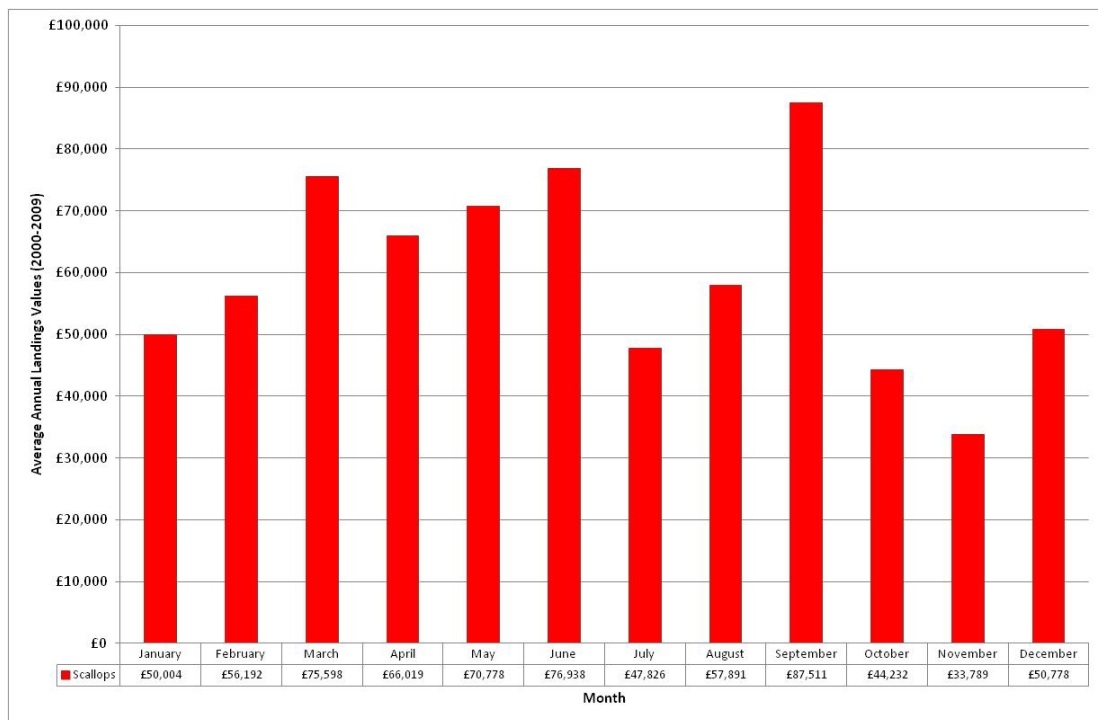
Figure 7.22 shows that squid is heavily targeted in June with considerably lower landings values for the remainder of the year.

Figure 7.15 Average annual (2000 to 2009) seasonality of species in ICES rectangle 42E7



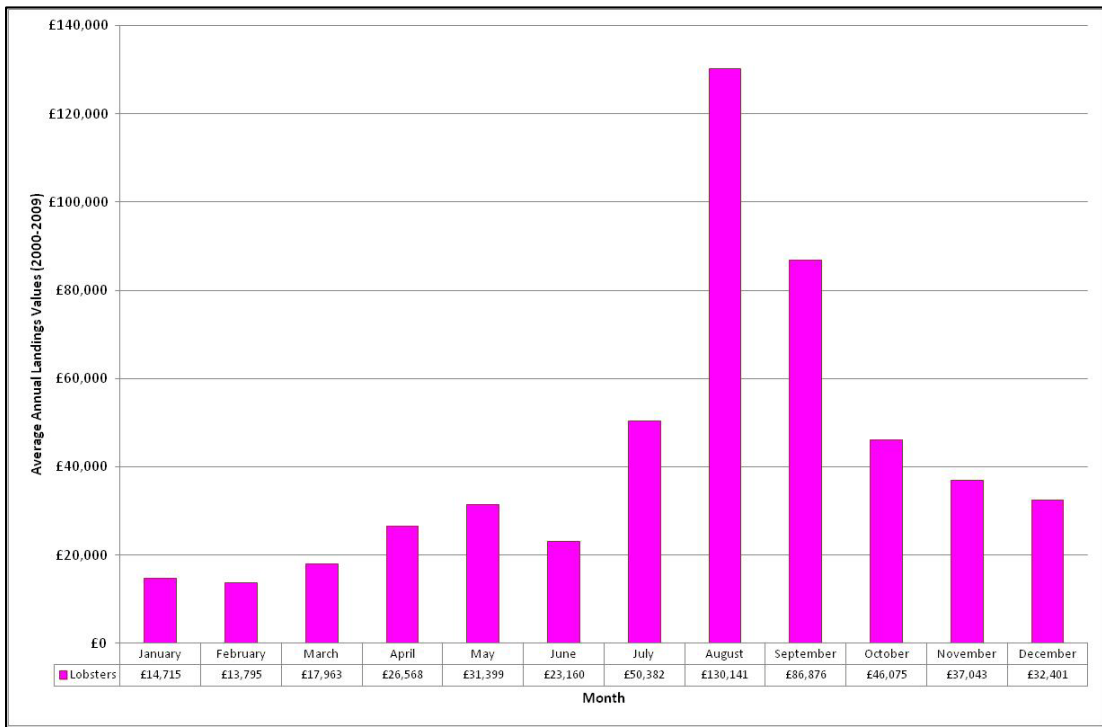
(source: MMO)

Figure 7.16 Average annual (2000 to 2009) seasonality of scallops in ICES rectangle 42E7



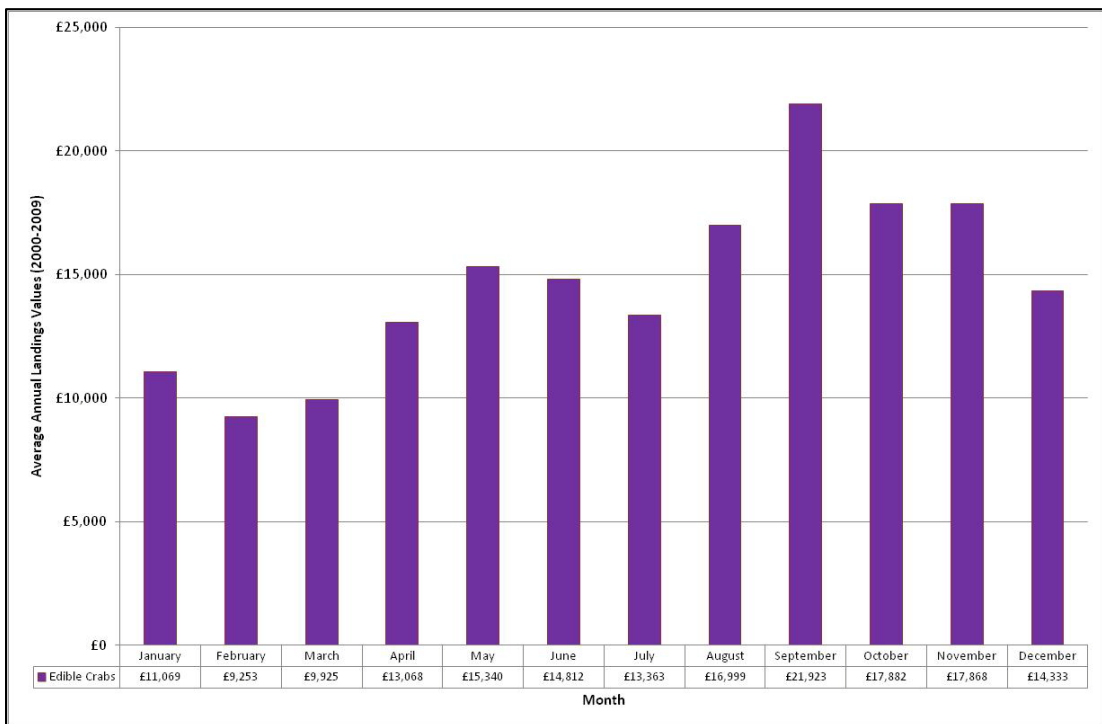
(source: MMO)

Figure 7.17 Average annual (2000 to 2009) seasonality of lobsters in ICES rectangle 42E7



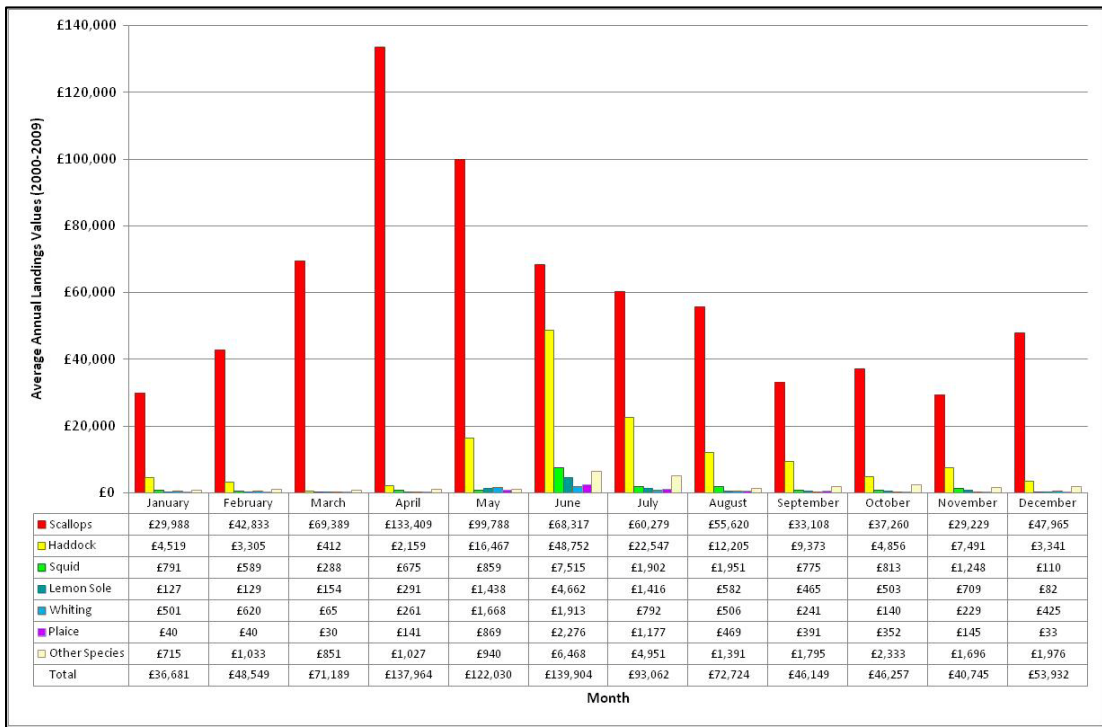
(source: MMO)

Figure 7.18 Average annual (2000 to 2009) seasonality of edible crabs in ICES rectangle 42E7



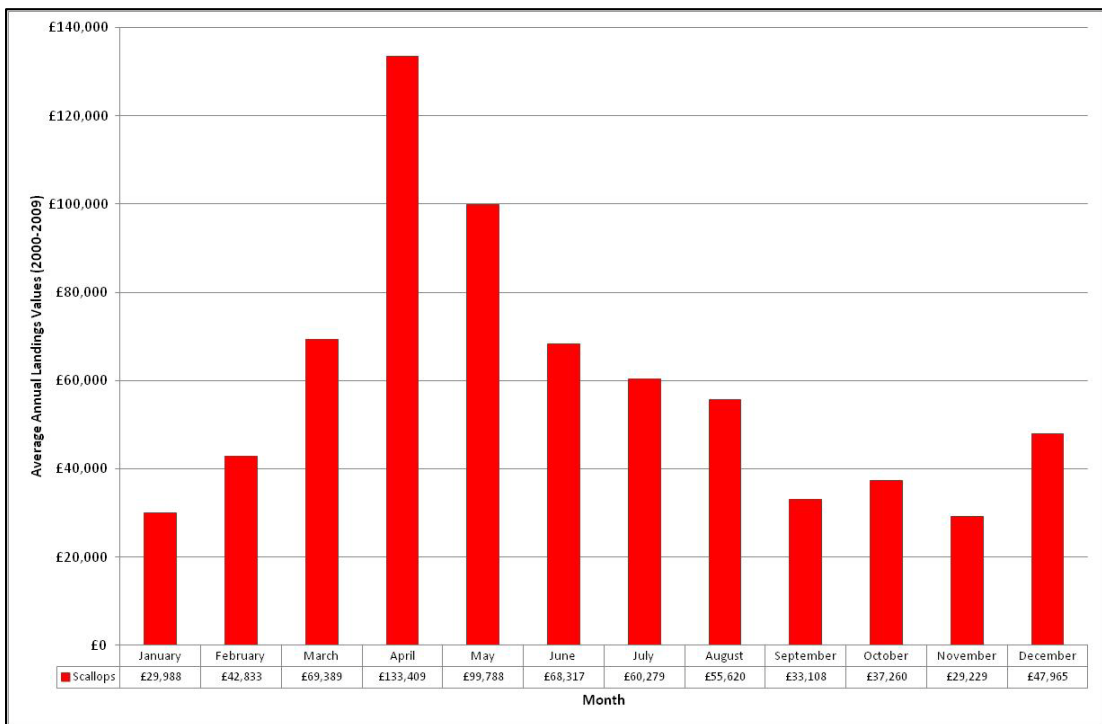
(source: MMO)

Figure 7.19 Average annual (2000 to 2009) seasonality of species in ICES rectangle 42E8



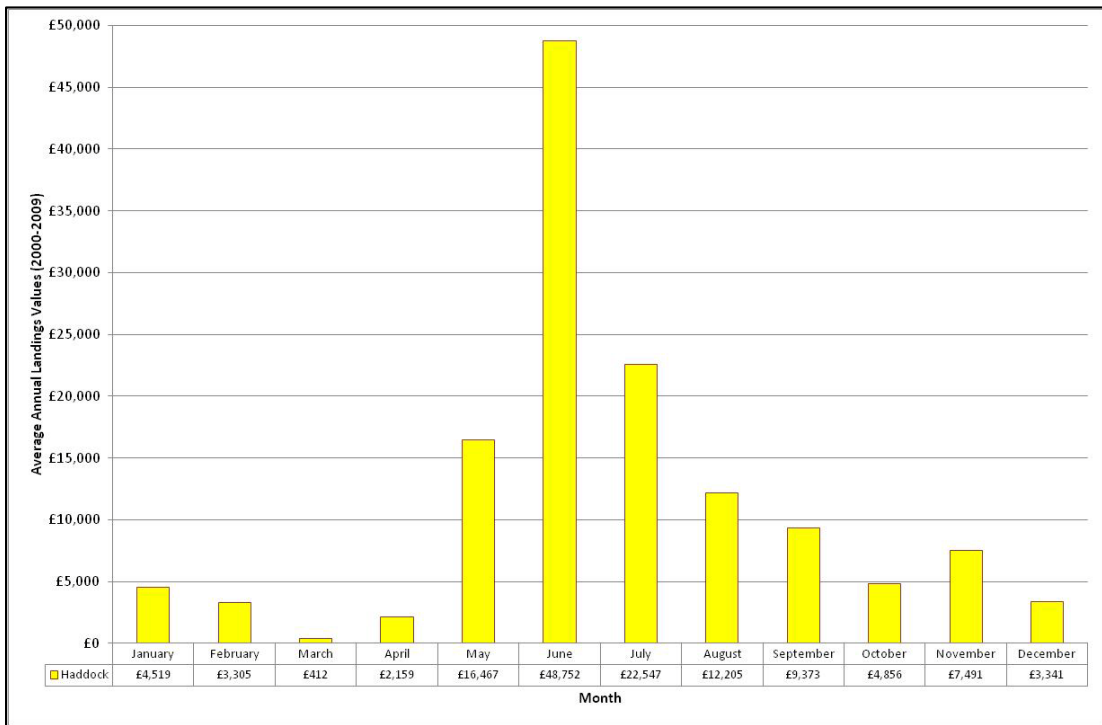
(source: MMO)

Figure 7.20 Average annual (2000 to 2009) seasonality of scallops in ICES rectangle 42E8



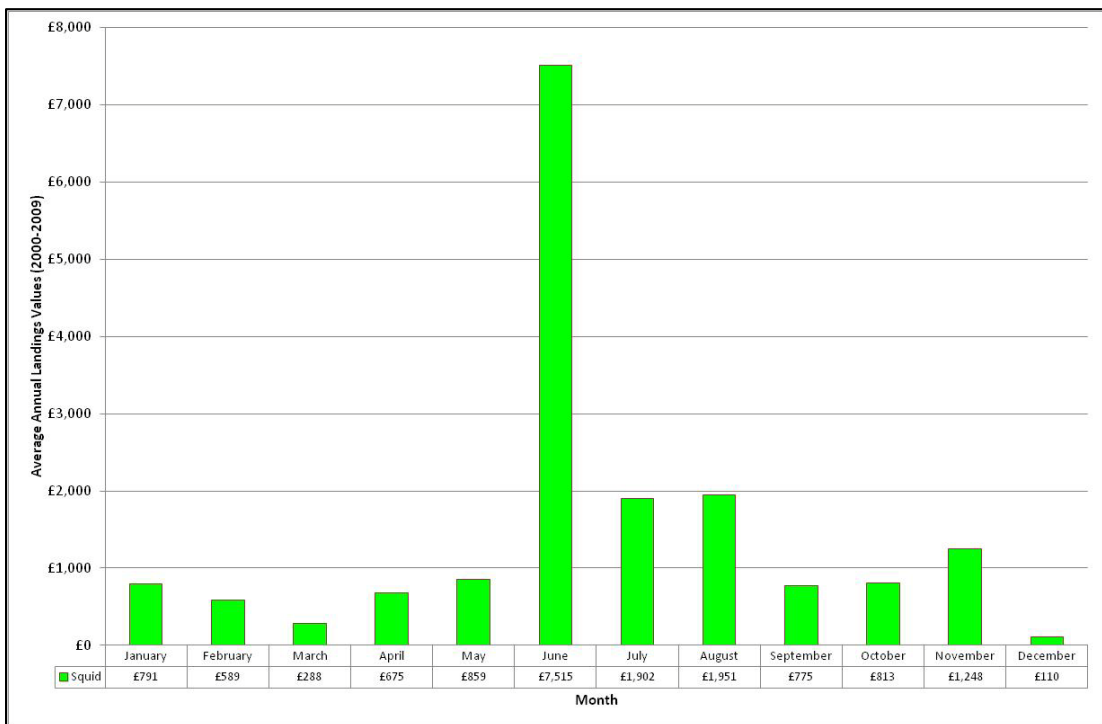
(source: MMO)

Figure 7.21 Average annual (2000 to 2009) seasonality of haddock in ICES rectangle 42E8



(source: MMO)

Figure 7.22 Average annual (2000 to 2009) seasonality of squid in ICES rectangle 42E8



(source: MMO)

7.1.3.3 Landings Values by Port

Table 7.1 and Table 7.2 list the top 20 ports by landings values from 42E7 and 42E8, respectively, and the percentage of the ports' total income that this represents (percentages have been rounded to the nearest one decimal place).

Table 7.1 shows that the highest percentage of landings from 42E7 are into the port at Arbroath (33.6%) which represents 70.9% of the ports' total annual income. Aberdeen records the second highest percentage of landings from 42E7 with 27.6%; however this only represents 3.9% of the ports total average annual value. The ports of Gourdon, Stonehaven, Johnshaven and Cove however, have lower percentages of the total landings values from 42E7 (14.5%, 4.7%, 4.5% and 0.2%, respectively) but landings from this rectangle contribute 94.2%, 87.1%, 96.4% and 87.1% of their total average annual values, respectively. The ports of Montrose, Burntisland and Catterline also have lower percentages of the total landings values from 42E7 (7.8%, 0.6% and 0.1%, respectively), but this represents 59.6%, 25.3% and 60.0% of their total average annual port values, respectively.

Table 7.2 shows that the highest percentage of landings from 42E8 is into Aberdeen (56.8%), although it should be noted that this rectangle only contributes 4.1% of the ports' total average annual income. The ports of Arbroath, Montrose and Stonehaven however, have lower percentages of the total landings values from 42E8 (11.3%, 4.3% and 0.7%, respectively) but landings from this rectangle contribute 12.2%, 16.8% and 6.9% of their total average annual values, respectively.

Table 7.1 Top 20 ports by landings value from ICES rectangle 42E7

Port	Average Annual Landings Values (£) in 42E7	% of Average Annual Value in 42E7	Total Average Annual Port Value (2000-2009)	% of Total Average Annual Port Value that 42E7 represents
Arbroath	£594,965	33.6%	£839,533	70.9%
Aberdeen	£488,362	27.6%	£12,482,442	3.9%
Gourdon	£256,905	14.5%	£272,592	94.2%
Montrose	£139,074	7.8%	£233,401	59.6%
Stonehaven	£83,658	4.7%	£96,023	87.1%
Johnshaven	£80,142	4.5%	£83,176	96.4%
Peterhead	£51,128	2.9%	£85,703,602	0.1%
Fraserburgh	£20,586	1.2%	£40,502,160	0.1%
Pittenweem	£15,712	0.9%	£2,381,495	0.7%
Buckie	£14,171	0.8%	£3,200,018	0.4%
Burntisland	£9,802	0.6%	£38,789	25.3%
Macduff	£6,379	0.4%	£1,412,012	0.5%
Eyemouth	£3,402	0.2%	£3,633,178	0.1%
Cove	£2,799	0.2%	£3,215	87.1%
Catterline	£1,746	0.1%	£2,910	60.0%
Scarborough	£908	0.1%	£2,196,629	0.0%
Wick	£724	0.0%	£1,338,177	0.1%
Unspecified Dutch Port	£387	0.0%	£4,462,887	0.0%
Tarbert	£348	0.0%	£2,065,655	0.0%
Granton	£344	0.0%	£56,891	0.6%

(source: MMO)

Table 7.2 Top 20 ports by landings value from ICES rectangle 42E8

Port	Average Annual Landings Values (£) in 42E8	% of Average Annual Value in 42E8	Total Average Annual Port Value (2000-2009)	% of Total Average Annual Port Value that 42E8 represents
Aberdeen	£516,452	56.8%	£12,482,442	4.1%
Peterhead	£104,549	11.5%	£85,703,602	0.1%
Arbroath	£102,469	11.3%	£839,533	12.2%
Eyemouth	£63,249	7.0%	£3,633,178	1.7%
Montrose	£39,271	4.3%	£233,401	16.8%
Buckie	£32,964	3.6%	£3,200,018	1.0%
Fraserburgh	£19,011	2.1%	£40,502,160	0.0%
Gourdon	£9,956	1.1%	£272,592	3.7%
Stonehaven	£6,590	0.7%	£96,023	6.9%
Macduff	£4,861	0.5%	£1,412,012	0.3%
Pittenweem	£4,300	0.5%	£2,381,495	0.2%
Hartlepool	£2,436	0.3%	£1,447,672	0.2%
North Shields	£1,368	0.2%	£3,571,121	0.0%
Amble	£893	0.1%	£1,533,223	0.1%
Plymouth	£286	0.0%	£9,937,598	0.0%
Brixham	£224	0.0%	£18,452,506	0.0%
Scalloway and Isles	£161	0.0%	£2,610,016	0.0%
Blyth	£71	0.0%	£2,410,416	0.0%
Grimsby	£44	0.0%	£5,660,109	0.0%
Zeebrugge	£28	0.0%	£63,838	0.0%

(source: MMO)

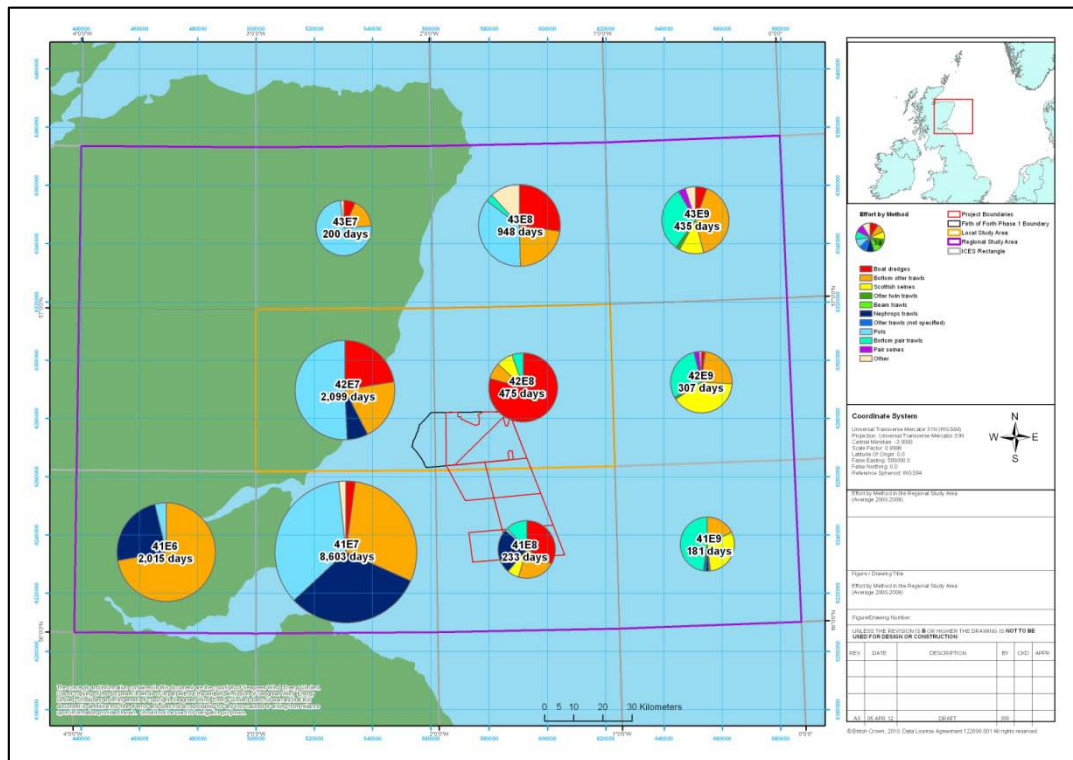
7.2 Effort (Days at Sea)

7.2.1 Regional Study Area

Figure 7.23 shows the average annual effort in the regional study area by fishing method. It can be seen that the pattern is similar to that described for the landings values: boat dredging is the principal activity in the north of the regional study area and in the central rectangles within which the development is located. Demersal otter trawlers (including nephrops trawlers) are high to the south east of the regional area. In coastal areas, creeling constitutes the large majority of fishing activity.

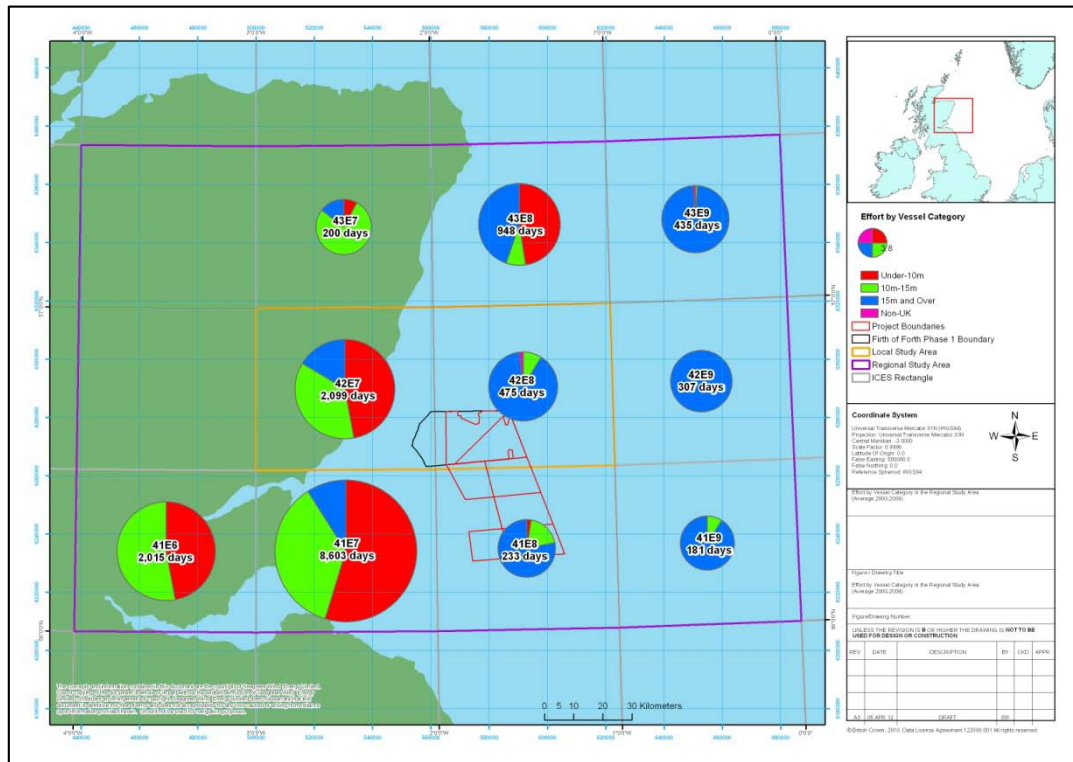
Figure 7.24 shows the average annual effort in the regional area by vessel category. Again, it can be seen that the pattern is similar to that described for the landings values. Significantly higher effort days are recorded in the coastal rectangles, principally by under-10 metre and 10-15 metre vessels. The over-15 metre fleet records the large majority of effort in the offshore rectangles. Effort by the non-UK fleet is negligible.

Figure 7.23 Effort (days at sea) by fishing method in the regional study area (average 2000 to 2009)



(source: MMO)

Figure 7.24 Effort (days at sea) by vessel category in the regional study area (average 2000 to 2009)



(source: MMO)

7.2.2 Local Study Area (ICES Rectangles 42E7 and 42E8)

Figure 7.25 and Figure 7.26 shows the annual variations in effort (days fished) in 42E7 and 42E8, respectively.

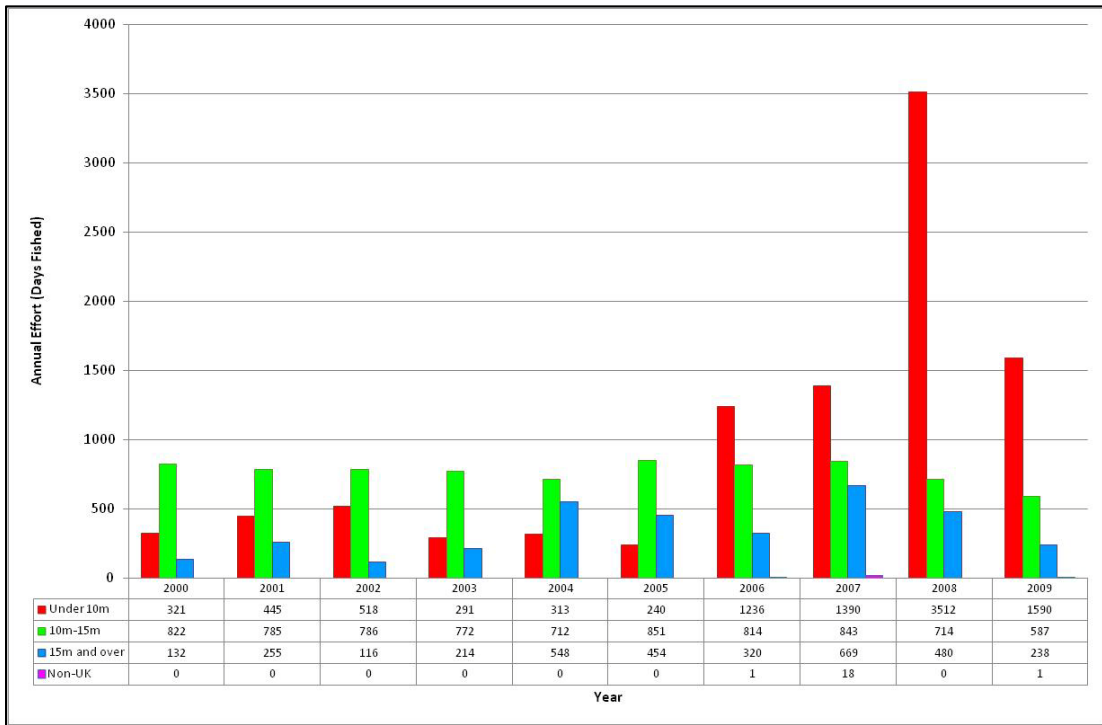
In rectangle 42E7 (Figure 7.25), effort by the under-10 metre fleet has increased substantially, with an initial rise in effort in 2006 to 1236 days. This effort more than doubled in 2008 to 3512 days, before declining again in 2009 to 1590 days. Effort by the 10-15 metre fleet has remained relatively stable, and effort by the over-15 metre fleet has remained at lower levels than the other sectors. Effort recorded by the non-UK fleet is negligible.

In rectangle 42E8 (Figure 7.26), the majority of effort has been recorded by the over-15 metre fleet. Effort recorded by the under-10 metre fleet has been negligible, and that by the 10-15 metre fleet has also remained at low levels. A small amount of effort was recorded by the non-UK fleet between 2007 and 2009 (between 5 and 43 days at sea).

Figure 7.27 and Figure 7.28 illustrate the average annual seasonality of effort (days fished) in rectangles 42E7 and 42E8, respectively. The seasonality is similar to that

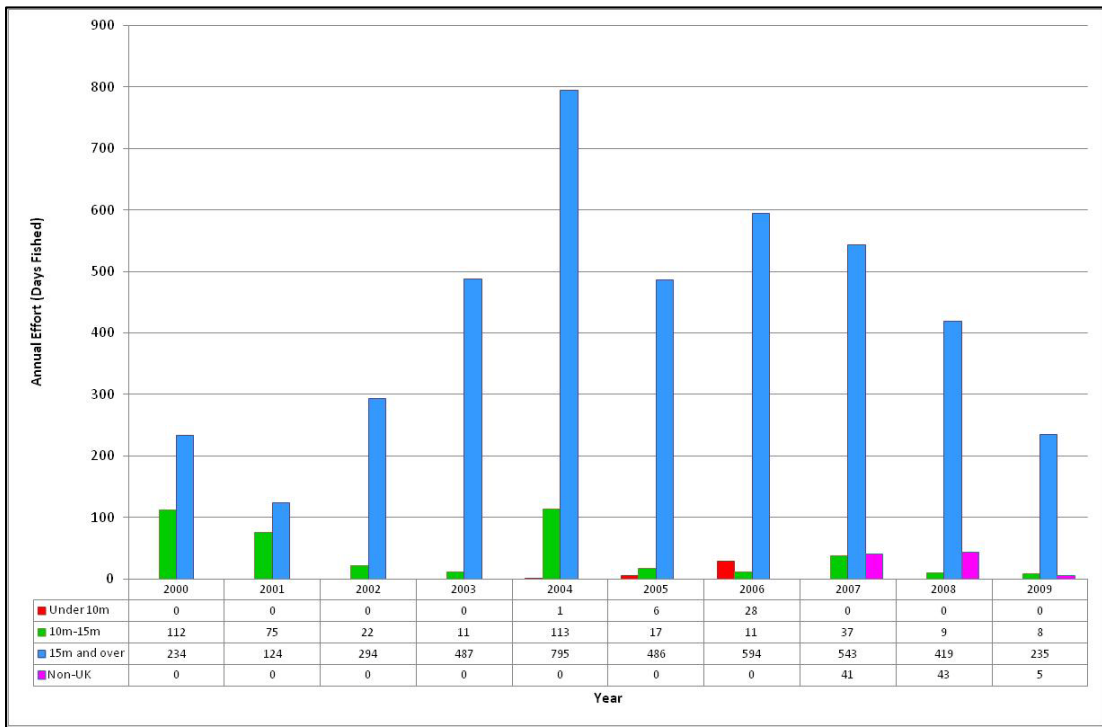
demonstrated by the landings values seasonality data in Figure 7.15 and Figure 7.19. Rectangle 42E7 (Figure 7.27) recorded effort peaks for all fleets between July and September, inclusive. Rectangle 42E8 (Figure 7.28) recorded effort peaks between April and July, inclusive, for the over-15 metre and 10-15 metre fleets. Effort by non-UK vessels is only in the winter months (October to February).

Figure 7.25 Annual variations in effort (days fished) by vessel category in ICES rectangle 42E7



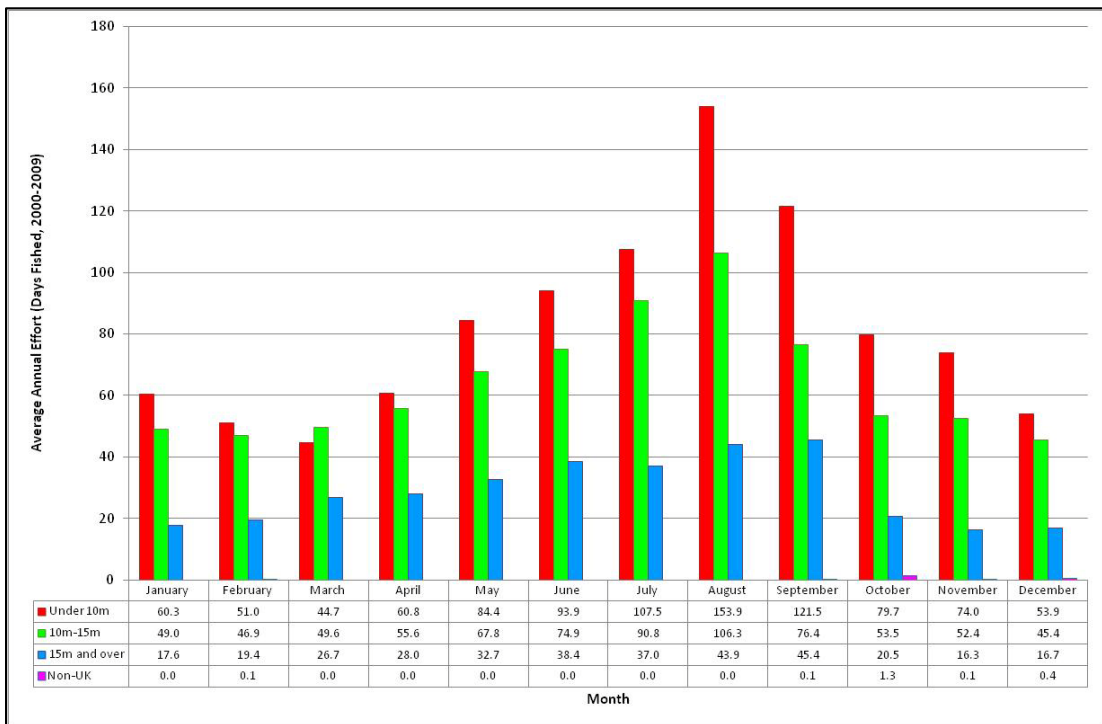
(source: MMO)

Figure 7.26 Annual variations in effort (days fished) by vessel category in ICES rectangle 42E8



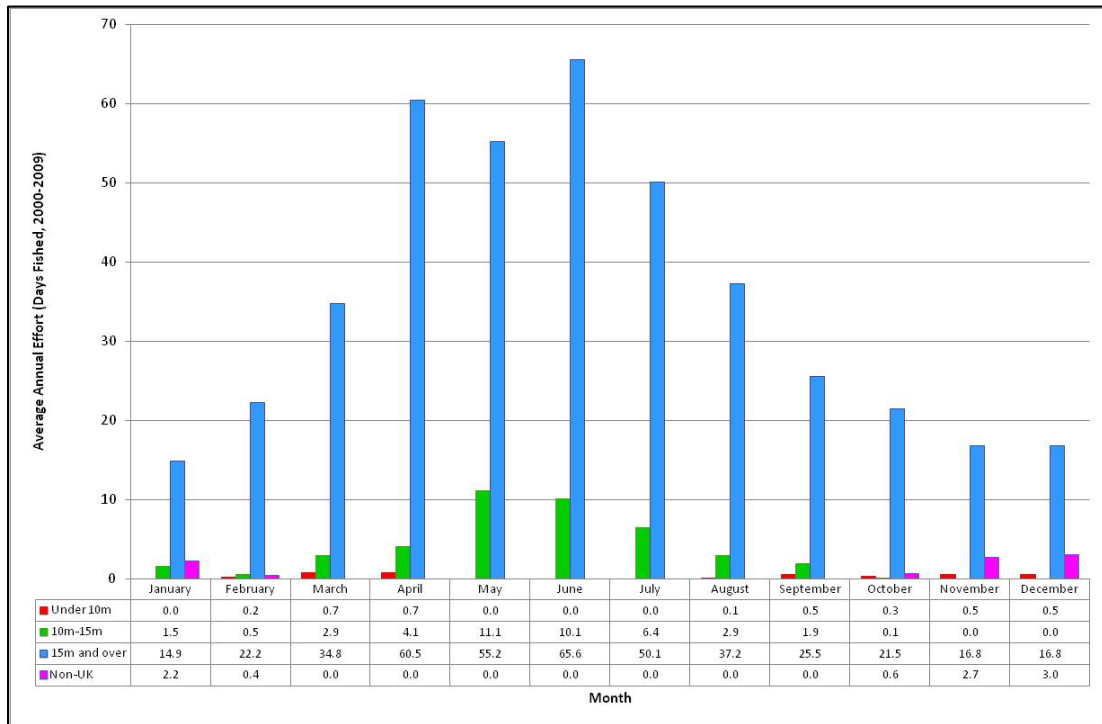
(source: MMO)

Figure 7.27 Average annual (average 2000 to 2009) seasonality by effort (days fished) and vessel category in ICES rectangle 42E7



(source: MMO)

Figure 7.28 Average annual (average 2000 to 2009) seasonality by effort (days fished) and vessel category in ICES rectangle 42E8



(source: MMO)

Table 7.3 and Table 7.4 list the top 20 ports by the effort made in rectangles 42E7 and 42E8, respectively, and the percentage of the ports' total effort this represents. The data demonstrates similar patterns to the landings values data.

In rectangle 42E7 (Table 7.3) the highest percentage of effort is made by vessels landing into Arbroath (36.7%) and this represents 77.1% of the ports' total average effort. Vessels landing into the ports of Gourdon, Stonehaven, Montrose, Johnshaven, Cove and Catterline however, contribute lower percentages of the effort in 42E7 (25.9%, 8.2%, 6.7%, 4.6%, 0.6% and 0.3%, respectively), but the effort made by these vessels represents 96.6%, 86.6%, 79.2%, 97.8%, 89.5% and 95.8% of the ports' total average effort, respectively.

In rectangle 42E8 (Table 7.4) the highest percentage of effort is made by vessels landing into Aberdeen (50.5%) although this only represents 4.8% of the ports' total average effort. Vessels landing into the ports of Arbroath, Stonehaven and Montrose however, contribute lower percentages of the effort in 42E8 (17.2%, 3.8% and 3.1%, respectively), but the effort made by these vessels represents 8.2%, 9.1% and 8.2% of the ports' total average effort, respectively.

Table 7.5 and Table 7.6 list the effort made in 42E7 and 42E8, respectively, by each vessel category from each port over a ten year period.

In rectangle 42E7 (Table 7.5) on average, the under-10 metre fleet contributes the most effort, followed by the 10-15 metre fleet. The majority of this effort is made by vessels landing into Arbroath and Gourdon. The over-15 metre fleet contributes moderate effort to the landings from 42E7, the majority of which is by vessels landing into Aberdeen. Non-UK vessels contribute negligible effort.

In rectangle 42E8 (Table 7.6) on average, the over-15 metre fleet contributes the most effort, the majority of which is by vessels landing into Aberdeen. The 10-15 metre fleet contributes little effort to the landings from 42E8, the majority of which is by vessels landing into Stonehaven. Under-10 metre and non-UK vessels contribute negligible effort.

Table 7.3 Top 20 ports by effort (days fished) in ICES rectangle 42E7

Port	Average Annual Effort (Days Fished) in 42E7	% of Average Annual Effort in 42E7	Total Average Annual Port Effort (Days Fished, 2000-2009)	% of Total Average Annual Port Effort that 42E7 represents
Arbroath	771.3	36.7%	999.9	77.1%
Gourdon	543.2	25.9%	562.4	96.6%
Aberdeen	254.8	12.1%	4983.1	5.1%
Stonehaven	172.6	8.2%	199.3	86.6%
Montrose	141.0	6.7%	178.0	79.2%
Johnshaven	96.9	4.6%	99.1	97.8%
Peterhead	25.6	1.2%	16129.0	0.2%
Pittenweem	22.2	1.1%	4708.3	0.5%
Burntisland	20.2	1.0%	123.7	16.3%
Fraserburgh	13.7	0.7%	17415.4	0.1%
Cove	13.6	0.6%	15.2	89.5%
Buckie	7.6	0.4%	2815.3	0.3%
Catterline	6.9	0.3%	7.2	95.8%
Macduff	3.2	0.2%	950.0	0.3%
Eyemouth	2.5	0.1%	3861.6	0.1%
Tarbert	1.1	0.1%	2813.8	0.0%
Scarborough	0.5	0.0%	4221.0	0.0%
Tayvallich	0.3	0.0%	418.8	0.1%
North Shields	0.3	0.0%	4236.4	0.0%
Wick	0.2	0.0%	1010.2	0.0%

(source: MMO)

Table 7.4 Top 20 ports by effort (days fished) in ICES rectangle 42E8

Port	Average Annual Effort (Days Fished) in 42E8	% of Average Annual Effort in 42E8	Total Average Annual Port Effort (Days Fished, 2000-2009)	% of Total Average Annual Port Effort that 42E8 represents
Aberdeen	239.9	50.5%	4983.1	4.8%
Arbroath	81.8	17.2%	999.9	8.2%
Peterhead	44.2	9.3%	16129.0	0.3%
Eyemouth	28.9	6.1%	3861.6	0.7%
Stonehaven	18.1	3.8%	199.3	9.1%
Montrose	14.6	3.1%	178.0	8.2%
Buckie	13.6	2.9%	2815.3	0.5%
Gourdon	11.7	2.5%	562.4	2.1%
Fraserburgh	11.0	2.3%	17415.4	0.1%
Pittenweem	4.2	0.9%	4708.3	0.1%
Macduff	2.4	0.5%	950.0	0.3%
North Shields	1.3	0.3%	4236.4	0.0%
Hartlepool	1.3	0.3%	1954.9	0.1%
Amble	0.6	0.1%	3140.4	0.0%
Plymouth	0.4	0.1%	5918.1	0.0%
Brixham	0.3	0.1%	13151.9	0.0%
Scalloway and Isles	0.2	0.0%	1428.1	0.0%
Grimsby	0.2	0.0%	2433.7	0.0%
Blyth	0.1	0.0%	3095.8	0.0%
Zeebrugge	0.1	0.0%	32.7	0.3%

(source: MMO)

Table 7.5 Annual effort (days fished) by port and vessel length in ICES rectangle 42E7

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	10 Year Average
Under 10m											
Arbroath	242	299	414	208	206	105	426	398	1381	567	424.6
Gourdon	23	56	46	34	37	42	338	400	668	416	206.0
Stonehaven	10	36	31	37	39	37	162	176	499	195	122.2
Johnshaven	20	18	9	0	0	0	201	149	440	132	96.9
Montrose	21	26	6	1	0	7	51	106	224	183	62.5
Aberdeen	5	6	6	5	28	39	57	107	100	53	40.6
Cove	0	0	0	0	0	0	0	0	109	27	13.6
Catterline	0	4	5	6	3	4	0	24	22	0	6.8
Burntisland	0	0	0	0	0	0	0	0	43	11	5.4
Pittenweem	0	0	1	0	0	0	0	27	15	5	4.8
Other Ports	0	0	0	0	0	6	1	3	11	1	2.2
Total	321	445	518	291	313	240	1236	1390	3512	1590	985.6
10m-15m											
Gourdon	287	246	272	281	308	353	457	431	365	365	336.5
Arbroath	415	346	322	357	305	334	224	262	249	4	281.8
Montrose	45	76	50	71	54	28	70	75	19	59	54.7
Stonehaven	66	100	115	50	36	36	10	3	15	73	50.4
Pittenweem	7	7	27	6	0	22	4	18	21	44	15.6
Aberdeen	2	10	0	5	9	65	23	17	2	13	14.6
Burntisland	0	0	0	0	0	0	9	35	42	26	11.2
Fraserburgh	0	0	0	0	0	6	13	0	0	0	1.9
Peterhead	0	0	0	0	0	4	3	0	0	3	1.0
Buckie	0	0	0	2	0	1	0	0	0	0	0.3
Other Ports	0	0	0	0	0	2	1	2	1	0	0.6
Total	822	785	786	772	712	851	814	843	714	587	768.6
15m and over											
Aberdeen	42	48	20	93	376	209	211	463	378	137	197.7
Arbroath	76	174	78	101	63	56	28	29	30	14	64.9
Peterhead	6	22	9	9	46	57	19	33	25	20	24.6
Montrose	0	1	0	0	35	62	31	77	21	11	23.8

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	10 Year Average
Fraserburgh	0	3	9	6	11	24	12	31	6	8	11.0
Buckie	3	1	0	4	1	42	8	6	4	3	7.2
Burntisland	0	0	0	0	0	0	0	0	0	36	3.6
Macduff	2	6	0	0	16	3	3	2	0	0	3.2
Eyemouth	0	0	0	0	0	0	2	18	1	3	2.4
Pittenweem	0	0	0	0	0	0	0	0	13	5	1.8
Other Ports	3	0	0	1	0	1	6	10	2	1	2.4
Total	132	255	116	214	548	454	320	669	480	238	342.6
Non-UK											
Aberdeen	0	0	0	0	0	0	0	18	0	1	1.9
Buckie	0	0	0	0	0	0	1	0	0	0	0.1
Total	0	0	0	0	0	0	1	18	0	1	2.0
Grand Total	1275	1485	1420	1277	1573	1545	2371	2920	4706	2416	2098.8

(source: MMO)

Table 7.6 Annual effort (days fished) by port and vessel length in ICES rectangle 42E8

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	10 Year Average
15m and over											
Aberdeen	112	58	139	264	365	241	305	265	308	193	225.0
Arbroath	9	3	38	106	194	156	95	142	43	0	78.6
Peterhead	85	19	50	21	98	33	65	23	20	21	43.5
Eymouth	6	22	30	64	109	12	15	2	2	0	26.2
Buckie	12	6	20	6	7	6	30	25	13	11	13.6
Montrose	0	2	0	0	8	10	54	45	11	0	13.0
Fraserburgh	8	7	4	25	9	17	11	13	4	9	10.7
Pittenweem	0	0	4	0	0	0	10	18	0	0	3.2
Macduff	0	0	0	0	3	6	9	6	0	0	2.4
Hartlepool	0	0	0	0	0	0	0	4	9	0	1.3
Other Ports	2	7	9	1	2	5	0	0	9	1	3.6
Total	234	124	294	487	795	486	594	543	419	235	421.1
10m-15m											
Stonehaven	95	61	17	1	7	0	0	0	0	0	18.1
Gourdon	6	11	4	5	47	12	6	7	4	8	11.0
Aberdeen	1	1	0	3	24	0	2	25	3	0	5.9
Eymouth	0	0	0	0	26	0	0	0	1	0	2.7
Montrose	1	2	0	2	6	3	0	2	0	0	1.6
Arbroath	4	0	1	0	0	2	3	0	0	0	1.0
Pittenweem	4	0	0	0	0	0	0	0	0	0	0.4
Fraserburgh	0	0	0	0	0	0	0	3	0	0	0.3
Amble	0	0	0	0	3	0	0	0	0	0	0.3
Peterhead	1	0	0	0	0	0	0	0	0	0	0.1
Other Ports	0	0	0	0	0	0	0	0	1	0	0.1
Total	112	75	22	11	113	17	11	37	9	8	41.5
Under 10m											
Arbroath	0	0	0	0	0	0	22	0	0	0	2.2
Aberdeen	0	0	0	0	1	6	0	0	0	0	0.7
Pittenweem	0	0	0	0	0	0	6	0	0	0	0.6
Total	0	0	0	0	1	6	28	0	0	0	3.5

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	10 Year Average
Non-UK											
Aberdeen	0	0	0	0	0	0	0	35	43	5	8.3
Peterhead	0	0	0	0	0	0	0	6	0	0	0.6
Total	0	0	0	0	0	0	0	41	43	5	8.9
Grand Total	346	199	316	498	909	509	633	621	471	248	475.0

(source: MMO)

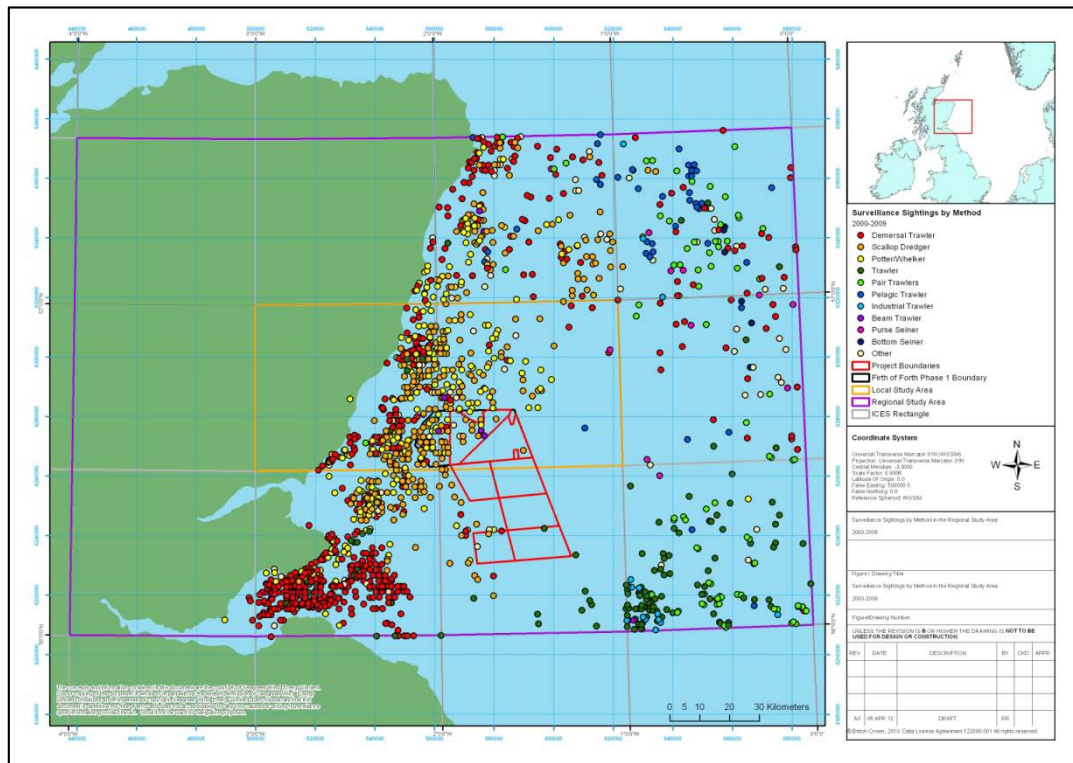
8 MMO Fisheries Surveillance Sightings Data

Figure 8.1 to Figure 8.4 below give the positions of vessels identified by fisheries surveillance officers in the regional and local study areas, by method and nationality. Vessels of all lengths and nationalities are recorded.

Sightings broadly corroborate the analysis of the MMO datasets and satellite (VMS) densities: they are concentrated in inshore areas, with fewer vessels sighted further offshore. Scallop dredgers (green dots) are sighted in areas to the north, and trawlers (red and blue dots) are concentrated in the south west of the Forth and Tay area, with some vessels sighted in offshore areas to the south east of the regional study area and fewer vessels sighted along coastal areas to the north west. In addition, the sightings show creeling activity (orange dots) in coastal areas.

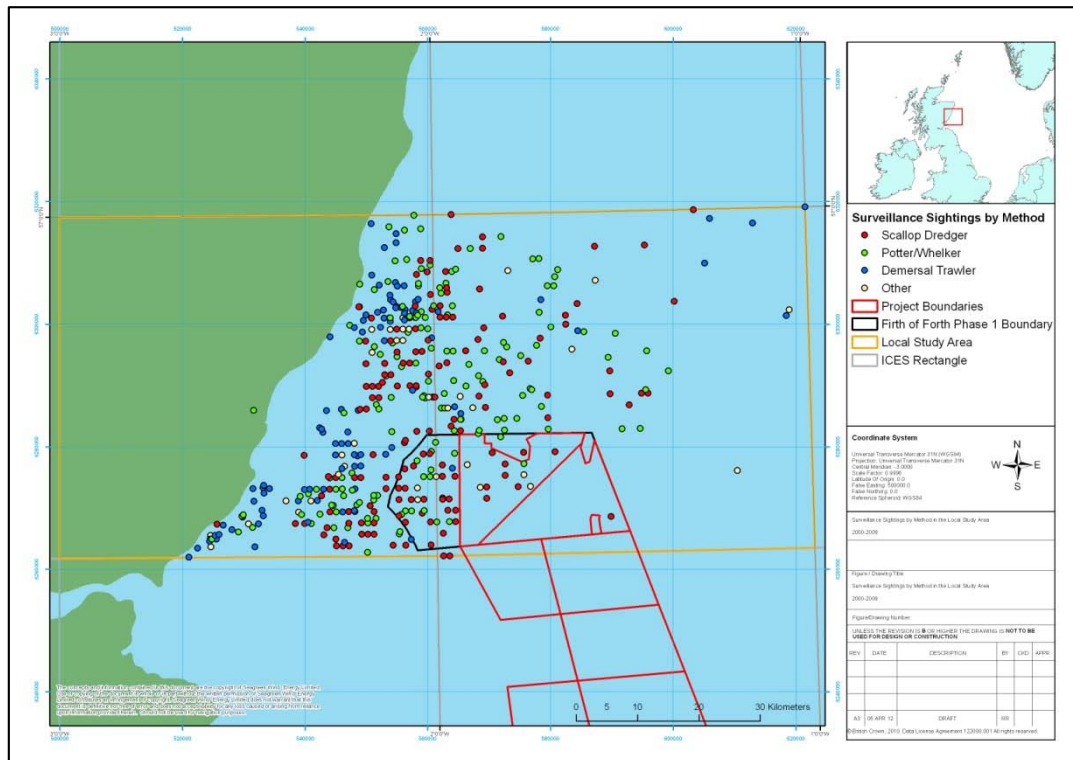
The majority of the vessels sighted within the regional study area UK vessels, these vessels have been sighted throughout the regional study area, but concentrated in inshore areas, with approximately 50 vessels sighted inside the development itself over the ten year period. There are a number of vessels from Denmark sighted in offshore areas to the east of the regional study area. Vessels from the Netherlands have been sighted within the vicinity of, and in one case inside, the development area. There have also been sporadic sightings of French, Norwegian, Swedish and German vessels.

Figure 8.1 Surveillance sightings by method in the regional study area



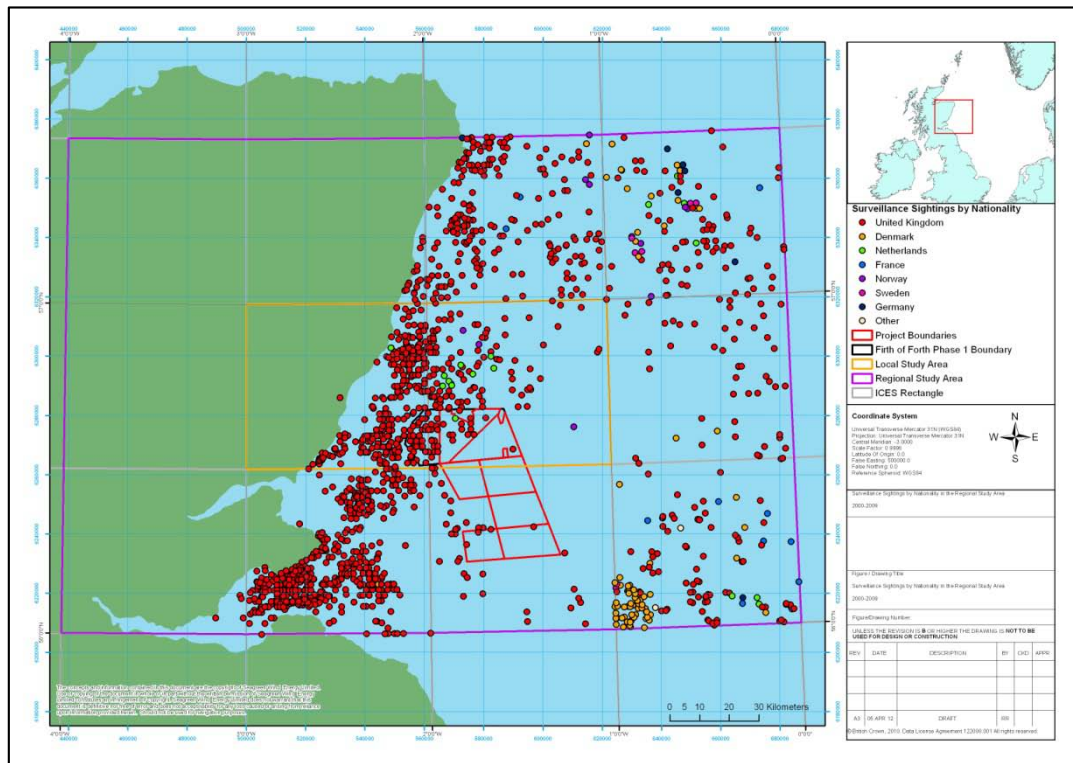
(source: MMO)

Figure 8.2 Surveillance sightings by method in the local study area



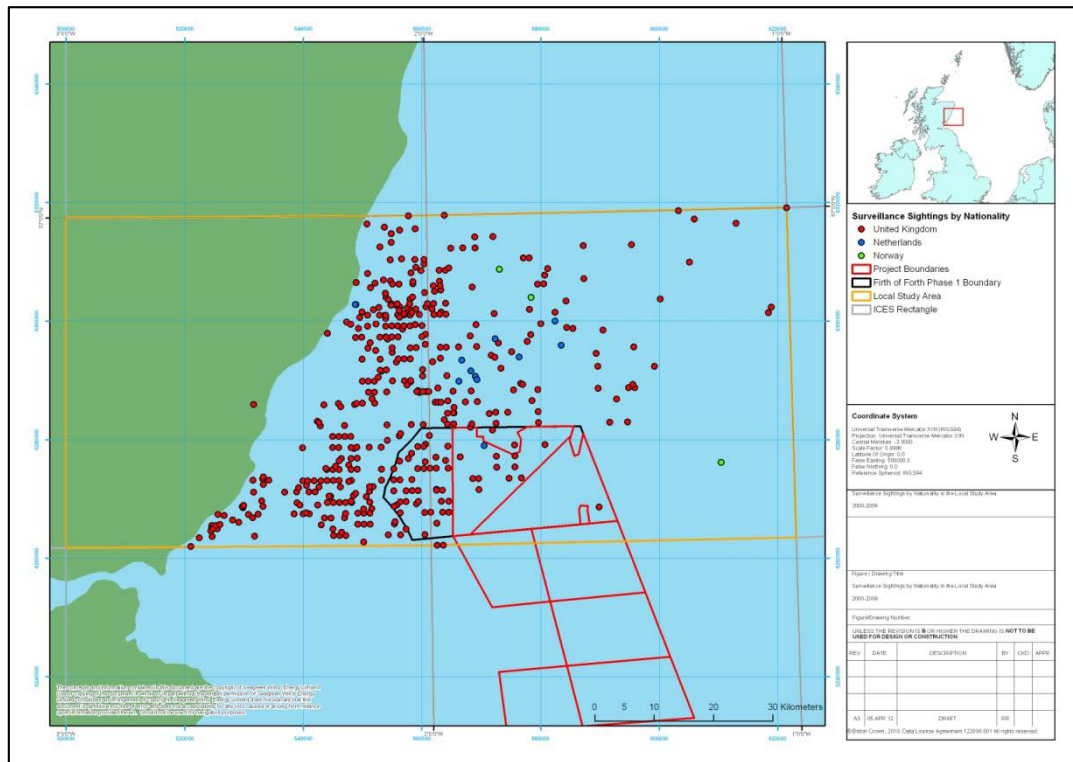
(source: MMO)

Figure 8.3 Surveillance sightings by nationality in the regional study area



(source: MMO)

Figure 8.4 Surveillance sightings by nationality in the local study area



(source: MMO)

9 MMO UK Satellite Tracking (VMS) Data

UK satellite data were obtained from the MMO and Marine Scotland in comma separated variable (CSV) format. The 2005 to 2008 data gave individual VMS position plots that have been converted into a density chart grid with each square measuring approximately 1nm². The 2009 data, as a result of restrictions on the release of data, have been provided as counts within one sixteenth of an ICES rectangle.

Due to the differences in data provided for satellite tracked vessels in 2009 (discussed in Section 5.2.2); Section 9.2.2 separately discusses the activity for this period.

As mentioned previously, satellite data is only indicative of the activity of vessels over-15 metres in length. Analysis of landings and effort data has demonstrated that the majority of activity in 42E8 is by the over-15 metre fleet and therefore the data presented below will be representative of the activity of these vessels. It should be noted that a proportion of the activity recorded in 42E7 is by vessels under-15 metres which will not be represented in this dataset.

9.1 National Overview

Figure 9.1 illustrates the average satellite (VMS) density of all UK vessels over-15 metres (2005 to 2008) within the national study area. The areas of the highest density are concentrated along the west coast and offshore in the north east. The Forth and Tay area records a moderate level of patchy activity.

9.2 Regional Overview

9.2.1 2005 to 2008 Data

Figure 9.2 shows the average relative density of all UK vessels over-15 metres (2005 to 2008). It can be seen that there are two main concentrations in areas adjacent to the north and south coasts and in the far north of the regional area.

9.2.2 2009 Data

Figure 9.3 shows the satellite density of all UK vessels over-15 metres during 2009. The patterns are broadly consistent with the 2005 to 2008 dataset.

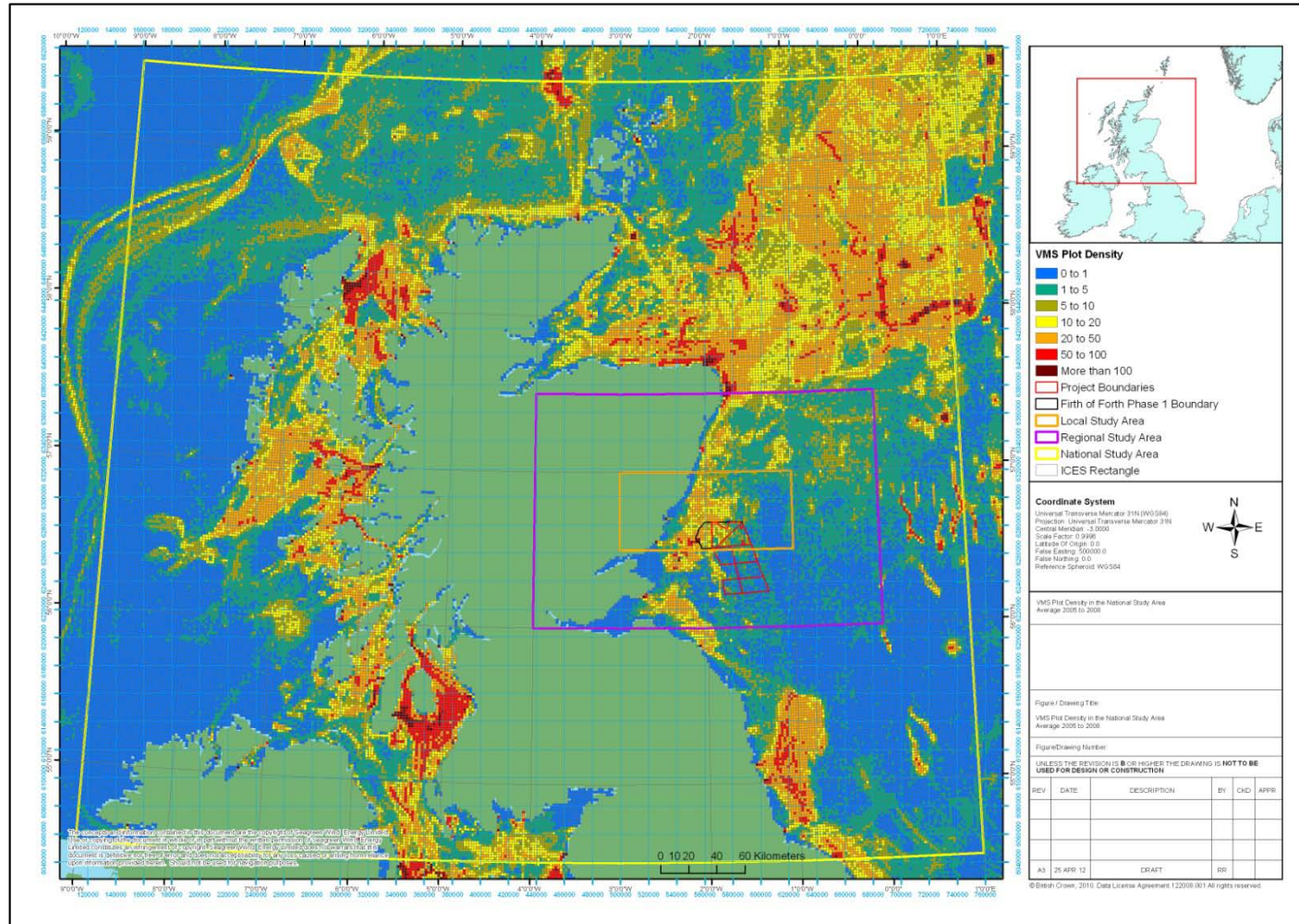
Figure 9.4 to Figure 9.6 provide a breakdown of density by gear type, categorising density by dredges, nephrops gear and whitefish gear, respectively.

The highest densities of scallop dredge vessels (Figure 9.4) occur in grounds in coastal and central rectangles to the north of the regional area, including the western section of the development.

Nephrops activity is concentrated to the south west of the Forth and Tay area. There is no nephrops activity by the over-15 metre fleet within the development (Figure 9.5).

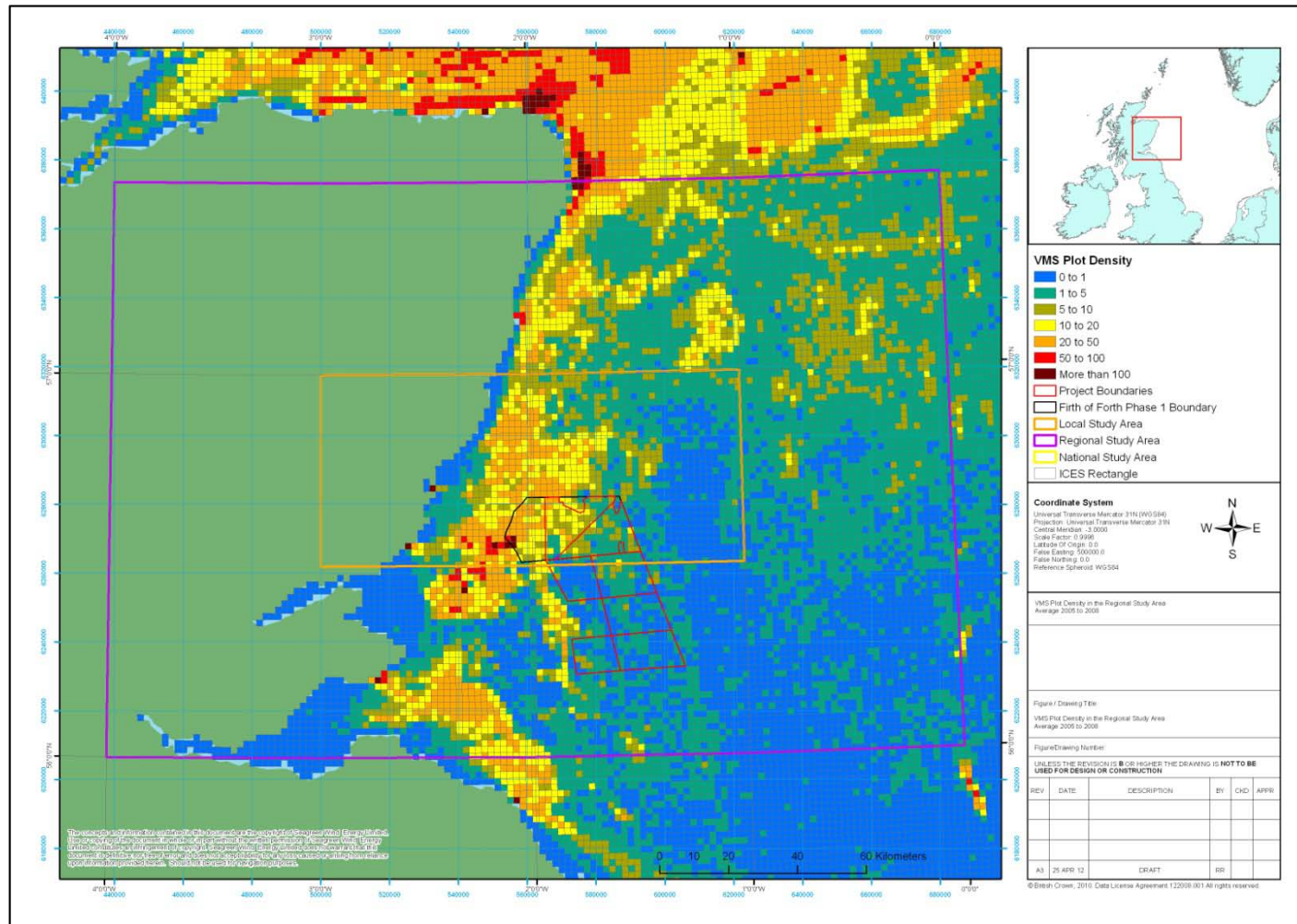
The highest densities of whitefish activity occur in offshore areas to the north east of the regional area. There is no whitefish activity recorded within the development (Figure 9.6).

Figure 9.1 Satellite (VMS) density of all UK over-15 metre vessels (average 2005 to 2008)



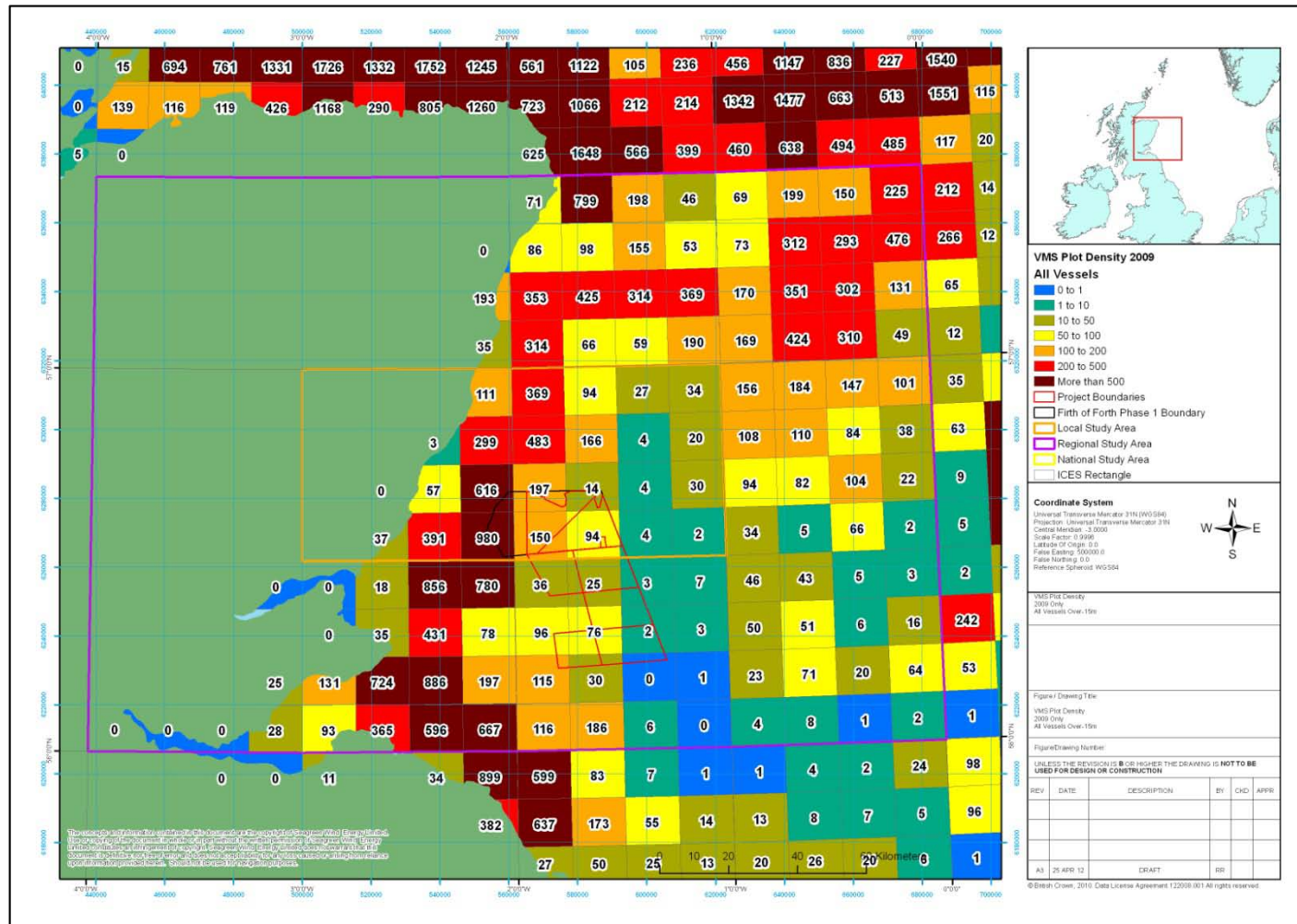
(source: MMO)

Figure 9.2 Satellite (VMS) density of all UK over-15 metre vessels (average 2005 to 2008)



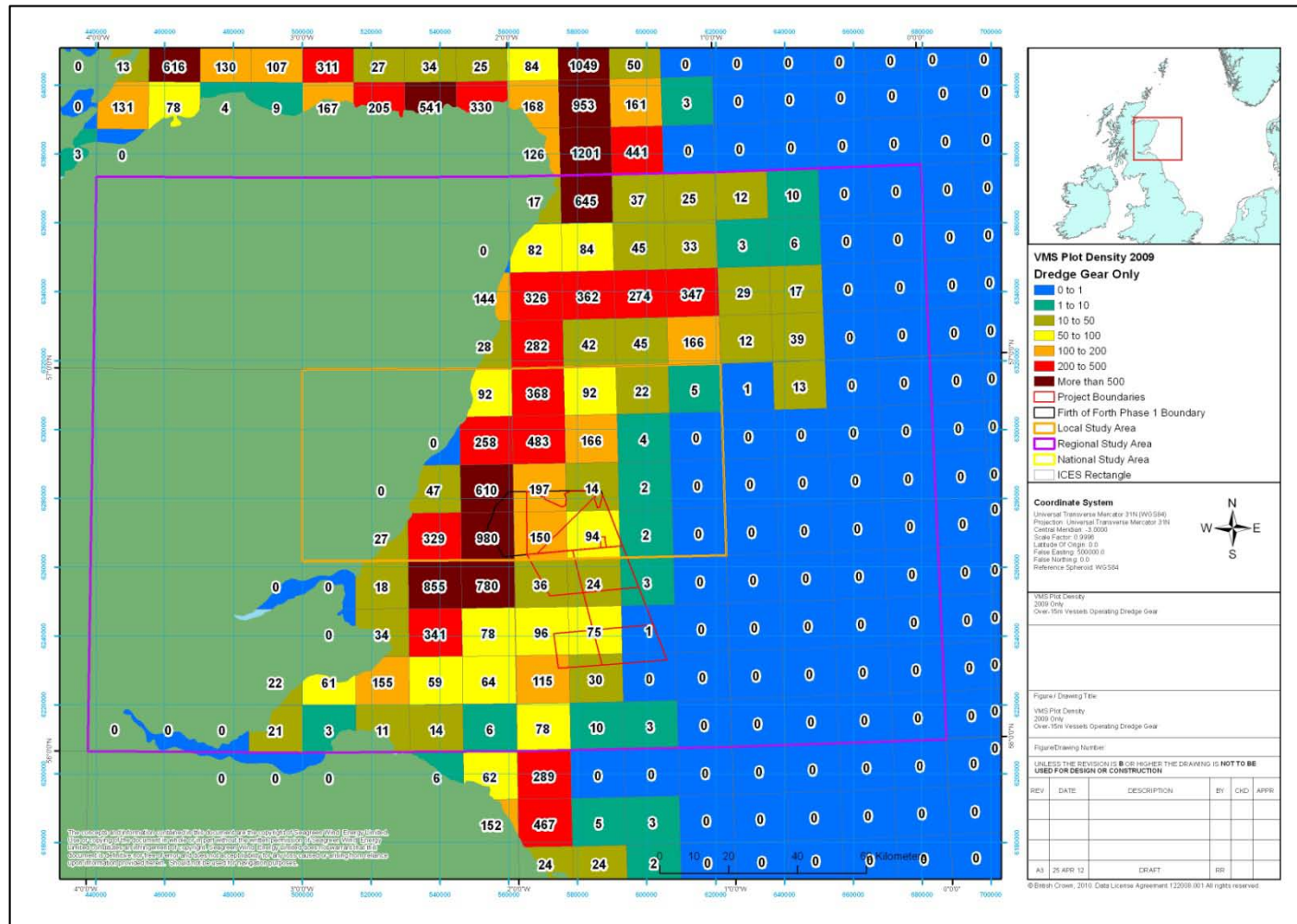
(source: MMO)

Figure 9.3 Satellite (VMS) density of all UK over-15 metre vessels in 2009



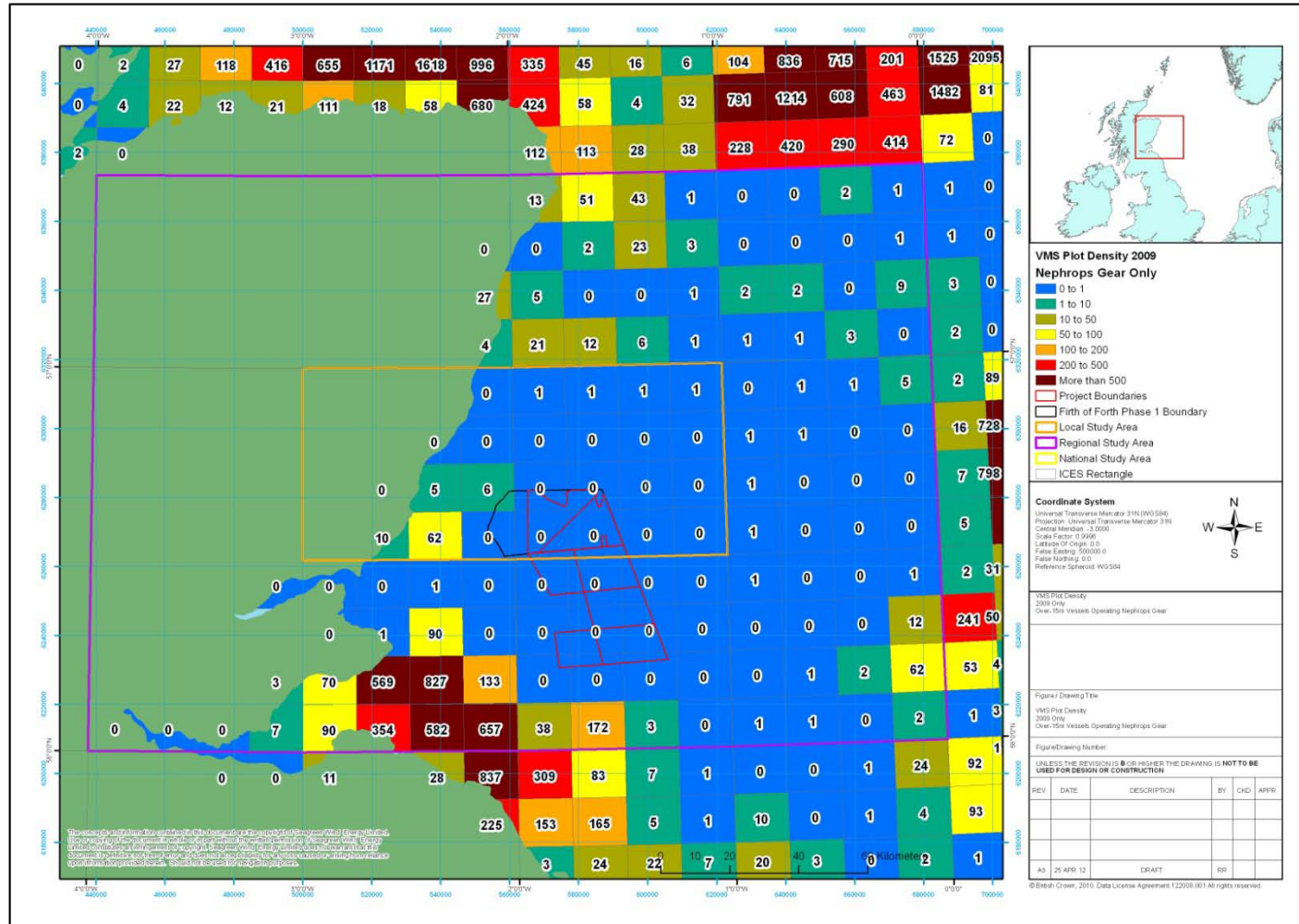
(source: MMO)

Figure 9.4 Satellite (VMS) density of UK over-15 metre vessels in 2009, scallop dredge gear only



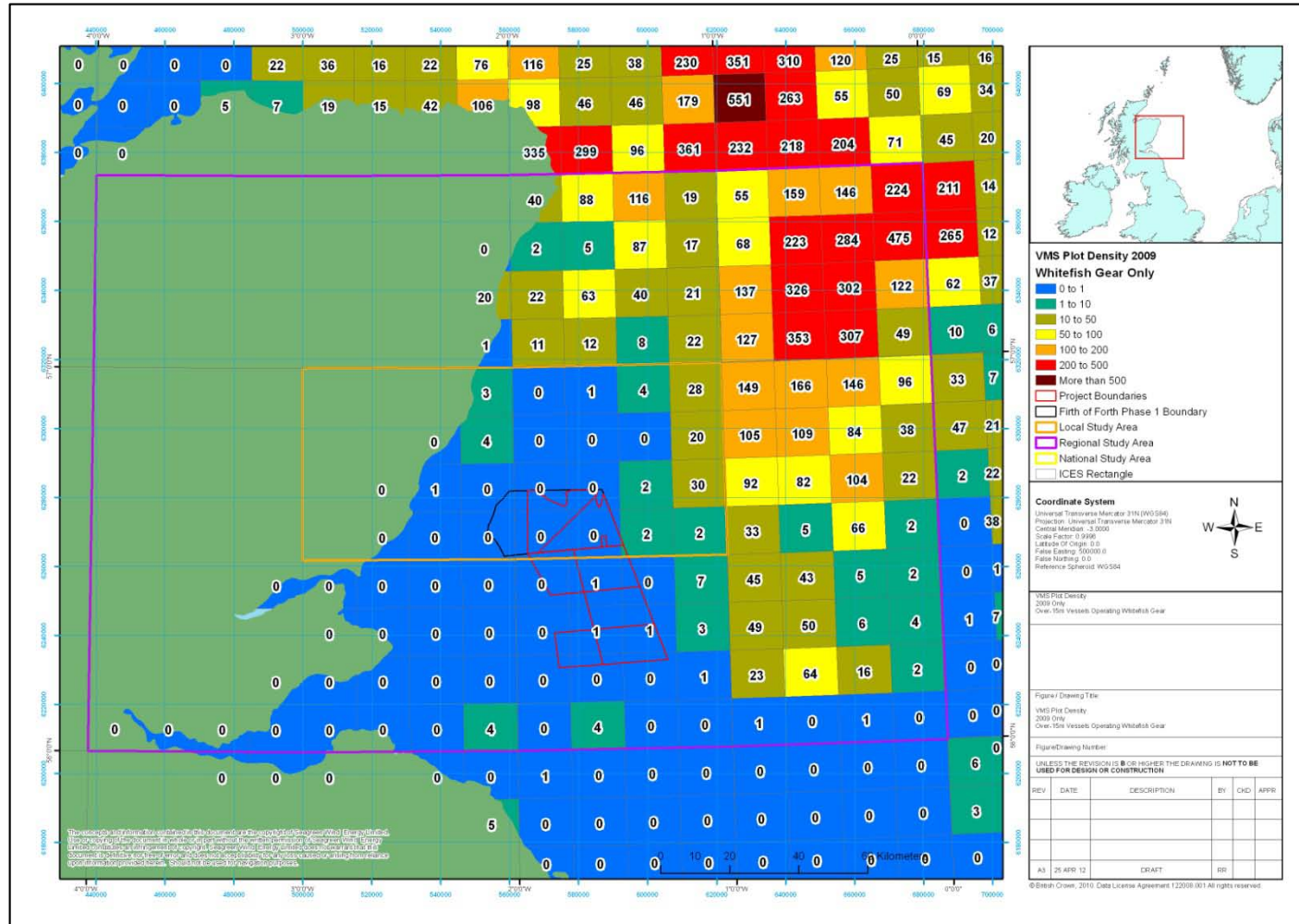
(source: MMO)

Figure 9.5 Satellite (VMS) density of UK over-15 metre vessels in 2009, nephrops gear only



(source: MMO)

Figure 9.6 Satellite (VMS) density of UK over-15 metre vessels in 2009, whitefish gear only



(source: MMO)

10 Marine Scotland Data Analysis

As mentioned in Section 4.4 previously, the following charts have been derived by Marine Scotland Science and provided to BMM to assist in the establishment of a commercial fisheries baseline in the Forth and Tay area. The limitations of this dataset, as explained previously in Section 8, are recognised.

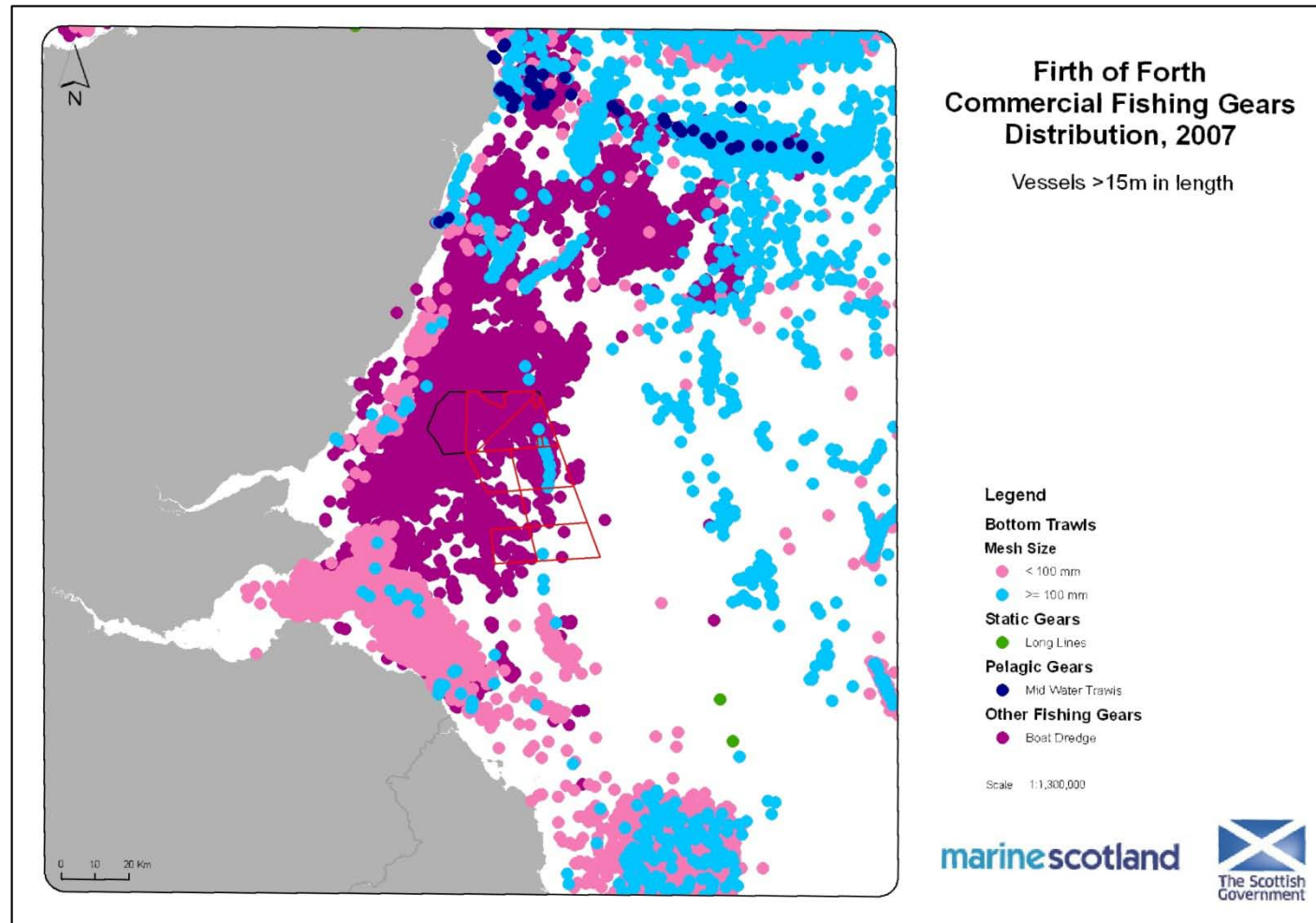
Figure 10.1 to Figure 10.3 illustrate the distribution of fishing gears in the Forth and Tay area for over-15 metre UK vessels between 2007 and 2009, respectively. In respect of the use of the bottom otter trawls, the mesh size is indicative of the species targeted: vessels employing mesh sizes of less than 100mm will be targeting nephrops or squid, while those using mesh sizes greater than 100mm will be targeting demersal finfish such as haddock.

Demersal trawlers targeting finfish species are generally concentrated offshore to the north of the area, and that distribution has become more concentrated over the three year period. There is a small concentration of whitefish trawlers to the south of the Forth and Tay area, off the coast at Eyemouth, although recorded activity has become sparser over the three year period. Demersal trawlers targeting squid and nephrops are predominantly recorded in coastal areas in the south of the study area, although a narrow coastal strip is noted north of the River Tay. Distribution of this gear type has remained relatively consistent over the three year period. Boat dredges are recorded in central areas of the Forth and Tay, including the development. The distribution of boat dredges has also remained relatively consistent throughout the period.

Figure 10.4 to Figure 10.6 show the commercial landings densities of finfish in the Forth and Tay area for over-15 metre UK vessels between 2007 and 2009, respectively. Overall, the study area has relatively very low recorded activity, and negligible finfish activity has been recorded within the development. It can be seen that demersal finfish are primarily caught and that landings of both demersal and pelagic finfish fluctuate over the three year period. 2007 saw low landings of demersal finfish, while 2008 and 2009 saw moderate to high landings.

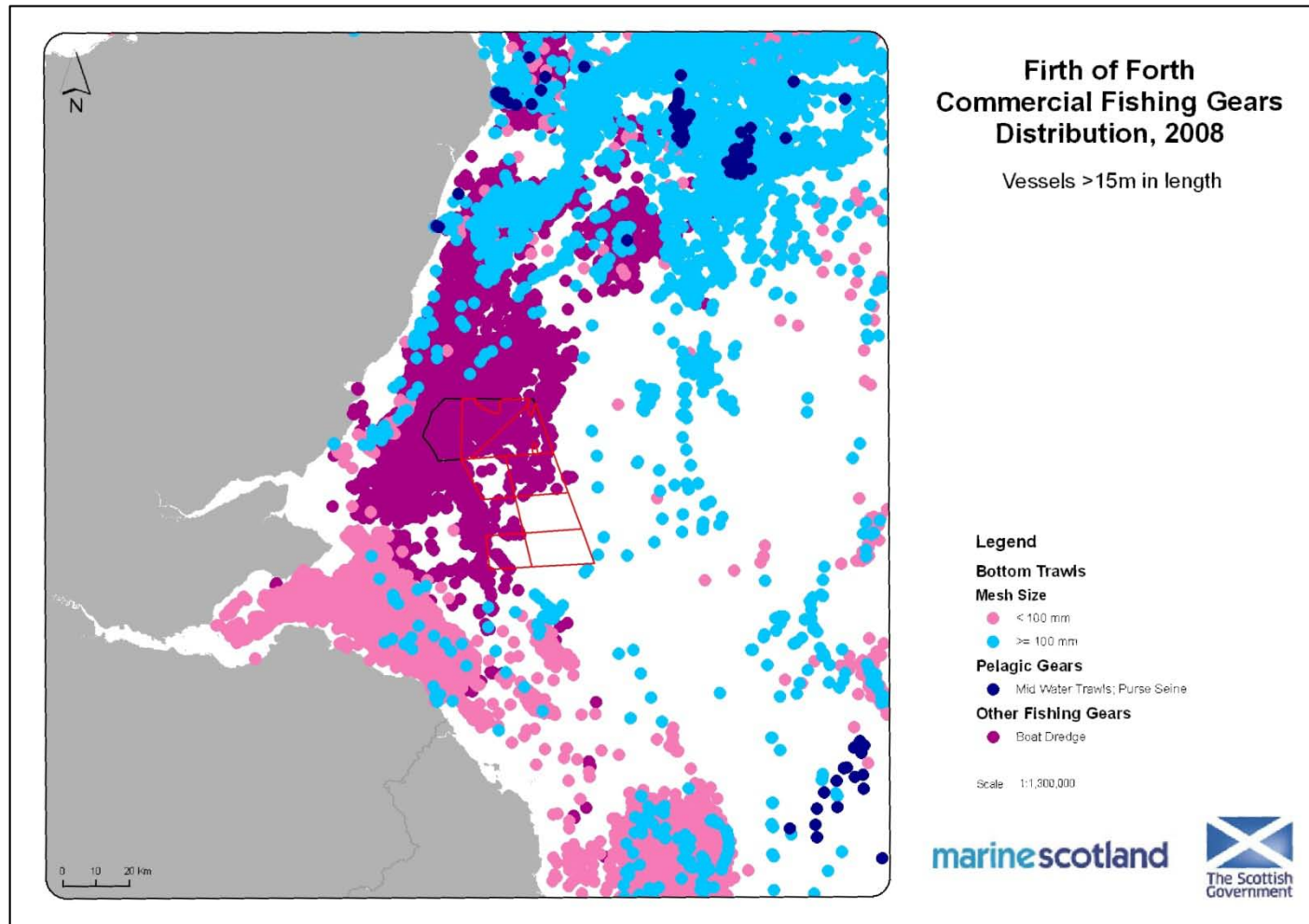
Figure 10.7 to Figure 10.9 show the commercial landings densities of shellfish in the Forth and Tay area for over-15 metre UK vessels between 2007 and 2009, respectively. Scallop landings correspond with those described for boat dredges with high levels of scallops landed from the development. As is the case with scallops and boat dredges, nephrops densities are consistent with demersal trawlers employing a mesh net of less than 100mm. It is of note that scallop and nephrops fishing grounds are clearly defined, likely as a result of the different substrates that the two species inhabit, discussed further in Section 11.

Figure 10.1 Fishing gear distribution for over-15 metre vessels, 2007



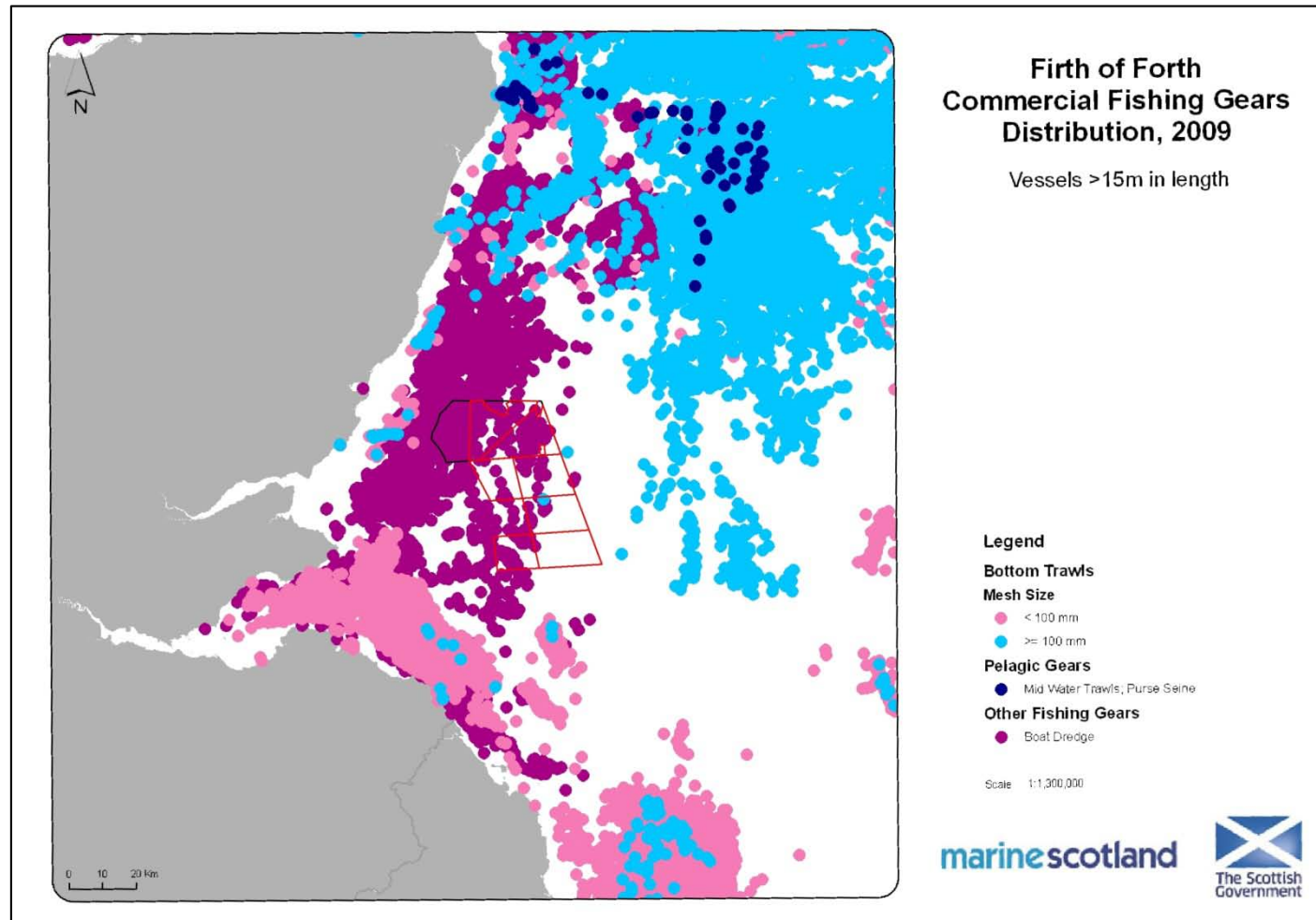
(source: Marine Scotland)

Figure 10.2 Fishing gear distribution for over-15 metre vessels, 2008



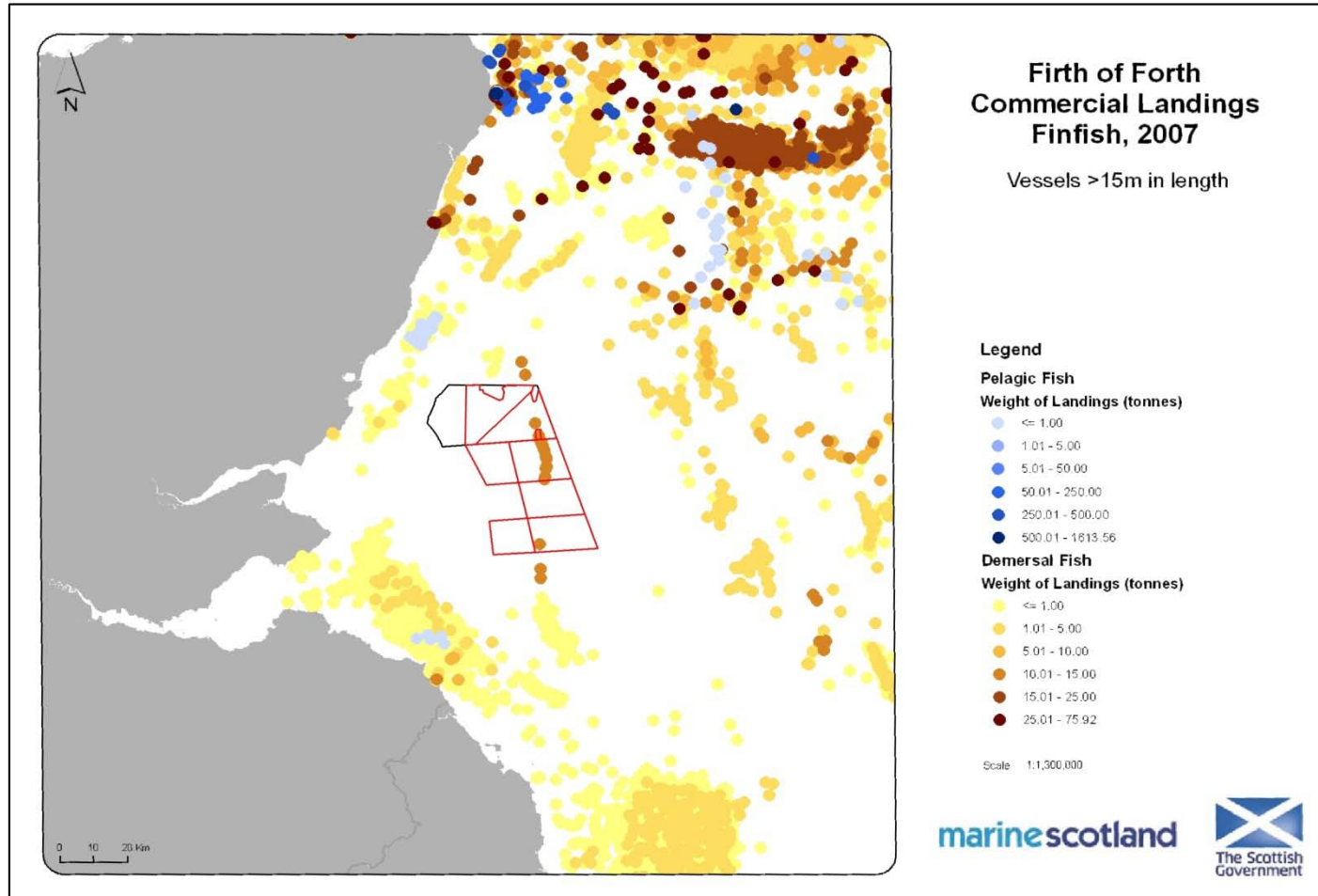
(source: Marine Scotland)

Figure 10.3 Fishing gear distribution for over-15 metre vessels, 2009



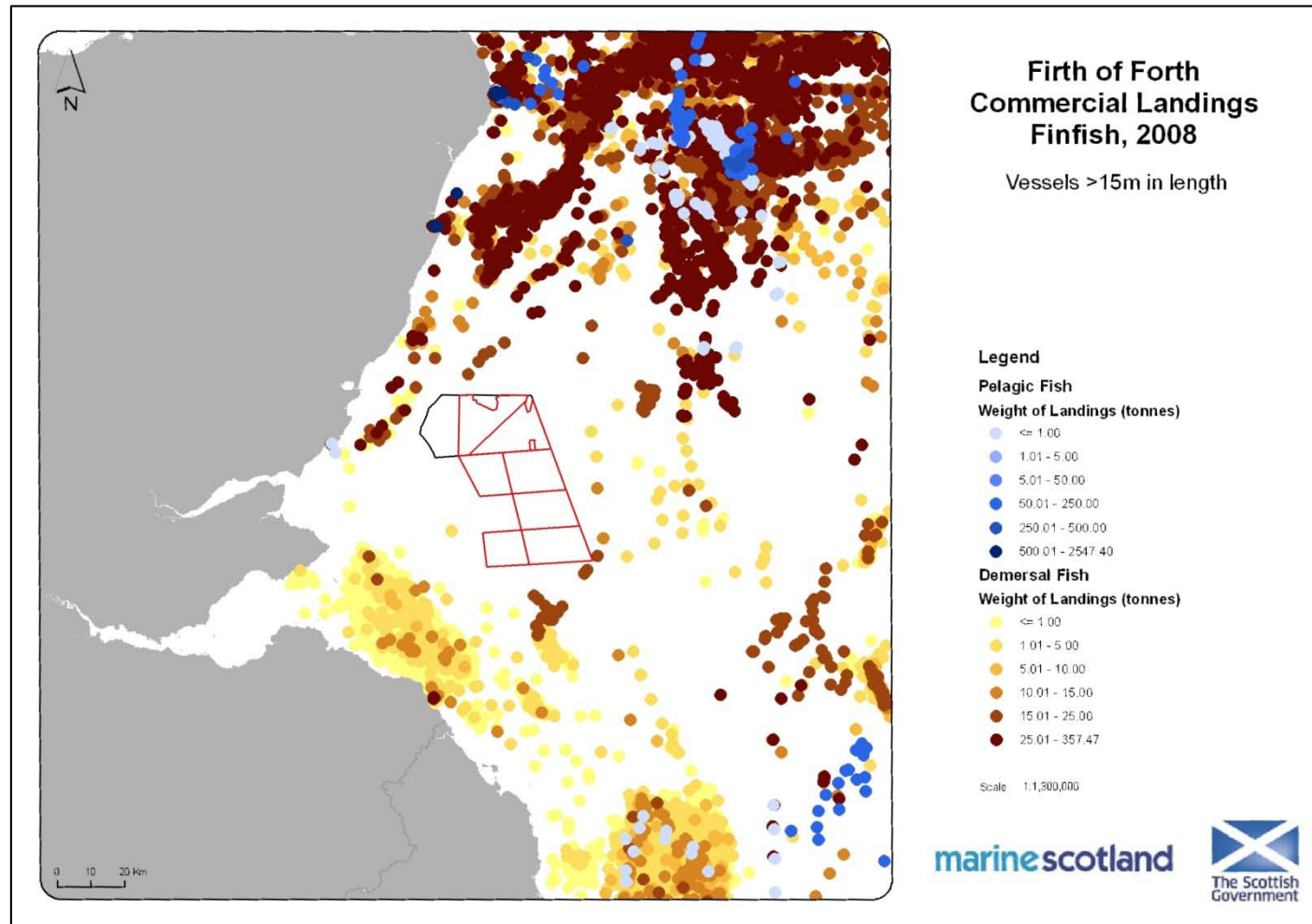
(source: Marine Scotland)

Figure 10.4 Commercial landings of finfish (demersal and pelagic) for over-15 metre vessels, 2007



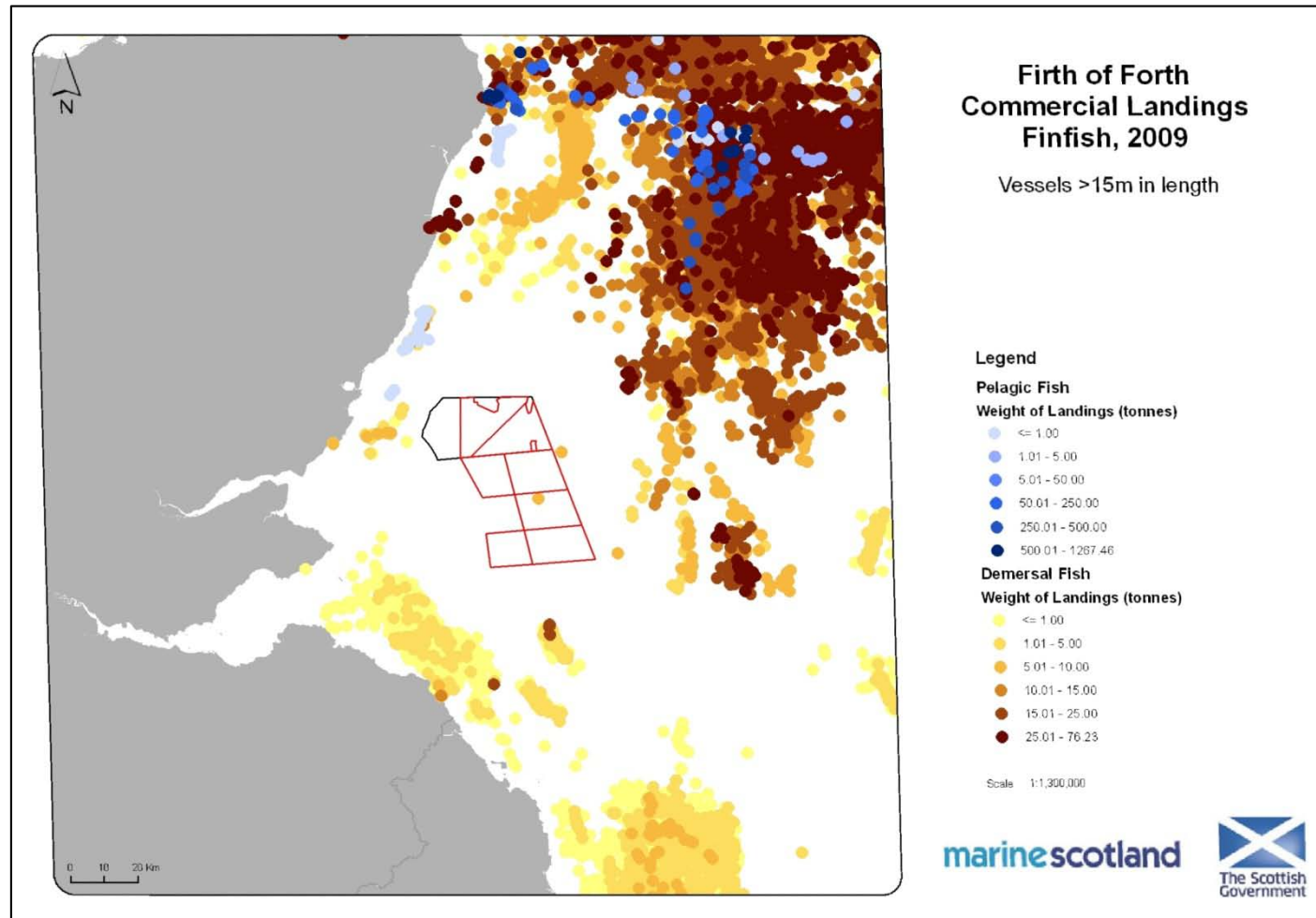
(source: Marine Scotland)

Figure 10.5 Commercial landings of finfish (demersal and pelagic) for over-15 metre vessels, 2008



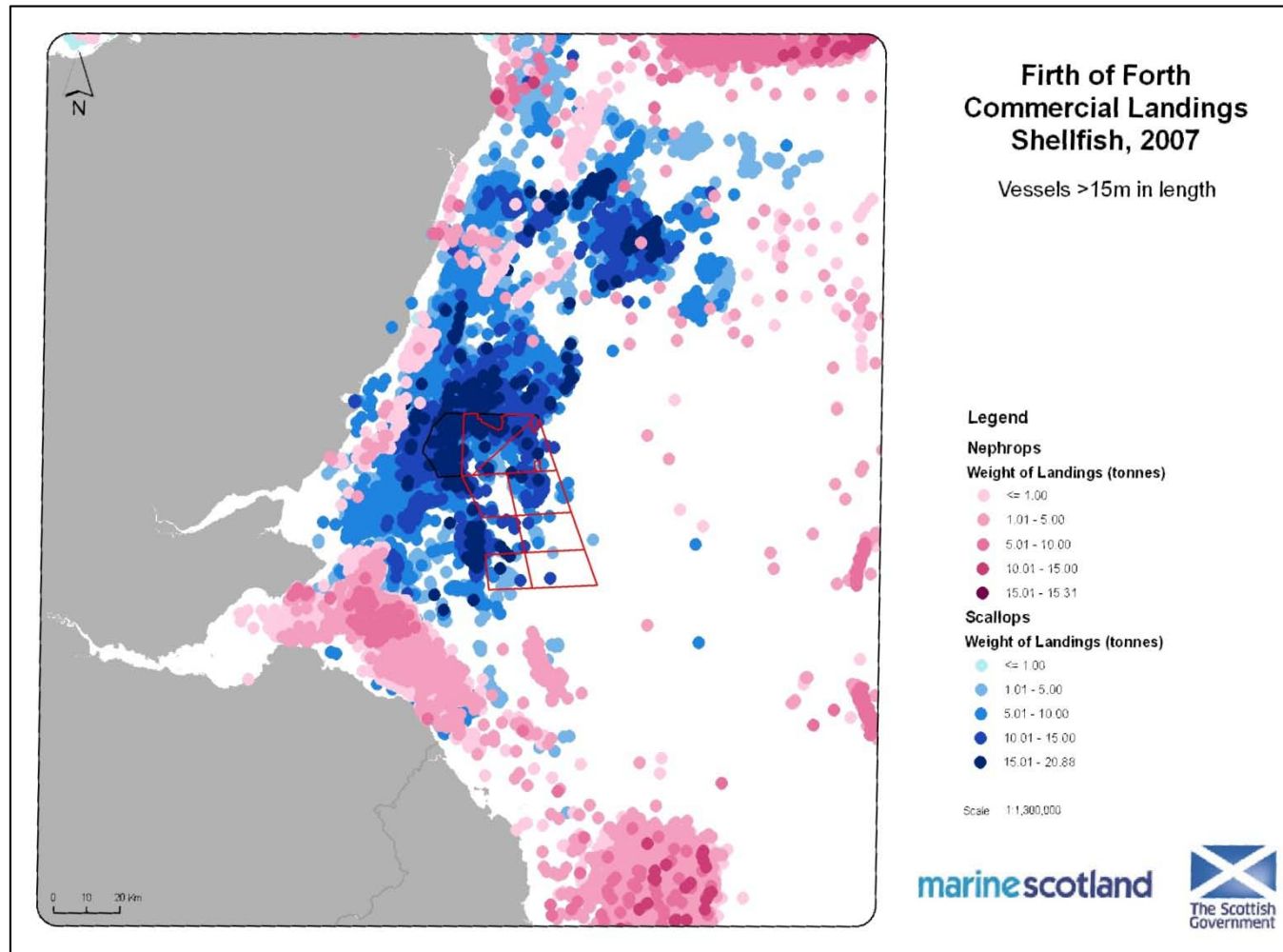
(source: Marine Scotland)

Figure 10.6 Commercial landings of finfish (demersal and pelagic) for over-15 metre vessels, 2009



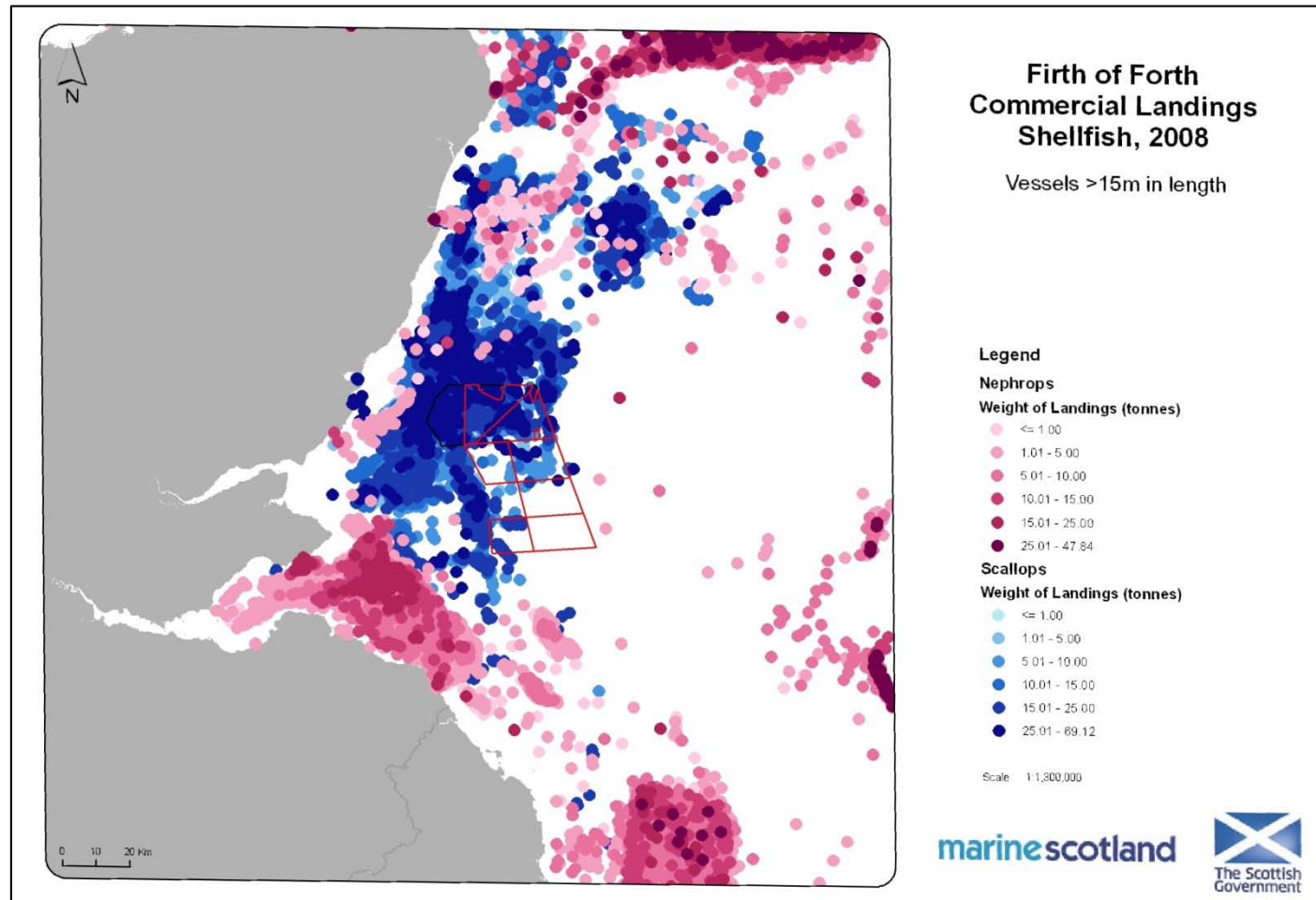
(source: Marine Scotland)

Figure 10.7 Commercial landings of shellfish (nephrops and scallops) for over-15 metre vessels, 2007



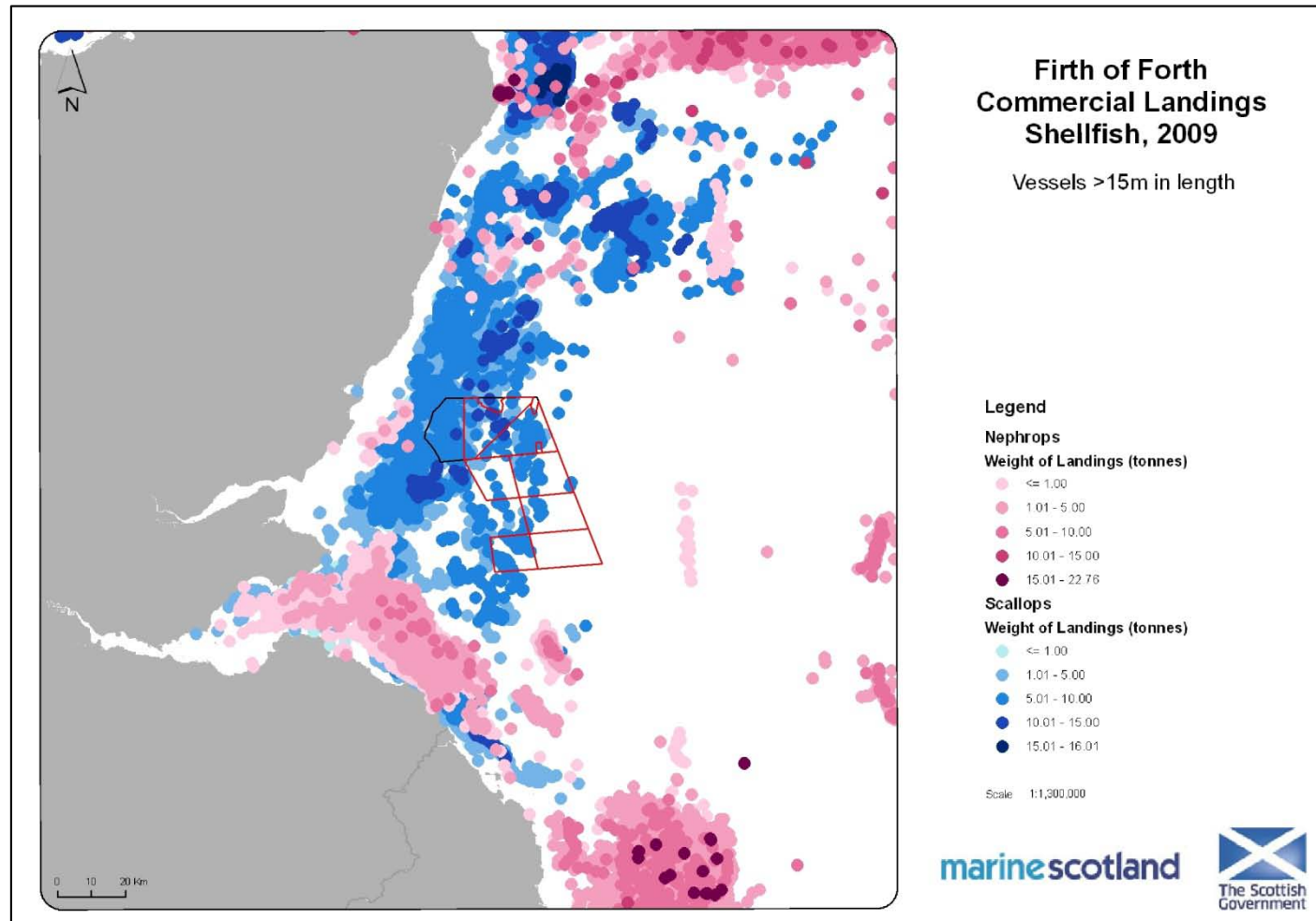
(source: Marine Scotland)

Figure 10.8 Commercial landings of shellfish (nephrops and scallops) for over-15 metre vessels, 2008



(source: Marine Scotland)

Figure 10.9 Commercial landings of shellfish (nephrops and scallops) for over-15 metre vessels, 2009



(source: Marine Scotland)

11 Fishing Methods, Operating Patterns and Practises

The principal fishing activities undertaken in the area of the proposed development are:

- Scallop dredging;
- Demersal trawling;
- Creeling.

Fishing patterns and practises relevant to these activities are also described. Information gathered through consultation with fisheries stakeholders has informed the assessment.

11.1 Scallop Dredging

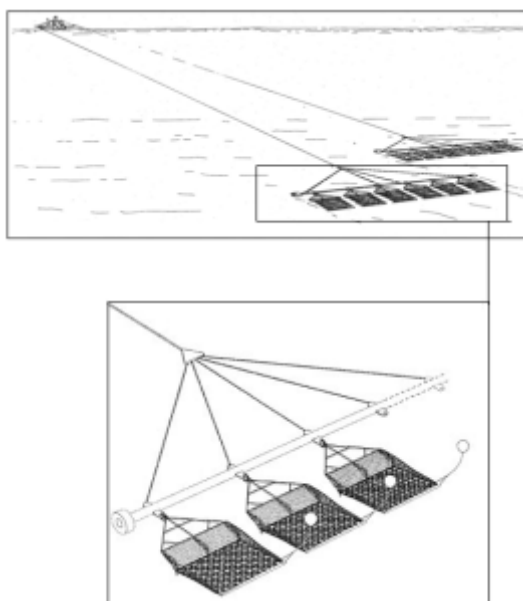
11.1.1 Fishing Gear

Scallop vessels operate by towing one (astern) or two (either side) beams onto which a number of dredges are attached. The number of dredges used depends on vessel size, engine power, winch capacity and distance travelled to fishing grounds. In Scottish waters, the total number of dredges can vary from three to four on a small, ten metre boat and up to 14 in waters outside of 12nm. In English waters, there are no restrictions outside 6nm.

The most common dredge type used in UK waters is the Newhaven scallop dredge. Scallops are 'raked' from their recessed position in the seabed by eight or nine steel teeth that penetrate the seabed. Teeth are up to 11cm long and are attached along the leading edge of the dredges. Mesh bags are situated behind the teeth to retain the catch. The maximum penetration depth of this gear is up to 20cm (pers. comm. scallop dredge manufacturer, September 2011), although this will vary depending on substrate composition.

Figure 11.1 shows the basic configuration of scallop fishing gear. Table 11.1 provides examples of the range in specifications of two scallop vessels, Vessel A and Vessel J.

Figure 11.1 Scallop dredging gear



(source: BMM)

Table 11.1 Gear dimensions of two scallop dredge vessels

Fishing vessel	Vessel A	Vessel J
Home port	Montrose	Buckie
Length	14.33m	30.20m
Drive type	Hydraulic	Electric
Number of trawl winch drums	2	4
Length of warp on each drum	220m	500m
Braking type	Band	Band
Wire type	6x19+1	6x26+1
Warp diameter	20mm	32mm
Length of warp paid out relative to depth	2.5-3.5:1	2.5:1
Number of beams	2	2
Beam length	5.3m	16m
Beam weight	N/A	2.5 tonne
Wheel diameter	65mm	480mm
Number of dredges per side	6	15
Dredger length	1 m	8.1 m
Dredger weight	N/A	2.5 tonnes
Estimated total gear width	10.7 m	16.5 m

11.1.2 Fishing Patterns and Practices

Scallops prefer sediments comprised of sand, gravel and mud, sometimes with stones, rocks or boulders⁵ and are found below the low water mark to depths exceeding 100m. The scallop fleet is most active during the second quarter of the year, although scallop fishing occurs all year round. A large proportion of scallop grounds to the east of Scotland (including the Forth and Tay area) are beyond the 12nm limit and therefore attract larger vessels which are able to use up to 14 dredges attached to a beam. Little is known about potential scallop grounds further offshore and it is possible that improved knowledge of the extent and potential of offshore stock could lead to an increase in the scallop dredge fleet, activity and grounds covered⁶.

A high proportion of the scallop fleet is nomadic and will variously target grounds around the UK. The areas fished depend on the productivity of each scallop ground and the changes in stock levels and regulations. It is understood that the majority of scallop grounds are fished periodically and then left (which can be for periods of approximately 18 months) until stocks have sufficiently recovered.

Within the Forth and Tay area, there are several locally based vessels that concentrate the majority of their activities within the local area. In addition there are visiting vessels from the east and west coasts of Scotland that periodically fish the Forth and Tay scallop grounds as well as other grounds around the UK. These vessels are further discussed in Section 12.1.1.

As has been previously stated, the scallop fishery in Scotland is managed through minimum landing sizes (100mm shell width), restrictions on dredge numbers and seasonal closures. There are currently no limits in the form of catch or effort quotas. It should be noted however that alternative management schemes have been implemented to restrict scallop dredging activity, for example, the closure of important scallop grounds in Cardigan Bay for conservation measures. In addition to this, restrictions have also been imposed upon the scallop fleet in the waters around the Isle of Man. The Isle of Man closure impacts upon many Scottish vessels who seasonally dredge the area. Directly related to the Isle of Man closure, environmental concerns over displaced vessels targeting grounds in nearby Luce Bay (south west Scotland) to the north resulted in the Scottish Government extending the seasonal closure of Luce Bay⁷.

11.2 Demersal Otter Trawling for Nephrops, Whitefish or Squid

In terms of full time vessel numbers, demersal otter trawling is currently the most common commercial fishing method in Scottish waters. Figure 11.2 gives the basic configuration of a single rig demersal otter trawler. The otter boards maintain the

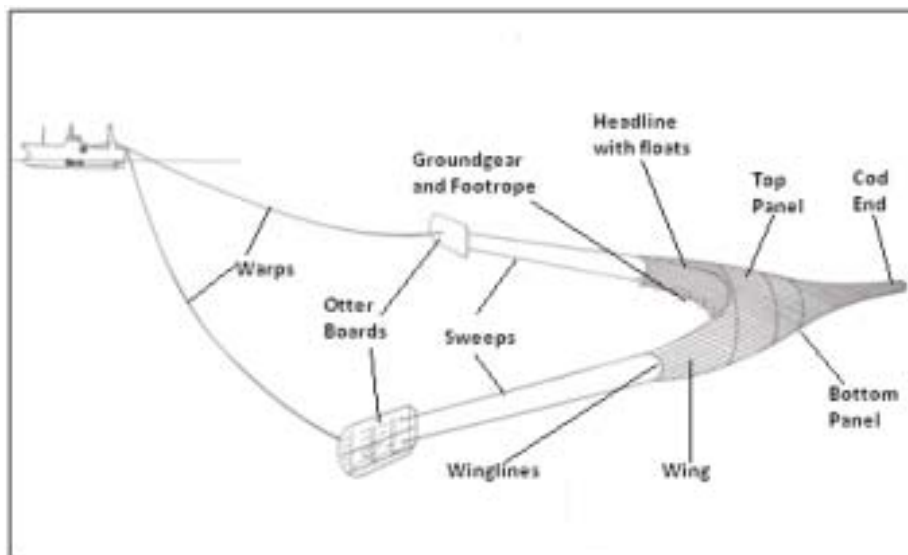
⁵ Keltz, S. and Bailey, N. (2010) Fish and Shellfish Stocks 2010. *Marine Scotland Report*

⁶ Howell, T.R.W., Davis, S.E.B., Donald, J., Dobby, H., Tuck, I. and Bailey, N. (2006) Report of Marine Laboratory Scallop Stock Assessments, *Fisheries Research Internal Report No. 08/06*

⁷ Ross, D. (2010) Scallop-dredging row leaves Scots boats nowhere to fish. *The Herald Scotland*, 18/11/10

horizontal opening of the net, they are relatively heavy and a steel toe can be added to ensure good contact with the seabed. Fish are herded between the otter boards, along the sweeps and into the mouth of the trawl where they drift through the net to be retained in the cod end. Studies have shown that otter board penetration depths can vary between 50mm on sandy bottoms to 300mm on soft mud⁸. The warp to depth payout ratio is generally around 3:1. Predominantly, demersal otter trawlers in the Forth and Tay area target nephrops and squid, with whitefish targeted further offshore.

Figure 11.2 Single net demersal otter trawl



(source: BMM)

Demersal otter trawl vessels can also operate two nets at the same time, known as twin-rigging. The two otter boards are used to maintain the lateral opening of the nets on the outer sweeps and a third warp is attached to a central clump weight, separating the two nets in the middle. Twin rig vessels are often used to target nephrops, but are also used in whitefish fisheries.

Demersal pair trawling can be undertaken whereby two vessels tow a single net between them, with each vessel towing one warp. The nets used for pair trawling are a similar design to those used for single net trawling, but tend to be larger and heavier. This allows vessels of moderate horsepower to tow relatively large gear between them.

⁸ Linnane, A., Ball, B., Munday, B., van Marlen, B., Bergman, M. and Fonteyne, R. (2000) A review of potential techniques to reduce the environmental impact of demersal trawls. *Irish Fisheries Investigations (New Series)*. No. 7

The gear dimensions of an average demersal trawler are given in Table 11.2. Vessel AT is a nephrops trawl vessel which is able to reconfigure its gear to target squid.

Table 11.2 Gear dimensions of Vessel AT, a demersal otter trawler

Fishing vessel	Vessel AT	
Home port	Arbroath	
Length	11.98m	
Drive type	Hydraulic	
Number of trawl winch drums	4	
Length of warp on each drum	200m	
Braking type	Band	
Wire type	16mm	
Warp diameter	16mm	
Length of warp paid out relative to depth	3:1	
Trawl door length	2m	
Trawl door height	1.2m	
Trawl door weight	0.25 tonnes	
Distance between doors	35m	
	Nephrops	Squid
Number of bridles per side	2	2
Bridle length	60m	60m
Ground line type	Soft ground	Rockhopper
Ground line length	30m	30m
Disc diameter of rockhoppers	N/A	35mm
Net type	Stuart	Harvest
Mesh size	80mm	10mm
Estimated headline height	2m	3m

11.2.1 Whitefish Fishery

Historically, the demersal otter trawl fleet (in addition to Scottish seine vessels) targeted whitefish such as cod and haddock in the Forth and Tay area. The fishery started to decline in the mid 1950s. Dwindling cod stocks throughout the North Sea resulted in a series of reductions in quota in the 1980s. The whitefish trawl fishery is, for the most part, a mixed fishery (i.e. multiple demersal species are simultaneously caught) and the restrictions placed upon the landing of cod have had a detrimental impact on the fleet's ability to fish alternative species. In addition, cuts to cod quota have encouraged the discarding of fish at sea, considered by all within the industry to be one of the biggest failures of the management policy. As a result of a lack of available quota, demersal trawlers have diversified into the nephrops fishery, where quota levels are not so restrictive.

There are currently no whitefish trawlers operating from home ports within the Forth and Tay area, and furthermore, it is not considered that vessels will return to the fishery in the near future, as a result of both a perceived lack in target species as well as a lack of available quota based upon track record (since the 1980s). It is considered that the level of whitefish landings recorded in inshore areas in the MMO statistics are by-catches from other demersal fisheries. The whitefish landings recorded further offshore to the north east of the regional study area are considered to be larger demersal trawl vessels which will land their catch at ports outside of the Forth and Tay area.

11.2.2 Nephrops Fishery

Nephrops gear is configured similarly to that used to target whitefish (Figure 11.2). A smaller mesh is used, which is a minimum of 70mm in diameter. Nephrops vessels can employ either single or twin rig demersal gear, as described above. Nephrops inhabit burrows in the seabed and favour muddy and soft substrates. Fishing is year round, although there is a peak in activity in the summer months⁹.

Nephrops are targeted by both the under and over-15 metre fleets. The under-15 metre fleet is generally comprised of local vessels which concentrate activity on grounds in proximity to their home ports. The over-15 metre fleet usually target grounds further offshore in the North Sea.

As has been previously stated, the nephrops fishery has become an important resource to demersal trawl fishermen. In Scottish waters, there are however currently considered to be too many vessels targeting the fishery and increasing pressure on the current stocks, which have seen a decline in landings in recent years¹⁰. In the Firth of Forth however, underwater television (UWTV) surveys conducted by Marine Scotland revealed that the nephrops population has been at a relatively high level

⁹ Keltz, S. and Bailey, N. (2010) Fish and Shellfish Stocks 2010. *Marine Scotland, The Scottish Government*

¹⁰ The Scottish Government (2010) The Future of Fisheries Management in Scotland; *Edinburgh 2010*

since 2003 and, taken with information showing stable mean sizes, indicates that the stock is being exploited sustainably¹¹.

11.2.3 Squid Fishery

Demersal otter trawl vessels are capable of targeting squid and will reconfigure gear to target the species when it is present. Due to the relatively short lifespan of squid and variable breeding success and survival rates, the squid fishery fluctuates from year to year.

In recent years the squid fishery has become a valuable alternative fishery for nephrops trawlers, chiefly supplying the European market. The fishery is unregulated, so there are currently no restrictions upon the activity (either in quota or effort). Ability to target the species can relieve pressure on regulated stocks such as nephrops.

The squid fishery is usually of short duration but is reported to have been extending in recent years. The timing of the squid fishery is dependent upon the arrival of the species in the area, but the peak season is generally around August and September. The fishery has become increasingly important to local inshore trawl fishermen, particularly during periods where other fisheries are experiencing low catch rates. It was reported that 2010 was a very good year for squid landings, although this will not be reflected in the annual landings values (until they are released in the third quarter of 2011). Furthermore, Fishermen also stated that 2010 saw an extended squid season, with activity continuing into November (pers. comm. Fishermen's Mutual Association Ltd. (Pittenweem) (FMA), Oct 2010).

Squid grounds are not fixed, and fishermen stated they were targeting the species in grounds further offshore than previously recorded (pers. comm. FMA, Oct 2010). Furthermore, it was considered that there is the potential for squid grounds to change in future years. A number of fishermen consulted considered that squid grounds are not moving, instead new squid grounds are still being discovered, as a result of the relatively recent introduction of the fishery. Current squid grounds, as identified by trawl fishermen, are discussed in Section 13.

In order to target the species, vessels will reconfigure their demersal gear (Figure 11.2). Nets are changed to those with a smaller mesh size of 40mm. Nets will have high headlines (i.e. the top of the net is higher in the water column), as the species is caught off the seabed. Squid are often targeted on rocky or uneven ground, and vessels targeting the species will employ additional protective gear such as rockhoppers (rubber disks attached immediately ahead of the ground-line to allow net to pass over rough ground) or 'flipper' gear (rubber mats fixed between the net and seabed to protect nets from rough ground) to minimise damage to nets.

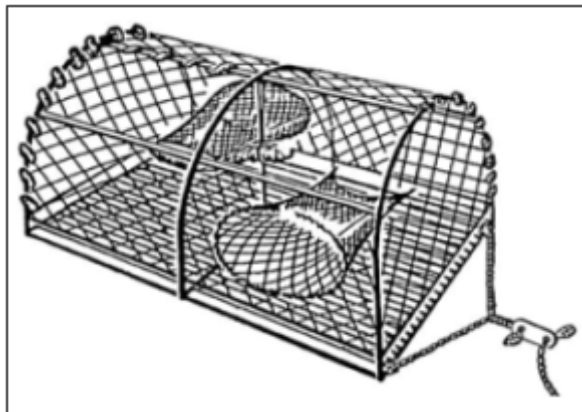
¹¹ Keltz, S. and Bailey, N. (2010) Fish and Shellfish Stocks 2010. *Marine Scotland, The Scottish Government*

11.3 Creeling

Creels are essentially traps baited to catch mobile shellfish such as lobster, crab species or nephrops (Figure 11.3). Creels are attached to a main line which is deployed from the vessel onto the seabed (Figure 11.4). Creels normally have an average soak time of around three days, although this can be extended during periods of bad weather. The priority of this fishery is to land live catch.

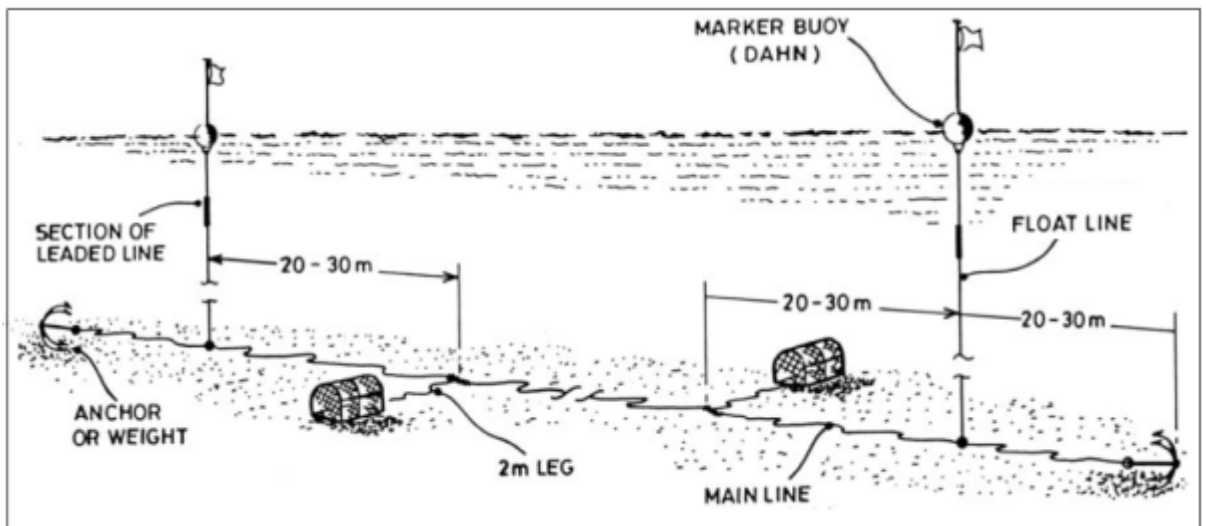
The scale of the activity can range from a 'hobbyist' fisherman setting around 20 creels, to a vivier crabber which may set more than 3000 creels at one time. Smaller vessels will keep their catch alive in cages on the seabed, while larger vessels will use purpose-built onboard vivier tanks.

Figure 11.3 Example of a 'parlour' lobster creel



(source: Seafish, 2005)

Figure 11.4 Fleet of creels



(source: Seafish, 2005)

Due to the limited operational range of small, inshore vessels, fishermen generally deploy their creels closer to the coast and in areas not frequented by towed gear. The Arbroath Static Gear Fishermen's Association considered that the development would not significantly impact upon the activities of their members.

There are a number of creeling vessels operating on a part-time basis. Generally, these vessels will operate during the summer months and are hauled out over the winter.

The gear dimensions of a creeling vessel which targets grounds in proximity to the development is given in Table 11.3.

Table 11.3 Gear dimensions of Vessel D, a creeler

Fishing vessel	Vessel D
Home port	Arbroath
Length	9.9m
Creel type	Parlour
Creel length	0.8m
Creel height	0.5m
Number of fleets	50
Fleet length	322m
Number of creels per fleet	20
Distance between each creel	18m
Type of gear marker	Dhan pole with flags
Number of gear markers per fleet	2
Deployment method	Directional (mainly south east)
Typical depth fished	2 to 50m
Bait used	Scad
Typical soak time	1 to 2 days (dependent on weather)
Method of hauling	Hydraulic

12 Vessels

With the exception of the nomadic scallop fleet and offshore whitefish fleet, the majority of vessels active in the Forth and Tay area have home ports within the jurisdiction of the following Fishery Districts:

- Aberdeen Fishery District (Aberdeen down to the north side of the Tay Bridge);
- Anstruther Fishery District (south side of the Tay Bridge to the north side of the Kincardine Bridge);
- Eyemouth Fishery District (south side of the Kincardine Bridge down to the Scottish border).

The primary remit of DFOs is to ensure compliance with fisheries regulations from vessels within their jurisdiction. In addition, DFOs undertake to keep vessels informed of all change and amendments to fisheries management policies and of any relevant marine activity that may affect normal fishing practises. In addition to vessels under the jurisdiction of these districts, there are vessels from other locations in Scotland and England that will periodically visit the Forth and Tay area. The majority of these are scallop dredgers and demersal trawlers. Visiting vessels are discussed separately in Sections 12.1.1 and 12.2.3. The fishing grounds of all vessels are discussed in Section 13.

12.1 Scallop Fishery

Table 12.1 below lists the three scallop vessels with home ports in the locality of the Forth and Tay area and which operate within the vicinity of the development. Both Vessel B and Vessel E are over-15 metres in length and therefore satellite tracked.

Table 12.1 Scallop vessels with home ports in the Forth and Tay area

Vessel	Home port	Vessel length (m)
Vessel A	Montrose	14.33
Vessel E	Pittenweem	16.67
Vessel B	Burntisland	20.29

Of the vessels listed in Table 12.1, the largest is Vessel B. As mentioned previously, scallop grounds around the UK are fished periodically and therefore the proportion of time spent fishing in the Forth and Tay area is dependent upon the productivity of the fishing grounds. Due to the number of dredges the vessel operates, it is able to operate within any distance of the coast. The basic specifications for the vessel are listed in Table 12.2.

Table 12.2 Specifications of Vessel B, a scallop dredger

Fishing vessel	Vessel B
Home port	Burntisland
Length	20.29m
Main engine power	500hp
Fishing association	Scallop Association (SA)
Typical fishing trip duration	10 days
Typical distance steamed per trip	50nm
Seasonality of activity	Scallops – all year
Average no. of days fishing per year	200 days per year
Number of beams per side	2
Number of dredges per beam	8
Estimated total gear width	9m each side
Average towing speed	2 knots
Average towing duration	1.5 hours
Average tow length	3nm

The two remaining vessels, Vessel A and Vessel E, spend all of their time fishing in the Forth and Tay area. These vessels are multi-purpose and are able to target other species in addition to scallops using the appropriate trawl gear. The vessel specifications of these two vessels are listed in Table 12.3.

Table 12.3 Specifications of Vessel A and Vessel E

Fishing vessel	Vessel A	Vessel E
Home port	Montrose	Pittenweem
Length	14.33m	16.67m
Main engine power	310hp	280hp
Fishing association	Northern Fisheries Producers Organisation (NFPO)	FMA
Typical fishing trip duration	36 to 40 hours	10 days
Typical distance steamed per trip	90 to 100nm (depends on weather)	25nm
Seasonality of activity	Scallops – all year Nephrops – 3 months during the summer Squid – 4 months during the summer	Scallops – 70% Nephrops – 30%
Average no. of days fishing per year	150 to 200 days per year	280 days per year
Average towing speed	2 to 2.5 knots	2.7 knots
Average towing duration	2 to 4 hours	1 hour 20 minutes
Average tow length	2 to 8nm	1nm

Due to increasing restrictions on other fisheries, some demersal trawl vessels are currently using additional gear to target scallops in the Forth and Tay area. One demersal trawl vessel known to be targeting scallops is Vessel F, whose specifications are given in Table 12.4. It is noted however, that due to its limited operational range it is unlikely this vessels targets scallops within the development.

Table 12.4 Specifications of Vessel F, a Pittenweem registered trawler

Fishing vessel	Vessel F
Home port	Pittenweem
Length	13.65m
Main engine power	279hp
Fishing association	FMA
Seasonality of activity	Nephrops – June to February Scallops – February to June
Typical fishing trip duration	1 day
Typical distance steamed per trip	16nm
Average no. of days fishing per year	220 days

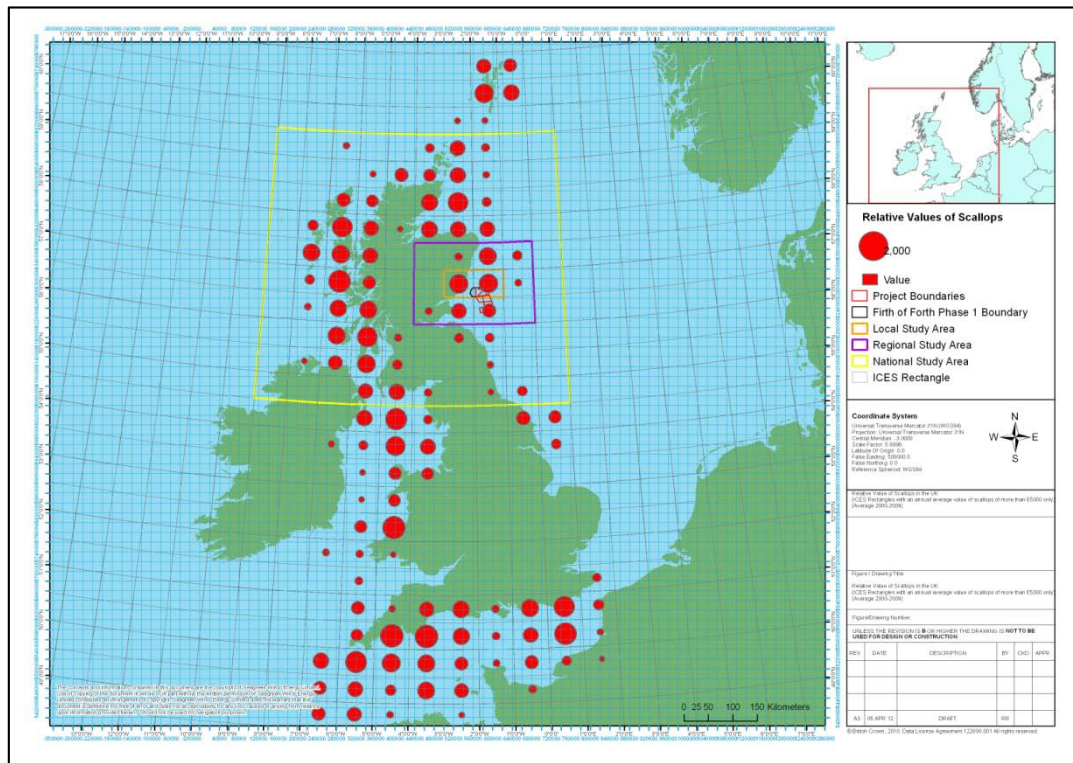
12.1.1 Visiting Scallop Vessels

Scallop dredge vessels from home ports outside of the Aberdeen, Anstruther and Eyemouth districts seasonally visit the regional study area of the development. Figure 12.1 shows the relative value of scallop landings around the UK. Grounds with values less than £5000 have been removed to prevent the data represented in the pie charts being disproportionate in scale. It can be seen that scallop landings in the Forth and Tay area are comparable to landings in the Moray Firth and are slightly lower than scallop landings on the Scottish west coast, in the Irish Sea and in the English Channel.

Table 12.5 lists the scallop dredgers that have home ports outside the Forth and Tay area and are known to target grounds down the east coast of Scotland (pers. comm. scallop fishermen, March 2011), potentially including grounds in the Forth and Tay area. The home ports of each vessel can be seen in Figure 12.2. It should be noted that the number of visiting scallop vessels targeting grounds in the Forth and Tay area and the amount of time they will spend in the area depends on the productivity of grounds elsewhere, which varies each year. Furthermore, it is considered that the largest vessels of the nomadic scallop fleet (those between 25 and 30 metres) are presently more likely to target scallop grounds in the English Channel (pers. comm. scallop fisherman, December 2010).

The specifications of four nomadic vessels known to regularly target grounds in the Forth and Tay area are listed in Table 12.6.

Figure 12.1 Scallop landings by value (£) in the UK



(source: MMO)

Figure 12.2 Nomadic scallop dredge home ports around the UK

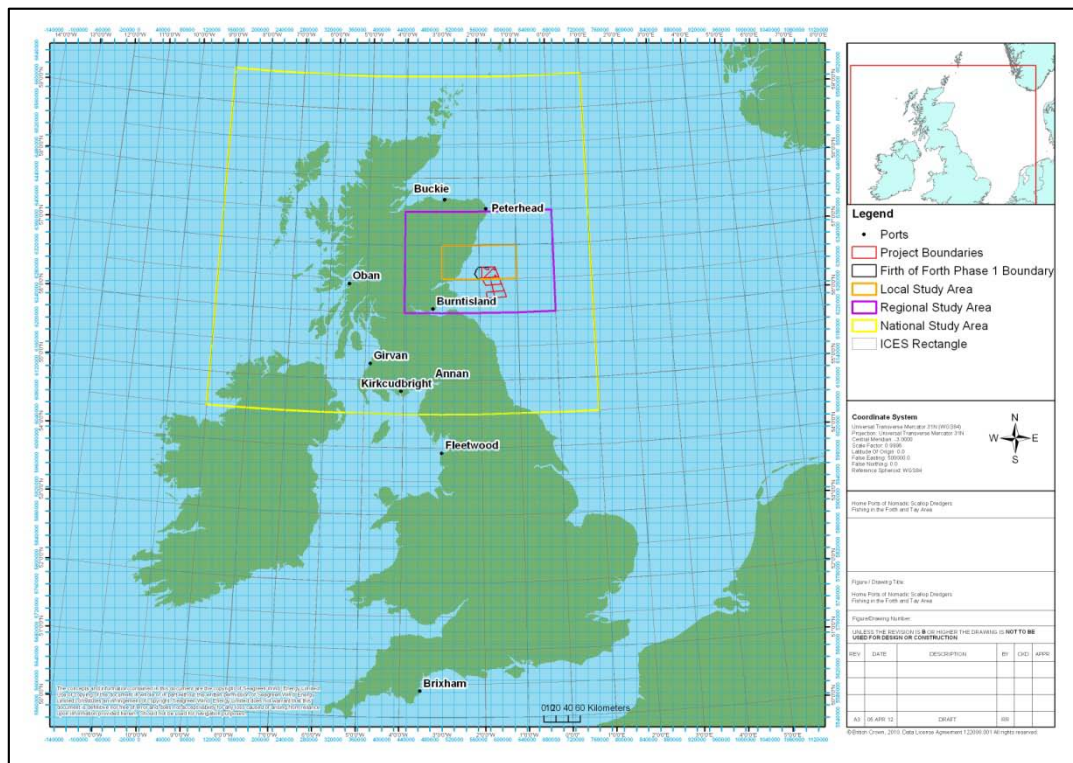


Table 12.5 Nomadic scallop dredgers

Vessel	Home port
Vessel G	Annan
Vessel H	Brixham
Vessel I	Buckie
Vessel J	Buckie
Vessel K	Fleetwood
Vessel L	Fleetwood
Vessel M	Girvan
Vessel N	Kirkcubright
Vessel O	Kirkcubright
Vessel P	Kirkcubright
Vessel Q	Kirkcubright
Vessel R	Kirkcubright
Vessel S	Kirkcubright
Vessel T	Kirkcubright
Vessel U	Kirkcubright
Vessel V	Kirkcubright
Vessel W	Oban
Vessel X	Oban
Vessel Y	Oban
Vessel Z	Oban
Vessel AA	Peterhead

Table 12.6 Specifications of Vessel I, Vessel J, Vessel M and Vessel AA

Fishing vessel	Vessel I	Vessel J	Vessel M	Vessel AA
Home port	Buckie	Buckie	Girvan	Peterhead
Length	18.17m	30.2m	18m	21m
Main engine power	540hp	999hp	440hp	625hp
Fishing association	N/A	North East of Scotland Fishermen's Organisation (NESFO)/SFF	Scottish Fishermen's Organisation (SFO)	N/A
Typical fishing trip duration	3 days	8 days	9 days	N/A
Typical distance steamed per trip	1 to 30nm	12 to 100nm	N/A	N/A
Seasonality of activity	Scallops – all year	Scallops – all year	Scallops – all year	Scallops – all year
Average number of days fishing per year	240 days per year	260 days per year	200 days per year	N/A
Average towing speed	2.3 knots	3 knots	2.4 knots	N/A
Average towing duration	1 hour	2 hours	1 to 1.5 hours	N/A
Average tow length	2.5nm	6nm	N/A	N/A

12.2 Demersal Trawl Fisheries

Table 12.7 lists the number of trawl vessels registered at ports within the Forth and Tay area. This list was created through cross-referencing the MMO vessel register with databases that contain information on individual vessel's gear categorisation. The list should not however be considered an accurate record of the vessels based in the area as individual vessels may have changed their home port and decommissioned or inactive vessels may still be included. In addition, the list does not distinguish between trawlers targeting different fisheries (nephrops or whitefish). It should also be noted that the majority of the vessels listed in Table 12.7 are under-15 metres in length and as a result are limited in their operation (i.e. geographical range). It is considered that smaller category vessels, particularly those under-10

metres, will not target offshore grounds such as those within which the development is located.

Table 12.7 List of demersal trawlers registered at ports within the Forth and Tay area

Vessel length category	Number of vessels	MMO registered home ports
Under-10 metres	21	7 Eyemouth 4 Pittenweem 2 Methil and Leven 2 Port Seton 1 Aberdeen 1 Anstruther 1 Arbroath 1 Granton 1 Johnshaven 1 St. Abbs
10-15 metres	21	5 Pittenweem 4 Port Seton 3 Eyemouth 3 Anstruther 3 Gourdon 1 Dunbar 1 St. Abbs 1 Stonehaven
Over-15 metres	9	4 Eyemouth 2 Granton 1 Arbroath 1 Pittenweem 1 Port Seton

(source: modified from the MMO vessel register lists)

12.2.1 Nephrops Fishery

Table 12.8 lists local demersal nephrops trawlers that are known to be fishing in the Forth and Tay area. It should be noted that the majority of the vessels listed are under-15 metres in length and therefore will not be included in the VMS dataset. The vessels listed below will employ a mixture of twin and single rig gear to target nephrops. It is of note that the majority of vessels are registered to home ports in the south of the study area and as a result will likely concentrate activities in nephrops grounds closer to their respective home ports. Furthermore, the operational limitations of the smaller vessels should be noted and it is unlikely that a number of the boats listed below will target offshore grounds such as those within which the development is located.

The basic specifications for one of the larger demersal trawl vessels targeting nephrops, Vessel AB, are given in Table 12.9. Vessel AB is an example of a resident vessel originally manufactured as a seine netter targeting whitefish. The vessel was later converted to bottom otter trawls targeting nephrops due to the restrictions and decline in the whitefish fishery.

Table 12.8 Forth and Tay demersal trawlers who are known to be actively targeting nephrops

Vessel	Length (m)	Home port
Vessel AC	8.00	Dunbar
Vessel AD	8.65	Eyemouth
Vessel AE	9.26	Dunbar
Vessel AF	9.30	Montrose
Vessel AG	9.49	Port Seton
Vessel AH	9.70	Pittenweem
Vessel AI	9.75	Port Seton
Vessel AJ	9.85	Port Seton
Vessel AK	9.95	St. Abbs
Vessel AL	10.21	Eyemouth
Vessel AM	10.97	Anstruther
Vessel AN	11.18	Dunbar
Vessel AO	11.27	Dunbar
Vessel AP	11.48	Port Seton
Vessel AQ	11.58	Pittenweem
Vessel AR	11.80	Dunbar
Vessel AS	11.90	Port Seton

Vessel	Length (m)	Home port
Vessel AT	11.98	Arbroath
Vessel AU	12.17	Eyemouth
Vessel AV	12.23	Port Seton
Vessel AW	12.47	Eyemouth
Vessel C	12.94	Pittenweem
Vessel AX	13.10	Dunbar
Vessel AY	13.60	Port Seton
Vessel F	13.65	Pittenweem
Vessel A	14.33	Montrose
Vessel AZ	14.70	Montrose
Vessel BA	15.58	New haven
Vessel E	16.67	Pittenweem
Vessel BB	16.82	Eyemouth
Vessel AB	17.20	Pittenweem
Vessel BC	17.78	Port Seton
Vessel BD	18.22	Eyemouth
Vessel BE	19.81	Eyemouth
Vessel BF	20.43	Fisherrow
Vessel BG	20.82	Eyemouth
Vessel BH	21.10	Fisherrow
Vessel BI	21.53	Eyemouth
Vessel BJ	21.78	Eyemouth

Table 12.9 Specifications of Vessel AB, a demersal trawler

Fishing vessel	Vessel AB
Home port	Pittenweem
Length	17.2m
Main engine power	180hp
Fishing association	FMA
Typical fishing trip duration	12 to 18 hours
Typical distance steamed per trip	20nm
Seasonality of activity	Nephrops and squid all year
Average number of days fishing per year	200 days per year

12.2.2 Squid Fishery

The majority of the vessels listed in Table 12.8 above are able to reconfigure their gear to target squid on a seasonal basis. As stated previously however, due to restrictions on the vessels' operational range, it is unlikely that the majority of these vessels will fish for squid in grounds offshore.

The vessel specifications of two nephrops trawlers, Vessel AX and Vessel AT, which are known to be seasonally targeting squid in the vicinity of the development, are given in Table 12.10.

Table 12.10 Specifications of Vessel AX and Vessel AT, demersal trawlers

Fishing vessel	Vessel AX	Vessel AT
Home port	Dunbar	Arbroath
Length	13.1 m	11.98m
Main engine power	210hp	300hp
Fishing association	Eyemouth and District Fishermen's Association	FMA
Typical fishing trip duration	14 hours	5 days
Seasonality of activity	Nephrops and whitefish – 8 months Squid – 4 months	Nephrops – 6 months Squid – 6 months
Average number of days fishing per year	185 days per year	200 days per year
Average towing speed	2.5 knots	N/A
Average towing duration	3 hours	N/A
Average tow length	8nm	N/A

12.2.3 Visiting Demersal Trawl Vessels

The majority of demersal trawl vessels visiting the Forth and Tay area are part of the transient north east English fleet (Seahouses, Amble or Blyth). These vessels will target both nephrops and squid in the Forth and Tay during the summer months, landing their catches at the ports in the district, including Port Seton, Pittenweem and Eyemouth.

There are a number of vessels which will seasonally visit the Forth and Tay from elsewhere in Scotland. Vessels from the Moray Firth, Orkney Islands and the west coast will berth at local ports and sell their catch to local buyers during the nephrops season. These visiting vessels appear in mid-June and may stay until the end of December. The vessels are also able to transfer to fishing for squid when they are available, generally between August and September, and may be joined by several larger category vessels seeking to capitalise on the unregulated fishery. There are also a number of larger, offshore demersal trawl vessels which will target whitefish species within the regional area of the development, but will land their catch at ports outside of the Forth and Tay area. Table 12.11 lists the visiting demersal trawl vessels that are known to be targeting grounds in the Forth and Tay area. The operational limitations of the smaller vessels should be noted and it is unlikely that a

number of the boats listed below will target offshore grounds such as those within which the development is located.

The basic specifications of Vessel BK are listed in Table 12.12. Vessel BK is based in Macduff in the Moray Firth but will seasonally target nephrops in the Forth and Tay area once the Moray Firth directed squid fishery has finished.

Table 12.11 Visiting demersal trawl vessels fishing grounds in the Forth and Tay

Vessel	Length (m)	Home port
Vessel BL	9.45	Blyth
Vessel BM	9.75	Seahouses
Vessel BN	9.90	Seahouses
Vessel BO	9.92	Amble
Vessel BP	11.88	Amble
Vessel BQ	12.08	Amble
Vessel BR	12.20	Amble
Vessel BS	13.17	Amble
Vessel BT	13.40	Buckie
Vessel BK	13.90	Macduff
Vessel BU	14.90	Seahouses
Vessel BV	14.95	Kirkwall
Vessel BW	14.99	Oban
Vessel BX	16.28	Seahouses
Vessel BY	16.61	Kirkwall
Vessel BZ	16.73	Amble
Vessel CA	18.59	Ardglass
Vessel CB	18.60	Buckie

Table 12.12 Specifications of Vessel BK, a visiting nephrops demersal trawler

Fishing vessel	Vessel BK
Home port	Macduff
Length	13.9m
Main engine power	325hp
Fishing association	SFF
Typical fishing trip duration	1 day
Seasonality of activity	Nephrops (in Forth and Tay) – December to May Squid (in Moray Firth) – June to December
Average number of days fishing per year	250 days per year
Average towing speed	2.5 knots
Average towing duration	3.5 hours
Average tow length	Up to 10nm

12.3 Crab and Lobster Fishery

Table 12.13 lists the creel vessels registered at ports within the Forth and Tay. As previously stated, the limitations of this information apply. It should be noted that all of the creel vessels in Table 12.13 are under-15m in length and therefore their activities will not be included within the VMS dataset. It is considered, however, that the considerable majority of activity by this fleet is limited to areas inshore of the development.

Currently, there are 37 full time local vessels that are known to be operating static gear to target crab and lobster within the Firth and Tay area, listed in Table 12.14. The limited length of the vessels restricts their range of operation, largely by reducing their capacity to operate in deeper waters at greater distances from their home port (i.e. economic viability and safety issues) and in inclement weather conditions. Therefore the majority of these vessels will be unlikely to operate within the development. The vessel specification of two vessels (Vessel D and Vessel CC) which have the potential to target crab and lobster species in the vicinity of the development are given in Table 12.15.

There are a number of visiting creel vessels in the southern area of the regional study area which are part of the transient English fleet (from Berwick, Seahouses and the Holy Island). However, due to their size restraints it is considered that these vessels will not operate within the vicinity of the development.

Table 12.13 List of creelers registered at ports within the Forth and Tay area

Vessel length category	Number of vessels	MMO registered home ports
Under-10 metres	189	44 Pittenweem 32 Aberdeen 32 Eyemouth 10 Montrose 8 Arbroath 7 Anstruther 7 Johnshaven 7 St. Abbs 7 St. Andrews 6 Crail 6 Gourdon 6 Methil and Leven 5 Dunbar 5 Granton 3 Port Seton 3 St. Monance 2 Burntisland 2 North Berwick 2 Stonehaven 1 Burnmouth 1 Cove
10-15 metres	6	2 Aberdeen 2 Eyemouth 1 Gourdon 1 Dunbar

(source: modified from the MMO vessel register lists)

Table 12.14 Forth and Tay creelers who are known to be actively targeting crab and lobster

Vessel	Length (m)	Home port
Vessel CD	4.87	North Berwick
Vessel CE	5.62	Burnmouth
Vessel CF	6.15	Burnmouth
Vessel CG	6.30	Burnmouth
Vessel CH	6.40	Burnmouth
Vessel CI	6.40	St. Abbs
Vessel CJ	6.50	Eyemouth
Vessel CK	6.90	Arbroath
Vessel CL	7.20	St Monance
Vessel CM	7.33	Arbroath
Vessel CN	7.39	Arbroath
Vessel CO	7.52	Montrose
Vessel CP	7.70	Pittenweem
Vessel CQ	7.77	Pittenweem
Vessel CR	7.87	Eyemouth
Vessel CS	7.93	Johnshaven
Vessel CT	7.95	Anstruther
Vessel CU	8.20	Arbroath
Vessel CV	8.25	Arbroath
Vessel CW	8.40	Eyemouth
Vessel CX	8.60	St. Abbs
Vessel CY	8.75	Arbroath
Vessel CZ	8.89	Eyemouth
Vessel DA	9.00	Arbroath
Vessel DB	9.15	Pittenweem
Vessel DC	9.15	St. Abbs
Vessel DD	9.20	Arbroath
Vessel AE	9.26	Dunbar
Vessel DE	9.55	Burnmouth
Vessel CC	9.60	Arbroath
Vessel DF	9.78	Dunbar
Vessel DG	9.78	Dunbar

Vessel	Length (m)	Home port
Vessel DH	9.80	Arbroath
Vessel D	9.90	Arbroath
Vessel DI	9.90	Montrose
Vessel DJ	9.90	Montrose
Vessel DK	9.92	Burnmouth
Vessel DL	9.94	Pittenweem
Vessel DM	10.40	Pittenweem

Table 12.15 Specifications of Vessel D and Vessel CC

Fishing vessel	Vessel D	Vessel CC
Home port	Arbroath	Arbroath
Length	9.9m	9.6m
Main engine power	300hp	300hp
Fishing association	Arbroath and District Static Gear Association	Scottish White Fish Producer's Association
Typical fishing trip duration	7 to 14 hours	1 day
Typical distance steamed per trip	20 to 50nm	30nm
Seasonality of activity	Edible crabs, lobster and velvet crabs all year Netting – 2 months	Edible crabs, lobster and velvet crabs all year Mackerel – 6 months
Average number of days fishing per year	310 days per year	280 days per year
Typical depth fished	N/A	6 to 20m
Typical soak time	N/A	2 days

13 Principal Fishing Grounds

The charts below have been produced using information provided by a representative sample of individual fishermen on paper charts. There are not currently considered to be productive whitefish fishing grounds in the vicinity of the Phase 1 development.

13.1 Scallop Fishing Grounds

Figure 13.1 shows the location of scallop grounds relative to the development, as identified by two individual vessels. Scallop grounds are located on substrates comprised of sand, gravel and mud, sometimes interspersed with stones, rocks or boulders throughout the development and adjacent areas to the west and south.

13.2 Nephrops Fishing Grounds

Figure 13.2 shows the principal nephrops grounds in the Forth and Tay area. It can be seen that the majority of grounds are inshore and to the south of the Forth and Tay area, with three vessels (Vessels 1, 4 and 7) identified as targeting nephrops off the coast at Arbroath. One vessel also targets nephrops grounds on the north western edge of the development. There are no other nephrops grounds within the development.

13.3 Squid Fishing Grounds

Fishermen targeting squid in the Forth and Tay area stated that the species were caught in a variety of locations and in addition, fishermen are catching squid in new grounds. The grounds identified in Figure 13.3 are therefore considered to be squid fishing areas, not discrete grounds, and verification through analysis of VMS datasets is not possible as a result of the vessels' length (under-15m). The areas identified by vessels are in inshore areas to the south of the Forth and Tay area, and in areas further offshore, including within the development.

13.4 Creel Fishing Grounds

Figure 13.4 shows the principal creel fishing grounds in the Forth and Tay area. It can be seen that, for the most part, grounds are inshore, largely as a result of the limited operational range of the vessels involved and the avoidance of towed gear grounds in areas further offshore. The Bell Rock is however considered to be an important creel area.

There is one larger vessel (Vessel 1) that targets creel grounds on the western edge of the development with another vessel (Vessel 18) targeting grounds immediately adjacent to the development.

Figure 13.1 Forth and Tay scallop fishing grounds

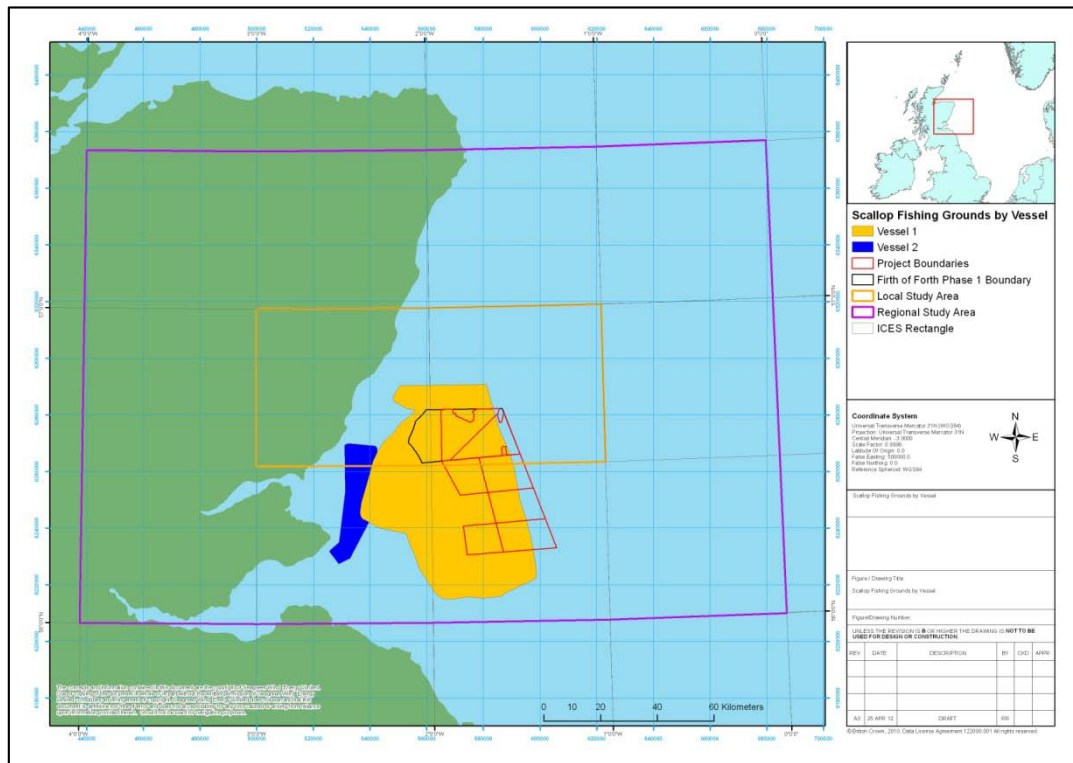


Figure 13.2 Forth and Tay nephrops fishing grounds

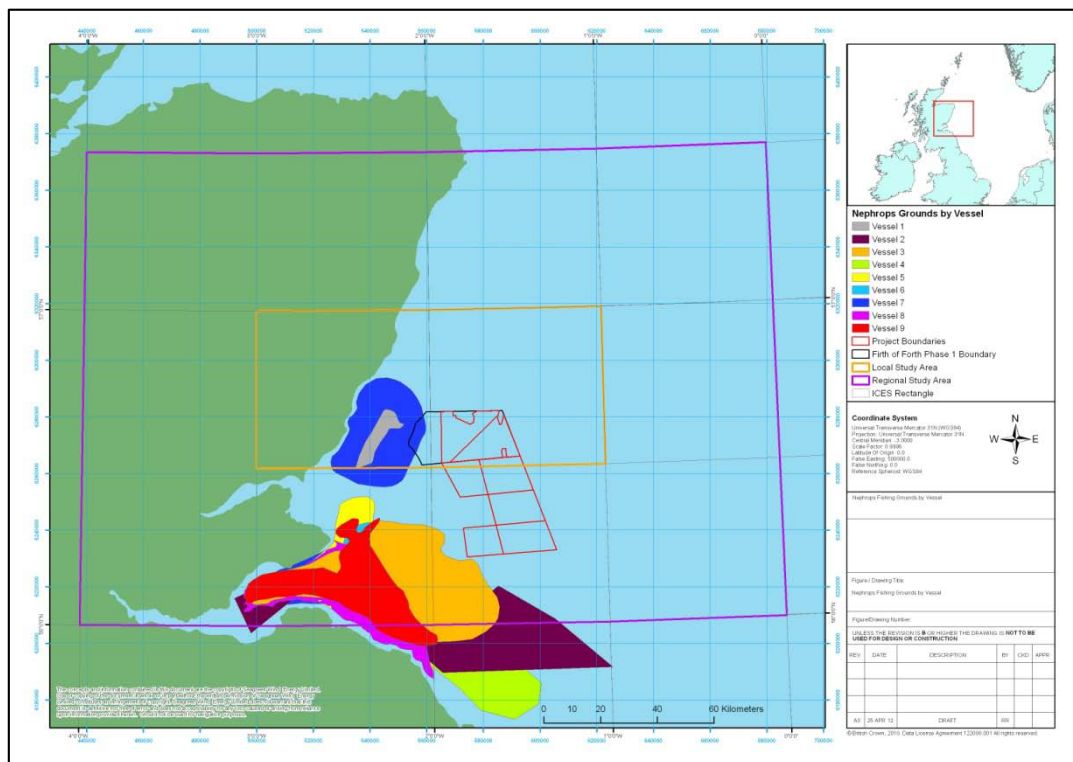


Figure 13.3 Forth and Tay squid fishing grounds

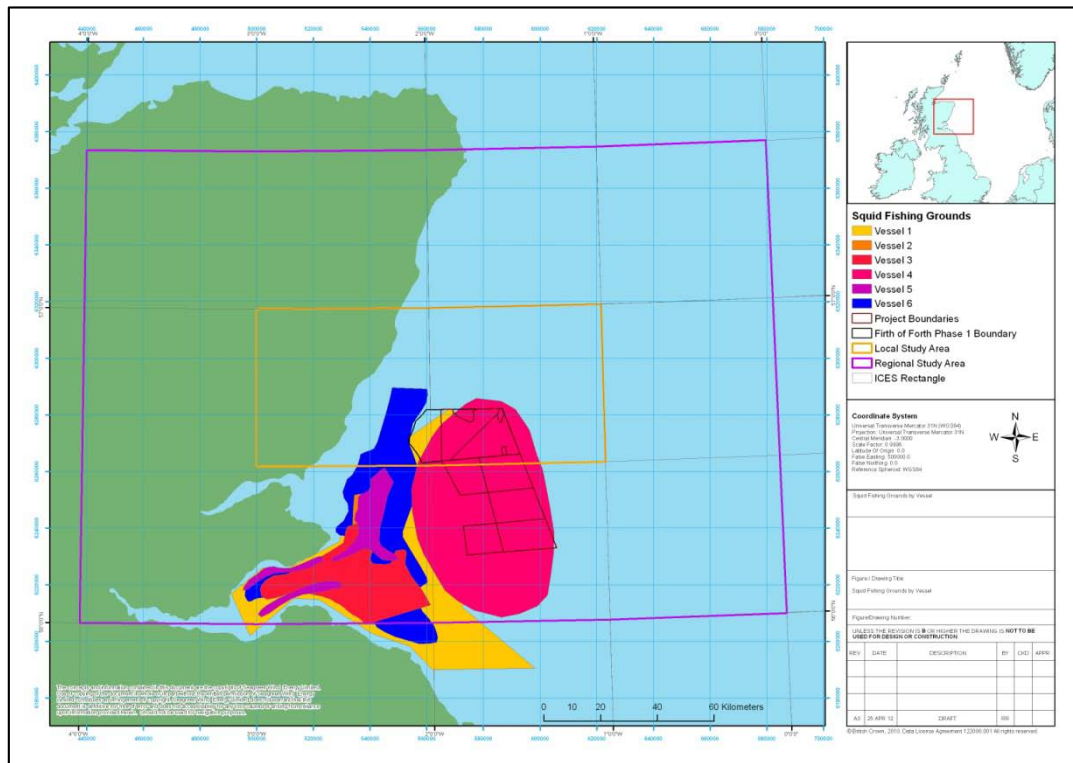
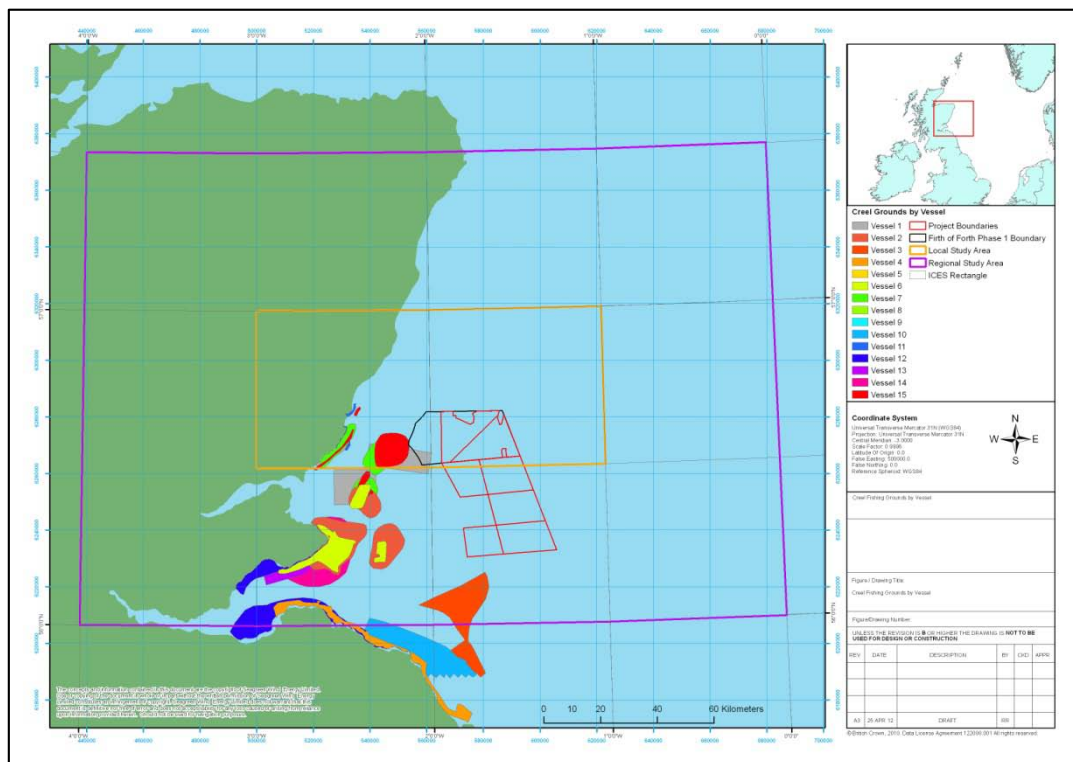


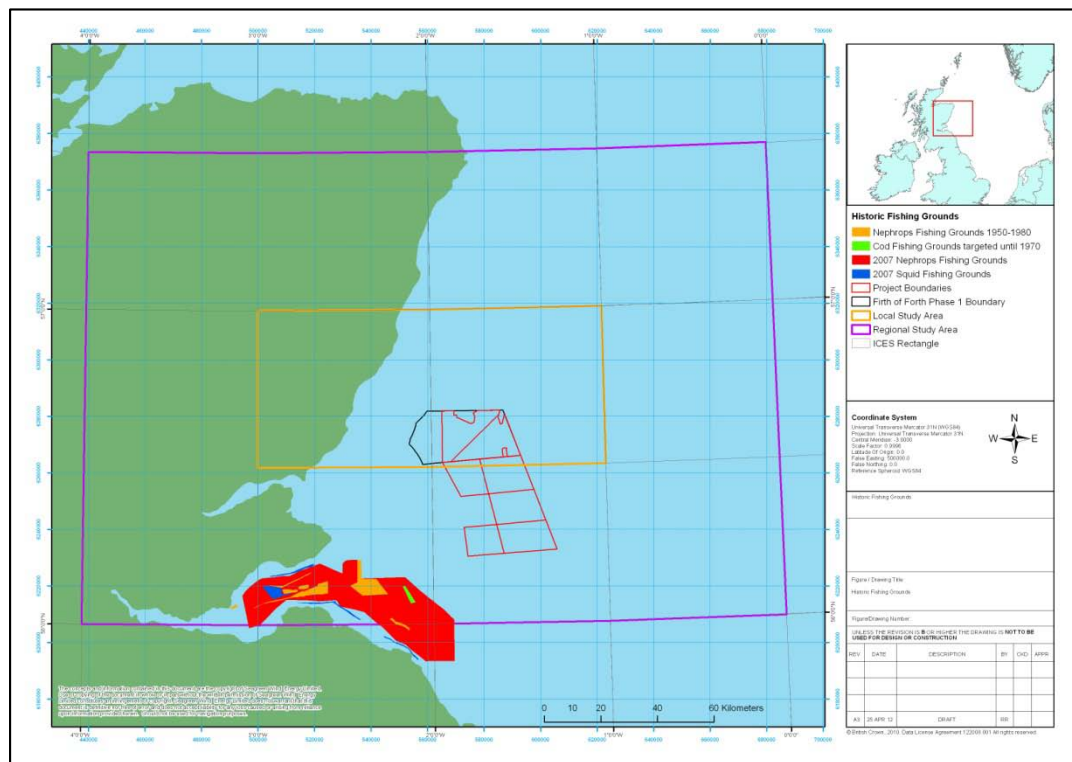
Figure 13.4 Forth and Tay creel fishing grounds



13.5 Historic Fishing Grounds

Figure 13.5 below shows changes in fishing grounds over the last 60 years as identified by one vessel targeting species in the Forth and Tay area. It can be seen that between 1950 and 1980, the vessel would target nephrops in discrete sea areas for seven months of the year (June to December); however in 2007 the vessel was targeting nephrops in a larger area all year round. As whitefish stocks declined and restrictions on fishing for whitefish increased, the vessel became more dependent on nephrops fishing. The vessel also diversified in 2007 and began targeting squid. As mentioned previously, squid are an increasingly important species in the Forth and Tay area due to increasing restrictions on pressure stocks such as whitefish and nephrops.

Figure 13.5 Historic and current day fishing grounds as identified by one vessel in the Forth and Tay area



14 Future Fisheries

Commercial fishing activities are not constant and patterns of fishing activity fluctuate both annually and on a longer term basis. As a result, predictions of future fishing activity are complicated. Furthermore, impending changes to fisheries management as a result of revisions to the CFP and other related legislation will likely significantly alter future fishing practices.

Given below is a summary of the potential changes in current fishing activities that may occur in the future, based upon current knowledge of fishing patterns and practices in the Forth and Tay area.

14.1 Scallop Fishery

Marine Scotland Science recommends that to protect scallop stocks and effectively manage the fishery, restrictions on the number of vessels entering the scallop fleet and increases in the minimum landing size are introduced in the near future¹². As has been previously stated, the Isle of Man has already introduced fishing restrictions to protect stocks. In addition, concerns over the impact of scallop dredging upon the environment have resulted in restricted or no access to sea areas, such as has occurred in Cardigan Bay. It is possible and indeed likely, in light of the commitments to increased protection of marine habitats through the establishment of Marine Protected Areas (MPAs), that further restrictions will apply to the fishery as it exists in its current form.

14.2 Nephrops Fishery

The nephrops fishery in the Forth and Tay area is currently considered to be sustainably exploited and significant changes to the activity of the fleet are not expected in the future. It is possible however, that other pressures on the fleet, such as rising fuel and crew costs and national quota cuts, may result in a number of vessels being decommissioned.

As has been previously stated all demersal trawl vessels operating in the Forth and Tay area target nephrops year round and squid on a seasonal basis. These vessels are however able to also target whitefish although a current lack of available quota, coupled with a collapse in the fishery in the area has curtailed this activity. It is possible that stocks of whitefish may recover and, subject to having access to the species, vessels may target this fishery in the future.

14.3 Squid Fishery

The squid fishery is a relatively new fishery to the Forth and Tay area, and future fishing practices are uncertain. It has however become an important alternative fishery for the nephrops fleet and it is likely, in the light of restrictions on pressure

¹² Keltz, S. and Bailey, N. (2010) Fish and Shellfish Stocks 2010. *Marine Scotland Science. The Scottish Government*

stock species such as whitefish and nephrops, that it will be increasingly important in the future.

Squid populations are currently perceived to be resistant to fishing pressure, however as squid have a relatively short life span, there are growing concerns that overfishing will result in limited numbers of spawning stock and a population depletion. Predicting the future of squid stocks is complicated and potentially misrepresentative due to the erratic fluctuations in stocks and squids high sensitivity to environmental factors. Current day factors, such as climate change and rising sea temperatures pose a risk to discrete squid populations as they continue to move to higher latitudes¹³.

Predicting the seasonality of squid stocks can also be difficult as it can vary annually. Vessels targeting squid are currently beginning earlier and finishing later each year. A major concern of the inshore fishermen is the early depletion of squid stocks as it leaves them with few alternative options for the remainder of the year (pers. comm. squid fisherman, December 2010).

As a result of the relatively recent focus on the squid fishery, there is the potential for fishing practises to be further adapted to better target the species. 'Jigging' for example, could be used in the Forth and Tay area. Jigging is fishing using a multi-hooked line and a mechanical, and nowadays computerised, jigger. The hooks are disguised with feathers or fish-like lures to attract the target species, and jigged up and down a few inches to seem lifelike. Fishing by this mode is done mainly inshore, but abler craft would be able to target grounds further offshore. There is the possibility that jigging could be increasingly used in the future¹⁴ as an alternative to traditional towed gear fishing methods. Furthermore, a Seafish study also considers that there are more productive marketing opportunities for squid in the UK than are currently exploited¹⁵.

14.4 Bivalve Fishery

There is currently a small bivalve fishery in the Anstruther district, targeted by one vessel which operates a small hydraulic dredge to target razor and surf clams in shallow waters off Pettycur Bay (between Kinghorn and Burntisland). There are however productive bivalve grounds in several inshore areas, such as Kinshaldy beach, Kirkcaldy Bay and St Andrews Bay, although commercial fishing activities are currently prohibited. At the time of writing a bivalve survey was being undertaken in St Andrews Bay, aimed at assessing population densities of bivalve species (pers. comm. IFG co-ordinator, February 2011). It is possible that in the future restrictions upon the prosecution of this fishery may be lifted, subject to an assessment upon the sustainability of stocks being undertaken.

¹³ Hastie, L., Pierce, G., Pita, C., Viana, M., Smith, J. and Wangvoralak, S. (2009) Squid Fishing in UK Waters. Report to SEAFISH Industry Authority

¹⁴ Young, I.A.G., Pierce, G.J., Stowasser, G., Santos, M.B., Wang, J., Boyle, P.R., Shaw, P.W., Bailey, N., Tuck, I. and Collins, M.A. (2006) The Moray Firth directed squid fishery. *Fisheries Research*, 78, 39-43

¹⁵ Hastie, L., Pierce, G., Pita, C., Viana, M., Smith, J. and Wangvoralak, S. (2009) Squid Fishing in UK Waters. Report to SEAFISH Industry Authority

14.5 Sprat Fishery

Sprats were traditionally targeted in the Inner Forth, where the species over-wintered. There was a productive fishery about 20 years ago, targeted by an estimated 100 vessels. Concerns about the level of juvenile herring bi-catch led to the closure of the fishery. It is however believed that it is only when the sprat move into the outer Firth (generally around February) that the species mixes with herring stocks. The South East IFG has proposed to survey the inner Forth over winter to identify clean sprat (i.e. no juvenile herring bi-catch) that are of a size suitable for human consumption, which if successful may lead to the identification of a small scale fishery in the future (pers. comm. IFG coordinator, February 2011).

14.6 Sandeel Fishery

There is currently no industrial trawling for sandeels in the vicinity of the development. There has however been a historic sandeel fishery, with fishing grounds on the east coast of Scotland including the Wee Bankie. Sandeel fishing grounds on the Wee Bankie were closed to industrial trawling in 2000 as a result of concerns about stock populations and the associated effect upon predators of conservation concern¹⁶. (sandeels are a key component of the marine food web, providing food for seabirds, fish species and marine mammals).

The sandeel fishery is generally a Danish one, with the Danish fleet (operating in the main out of Esberg) allocated over 90% of the TAC for sandeels in the North Sea.

Figure 14.1 to Figure 14.7 show the effort distribution of the Danish fleet targeting sandeels in the North Sea, in relation to the development, between 2003 and 2009, respectively. It can be seen that over the seven year period, the effort by the Danish fleet on the Wee Bankie in the Firth of Forth has declined from low/moderate levels (2003 to 2006) to negligible levels (2007 to 2009). The low level of activity recorded between 2003 and 2006 was as a result of a small amount of quota being made available to the Danish fleet for scientific monitoring in the area.

Whilst some scientific surveying has been undertaken by the Danes, recorded levels of catch have not met requirements for the reopening of the fishery and there is still a moratorium on trawling for sandeels on the Wee Bankie. Vessels currently target sandeels elsewhere in the North Sea, such as on the Dogger Bank.

It is possible that the species may recover to sufficient levels for the fishery to reopen in the future and the Danish fleet regains access to the Wee Bankie to target the species.

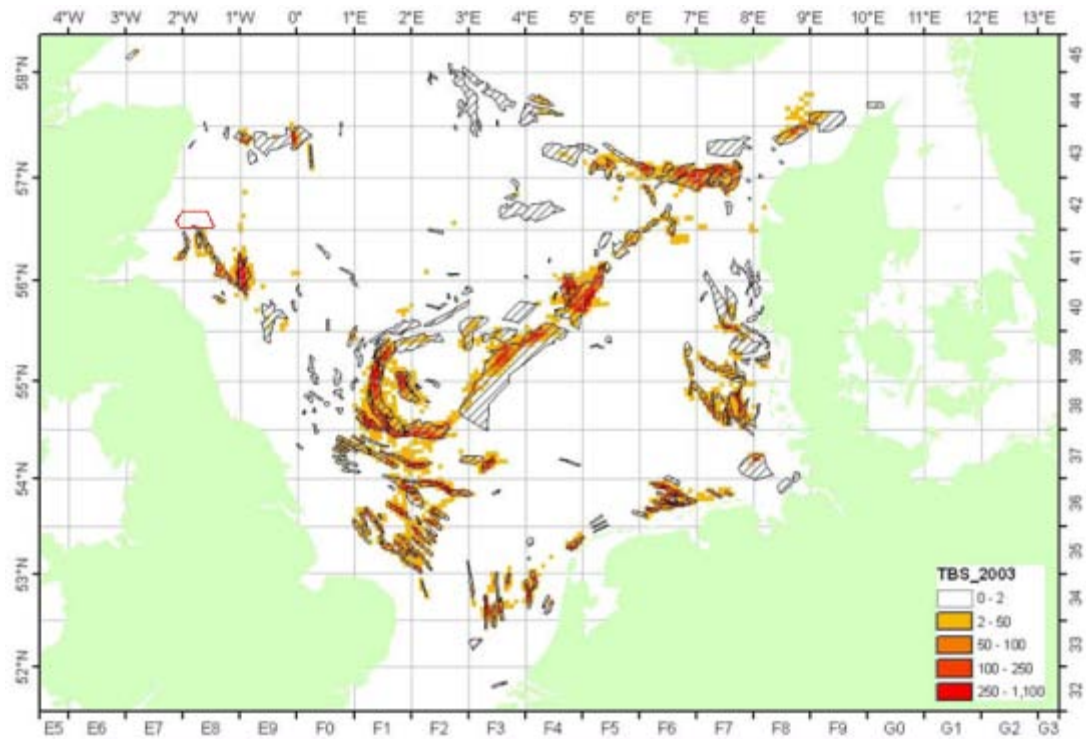
It should be noted that there is no historic access for the Danish fleet to waters between the 6nm and 12nm limit and activity was therefore restricted to outside of 12nm.

¹⁶ FIN (2008) Annual Review of the Feed grade fish stocks used to produce fishmeal and fish oil for the UK market. *FIN Dossier 2008*

14.7 Foreign Vessel Activity

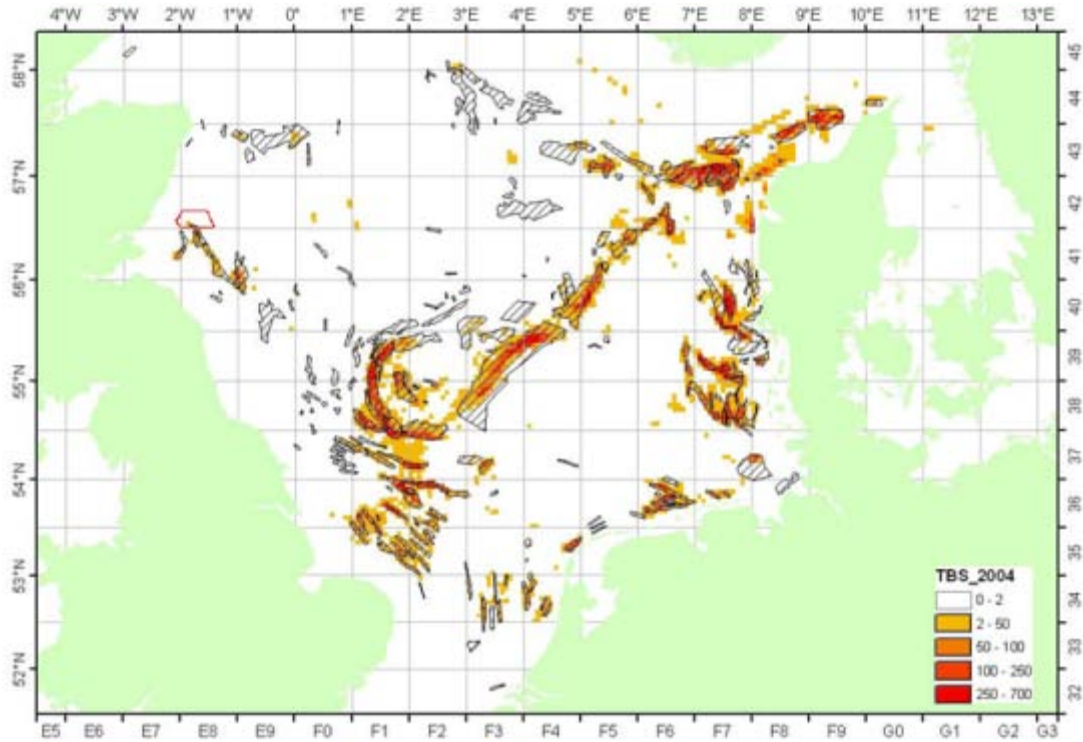
Although there is currently very limited foreign fishing activity within the development, there is the potential that additional fishing vessels from the EU may target grounds outside 12nm as a result of access rights. This is most likely to be the case with the Danish fleet, as stated above.

Figure 14.1 Effort distribution of Danish vessels targeting sandeels in the North Sea, 2003



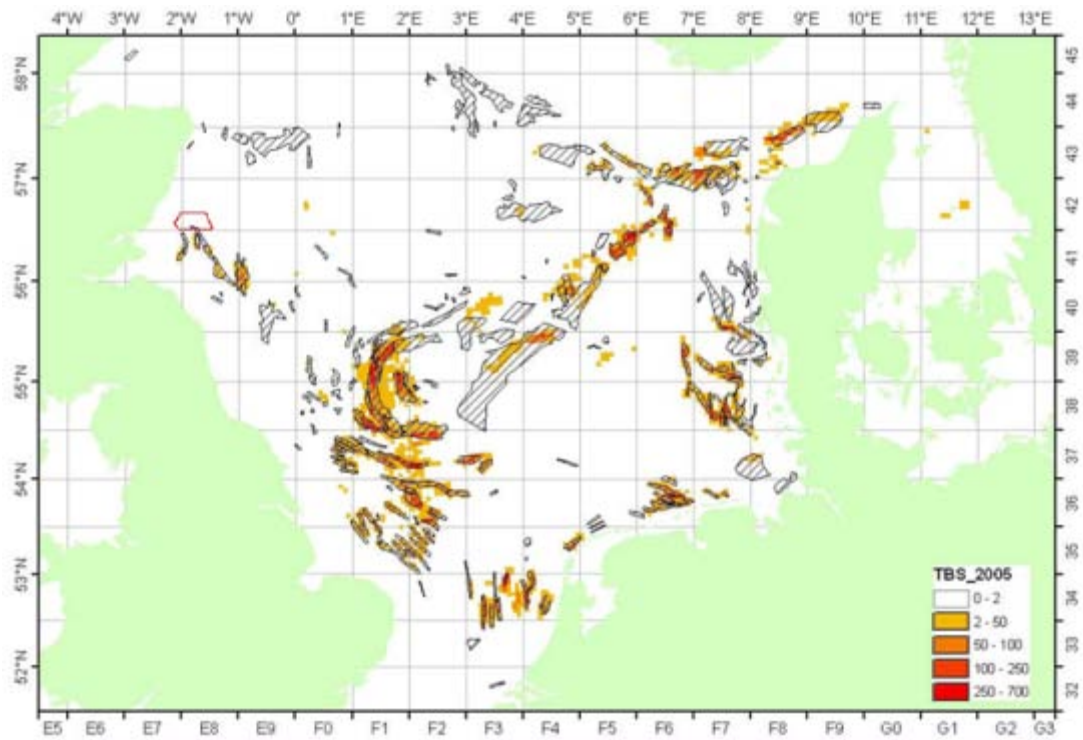
(source: modified from ICES 2009)

Figure 14.2 Effort distribution of Danish vessels targeting sandeels in the North Sea, 2004



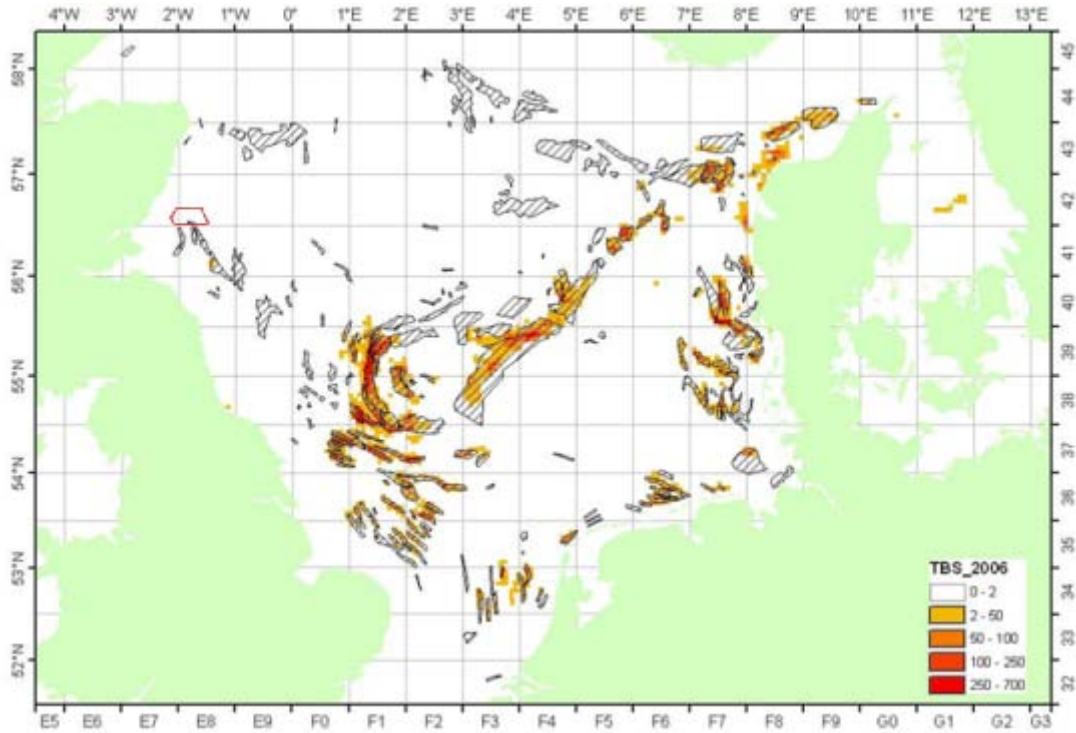
(source: modified from ICES 2009)

Figure 14.3 Effort distribution of Danish vessels targeting sandeels in the North Sea, 2005



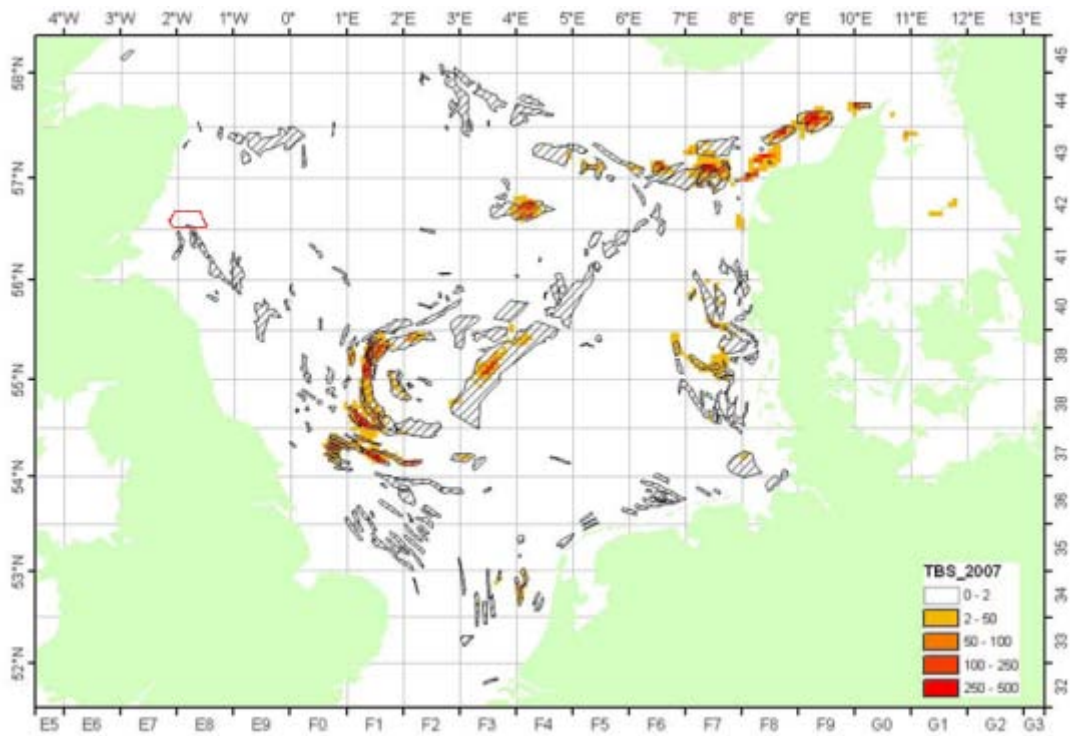
(source: modified from ICES 2009)

Figure 14.4 Effort distribution of Danish vessels targeting sandeels in the North Sea, 2006



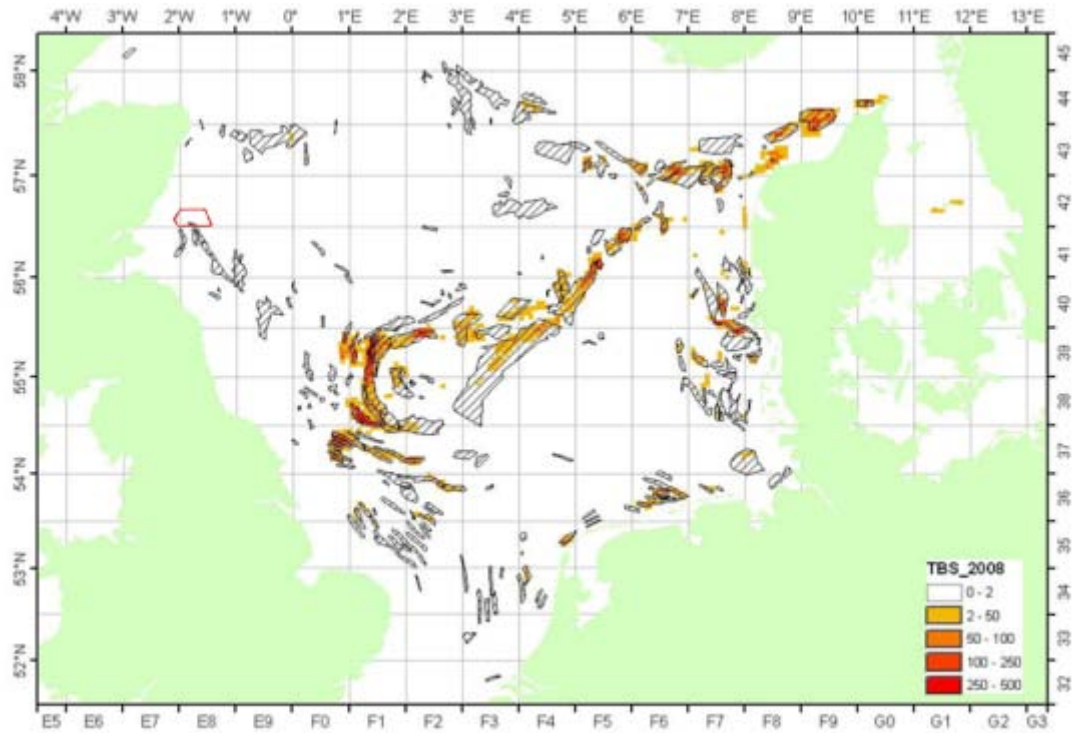
(source: modified from ICES 2009)

Figure 14.5 Effort distribution of Danish vessels targeting sandeels in the North Sea, 2007



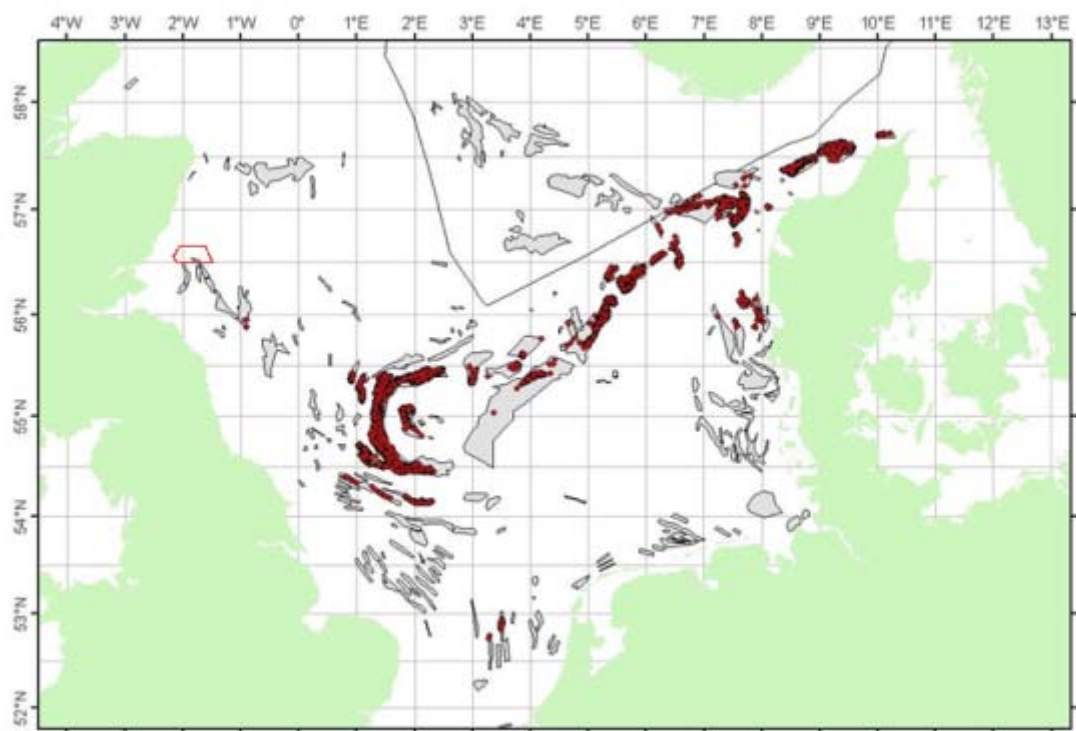
(source: modified from ICES 2009)

Figure 14.6 Effort distribution of Danish vessels targeting sandeels in the North Sea, 2008



(source: modified from ICES 2009)

Figure 14.7 Effort distribution of Danish vessels targeting sandeels in the North Sea, 2009



(source: modified from ICES 2009)

15 Fishermen's Concerns

The following section describes the concerns of fishermen and their representatives noted during the course of consultation. It should be noted that the comments provided are attributed to representatives of the associations listed below, and are confidential.

15.1 Anglo-Scottish Fishermen's Association (October 2010)

- Fishing is facing hard times. Restrictions upon catch quota and effort limits are reducing the ability of fishermen to catch fish. The fleet has been significantly reduced in size over the past 50 years, there used to be 40 demersal otter trawl vessels in Eyemouth and today there are 12. Offshore wind farm development is going to add to these difficulties;
- The squid fishery is very important to the fleet. Losing access to fishing grounds would have a significant impact on the fleet's activities.

15.2 FMA (October 2010)

- Fishermen are facing a number of threats to their industry: Increasing restrictions, loss of fishing grounds through MPAs and other protective measures and increasing operational costs. Offshore wind farm development will add to these problems;
- There is concern about the effects of wind farms upon commercially exploited species. They would like to see evidence that proves fish and shellfish will return to a site after construction;
- Fishermen are concerned about access to grounds in and around wind farms. What activities will be possible and permitted within an operational wind farm?
- Displacement of vessels from grounds will increase competition in other areas and more will be vessels fishing in a smaller area;
- Fishermen would like to know what kind of compensation and mitigation they will receive;
- Static gear fishermen are concerned about indirect effects of wind farm construction on their grounds outside of the development, i.e. changes to water flow;
- Static gear fishermen have had conflicts with offshore oil and gas works vessels towing away gear and they are worried this will be the case with wind

farm related vessels. They would like to agree an acceptable transit route through the Firth of Forth.

15.3 Arbroath and District Static Gear Association (December 2010)

- Export Cable Route (baseline covered in separate ECR Report Ref: A4MR-SEAG-Z-DEV210-CRP-093) work is the greatest concern to Arbroath fishermen. It is important that survey times and installation are outside of their peak season (mid to late June to the end of September). May to June is their quietest time, when all creels are out of the water for annual repair. Eight weeks notice for creel removal is necessary. It is important to inform the fishermen of the timescales of the project (i.e. when surveys are happening, when ECR will be installed);
- The Forth and Tay area is a breeding ground for a number of species, including crab and lobster species. What are the long term impacts of wind farm development upon breeding and nursery grounds?
- What are the effects of electro-magnetic fields upon shellfish species?
- What are the effects of noise disturbance of operational wind farms upon fish and shellfish?
- There is concern that there will be displacement of towed gear from their grounds (specifically otter trawls and scallopers) into static gear grounds.

15.4 Cockenzie and Port Seton Fishermen's Association (December 2010)

- Which fishing activities will actually be able to take place within an operational wind farm?
- What kind of exclusion zones will be implemented during both construction and operation?
- What mitigation is going to be available to fishermen?
- Installation method is key: single pile would not pose a large obstacle to fishermen but anchors would (because of cables in the water column);
- Fishermen are confronted by a number of threats to their industry. Wind farm development is one of these, but it is another nail in the coffin for the fleet.

16 Consultation List

Consultation and liaison has been ongoing, and will continue, with the following organisations and individuals:

SFF

- Michael Sutherland;
- John Watt;
- Malcolm Morrisson.

FMA

- Billy Hughes (FIR).

Anglo Scottish Fishermen's Association

- Sandy Ritchie (FIR).

SA

- John Hermse.

Anstruther Fishery Office

- Philip Gibson;
- Ellie Burt.

Eyemouth Fishery Office

- Stuart Bell.

Aberdeen Fishery Office

- Uilleam Fraser.

The following individuals and associations were additionally met with during the course of the baseline information gathering process:

Anglo-Scottish Fishermen's Association – October 2010

- William Aitcheson (vice chairman);
- Sandy Ritchie (secretary).

FMA – October 2010

- Billy Hughes (secretary);
- Graham Riley;

- Stuart Allen;
- John Davidson;
- Tom Gordon.

Arbroath Fishermen's Association – December 2010

- Bryan Beckett (chairman) and 14 members.

Cockenzie and Port Seton Fishermen's Association – December 2010

- Archie Johnson.

In addition to the above-listed consultation, three fisheries stakeholder events were held in February 2011 on behalf of the FTOWDG, to which all fishermen operating in the area were invited to attend. Introductions to the individual projects were provided by the developers and fishermen were then engaged in a question and answer session.

The following vessels (Table 16.1) contributed to the commercial fishing baseline:

Table 16.1 List of vessels who contributed to the commercial fishing baseline

Vessel	Home port	Vessel type
Vessel CT	Anstruther	Creels
Vessel CW	Eyemouth	Creels
Vessel DL	Pittenweem	Creels
Vessel DA	Arbroath	Creels
Vessel DC	St. Abbs	Creels
Vessel DN	Seahouses	Creels
Vessel CI	St. Abbs	Creels
Vessel CQ	Pittenweem	Creels
Vessel DB	Pittenweem	Creels
Vessel DH	Arbroath	Creels
Vessel CY	Arbroath	Creels
Vessel DO	Seahouses	Creels
Vessel CO	Montrose	Creels
Vessel CJ	Eyemouth	Creels
Vessel CM	Arbroath	Creels
Vessel CC	Arbroath	Creels
Vessel CU	Arbroath	Creels
Vessel DP	Seahouses	Creels
Vessel CX	St. Abbs	Creels
Vessel DD	Arbroath	Creels
Vessel D	Arbroath	Creels
Vessel CV	Arbroath	Creels

Vessel	Home port	Vessel type
Vessel CK	Arbroath	Creels
Vessel CN	Arbroath	Creels
Vessel CR	Eyemouth	Creels
Vessel DI	Montrose	Creels
Vessel DQ	Seahouses	Creels
Vessel CS	Johnshaven	Creels
Vessel CL	St. Monance	Creels
Vessel DK	Burnmouth	Creels
Vessel CH	Burnmouth	Creels
Vessel DR	Seahouses	Creels
Vessel CP	Pittenweem	Creels
Vessel DS	Seahouses	Creels
Vessel DJ	Montrose	Creels
Vessel AX	Dunbar	Demersal trawl
Vessel AU	Eyemouth	Demersal trawl
Vessel AW	Eyemouth	Demersal trawl
Vessel BU	Seahouses	Demersal trawl
Vessel BB	Eyemouth	Demersal trawl
Vessel AL	Eyemouth	Demersal trawl
Vessel AH	Pittenweem	Demersal trawl
Vessel BK	Macduff	Demersal trawl
Vessel AB	Pittenweem	Demersal trawl
Vessel AZ	Montrose	Demersal trawl

Vessel	Home port	Vessel type
Vessel C	Pittenweem	Demersal trawl
Vessel AQ	Pittenweem	Demersal trawl
Vessel F	Pittenweem	Demersal trawl
Vessel AC	Dunbar	Demersal trawl and creels
Vessel A	Montrose	Demersal trawl and scallop dredge
Vessel AT	Arbroath	Demersal trawl and scallop dredge
Vessel E	Pittenweem	Demersal trawl and scallop dredge
Vessel AA	Peterhead	Scallop dredge
Vessel I	Buckie	Scallop dredge
Vessel J	Buckie	Scallop dredge
Vessel B	Burntisland	Scallop dredge
Vessel M	Girvan	Scallop dredge



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A4MR/SEAG-Z-DEV210-CRP-093

DOCUMENT TITLE:
**Commercial Fisheries Baseline
 Assessment – ECR**

PROJECT NAME:
**Round 3 Zone 2
 Firth of Forth
 Offshore Wind Farm Development**

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Revision	Date	Description	Originated By	Checked By	Approved By

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1 Glossary of Terms

BMM – Brown and May Marine Limited

Cefas – Centre for Environment, Fisheries and Aquaculture Science

CPA – Coast Protection Act 1949

Defra – Department for Environment, Food and Rural Affairs

DFO – District Fishery Officer

EU – European Union

FEPA – Food and Environment Protection Act 1985

FMA – Fishermen's Mutual Association Ltd. (Pittenweem)

hp – horsepower

ICES – International Council for the Exploration of the Seas

IFG – Inshore Fisheries Group

MMO – Marine Management Organisation

MSS – Marine Scotland Science

nm – nautical mile

SFF – Scottish Fishermen's Federation

VMS – Vessel Monitoring System (satellite tracking data)

UK – United Kingdom

12nm limit – Territorial waters of EU Member States extend to 12nm. Member States manage these waters exclusively within these limits

6nm limit – exclusive access to UK vessels only within 6nm

6nm-12nm limit – some access to certain EU Member States in identified areas around the UK coast, based upon historic access

Under-10m – Category of fishing vessels that are less than 10m in length

10-15m – Category of fishing vessels that are between 10m and 15m in length

Over-15m – Category of fishing vessels that are greater than 15m in length

Creeling – The Scottish designation for potting

Demersal – Activities or species located near or on the sea bed

Pelagic – Activities or species located in the water column

Quota – A measure of the quantity of a species that can legally be landed within a set period

Development – Firth of Forth Round 3, Zone 2, Phase 1 Offshore Wind Farms Development

2 Introduction

Given below is the commercial fishing baseline assessment for the Firth of Forth, Round 3, Zone 2, Phase 1 proposed offshore wind farms development (hereafter referred to as 'the development') Export Cable Route (ECR) in the Forth and Tay area. The preparation of the baseline takes into account the Marine Licence (replacing Section 5 Part II of the Food and Environmental Protection Act 1985 (FEPA), 1985 and Section 34 of Coast Protection Act, 19491);, Department for Environment, Food and Rural Affairs (Defra) and Centre for Environment Fisheries and Aquaculture Science (Cefas) as specified in the 2004 Guidelines (Cefas 2004) and British Wind Energy Association (BWEA) 2004 Recommendations (BWEA 2004).

The purpose of this report is to establish a commercial fisheries baseline relevant to the development ECR. An Environmental Impact Assessment (EIA) will subsequently be undertaken that considers the development ECR relative to any commercial fishing activities that occur within the area, and to aid with mitigation strategies, if required.

Currently, there is no single data source or recognised model for establishing a commercial fisheries baseline in discrete sea areas such as ECRs. The following baseline has therefore been derived using data and information from a number of sources.

Establishing a fisheries baseline is complicated by the fact that fishing activities are not constant and may change over time. Fluctuations in landings, changes in legislation, economic constraints (i.e. fuel costs and crew availability) and environmental restrictions (i.e. weather) can contribute to variations in fishing activities and practices as a result.

This Report should be read in conjunction with the Commercial Fisheries Baseline Assessment Report for the Phase 1 Offshore Wind Farms (Ref: A4MR-SEAG-Z-DEV210-CRP-092).

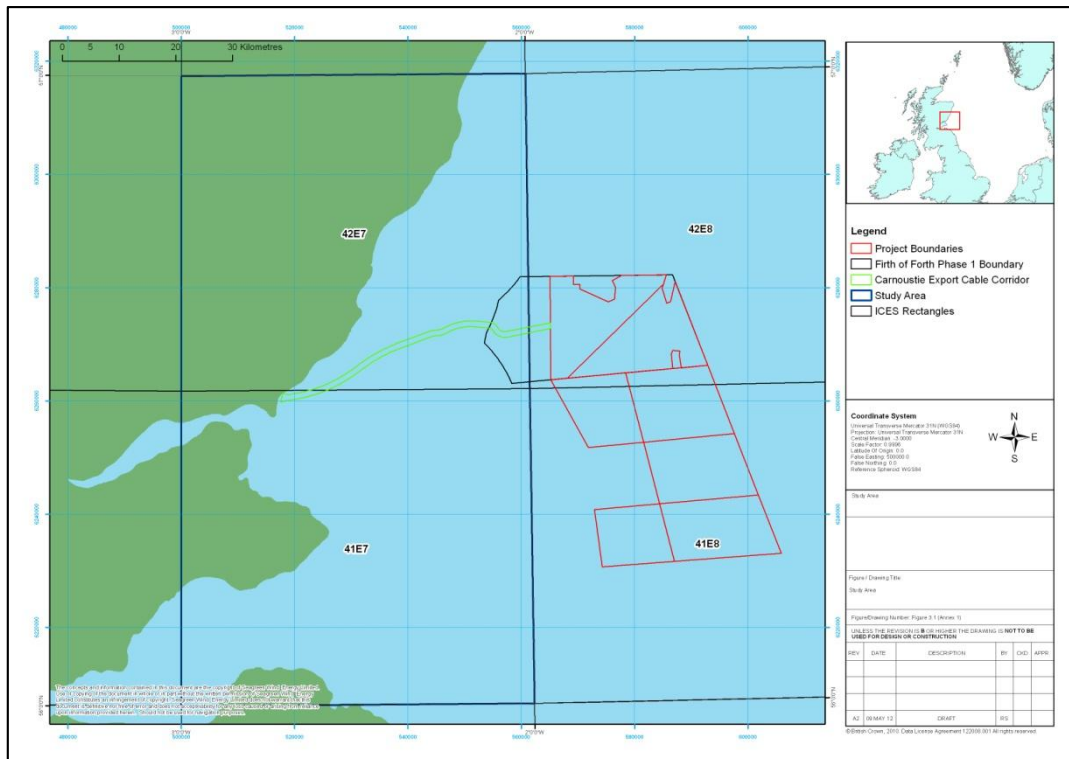
The methodology used to establish this baseline can be considered congruent with the methodology followed for the compilation of the commercial fisheries baseline (Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 4.0). The data and information sources, sensitivities and qualifications, as well as the fisheries controls and legislation, can also be considered the same as those listed in the commercial fisheries baseline (Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 5.0), and as a result have not been included within this Report.

¹ From April 2011, a Marine License granted under the Marine (Scotland) Act 2010 and UK Marine and Coastal Access Act 2009 will replace the requirement for Coastal Protection Act consent and a FEPA licence.

3 Study Area

The study area is shown in Figure 3.1. The approach has been to describe an area comprised of two ICES rectangles (42E7 and 41E7) within which the ECR is located (a very small portion of the most offshore section falls into ICES rectangle 42E8, which is not discussed in this Report although detailed information in this area is provided in Report A4MR-SEAG-Z-DEV210-CRP-092). The defined study area allows fishing grounds in the general area of the ECR to be described. It should be noted that an ICES rectangle is the smallest spatial unit available for the collation of fisheries statistics, although they are very large relative to the ECR. Where possible, fishing activities in the immediate area of the ECR are subsequently further described.

Figure 3.1 Firth of Forth, Round 3, Zone 1 ECR study area



4 MMO Fisheries Statistics

Figure 4.1 and Figure 4.2 show the landings values in the study area of the ECR by species and methods, respectively (averaged 10 year period). The ECR passes through rectangles which record landings of nephrops, scallops, crustaceans (including lobsters, edible crabs and velvet crabs), squid and clams (including razor and surf clams).

Nephrops record the highest landings values for all species in rectangle 41E7 (60.1%, £2,569,718). Recorded landings values are lower in rectangle 42E7 (9.6%, £170,915). Nephrops are principally targeted by single and twin demersal otter trawlers (see Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 7.1.3).

Landings of scallops, which are targeted by boat dredge vessels, record the highest values for all species in rectangle 42E7 (40.5%, £717,556). Recorded landings are lower in 41E7 (6.8%, £289,371).

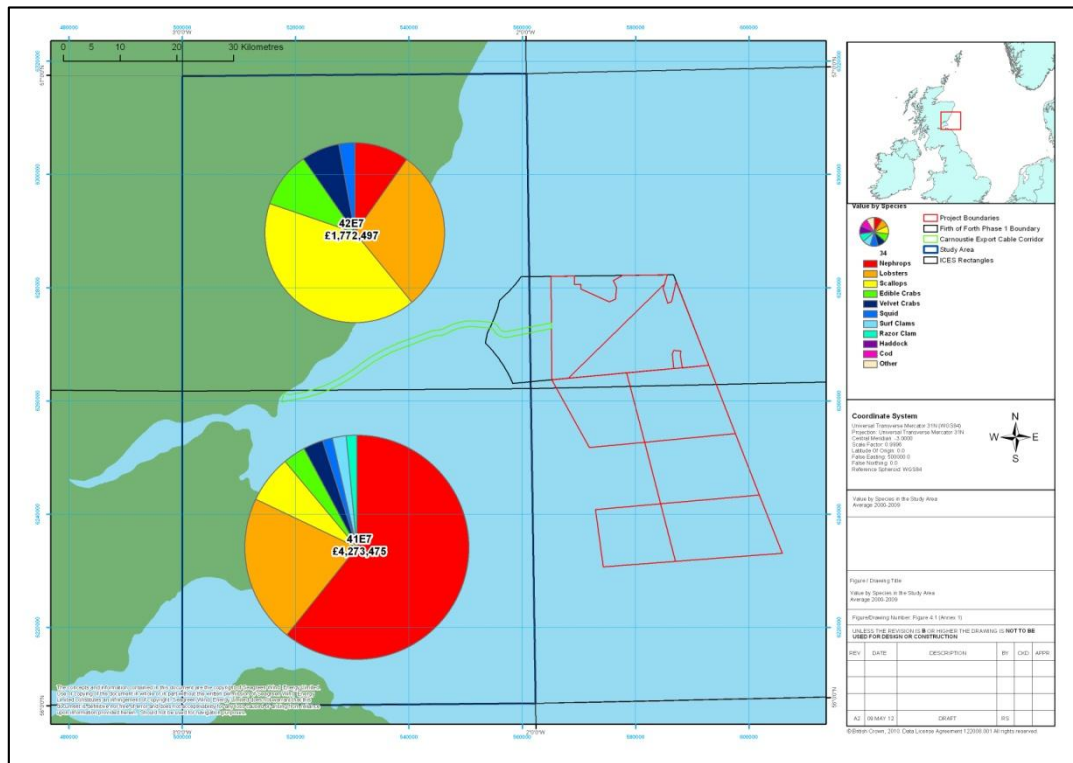
Crab and lobster record a proportion of landings values in both rectangles (41E7: 27.2%, £1,163,586; 42E7: 45.5%, £805,872). The species are targeted by potting, static gear vessels, predominantly operating in inshore waters (see Section 8.3).

Squid are landed in both rectangles (41E7: 1.4%, £60,275; 42E7: 2.8%, £49,567). Squid are primarily caught by single and twin demersal otter trawlers which reconfigure their gear to target the species.

Clams, principally targeted by vessels operating mechanized and boat dredges, account for a small proportion of the landings values recorded in rectangle 41E7 (3.5%, £150,035), with 42E7 (0.1%, £936) recording negligible values.

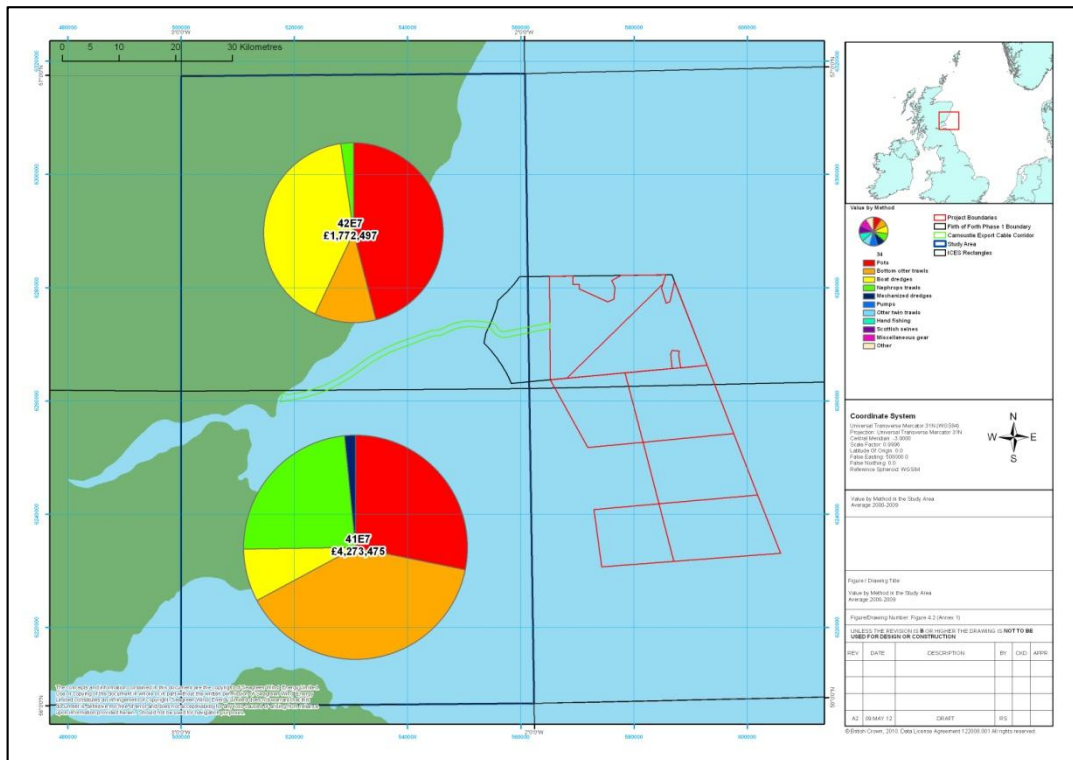
Figure 4.3 shows the landings values recorded in the study area of the ECR by vessel category. It can be seen that a considerable proportion of vessels operating within the study area are under-15 metres in length, and hence will not be included in the VMS dataset. It should be noted, however, that a percentage of vessels are over-15 metres. As a result, these vessels will be tracked by VMS and their activity further detailed through the assessment of this dataset (Section 5).

Figure 4.1 Landings values by species (average 2000 to 2009) in the study area



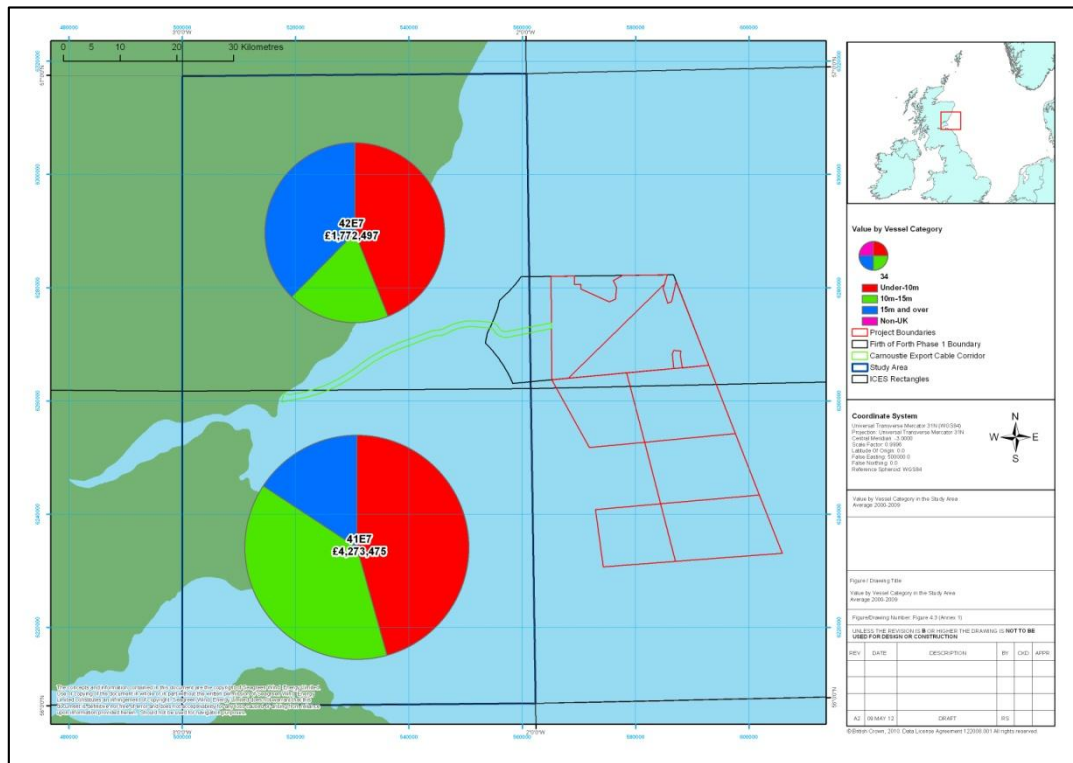
(source: MMO)

Figure 4.2 Landings values by methods (average 2000 to 2009) in the study area



(source: MMO)

Figure 4.3 Landings values by vessel category (average 2000 to 2009) in the study area



(source: MMO)

4.1 Annual Variation

Figure 4.4 to Figure 4.8 show the annual variation in landings values (all vessel categories) of the top commercial species targeted in the study area (two rectangles combined).

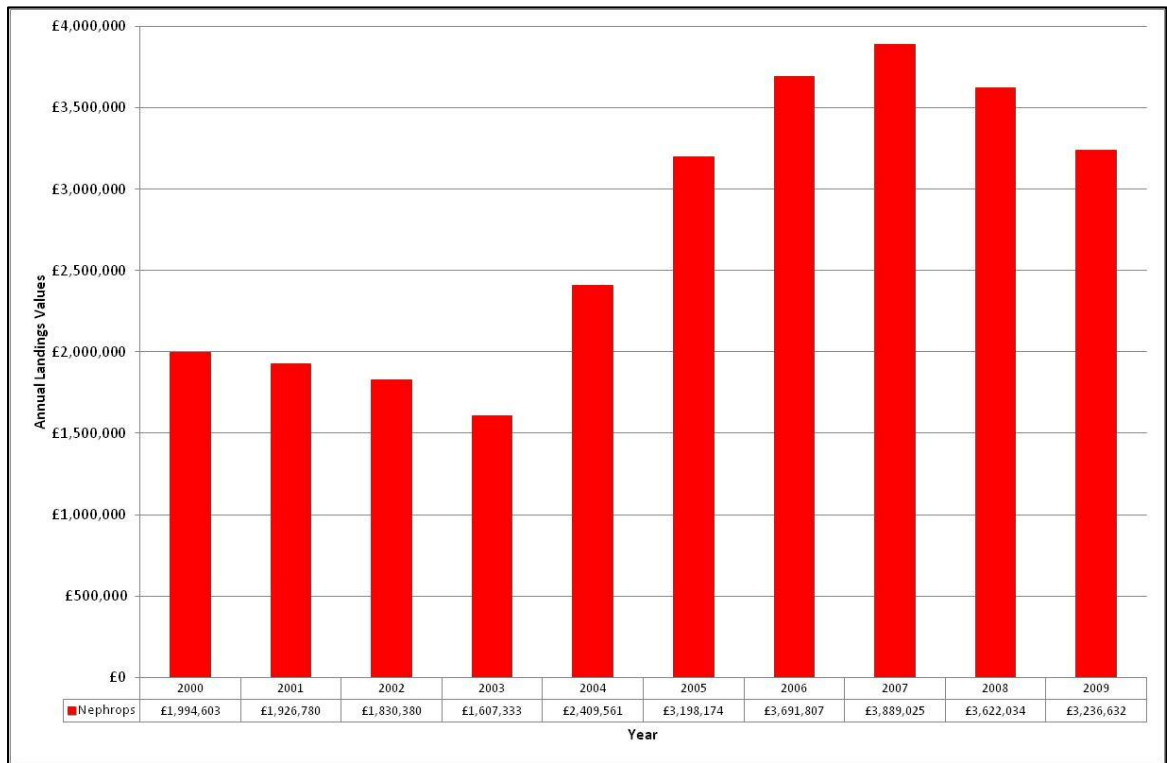
Figure 4.4 shows the annual variation in landings values of nephrops in the study area. Landings values have fluctuated over the ten year period, being lower in the first half and with a rise in recorded landings between 2003 and 2009 (between £1,607,333 in 2003 and £3,889,025 in 2007). Figure 4.5 shows the annual variation in landings values of scallops in the study area. Landings values have fluctuated greatly in the ten year period (£211,116 in 2002 to £2,614,386 in 2007).

Figure 4.6 shows the annual variation in landings values of the top three commercial species of crustacean; lobster, edible crab and velvet crab. Landings values of all three species have generally increased over the ten year period with relatively low levels recorded until 2005 when values increased from £708,858 to £3,283,846 in 2009. Landings values of edible crabs have stayed relatively consistent, although there was a decline in values between 2002 and 2005. Values over the ten year period have ranged from £160,897 in 2003 to £430,783 in 2007. Velvet crab landings values have increased in recent years, with £390,832 landed in 2006 compared to £136,390 in 2005. It is considered that the general increase in landings of all crustaceans in the final years of the period is likely attributable to improved recording of catches through the Shellfish Entitlement Scheme (2004) and the Registration of Buyers and Sellers (2005).

Figure 4.7 shows the annual variation of squid landings values in the study area. It can be seen that values vary considerably over the ten year period (between £1,035 in 2002 and £456,259 in 2007). It should be noted that seasonal squid abundance in the Forth and Tay area is reported to be erratic, and furthermore, the number of vessels targeting the species may vary, depending upon the availability of other, quota restricted stocks.

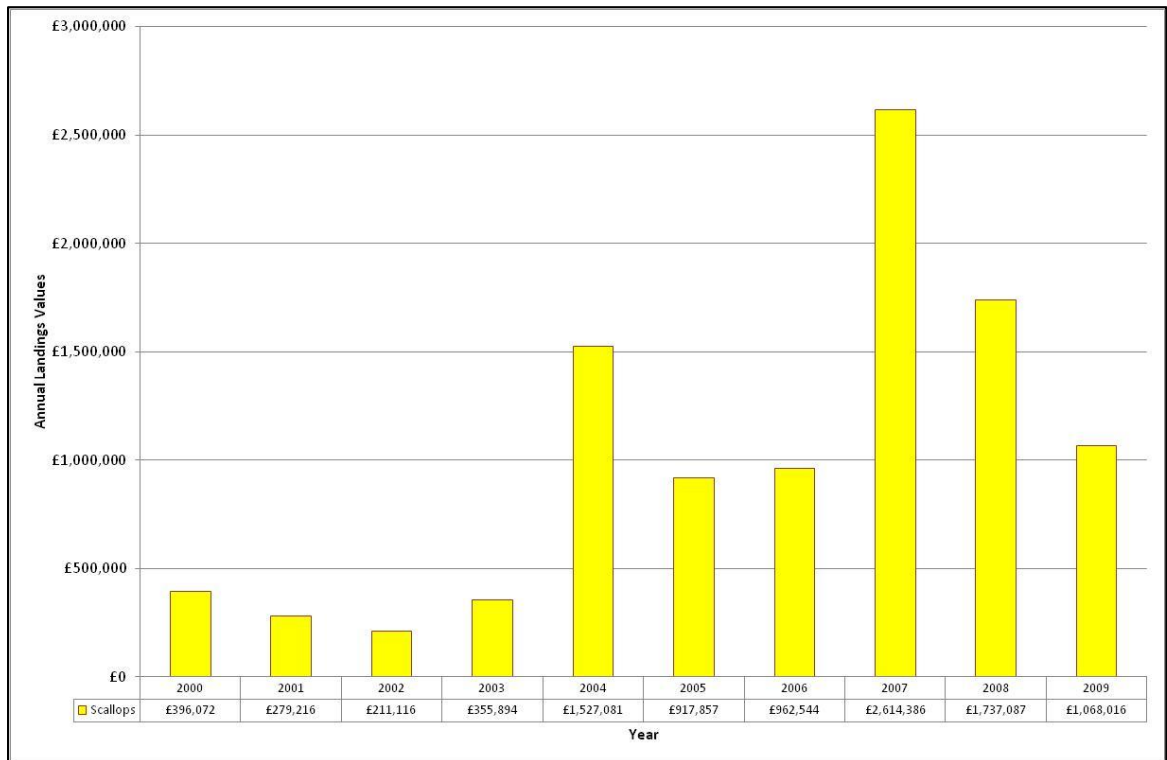
Figure 4.8 shows the annual variation in landings values of the top two commercial species of clam; surf and razor clams. From the dataset and further identified through consultation (Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 14.4), it is apparent that both fisheries are relatively recent. Landings of surf clams have primarily been recorded since 2003, with values fluctuating between £219,950 (2004) and £4,430 (2006). Landings of razor clams have been recorded since 2005, with peak landings of £257,325 recorded in 2009.

Figure 4.4 Annual variations in landings values of nephrops in the study area



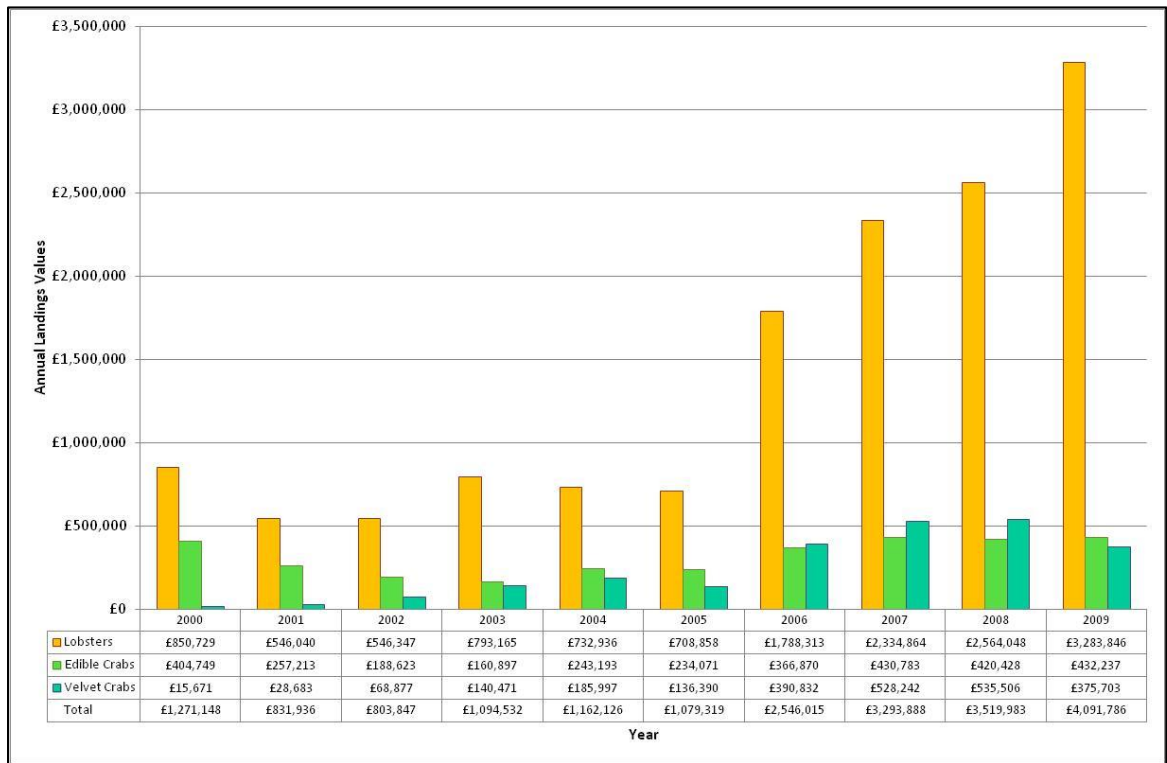
(source: MMO)

Figure 4.5 Annual variations in landings values of scallops in the study area



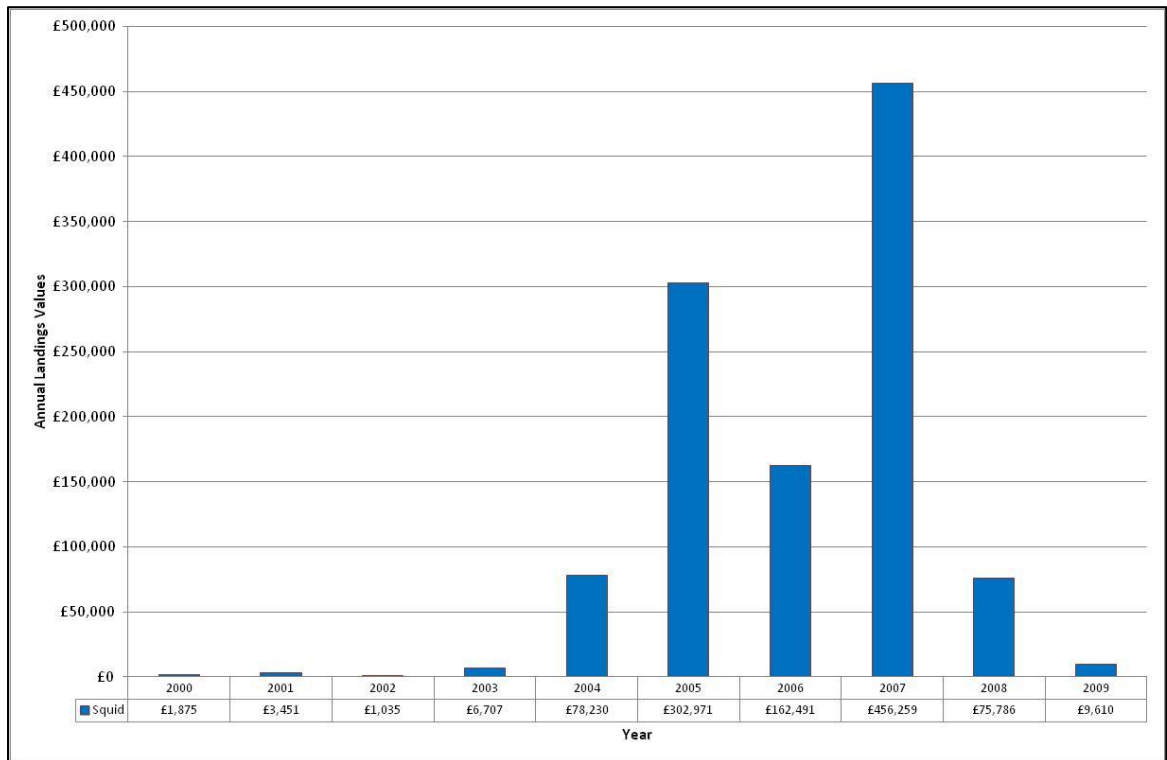
(source: MMO)

Figure 4.6 Annual variations in landings values of crustaceans in the study area



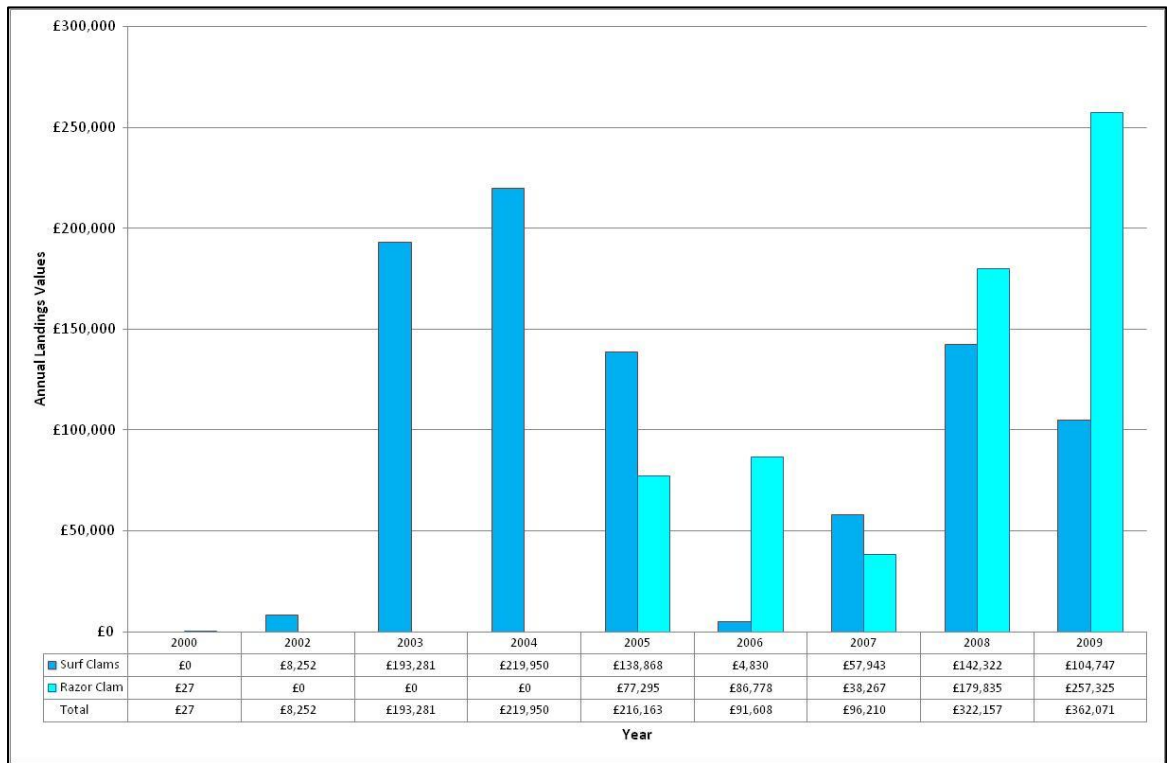
(source: MMO)

Figure 4.7 Annual variations in landings values of squid in the study area



(source: MMO)

Figure 4.8 Annual variations in landings values of clams in the study area



(source: MMO)

4.2 Seasonality

Figure 4.9 to Figure 4.13 show the average seasonality of landings values of the top commercial species targeted in the study area.

Figure 4.9 shows the average seasonality of nephrops. Landings values are highest in July and August (£435,461 in July) and low to moderate for the remainder of the year, with the lowest values recorded in May (£86,322).

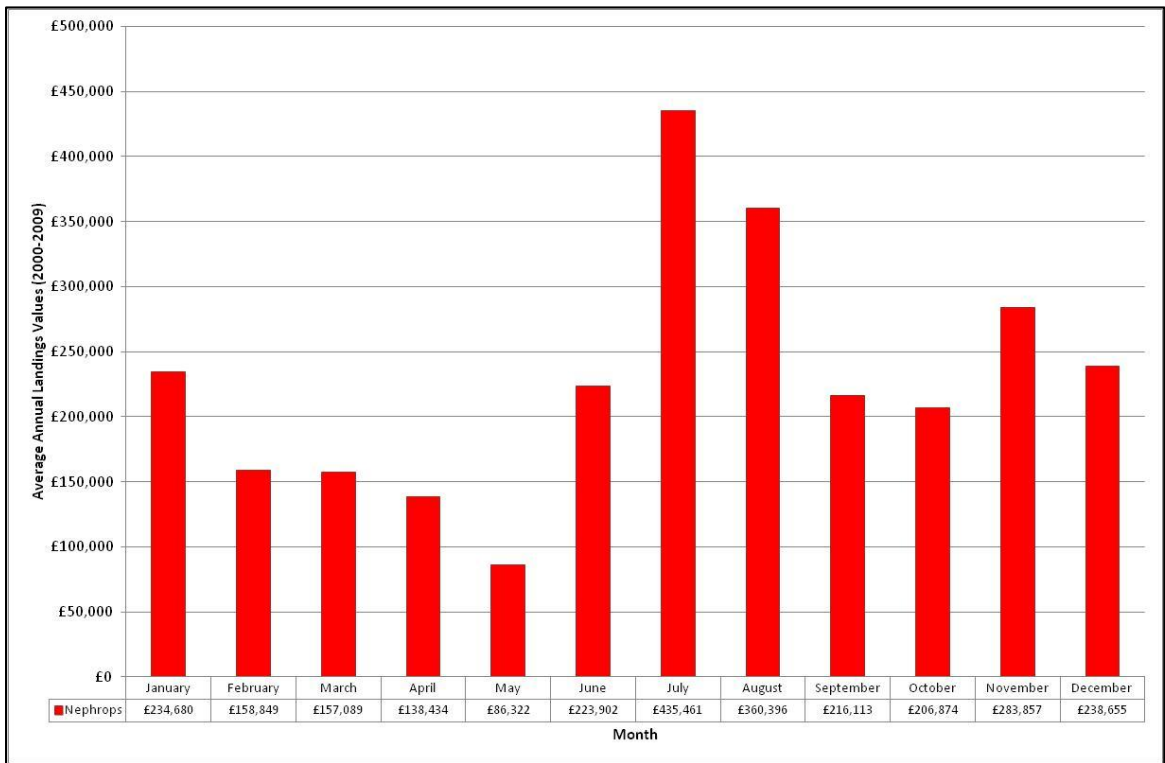
Figure 4.10 shows the average seasonality of scallops. The highest landings values are recorded between March and September, inclusive, peaking in June and September (£131,978 and £135,170, respectively). Landings values for the remainder of the year are relatively low, with the lowest in November (£37,271).

Figure 4.11 shows the average seasonality of the top three commercial crustaceans targeted in the study area; lobsters, edible crabs and velvet crabs. Generally, the highest average landings values for all crustaceans are recorded in the second half of the year particularly between July and September. Lobster landings show the most marked seasonality, with lowest values recorded in the initial months of the year, before rising relatively sharply in July (£170,826), and peaking in August (£337,431). Landings of edible and velvet crabs are generally consistent throughout the period.

Squid is seasonally present on an annual basis in the area, although, as previously stated, abundance varies. Figure 4.12 shows that the species is principally landed in August and September (£50,713 and £40,358, respectively), although the season has been reported to be extending in recent years (Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 11.2.3).

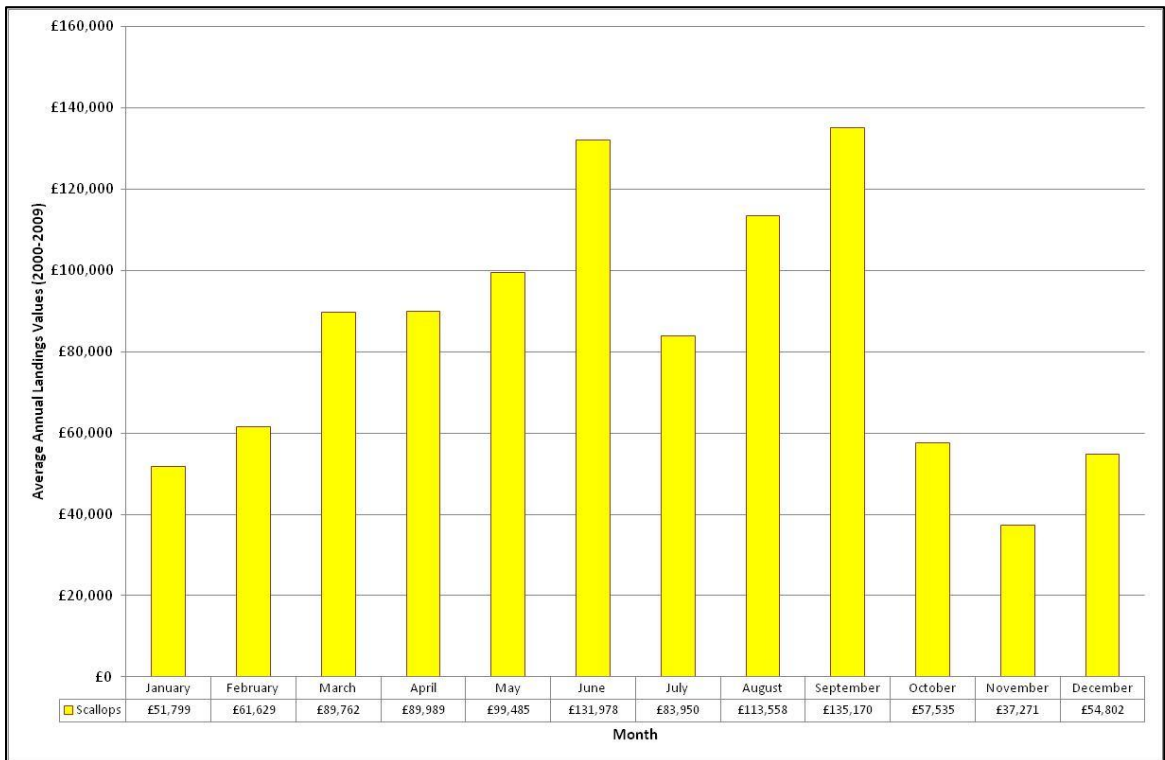
Figure 4.13 shows the average seasonality of the top two commercial clam species targeted in the study area; surf and razor clams. Surf clam landings values fluctuate throughout the year, with the highest landings values recorded in October (£10,969). Razor clam landings values also vary throughout the year, with the highest landings values recorded in April (£7,107). The lowest landings for both species are recorded in January (surf clams: £1,807; razor clams: £3,366).

Figure 4.9 Average annual (2000-2009) seasonality of nephrops in the study area



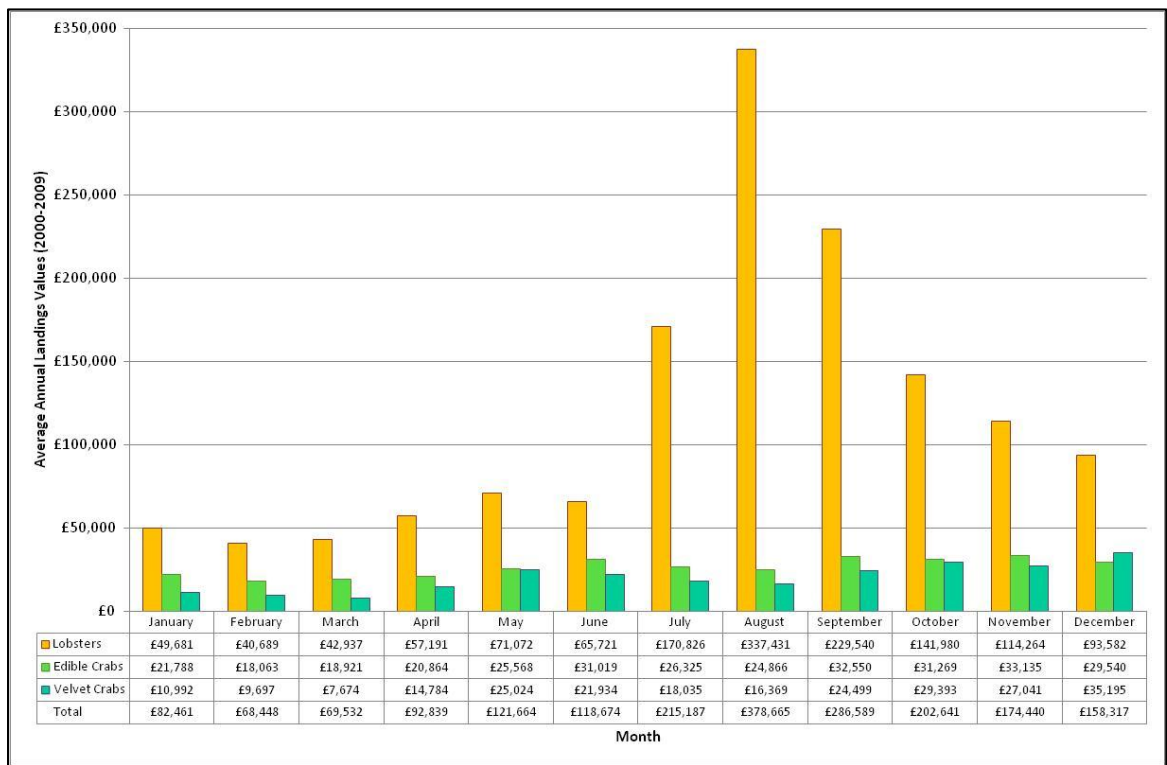
(source: MMO)

Figure 4.10 Average annual (2000-2009) seasonality of scallops in the study area



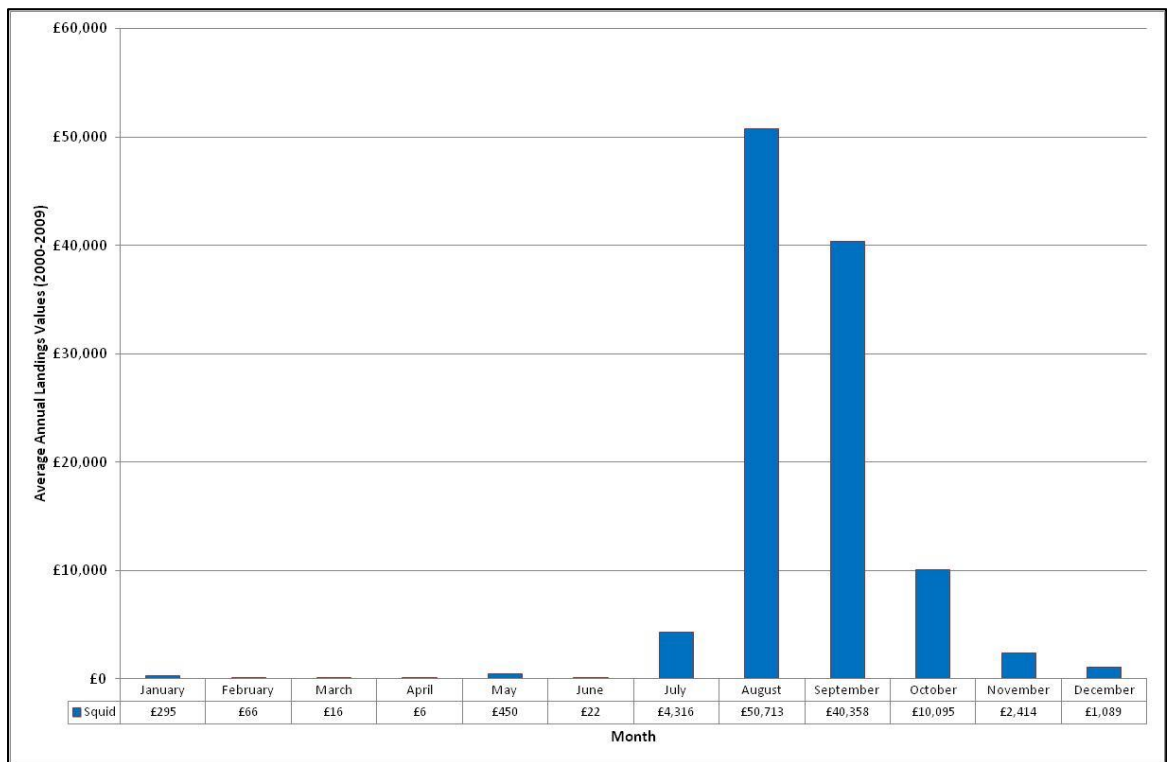
(source: MMO)

Figure 4.11 Average annual (2000-2009) seasonality of crustaceans in the study area



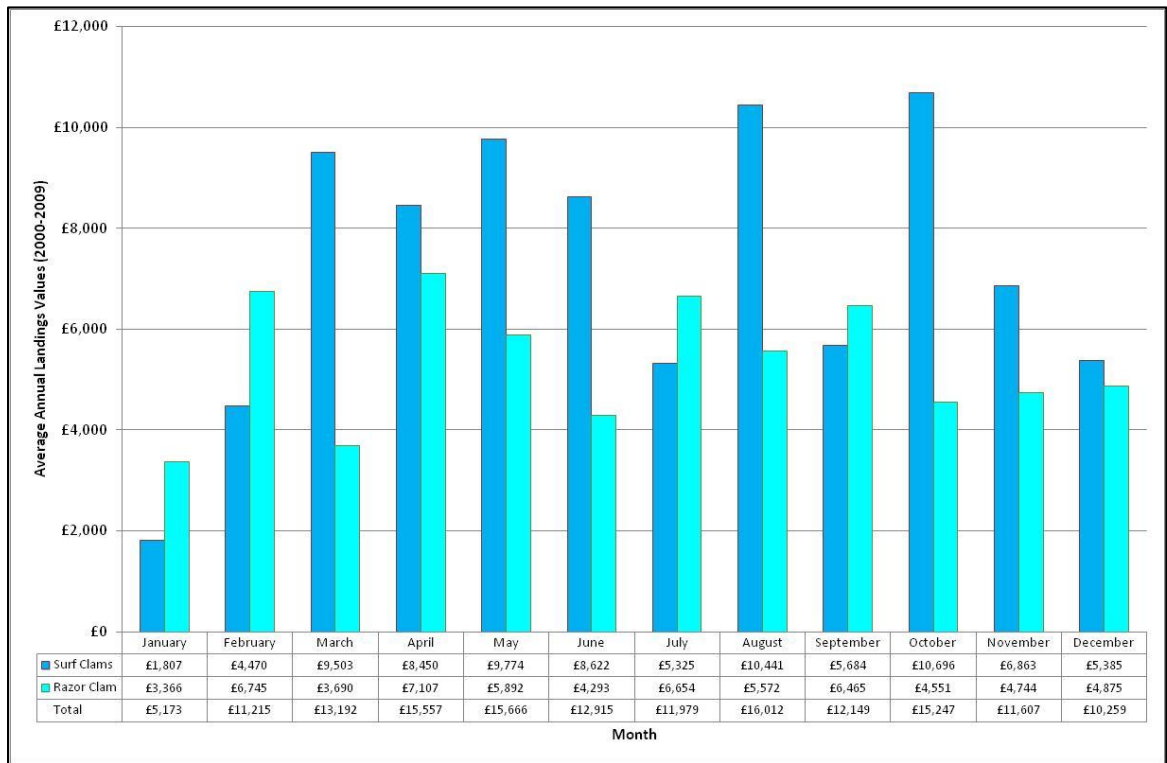
(source: MMO)

Figure 4.12 Average annual (2000-2009) seasonality of squid in the study area



(source: MMO)

Figure 4.13 Average annual (2000-2009) seasonality of clams in the study area



(source: MMO)

5 Satellite Tracking

Since January 2005, all European Commission (EC) vessels of over-15 metres in length have been fitted with satellite tracking equipment which transmits the vessels' position every two hours to the relevant Member States' fisheries authorities. The datasets have been provided to Brown and May Marine (BMM) by the Marine Management Organisation (MMO) and Marine Scotland. An explanation of the VMS datasets, including limitations, is provided in the Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 9.0. As has been previously stated, however, it should be recognised that activity by vessels under-15 metres will not be included in this dataset.

Due to the differences in data provided for satellite tracked vessels in 2009, analysis of activity for this year is discussed separately in Section 5.2 below.

5.1 2005 to 2008 Data

Figure 5.1 shows the relative density of all UK vessels over-15 metres (average 2005 to 2008). A pattern of activity is recorded in areas running parallel to the coast to the south and north of the Forth and Tay area, crossing the ECR.

5.2 2009 Data

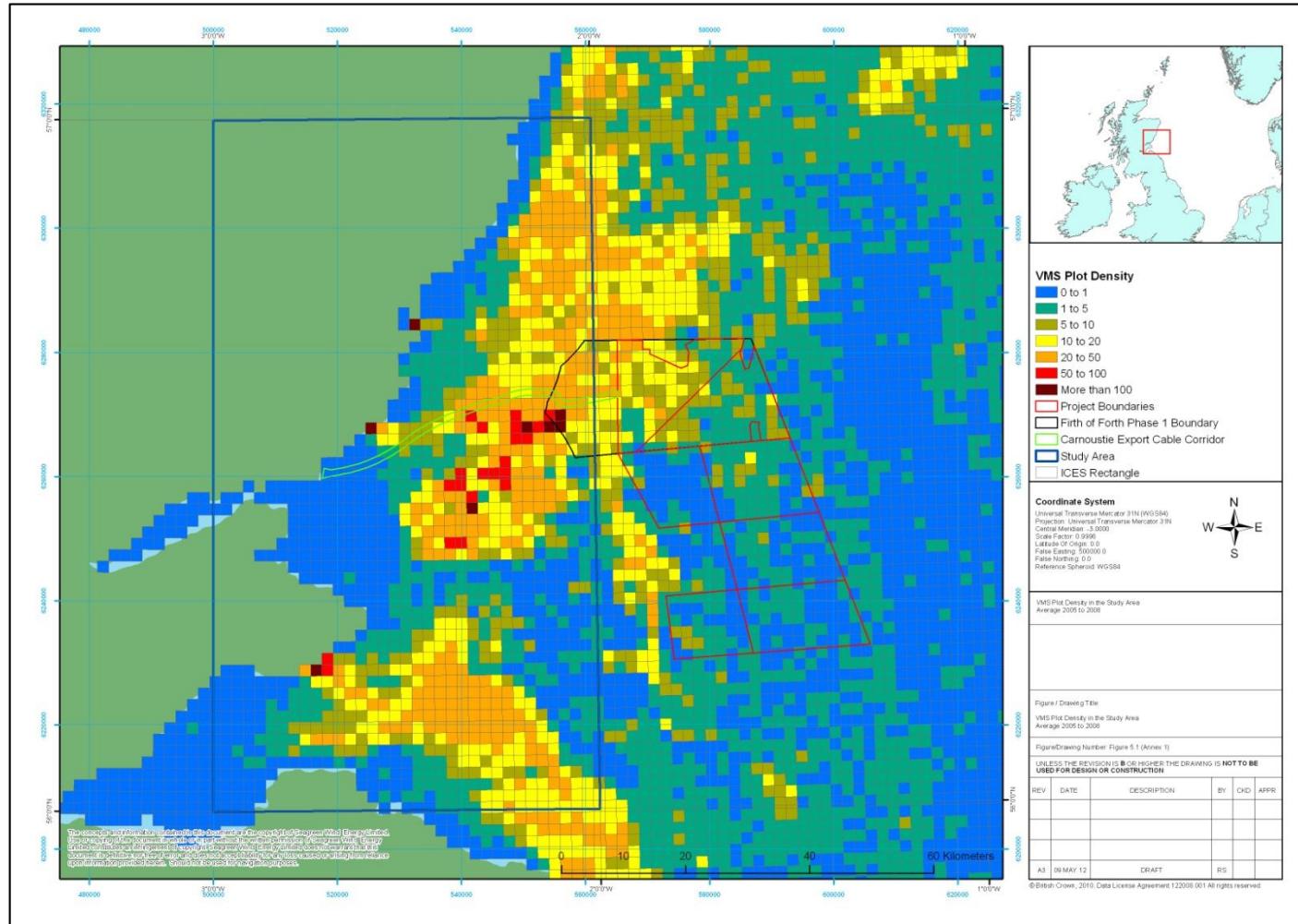
Figure 5.2 shows the satellite density of all UK vessels over-15 metre in 2009. Patterns are broadly commensurate to those in the 2005 to 2008 dataset, although the larger grid format of this dataset presents the activity as seeming to be of a higher intensity.

Figure 5.3 to Figure 5.4 provide a breakdown of density by gear type, which was not possible to apply to the dataset between 2005 and 2008, showing nephrops gear and dredges, respectively.

Nephrops activity (Figure 5.3) is concentrated in the south of the study area. There is limited activity along the ECR. It should be noted that a number of locally based nephrops vessels are under-15 metres and hence not included within this dataset.

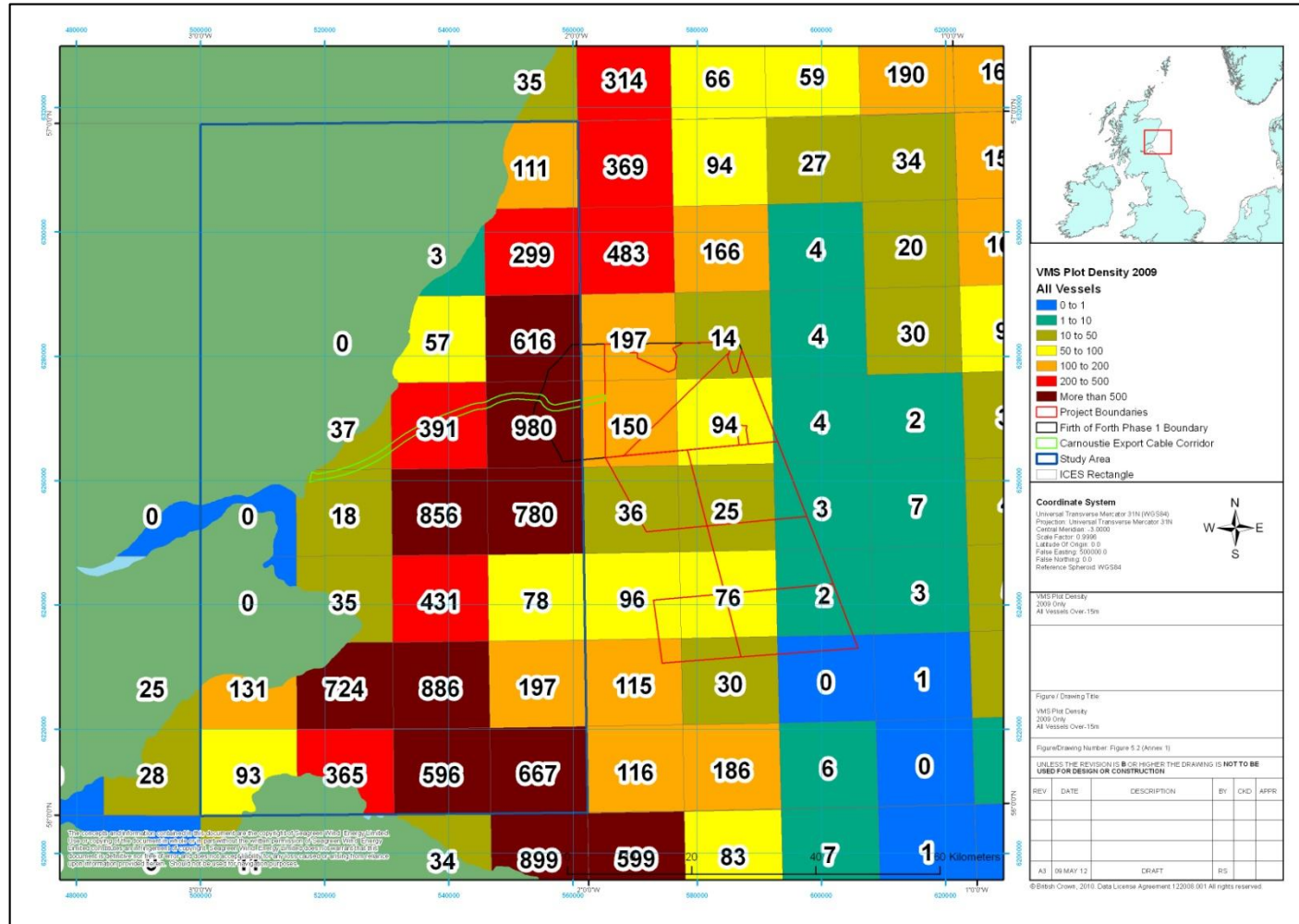
Scallop dredging activity is recorded in an area crossed by the ECR, particularly in the offshore section. Density levels reduce to low along the inshore section of the ECR, particularly in landfall areas (Figure 5.4).

Figure 5.1 Satellite (VMS) density of all UK over-15 metre vessels (average 2005 to 2008)



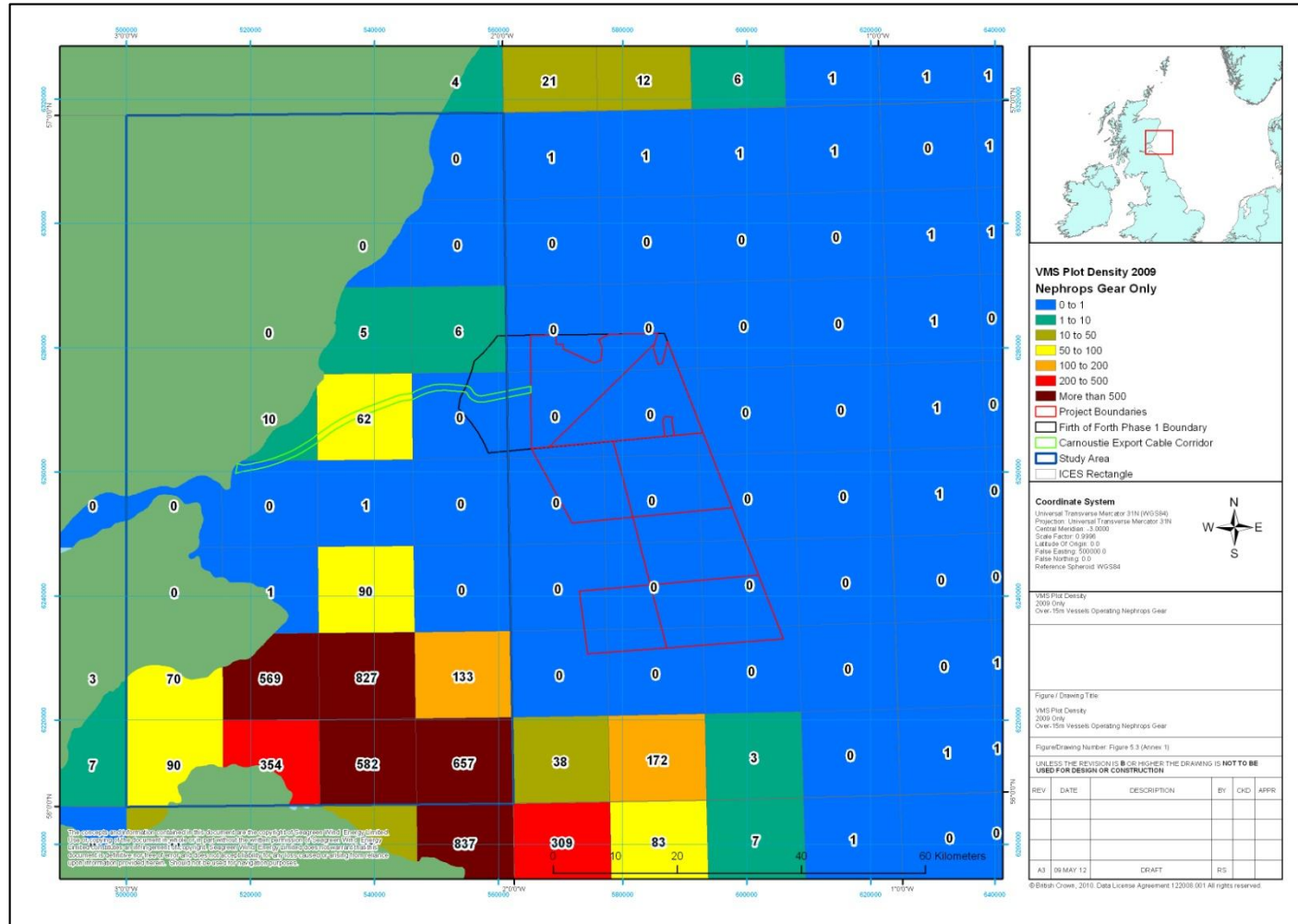
(source: MMO)

Figure 5.2 Satellite (VMS) density of all UK over-15 metre vessels in 2009



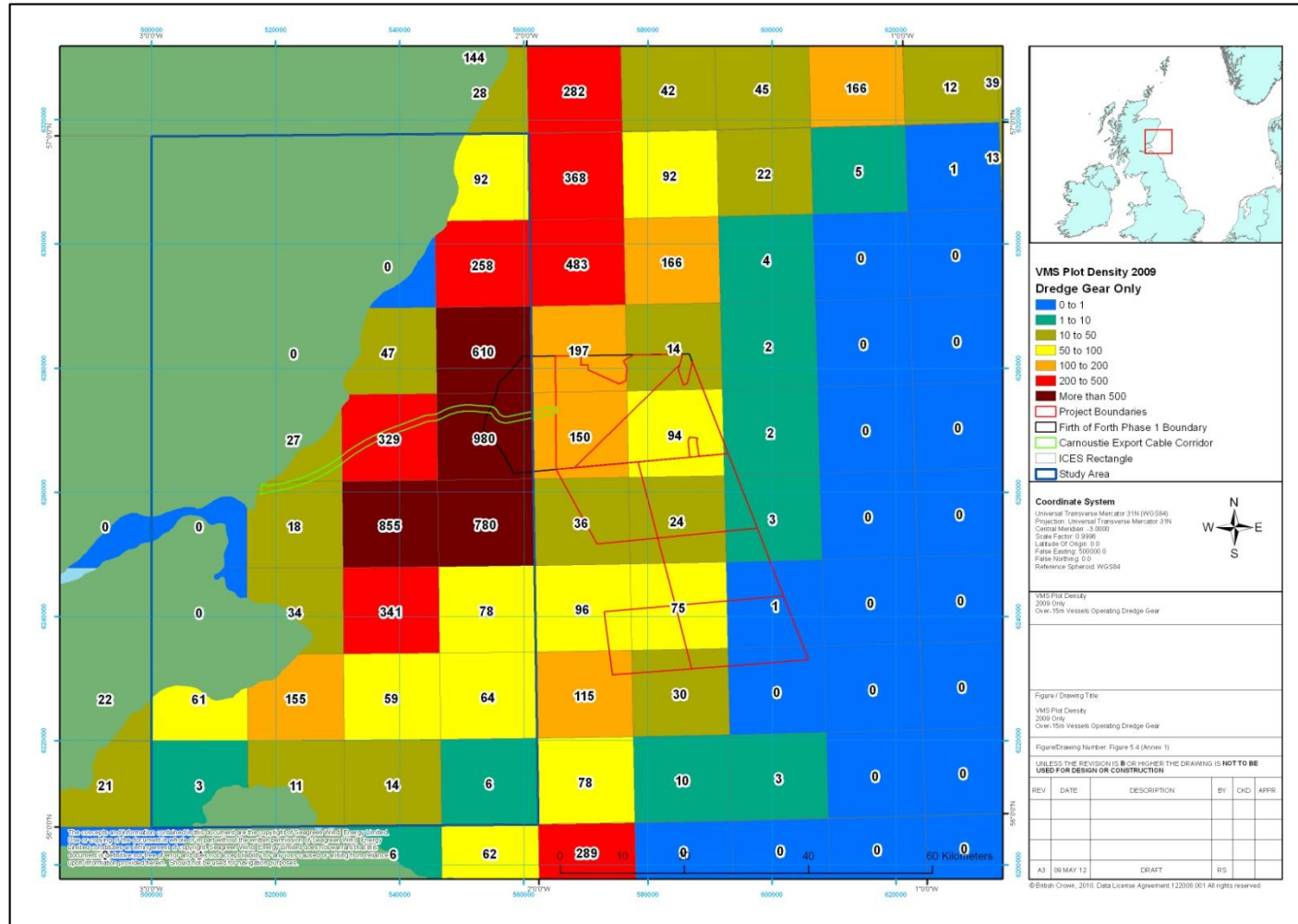
(source: MMO)

Figure 5.3 Satellite (VMS) density of UK over-15 metre vessels in 2009, nephrops gear only



(source: MMO)

Figure 5.4 Satellite (VMS) density of UK over-15 metre vessels in 2009, scallop dredge gear only



(source: MMO)

6 Marine Scotland Data Analysis

The following charts have been derived by Marine Scotland Science (MSS) and provided to BMM to assist in the establishment of a commercial fisheries baseline in the Forth and Tay area. As stated in the Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 10.0, limitations of this dataset apply, and the activity of vessels under-15 metres is not included.

Figure 6.1 to Figure 6.3 show the distribution of fishing gears in the Forth and Tay for all over-15 metre UK vessels between 2007 and 2009, respectively, by weight of landings. In respect of the use of the bottom otter trawls, the mesh size is indicative of the species targeted: vessels employing mesh sizes of less than 100mm will be targeting nephrops or squid, while those using mesh sizes greater than 100mm will be targeting demersal finfish such as haddock.

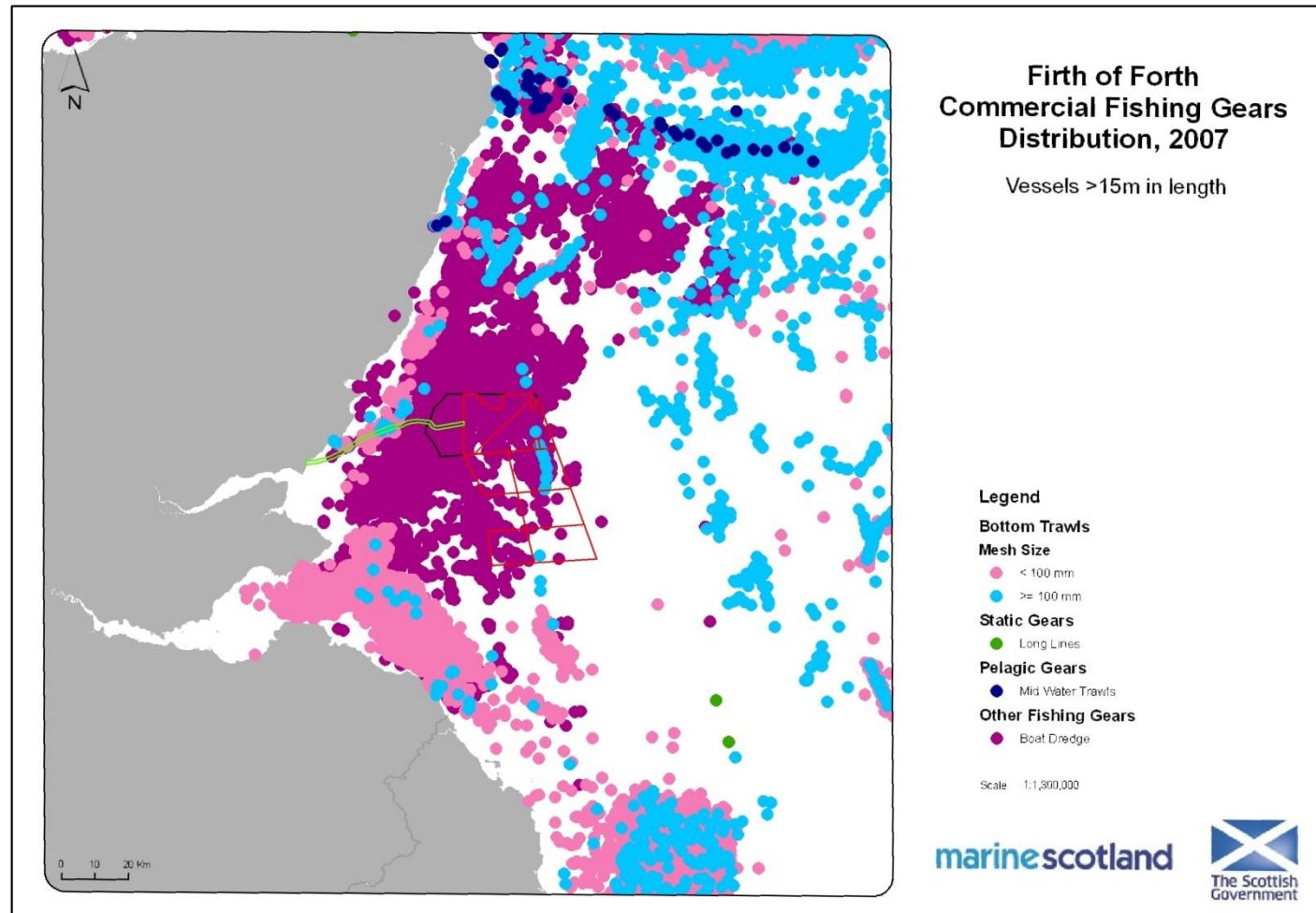
It can be seen that generally trawlers targeting demersal finfish species are recorded to the north and south of the Forth and Tay area, becoming more concentrated over the three year period. Activity along the ECR is low.

Demersal trawlers using small mesh nets are predominantly recorded in the southern section of the area and the distribution of this activity has remained relatively consistent over the three years. Activity is concentrated along the western section of the ECR and in areas adjacent to the landfall sites.

Boat dredges are predominantly recorded in central areas. The distribution of vessels boat dredging has also remained relatively consistent over the three year period. Activity along the ECR is concentrated in areas immediately adjacent to the development.

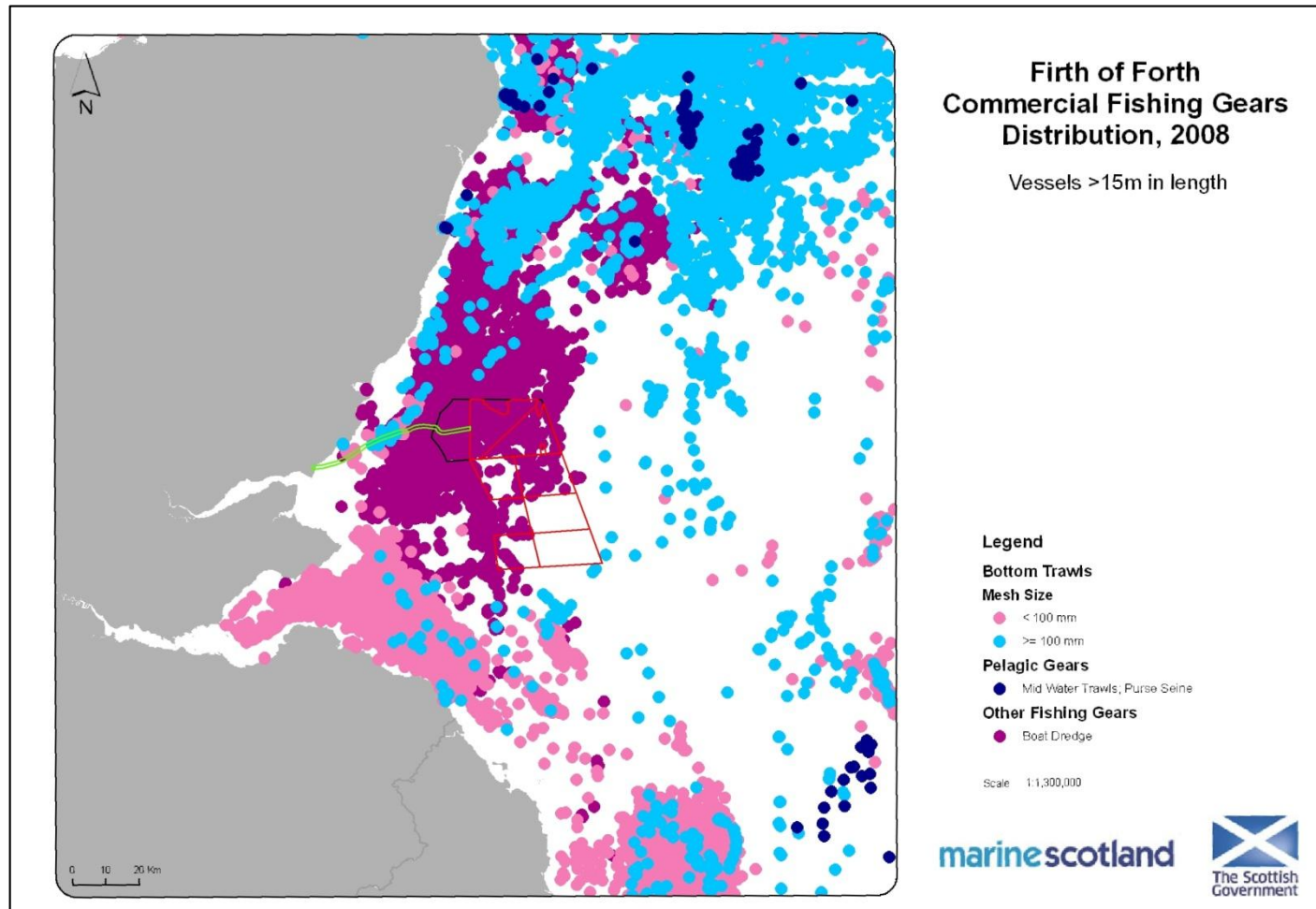
Figure 6.4 to Figure 6.6 show the commercial landings densities of shellfish between 2007 and 2009, respectively. The distribution of activity is broadly consistent throughout the three year period, with densities varying slightly during this time. The ECR passes through relatively high density scallops grounds adjacent to the development, through nephrops grounds in the mid and inshore sections, with a low level of scallop activity also recorded inshore.

Figure 6.1 Fishing gear distribution for over-15 metre vessels, 2007



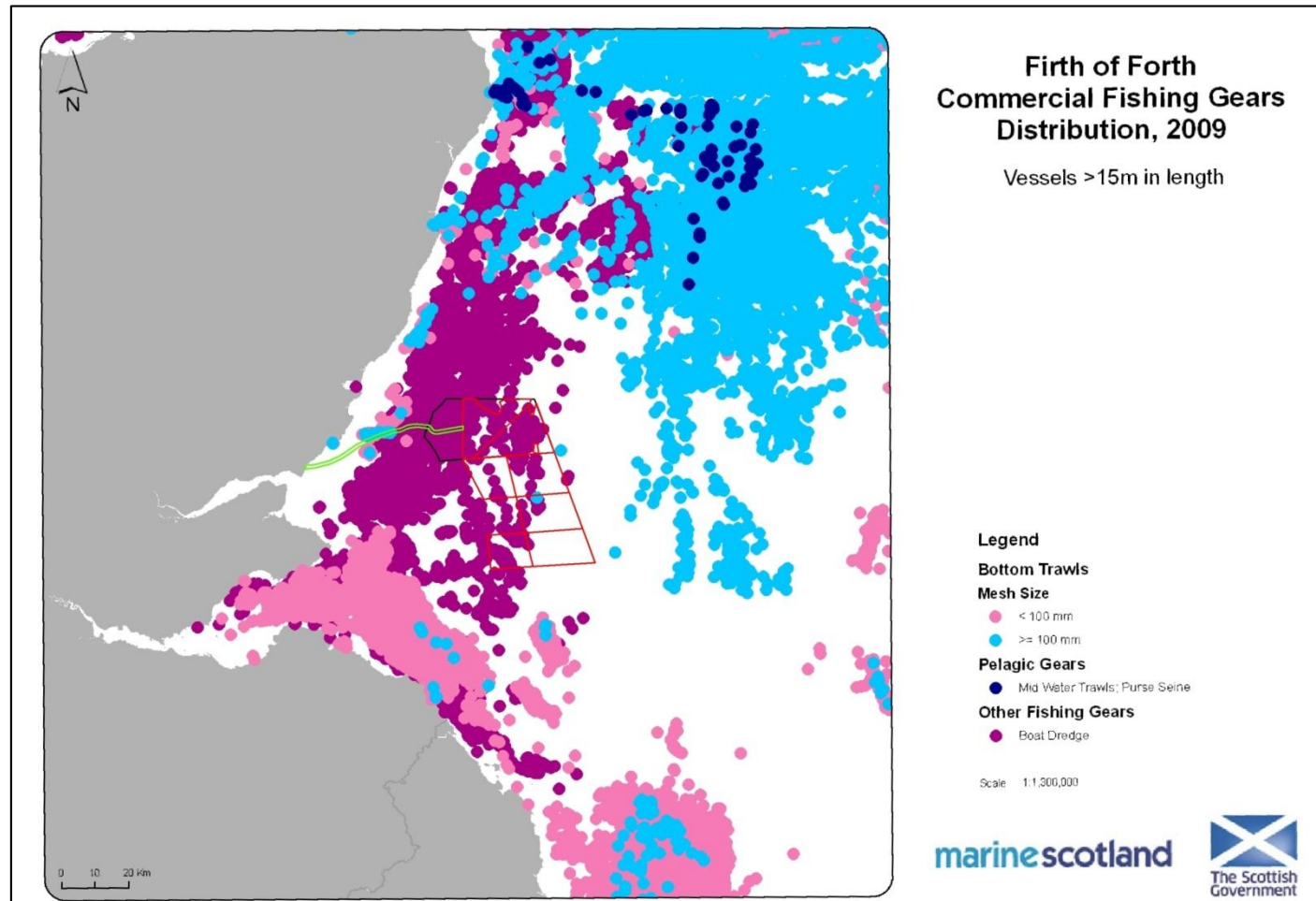
(source: Marine Scotland)

Figure 6.2 Fishing gear distribution for over-15 metre vessels, 2008



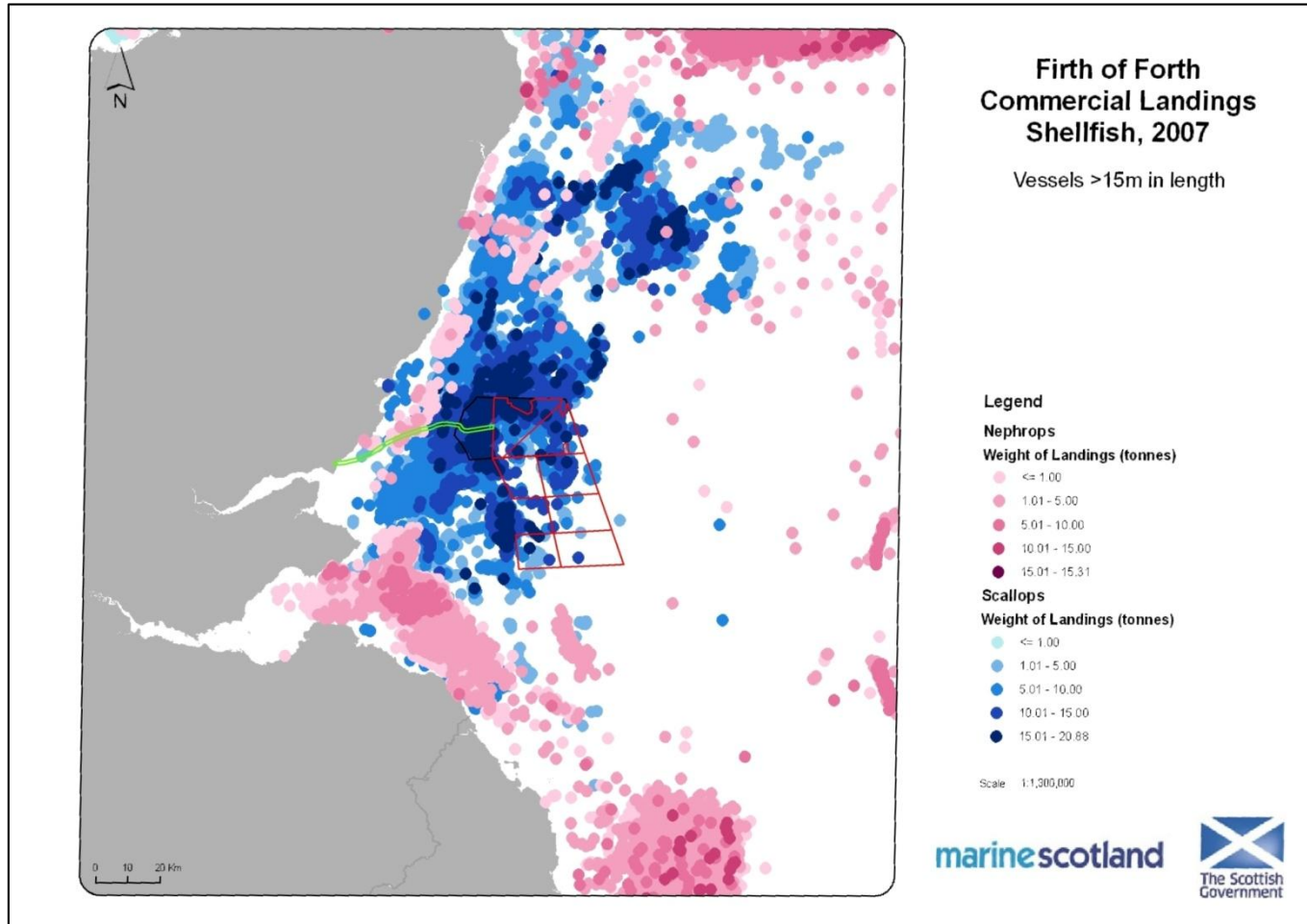
(source: Marine Scotland)

Figure 6.3 Fishing gear distribution for over-15 metre vessels, 2009



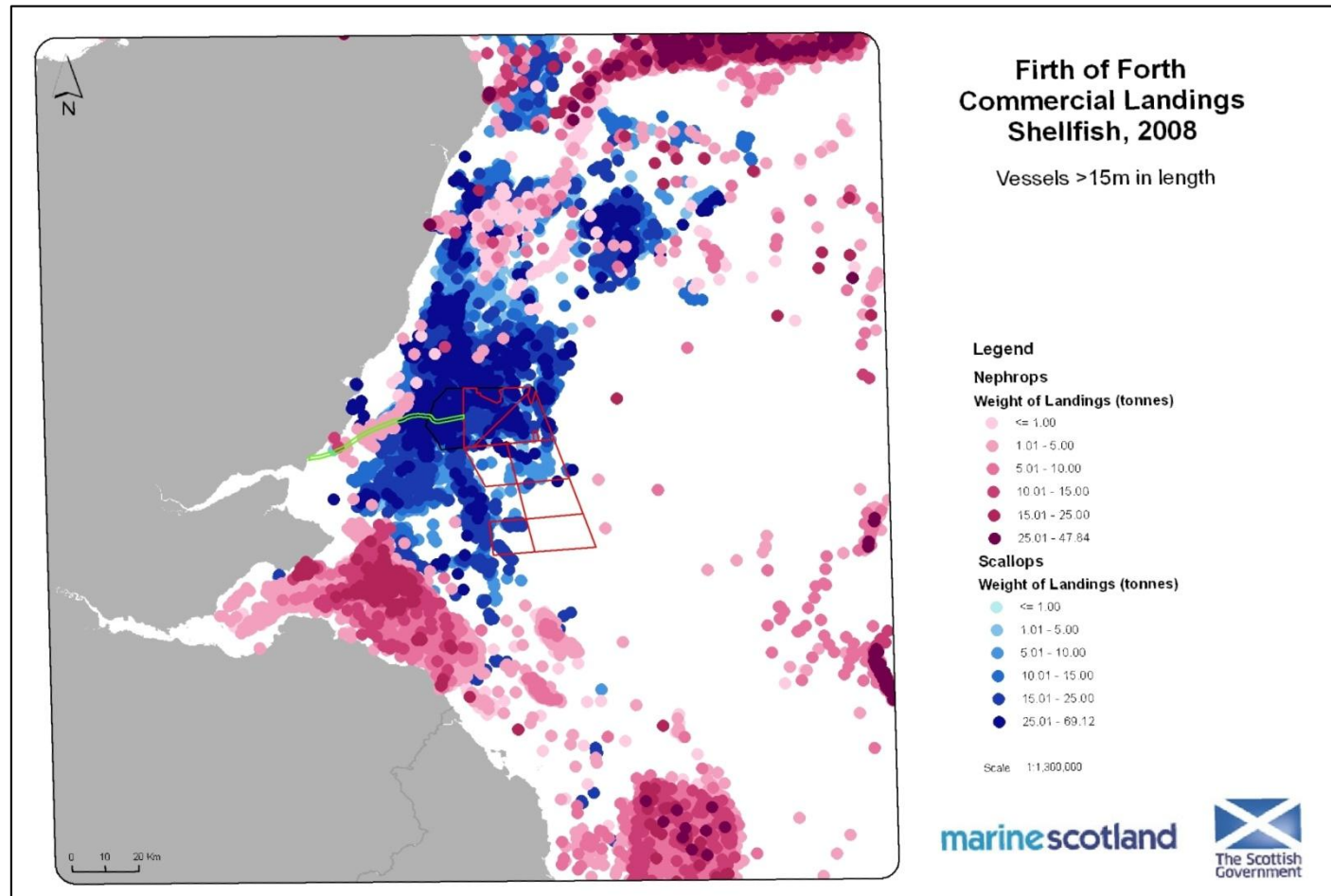
(source: Marine Scotland)

Figure 6.4 Commercial landings of shellfish (nephrops and scallops) for over-15 metre vessels, 2007



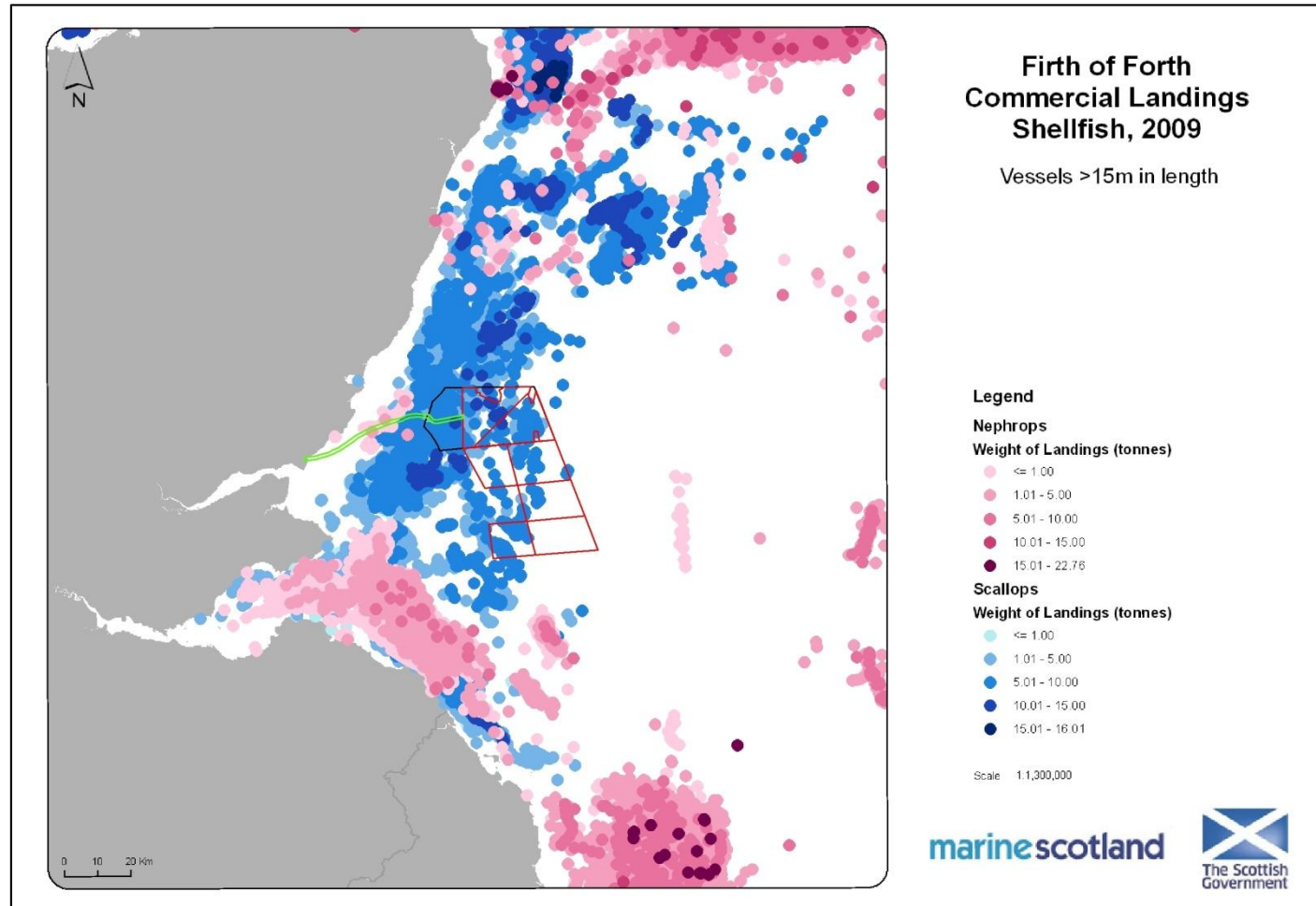
(source: Marine Scotland)

Figure 6.5 Commercial landings of shellfish (nephrops and scallops) for over-15 metre vessels, 2008



(source: Marine Scotland)

Figure 6.6 Commercial landings of shellfish (nephrops and scallops) for over-15 metre vessels, 2009



(source: Marine Scotland)

7 Fishing Vessels, Patterns and Practises

Commercial fisheries in the Forth and Tay area are targeted by both local and visiting vessels. For the purposes of this report, local vessels are considered to be those based at home ports within the regional area. Visiting vessels have home ports outside of the area but who will seasonally be present. Although not exclusively so, visiting vessels are generally over-15 metres in length.

The ECR passes through grounds targeted by vessels described below; it should however be noted that the cable route constitutes only a small percentage of the total area fished by these vessels.

7.1 Nephrops

The majority of vessels targeting nephrops in the Forth and Tay have home ports in the area. Local vessels reported to target nephrops and whose operational ranges will allow them to fish the grounds in the vicinity of the ECR are listed in

Table 7.1. The basic specifications of one vessel known to be targeting nephrops in the immediate area of the ECR is provided in Table 7.2.

There are a number of visiting vessels who will seasonally target nephrops grounds in the Forth and Tay area, landings their catch into ports at Eyemouth, Anstruther and Arbroath. The transient north east England fleet are generally present during the summer months, with the west coast fleet targeting nephrops in the area during the autumn and winter (pers. comm. Eyemouth Fishery Office, October 2010). Table 7.3 lists visiting vessels reported to target nephrops in the vicinity of the ECR.

The vessels highlighted (*) in

Table 7.1 and Table 7.3 are able to reconfigure their gear to prosecute the squid fishery on a seasonal basis.

Table 7.1 Vessel reported to target nephrops in the Forth and Tay area

Vessel Number	Home Port	Length	Typical Distance Steamed per Trip
Vessel BJ*	Eyemouth	21.78m	200nm
Vessel BC*	Port Seton	17.78m	200nm
Vessel DU	Arbroath	18.47m	N/A
Vessel A*	Montrose	14.33m	90-100nm
Vessel BA*	New haven	15.58m	200nm
Vessel BH*	Fisherrow	21.10m	200nm
Vessel BF*	Fisherrow	20.43m	200
Vessel AT*	Arbroath	11.98m	N/A
Vessel BI*	Eyemouth	21.53m	200nm
Vessel AZ*	Montrose	14.70m	20-50nm
Vessel BE*	Eyemouth	19.81m	200nm
Vessel BG*	Eyemouth	20.82m	200nm

Table 7.2 Specifications of Vessel AT, an Arbroath trawler

Fishing vessel	Vessel AT
Home port	Arbroath
Length	11.98m
Main engine power	300hp
Fishing association	FMA
Typical fishing trip duration	5 days
Average steaming speed	6 knots
Seasonality of activity	Nephrops – 6 months Squid – 6 months
Average number of days fishing per year	200 days per year
Trawl door dimensions	2x1.2m
Trawl door weight	0.25t
Distance between doors when towing	35m

Table 7.3 Visiting vessels reported to target nephrops in the Forth and Tay area

Vessel Number	Home Port	Length	Typical Distance Steamed per Trip
Vessel BS	Amble	13.17m	100nm
Vessel BU*	Seahouses	14.90m	80nm
Vessel BP	Amble	11.88m	100nm
Vessel CB	Buckie	18.60m	100nm
Vessel BW	Oban	14.99m	10-100nm
Vessel BX	Seahouses	16.28m	80nm
Vessel CA	Ardglass	18.59m	100nm
Vessel BQ	Amble	12.08m	100nm

7.2 Scallop

Vessels targeting scallops in the Forth and Tay area fall into two categories: smaller vessels with home ports based within the Forth and Tay and larger, nomadic vessels which will variously target scallop grounds around the UK. Table 7.4 lists scallop dredge vessels reported to fish grounds in the Forth and Tay area.

The basic specifications of one local and one visiting vessel known to be targeting scallops in the immediate area of the ECR are provided in Table 7.5 and Table 7.6, respectively.

Table 7.4 Vessels reported to target scallops in the Forth and Tay area

Vessel Number	Home Port	Length	Grounds Targeted
Vessel N	Kirkcudbright	16.11 m	Around the UK
Vessel O	Kirkcudbright	18.27m	Around the UK
Vessel P	Kirkcudbright	18.25m	Around the UK
Vessel Q	Kirkcudbright	16.15m	Around the UK
Vessel R	Kirkcudbright	17.13m	Around the UK
Vessel A	Montrose	14.33m	Forth and Tay
Vessel AA	Peterhead	21.00m	Scottish east coast
Vessel G	Annan	19.35m	Around the UK
Vessel H	Brixham	25.50m	Around the UK
Vessel W	Oban	18.99m	Around the UK
Vessel I	Buckie	18.17m	Around the UK
Vessel J	Buckie	30.20m	Around the UK
Vessel B	Burntisland	20.29m	Scottish east coast
Vessel S	Kirkcudbright	23.66m	Around the UK
Vessel K	Fleetwood	26.36m	Around the UK
Vessel L	Fleetwood	16.89m	Around the UK
Vessel X	Oban	18.90m	Around the UK
Vessel T	Kirkcudbright	17.83m	Around the UK
Vessel M	Girvan	18.00m	Around the UK
Vessel Y	Oban	18.29m	Around the UK
Vessel Z	Oban	19.00m	Around the UK
Vessel U	Kirkcudbright	24.80m	Around the UK
Vessel E	Pittweem	16.67m	Forth and Tay
Vessel V	Kirkcudbright	26.24m	Around the UK

Table 7.5 Specifications of Vessel A, a Montrose scallop dredge.

Fishing vessel	Vessel A
Home port	Montrose
Length	14.33m
Main engine power	310hp
Fishing association	Northern Fisheries Producers Organisation
Typical fishing trip duration	36 to 40 hours
Typical distance steamed per trip	90 to 100nm (depends on weather)
Seasonality of activity	Scallops – all year Nephrops – 3 months during the summer Squid – 4 months during the summer
Number of dredges per side	6
Average no. of days fishing per year	150 to 200 days per year
Average towing speed	2 to 2.5 knots
Average towing duration	2 to 4 hours
Average tow length	2 to 8nm

Table 7.6 Specifications of Vessel AA, a Peterhead scallop dredger

Fishing vessel	Vessel AA
Home port	Peterhead
Length	21.00m
Main engine power	625hp
Seasonality of activity	Scallops – all year
Number of dredges per side	10

7.3 Crab and Lobster

Crab and lobster fishing grounds are, in the main, located in inshore areas in the Forth and Tay area. There are fifteen full time vessels reported to target crab and lobsters in the areas around the ECR(s), listed in Table 7.7 below. There are also a number of part time vessels who will set pots in inshore areas during the summer months. The basic specifications of one of these vessels, Vessel D, are provided in Table 7.7.

Table 7.7 Vessels reported to target crab and lobster grounds in the vicinity of the ECR

Vessel Number	Home Port	Length
Vessel DU	Arbroath	8.54m
Vessel DA	Arbroath	9.00m
Vessel DH	Arbroath	9.80m
Vessel CY	Arbroath	8.75m
Vessel CO	Montrose	7.52m
Vessel CM	Arbroath	7.33m
Vessel CC	Arbroath	9.60m
Vessel CU	Arbroath	8.20m
Vessel DD	Arbroath	9.20m
Vessel D	Arbroath	9.90m
Vessel CV	Arbroath	8.25m
Vessel CK	Arbroath	6.90m
Vessel CN	Arbroath	7.39m
Vessel DI	Montrose	9.90m
Vessel DJ	Montrose	9.90m

Table 7.8 Specifications of Vessel D, an Arbroath creeler

Vessel Name	Vessel D
Home Port	Arbroath
Length	9.90m
Main engine power	300hp
Fishing Association	Arbroath and District Static Gear Association
Typical fishing trip duration	7 to 14 hours
Typical distance steamed per trip	20 to 50nm
Seasonality of activity	Edible crab, lobster and velvet crabs – all year Netting – 2 months
Average number of days fishing per year	310 days per year
Pot dimensions	0.8x0.5m
Number of fleets	50
Fleet length	322m
Number of pots per fleet	20
Distance between each pot	18m
Deployment method	Directional (mainly south east)
Typical depth fished	2 to 50m
Bait used	Scad
Typical soak time	1 to 2 days (dependent on weather)

7.4 Squid

A number of demersal trawl vessels will reconfigure gear to target squid on a seasonal basis in seasonal basis in the Forth and Tay area. Depending upon the productivity of the fishery and fishery and availability of other, restricted stocks, the fishery may be the focus of a number of number of visiting vessels, some of which are of the larger category of vessel. The vessels vessels highlighted (*) in

Table 7.1 and Table 7.3 are reported to target squid in the vicinity of the ECR.

8 Fishing Grounds

8.1 Nephrops Fishing Grounds

Figure 8.1 shows the location of nephrops grounds targeted by the local fleet, identified by a sample of nephrops fishermen, relative to the ECR. It can be seen that grounds are, for the most part, located in the southern Forth and Tay area. Three of the vessels sampled have identified nephrops fishing grounds through which the ECR will pass.

8.2 Scallop Fishing Grounds

Figure 8.2 shows the location of scallop grounds relative to the ECR, identified by a sample of scallop fishermen. Scallop grounds have been identified along the ECR in areas adjacent to the development and along the mid section of the route.

8.3 Crab and Lobster Fishing Grounds

Figure 8.3 shows the creel fishing grounds in the Forth and Tay area, identified by a sample of creel fishermen. The majority of crab and lobster fishing grounds identified are located in inshore areas. Crab and lobster grounds have been identified along the eastern section of the cable route and in areas adjacent to the South Arbroath landfall site.

8.4 Squid Fishing Grounds

As has been previously stated, squid fishing grounds are reported to vary each year. Figure 8.4 illustrates the squid fishing areas in the Forth and Tay area as identified by a sample of squid fishermen. Squid fishing occurs throughout the Forth and Tay area, in both inshore and offshore areas. Two of the vessels sampled have identified squid fishing areas through which the ECR will pass in areas adjacent to the development.

Figure 8.1 Forth and Tay nephrops fishing grounds

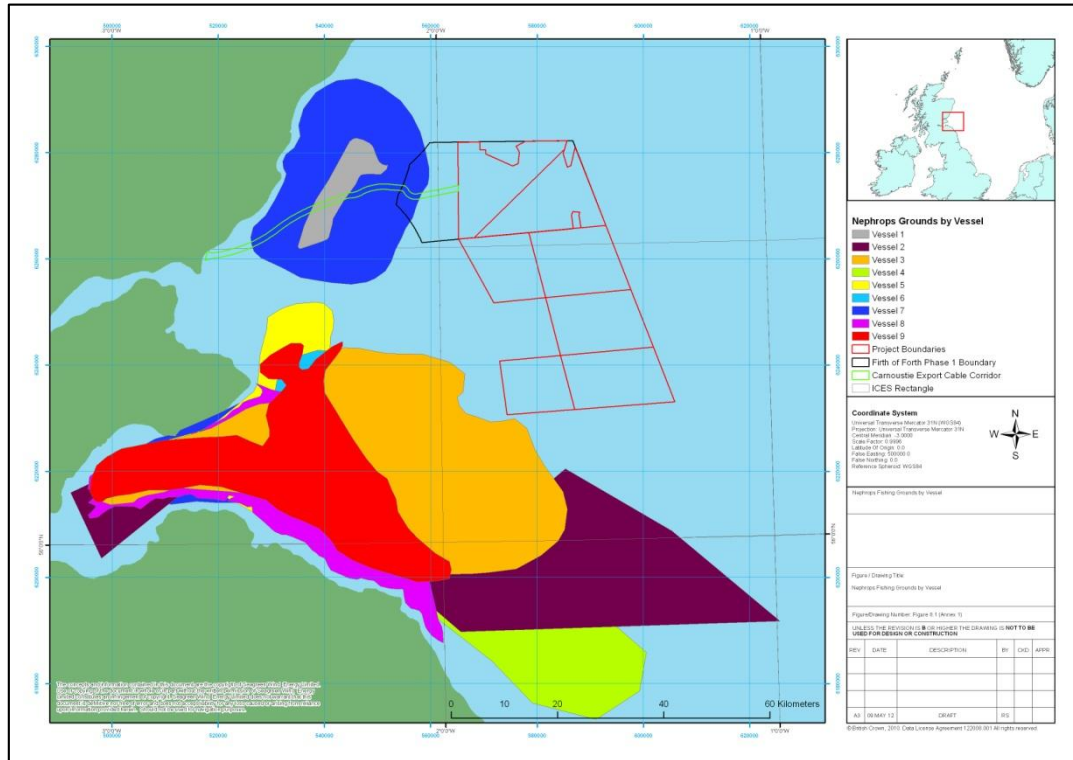


Figure 8.2 Forth and Tay scallop fishing grounds

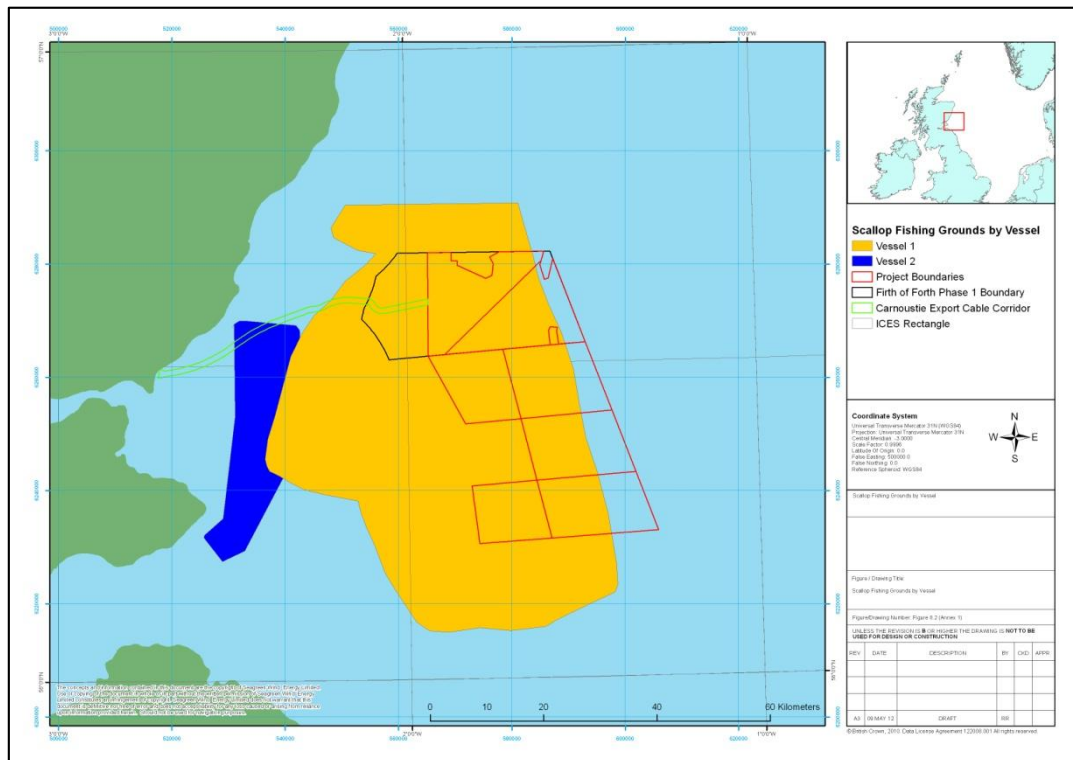


Figure 8.3 Forth and Tay creel fishing grounds

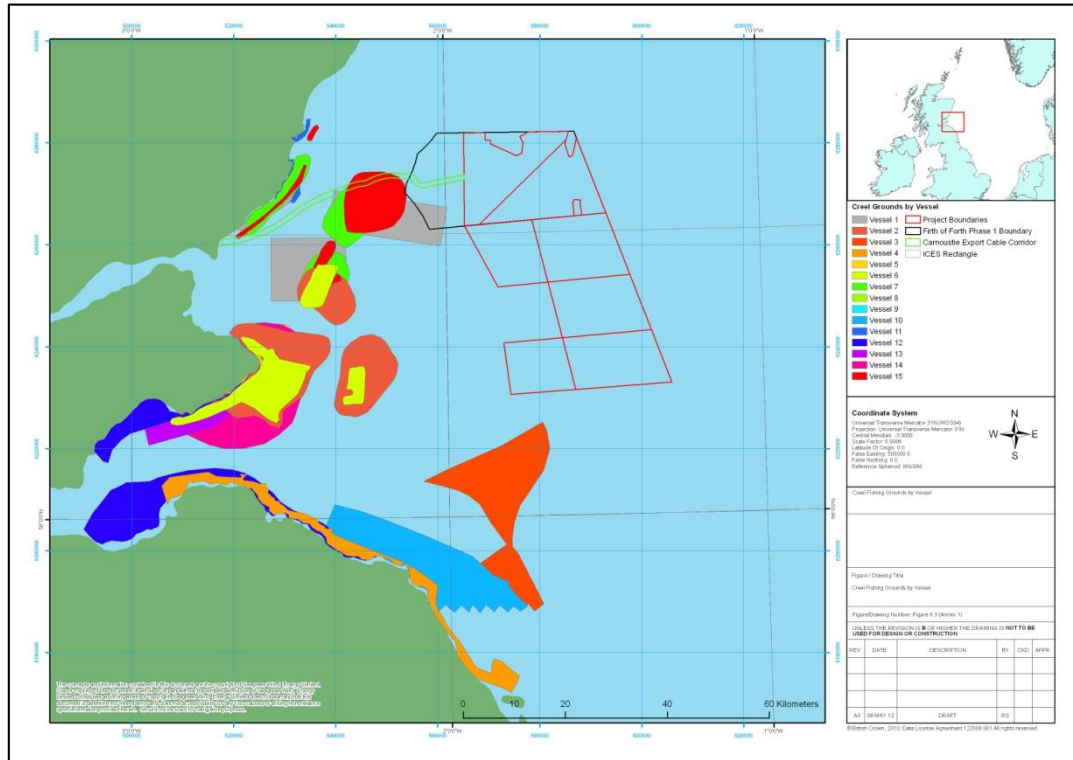
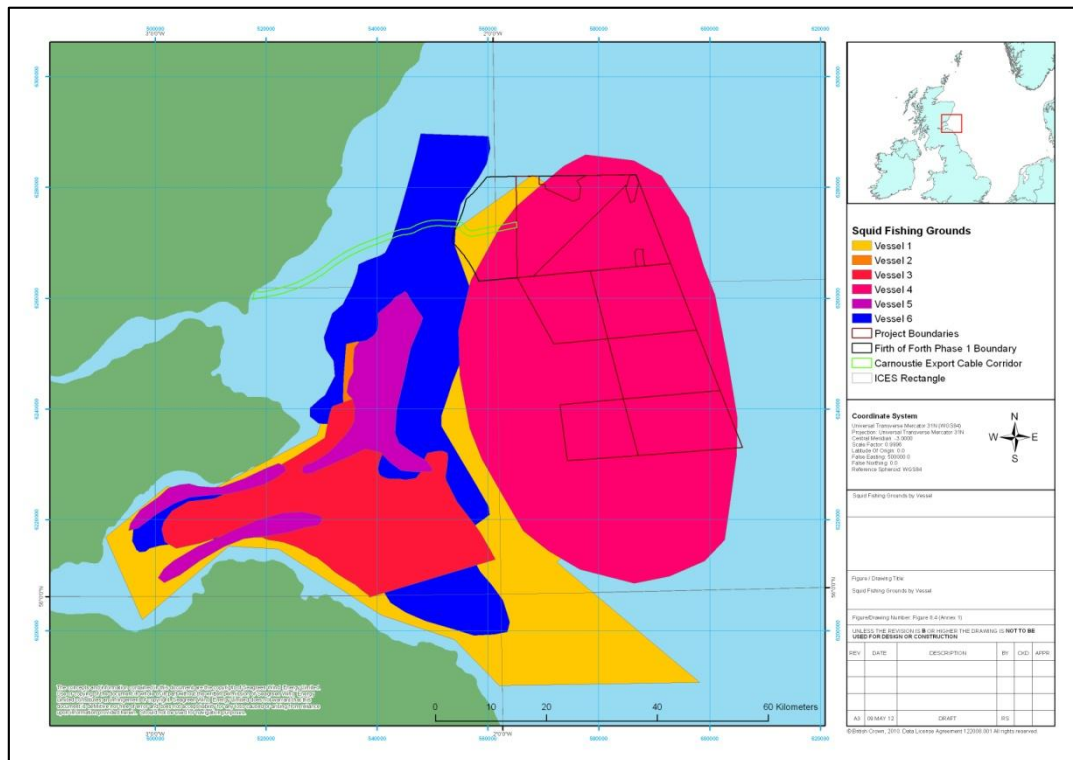


Figure 8.4 Forth and Tay squid fishing grounds



9 Future Fisheries

A short summary of potential changes to the current fishing baseline identified above that may occur in the future is provided below.

9.1 Nephrops Fishery

Nephrops stocks in the Forth and Tay area are currently considered to be sustainably exploited². It is however considered that active vessels may in the future diversify into alternative fisheries with fewer restrictions, such as squid and crustaceans. Impending changes in fisheries management policies will potentially see further changes to the fleet.

9.2 Scallop Fishery

The Forth and Tay scallop fishery is reported to be fished at lower levels than grounds elsewhere, such as in the English Channel. The number of vessels in the national scallop fleet has however increased over the last ten years.

The scallop fishery could face stricter management in the future, with Marine Scotland Science (2010) advising that restrictions are placed on the number of vessels entering the scallop fleet and increases in landing size are recommended for future management of the fishery³. In addition, it is possible that restrictions may be imposed as a result of conservation management measures, such as those closures enforced in Cardigan Bay and the Isle of Man. Environmental conditions have also affected scallop landings, with the warmer sea temperatures altering the distribution of scallop species⁴.

9.3 Crab and Lobster Fisheries

Crab and lobster are not currently quota or effort restricted, unlike the whitefish and nephrops fisheries, being regulated in the main by licensing and minimum landing sizes. The number of vessels targeting the fishery has broadly increased in recent years. Furthermore, it has been noted that several vessels operating in the regional study area now additionally employ potting gear to seasonally target crustaceans. It is possible that the number of creel vessels will increase in the future, particularly in light of increasing restrictions upon other fisheries, unless additional management measures are implemented which will prevent this.

9.4 Squid Fishery

The squid fishery is a relatively new fishery to the Forth and Tay area, and future fishing practices are uncertain. It has however become an important alternative

² Keltz, S. and Bailey, N. (2010) Fish and Shellfish Stocks 2010. *Marine Scotland Science. The Scottish Government*

³ Keltz, S. and Bailey, N. (2010) Fish and Shellfish Stocks 2010. *Marine Scotland Science. The Scottish Government*

⁴ Shephard, S., Beukers-Stewart, B., Hiddink, J.G., Brand, A.R. and Kaiser, M.J. (2010) Strengthening recruitment of exploited scallops *Pecten maximus* with ocean warming. *Mar. Biol.* 1575: 91-97.

fishery for the nephrops fleet. The fishery is currently unregulated, and it is possible that more fishermen will rely on this fishery to supplement their income.

Squid are seemingly resistant to fishing pressures due to their short lifespan; however squid stocks can be erratic and are sensitive to both environmental and human pressures. There are concerns over the resistance of squid stock due to increases in fishing pressure and expansion of the fishing season. Increases in sea temperature could lead to squid populations moving north⁵.

9.5 Bivalve Fisheries

Within the Forth and Tay area, there are fisheries for razor and surf clams (in Pettycur Bay). There are productive bivalve grounds in several inshore areas (including Kinshaldy beach, Kirkcaldy Bay and St. Andrews Bay) although commercial fishing activities are currently prohibited (Report A4MR-SEAG-Z-DEV210-CRP-092 - Section 14.4). It is possible that in the future restrictions upon the fishery may be lifted, subject to an assessment by the IFG upon the sustainability of stocks being undertaken.

Current moves to reduce pressures on a number of exploited commercial species have led to a call for diversification of fishing effort onto alternative fish and shellfish species. Razor and surf clams represent alternative resources and there has been a growing interest in the use of mobile hydraulic dredges used to harvest the species. It is possible therefore that more fishermen could be targeting clams in the future⁶.

9.6 Sandeel Fishery

There is currently no fishing for sandeels in the Forth and Tay area, although there has historically been a fishery, concentrated on the Wee Bankie and targeted predominantly by the Danish fleet. The North Sea sandeel fishery was closed in 2000 as a result of concerns about marine top predators, particularly seabirds. The fishery was reopened in 2009 with a quota of 200,000 tonnes (MMO statistics), although there still remains a moratorium on the fishery along the Scottish east coast and grounds elsewhere, such as the Dogger Bank, are currently targeted.

It is possible that a fishery may recommence in the future, although it should be noted that the Danish fleet (to whom the vast majority of quota is allocated) only have access to grounds outside of 12nm and possible activity in the area of the cable route will be limited.

⁵ Hastie, L., Pierce, G., Pita, C., Viana, M., Smith, J. and Wangvoralak, S. (2009) Squid Fishing in UK Waters. *Report to SEAFISH Industry Authority*

⁶ Laing, I. (2001) Shellfish News. *Cefas*

Seagreen

Firth of Forth Round 3 Zone

Phase 1

Commercial Fisheries Assessment

Annex 2

2010 Addendum to the Technical Report

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FoF Comm. Fish 2010 Addendum	Draft	RR/JH-M	J H-M	/05/2012

Addendum to the Commercial Fisheries Technical Report: 2010 Data

The assessment below provides analysis of fisheries datasets and information in addition to those described in the Technical Report, which was completed prior to the release of finalised 2010 statistical data. The information below covers both the offshore wind farm sites and the offshore transmission infrastructure route.

1.0 Fisheries Controls and Legislation

1.1 Quota Restrictions

Figure 1.1 and Figure 1.2 below show the combined national Total Allowable Catch (TAC) for all species excluding blue whiting and the UK's TAC for all species, respectively, including 2011. Broadly, the TACs have not significantly altered, with the exception of sandeels which has increased in quota two years after the reopening of the fishery. There is some reduction in quota for demersal species, with the exception of plaice, and some increase in the quota for the pelagic species herring and mackerel. With regard to the latter, this follows a significant cut in quota allocation in 2010.

Table 1.1 shows the quota allocation for the under-10 metre fleet, including 2011. Broadly the trend is the same as with the UK, with the exception of Norwegian Lobster (nephrops) which has increased slightly.

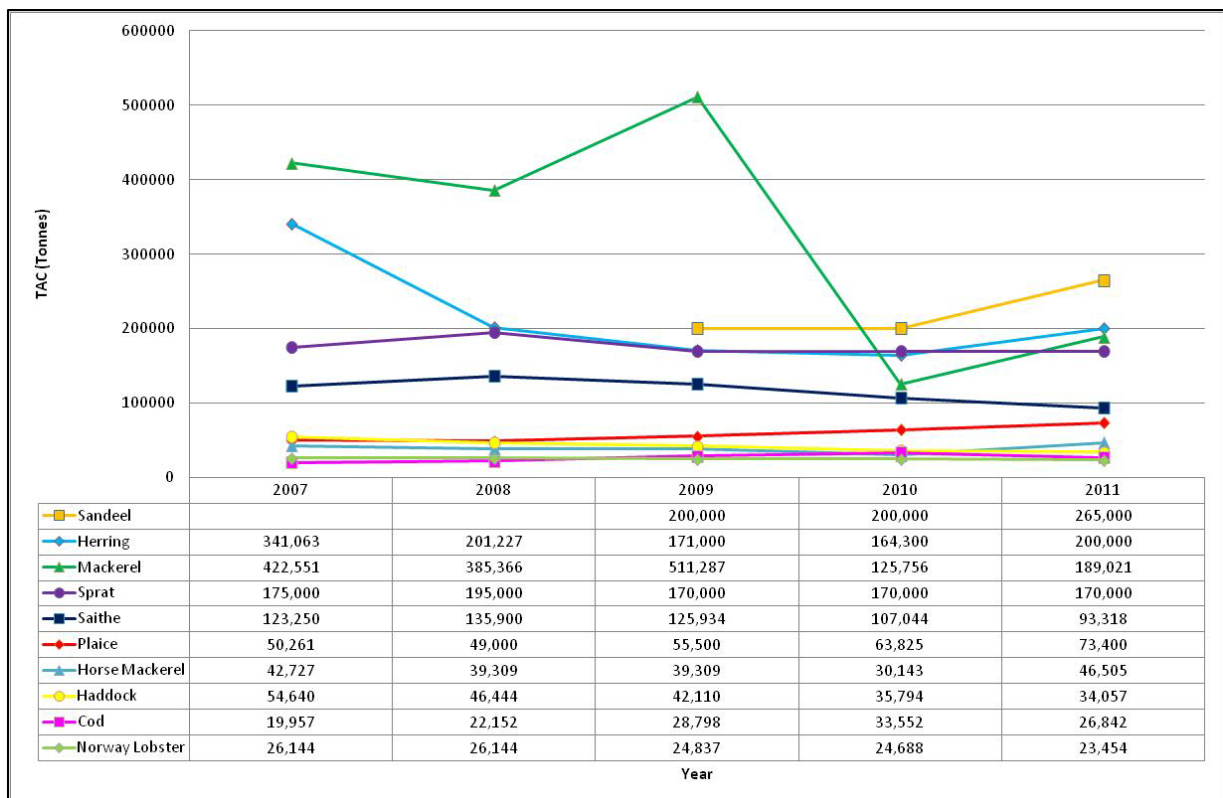


Figure 1.1 Combined national TACs (top ten species) in ICES area IV (North Sea), 2007 to 2011 (excluding blue whiting)

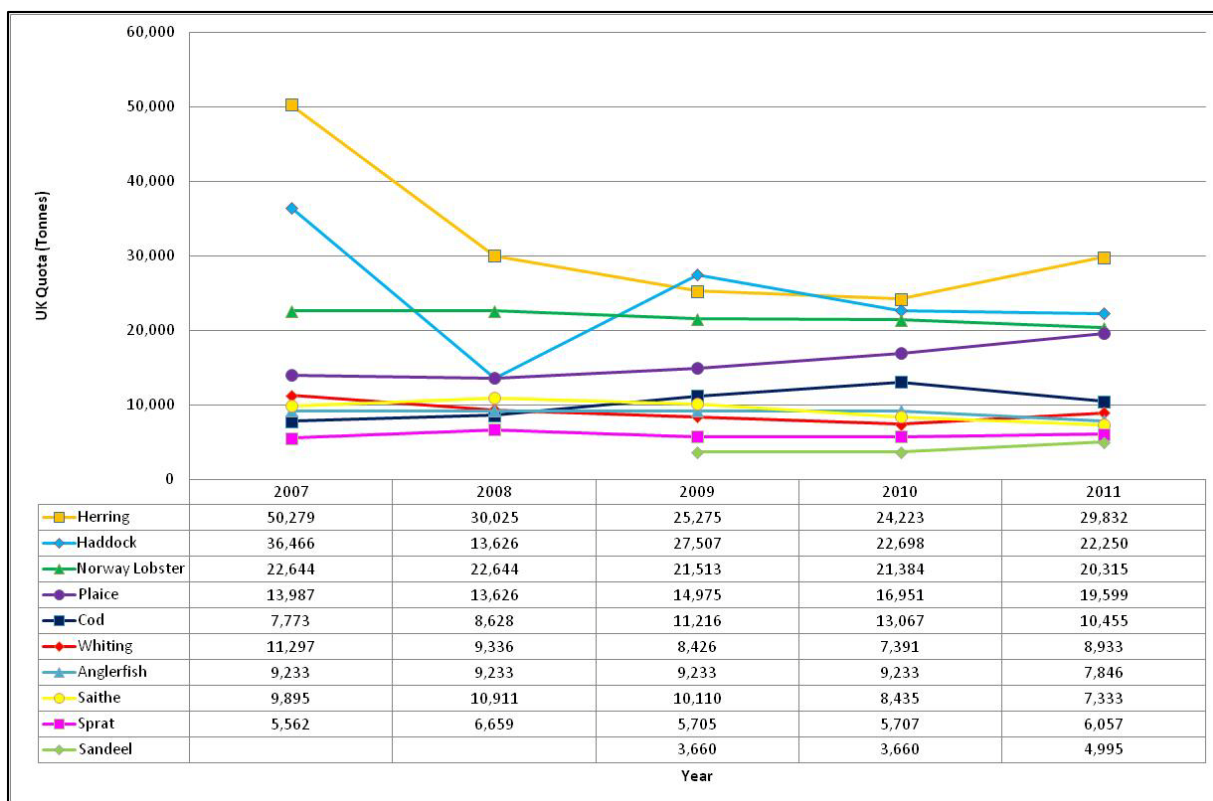


Figure 1.2 TACs (top ten species) in ICES area IV (North Sea), UK only, 2007 to 2011

Table 1.1 Under-10 metre final quota allocations in the North Sea

Species	2008 quota (tonnes)	2009 quota (tonnes)	2010 quota (tonnes)	2011 quota (tonnes)
Nephrops	1267.2	1078.8	882.0	1028.2
Cod	403.1	561.3	588.0	470.5
Haddock	131.6	80.5	127.9	103.6
Sole	342.1	275.7	110.5	101.2
Plaice	54.2	40.7	40.4	46.6
Whiting	89.8	355.5	321.9	326.6
Skate and Rays	265.1	106.3	103.1	74.1
Lemon Sole and Witches	72.6	23.2	22.2	21.8
Turbot and Brill	17.9	15.0	10.6	4.7
Dab and Flounder	18.7	18.9	19.4	19.0

2.0 MMO Fisheries Statistics (Landings Values and Effort Data Sets)

2.1.1 National Overview

Figure 2.1 and Figure 2.2 display the total landings values (2010 only) by species and method in the national study area, respectively. Broadly, the total value of landings has not significantly altered from the previous ten year average, and the ICES rectangles within which Phase 1 and the majority of the export cable corridors are located (42E7 and 42E8) contain fishing grounds which are of moderate importance on a regional and national scale. The composition of species landed by value has however altered, with an increase in squid, targeted by demersal gear, and a reduction in haddock, also targeted by demersal gear.

Figure 2.3 shows scallop landings on a national scale. Landings values of scallops in ICES rectangle 42E7 and 42E8 in 2010 are lower than the average values previously recorded, although the rectangle still records moderate values on national scale.

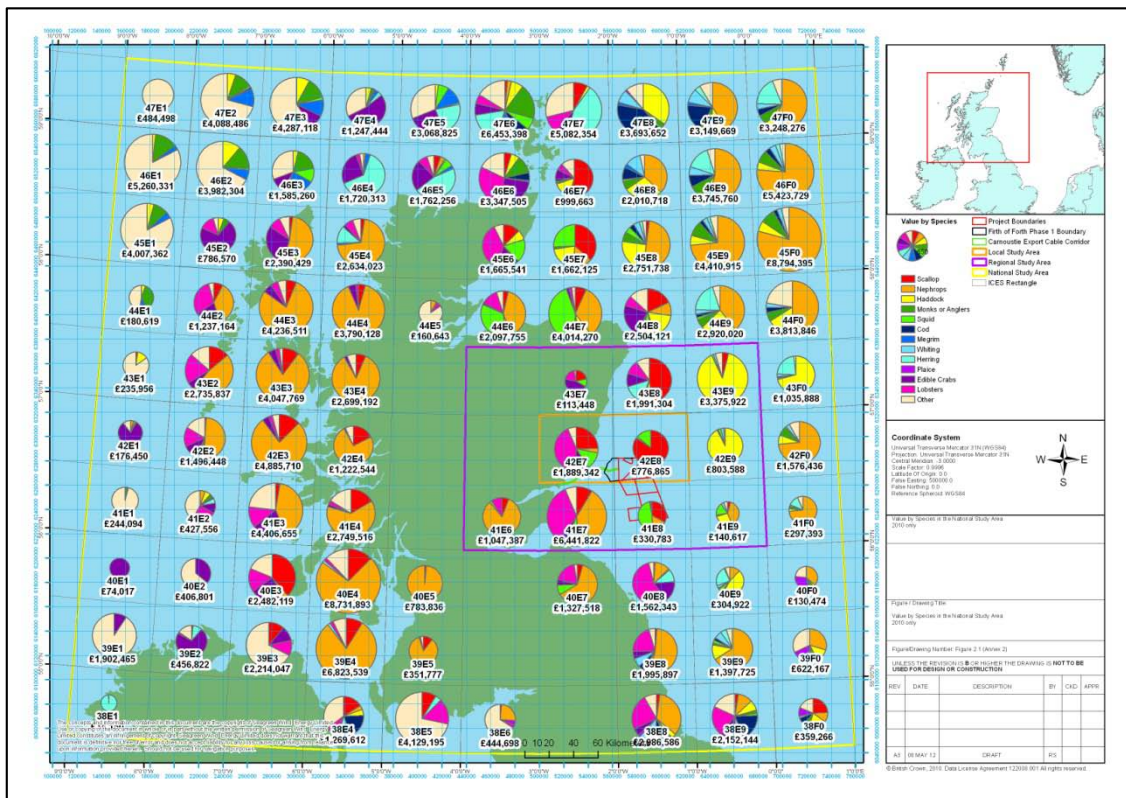


Figure 2.1 Landings values by species (2010 only) in the national study area

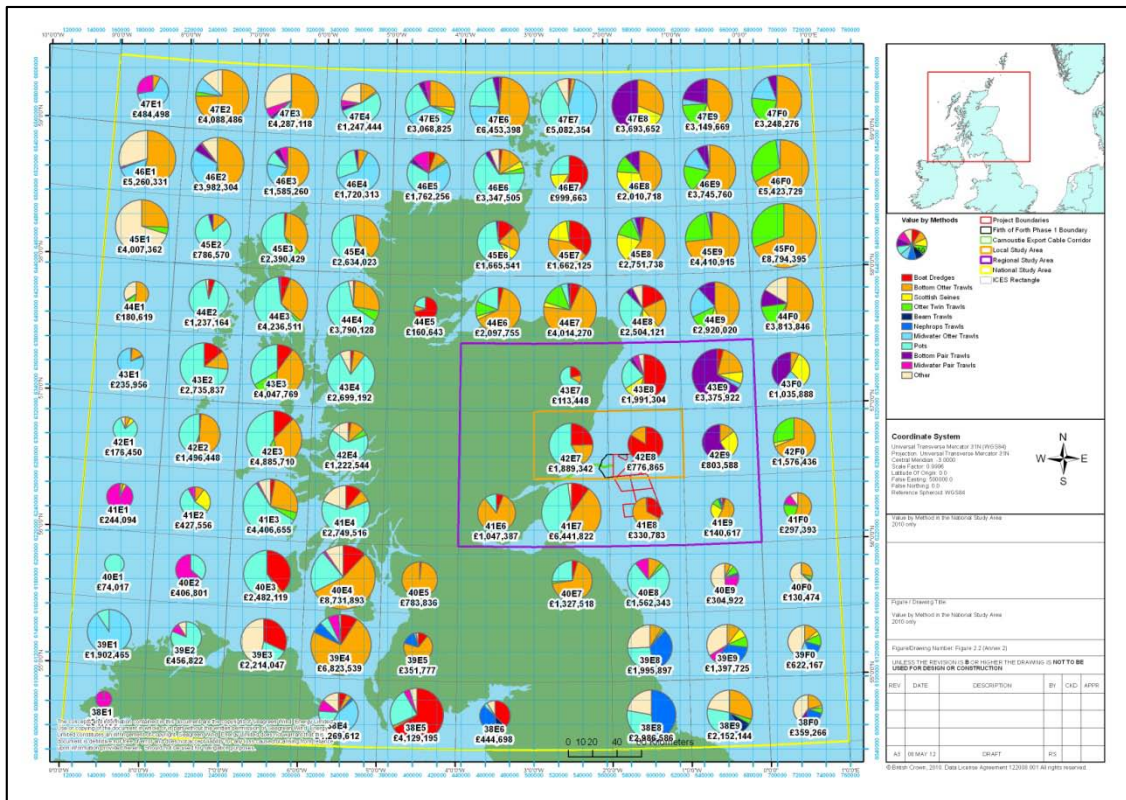


Figure 2.2 Landings values by method (2010 only) in the national study area

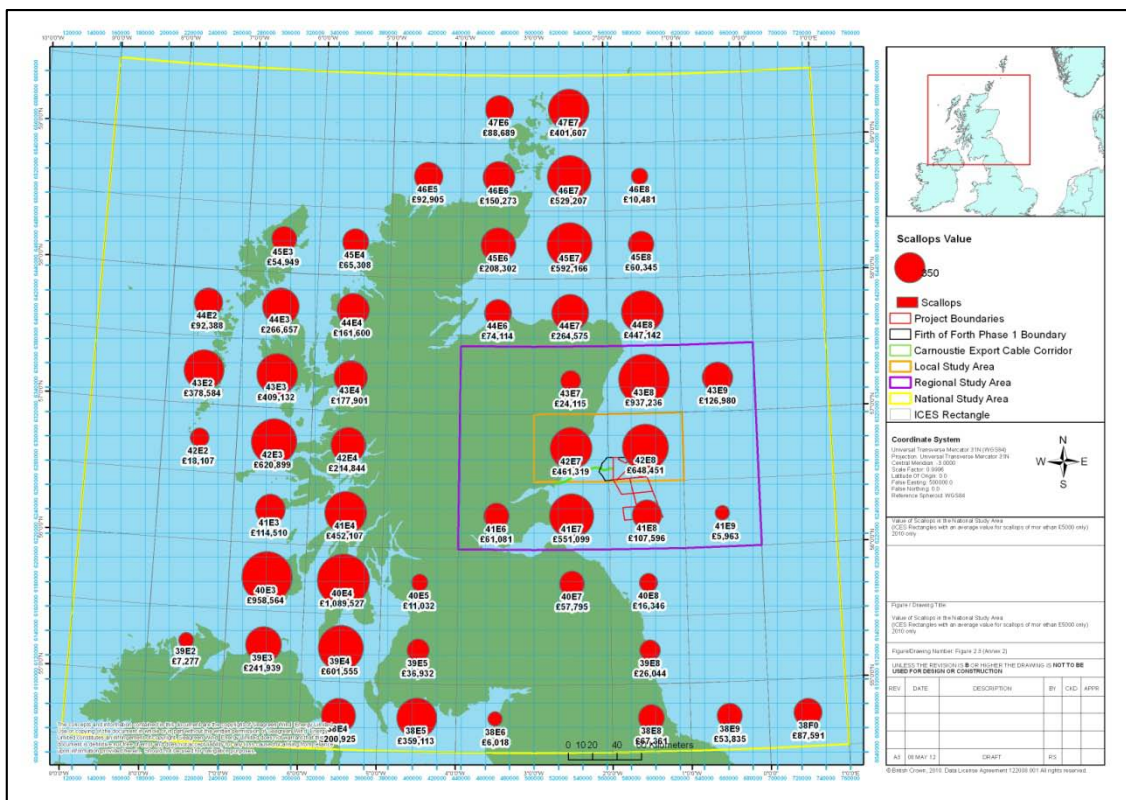
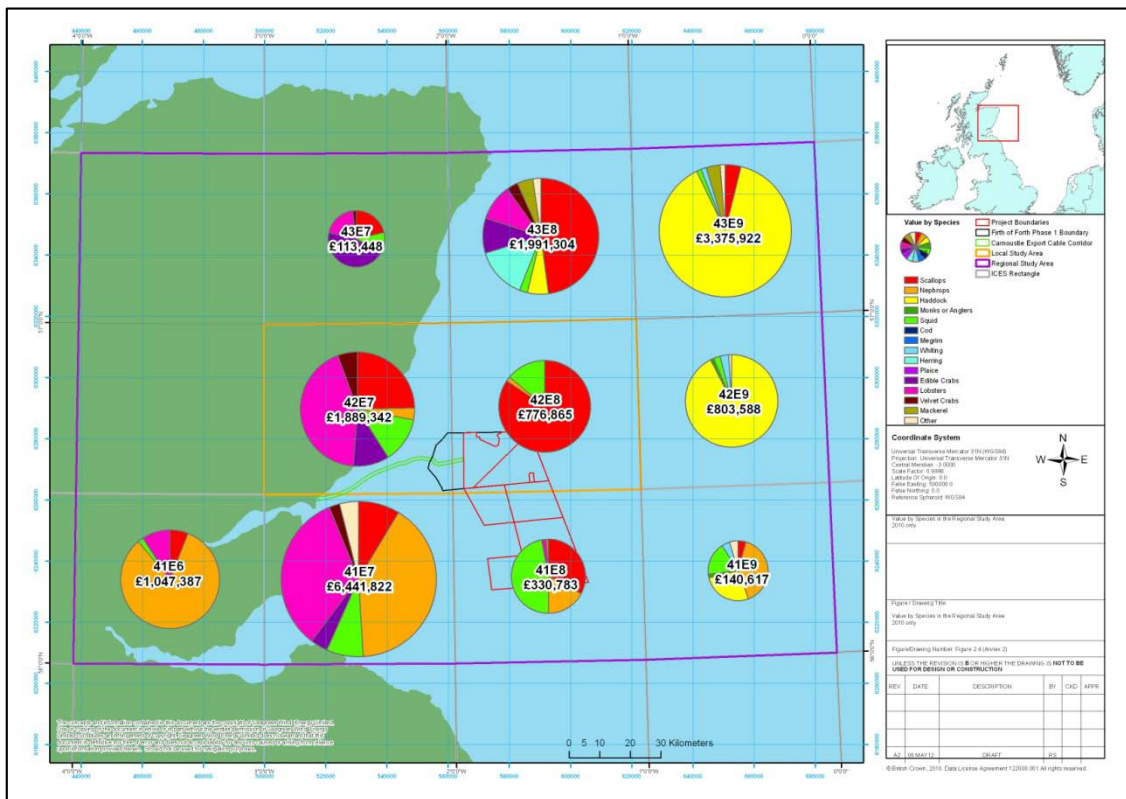


Figure 2.3 Landings values of scallops (2010 only) in the national study area

2.1.2 Regional Overview

Figure 2.4 and Figure 2.5 show the landings values in the regional study area (2010 only) by species and method, respectively. King scallops targeted by boat dredges record the highest landings in rectangle 42E8 within which Phase 1 is located and in 43E8 to the north. Potting for edible crabs and lobsters record the majority of landings values along the coast and in rectangle 42E7 within which the majority of the export cable corridors are located. Landings of nephrops are high to the south of the regional study area and are principally targeted by demersal otter trawlers, consistent with the preceding 10 year average. Squid records a significant increase in landings values in 2010 from the previous 10 year average. Squid is principally targeted by reconfigured demersal otter trawlers and landings are recorded in central and southern rectangles. Haddock is recorded in offshore areas in the east of the regional study area and records a slight increase in landings values than previously recorded in the regional study area. Haddock are targeted by demersal otter trawlers and Scottish seine netters.

Figure 2.6 shows that the majority of the vessels operating in central and eastern parts of the study area are over-15m in length. The level of activity by the 10m to 15m fleet is broadly consistent with previous years. Activity undertaken by vessels under-10 metres is recorded in coastal rectangles. There is low recorded foreign vessel activity in the north of the study area.



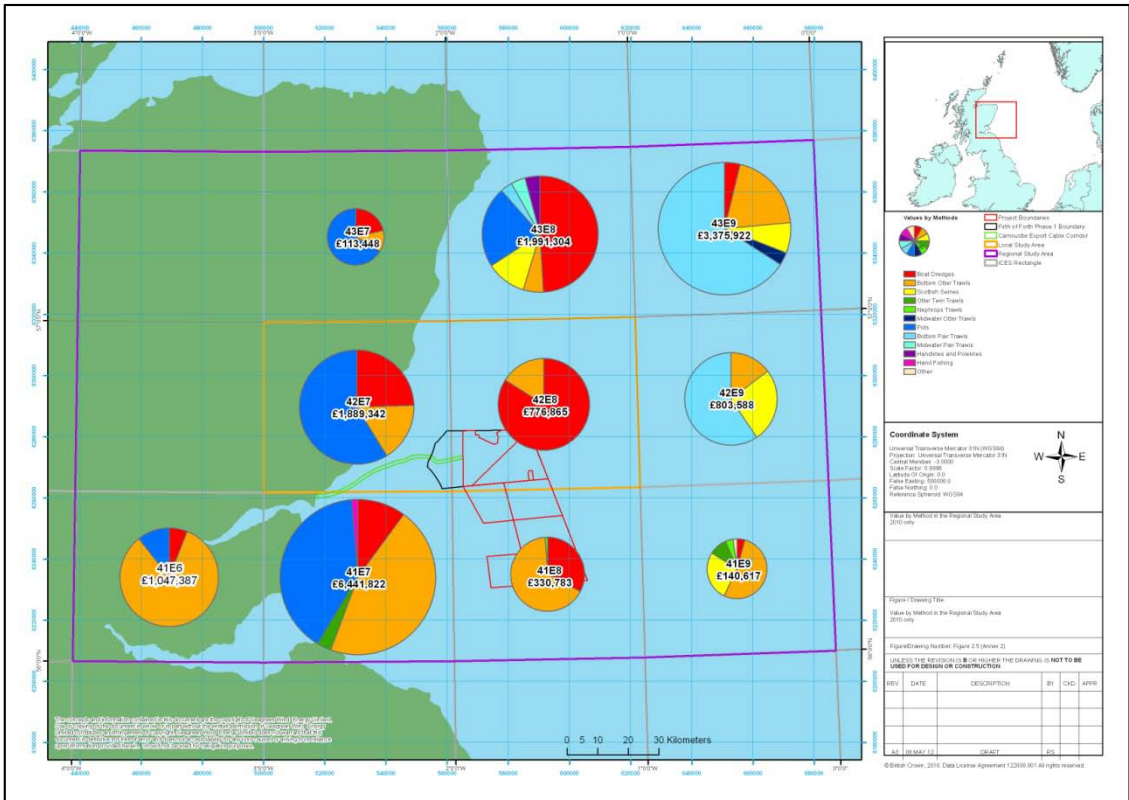


Figure 2.5 Landings values by methods (2010 only) in the regional study area

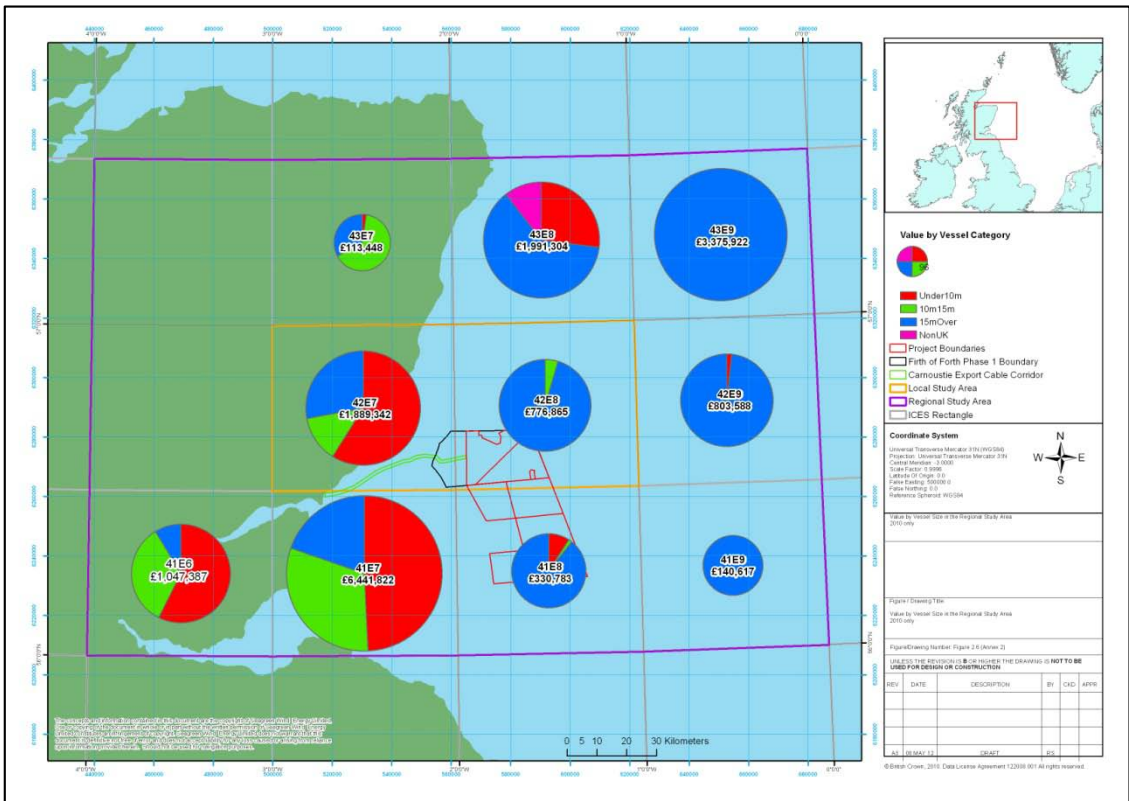


Figure 2.6 Landings values by vessel category (2010 only) in the regional area

2.1.3 Local Study Area (ICES Rectangles 42E8)

Figure 2.7 below shows that scallops represent the highest landings values in rectangle 42E8 (84% of the total). This is higher than average values previously recorded (78% of the total average landings values 2000 to 2009). Squid represents a significantly higher proportion of the total landings values than previously recorded (14% of the 2010 total, compared to 1.9% of the total average landings values 2000 to 2009).

As previously stated, Figure 2.8 indicates that boat dredges are the sole fishing method targeting king scallops. Bottom otter trawlers target both squid and nephrops although a small percentage target whitefish such as haddock and monks. Haddock are principally targeted by vessels operating Scottish seine nets.

Figure 2.9 illustrates that the majority of demersal otter trawlers, boat dredges and Scottish seine netters are over-15m in length. The increase in demersal trawlers between 10m and 15m from previous years (average 2000-2009) is likely due to the productive squid fishery in 2010.

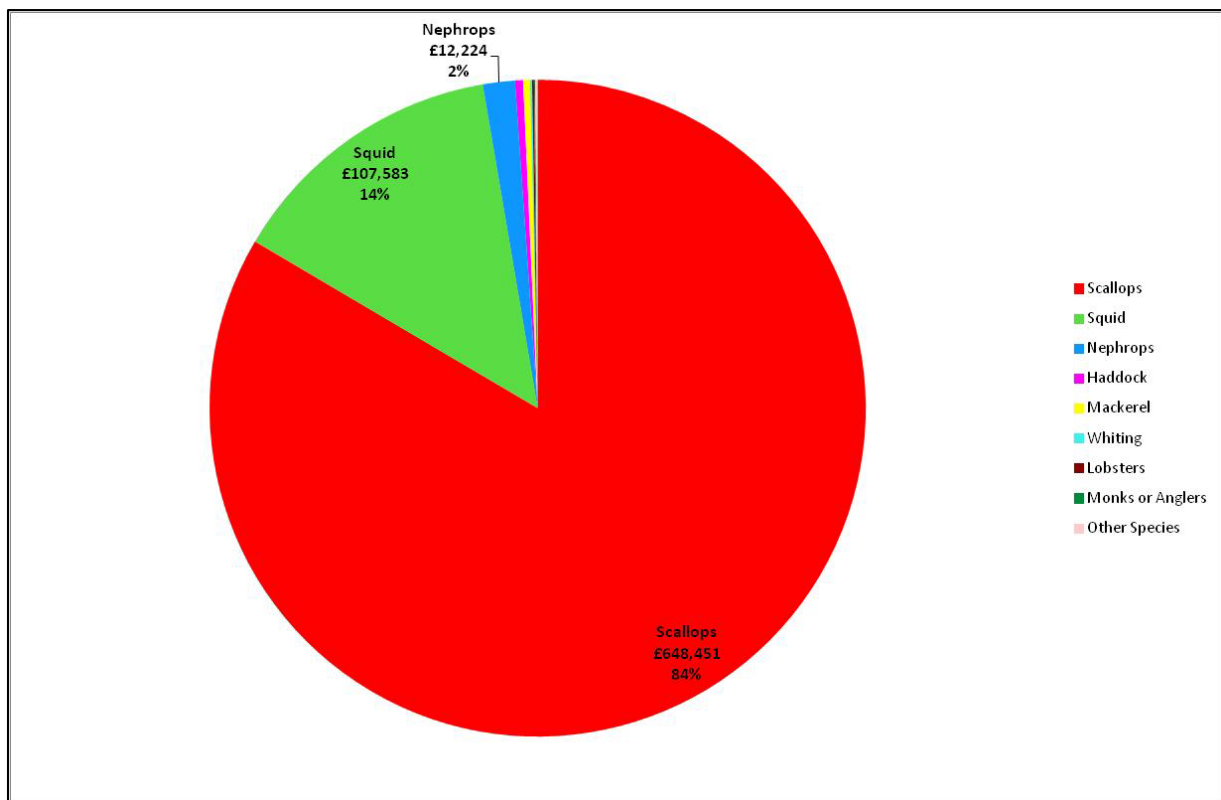


Figure 2.7 Percentage distribution of landings values by species in ICES rectangle 42E8

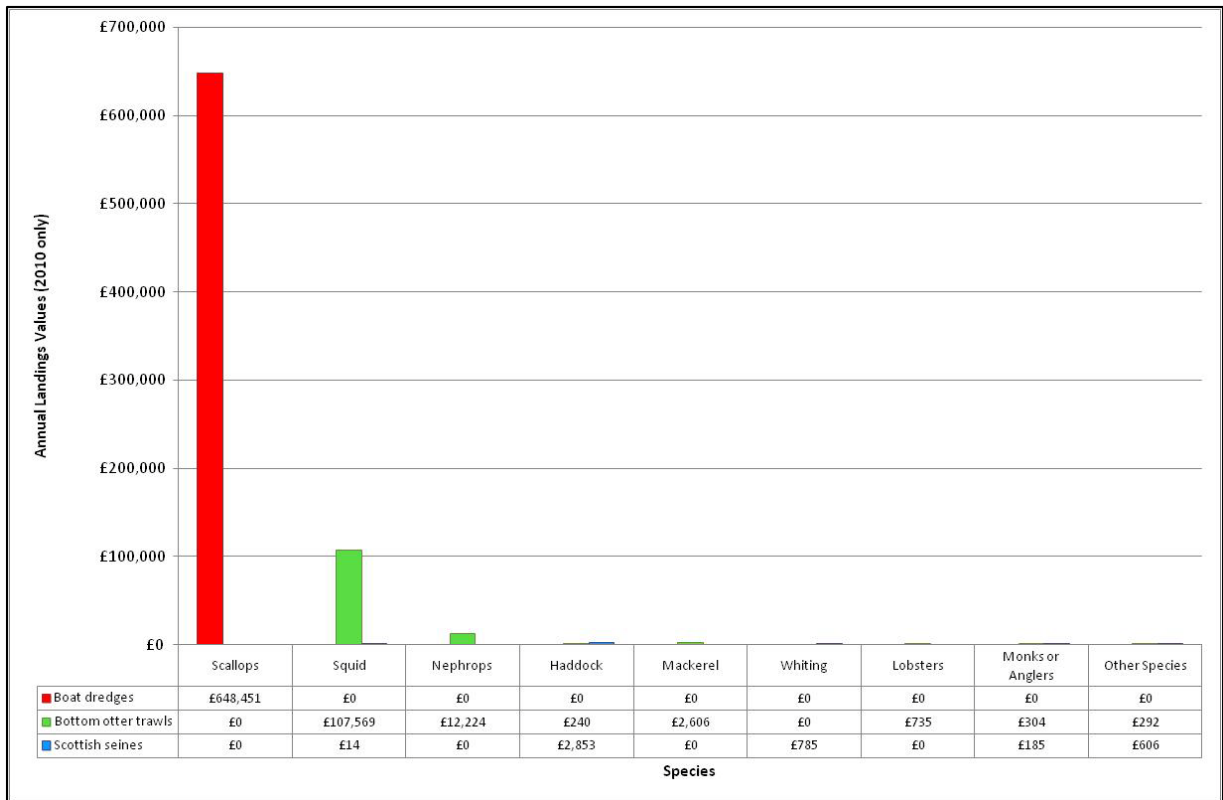


Figure 2.8 Annual landings values (2010 only) by species and methods in ICES rectangle 42E8

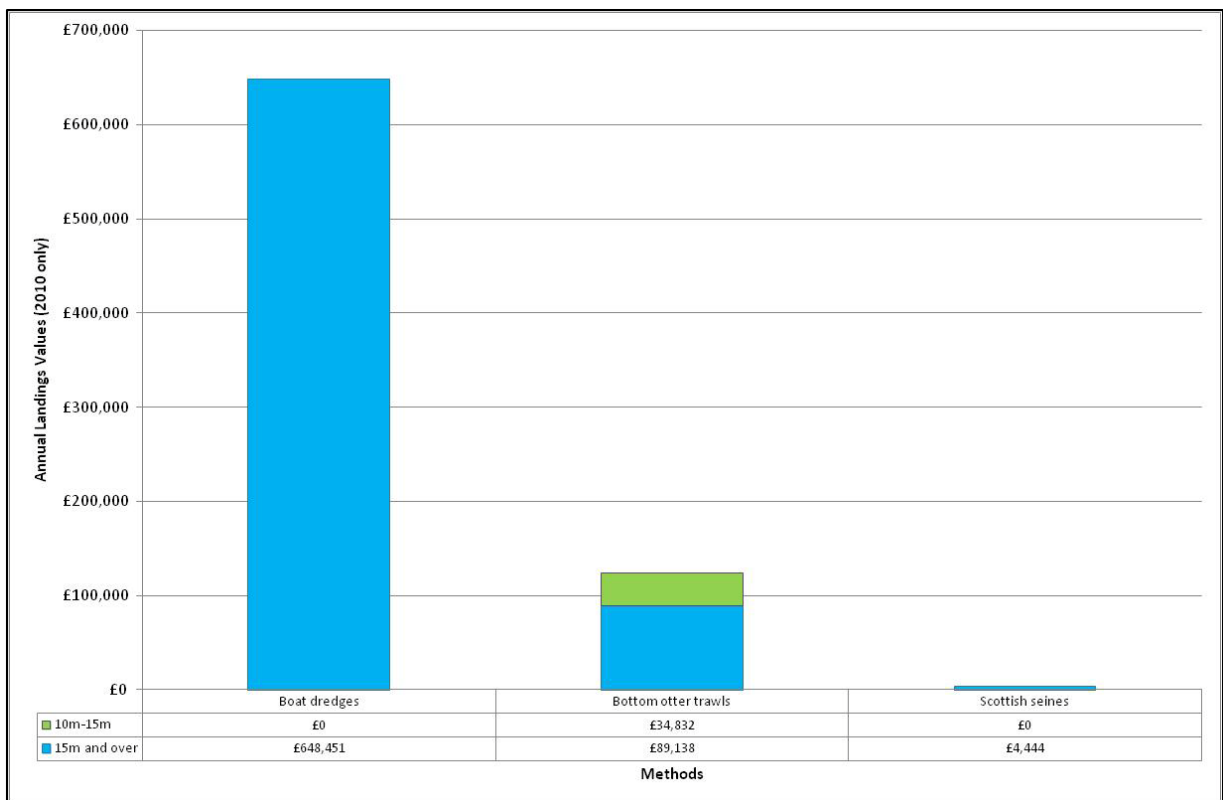


Figure 2.9 Annual landings values (2010 only) by methods and vessel lengths in ICES rectangle 42E8

2.1.3.1 Annual Landings

Figure 2.10 shows the annual variations in landings values by species. It can be seen that landings values in 2010 vary from previous years, principally being lower. Landings values of king scallops have increased slightly when compared to 2009, but are still lower than values recorded previously. Squid landings values have increased.

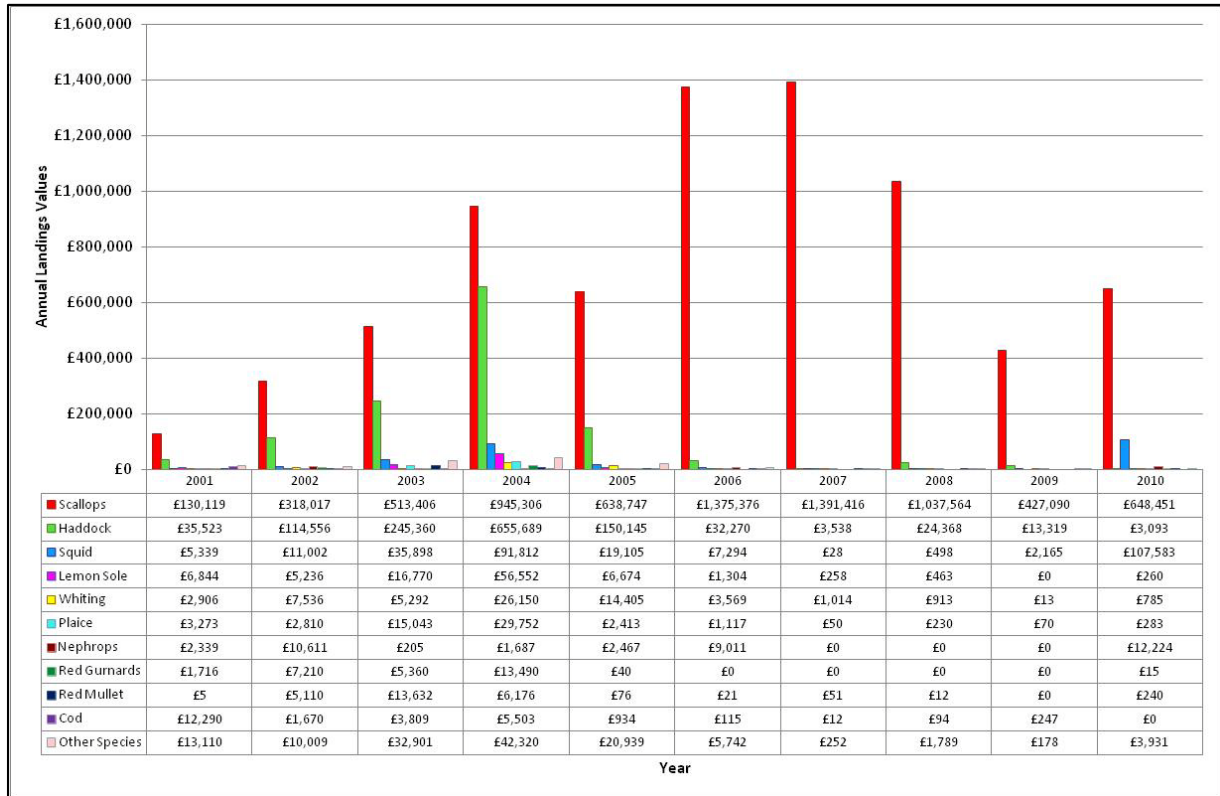


Figure 2.10 Annual variations in landings values of species in ICES rectangle 42E8

2.1.3.2 Seasonality

Figure 2.11 shows the seasonal trend of landings for all species in rectangle 42E8 during 2010. Landings are highest between April and September, inclusive, with moderate landings values recorded in February, March and October. The lowest landings values are recorded in January and December.

As with average landings previously recorded, scallops landings generally conform to the broad seasonality pattern of highest landings between April and September and lowest landings during the winter months. It should be noted however that May and July recorded relatively low scallop landings values in 2010. The squid fishery has become important in the Forth and Tay area with moderate values recorded during 2010. Squid landings values are recorded between August and November, inclusive. Low nephrops landings values were recorded in November 2010 which had not been recorded in the years previously.

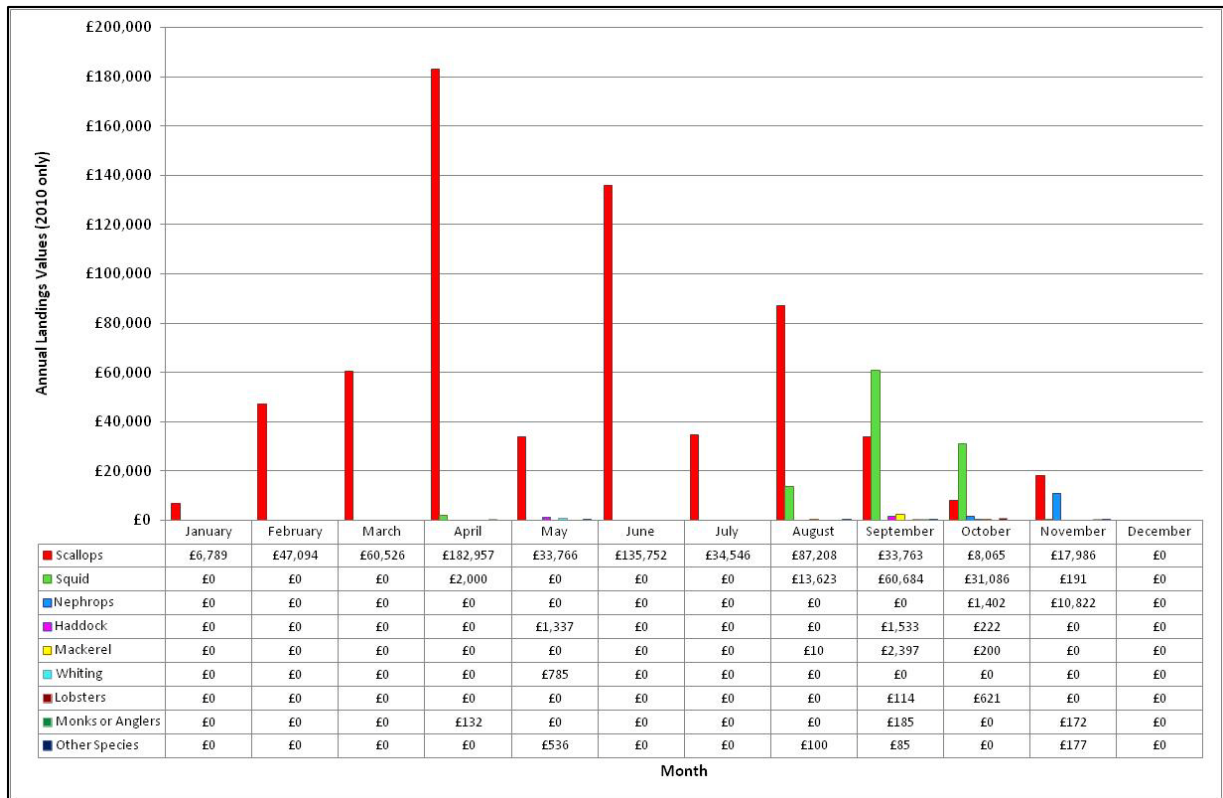


Figure 2.11 Annual (2010 only) seasonality of species in ICES rectangle 42E8

2.1.4 Landings Values by Port

Table 2.1 lists the top ports in the area by landings values from 42E8 in 2010 and the percentage of the ports' total 2010 income that this represents. As with previous years, the highest percentage of landings is into the port at Aberdeen (57.3%) and this represents 23.2% of the port's total annual income. The port of Montrose records lower percentages of the total landings values from 42E8 but landings from this rectangle contribute 13.8% of the total annual values.

Table 2.1 Top ports by landings values from ICES rectangle 42E8

Port	Annual Landings Values (£) in the Local Study Area (2010 only)	% of Annual Value in the Local Study Area	Total Annual Port Value (2010 only)	% of Total Annual Port Value that the Local Study Area represents
Aberdeen	£445,077	57.3%	£1,919,216	23.2%
Peterhead	£100,408	12.9%	£139,409,861	0.1%
Montrose	£76,104	9.8%	£552,992	13.8%
Fraserburgh	£66,955	8.6%	£44,771,952	0.1%
Buckie	£42,955	5.5%	£2,515,441	1.7%
Arbroath	£21,345	2.7%	£1,094,772	1.9%
Eyemouth	£13,872	1.8%	£2,447,998	0.6%
Gourdon	£5,780	0.7%	£354,913	1.6%
Burntisland	£2,347	0.3%	£84,110	2.8%
Pittenweem	£2,022	0.3%	£2,834,106	0.1%

2.2 Effort (Days at Sea)

2.2.1 Regional Overview

Figure 2.12 shows the annual effort in the regional study area by fishing method in 2010. It can be seen that the pattern is similar to that described for the landings values: demersal otter trawlers comprise the majority of the activity in the south of the study area. In coastal areas, with the exception of 41E6, potting constitutes the majority of fishing activity. The highest levels of boat dredging activity are recorded in central rectangles.

Figure 2.12 shows the annual effort in the regional study area by vessel category. Again, the pattern seen in the figure is similar to that described for the landings values. The majority of vessels in the regional study area are over-15m in length, with lower levels of activity undertaken by the 10m to 15m fleet. The majority of coastal activity is recorded by under-10m vessels.

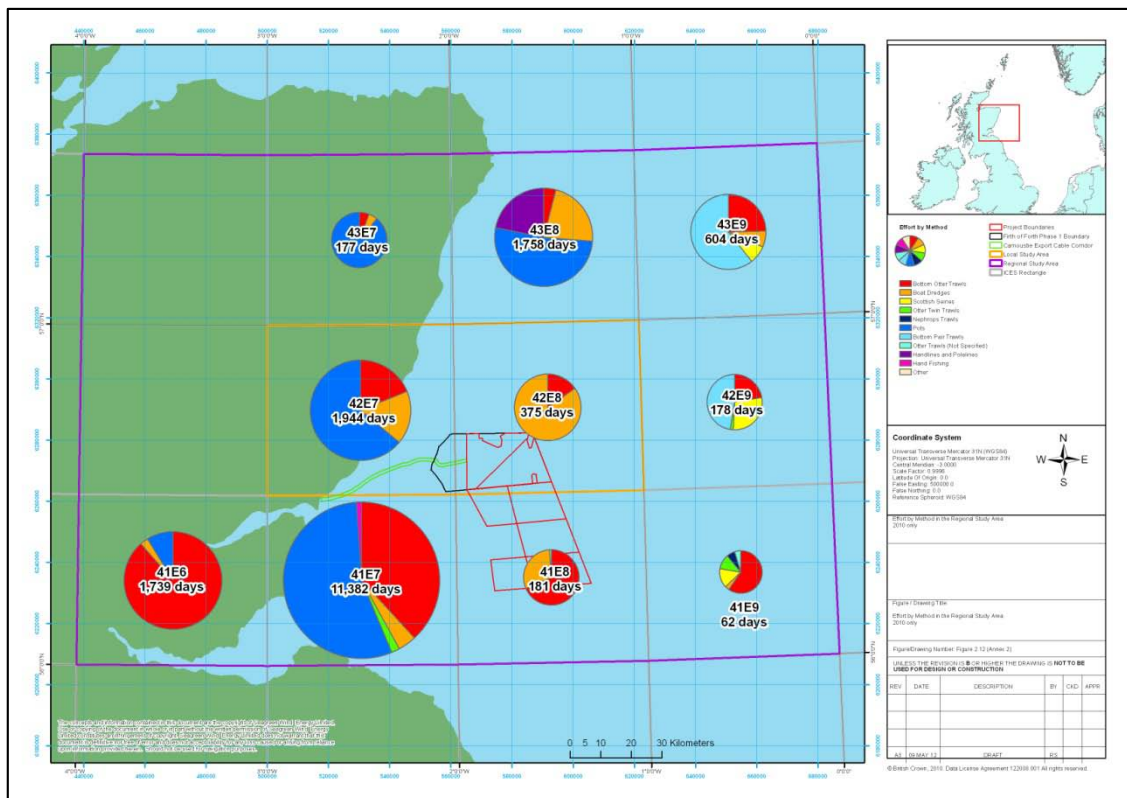


Figure 2.12 Effort (days at sea) by fishing method in the regional study area (2010 only)

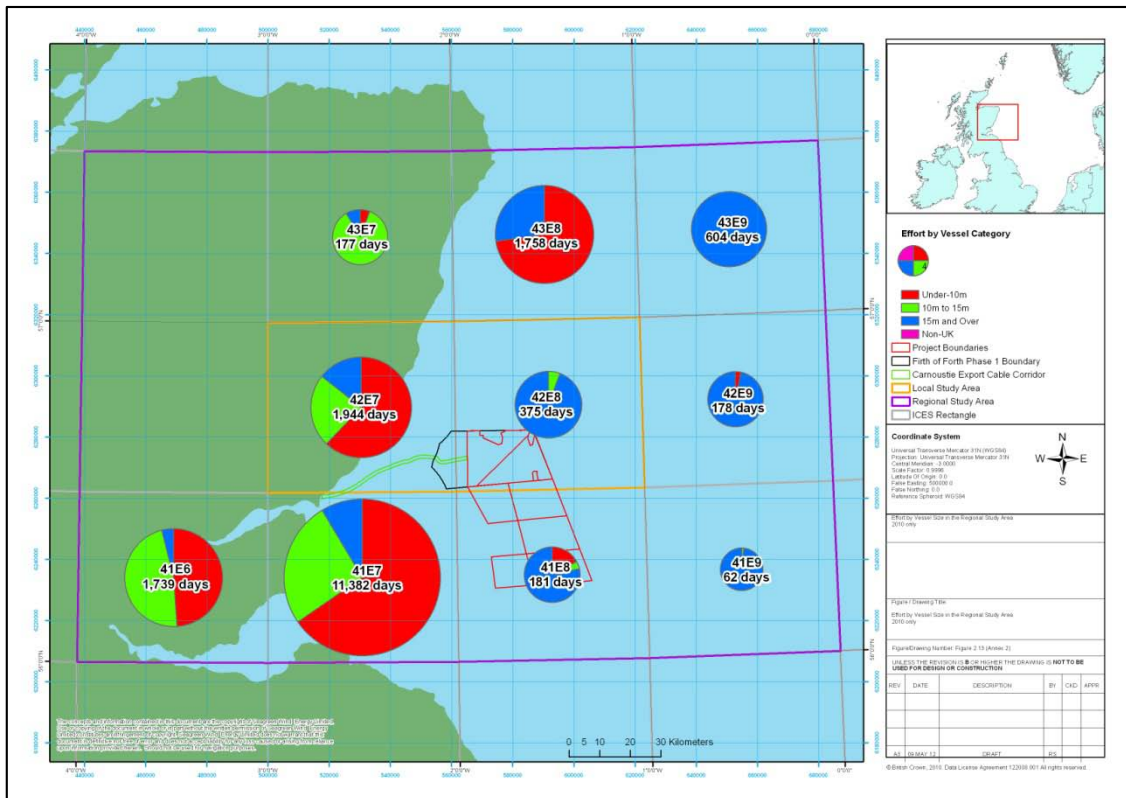


Figure 2.13 Effort (days at sea) by vessel category in the regional study area (2010 only)

2.2.2 Local Study Area (ICES Rectangle 42E8)

Figure 2.14 below shows the annual variations in effort (days fished) in 42E8. Effort in 2010 by the over-15m fleet has increased compared to 2009, but there is still an overall decline in activity by these vessels. Effort by the 10m to 15m and under-10m fleets has also shown an overall decline in activity.

Figure 2.15 shows the seasonality by effort in 42E8 during 2010. The effort is similar to the landings values described previously, with the highest landings values recorded between April and September, with a decline in recorded effort in May and July.

Table 2.2 lists the top ports by effort in rectangle 42E8 during 2010 and the percentage of the ports' total effort this represents. The data demonstrates similar patterns to the landings values data, with the highest percentage of effort made by vessels landing into Aberdeen (58.1%), representing 20.7% of the port's total effort. Vessels landing into the ports of Montrose however, contribute relatively low percentages of the effort in 42E8, but this effort represents 9.2% of the port's total effort.

Table 2.3 lists the effort made in 42E8 by each vessel category from each port over a ten year period. In 2010, the majority of the over-15m effort was recorded by vessels landing into Aberdeen, followed by Peterhead and Montrose. Effort by vessels that are 10m to 15m in length generally land into Arbroath.

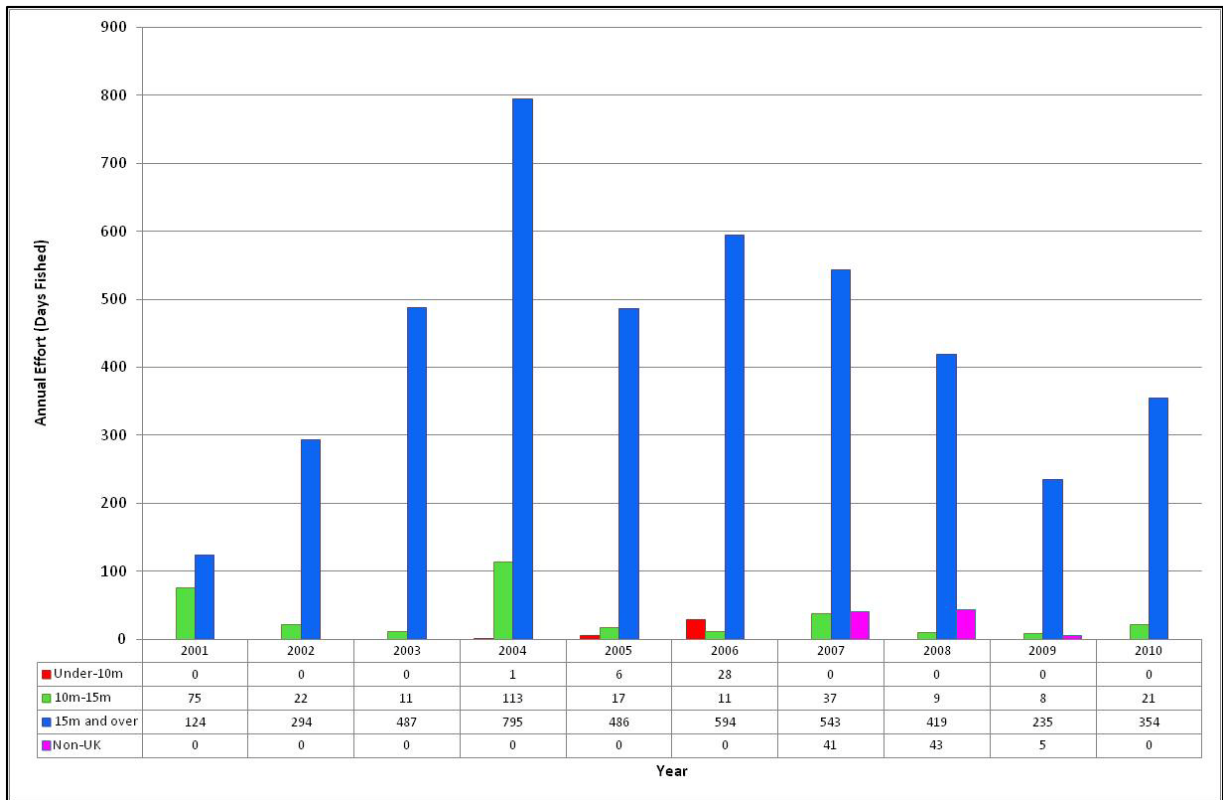


Figure 2.14 Annual variations in effort (days fished) by vessel category in ICES rectangle 42E8

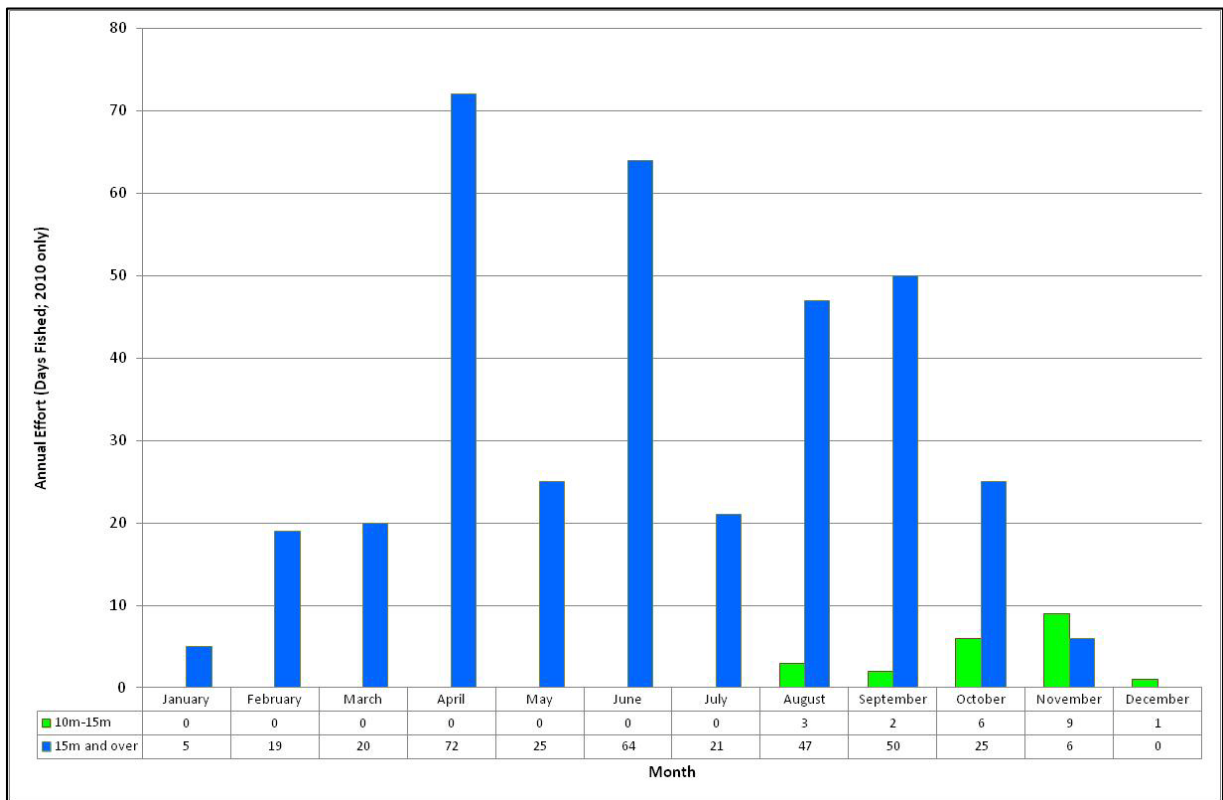


Figure 2.15 Annual (2010 only) seasonality by effort (days fished) and vessel category in ICES rectangle 42E8

Table 2.2 Top ports by effort (days fished) in ICES rectangle 42E8

Port	Annual Effort (Days Fished) in the Local Study Area (2010 only)	% of Annual Effort in the Local Study Area	Total Annual Port Effort (2010 only)	% of Total Annual Port Effort that the Local Study Area represents
Aberdeen	218	58.1%	1055	20.7%
Peterhead	45	12.0%	14339	0.3%
Montrose	35	9.3%	382	9.2%
Fraserburgh	29	7.7%	17844	0.2%
Arbroath	17	4.5%	1024	1.7%
Buckie	16	4.3%	1708	0.9%
Burntisland	5	1.3%	267	1.9%
Pittenweem	4	1.1%	5201	0.1%
Eyemouth	4	1.1%	2625	0.2%
Gourdon	2	0.5%	805	0.2%

Table 2.3 Annual effort (days fished) by port and vessel length in ICES rectangle 42E8

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	10 Year Average
15m and over											
Aberdeen	58	139	264	365	241	305	265	308	193	217	235.5
Arbroath	3	38	106	194	156	95	142	43	0	5	78.2
Peterhead	19	50	21	98	33	65	23	20	21	44	39.4
Eyemouth	22	30	64	109	12	15	2	2	0	4	26.0
Montrose	2	0	0	8	10	54	45	11	0	33	16.3
Buckie	6	20	6	7	6	30	25	13	11	15	13.9
Fraserburgh	7	4	25	9	17	11	13	4	9	29	12.8
Pittenweem	0	4	0	0	0	10	18	0	0	2	3.4
Macduff	0	0	0	3	6	9	6	0	0	0	2.4
Hartlepool	0	0	0	0	0	0	4	9	0	0	1.3
Other Ports	7	9	1	2	5	0	0	9	1	5	3.9
Total	124	294	487	795	486	594	543	419	235	354	433.1
10m-15m											
Gourdon	11	4	5	47	12	6	7	4	8	2	10.6
Stonehaven	61	17	1	7	0	0	0	0	0	0	8.6
Aberdeen	1	0	3	24	0	2	25	3	0	1	5.9
Eyemouth	0	0	0	26	0	0	0	1	0	0	2.7
Arbroath	0	1	0	0	2	3	0	0	0	12	1.8
Montrose	2	0	2	6	3	0	2	0	0	2	1.7
Amble	0	0	0	3	0	0	0	0	0	0	0.3
Fraserburgh	0	0	0	0	0	0	3	0	0	0	0.3
Pittenweem	0	0	0	0	0	0	0	0	0	2	0.2
Lerwick	0	0	0	0	0	0	0	1	0	0	0.1
Other Ports	0	0	0	0	0	0	0	0	0	2	0.2
Total	75	22	11	113	17	11	37	9	8	21	32.4
Under 10m											
Arbroath	0	0	0	0	0	22	0	0	0	0	2.2
Aberdeen	0	0	0	1	6	0	0	0	0	0	0.7
Pittenweem	0	0	0	0	0	6	0	0	0	0	0.6
Total	0	0	0	1	6	28	0	0	0	0	3.5
Non-UK											
Aberdeen	0	0	0	0	0	0	35	43	5	0	8.3
Peterhead	0	0	0	0	0	0	6	0	0	0	0.6
Total	0	0	0	0	0	0	41	43	5	0	8.9
Grand Total	199	316	498	909	509	633	621	471	248	375	477.9

3.0 MMO Fisheries Surveillance Sightings Data

Figure 4.1 and Figure 4.2 below give the positions of vessels identified by fisheries surveillance officers in the regional study area during 2010 by method and nationality, respectively. The sightings broadly corroborate with the analysis of the MMO data sets and satellite (VMS) densities: sightings are broadly concentrated in inshore areas; sightings are low in the local study area and within phase 1.

Within phase 1, two scallop dredgers and one potting vessel have been sighted.

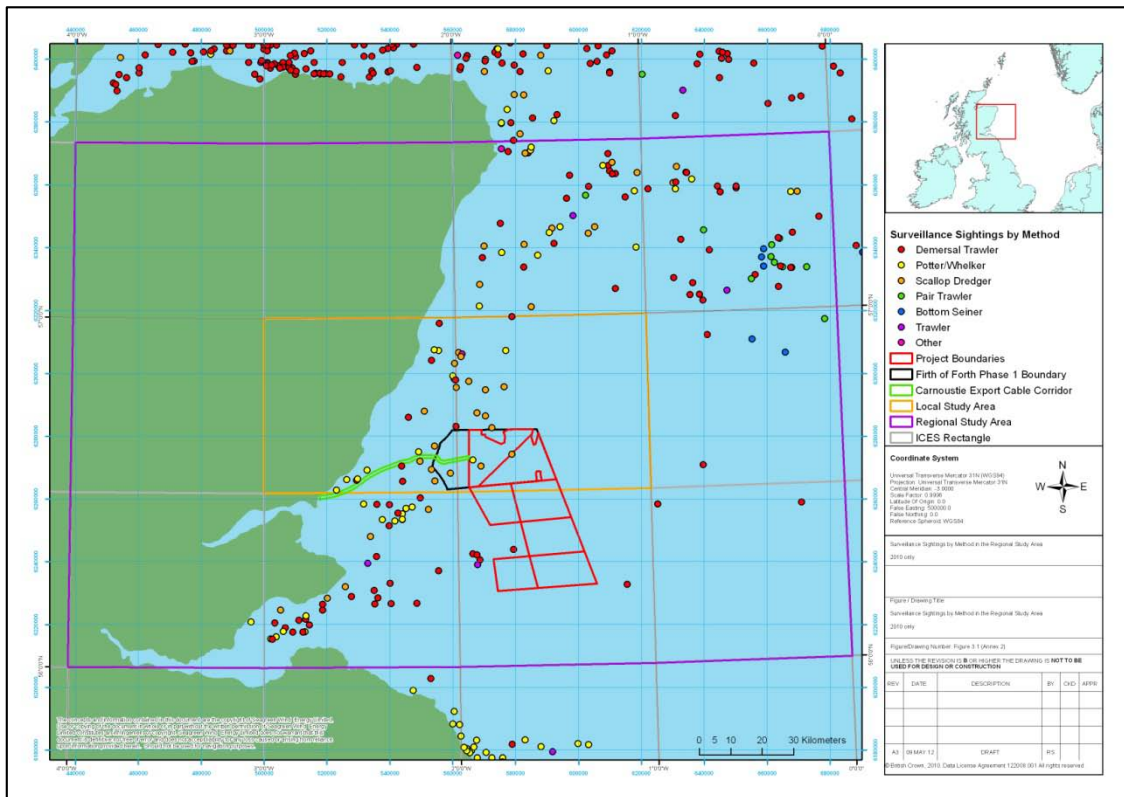


Figure 3.1 Surveillance sightings by method in the regional study area

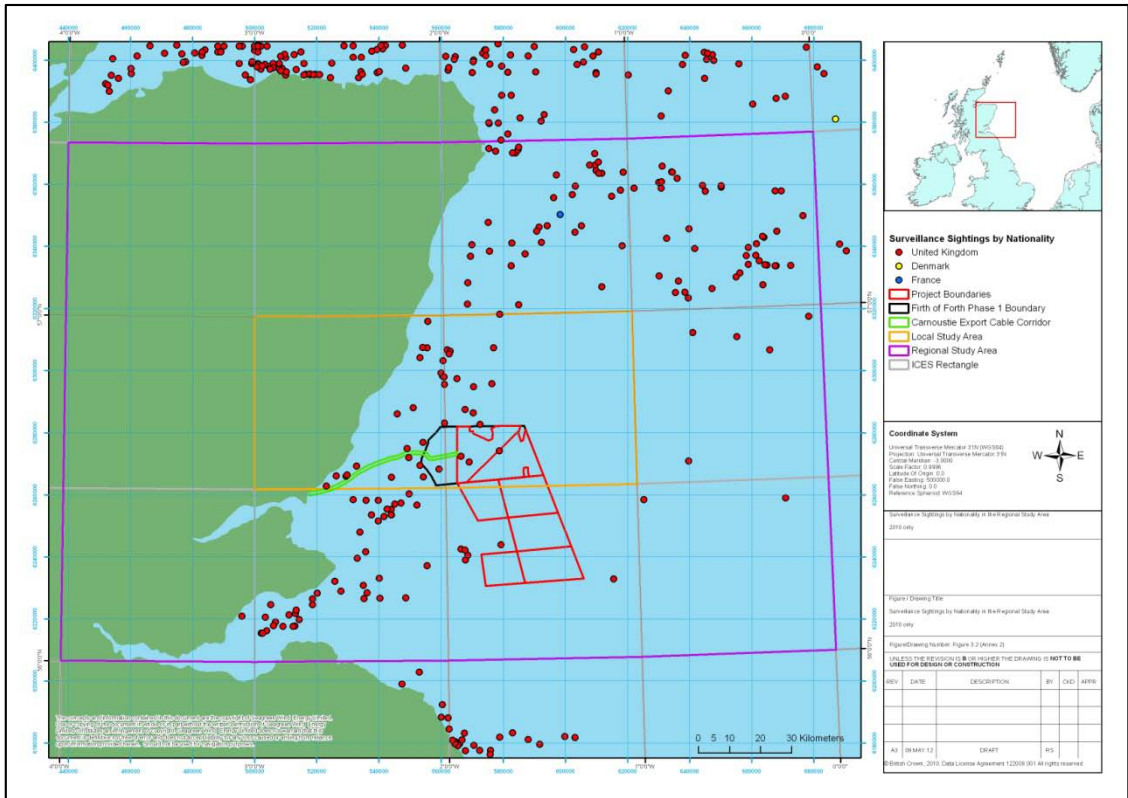


Figure 3.2 Surveillance sightings by nationality in the regional study area

4.0 MMO UK Satellite Tracking (VMS) Data

4.1 National Overview

Figure 3.1 to Figure 3.2 show the averaged VMS densities by landings and effort values for over-15 metre vessels (2007 to 2010). The dataset was not available in this format at the time of writing the Technical Report. The dataset cannot be broken down by individual year, or by gear type. Values and effort have however been integrated.

Figure 3.1 and Figure 3.2 show VMS densities in the national study area by value and effort, respectively. Figure 3.3 and Figure 3.4 show VMS densities in the regional study area by value and effort, respectively. It can be seen that phase 1 is located in an area of low to moderate activity. Areas of higher density are located in inshore areas and offshore to the north-east. There is also higher density activity along the west coast and in offshore areas in the north-west. It is of note that effort records proportionally higher densities than value in the area of phase 1.

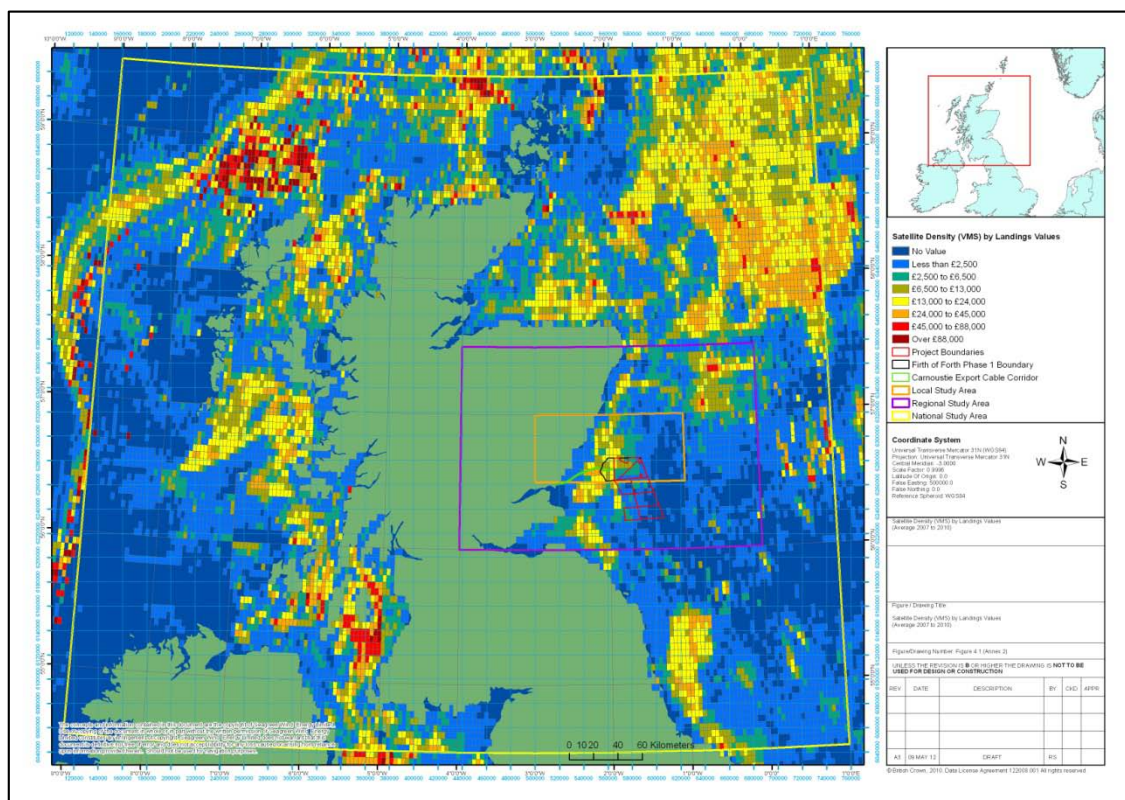


Figure 4.1 Satellite (VMS) density by landings values of all UK over-15 metre vessels (average 2007 to 2010)

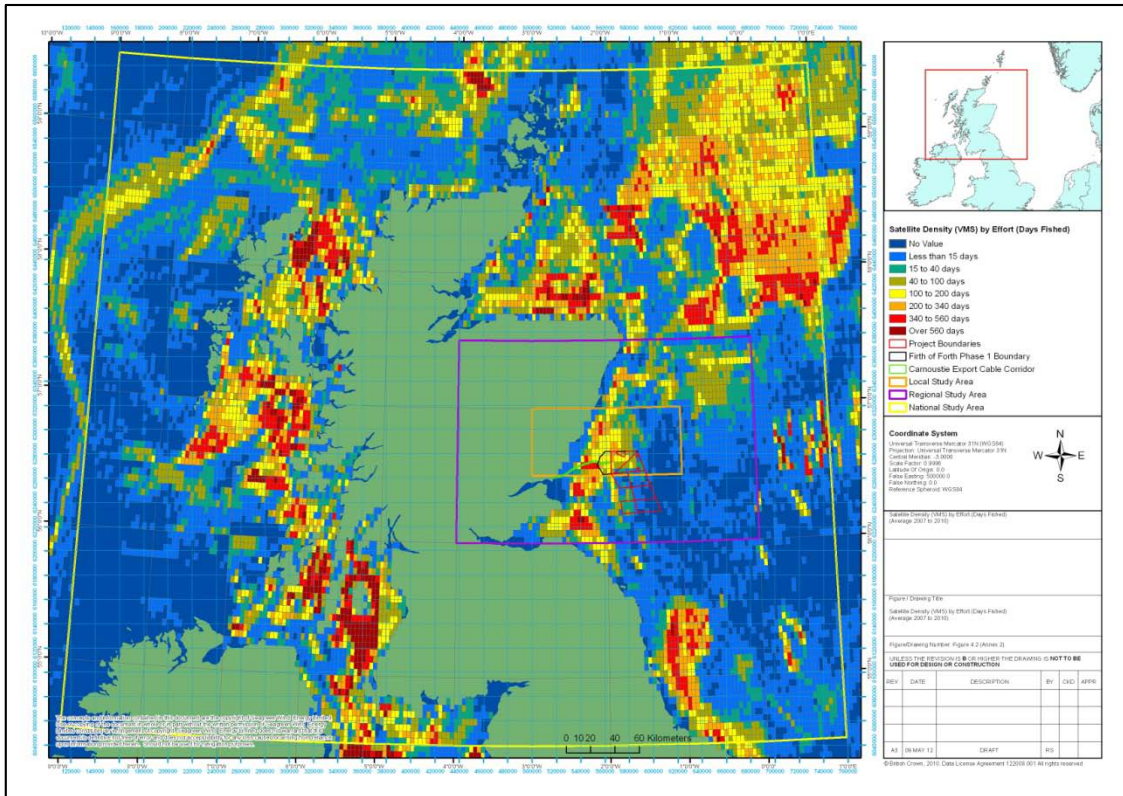


Figure 4.2 Satellite (VMS) density by effort (days fished) of all UK over-15 metre vessels (average 2007 to 2010)

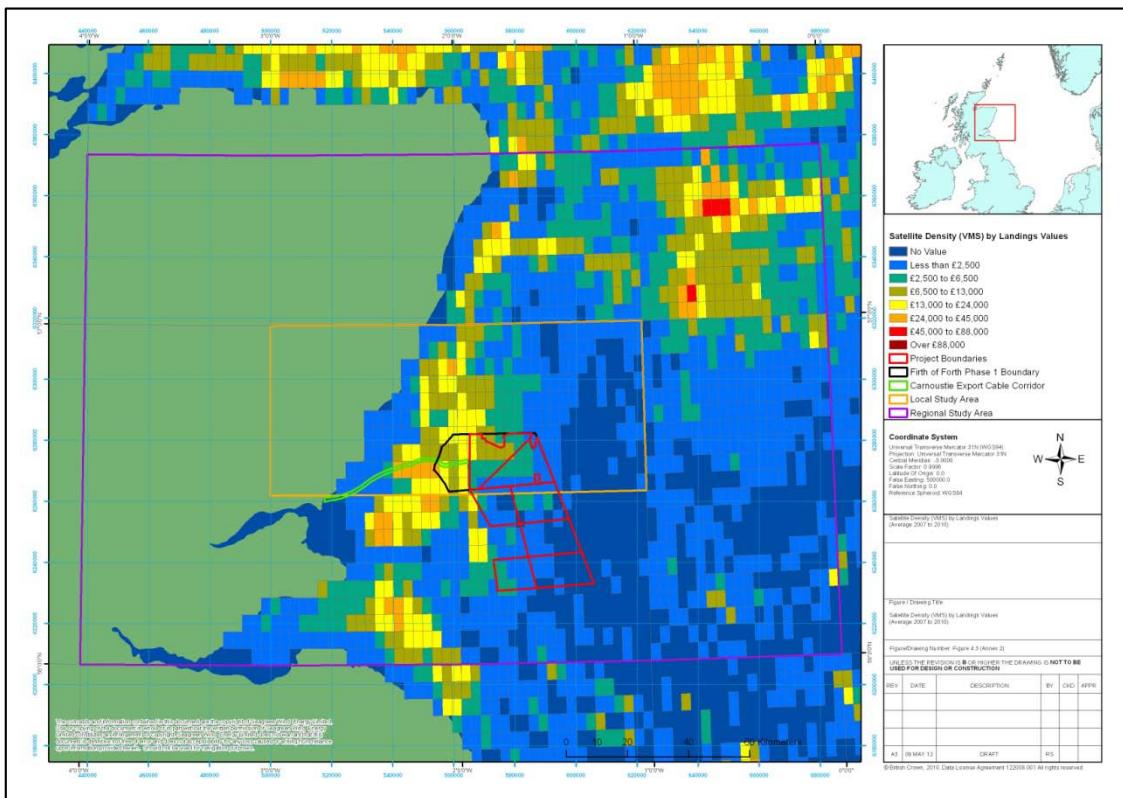


Figure 4.3 Satellite (VMS) density by landings values of all UK over-15 metre vessels (average 2007 to 2010) in the regional study area

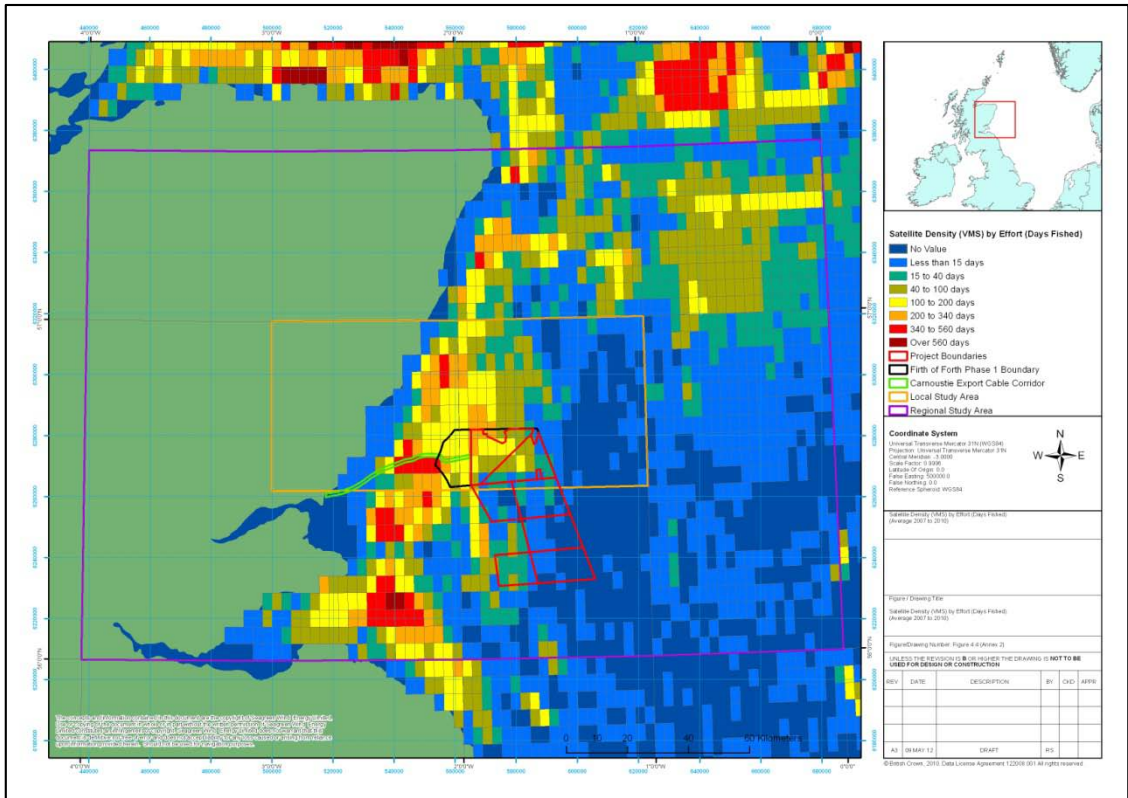


Figure 4.4 Satellite (VMS) density by effort (days fished) of all UK over-15 metre vessels (average 2007 to 2010) in the regional study area

5.0 Marine Scotland Data Analysis

The following charts have been derived by Marine Scotland Science and provided to BMM to assist in the establishment of a commercial fisheries baseline in the Moray Firth area. The dataset was not available in this format at the time of writing the Technical Report.

Figure 5.1 to Figure 5.3 show the distribution of commercial fisheries activity in the Moray Firth for over-15m UK vessels between 2007 and 2009, respectively. It can be seen that the pattern of activity is similar to that described in the Technical Report, with scallops targeted in central areas including within phase 1. Vessels targeting squid and nephrops operate in grounds inshore and in the south east of the study area. Relatively low levels of demersal activity are recorded offshore.

Figure 5.4 shows the distribution of commercial fisheries activity in the Forth and Tay area in 2010. It can be seen that the distribution of vessels targeting scallops, nephrops and demersal whitefish remain consistent with previous years, although there has been a decline in scallop and whitefish landings. Vessels targeting squid operate in a wider area, including with phase 1. There has also been an increase in pelagic landings values, generally in central areas, including within phase 1. Further consultation has attributed this to by-catch of mackerel in the squid fishery.

Figure 5.5, Figure 5.6 and Figure 5.7 show the distribution of commercial fisheries activity in the Forth and Tay area in 2010 for vessels targeting scallops, nephrops and squid, respectively. It can be seen that the majority of vessels targeting scallops are located in the north of the Forth and Tay area, including within phase 1 and along the eastern section of the export cable corridor. Nephrops are targeted in the south of the Forth and Tay area, outwith of phase 1 and in an area away from the export cable corridor. Squid are targeted throughout the Forth and Tay area, including within phase 1 and along the export cable corridor.

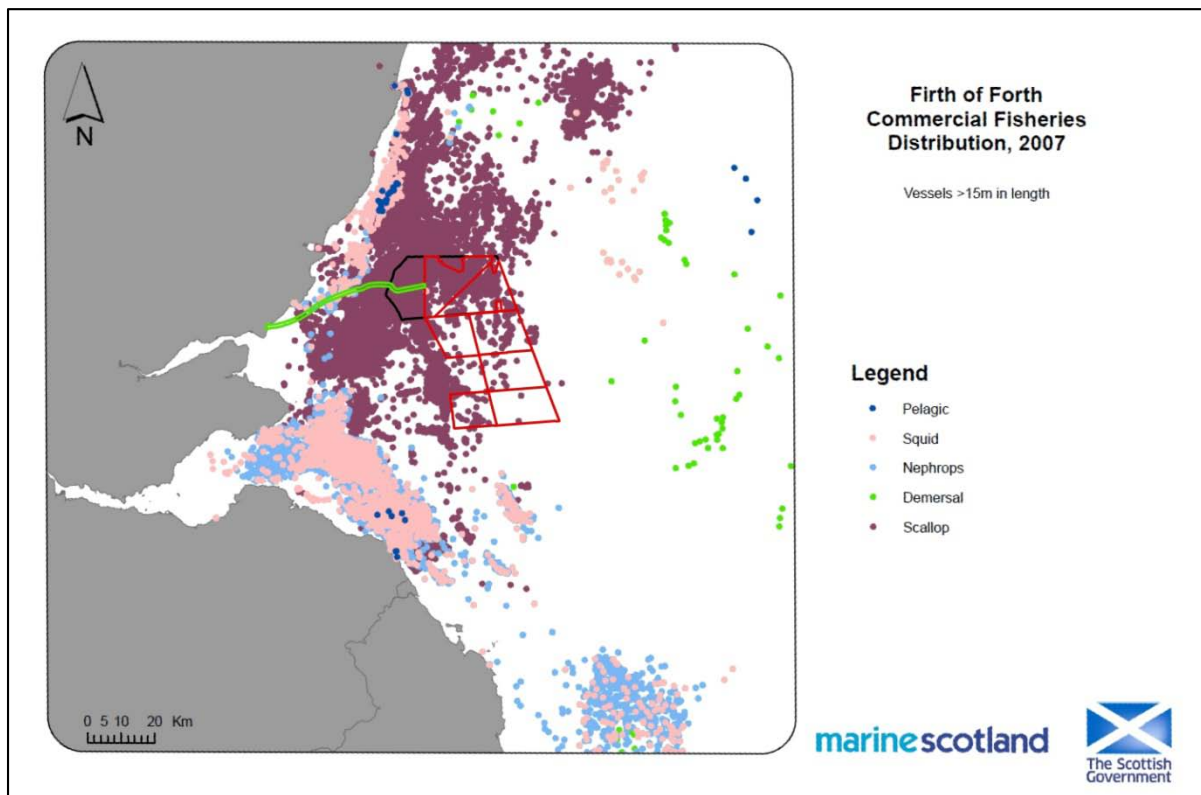


Figure 5.1 Commercial fisheries distribution for over-15 metre vessels, 2007

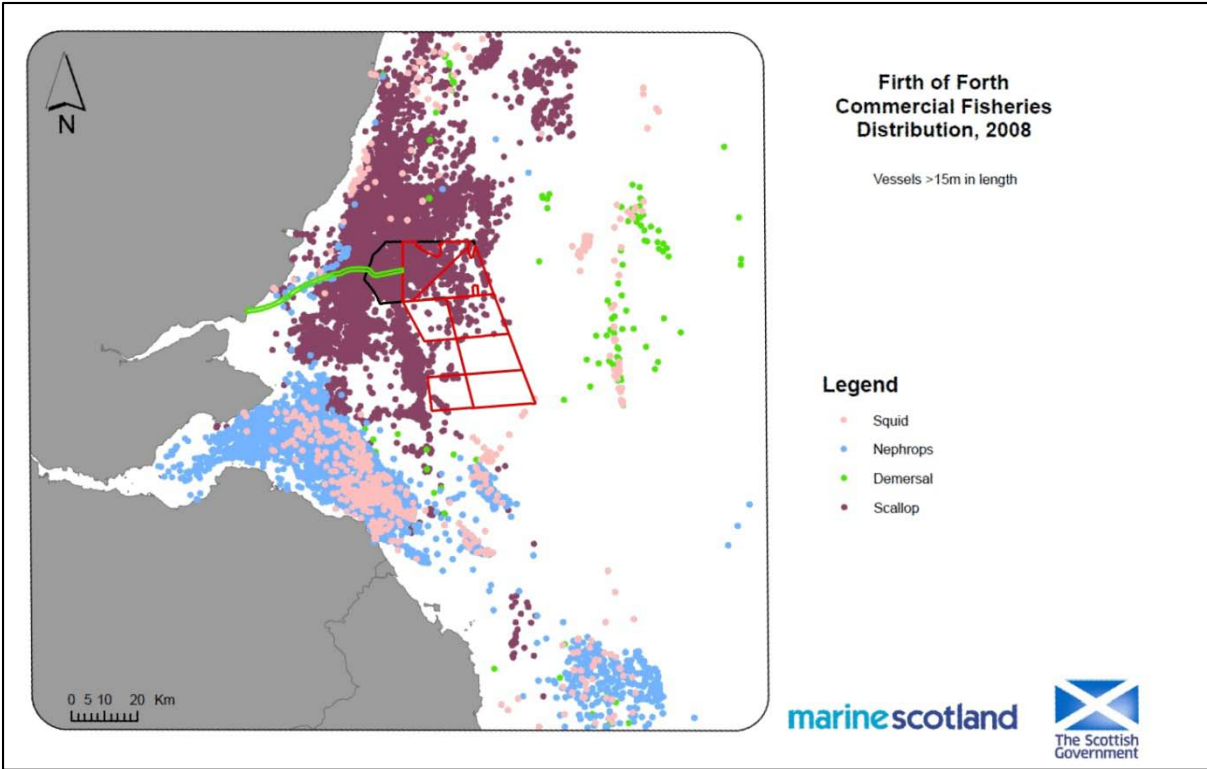


Figure 5.2 Commercial fisheries distribution for over-15 metre vessels, 2008

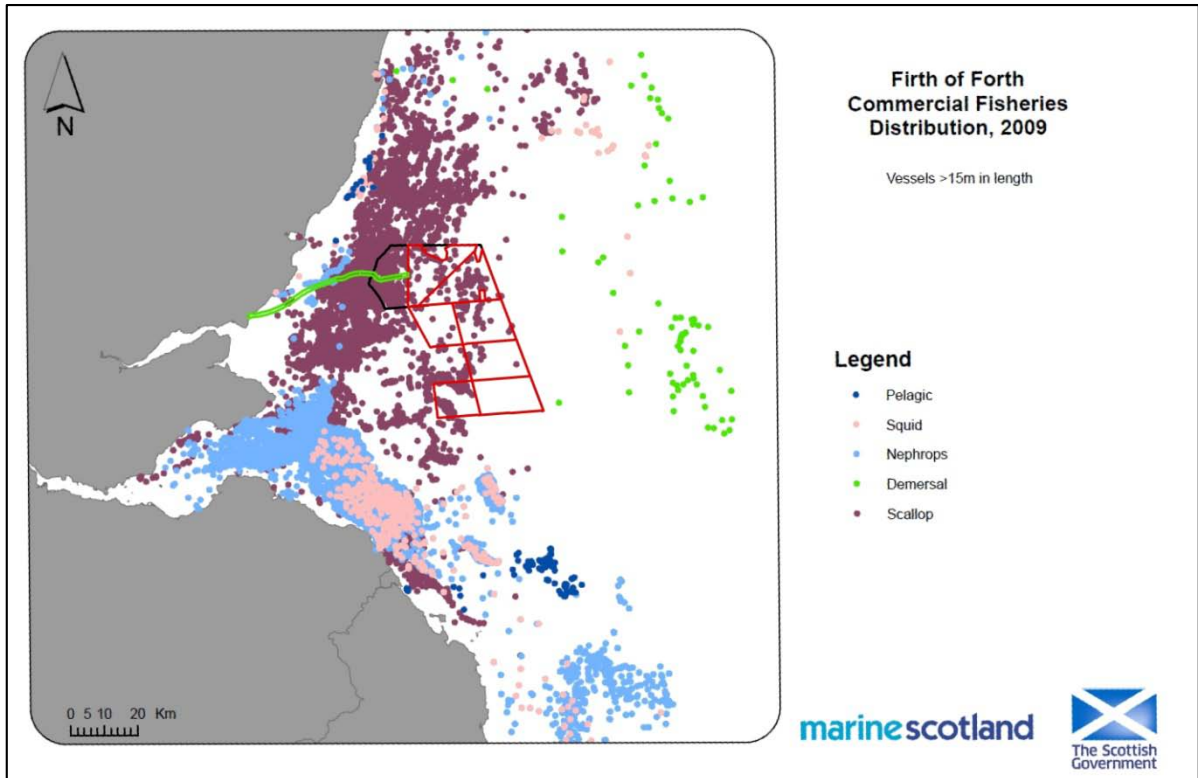


Figure 5.3 Commercial fisheries distribution for over-15 metre vessels, 2009

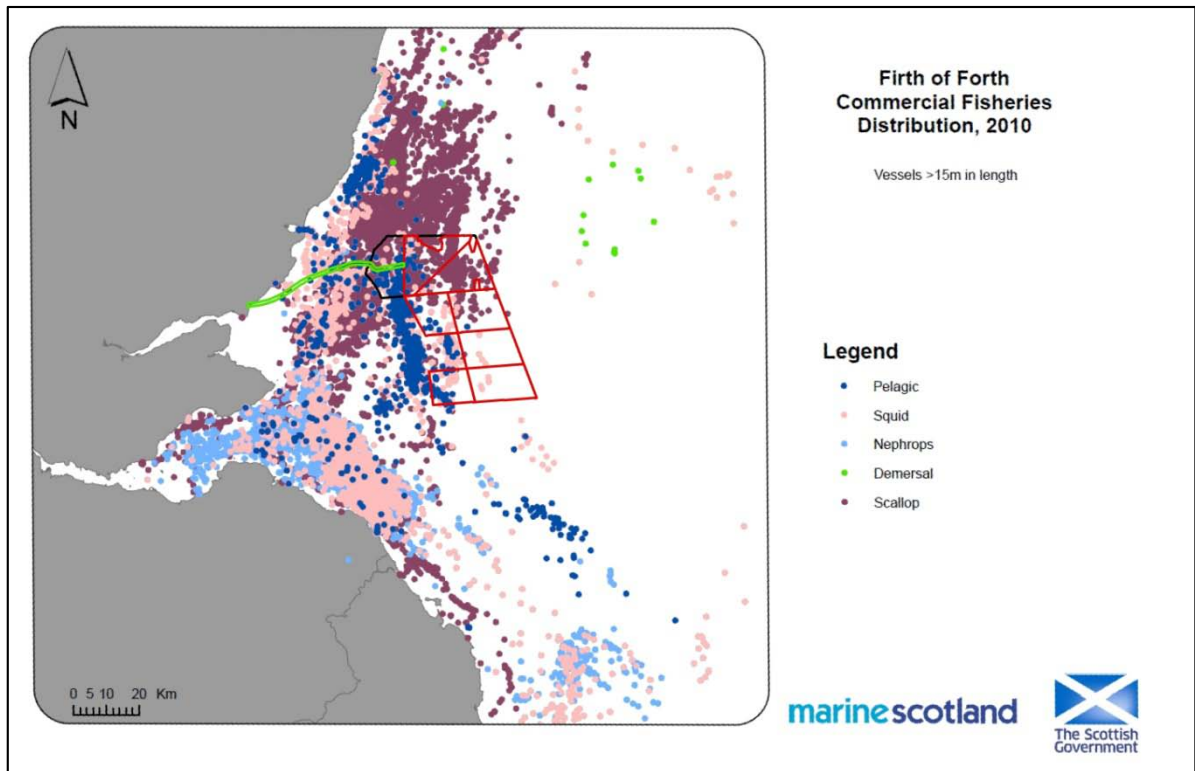


Figure 5.4 Commercial fisheries distribution for over-15 metre vessels, 2010

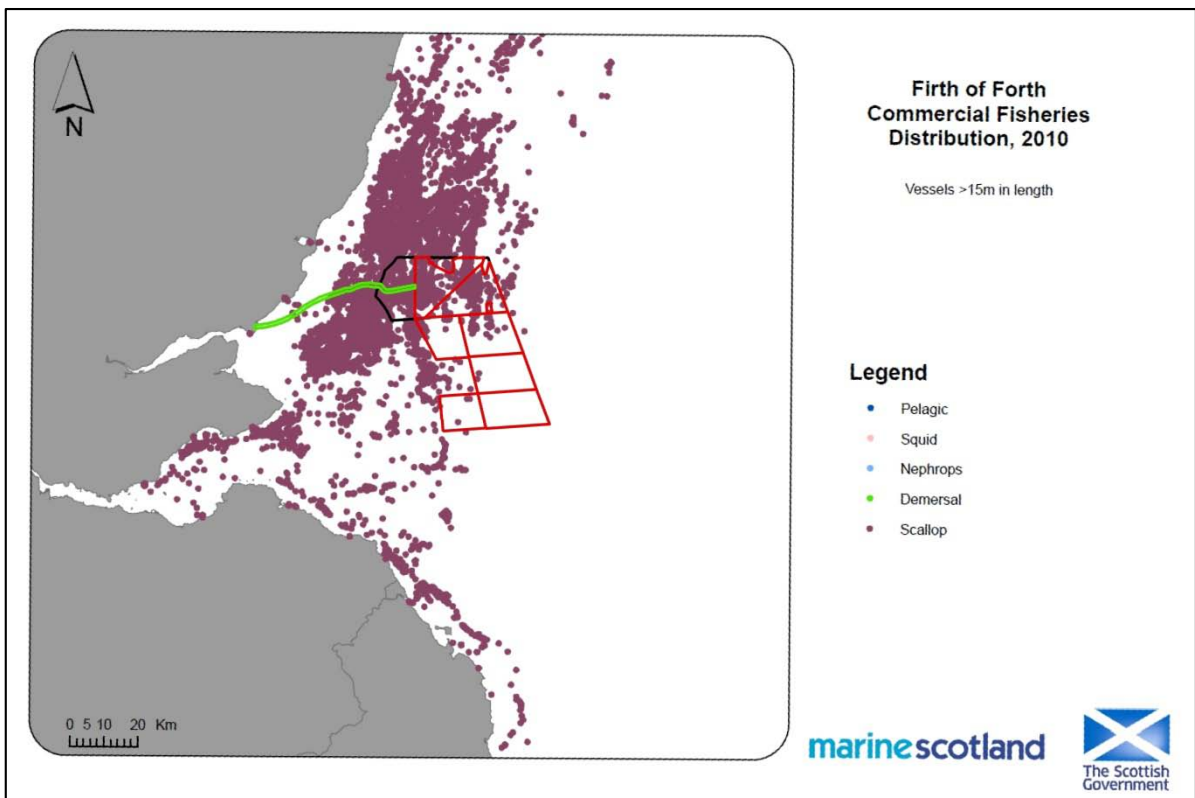


Figure 5.5 Commercial fisheries distribution for over-15 metre scallop dredging vessels, 2010

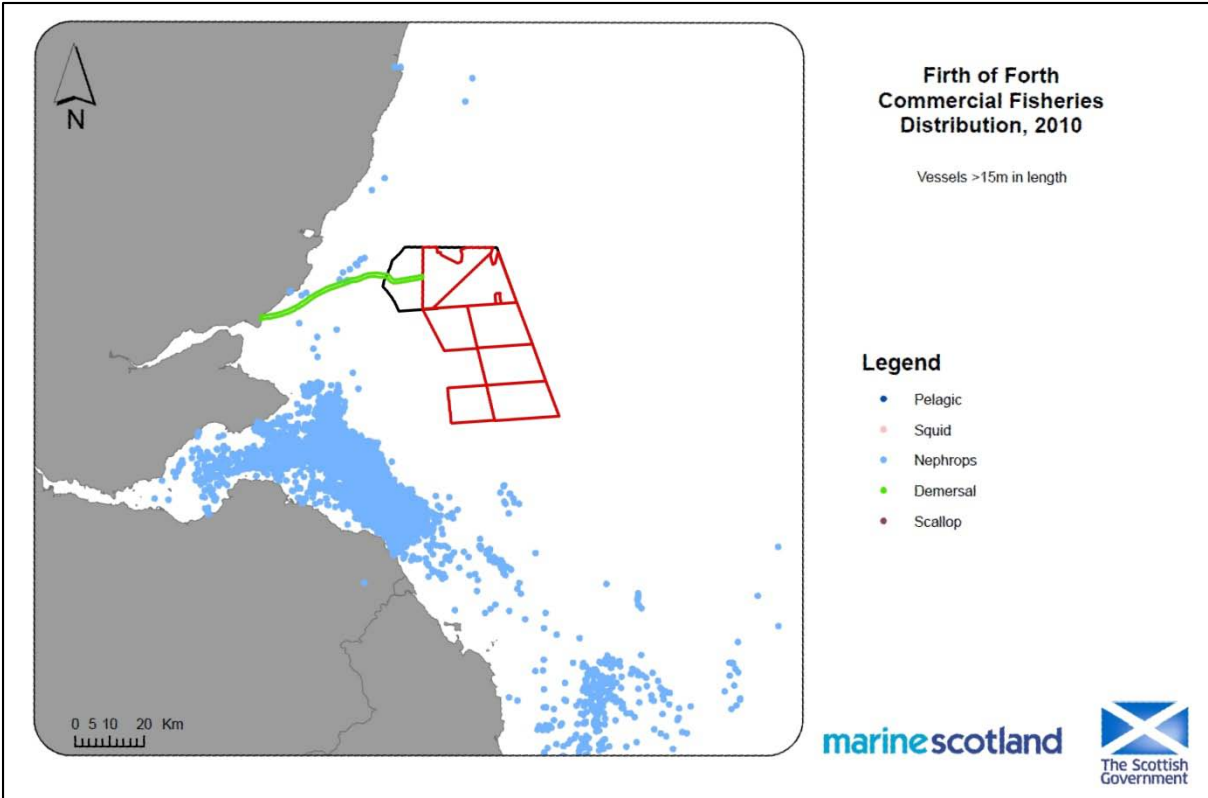


Figure 5.6 Commercial fisheries distribution for over-15 metre nephrops trawl vessels, 2010

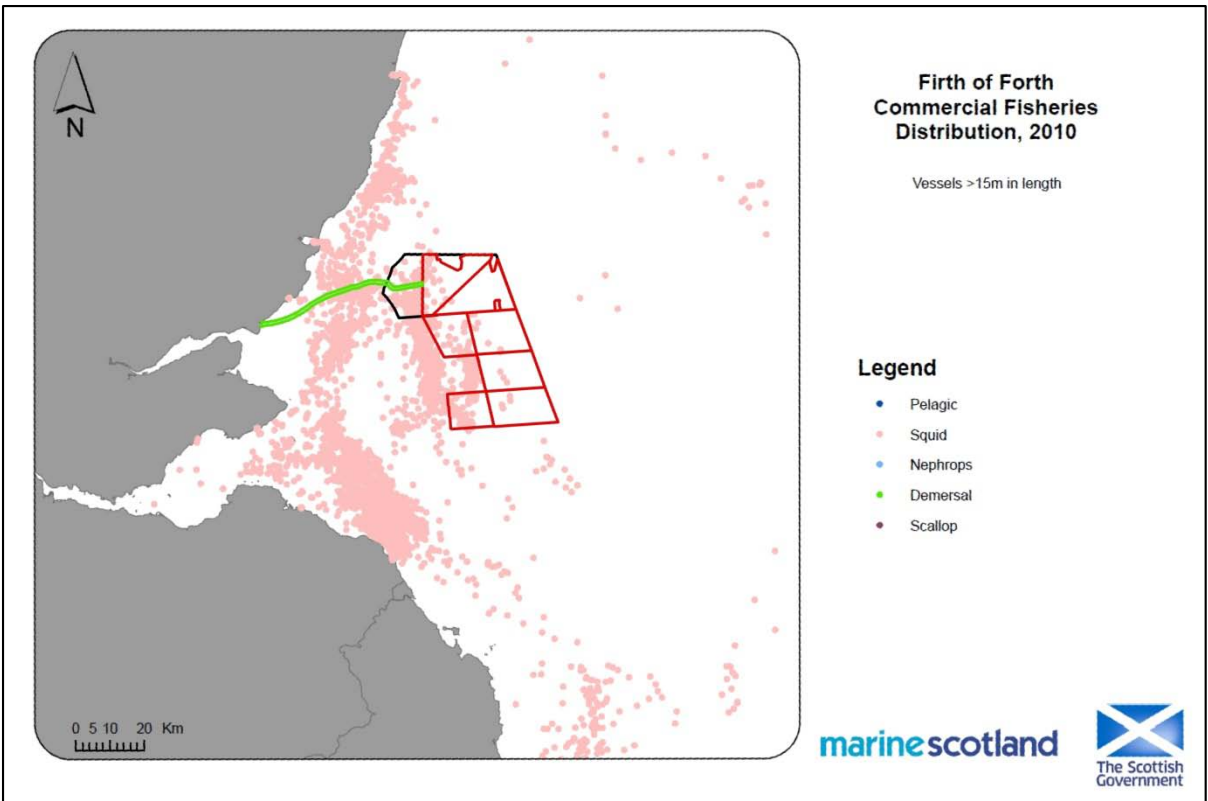


Figure 5.7 Commercial fisheries distribution for over-15 metre squid trawl vessels, 2010

6.0 Vessels

6.1 Visiting Scallop Vessels

Figure 6.1 below shows the distribution of scallop landings by value around the UK during 2010. It can be seen that although scallop landings values in rectangle 42E8 have declined slightly compared to previous years, they are still comparable to moderately important grounds around the UK.

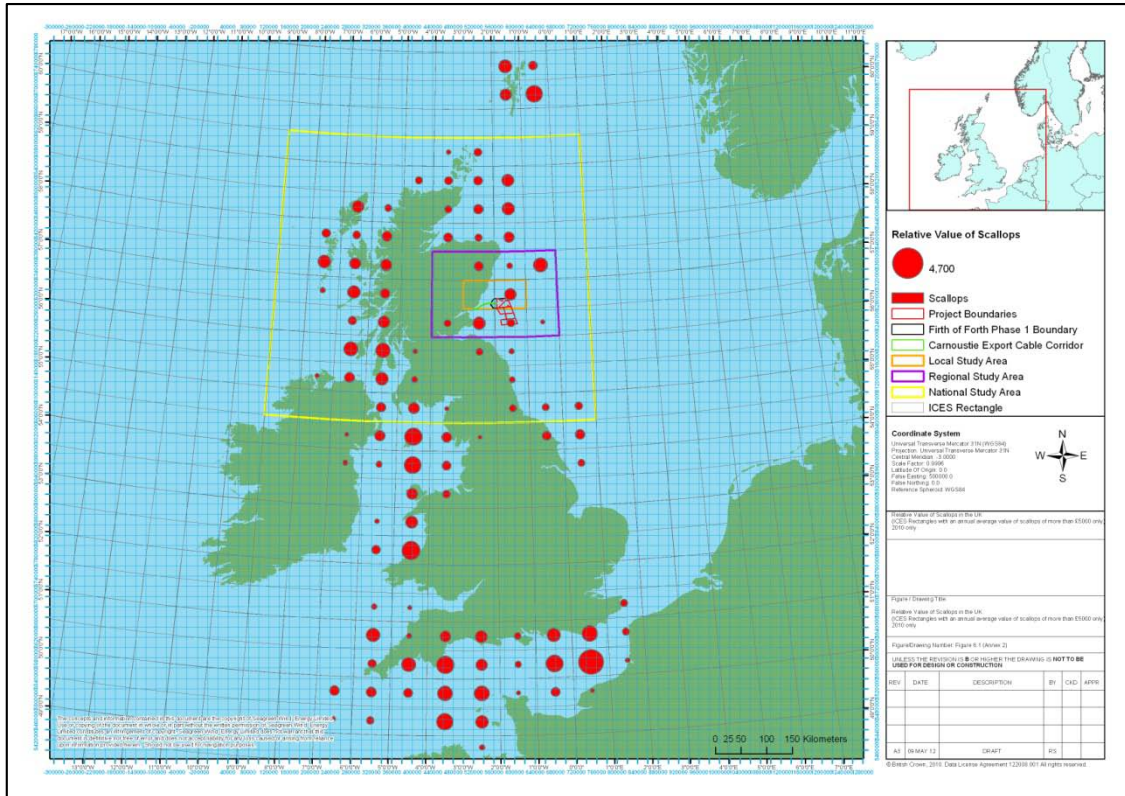


Figure 6.1 Scallop Landings by value (£) in the UK (2010 only)