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Glossary

10 - 15 metre	Category of fishing vessels that is between 10 and 15 metres in length.
12 nm limit	Territorial waters of European Union (EU) Member States extend to 12 nm. The coastal Member State manages these waters exclusively within the limits.
Baseline	Existing environmental conditions
Creeling	The Scottish designation for potting, also referred to as static gear. The use of small cages or baskets to capture shellfish such as crabs or lobster.
Demersal	Fishing activities or species located near or on the seabed.
Electrofishing	Fishing method which uses direct current electricity to affect the movement of the fish. The electric field stuns clams causing them to emerge from their burrows.
ICES rectangle	ICES rectangles create a grid dividing up the earth's surface. Each ICES statistical rectangle is '30 min latitude by 1° longitude which is approximately 30 x 30 nautical miles. The average area of a rectangle in Scottish waters of 940 nm^2.
Over-15 metres	Category of fishing vessels that are greater than 15 metres in length.
Quota	A measure of the quantity of a species that can legally be landed within a set period as determined through the Common Fisheries Policy.
Rockhoppers	Heavy gear type used in demersal trawling. Enable the trawl to be towed on very rough bottoms.
Substrate	An underlying surface or layer.
Territorial waters	0-12 nautical miles from the coast baseline
Under-10 metre	Category of fishing vessels that are less than 10 metres in length.

Abbreviations and Acronyms

CCS	Conservation Credits Scheme
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CFP	Common Fisheries Policy
Defra	Department for Environment, Food and Rural Affairs
DFO	District Fishery Officer
EC	European Commission
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
FIN	Fisheries Information Network
ICES	International Council for the Exploration of the Sea
IFG	Inshore Fisheries Group
MLS	Minimum Landing Size
MMO	Marine Management Organisation
MPA	Marine Protected Area
MSS	Marine Scotland Science
nm	Nautical mile
REM	Remote electronic monitoring
SFF	Scottish Fishermen's Federation
SI	Statutory Instrument
TAC	Total Allowable Catch
TCE	The Crown Estate
UKFIM	UK Fisheries Information Mapping
VMS	Vessel Monitoring System

14A Commercial Fisheries Baseline

14A.1 Introduction

1 This document provides commercial fishing baseline data that will be used to support the commercial fisheries Environmental Impact Assessment (EIA) (*Chapter 14*) for the Inch Cape Wind Farm and it's Offshore Transmission Works (the Development). This document covers commercial fisheries; salmon and seatrout fisheries are covered in a separate baseline in *Appendix 14B: Salmon and Seatrout baseline technical report*.

2 This document covers baseline data for the time period 2011-2016 and updates the baseline collected for the Inch Cape 2013 Environmental Statement (ES), which covered the time period 2001-2010. The need to update the baseline arises from the requirement for the assessment to be based on the most recent 5 years' worth of fisheries data (at the time of writing this was 2011 to 2016) in line with standard practice (Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2012). This will ensure that the latest trends in fishing activity are taken into account, as fishing activities are not constant and may change over time.

3 This baseline covers a 6 year time period in order to provide continuity between the two baseline documents. For scallops 10 years are examined in order to allow a greater understanding of changing fishing patterns. For this reason the previous baseline appendix for the Development Area (taken from the Inch Cape 2013 ES) is also provided in a separate appendix (*Appendix 14C: Commercial Fisheries Baseline Development Area*).

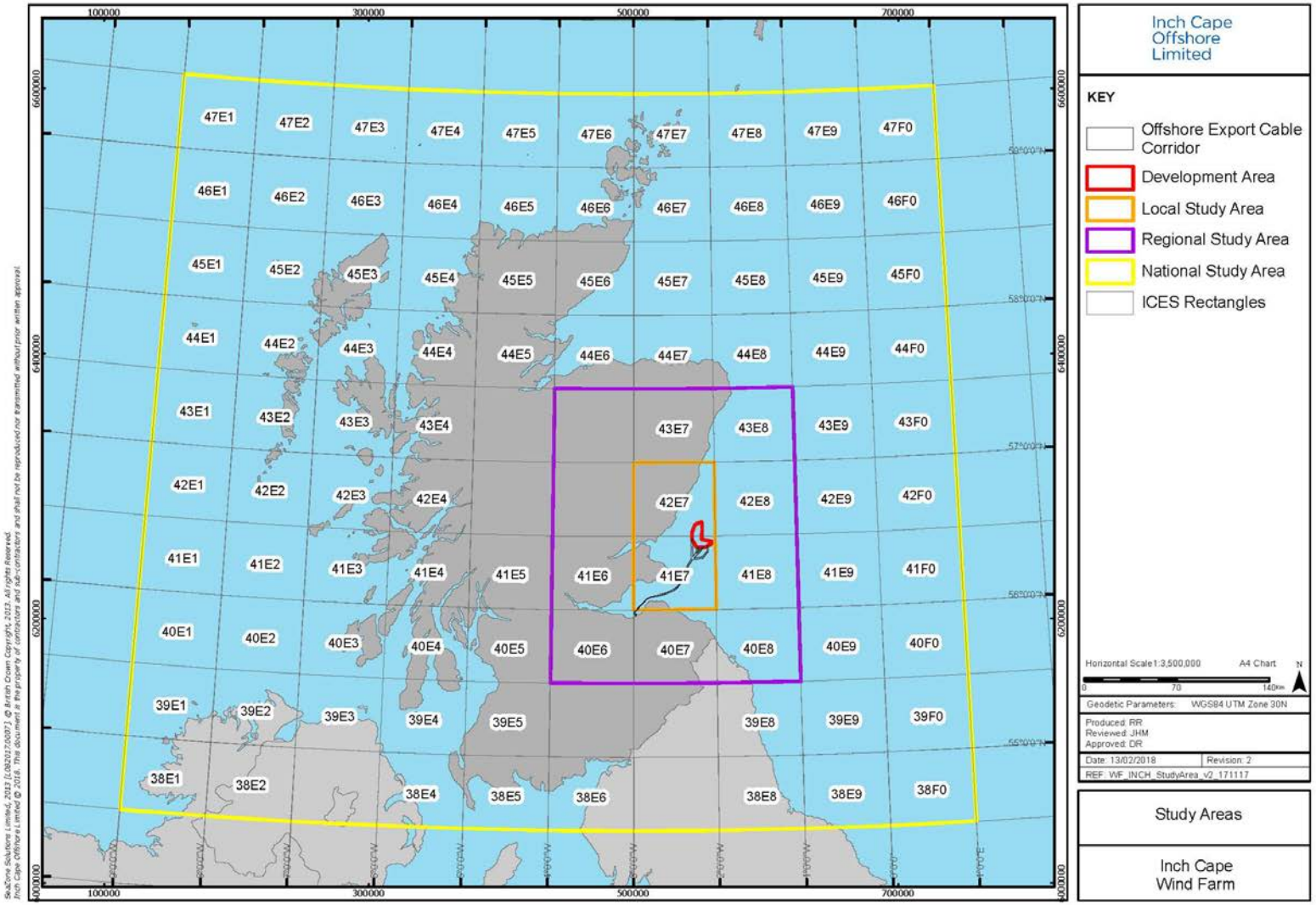
14A.2 Study Area

4 The Study Areas have been defined at three distinct levels; National, Regional and Local. The National Study Area provides an overview of fishing grounds in a national context. The Regional Study Area has been defined to ensure sufficient coverage of those fishing grounds surrounding the Development. The smallest spatial unit available for the collection and collation of relevant fisheries data is defined as the Local Study Area (Figure 14A.1).

5 The Development Area at the Local Study Area sits within International Council for the Exploration of the Sea (ICES) rectangles 41E7 and 42E7. The large majority of the Offshore Export Cable Corridor passes through 41E7, with a small proportion of the inshore section falling within rectangle 40E7.

6 ICES rectangle 40E7 has two separate areas of sea separated by land, a small section in the Firth of Forth where the Offshore Export Cable landfall is located and one larger area of sea along the coast of East Lothian and the Borders. Landings in 40E7 between 2011-2016 were predominantly made up of *Nephrops* and lobster (accounting for 85% of landings by value) and these are targeted most intensively along the North Sea coast (Figures 14A.32 and 14A.33). Hence figures for this rectangle are unlikely to be representative of the level of fishing which occurs around the landfall. For this reason this 40E7 has been included in the Regional Study Area rather than Local Study Area.

Figure 14.A1: Study Areas



14A.3 Data Sources and Limitations

7 The requirements of the following guidance was taken into account in updating the baseline:

- Guidance note for Environmental Impact Assessment in respect of FEPA and CPA requirements, Version 2 (Cefas, 2004);
- *Recommendations for Fisheries Liaison: FLOWW* (Fishing Liaison with Offshore Wind and Wet Renewables Group) (BERR, 2008);
- Best practice guidance for fishing industry financial and economic impact assessments. Sea Fish Industry Authority and UK Fisheries Economic Network (UKFEN 2012);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014);
- Guidance on Environmental Considerations for Offshore Wind Farm Development. Reference Number: 2008-3 (OSPAR, 2008); and
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Cefas contract report: ME5403 – Module 15 submitted to Department for Environment, Food and Rural Affairs (Defra) and the MMO (Cefas, 2012).

8 There is no single data source for establishing fisheries baselines for offshore developments, therefore the baseline has been updated from a variety of organisations and data types, which were then validated through consultation with fishermen and fisheries representatives. The data sources have been used to compile this baseline:

- ICES;
- Marine Management Organisation (MMO);
- Marine Scotland;
- Marine Scotland Science (MSS);
- The Crown Estate (TCE)
- Scottish Fishermen's Federations (SFF);
- District Fishery Officers (DFO); and
- Fishermen and their representatives

9 Information on the type of data used in this baseline and its limitations are provided in *Section 14A.3*.

10 In addition to the above data sources Marine Scotland also provided a number of references to ongoing studies that could be used to assist in the gathering of the baseline:

- Evidence Gathering in Support of Sustainable Scottish Inshore Fisheries (2014-2015): An European Fisheries Fund funded project led by Seafish and managed by The Marine Alliance for Science and Technology for Scotland (MASTS) aimed to develop new

methods for data acquisition and quality assurance within the Scottish fishery sector (particularly for small inshore fishing vessels), addressing knowledge gaps in Inshore Fisheries Group (IFG) management plans and providing opportunities for fishermen to become more involved in the catch monitoring process (MASTS, 2018a); and

- Scottish Inshore Fisheries Integrated Data System Project (2017-2019): An European Maritime and Fisheries Fund funded project led by The University of St Andrews to support research into the development of an integrated system for the collection, collation, analysis and interrogation of data from the Scottish inshore fishing fleet (MASTS, 2018b). Aims to develop an On Board Central Data Collation System from the Scottish inshore fisheries fleet.

11 These studies are principally aimed at working out ways of improving fishing data collection in the future. As they do not provide information on current levels of fishing they have not been used in this baseline.

14A.3.1 Fisheries Statistics

ICES Rectangles

12 ICES statistical rectangles are the smallest unit used in the collation of fisheries statistics (landings / catch data) from vessel logbook data (except for under 10 m UK vessels targeting shellfish, which are subject to a separate catch return system) by the European Commission (EC) and Member States.

13 ICES rectangles create a grid dividing up the earth's surface. Each ICES statistical rectangle is '30 min latitude by 1° longitude which is approximately 30 x 30 nautical miles. The average area of a rectangle in Scottish waters of 940 nautical mile $(nm)^2$.

14 The area of an ICES rectangle is relatively large compared to the area covered by the Development, which is situated in 41E7 and 42E7, with the cable landfall falling within 40E7. Fishing activity within an ICES rectangle is unlikely to be evenly distributed. This limitation should be accounted for when considering this data.

MMO and Marine Scotland Fisheries Statistics Data

15 Under European Commission (EC regulations 2847/93 of 12 October 1993, establishing a control system applicable to the Common Fisheries Policy (CFP), masters of community fishing vessels over 15 m are required to keep a logbook of their operations indicating the quantities of each species caught and kept on board, the date and location (ICES statistical rectangle) of such catches and the type of gear used. It is this data which is transposed into fisheries statistical data (EC, 1993).

16 Vessels under 10 m in length were previously exempt from these requirements, however Marine Scotland require the under 10 m fleet to provide equivalent information to the over 15 m fleet.

17 The MMO has provided fisheries statistical data covering a six-year period (2011 to 2016). The data includes information on landings (weight and value) and effort (days fished), however as seasonality and annual variation will be discussed, effort will not be considered further.

18 The fisheries statistics have been analysed to identify:

- Species targeted;
- Fishing methods used;
- Vessel category;
- Annual variations;
- Seasonal variations; and
- Landings values and weight.

19 To facilitate further collection of fisheries data from the under 10 m fleet, two schemes have been introduced, the Shellfish Entitlement Scheme (2004); and Registration of Buyers and sellers of First Sale Fish and Designated Auction Site Scheme (2005). Both of these schemes are discussed further in *Section 14A.4*.

14A.3.2 Fisheries Vessel Monitoring System (VMS) Data

20 Vessel Monitoring System (VMS) is a vessel mounted satellite tracking device which transmits a signal of its geographical position, vessel identification, date / time of position fixing and the vessel course and speed. VMS is a legal requirement under EC Regulation 2244/2003 and Scottish Statutory Instrument (SI) 392/2004 for all European Union (EU) registered vessels over 12 m in length, since 2012. Prior to this only vessels exceeding 15 m overall length were fitted with VMS units (Scottish Government, 2017a).

21 As VMS is only available for vessels of over 15/12 m (depending on year/ data source) any fishing activity by smaller vessels is not covered by this data.

MMO VMS Data

22 The MMO receives information from all UK vessels and all non-UK vessels within UK waters. The MMO has provided VMS data for the years 2011 to 2015 for all fishing vessels of 15 m in length and over. (NB although all vessels over 12 m are now fitted with VMS MMO data only includes vessels of 15 m in length and over to ensure consistency with previous data).

23 The VMS data from the MMO is not broken down by species due to concerns over data protection, however it is broken down by gear types. A basic 0.05° by 0.05° grid has been cross-referenced with landings data to provide values in a grid format.

Marine Scotland VMS Data

24 Marine Scotland also provides satellite tracking data using VMS data for over 15 m vessels targeting specific fisheries, namely *Nephrops* (mobile and static gear), demersal (mobile and

static gear), mackerel, herring, crab, lobster, scallop and squid for the periods 2009 to 2013 (Kafas *et al.,* 2013).

25 These mapping data 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 catch, gear type, landings (weight, price at sale). The log time identifies the date and time of each VMS transmission; this enables the location of a vessel to be linked to the gear type used and the weight of landings (Holmes *et al.,* 2011).

26 This data is only available as amalgamated data sets, so identifying year on year fishing area variations is not possible.

27 More recent data on intensity scallop fishing in the Regional Study Area was also provided by Marine Scotland for each year between 2007 and 2016. This multi-year VMS data for UK fishing vessels were sourced through the Scottish fisheries administration database (FIN). The raw data were filtered to include commercial fishing vessels registered in the UK, deploying dredge-class gears and targeting primarily king scallops. The data include spatial locations of fishing vessels recorded, mostly at 2 hour intervals. Additional attributes for each VMS point include unique identifiers for individual vessels and trips, home and landing ports, gear used, as well as vessel average speed (based on Harversine calculations) and course. The dredge gear class includes boat dredge, hand dredge and mechanized dredge gears. All dredge-class gears were treated the same in the analysis. UK vessels include vessels from England, Scotland, Wales, and Northern Ireland. Raw data was cleansed by identifying records with any erroneous coordinates and headings, duplicated records, speeds above 20 knots and a time difference of less than 5 minutes. Records within 1 km radius of major Scottish fishing ports have also been removed to avoid fishing activity misidentification when filtering by speed at a later phase of the analysis. Fishing activity is identified using a uniform rule of 0.5 ≤ VMS point speed ≤ 3.5 knots.

ICES VMS Data

28 VMS data is also available from ICES relating to fishing intensity for certain gear types for 2016 only (ICES, 2017). This data includes vessels of over 12m. The ICES 2016 data was produced for OSPAR to assess benthic impact from bottom contacting fishing gears. Spatial data layers on fishing intensity / pressure were produced within the OSPAR maritime area using VMS and logbook data.

14A.3.3 UK Fisherman's Information Mapping (UKFIM) Data

29 UK Fisherman's Information Mapping (UKFIM) collected data from individual fishermen on where they tow gear. This data, held by TCE, is collected confidentially therefore cannot be made public or referred to directly. UKFIM can however be used to check and confirm findings using other data sources, to ensure they are consistent with UKFIM information. At the time of writing TCE was in the process of updating UKFIM for Scotland, hence was this data set was not available to examine. Validation of VMS data was therefore undertaken directly with SFF instead.

14A.3.4 Scottish Fisheries Specific Studies

Creel Fishing Effort Study

30 The *Creel Fishing Effort Study* (Marine Scotland Science, 2017) is a MSS project which aims to address four questions on creel effort:

- What fishing effort is currently being deployed in the *Nephrops*, crab and lobster fisheries in Scotland?
- What is the spatial and seasonal distribution of effort in these fisheries?
- Are fishers concerned about the sustainability of these fisheries? and
- What management approaches are required to improve the sustainability and performance of these fisheries?

31 The study is based on interviews with 198 creel vessel skippers from four regions, two on the west and two on the east coast of Scotland. This data was then presented to wider marine stakeholders at several workshops. The collected data was represented on maps for both the average number of pots hauled per 4 km^2 cell per day and the average number of pots per 4 km^2 cell during peak period (August) for both *Nephrops* and crabs / lobsters.

32 The outputs from this study represent a 'snapshot' of creel fishing effort in the four regions sampled. This study has apparent limitations including; only a limited number of vessel owners were interviewed in a limited number of regions. It does not therefore give an indication of total creel effort within these regions or across Scotland (MSS, 2017).

ScotMap

33 ScotMap is a Marine Scotland project which provides spatial information on the fishing activity of Scottish registered commercial fishing vessels under 15 m in length. The data was collected from interviews with vessel owners and operators for the period 2007 to 2011 and relates to fishing activity (Marine Scotland, 2014).

34 Scotmap data has been included in the updated baseline, despite the fact that it is from 2007-2011, and this baseline covers 2011-2016, as data from the Scotmap project was not included in the Inch Cape 2013 ES baseline as it had not been published at the time.

35 At the time of publication ScotMap provided the best available data for the under 15 m fleet registered in Scotland. There are however notable limitations to this data specifically, not all vessels were interviewed and as a consequence under-representation of the value and spatial extent of fishing was reported (Kafas *et al.,* 2014). In addition Scotmap data is now 7 years old.

14A.3.5 Information from Fishermen and Their Representatives

36 The data sources covered, although extensive, do not capture all fishing activity. As stated above, projects such as Scotmap and the Creel Fishing Effort Study are surveys providing a snapshot rather than up to date definite spatial data on fishing activity. Data are most limited

for vessels under 10 m targeting non-quota species as they do not have VMS or a requirement to complete logbooks. Hence both data on the distribution of fishing of under 10 m vessels and information on the landings are limited. This information can only be obtained from consultation with species fishermen and their representatives.

Inch Cape 2013 ES Data

37 Prior to the Scotmap project there was very little information on the distribution of fishing for the under 15 m fleet, hence extensive consultation was undertaken to collate the fisheries baseline for the Inch Cape 2013 ES. This included open and advertised fisheries stakeholder meetings, interviews with individual skippers, fishermen's organisations and regulatory organisations (DFOs and the IFG).

38 Fishermen were invited to provide information on where they fished and what methods they used. This information was then used in the original assessment and in 2011 this was the only information on the spatial distribution of creel fishing, squid fishing and *Nephrops* trawling for the under 15 m fleet (*Appendix 14C*). This information has been used in this current assessment as the basis for consultation with fishermen to identify if fishing patterns / methods have changed since the previous application.

Validation of New Baseline Data

39 All data collated to update this baseline was then validated through consultation with local fishermen, fishermen's organisations and other fisheries representatives. This involved both validation meetings, as well as email and telephone correspondence.

40 In order to validate under 15 m data, four consultation events were arranged at the following locations, namely Montrose; Arbroath; Pittenweem; and Port Seton in September 2017 (Table 14A.1). A range of stakeholders, fishermen and industry representatives were invited to attend the events (*Annex A* provides the list of organisations invited). The meetings served both to inform local fishermen about the Development as well as to allow validation of fishing data.

41 Attendees at the meetings were presented with data of fishing distribution for fisheries within the Local Study Area, regarding landings and distribution of fishing. Maps were presented on various fisheries known to occur in the area (namely, scallops, creeling, *Nephrops*, squid, mackerel) from various data sources including the Inch Cape 2013 ES baseline (fishing distribution maps derived from fishermen's input in 2011), Scotmap, the Creeling Fishing Effort Study and VMS (Kafas *et al.* 2013, and MMO data). Attendees were then invited to comment on the validity of the maps and describe any inaccuracies in spatial patterns.

42 Attendees were also asked to provide information on fisheries that are important in the area. This information was recorded at meetings through a scribe or through questionnaires. Questionnaires were also made available to those unable to attend.

43 Validation of fisheries data for the over 15 m fleet was undertaken through a meeting with the SFF and key fishing representatives (invited by the SFF) in Edinburgh in February 2018 (Table 14A.1), as well subsequent email correspondence.

Table 14A.1: Details of validation meetings

Meeting	Date	Attendees
Under 15 m Validation meeting		
Montrose	14/9/2017	SFF 2 x Fishermen
Arboath	15/9/2017	Marine Scotland - Aberdeen District Fisheries Office (DFO) SFF Arbroath and Montrose Static Gear Association 8 x fishermen
Pittenweem	23/9/2017	Fife Fishermen's Mutual Association (Pittenweem) 10m and Under Association (Pittenweem) Fife Creel Fishermen's Association 2 x fishermen
Cockenzie & Port Seton	27/9/2017	Marine Scotland - District Fisheries Office Dunbar Fisherman's Association Cockenzie & Port Seton Fishermen's Association Eyemouth Fishermen's Rep (Creel) 8 Fishermen
Over 15 m Validation meeting		
Edinburgh	01/2/2018	SFF Mallaig and North West Fishermen's Mutual Association Fife Fishermen's Mutual Association (Pittenweem) Scallop Committee of Scottish White Fish Producers Association Scottish White Fish Producers Association

14A.4 Fisheries Controls and Legislation

44 It is recognised that there are a number of Marine Protected Areas (MPAs) within the Regional Study Area, most notable the Forth Bank Complex, however at present there are no additional fishing restrictions in place for this MPA. It is recognised that there may be

fishing restrictions in place for MPAs in the future and other areas of the National Study Area and this may affect future fishing and already affect the nomadic fleet.

45 Several controls and legislative requirements regulate commercial fishing in local, regional, national and international waters. These measures can effect landings and hence the baseline. Relevant regulations include:

- CFP and quotas: EU fisheries must operate in compliance with the CFP, which sets rules for conserving fish stocks. Total Allowable Catch (TAC) limits are defined annually for commercially important fish stocks in the EU. Quotas based on TACs are then set for each ICES division. Table 14A.2 presents the EU TAC and 2015 quota allocations for species in ICES division IV (Atlantic North Sea).

Table 14A.2: 2015 TAC and quota allocations (tonnes) for ICES division IV (Atlantic North Sea) (EC, 2015)

Species	EU TAC	Quota (IV)
Anglerfish	9 390	7 641
Cod	29 189	11 369
Haddock	40 711	28 576
Herring	15 744	286
Mackerel	N/A	1 933
Nephrops	17 843	15 456
Plaice	128 376	34 066
Saithe	66 006	5 249
Sprat	227 000	8 271
Whiting	13 678	8 739

- A new reform of the CFP was agreed in 2011 and became effective as of 1 January 2014 through to 2020. This includes a legally binding commitment to fishing at sustainable levels; decentralisation of decision making; and a landings obligation or phased-in ban on fish discards (effective from 1 January 2015). It should be noted however that the UK Government plans to leave the CFP as part of its Brexit strategy. It is still uncertain as to what fishery arrangements will replace the CFP in Britain.
- Fishing licences (category A, B and C): authorise registered vessels to sea fish in specified areas and allows fishing to be monitored so that quotas are not exceeded. Vessels fishing for and selling sea fish who do not hold a licence are operating illegally.

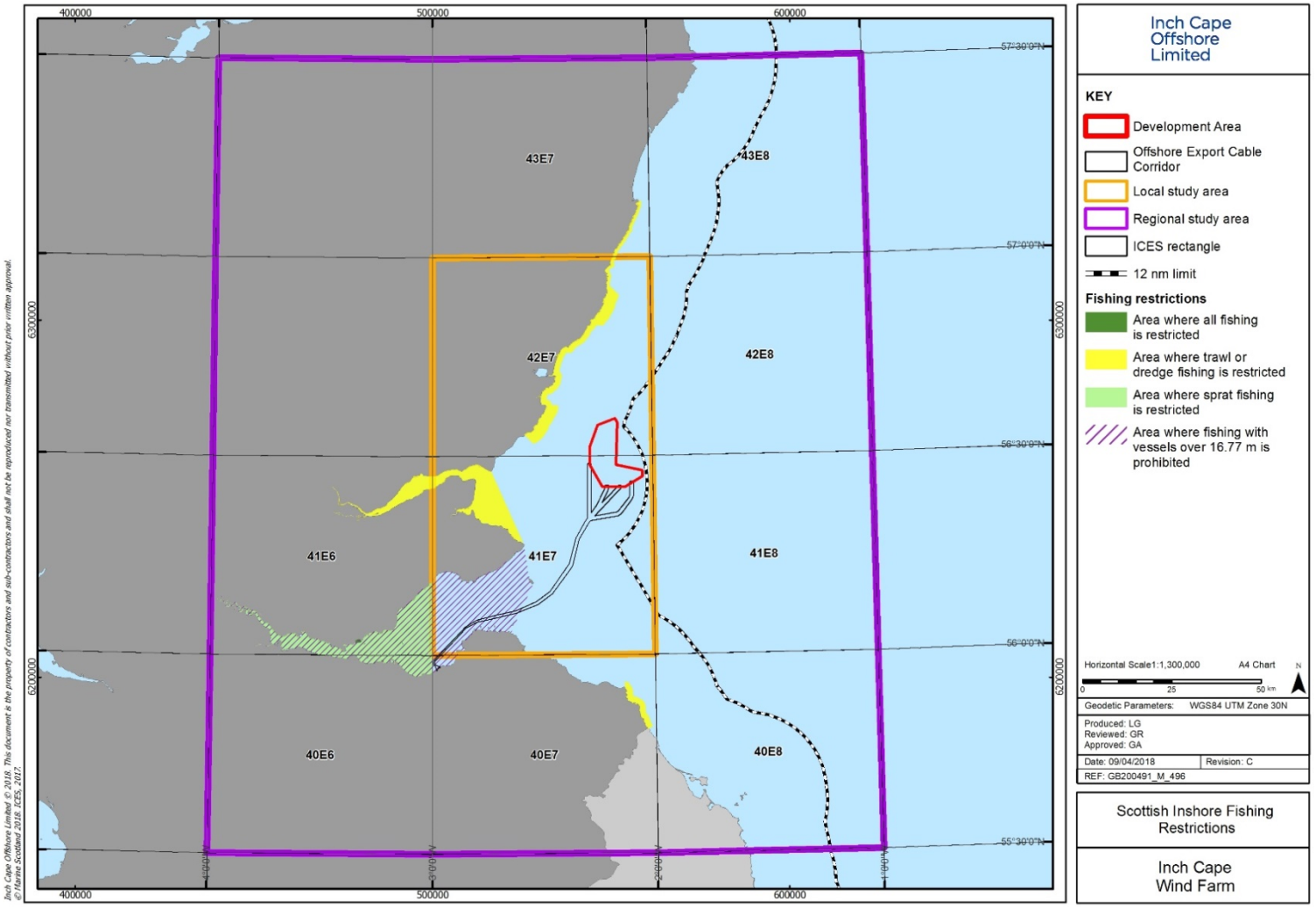
- Effort (days at sea): fishing effort is based on fishing capacity and time spent fishing (WWF, 2009). The Scottish Government implemented the Conservation Credits Scheme (CCS) in 2008 to ensure sustainable fishing of whitefish. If fishers adopt the conservation measures implemented under the CCS, they are granted additional days at sea.
- Shellfish Entitlement Scheme (2004): unrestricted landings of crabs and lobsters can be caught by vessels already licenced, where they can demonstrate that they caught over 750 kg of crabs or over 200 kgs of lobsters in any calendar year between 1 January 1998 and 31 March 2004. A condition in the 10 m and under licence requires owners of vessels under this arrangement to complete and submit the FISH1 form for all landings of crab and lobster on a weekly basis. Licenced vessel owners who do not hold the Shellfish Entitlement can land up to 25 crabs and five lobsters per day (Marine Scotland, 2017).
- Registration of Buyers and sellers of First Sale Fish and Designated Auction Site Scheme (2005): Article 9 of Council Regulation (EC) No 2847/93 ("the Control Regulation" – as amended) requires relevant information relating to the landing, first marketing and sale of fishery products in the Community to be submitted to the competent authorities in a Member State. These documents, or 'sales notes', aim to keep track of amounts of fish species sold (Seafish, 2005).
- Scallop Dredging restrictions: new conservation measures for the Scottish king scallop fishery came into force on 1 June 2017 under The Regulation of Scallop Fishing (Scotland) Order 2017 (Scottish Government 2017d). This included:
  - An increase in the Minimum Landing Size (MLS) from 100 mm to 105 mm in all areas bar the west coast of mainland Scotland south of 55°N and Shetland (UK Government, 2017).
  - Restriction on dredge numbers and tow bar length within (territorial waters, i.e. within 0 to 12nm miles from the coast, unless remote electronic monitoring (REM) equipment is fitted. This equipment had to be purchased and installed at the vessel owner's expense. It will be used by Marine Scotland to monitor the number of dredges being used in the different fishing zones within Scottish waters.
  - Fishing with 10 dredges per side in the six to 12 nm zone will be permitted only if a vessel has installed REM equipment.
  - Without REM equipment with territorial waters scallop dredgers are restricted to:
  - the total length of any tow bar deployed cannot exceed 7.5 m;
  - no more than two tow bars can be deployed at any time; and
  - no more than eight scallop dredges per side (i.e. no more than 16 in total)
  - These restrictions will also apply to vessels that wish to fish both inside and outside 12 nm during the same trip.
  - Fishing with 10 dredges per side in the six to 12 nm zone will be permitted only if a vessel has installed REM equipment. This equipment will have to be purchased and installed at the vessel owner's expense. It will be used by Marine Scotland to monitor

the number of dredges being used in the different fishing zones within Scottish waters;

- Fishermen who wished to continue fishing with 10 dredges per side in the six to 12 nm zone needed to install REM equipment by 1 June 2017. All REM was verified by Marine Scotland to ensure that the equipment is installed correctly and is fit for purpose.

- The Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order 2004: specifies areas and periods where sea fishing with mobile or active gear is prohibited (UK Government, 2004) (Figure 14A.2). Key restrictions under this act include:
  - Vessels with a length of over 16.77 m fishing for anything other than herring, mackerel or sprats (subject to specific closure dates) are prohibited from fishing within the Firth of Forth 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 (Figure 14A.2).
  - Use of mobile gear is restricted all year in a number of areas (Figure 14A.2) such as St. Andrews Bay; St. Abbs Head to the Border; and within two miles of the MHW mark between Mons Craig and Doolie Ness and 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.

Figure 14A.2: Scottish inshore fishing restrictions in the Firth of Forth (Marine Scotland)



14A.5 Fisheries Statistics

14A.5.1 Landings Values

National Overview

46 Average landings values (2011 to 2016) by species in the National Study Area are shown in Figure 14.A3. The species displayed on the pie charts in Figure 14.A3 include the national top ten species by landing value, as well as regionally important species such as squid, velvet crabs and whelks. All other species were categorised as 'Other (all other species)'. To facilitate data interpretation, ICES rectangles with annual average landings values <£5,000 were removed from analysis.

47 The majority of landings in 41E7 over this time period were made up of *Nephrops* and lobster, while in 42E7 landings were dominated by lobsters, scallops and smaller quantities of crabs (edible and velvet swimming crabs). *Nephrops*, lobster, scallops and edible crabs all appear in the national top ten species by value. ICES rectangles 41E7 and 42E7, contain fishing grounds that are of importance to fisheries at a national scale, for *Nephrops* and lobsters.

48 National average *Nephrops* landings (Figure 14A.4) were greatest off the west, north-east and south-east coasts of Scotland, with the highest landings recorded in the Clyde region (£6,385,230 and £6,276,363 in rectangles 40E4 and 39E4, respectively). Rectangle 41E7 had the third highest landings (£4,093,313) nationally, whereas 42E7 recorded relevantly small *Nephrops* landings (£152,105).

49 Scallop landings were greatest off south-west Scotland (40E4, 40E3, 42E3) (Figure 14A.5). Locations further offshore to the east of Montrose (42E8) and Arbroath (43E8), and east of the Moray Firth (45E7) also recorded high landings, with 42E8 recording the second highest scallop landings (£1,418,659) nationally. Average landings in the local study were moderate in 42E7 (£529,645) and relatively low in 41E7 (£240,262).

50 Highest lobster landings (£3,614,038) were recorded in rectangle 46E8 which is situated offshore to the North East of John o' Groats (Figure 14A.6). Rectangles 41E7 and 42E7, in which the Development is located, recorded the second (£2,602,308) and fourth (£1,264,203) highest lobster landings nationally. Landings values for both edible and velvet crabs were both highest off northern Scotland. Velvet crab landings in rectangles 42E7 and 41E7were seventh and eighth highest nationally.

51 Nationally, highest squid landings values were recorded in the Moray Firth (£1,187,706 and £519,957 in rectangles 44E7 and 44E6, respectively) (Figure 14A.7). Although relatively low compared to landings in the Moray Firth, rectangles 41E7 (£159,030) and 42E7 (£71,804) both recorded values in the top ten nationally.

Figure 14A.3: Annual Landings values by species (average 2011 to 2016) in the National Study Area (MMO)

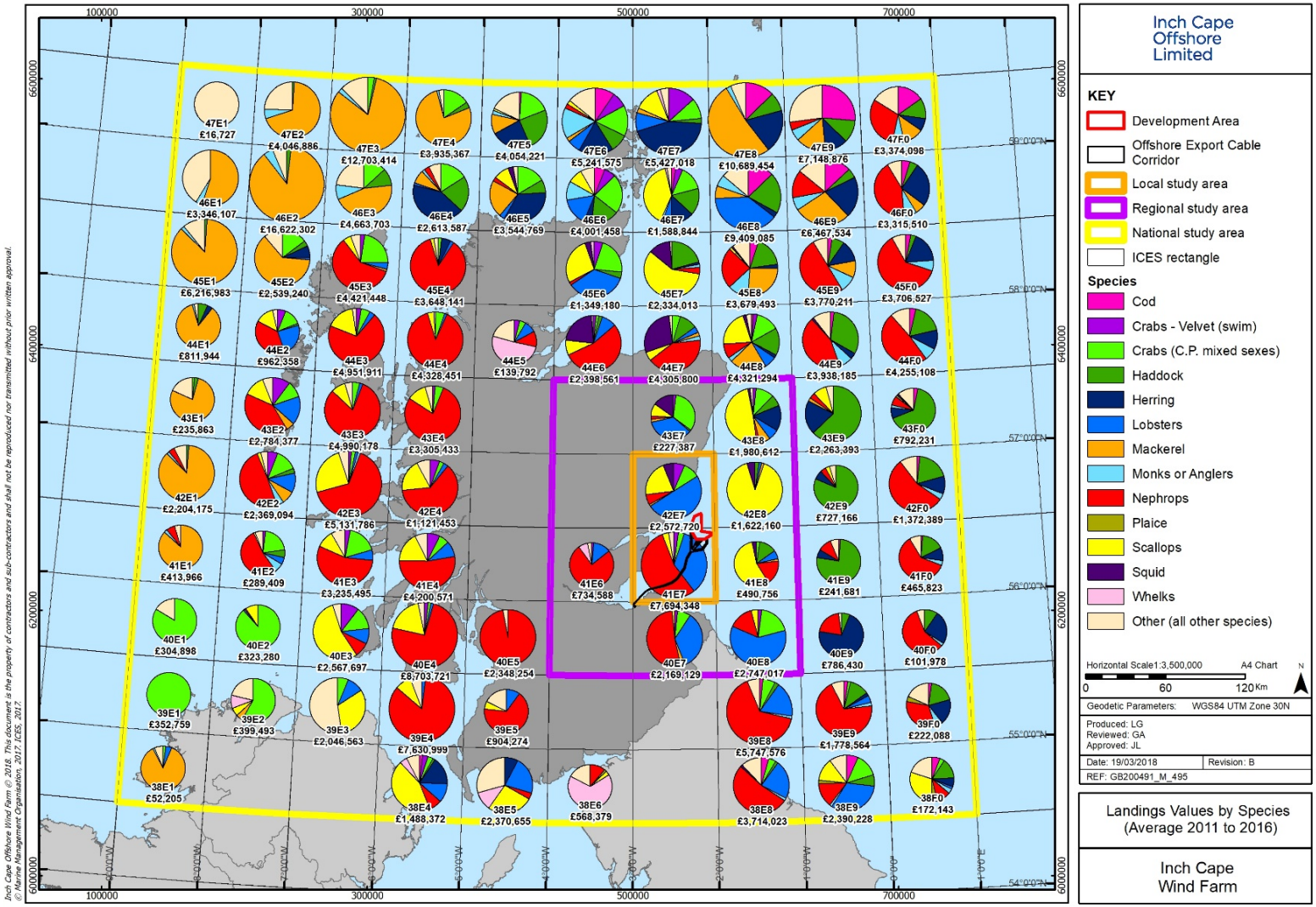


Figure 14A.4: Relative annual landings values by species *Nephrops* only (average 2011 to 2016), in the National Study Area (: MMO)

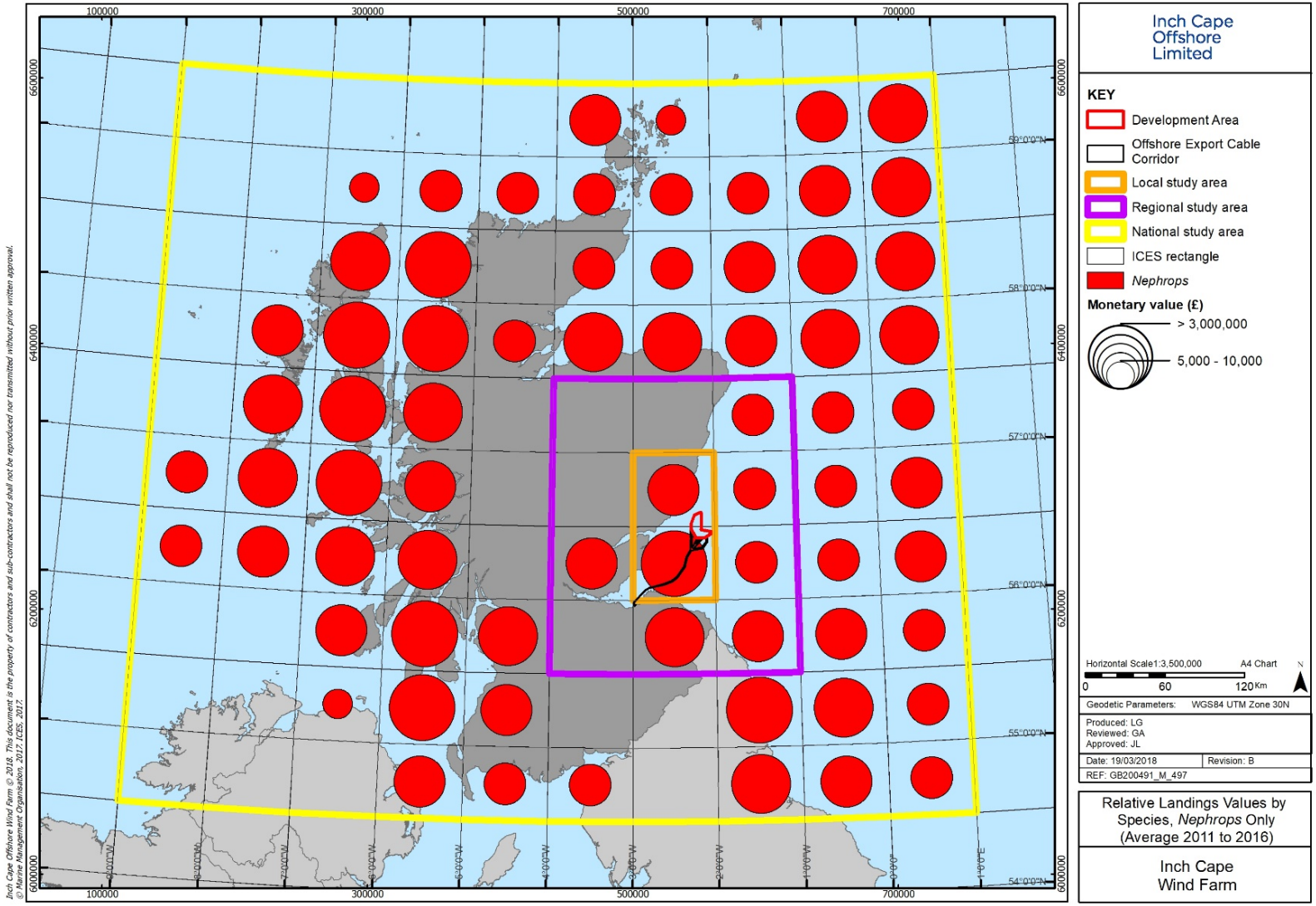


Figure 14A.5: Relative annual landings values by species, Scallops only (average 2011 to 2016), in the National Study Area (MMO)

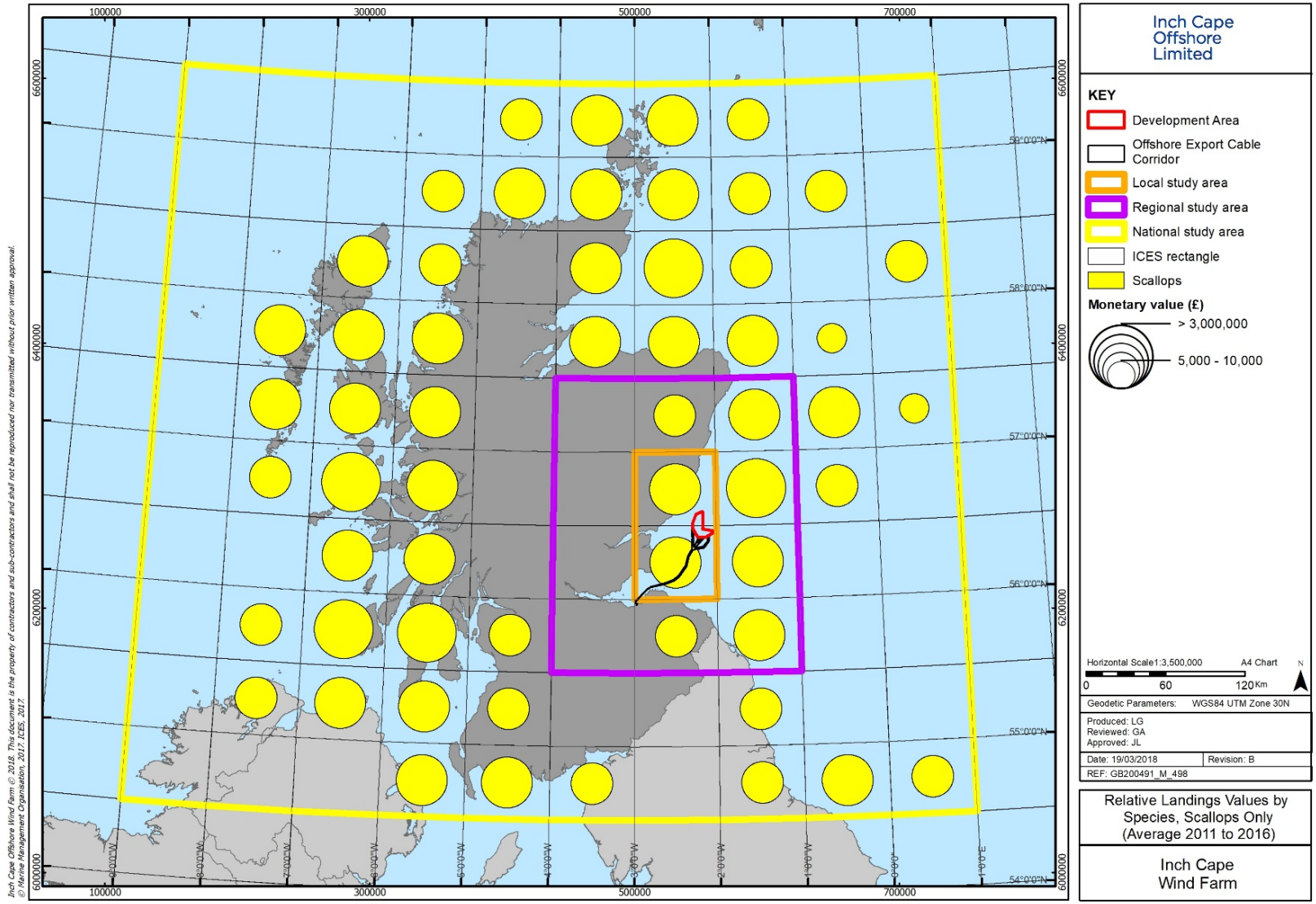


Figure 14A.6: Relative annual landings values by species, shellfish only (Average 2011 to 2016), in the National Study Area (MMO)

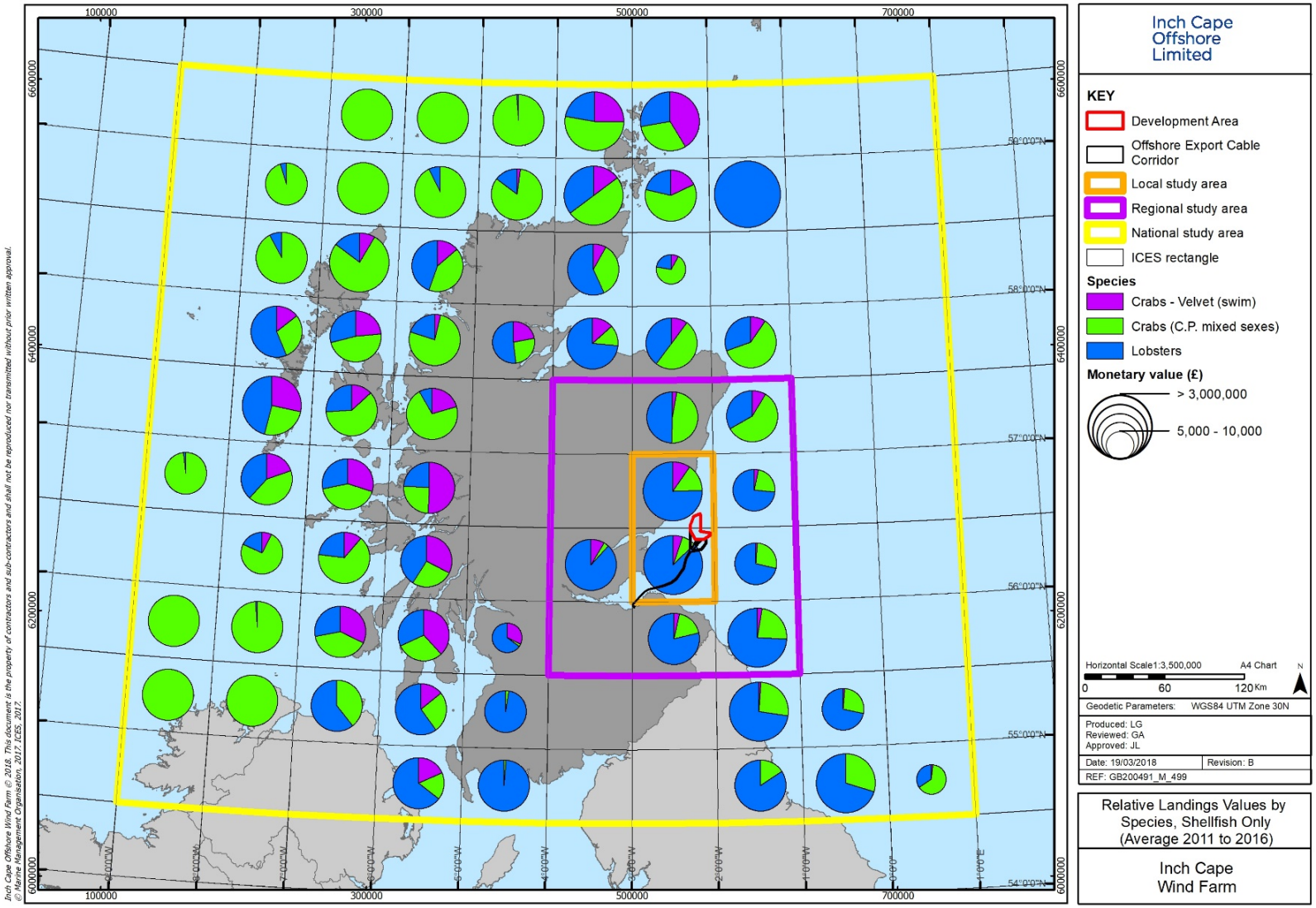
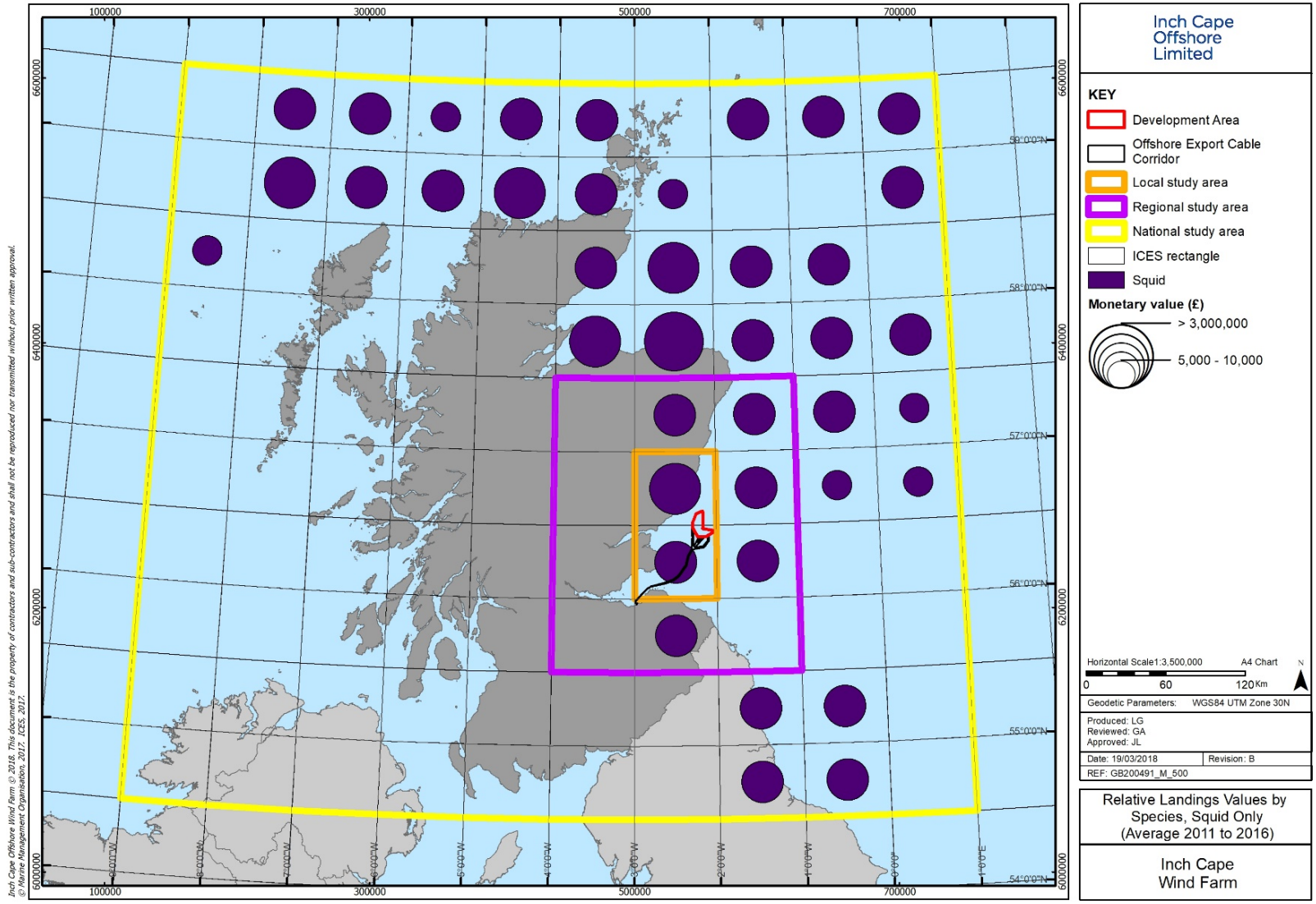


Figure 14A.7: Relative annual landings values by species, squid only (average 2011 to 2016), in the National Study Area (MMO)



Regional Study Area

52 Lobsters, *Nephrops*, scallops, edible crabs and velvet crabs were responsible for 91.6% of landings in the Regional Study Area. Lobsters accounted for 32.6% of total landings regionally, and were principally captured by 'pots and traps' (i.e. creeling) along the south-east coast. Rectangles 41E7 and 42E7, in which the Development is located, recorded the first (£2,602,308) and third (£1,264,203) highest lobster landings in the Regional Study Area.

53 *Nephrops* accounted for 31.8% of total landings and were largely targeted in rectangle 41E7, south of the Development Area (Figure 14A.8). Demersal trawlers (recorded as 'demersal trawl/seines') were responsible for the majority (95.3%) of *Nephrops* landings (Figure 14A.9).

54 Scallops contributed 17.7% to average landings regionally, with dredgers responsible for 99.9% of landings. This was the principal activity recorded in the north east of the Regional Study Area, particularly rectangles 42E8 and 43E8, which are located further offshore (Figure 14A.8*).* Rectangle 42E8 landed over 39% of scallops in the Regional Study Area. Scallops were also targeted in rectangle 42E7 to the north of the Development Area.

55 Edible and velvet crabs contributed 7% and 2% to regional landings, respectively, with over 98% being targeted by creeling (recorded as 'pots and traps'), generally in coastal locations *(*Figure 14A.9). Rectangles 42E7 and 41E7 recorded the highest landings of velvet crabs in the Regional Study Area, and the second and third highest landings of edible crabs.

56 Squid represented 2% of regional landings values. Over 57% of these landings were recorded in rectangles 41E7 and 42E7, where the Development is located. Demersal trawling were responsible for over 99% of regional squid landings.

57 All fish species represented 4.7% of average landings in the Regional Study Area. Relatively small landings of whitefish such as haddock and cod, were primarily landed in offshore rectangles (Figure 14A.8). Demersal trawl/seine fisheries were responsible for 99.9% and 65.6% of haddock and cod landings, respectively.

58 Herring, mackerel, razor clams and whelks relatively small amounts to the overall landings of the Regional Study Area. Herring and mackerel were principally captures offshore in rectangle 43E8, whereas razor clams and whelks were mainly captures in more estuarine locations (rectangles 41E6 and 41E7) (Figure 14A.8).

59 Vessels ≥15 m contributed 32.8% total landings in the Regional Study Area, compared to vessels ≤10 m which contributed 42.2% and vessels 10-15 m which contributed 25% (Figure 14A.10). Vessels over 15 m contributed more to landings in offshore areas, whereas vessels 10 m and under were predominantly responsible for landings in coastal rectangles. For example, vessels over 15 m were responsible for 77.6% and 96.7% landings in rectangles 41E8 and 42E8, respectively. Under 10m vessels were responsible for 0.5% and 2.2% landings, respectively in these rectangles.

Figure 14A.8: Annual landings values by species (average 2011 to 2016) in the Regional Study Area (MMO)

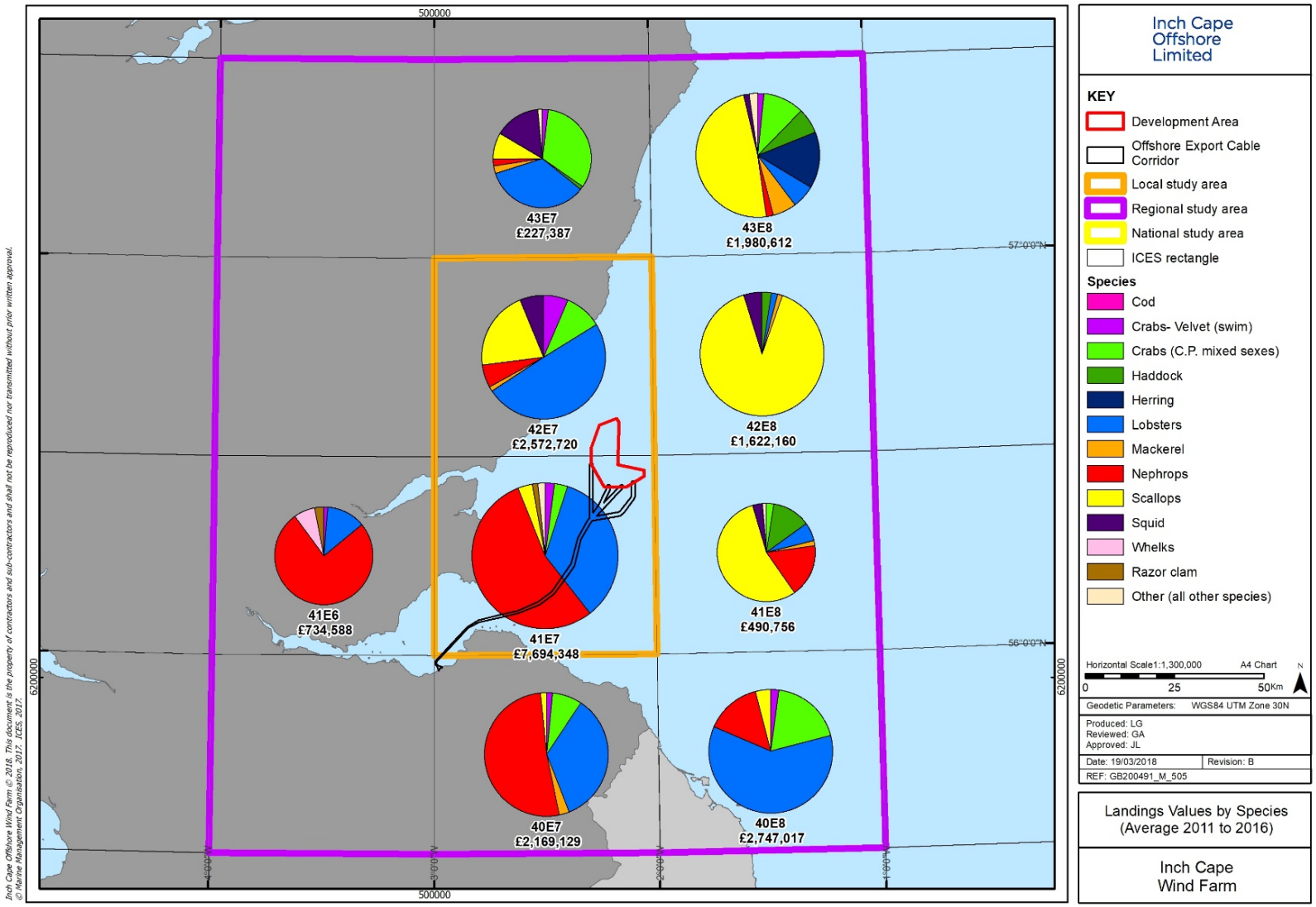


Figure 14A.9: Average annual landings values by method (average 2011 to 2016) in the Regional Study Area (MMO)

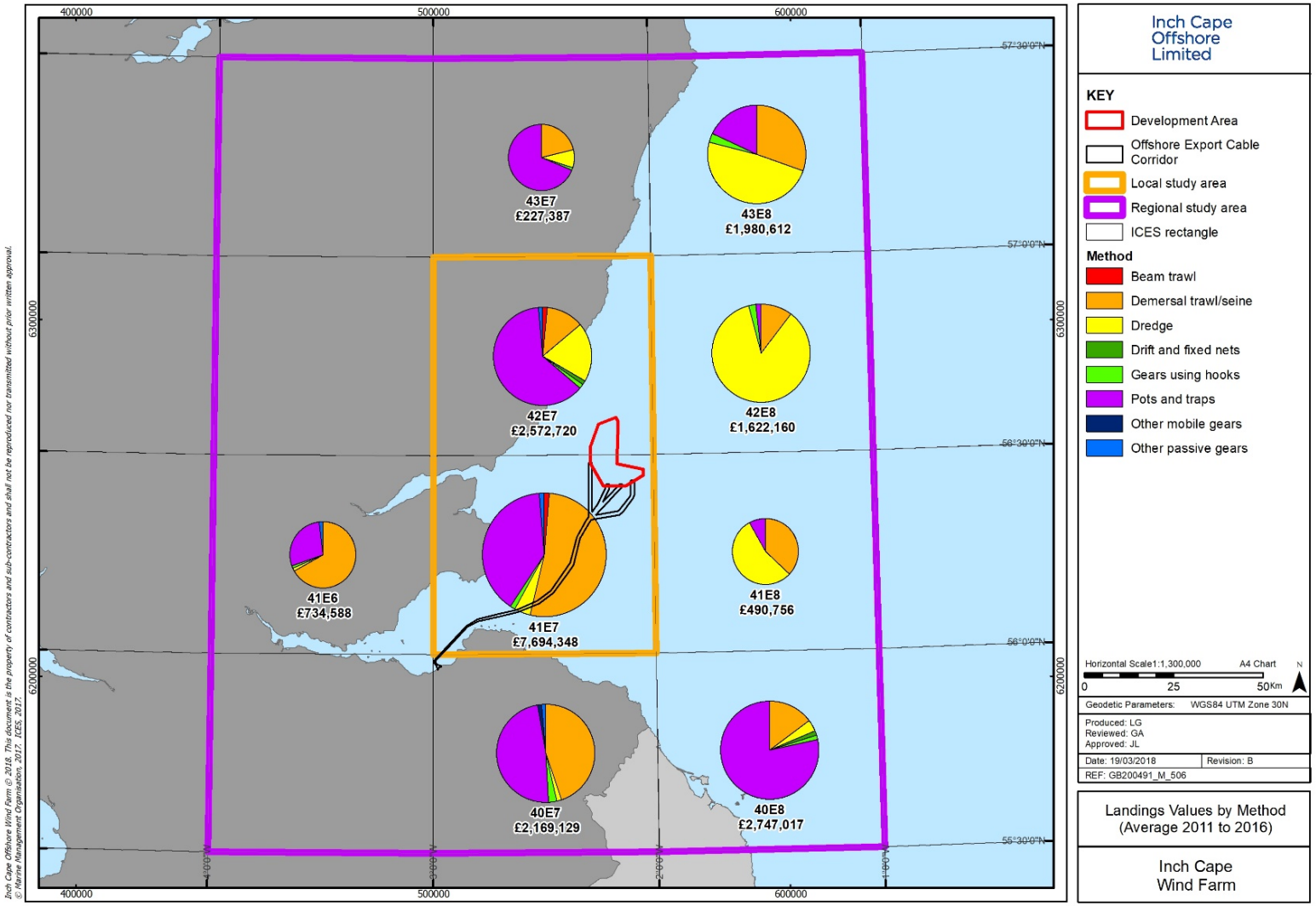
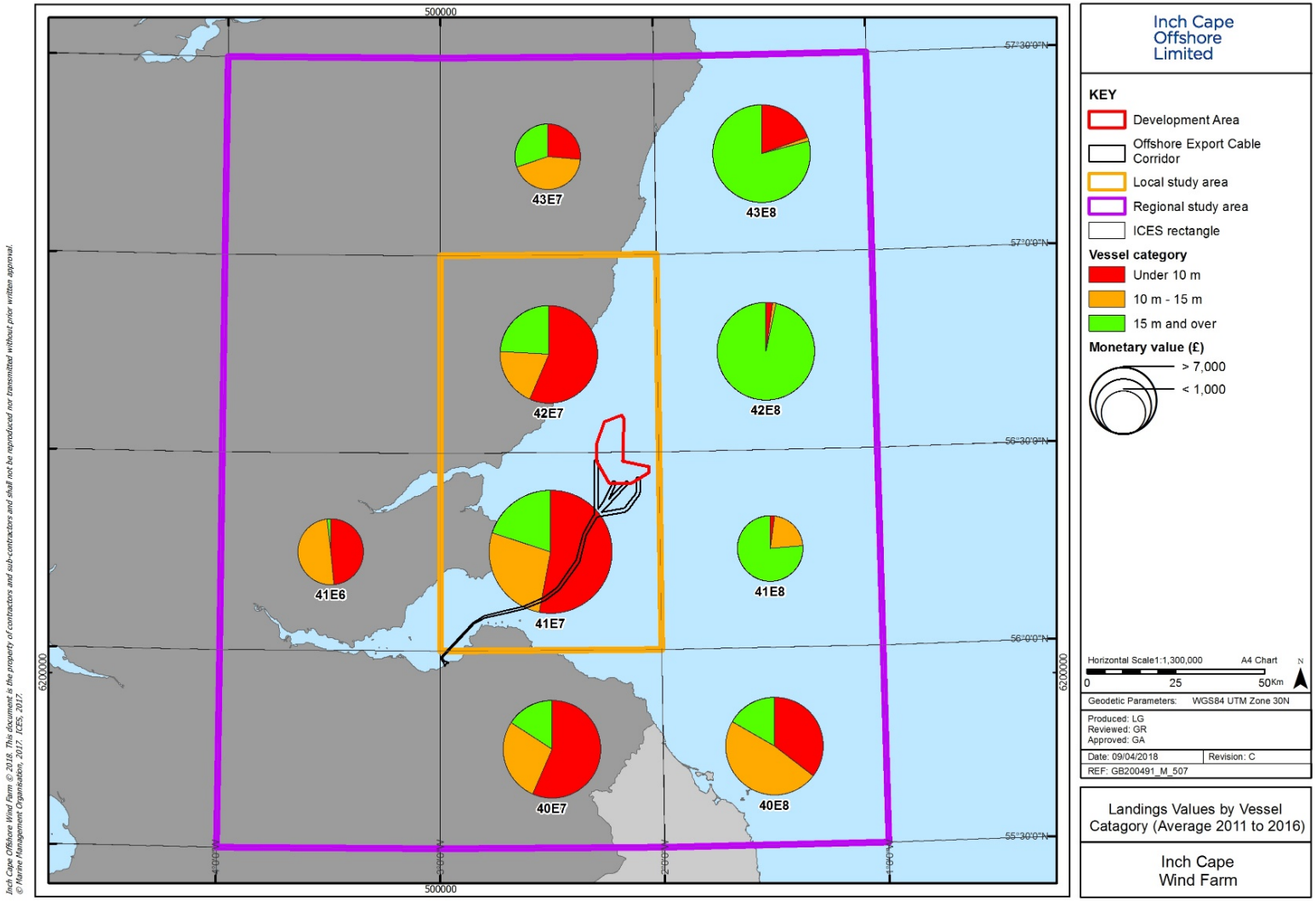


Figure 14A.10: Annual Landings values by vessel category (average 2011 to 2016) in the Regional Study Area (MMO)



Local Study Area (ICES Rectangles 41E7 and 42E7)

60 Overall landings in 41E7 (£7,694,348) were three times higher than in 42E7 (£2,572,720). This reflects the fact that a greater proportion of 42E7 is made up of land, not sea. There is also a difference in the fisheries targeted within each square, with 41E7 being dominated by *Nephrops* and lobster landings and 42E7 by lobster and scallops (Figures 14A.11 and 14.A12).

61 Over the 6 year period between 2011 and 2016, the majority of landings in 41E7 were made up of *Nephrops* which accounted for 53% of all landings (by value) which equates to an annual average of £4,093,313. Landings of lobster was the second highest in this rectangle (34% - £2,602,308), with smaller quantities of crabs (edible and velvet crabs 5%), scallops (3%), razor clams (1%), squid (1%) as well as other species landed (Figure 14A.11). Other notable species captured in this rectangle include mackerel and whelks, although together they account for less than 1.2% of the average annual landings.

62 In rectangle 42E7 lobsters made up almost half the landings in the study period (49% which equates to an annual average £1,264,203), followed by scallops (21% - £529,645) and crabs (edible 10% and velvet swimming crabs 6%), squid (6%), *Nephrops* (6%) and mackerel (1%) and other species (Figure 14A.12).

63 *Nephrops* throughout the Local Study Area are principally captured using demersal otter trawls (recorded as 'demersal trawls/seines') although a small proportion were also caught using prawn pots (recorded as 'pots and traps') in 41E7. Lobsters and crabs are targeted using creeling. Whereas scallop dredging is the principle method for catching scallops (Figure 14A.13 and 14A.14).

64 Just over half the catch (52.9%) landed in 41E7 was captured by vessels of under 10 m in length. In 42E7 this proportion was slightly higher with 56.5% of landings being captured by vessels of under 10 m (Figures 14A.10, 14A.15 and 14A.16).

65 In the majority of the demersal otter trawling and scallop fleets vessels are ≥15 m in length (43.2% and 95.7%, respectively) (Figures 14A.15 and 14A.16). The under 10 m fleet used a larger range of fishing methods but pots and traps predominated (Figures 14A.15 and 14A.16).

Figure 14A.11: Percentage distribution of annual landings values by species in ICES Rectangle 41E7 (MMO)

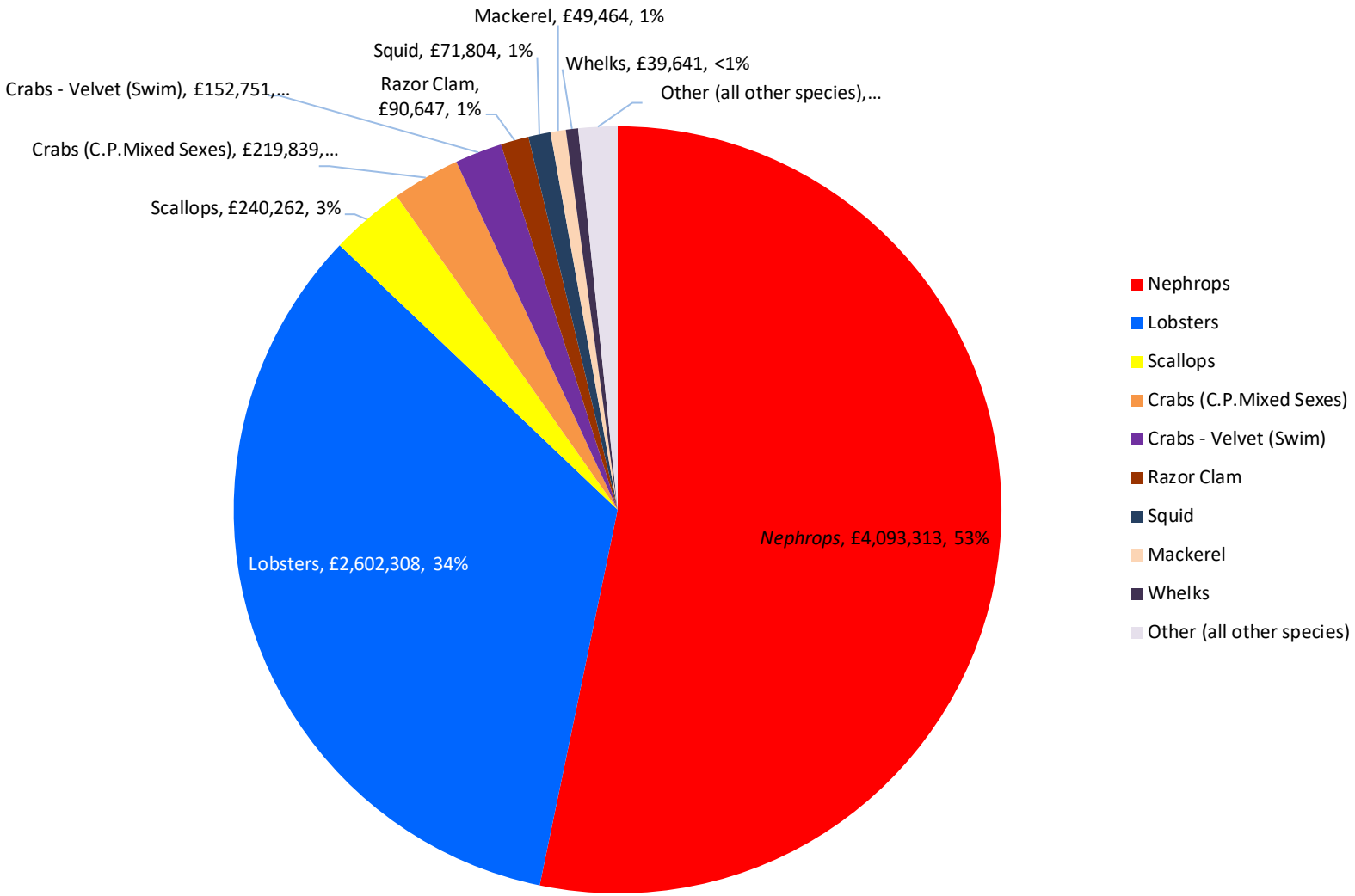


Figure 14A.12: Percentage distribution of annual landings values by species in ICES Rectangle 42E7 (MMO)

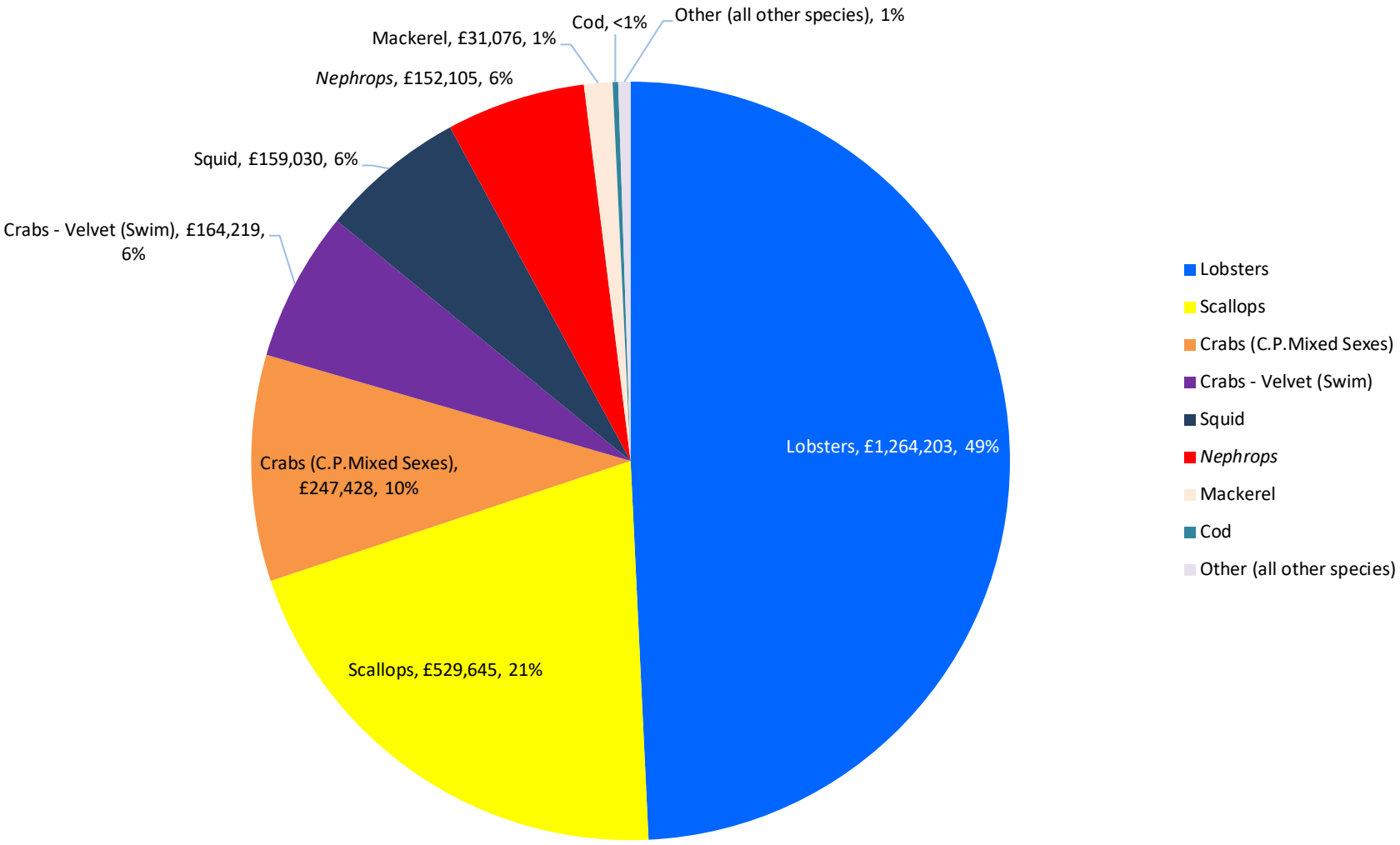
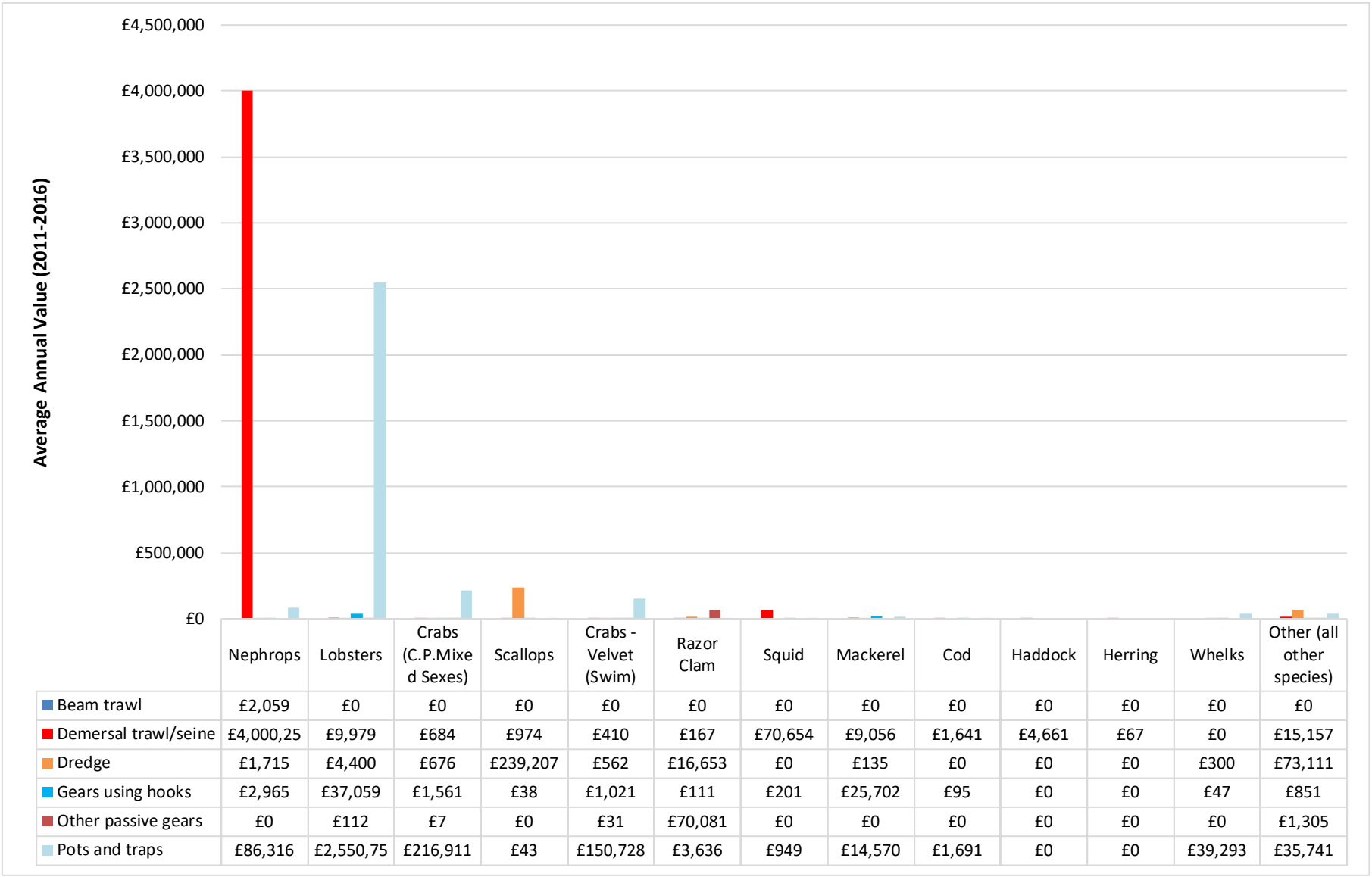
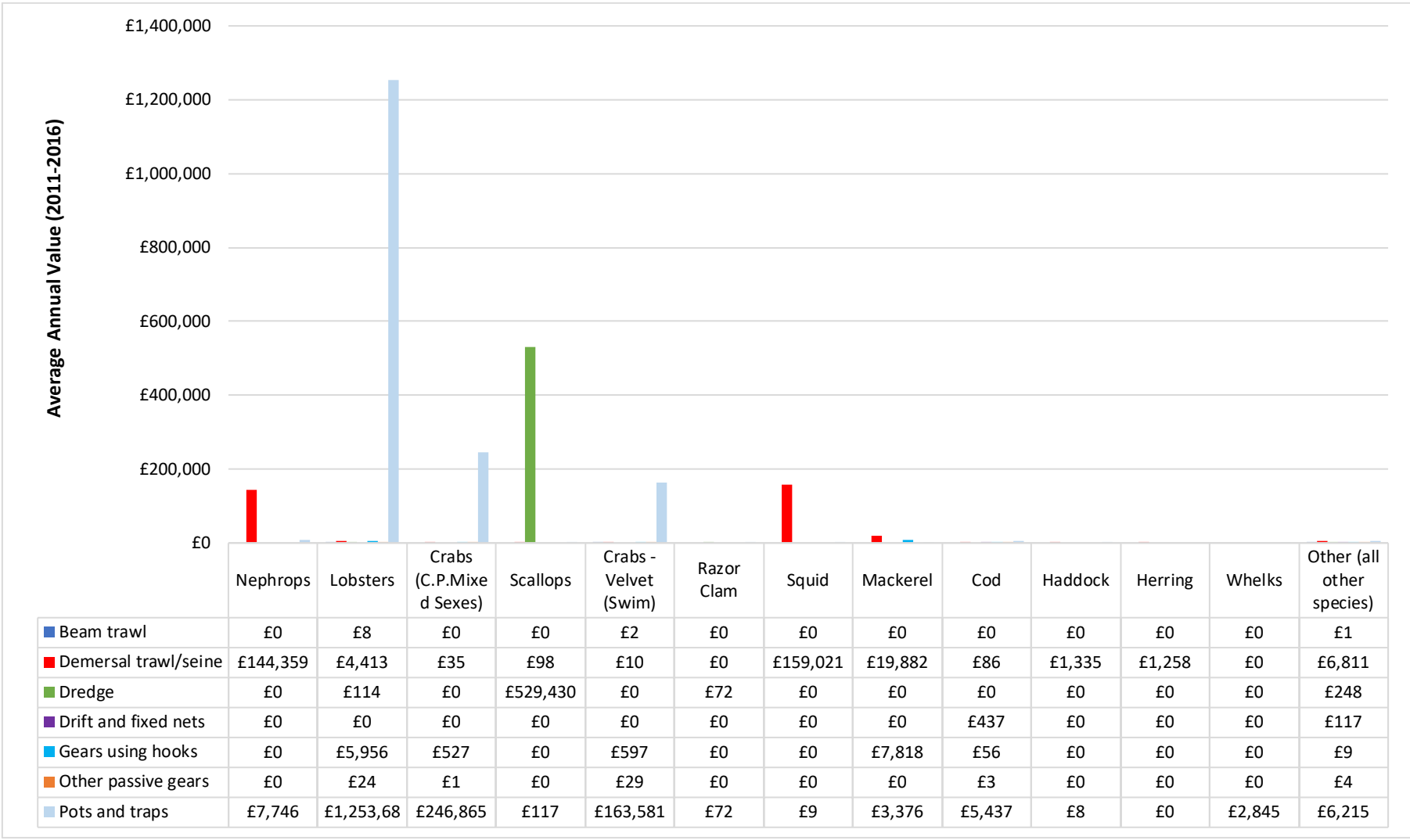


Figure 14A.13: Average annual landings values (2011 to 2016) by species and methods in ICES Rectangle 41E7 (MMO)



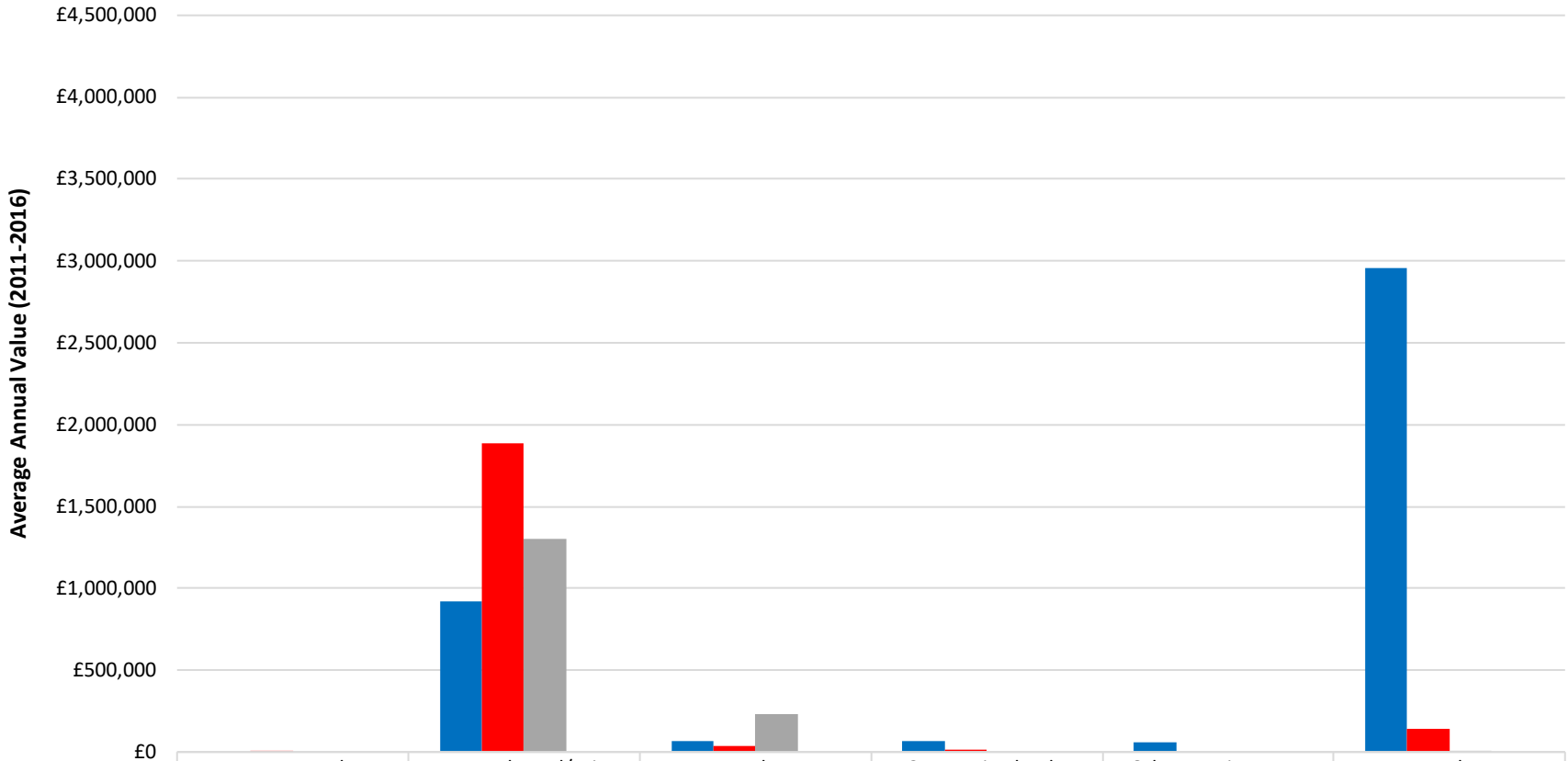
	Nephrops	Lobsters	Crabs (C.P.Mixed Sexes)	Scallops	Crabs - Velvet (Swim)	Razor Clam	Squid	Mackerel	Cod	Haddock	Herring	Whelks	Other (all other species)
Beam trawl	£2,059	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Demersal trawl/seine	£4,000,25	£9,979	£684	£974	£410	£167	£70,654	£9,056	£1,641	£4,661	£67	£0	£15,157
Dredge	£1,715	£4,400	£676	£239,207	£562	£16,653	£0	£135	£0	£0	£0	£300	£73,111
Gears using hooks	£2,965	£37,059	£1,561	£38	£1,021	£111	£201	£25,702	£95	£0	£0	£47	£851
Other passive gears	£0	£112	£7	£0	£31	£70,081	£0	£0	£0	£0	£0	£0	£1,305
Pots and traps	£86,316	£2,550,75	£216,911	£43	£150,728	£3,636	£949	£14,570	£1,691	£0	£0	£39,293	£35,741

Figure 14A.14: Average annual landings values (2011 to 2016) by species and methods in ICES Rectangle 42E7 (MMO)



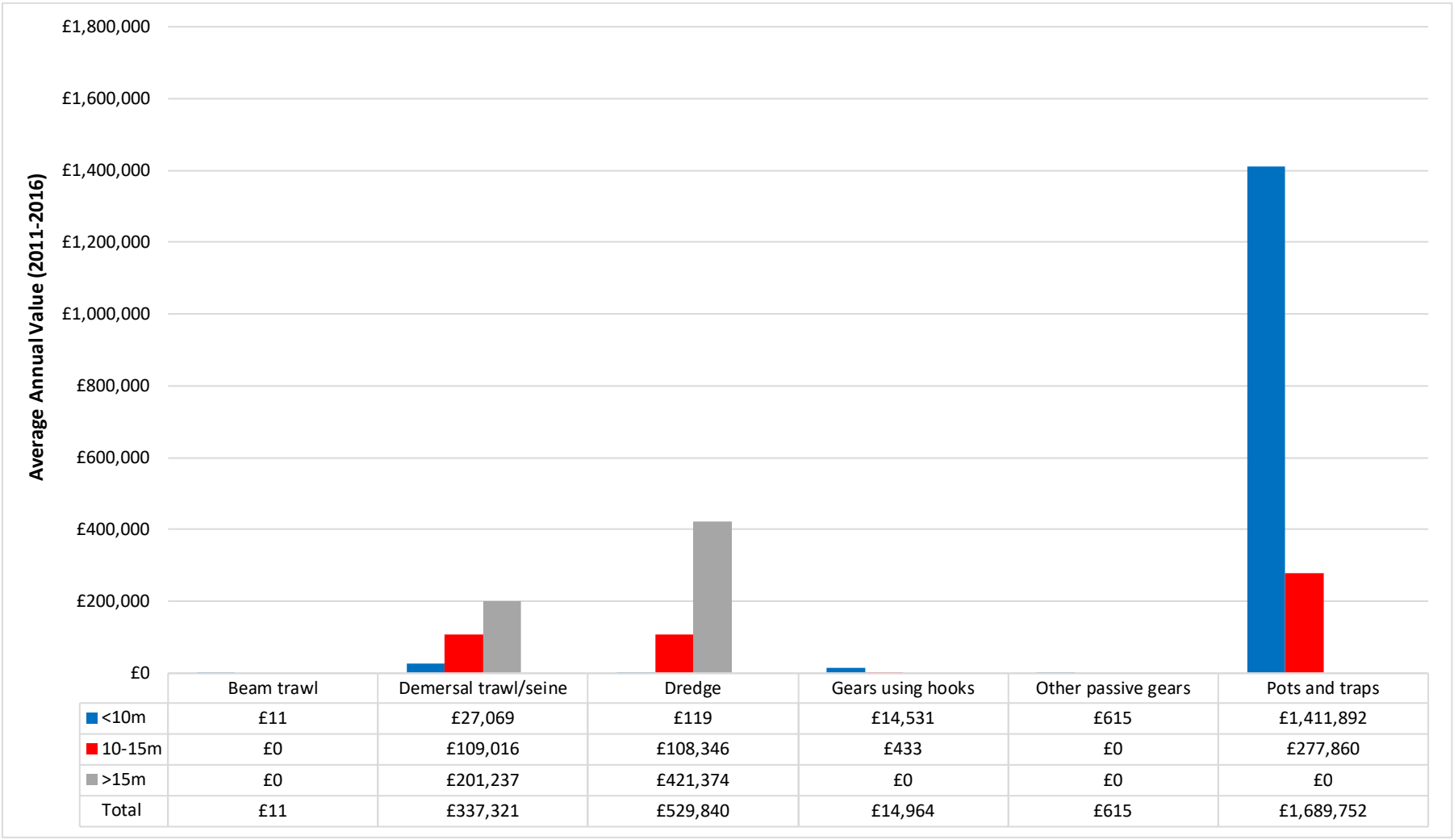
	Nephrops	Lobsters	Crabs (C.P.Mixed Sexes)	Scallops	Crabs - Velvet (Swim)	Razor Clam	Squid	Mackerel	Cod	Haddock	Herring	Whelks	Other (all other species)
Beam trawl	£0	£8	£0	£0	£2	£0	£0	£0	£0	£0	£0	£0	£1
Demersal trawl/seine	£144,359	£4,413	£35	£98	£10	£0	£159,021	£19,882	£86	£1,335	£1,258	£0	£6,811
Dredge	£0	£114	£0	£529,430	£0	£72	£0	£0	£0	£0	£0	£0	£248
Drift and fixed nets	£0	£0	£0	£0	£0	£0	£0	£0	£437	£0	£0	£0	£117
Gears using hooks	£0	£5,956	£527	£0	£597	£0	£0	£7,818	£56	£0	£0	£0	£9
Other passive gears	£0	£24	£1	£0	£29	£0	£0	£0	£3	£0	£0	£0	£4
Pots and traps	£7,746	£1,253,68	£246,865	£117	£163,581	£72	£9	£3,376	£5,437	£8	£0	£2,845	£6,215

Figure 14A.15: Average annual landings values (2011 to 2016) by methods and vessel category in ICES Rectangle 41E7 (MMO)



	Beam trawl	Demersal trawl/seine	Dredge	Gears using hooks	Other passive gears	Pots and traps
<10m	0	£919,869	£66,815	£69,651	£57,014	£2,957,853
10-15m	£2,059	£1,888,797	£37,965	£14,521	£0	£141,951
>15m	£0	£1,305,165	£231,979	£0	£0	£1,076
Total	£2,059	£4,113,831	£336,759	£84,172	£57,014	£3,100,879

Figure 14A.16: Average annual landings values (2011 to 2016) by methods and vessel category in ICES Rectangle 42E7 (MMO)



	Beam trawl	Demersal trawl/seine	Dredge	Gears using hooks	Other passive gears	Pots and traps
<10m	£11	£27,069	£119	£14,531	£615	£1,411,892
10-15m	£0	£109,016	£108,346	£433	£0	£277,860
>15m	£0	£201,237	£421,374	£0	£0	£0
Total	£11	£337,321	£529,840	£14,964	£615	£1,689,752

Annual Landings

ICES Rectangle 41E7

66 Over the six-year data set both *Nephrops* and lobsters continued to produce the highest landings values within rectangle 41E7 (Figure 14A.17).

67 *Nephrops* landings have shown a degree of variation over the data series. The lowest recorded *Nephrops* landings was in 2013 (£2,648,685) with the highest landings value in the following year (£5,195,466). Despite a decline from 2014 to 2015, landings values remain similar for 2016 (£4,419,722).

68 Lobster landings values within this rectangle have remained stable throughout the data series with some year on year variation, although values have always remained within the £2,000,000 bracket.

69 Edible crab landings values have varied but have increased from 2011 (£190,038) to 2016 (£261,664) which was the largest landings value over the data series.

70 Landing values of scallops have increased from 2011 to 2016 with the largest catch (£397,865) evident in 2016.

71 Velvet crabs landings values show one of decline with a slight increase in 2016. The razor clam fishery was fairly stable until 2015, when landings fell considerably. As of 2016 the fishery seems to be recovering.

72 Landings values for squid are one of substantial variation with highest landings in 2013 (£169,115) followed by the lowest in 2014 (£3,804), landings values then increased in 2015 (£83,775) but declined again in 2016 (£6,340).

73 Mackerel landings values peaked in 2014 (£91,504) but values then decreased to the lowest landings values in 2016 (£25,738).

74 Both cod and haddock landings values have steadily declined over the data series with low values though out.

75 Whelks show the greatest relative increase in landings values across the data series from 2011 (£1,833) to 2016 (£186,877).

ICES Rectangle 42E7

76 Over the 6-year data set lobsters have continuously produced the highest landings values within rectangle 42E7 (Figure 14A.18). The lowest recorded lobster landings were in 2014 (£1,095,741) with landings values increasing in 2016, which recorded the highest values (£1,567,557).

77 Scallops exhibited the second highest landings values within this rectangle but also show a marked year on year increase in catches across the data series. The lowest landings values were in 2011 (£188,092) and the highest in 2016 (£785,411).

78 *Nephrops* landings values have increased over the data series from 2011 (£124,407) to 2016 (£299,011) although in 2013 landings values were at their lowest for this species (£93,073).

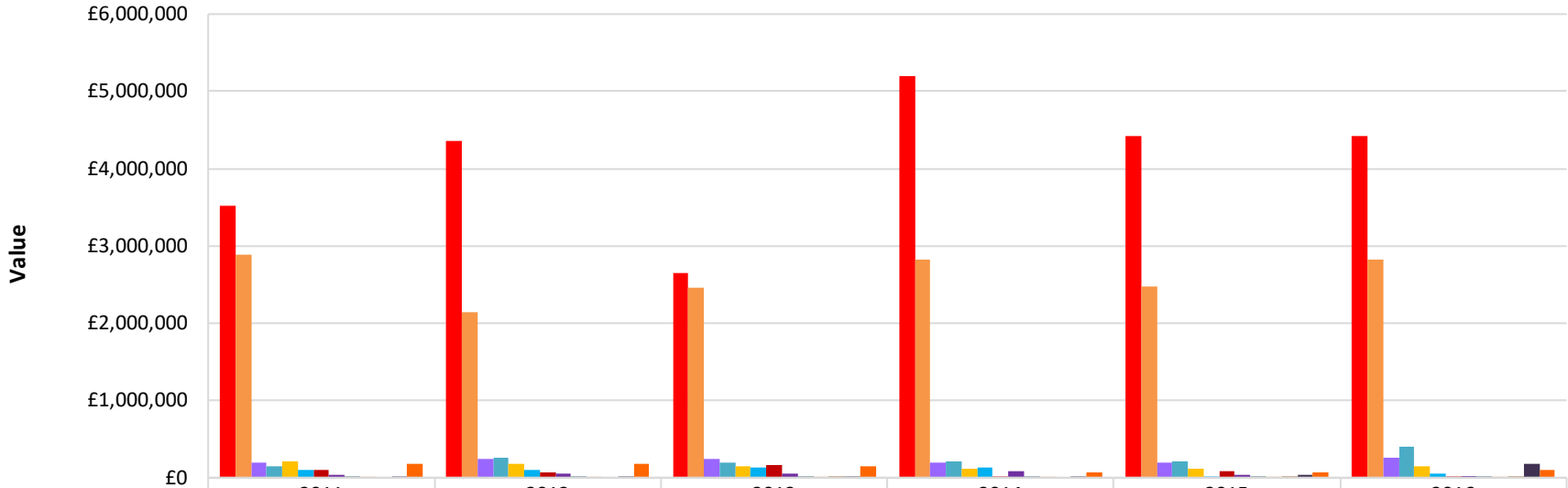
79 Edible crabs landings values have increased over the data series from 2011 (£204,442) to the highest recorded values in 2016 (£303,303).

80 Velvet crabs landings values have decreased from 2011 (£255,893) to 2016 (£146,119).

81 Squid landings values show one of marked fluctuation from year to year with one high landing year followed by a low landing year across the data series. The highest landings were in 2013 (£299,065) and the lowest in 2016 (£40,974).

82 The whelk landings values, although not large, have increased from 2011 (£471) to 2016 (£9,689).

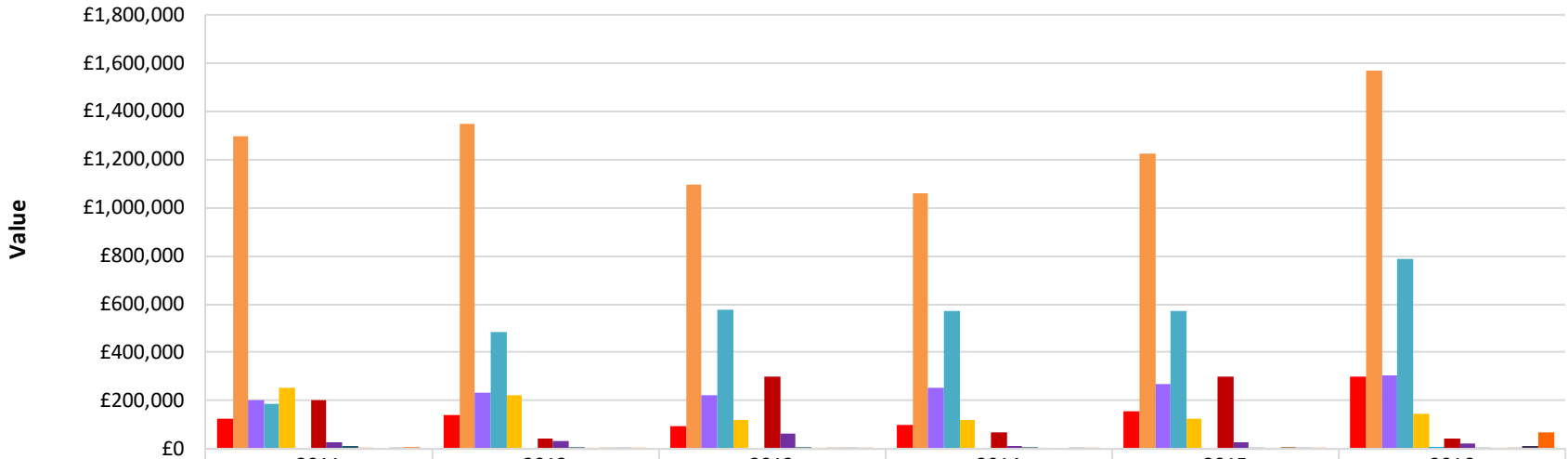
Figure 14A.17: Annual variations in landings values of species in ICES Rectangle 41E7 (MMO)



	2011	2012	2013	2014	2015	2016
Nephrops (Norway Lobster)	£3,518,055	£4,355,776	£2,648,685	£5,195,466	£4,422,172	£4,419,722
Lobsters	£2,882,171	£2,143,851	£2,459,679	£2,819,776	£2,482,073	£2,826,299
Crabs (C.P.Mixed Sexes)	£190,038	£237,908	£236,679	£199,590	£193,154	£261,664
Scallops	£154,286	£255,578	£202,280	£213,681	£217,883	£397,865
Crabs - Velvet (Swim)	£219,003	£177,781	£144,637	£115,570	£119,177	£140,338
Razor Clam	£100,256	£101,990	£139,860	£128,659	£12,903	£60,217
Squid	£100,368	£67,420	£169,115	£3,804	£83,775	£6,340
Mackerel	£38,090	£53,047	£48,346	£91,504	£40,062	£25,738
Cod	£6,382	£4,756	£2,031	£3,920	£2,048	£1,427
Haddock	£9,948	£7,595	£3,899	£5,759	£563	£200
Herring	£0	£0	£120	£0	£255	£25
Whelks	£1,833	£1,966	£5,276	£6,861	£35,030	£186,877
Other (all other species)	£180,312	£181,471	£153,908	£67,475	£75,965	£97,856

Year / species

Figure 14A.18: Annual variations in landings values of species in ICES Rectangle 42E7 (MMO)



	2011	2012	2013	2014	2015	2016
Nephrops (Norway Lobster)	£124,407	£141,754	£93,073	£98,351	£156,033	£299,011
Lobsters	£1,295,874	£1,345,560	£1,095,741	£1,058,376	£1,222,107	£1,567,557
Crabs (C.P.Mixed Sexes)	£204,442	£232,862	£222,758	£253,204	£267,999	£303,303
Scallops	£188,092	£486,527	£575,195	£573,142	£569,505	£785,411
Crabs - Velvet (Swim)	£255,893	£221,591	£118,575	£117,943	£125,193	£146,119
Razor Clam	£0	£0	£0	£0	£0	£867
Squid	£201,729	£45,361	£299,065	£69,239	£297,812	£40,974
Mackerel	£28,604	£33,781	£62,841	£11,628	£28,320	£21,281
Cod	£12,934	£5,343	£6,688	£6,568	£3,879	£702
Haddock	£7,075	£686	£158	£70	£9	£62
Herring	£0	£88	£30	£0	£6,596	£837
Whelks	£471	£1,400	£2,068	£2,084	£1,357	£9,689
Other (all other species)	£7,868	£944	£2,137	£638	£1,116	£67,727

Year / species

Seasonality

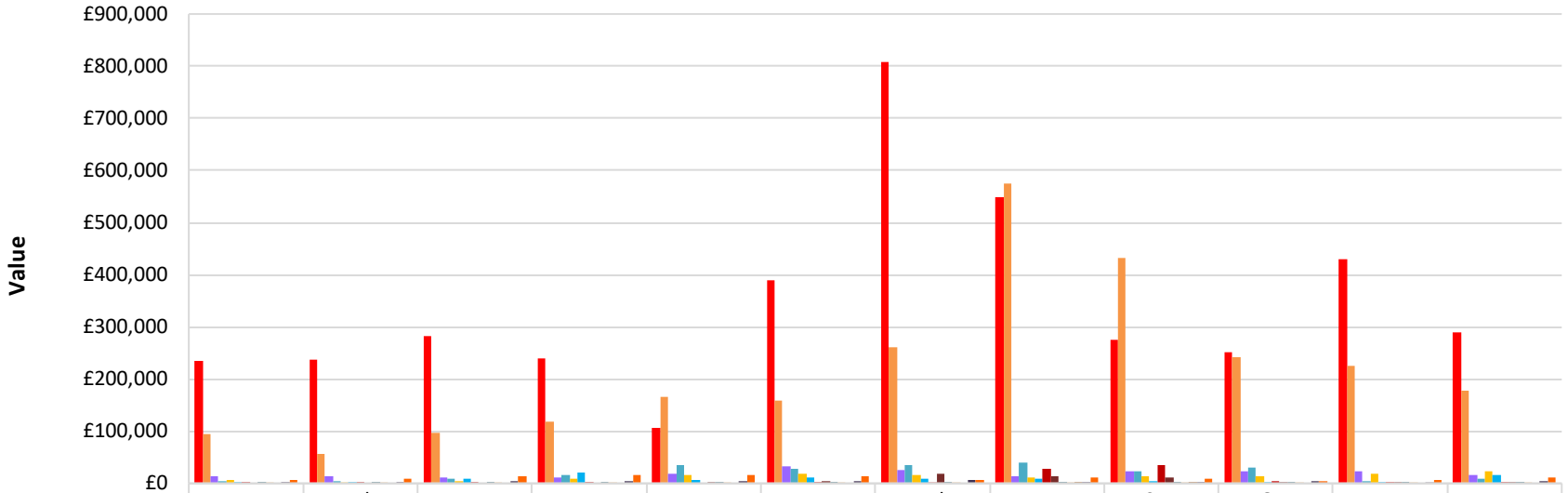
ICES Rectangle 41E7

83 In rectangle 41E7, total landings were generally highest in the summer months with *Nephrops* landings highest in July (£803,881) and lobsters in August (£574,031) (Figure 14A.19). Landings of edible crabs were highest in June (£32,619) whereas velvet crabs were highest in December (£24,344). Scallops landings were highest in August (£39,970) although May also produced comparatively high landings values (£35,309). There is a distinct seasonal period for squid landings of August (£28,263) and September (£34,723) with numbers reducing in October (£4,488) and low catches reported for the remainder of the year. Mackerel catches were highest in July (£17,657) and August (£14,735) with zero landings values from January to April. Landings values for whelks were highest in July (£7,306) with values for the remainder of the year comparatively lower with January (£188) producing the lowest landings values.

ICES Rectangle 42E7

84 Generally, landings in 42E7 peaked in the summer months (Figure 14A.20). Lobster landings were at their highest in August (£266,954) and September (£211,040), and lowest in February (£18,833). *Nephrops* landings values were highest in July (£35,168) and August (£27,247), with lowest landings in May (£1,811). Although edible crab landings were fairly consistent from June to December, values peaked in September (£32,333). January (£13,736) and February (£13,820) recorded the lowest edible crab landings values. Velvet crabs exhibited highest landings in November (£20,765) and December (£34,305). Squid landings exhibited distinct seasonal landings over the summer period with highest landings in August (£79,010); notably zero catches were recorded from January to May. Mackerel also showed a distinct summer season with highest recorded landings in August (£10,910) and September (£10,551). Landings then reduced markedly with zero landings recorded from January to April. Landings values for whelks was highest in July (£1,046) and June (£933), with comparably low landings for the remainder of the year.

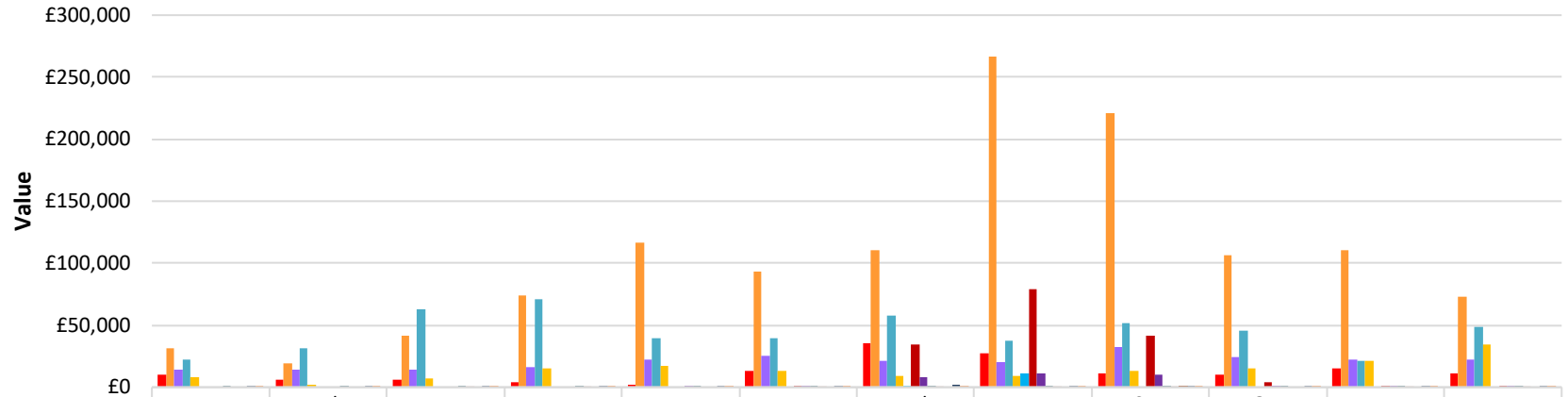
Figure 14A.19: Average annual (2011-2016) seasonality of species in ICES Rectangle 41E7 (MMO)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Nephrops (Norway Lobster)	£234,323	£236,921	£282,634	£239,975	£105,535	£388,848	£806,881	£549,775	£275,714	£252,375	£430,518	£289,813
Lobsters	£94,340	£55,560	£96,184	£117,578	£164,973	£158,991	£260,843	£574,031	£433,400	£242,702	£226,170	£177,537
Crabs (C.P.Mixed Sexes)	£12,630	£12,872	£12,068	£10,864	£18,428	£32,619	£24,845	£13,262	£22,361	£22,094	£22,695	£15,100
Scallops	£4,917	£4,572	£7,751	£17,148	£35,309	£28,240	£34,557	£39,970	£24,170	£30,177	£4,802	£8,648
Crabs - Velvet (Swim)	£6,728	£2,750	£5,264	£8,537	£15,405	£17,341	£15,861	£11,364	£12,680	£13,774	£18,703	£24,344
Razor Clam	£679	£2,285	£7,917	£20,655	£7,251	£12,465	£9,297	£8,807	£3,426	£1,169	£1,702	£14,994
Squid	£93	£10	£8	£36	£0	£12	£2,904	£28,263	£34,723	£4,488	£667	£600
Mackerel	£0	£0	£0	£0	£111	£3,174	£17,657	£14,735	£11,764	£1,930	£88	£6
Cod	£196	£156	£141	£245	£233	£228	£355	£531	£217	£266	£335	£526
Haddock	£26	£101	£61	£66	£496	£742	£835	£708	£358	£268	£117	£882
Herring	£0	£0	£0	£0	£0	£0	£0	£4	£63	£0	£0	£0
Whelks	£188	£867	£3,273	£5,181	£4,313	£5,174	£7,306	£1,385	£2,047	£3,677	£2,919	£3,311
Other (all other species)	£6,201	£10,112	£14,809	£15,308	£16,624	£13,045	£7,482	£11,701	£8,662	£5,162	£6,684	£10,375

Month / species

Figure 14A.20: Average annual (2011-2016) seasonality of species in ICES Rectangle 42E7 (MMO)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Nephrops (Norway Lobster)	£10,491	£6,215	£6,210	£3,885	£1,811	£12,857	£35,168	£27,247	£10,892	£10,109	£15,681	£11,539
Lobsters	£30,899	£18,833	£41,194	£74,302	£116,437	£93,678	£110,931	£266,954	£221,040	£106,413	£110,925	£72,597
Crabs (C.P.Mixed Sexes)	£13,736	£13,820	£14,016	£16,220	£22,639	£25,016	£21,427	£19,893	£32,333	£23,850	£22,594	£21,883
Scallops	£22,650	£31,358	£62,574	£70,784	£39,909	£39,951	£57,338	£37,688	£51,678	£45,319	£21,319	£49,077
Crabs - Velvet (Swim)	£8,089	£2,155	£6,899	£15,421	£17,692	£13,027	£9,130	£8,936	£12,741	£15,058	£20,765	£34,305
Razor Clam	£0	£0	£0	£0	£0	£0	£145	£11,118	£0	£0	£0	£0
Squid	£0	£0	£0	£0	£0	£83	£34,854	£79,010	£41,132	£3,636	£79	£237
Mackerel	£0	£0	£0	£0	£87	£730	£7,695	£10,910	£10,551	£857	£21	£224
Cod	£572	£356	£275	£487	£742	£569	£346	£613	£615	£702	£494	£247
Haddock	£0	£0	£9	£32	£0	£750	£126	£346	£53	£0	£1	£26
Herring	£0	£0	£0	£0	£0	£0	£0	£0	£212	£0	£0	£0
Whelks	£77	£127	£253	£216	£143	£172	£1,540	£136	£66	£23	£54	£38
Other (all other species)	£299	£34	£80	£74	£8	£933	£238	£1,046	£182	£102	£114	£222

Month / species

14A.5.2 Landings Values by Port

85 The total average annual landings for all ports in rectangle 41E7 was three times that of 42E7. The top 20 ports contributed 97.7% and 99.7% of total landings values in 41E7 and 42E7, respectively. Rectangle 41E7 represented over 90% of total incomes in seven of the top 20 ports, compared to 42E7 which represented over 90% of total income in one of the top 20 ports. Thus, fishers working in 41E7 may be more dependent on grounds in this rectangle, compared to fishers working in 42E7, who are likely to also utilise grounds in other ICES rectangles.

86 During the period 2011-2016, 39.5% of landings from rectangle 41E7 were landed to the port of Pittenweem, representing 95.7% of the port's total income. The second highest percentage of landings from this rectangle (14.7%) was to Dunbar, which represented 81.3% of the port's total income. Landings from 41E7 also accounted for 90% of the total income for the following 6 ports: Crail, St Andrews, Anstruther, St. Monans, North Berwick and Methil and Leven (Table 14A.3).

87 During the period 2011-2016, 36.8% of landings from rectangle 42E7 were landed to the port of Arbroath, representing 65% of the port's total income. The second highest percentage of landings from this rectangle (13.8%) was to Gourdon, which represented 95.6% of the port's total income. Landings from 42E7 also accounted for over 75% of the total income for the following three ports: Stonehaven; Johnshaven; and North Queensferry *(*Table 14A.4).

Table 14A.3: Top 20 ports by landings values from ICES Rectangle 41E7 (MMO)

Port	Average annual landings values (£) in 41E7	% of average annual values in 41E7	Total average annual port value (£)	% of total average annual port value that 41E7 represents
Pittenweem	£3,039,487	39.5%	£3,175,845	95.7%
Dunbar	£1,134,309	14.7%	£1,394,565	81.3%
Eyemouth	£856,222	11.1%	£2,797,708	30.6%
Arbroath	£445,321	5.8%	£1,456,902	30.6%
Port Seton	£376,632	4.9%	£1,071,298	35.2%
Crail	£282,699	3.7%	£283,774	99.6%
St Andrews	£262,662	3.4%	£267,253	98.3%
Anstruther	£233,287	3.0%	£239,082	97.6%
Fraserburgh	£136,839	1.8%	£36,196,912	0.4%
Methil and Leven	£133,679	1.7%	£170,957	78.2%

Port	Average annual landings values (£) in 41E7	% of average annual values in 41E7	Total average annual port value (£)	% of total average annual port value that 41E7 represents
Peterhead	£97,831	1.3%	£146,865,991	0.1%
North Berwick	£88,610	1.2%	£97,017	91.3%
Aberdeen	£80,310	1.0%	£1,154,581	7.0%
St Monance	£72,007	0.9%	£75,271	95.7%
North Shields	£61,116	0.8%	£6,429,924	1.0%
Montrose	£60,329	0.8%	£404,066	14.9%
Cove (Leith)	£58,615	0.8%	£156,291	37.5%
West Wemyss	£37,277	0.5%	£41,314	90.2%
Burntisland	£30,894	0.4%	£75,683	40.8%
Newhaven (Scotland)	£30,540	0.4%	£83,595	36.5%

Table 14A.4: Top 20 ports by landings values from ICES Rectangle 42E7 (MMO)

Port	Average annual landings values (£) in 42E7	% of average annual values in 42E7	Total average annual port value (£)	% of total average annual port value that 42E7 represents
Arbroath	£946,386	36.8%	£1,456,902	65.0%
Gourdon	£354,810	13.8%	£370,955	95.6%
Aberdeen	£277,578	10.8%	£1,154,581	24.0%
Montrose	£250,627	9.7%	£404,066	62.0%
Stonehaven	£210,323	8.2%	£270,539	77.7%
Johnshaven	£172,973	6.7%	£192,753	89.7%
Peterhead	£165,126	6.4%	£146,865,991	0.1%
Fraserburgh	£89,797	3.5%	£36,196,912	0.2%
Pittenweem	£40,695	1.6%	£3,175,845	1.3%

Port	Average annual landings values (£) in 42E7	% of average annual values in 42E7	Total average annual port value (£)	% of total average annual port value that 42E7 represents
Eyemouth	£11,301	0.4%	£2,355,565	0.5%
Buckie	£10,872	0.4%	£2,242,232	0.5%
Cove (Aberdeen)	£7,965	0.3%	£32,725	24.3%
North Queensferry	£5,304	0.2%	£6,343	83.6%
Hartlepool	£5,224	0.2%	£251,979	2.1%
Anstruther	£4,918	0.2%	£46,531	10.6%
Catterline	£3,882	0.2%	£35,715.4	10.9%
Macduff	£2,493	0.1%	£344,541	0.7%
Methil and Leven	£2,179	0.1%	£29,581	7.4%
Unknown	£1,873	0.1%	£7,570	24.7%
North Shields	£1,735	0.1%	£3,976,310	0.0%

14A.6 UK Satellite Tracking (VMS) Data

88 UK satellite data was obtained from the MMO for the period 2011 to 2015. For this period, VMS data was available only for vessels of 15 m and over. The data is not broken down by method due to concerns over data protection.

89 An additional year of data for 2016 was obtained from ICES; this gives the most recent fishing data available for the 12 m and over fleet.

14A.6.1 National Overview

90 MMO VMS data shows that larger category vessels (over 15 m) generally worked offshore during the period 2011-2015, particularly in waters off north west Scotland, north east Scotland, and off south west Scotland (Argyll and Bute) (ICES rectangle 39E4) (Figure 14A.21). Landings from vessels over 15 m were relatively low in the Regional Study Area, compared to other areas of Scotland, suggesting that fewer larger category vessels operate in this area. However, moderate landings were recorded north-east of North Berwick and Dunbar (ICES rectangle 41E7), and to the east of Arbroath and Montrose (ICES rectangle 42E8).

91 ICES data for (Figure 14A.22; which includes over 12 m vessels) shows increased fishing activity to the south and north east of the Development Area (rectangles 41E7 and 42E8,

respectively) compared to MMO VMS data for the period 2011-2015 (Figure 14A.21). This, however, may be partly attributed to the inclusion of vessels between 12-15 m in ICES 2016 data which was not included in the MMO VMS data, rather than a change in fishing patterns.

92 In summary, MMO VMS data for Scotland shows that the Regional Study Area is not targeted as intensively by the over 15 m fleet compared to other areas within Scottish waters. The ICES data which includes 12-15 m vessels for 2016 would instead suggest that vessels operating in the Regional Study Area tend to be 12-15 m in length.

Figure 14A.21: VMS density (all fishing) value (Average 2011 to 2015) in the National Study Area (MMO)

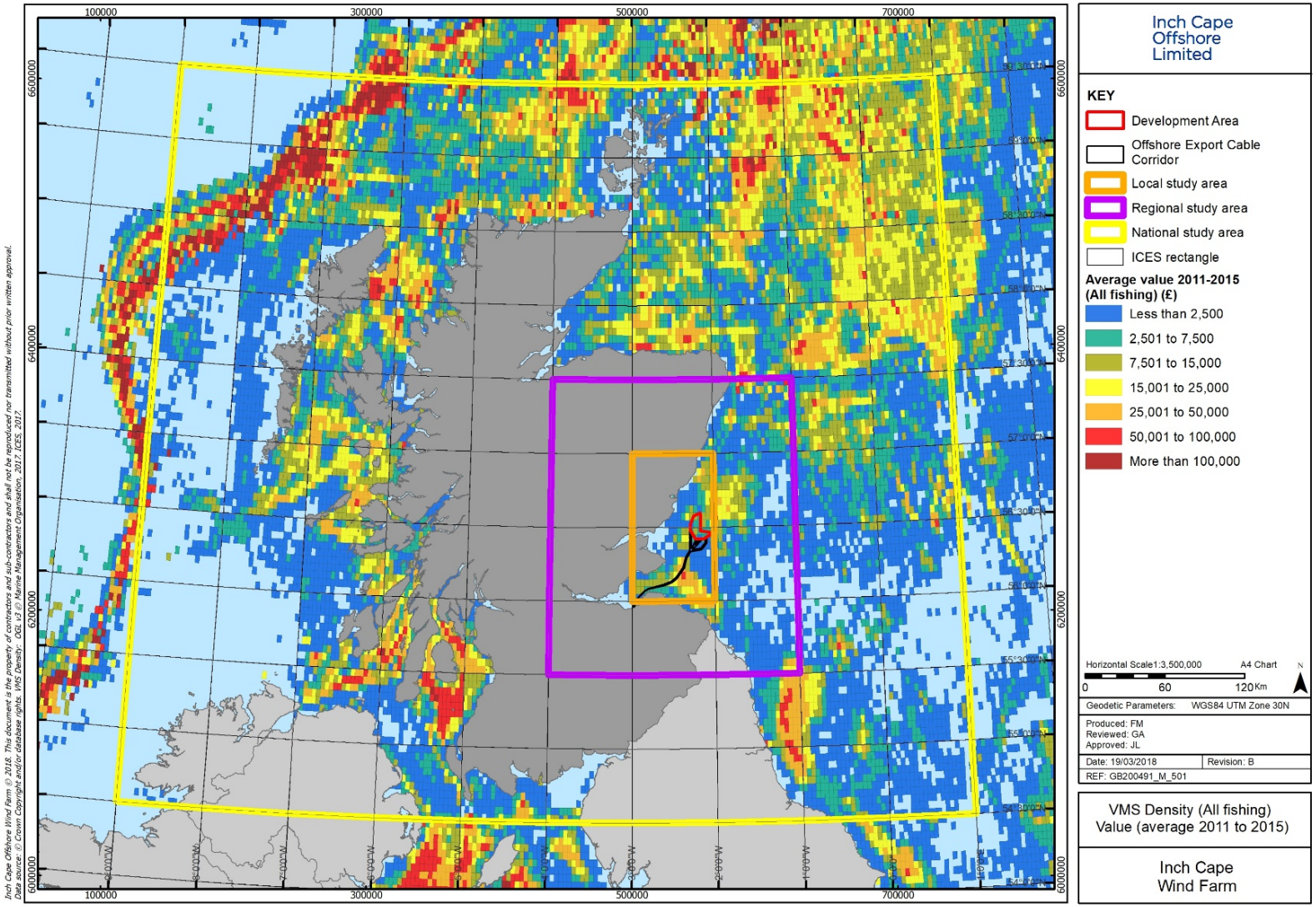
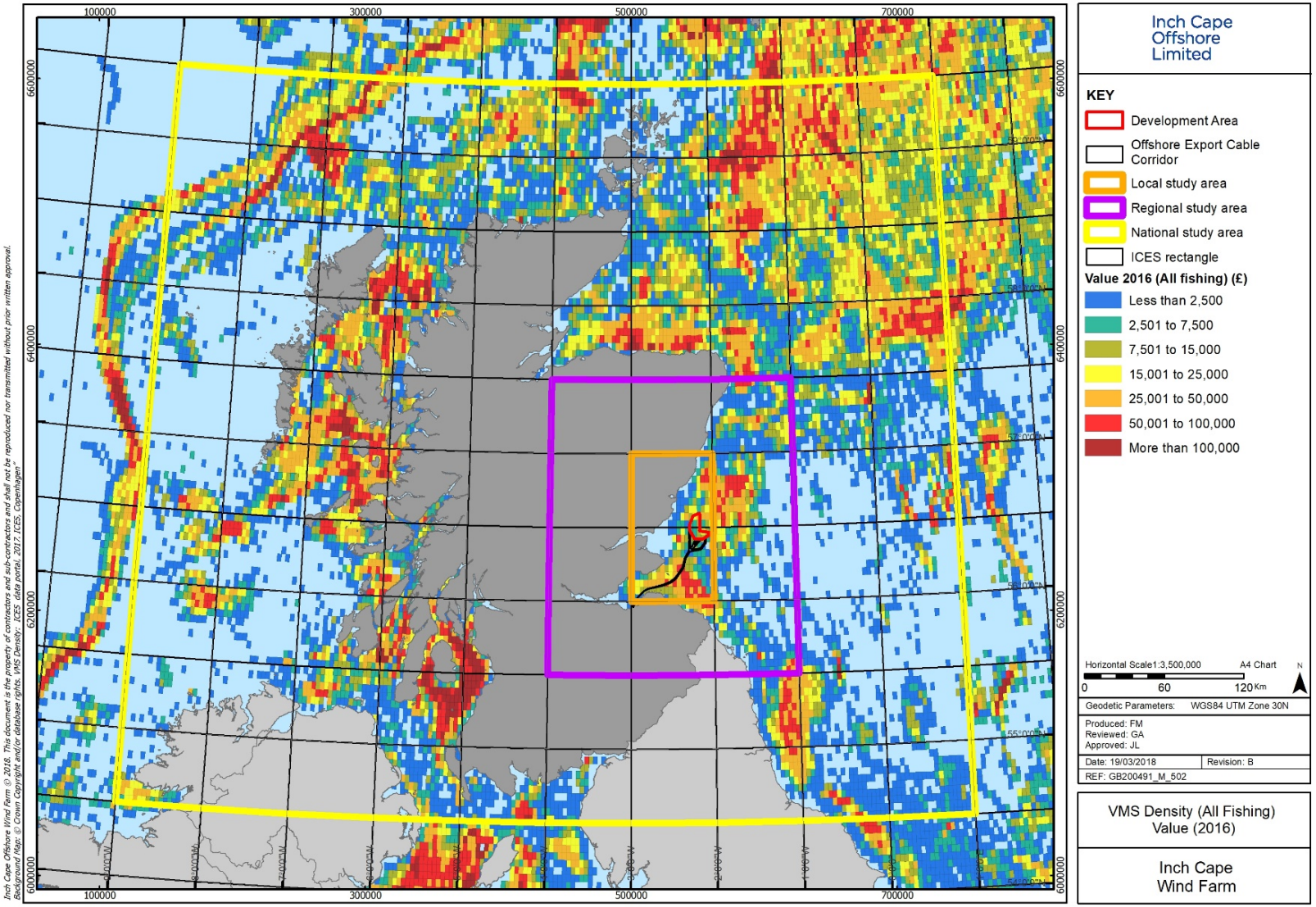


Figure 14A.22: VMS density (all fishing) value (2016) in the National Study Area (ICES)



14A.6.2 Regional and Local Overview

93 When the VMS data is broken down by gear type a clearer picture emerges as to the location of important fisheries within ICES rectangles, in the Regional Study Area.

94 For demersal gear types (Figures 14A.23 and 14A.24) concentrations of activity (by landing values) can be seen. Given that most of the demersal trawlers in this area are targeting Nephrops, this data provides evidence of the spatial distribution of Nephrops fishing in the Regional Study Area. Concentrations of activity can be seen to the south west of 41E7, around the mouth of the Firth of Forth, through which the Offshore Export Cable Corridor passes, and this area of concentrated activity extends south westerly as far as Eyemouth. A lesser concentration of activity in 42E7 can also be seen, to the north east of the Development along the coast between Inverbervie and Stonehaven.

95 In 2016 ICES fisheries intensity data (Figure 14A.24) shows a higher intensity of demersal trawling in rectangle 41E7 than the MMO data for 2011-2015 (Figure 14A.23). This is likely to be as a result of the inclusion of vessels of 12-15 m in the ICES data rather than an increase in activity in 2016, as landings in 2016 in this area were not markedly higher than the 2011-2015 average. It is also worth noting that vessels of 16.77 m (for anything other than herring, mackerel and sprat) are not allowed to fish within the Firth of Forth (see Figure 14A.2), hence the ICES VMS data show more activity within the Firth of Forth for vessels as it includes the landings of vessels of between 12-15 m in length.

96 For dredge, which corresponds to scallop dredging, the average landings values for vessels over 15 m operating dredge gears in the Regional Study Area were low across the entire Study Area (Figure 14A.25). In comparison, Figure 14A.26, which presents data for the over 12 m fleet in 2016, shows concentrations of higher landings values for dredgers, particularly in Montrose (42E8), Arbroath (43E8) and the Moray Firth (45E7). Vessels over 12 m operating in ICES rectangle 42E8 frequently landed >£100,000 worth of fish. This suggests that the majority of vessels using dredge gears in the Regional Study Area are 12-15 m in length.

97 The distribution of dredge gears coincides with concentrations of scallop landings; for example, rectangle 42E8 (within the Regional Study Area, north west of the Development Area) had the second highest scallop landings value (£1,418,659) nationally.

98 While VMS data is available for creeling, this has not been presented due to the low number of creeling vessels over 25m in length.

Figure 14A.23: VMS density by value for demersal gears (2011 – 2015) (MMO)

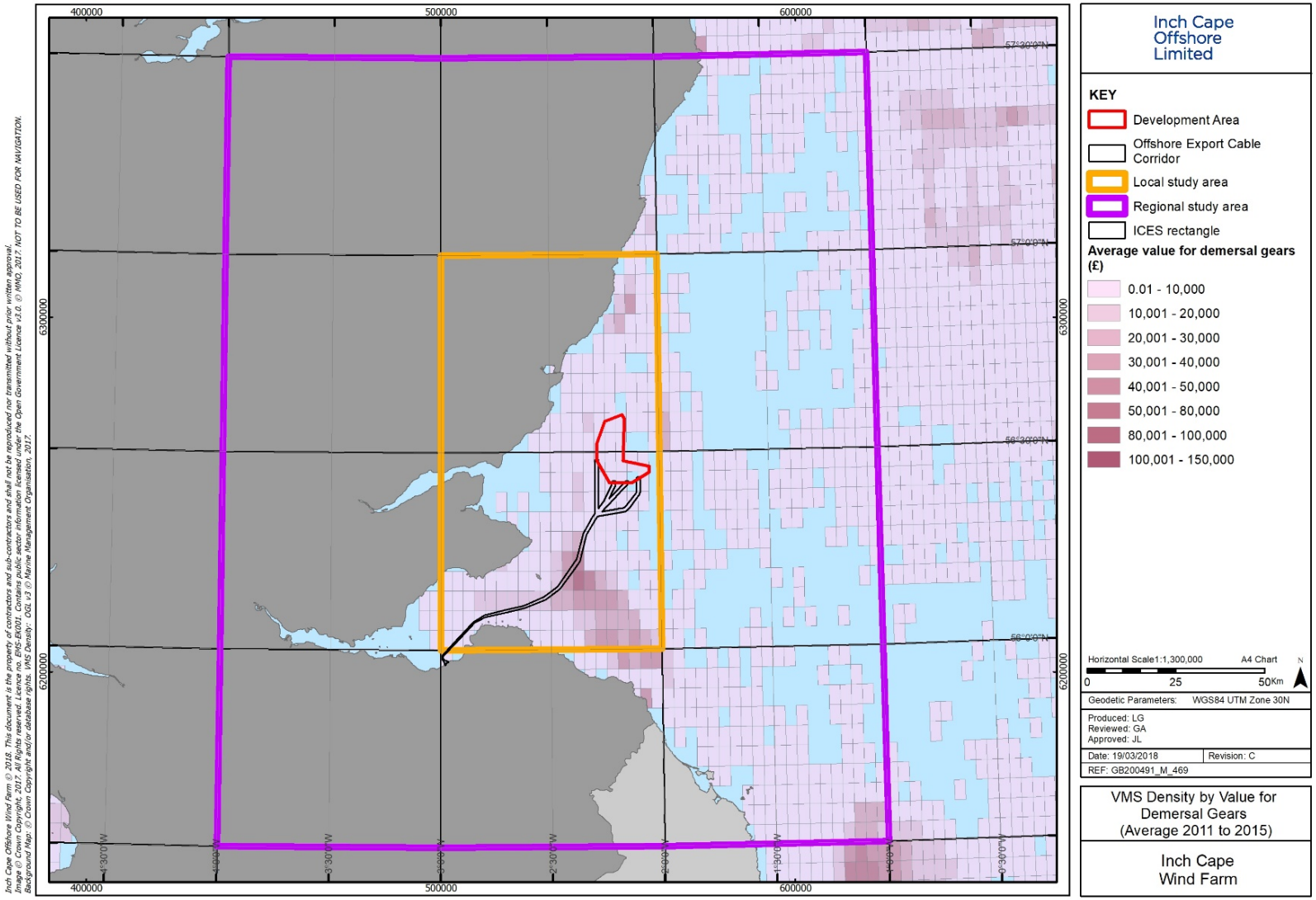


Figure 14A.24: VMS density by fishing intensity for *Nephrops* (2016) (ICES)

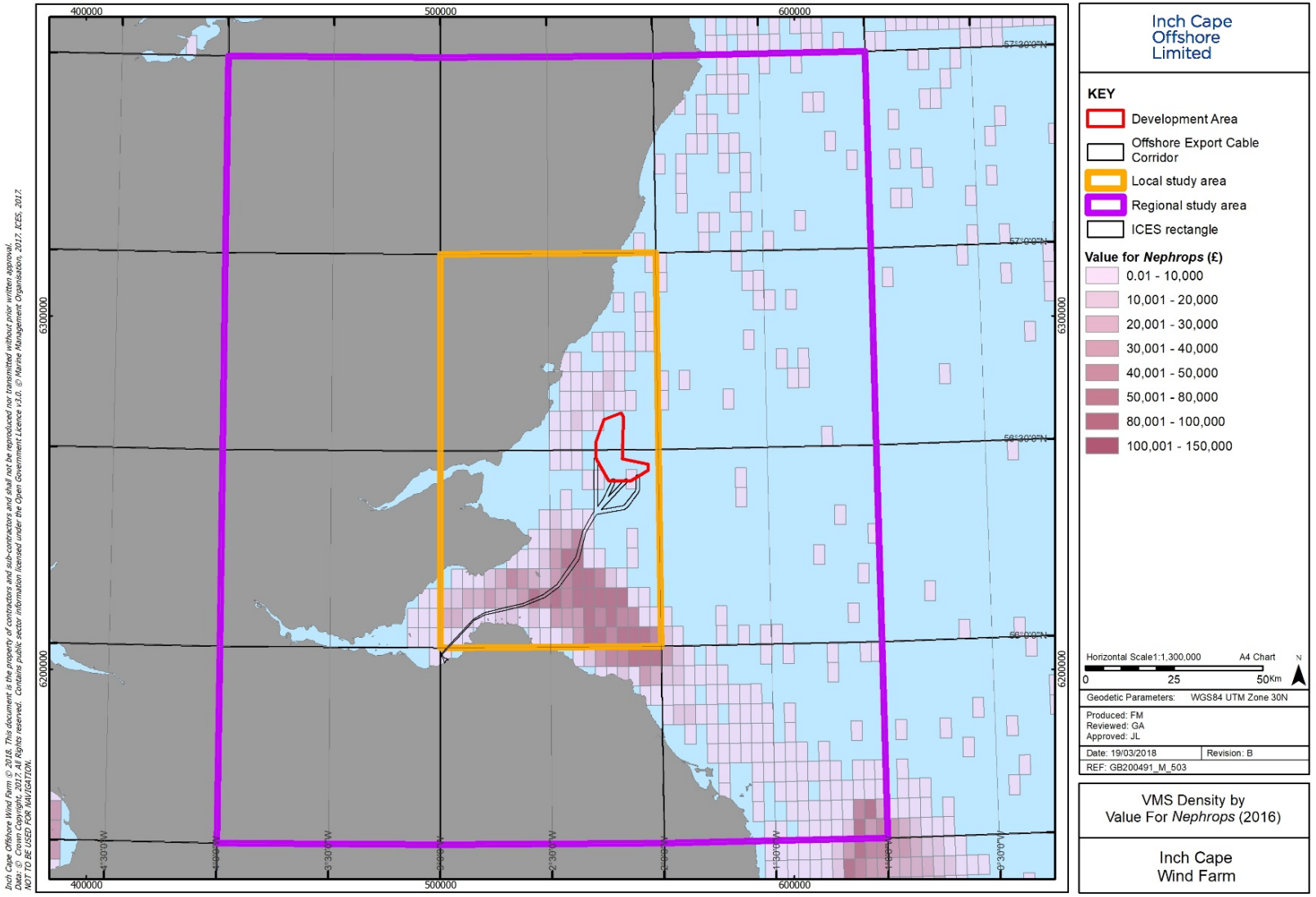


Figure 14A.25: VMS density by value for dredge (2011 – 2015)

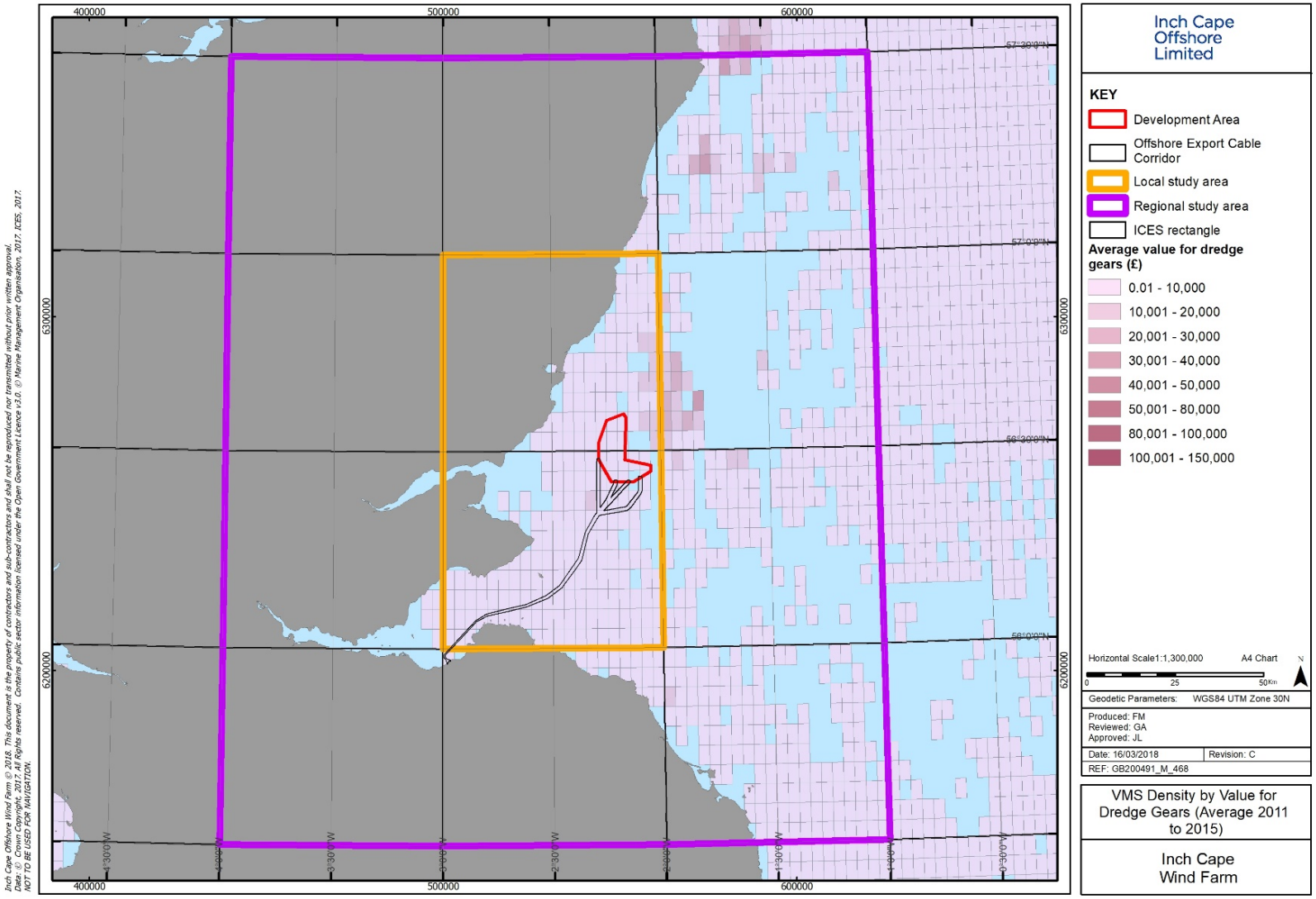
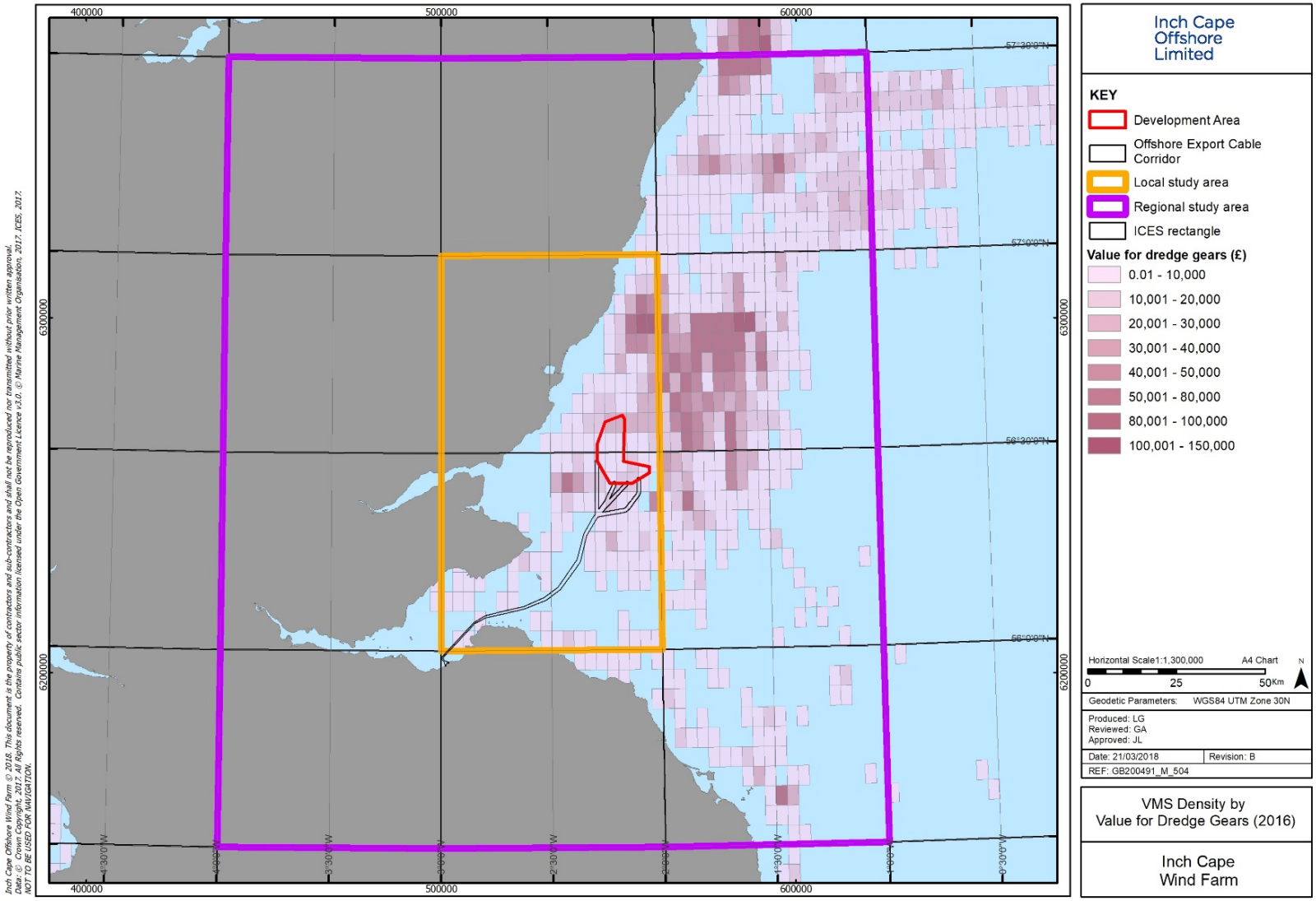


Figure 14A.26: VMS density by fishing intensity for dredge (2016)



14A.7 Marine Scotland VMS data

99 As described in *Section 14A.3.2* Marine Scotland also provided satellite tracking data using VMS data for over 15 m vessels targeting specific fisheries, namely *Nephrops* (mobile and static gear), demersal fish (mobile and static gear), mackerel and herring (pelagic), crab, lobster, scallop and squid for the periods 2009 to 2013 (Kafas *et al.,* 2013).

100 According to this data scallop fishing between 2009 and 2013 occurred across the whole of rectangle 41E7 (Figure 14A.27), with the most valuable areas being towards the north-eastern boundary, adjacent to the northern section of the Offshore Export Cable Corridor. In rectangle 42E7, high intensity scallop fishing occurs in and around the Development Area, with areas of lower intensity along the coastal fringe.

101 Highest intensity fishing for Nephrops occurs in the south-eastern areas of ICES rectangle 41E7 (Figure 14A.28), overlapping the Offshore Export Cable Corridor. Low intensity Nephrops fishing occurs in rectangle 42E7.

102 Low intensity fishing for squid occurs in rectangle 41E7, with slightly higher landings values in the south-easterly corner (Figure 14A.29). Rectangle 42E7 shows an area of greater fishing intensity in the north-east corner and an area of low intensity in the south-east corner. The majority of squid fishing in rectangles 41E7 and 42E7 is of low intensity.

103 Kafas *et al.* (2013) data for pelagic fisheries (mackerel and herring), crab and lobster have not been presented in this baseline, as these fisheries occur at either a low intensity (hence no pattern can be seen) or are targeted by under 15m vessels, hence the maps provide no detail on the distribution of fishing in the Regional Study Area.

104 Additional data was provided by Marine Scotland for scallop annual fishing intensity each year between 2006 and 2016 (Figure 14A.30) which demonstrate the annual variations in scallop fishing dredging activity, but overall gradual shift in the most intensively fished areas offshore of the Development Area.

Figure 14A.27: Scallop fishing by intensity (over 15 m - 2009 to 2013) in the Regional Study Area (Marine Scotland; Kafas *et al.* 2013)

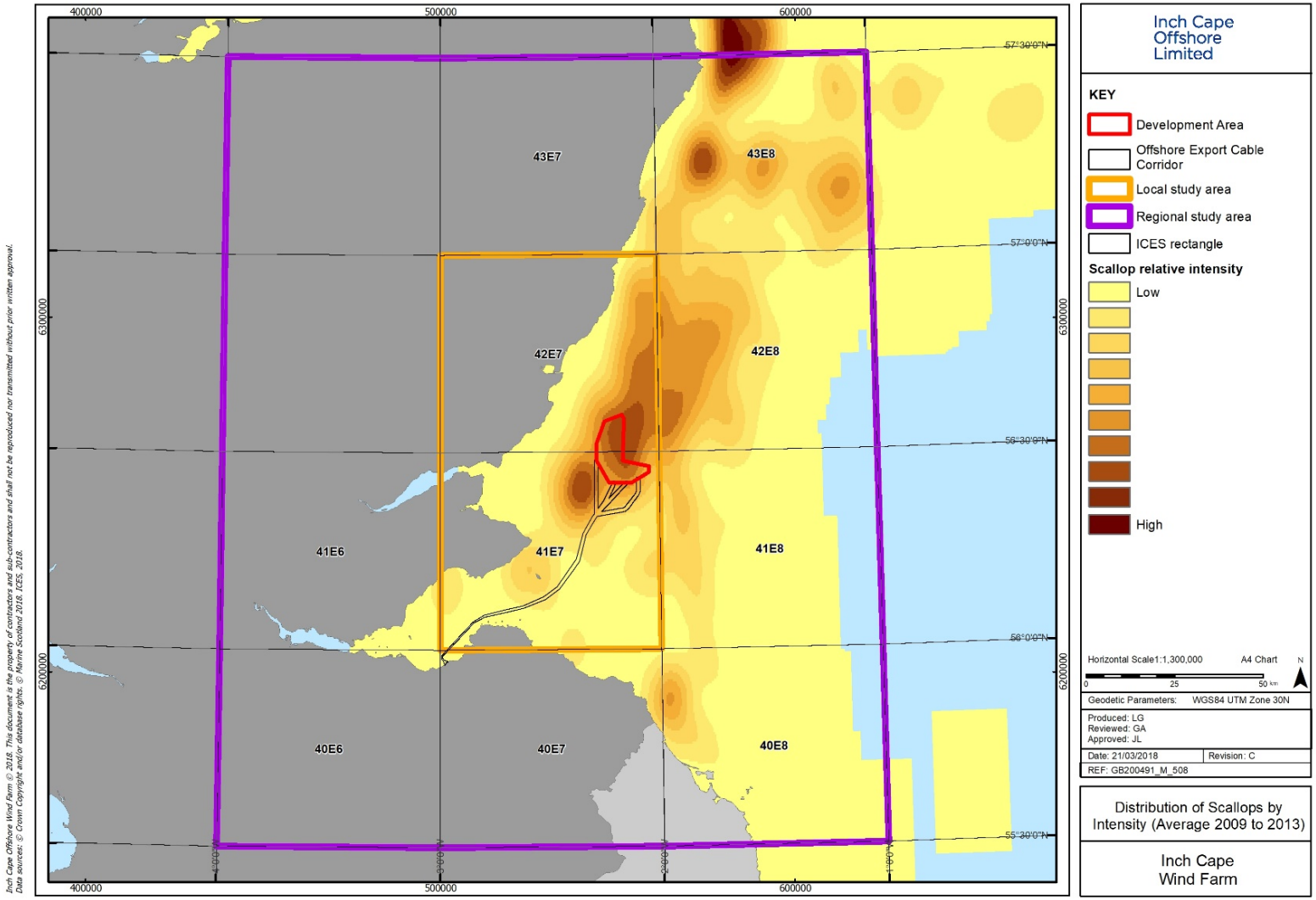


Figure 14A.28: *Nephrops* fishing by intensity (Over 15m - 2009 to 2013) in the Regional Study Area (Marine Scotland; Kafas *et al.* 2013)

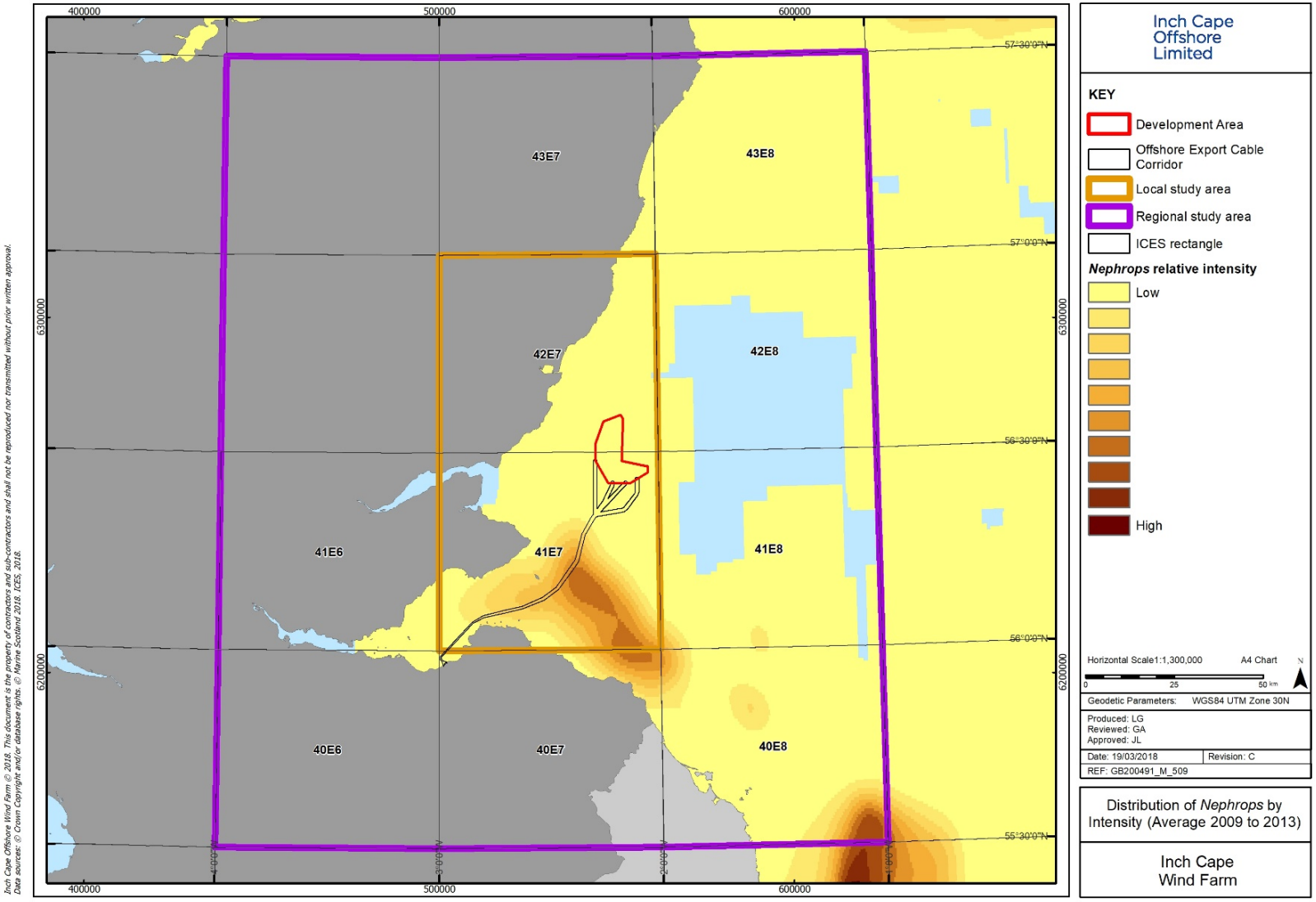


Figure 14A.29: Squid fishing by intensity (over 15m - 2009 to 2013) in the Regional Study Area (Marine Scotland; Kafas *et al.* 2013)

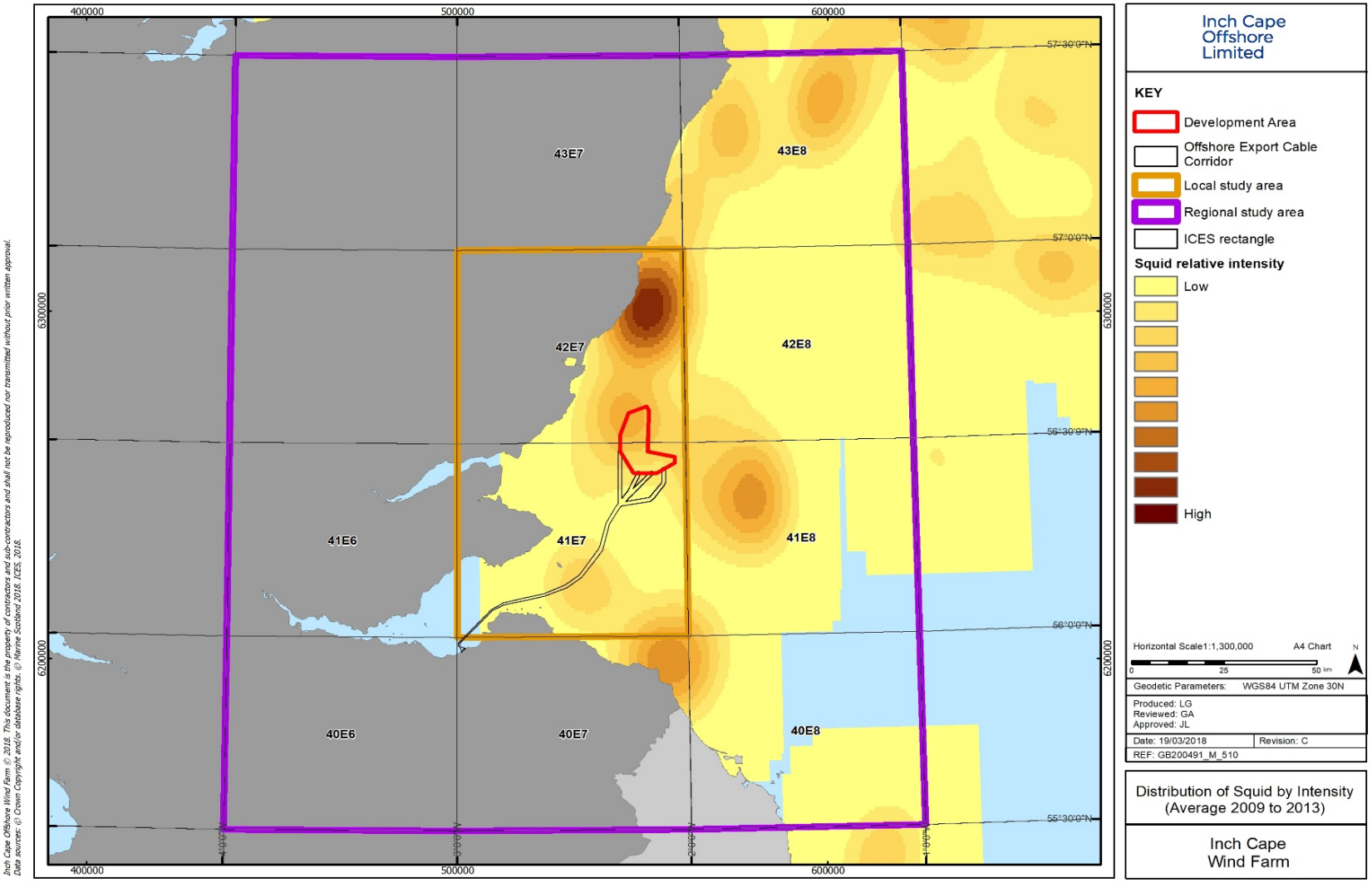
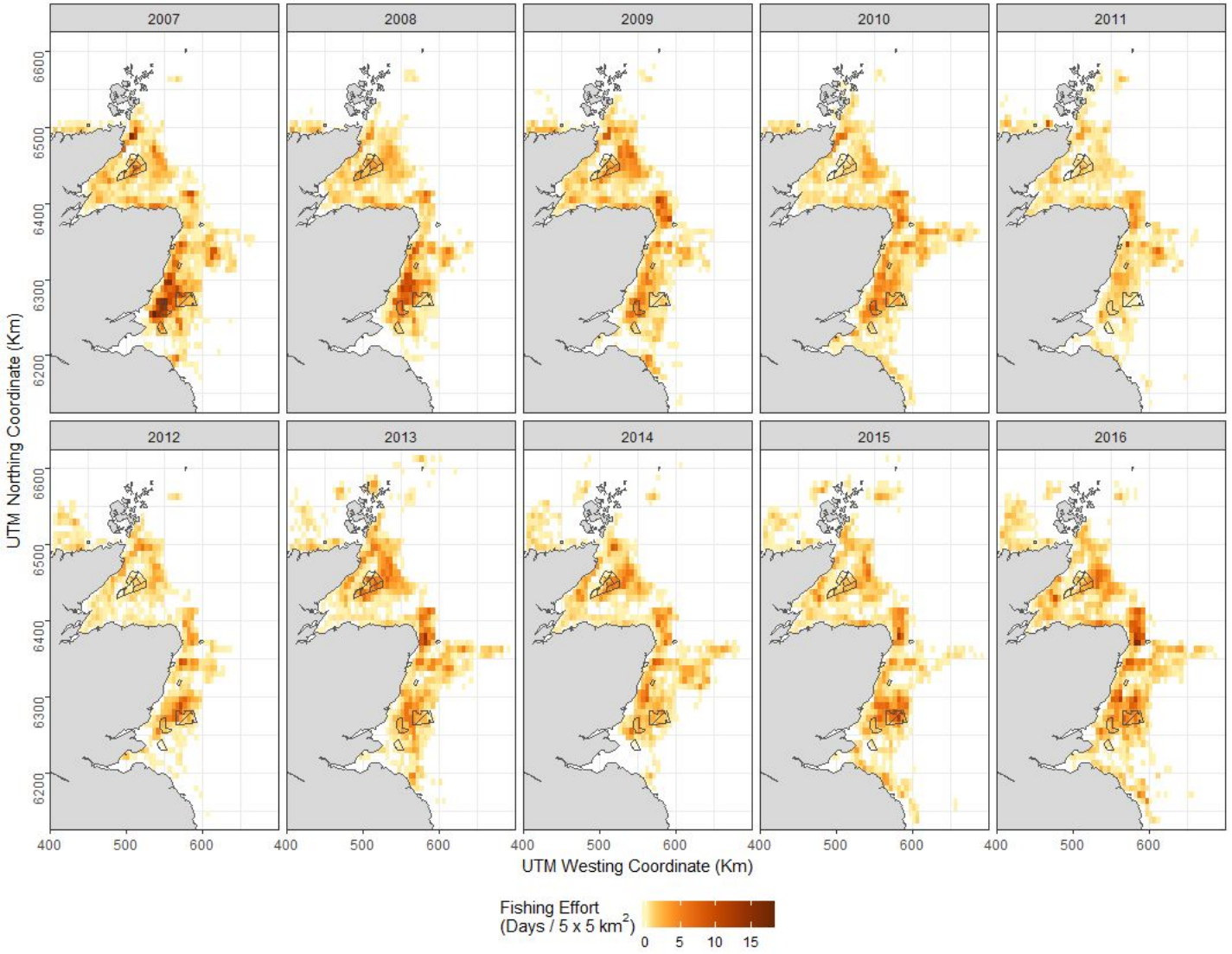


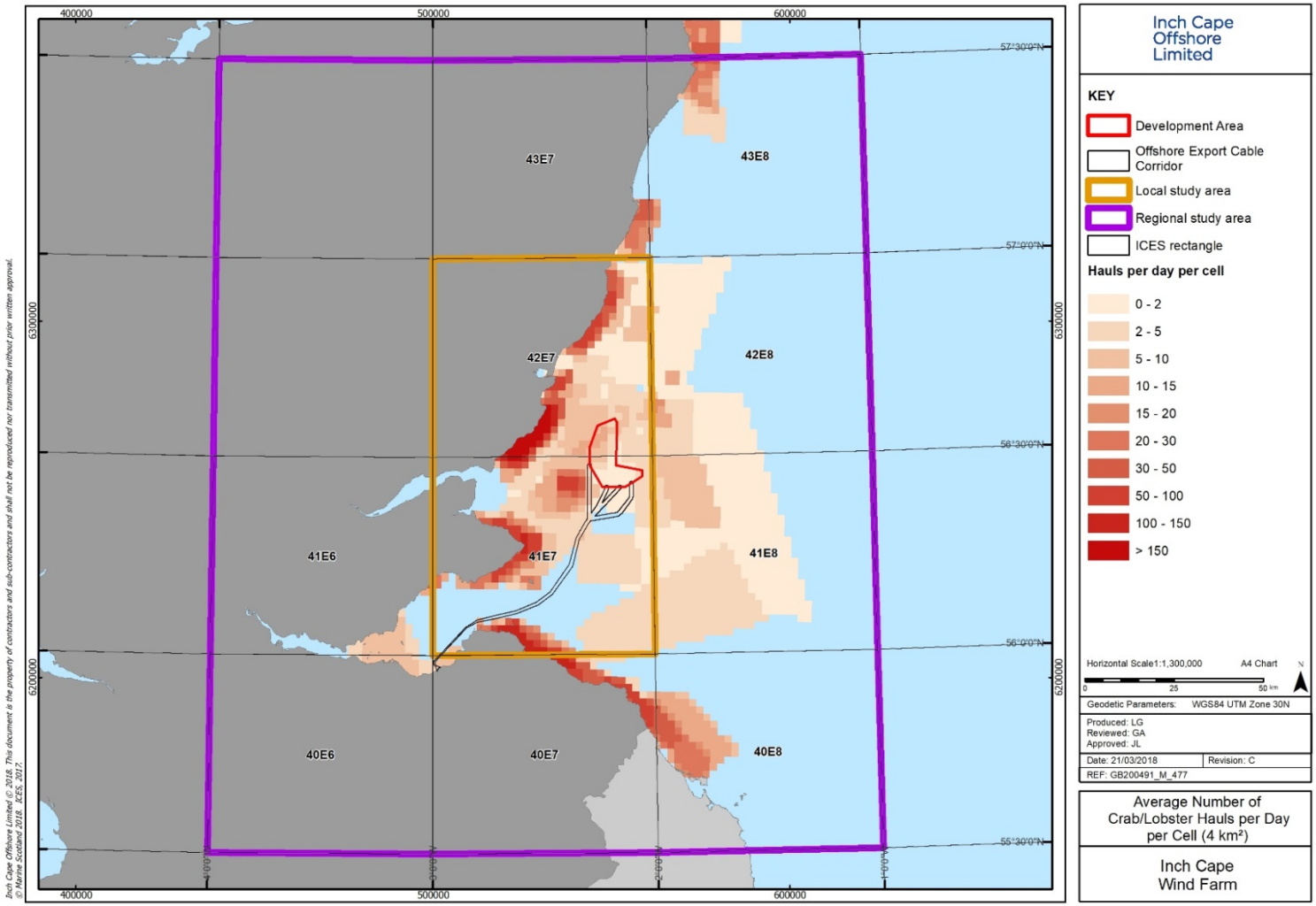
Figure 14A.30: Scallop fishing by Intensity (over 15 m - 2006 to 2016) in the Regional Study Area (Marine Scotland pers. comm)



14A.8 Creel Fishing Effort Study

105 The results of the recent Marine Scotland Creel Fishing Effort Study (MSS, 2017) revealed intensive creel fishing effort occurs in coastal areas of ICES rectangle 42E7, to the west and north of the Development Area (rectangle 42E7) (Figure 14A.31). Locations experiencing moderately high creel effort include coastal areas to the south of the Development Area between North Berwick and Eyemouth (rectangles 41E7 and 40E7), and around the East Neuk of Fife in 41E7. It should be noted that this study did not survey all creeling vessels and so may underestimate creel effort.

Figure 14A.31: Average number of crab/lobster hauls per day per cell (4 km^2) (MSS, 2017)



14A.9 ScotMap

106 In the Regional Study Area, the Scotmap study (2007 to 2011) shows that the majority of creeling by under 15m vessels for crab and lobster (as indicated by monetary value per 4 km^2 per day) occurs in along the coast, with areas of intensive fishing around the coast of Fife, North Berwick, Arbroath and Johnshaven to Stonehaven *(Figure 14A.32).*

107 The majority of Nephrops trawling by under 15m vessels occurs inside the Firth of Forth, through which the Offshore Export Cable Corridor passes, and generally decreases with distance from the estuary (Figure 14A.33). This data indicates that vessels of under 15m tended to fish within the area inside the Firth of Forth that is restricted to vessels under 16.77m during this time period.

108 There is little information on the distribution of under 15m vessels targeting squid, however some information can be drawn from the 'Not *Nephrops* trawl data' (Figure 14A.34), as from the landing figures it can be seen that little demersal trawling occurs for fish in the Regional Study Area (Figures 14A.13 and 14A.14). From this it would appear that during this time period squid fishing was concentrated around the Firth of Forth and inshore of the Development Area.

109 In the Regional Study Area, mackerel line fisheries are generally concentrated in Peterhead, located in the north westerly corner of ICES rectangle 43E8 (Figure 14A.35). In the Local Study Area, mackerel landings are relatively low, with an area of low value (£1-£1200) covering the Development Area. Landings are marginally higher (up to £2,400 worth of mackerel per 4 km^2 cell per day) around the East Neuk of Fife.

Figure 14A.32: Scotmap pots crab/lobster: Monetary value

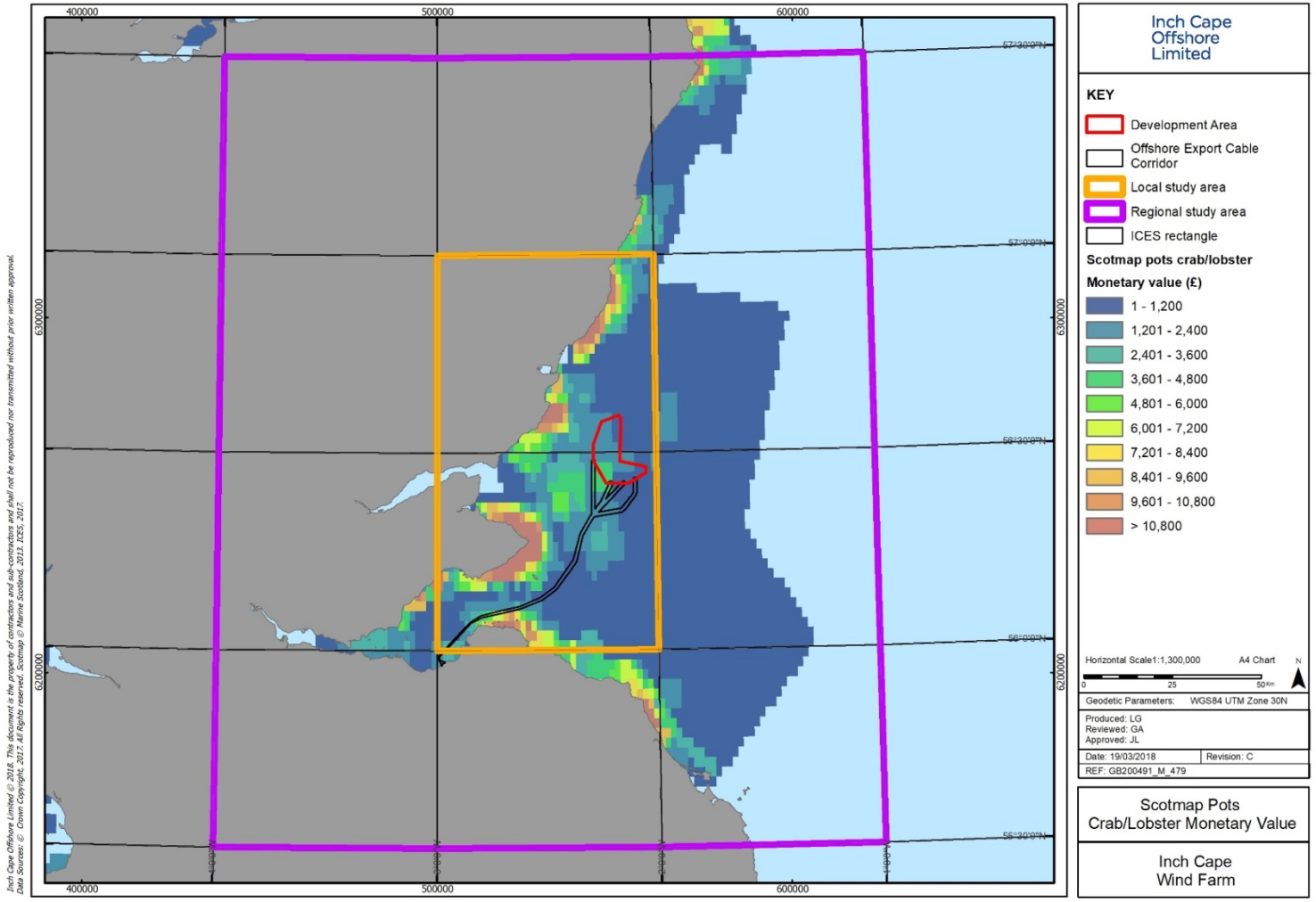


Figure 14A.33: Scotmap *Nephrops* trawls: Monetary value

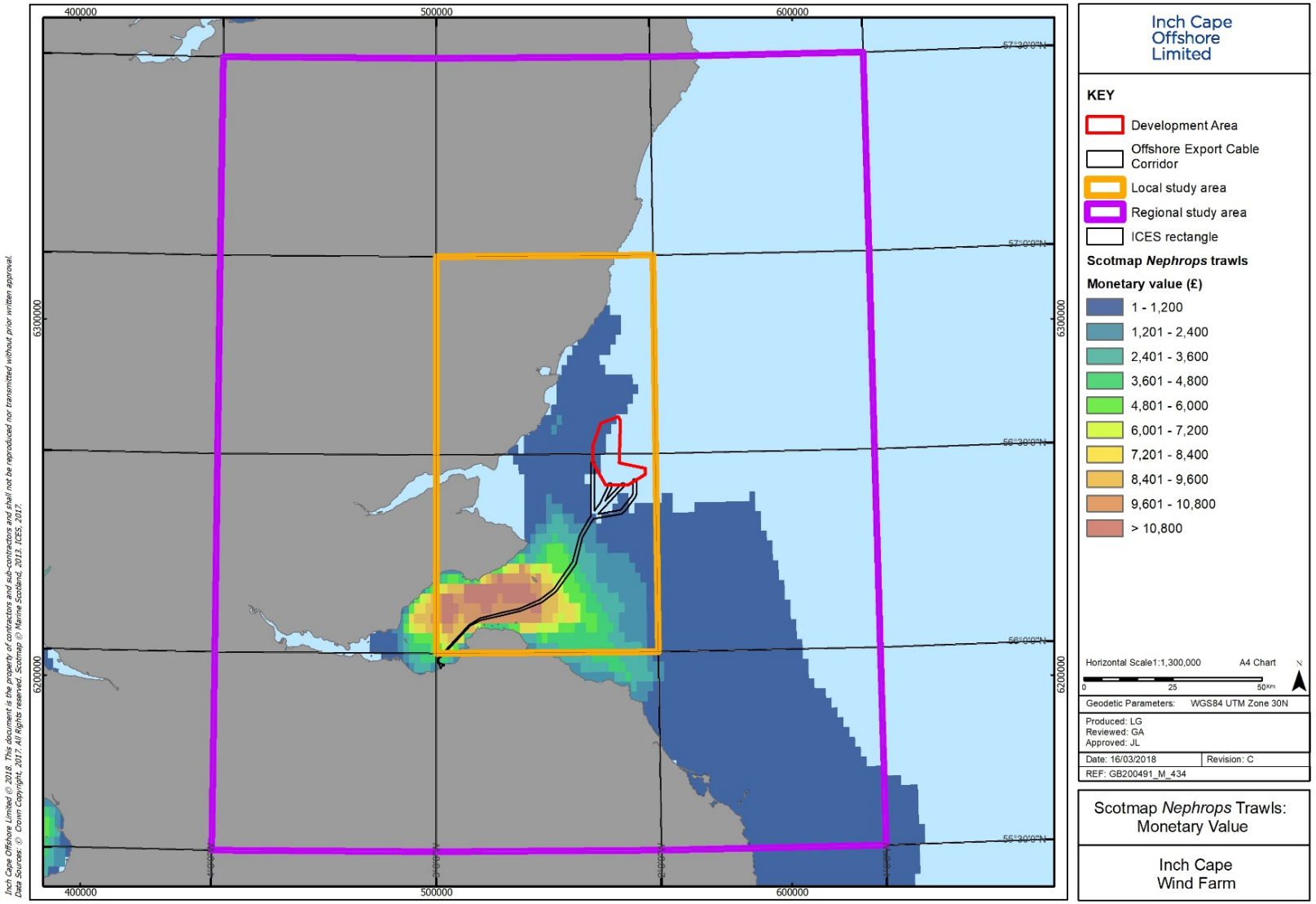


Figure 14A.34: Scotmap not *Nephrops* trawls: No. of vessels

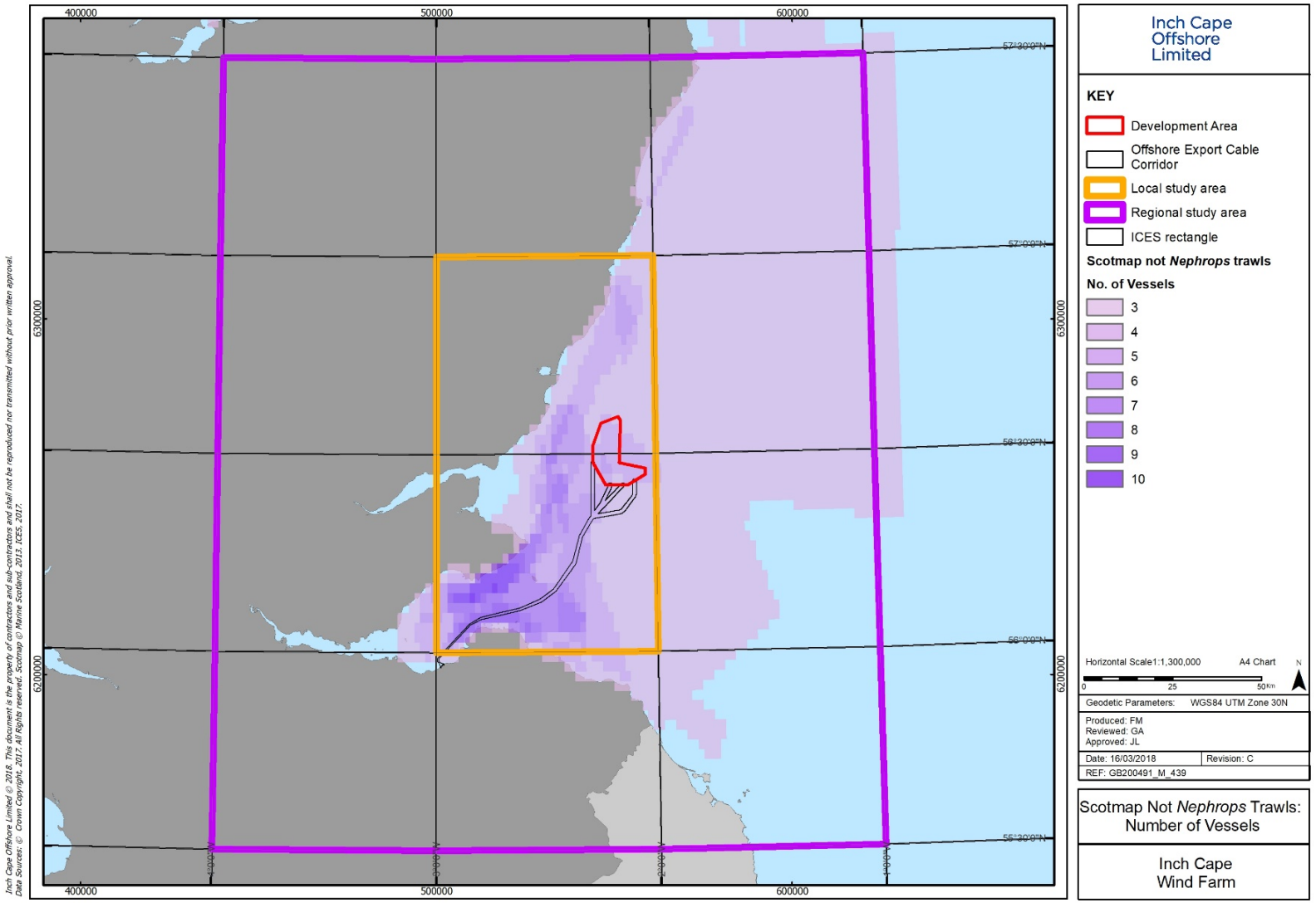
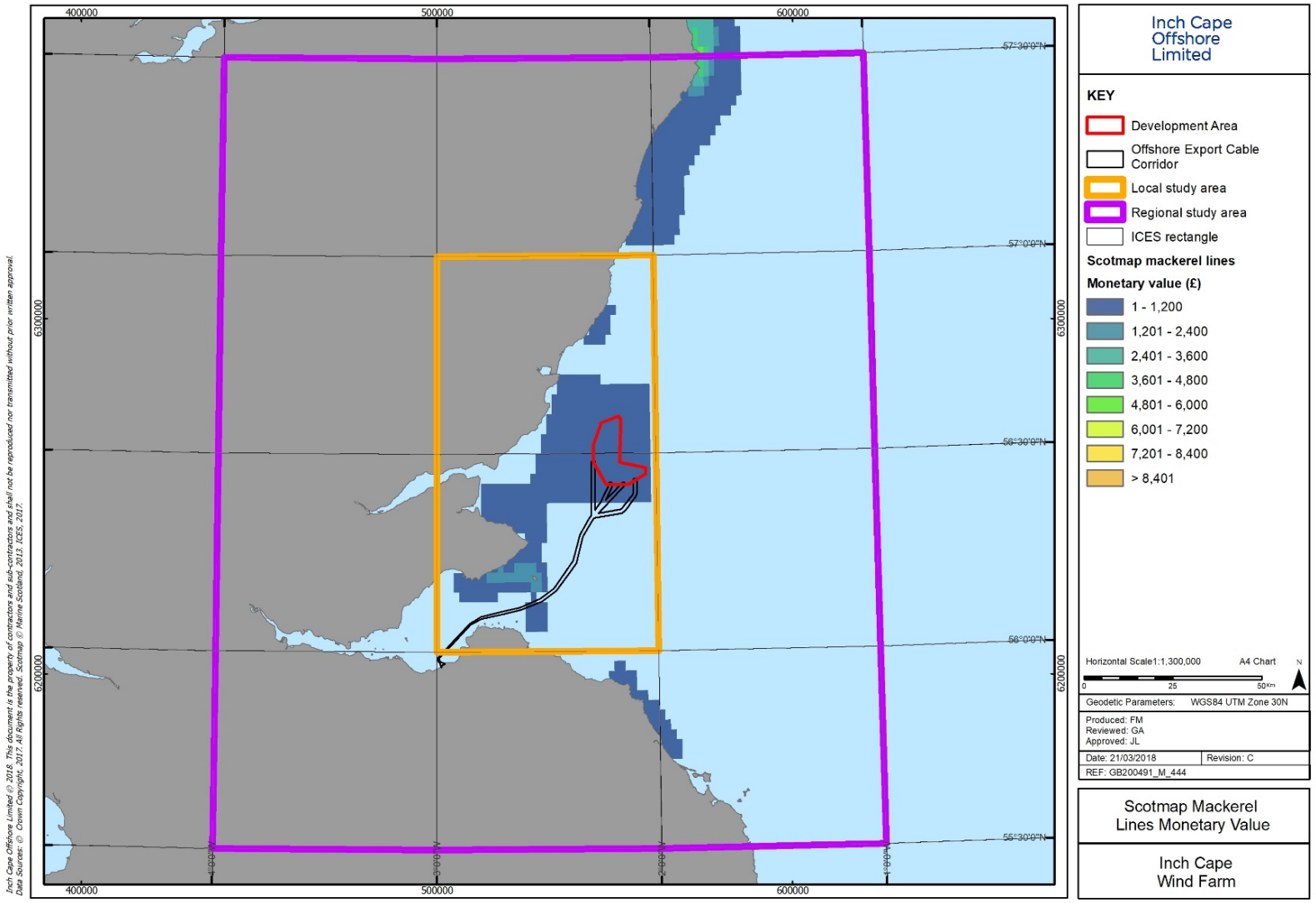


Figure 14A.35: Scotmap Mackerel lines: Monetary value



14A.10 Fishing Methods, Operating Patterns and Practices

110 According to official landing figure creeling (pots and traps), demersal otter trawling (demersal trawls/seine) and scallop dredging were responsible for 98.5% fishing activities in the Local Study Area between 2011-2016 (Table 14A.5).

Table 14A.5: Percentage contribution of fishing methods to local landings (by value) (MMO)

Fishing method	% contribution to local landings	Target species
Pots and traps	46.7	e.g. Lobster, edible crabs, velvet crabs, whelks, *Nephrops*
Demersal trawls/seine	43.4	e.g. *Nephrops*, squid, mackerel
Dredge	8.4	e.g. Scallops, razor clams
Gears using hooks	0.8	e.g. Mackerel
Other passive gears	0.7	e.g. Razor clams

111 These fishing practises are described below. Information gathered through consultation with fisheries stakeholders has been used to inform this section.

14A.10.1 Pots and traps

Creeling for lobsters and crabs

112 Creels (or pots) are small traps (Figure 14A.36) baited with fish which are set on the seabed to catch crabs, lobsters and *Nephrops.* They may be fished singly but most commercial fishermen use them in strings also known as fleets (Figure 14A.37). Pots are attached to a main line which is deployed from the vessel onto the seabed. Buoys and markers (also known as dhans) are attached to the fleet to mark its position, while the fleet is held in place with anchors. Creels are then left to soak for an average period of three days.

113 In the Regional Study Area, creel pots are generally deployed from small vessels (78% from under 10 m vessels). Creeling occurs year-round in the Local Study Area, however it is most active during June-September (Personal Communication, 2017).

Figure 14A.36: Example of parlour pot used for lobsters and crabs (Coastal Nets, 2017)

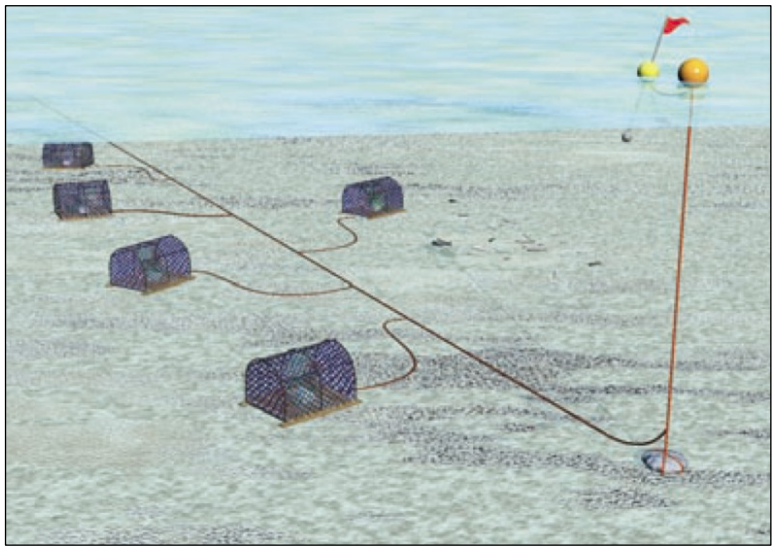


Figure 14A.37: Fleet of pots (Galbraith and Rice, 2004)

114 The scale of creeling activities can range from a hobby fishermen setting around 20 pots, to a vivier crabber (i.e. one with tanks to keep the catch alive) setting to up to 3000 creels at any one time.

115 During the consultation events fishermen identified that the maps of fishing activity data from the recent Marine Scotland *Creel Fishing Effort Study* (Figure 14A.31; MSS, 2017) provided the most accurate representation of the current distribution of creeling in the Regional Study Area. Fishers commented that the industry is growing; with new larger vessels capable of carrying more pots and steaming greater distances are entering the fishery and operating in deeper waters further offshore. This is reflected in the change in fishing patterns between Scotmap and the creeling study, which show more activity further offshore than before, particularly to the north and east of the Development. Fishermen also commented that even the creeling study may be an underestimation of creeling effort as new vessels have entered the fishery since this study was undertaken.

Whelk Fishery

116 Fishing for whelks is carried out by use of whelk pots; these can vary in shape and size but are normally made from a plastic container with holes cut in it (Figure 14A.38). Several whelk pots are tied to a line similar to that used in creel fishing; each trap is then baited with fish, deployed on soft sediment on the sea floor and left to soak for approximately three days. Average whelk landings in the local study for the period 2011-2016 area peaked in July (Figures 14A.19 and 14A.20).

Figure 14A.38: Example of a whelk pot (Seafish, 2017)

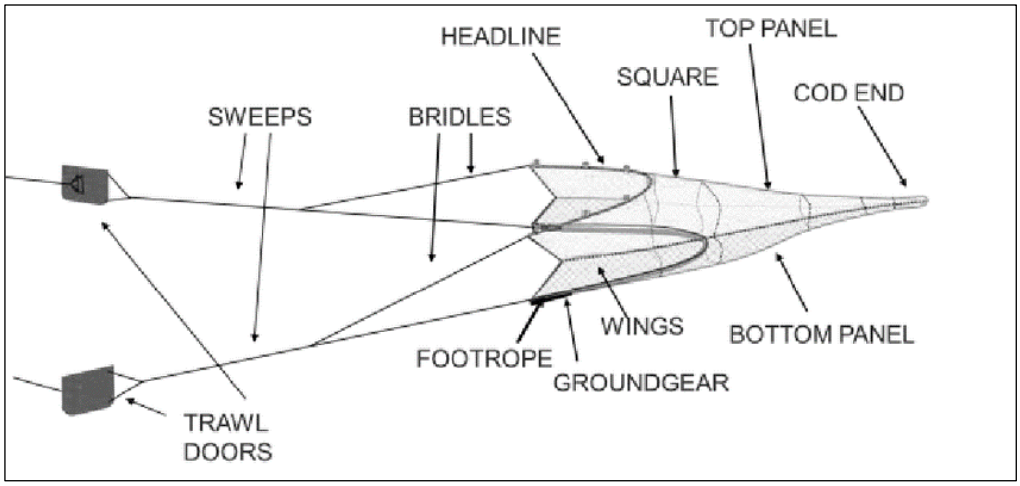
117 Fishermen at the validation meetings commented that whelk fishing is a growing fishery. Currently there are no official data showing the distribution of this fishery, but fishermen confirmed whelk fishing takes place predominantly on soft ground, which is widespread in the Local Study Area. Currently whelk fishing takes place within the Firth of Forth near the landfall for the Offshore Export Cable Corridor, near Port Seton, although fishermen commented that it may develop further offshore. Stakeholders commented that vessels are diversifying from prawn gear to whelk gear in Port Seton; two under 15 m vessels which previously fished prawn are now fishing whelks full time.

14A.10.2 Demersal Otter Trawling

118 Demersal otter trawlers are cone shaped nets which are towed along the seabed to target demersal species. As the net is being towed, two heavy rectangular otter boards (trawl doors) maintain its lateral opening, while a floating headline keeps the trawl open vertically (Figure 14A.39). A top canopy (the square) prevents animals escaping over the top of the net. The bottom panel is dragged along the seafloor using rollers, bobbins and rockhoppers.

119 The predominant target species in the Local Study Area are *Nephrops* and squid, but mackerel, whitefish and other shellfish are also caught using this method. These species are retained in the cod end before being hauled onto deck using a winch.

Figure 14A.39: Demersal otter trawl (Grieve *et al.*, 2014)



***Nephrops* Fishery**

120 *Nephrops* gear is configured similarly to standard demersal otter trawling although a smaller mesh is used with a minimum of 70 mm diameter. *Nephrops* favour muddy or soft substrates and inhabit burrows.

121 The *Nephrops* fishery is targeted by the under and over 15 m fleets, with the under 15m vessels generally targeting grounds in proximity to their home ports and the larger over 15 m fleet utilising grounds further offshore. Catches are reported throughout the year but peak in the summer months (Figures 14A.19 and 14A.20).

122 Over 70% of *Nephrops* landings (by value) in the Regional Study Area were targeted by vessels under 15 m.

123 Fishermen at the consultation events agreed that the Scotmap (Figure 14A.33) and MMO VMS data (Figures 14A.23 and 24) was an accurate representation of fishing patterns for the under and over 15 m vessels respectively. Although some fishermen commented that since the Scotmap exercise the under 15 m fleet has started to move offshore within the Firth of Forth. In addition, one fishermen commented that the Scotmap was an underestimate of the intensity of fishing of under 15m vessels off Montrose/Arbroath. These fishermen recommended that using both VMS and Scotmap data combined would give the most accurate representation of *Nephrops* fishing.

Squid Fishery

124 The squid fishery also uses demersal trawls which is the primary method for targeting this species. Fishing gear features a mesh size up to 40mm, increased protection (i.e. rockhoppers or flipper gear) and a high headline. It is difficult to define what ground squid can be consistently targeted with fishermen at consultation events reporting catches over both hard and soft ground.

125 Fishermen at consultation events confirmed that vessels targeting *Nephrops* with demersal otter trawls can reconfigure their nets to target squid. As there are no licence restrictions for squid, fishermen commented that the ability to catch them was a useful to reduce pressure on stocks with catch limits (such as *Nephrops*).

126 Vessels ≥15 m were responsible for the largest proportion of the squid catch (88.4%) in the Regional Study Area between 2011-2016. Stakeholders revealed that squid catches are highest over the summer months and also September and October, with 2017 reported as a good year.

127 It was widely commented by fisherman that fishing for squid in this area is both unpredictable between years and seemed to depend on water temperature. Despite this fishermen have identified areas off Stonehaven, East of Bell Rock, the mouth of the Forth, Pittenweem and Port Seton, as well as the Development Area as important areas.

128 Data is limited on the distribution of fishing activity for squid, although Kafas *et al*., (2013) identified low intensity of fishing throughout the Regional Study Area. Feedback from fisherman suggested that due to the inconsistencies associated in terms of the distribution of the fishery, a map would be of little value.

White Fish Fishery

129 Demersal trawling is the method adopted by Scottish fishermen to catch white fish such as cod and haddock. Fishing gear uses a mesh size of 120mm.

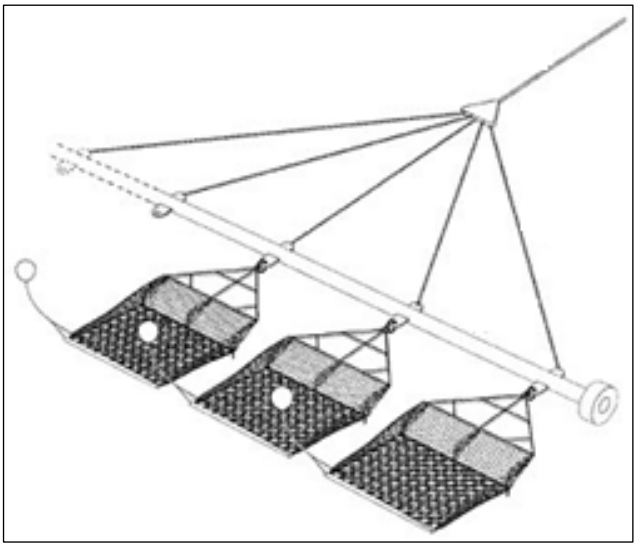
130 Historically fishing for white fish was important in the area but now landings have greatly decreased with cod representing 0.09% and haddock 0.06% of total average landings in the Local Study Area (2011 to 2016). This fishery, therefore is not widely exploited by vessels within the Local Study Area.

14A.10.3 Dredging

131 This method is generally used to catch species such as scallops, with vessels towing one or two beams across the bottom of the seabed, each with several dredgers attached (Figure 14A.40). The number of dredges is dictated by the size and power of the vessel, as well as any dredge restrictions imposed by fisheries regulations that may be in place in a particular area.

132 A dredge consists of a triangular steel frame, tooth-bearing bar and collecting bag made of chain links. The eight or nine steel teeth on the front of the bar 'rake' the scallops from the seabed, before retaining them in the collecting bag. Dredgers may penetrate 3-10 cm into the seabed (Howarth and Stewart, 2014).

Figure 14A.40: Scallop dredging gear (Seafood Scotland, 2017)



Scallop Fishery

133 Generally, scallop dredging is undertaken by larger vessels; in the Regional Study Area, 95.7% scallop landings (by value) were captured by vessels of 15 m and over. Soft substrates are targeted due to the scallops' preference for sediments consisting of sand, gravel and mud.

134 Many UK scallop vessels are nomadic in nature, targeting a range of different grounds before leaving them and moving on to another area. Vessels from other regions (Oban; Girvan; Kirkcudbright; Annan; Burntisland; Fleetwood; Brixham) (Figure 14A.41) thus visit scallop grounds located in the Forth and Tay, depending on productivity elsewhere. Scallop dredging occurs year-round; however, values tend to be highest during April to October (Figures 14A.19 and 14A.20). While many vessels utilising the local and Regional Study Area are nomadic, fishermen commented that some local vessels also are rigged for scallop dredging and some *Nephrops* vessels will occasionally target this fishery.

135 Figure 14A.40 shows relative values of scallop landings across the UK over the period 2011-2016. Highest landings values were recorded around the Isle of Man, off the Cardiganshire coast and in the English Channel. Landings were lower in the Regional Study Area, however still important on a national scale. For example, ICES rectangle 42E8 to the north east of the Development Area had the second highest scallop landings value (£1,418,659) in Scotland. Landings were moderate in the Forth and Tay area, reaching similar values to that in the Moray Firth. This data is confirmed by VMS data for scallop dredging provided by Marine Scotland (Figure 14A.43).

136 Fishermen agreed that the Scotmap and VMS data was an accurate representation of the location and density of the under 15 m and over 15 m vessels respectively with few vessels under 15 m dredging for scallops in the Local Study Area. Fishermen at validation meetings also commented that the restrictions in the number of dredges within the territorial zone had resulted in a reduction of scallop fishing within the 12nm limit.

Figure 14A.41: Home ports of the nomadic Scallop dredge vessels operating in the Forth and Tay Area

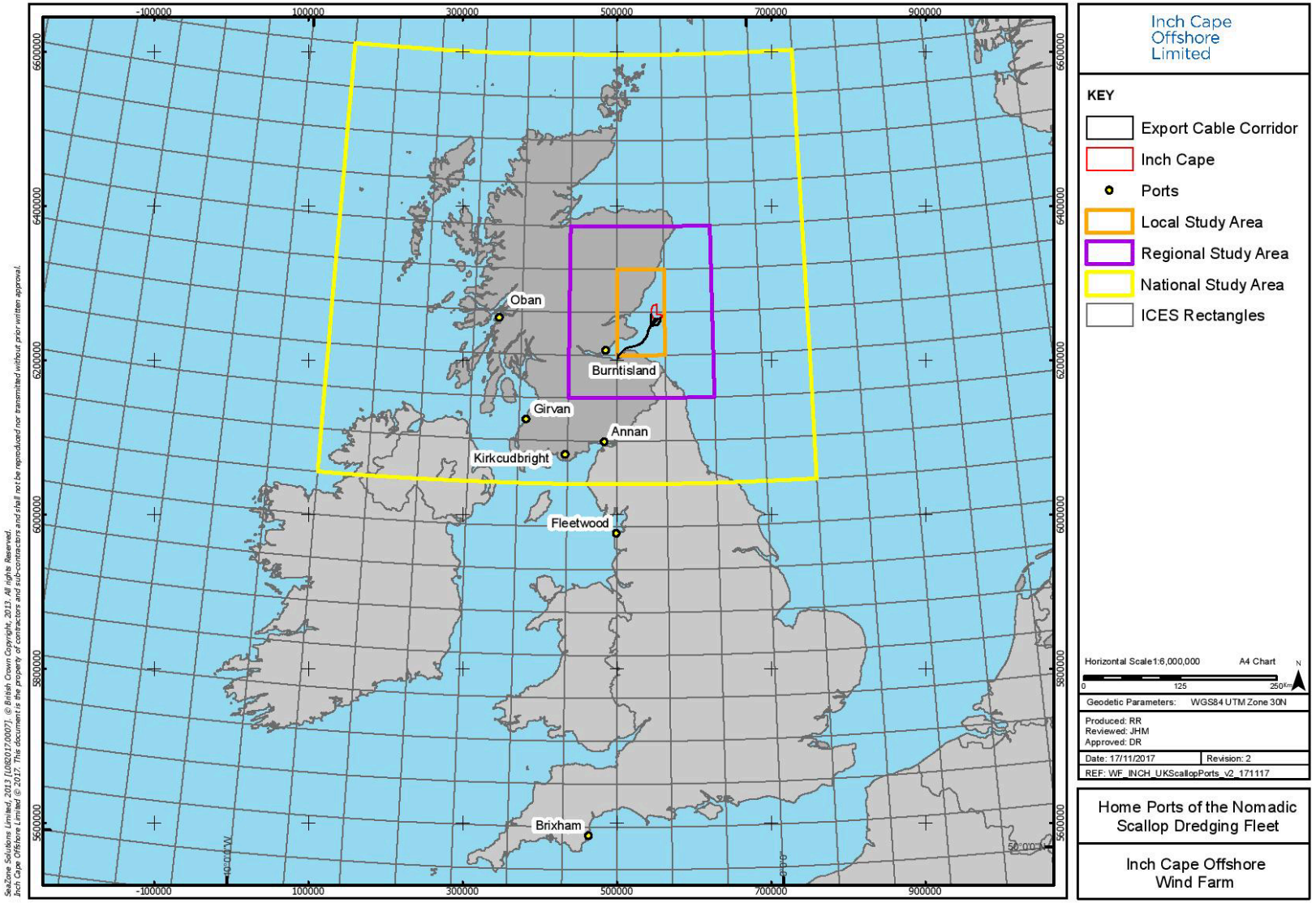


Figure 14A.42: Scallop annual landings values (Average 2007 to 2016) in the UK (MMO)

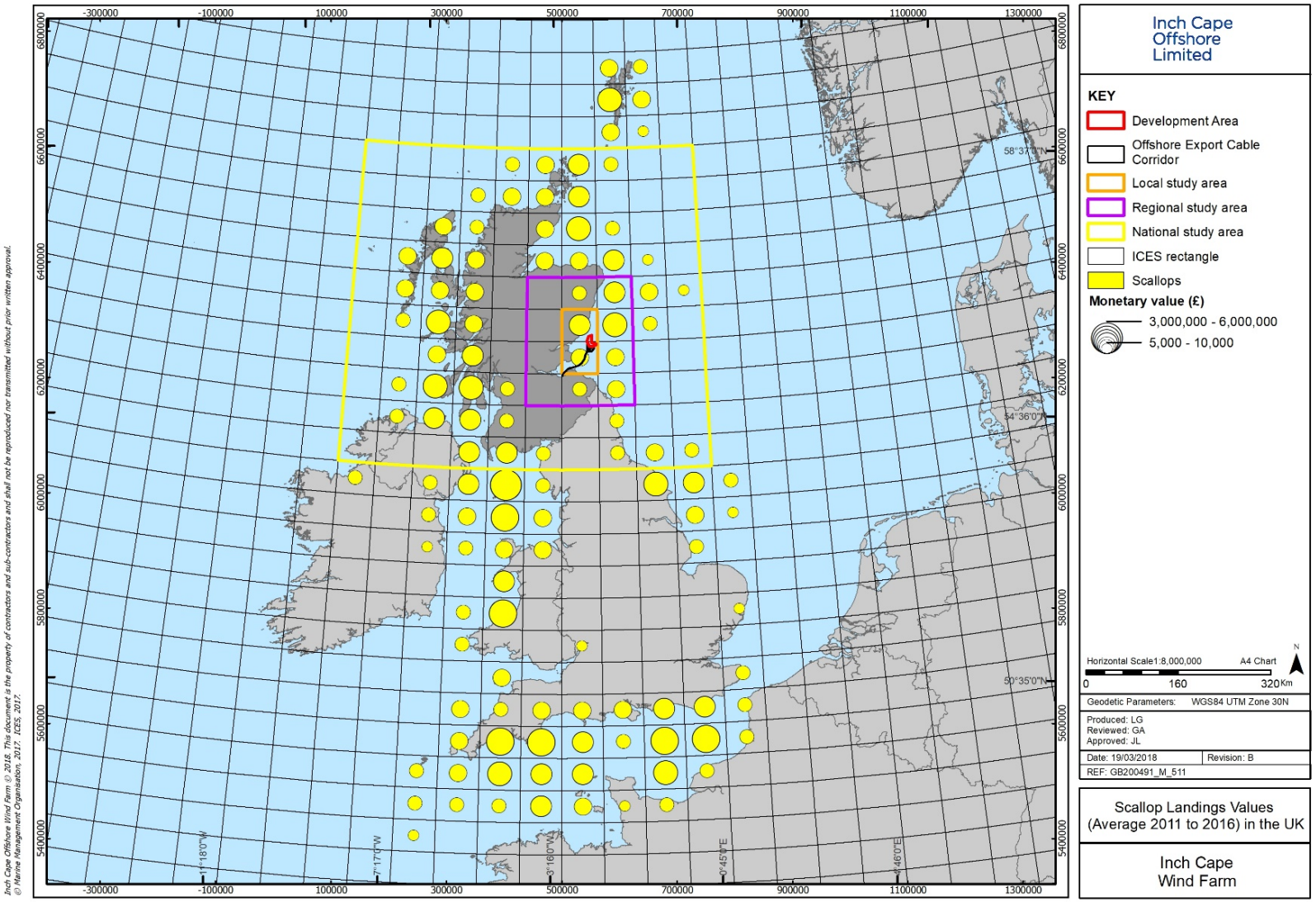
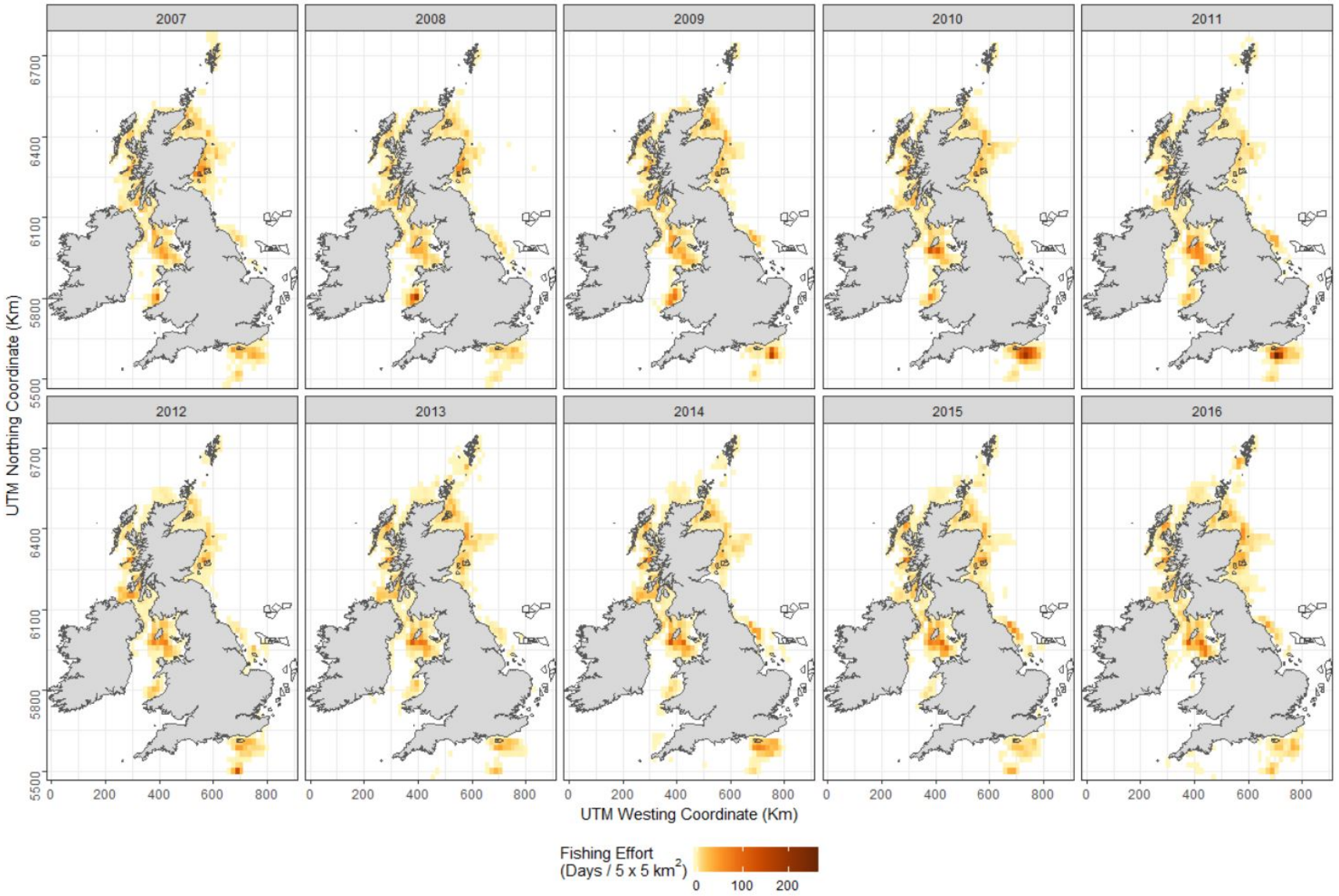


Figure 14A.43: Scallop dredging VMS intensity (2007 to 2016) in the UK (Marine Scotland *pers comm*)



14A.10.4 Other Fisheries

137 Landings data revealed that other species were captured in relatively small amounts compared to those fisheries described above. These included: razor clams; mackerel; and clams.

Razor Clams

138 Razor clams contributed 0.9% and 1.2% to landings (by value and tonnage, respectively) in the Local Study Area and were primarily landed in rectangle 41E7. Although sixth most important in terms of landings by value, the species were tenth most important when considering tonnage.

139 Little is known about the razor clam fishery, according to fisheries statistics, 76% was captured by 'other passive gears' and 19% by suction and hydraulic dredgers. Although electrofishing is illegal in European waters (EU Regulation 850/98, Article 31), it is also widely believed within the Scottish fishing community that boats harvesting razor clams are electrofishing to some degree (Scottish Government, 2014).

140 Currently there is a lack of information available regarding the distribution of razor clams in the vicinity of the Development. However, according to local fishermen harvesting of razor clams takes place on the north side of the inner Firth of Forth.

Mackerel

141 In the Regional Study Area, mackerel were predominantly landed by pelagic trawling/seining (46%) or gears using hooks (35%) such as small-scale inshore long-lining. Within 41E7 and 42E7 mackerel landings accounted for only 1% of the catch and according to fishermen is predominately undertaken by handlining by the under 10m fleet in the Local Study Area.

142 Handlining is a traditional low impact method of fishing, often used by small boats fishing relatively close to shore. Mackerel handlining, involves using hooks with traditional 'feather' lures attached to a line with a heavy weight at the end. Between 12 and 24 hooks are put on each line. This is then 'worked' up and down through the depths - either by hand or using a gurdy (a hand powered drum). When a shoal of fish is hit the line is retrieved and the fish are shaken off the hooks or in some cases knocked off the hooks into the boat as the line is pulled past a series of metal 'strippers'.

143 Fishermen generally agreed with the patterns of Scotmap mackerel landings data, although areas along the Arbroath coast, around the Bell Rock, outside the Firth of Forth, within and to the east of the Development Area (the scallop bank) were identified as being of importance to this fishery. Fishermen also commented that that intensity of the mackerel fishery on Scotmap was under estimated, as the fishery has grown since then. This is largely due to the 'Trial Mackerel Inshore Fishery 2014-2017' in Scotland's inshore waters, which allowed open access to mackerel fisheries for the 10 m and under fleet (vessels had access to approximately 1,000 tonnes of North Sea mackerel and 300 tonnes of West of Scotland

mackerel); many smaller vessels have taken advantage of this opportunity and have invested in specialised mackerel boats (Scottish Government, 2017b).

144 Landings data identified that mackerel catches fluctuated annually in the Local Study Area (Figures 14A.17 and 14A.18) and peaked in July – September (Figures 14A.19 and 14A.20). Consultations revealed that 2015 and 2016 were particularly bad years for mackerel fishing.

Clams

145 Although clam landings (by value) ranked eighth highest in the Local Study Area, this value only represented 0.8% total landings. Rectangle 41E7 landed 95.5% clams in the Local Study Area. Fishermen commented that clams (*M. arenaria*) are primarily targeted by box dredgers in muddy estuarine sediments. Consultees revealed that dredging for surf clams is another developing fishery in the inshore areas of Fife and in the Inner Firth of Forth and Tay.

14A.11 Future Fisheries

146 Temporal fluctuations in fishery activities and target species reduces the accuracy of predicting future fisheries, and thus variations to the baseline. This limitation is further enhanced by ongoing changes to legislation, management measures and regulatory requirements. Environmental restrictions (weather), climate change and economic constraints (rising crew and fuel costs) are also pressures with potential to affect target fisheries and fleet size.

147 Information has been collated from national datasets, current regulatory guidance and consultations with local stakeholders to identify potential future changes to fisheries operating in the Local Study Area. These are summarised below.

14A.11.1 *Nephrops* Fishery

148 Despite fluctuations, the *Nephrops* fishery has grown substantially between 2001 and 2016 in ICES rectangle 41E7. *Nephrops* landings also remained fairly low but stable in 42E7. Fishermen in Dunbar, however identified that the *Nephrops* fishery is not doing well at the present time. They identified this as being primarily due to restrictions over gears and horsepower. Similarly, in Port Seton (40E7) many boats previously fishing *Nephrops* have turned to creeling. Although this could mean a slight reduction in future *Nephrops* landings, (with average annual landings of the species accounting for 53% between 2011-2016 in 41E7) this is unlikely, as fishermen will pursue the fishery as long as there is stock.

14A.11.2 Lobster Fishery

149 Lobster fishery landings values have remained fairly stable over the past 6 years in both ICES rectangles 41E7 and 42E7 (Figure 14A.19 and 14A.20). However, stakeholders consistently identified that a reduction in space for setting gear inshore has led to the displacement of creel grounds to the east. This shift has resulted in the investment of larger vessels and creel gear, catalysing the growth of the offshore lobster fishery.

14A.11.3 Scallop Fishery

150 Between the periods 2011-2016, the scallop fishery underwent large fluctuations. Landings values underwent rapid expansion until 2007, before decreasing until 2011. Since 2011, there has been a steady increase in scallop landings in both 41E7 and 42E7. The fishery contributed 21% of average annual landings in 41E7 from the period 2011-2016; this was second only to lobster landings.

151 In order to improve stock management, health and fleet performance, new conservation measures were introduced for scallops on 1 June 2017. These included an increase in the MLS from 100 mm to 105 mm and restrictions on dredge numbers and tow bar length (*Section 14A.4*). Thus, although the future fishery is difficult to predict, it is hoped that these alterations to legislation will achieve a more sustainable scallop sector.

14A.11.4 Squid Fishery

152 Squid landings values have been inconsistent over the period 2001-2016, generally peaking every other year. This makes predicting the future of the fishery particularly difficult. However, with no licence restrictions in place for the species, one consultee stated that it is a new opportunity, and a good market. Many vessels targeting *Nephrops* can reconfigure their nets to target squid, reducing pressure on stocks with catch limits. Thus, it is likely that until management measures are implemented, the fishery will continue to increase in importance.

153 Fishermen revealed that there are lots more boats fishing squid, but this changes every year. From extrapolating existing trends in the Local Study Area, it can be assumed that squid landings values will peak in 2017, decreasing again in 2018. It should be noted that with a lack of management over the species, there is potential for future overfishing and stock depletion.

14A.11.5 Whelk Fishery

154 The whelk fishery has expanded rapidly over the period 2011-2016, particularly in rectangle 41E7, where landings have increased tenfold, with £186,877 of whelks in 2016 compared to £1,833 in 2011. Consultees in Arbroath and Port Seton identified an intense growth in whelk fisheries over the past two years, using small boats inshore. Fishers in Port Seton also stated that there has been an increase in the fishery, with vessels changing from prawn gear to whelk gear. Thus, this could be a fishery of increased importance in future.

14A.11.6 Sprat Fishery

155 Although there is a lack of explicit management objectives for the species, fishing for sprat is prohibited in the inner waters of the Firth of Forth from 1 January to 31 March, and from 1 October to 31 December in order to reduce bycatch of juvenile herring (EC, 1998). Thus, although sprats were identified by fishers in Port Seton to be a potential inshore future fishery, they stated that sprat fishing stopped years ago, as people have now turned to fishing whelks. The viability of fishing for this species is undergoing IFG discussion.

14A.11.7 Herring Fishery

156 During the period 2011-2016, herring contributed very little to landings by value in the Local Study Area. However, consultees in Port Seton suggested that the fishery could be developed in future; this is a topic under discussion at IFG. Similarly, in Port Seton it was noted that there has been an increase in effort since the publication of ScotMap; fishers have invested in gear to operate vessels >15 m, 2-3 miles out.

14A.11.8 Razor Clam Fishery

157 In ICES rectangle 41E7, razor clam landings values increased from £0 in 2001-2004, to an average of £90,647 over the period 2011-2016. A scientific trial for electrofishing of razor clams has been authorised under Article 43 of EC Regulation No. 850/98, with the Firth of Forth being proposed as one of 11 sites (Scottish Government, 2017c). Due to commence in February 2018, this could well increase razor clam landings values in the Local Study Area.

14A.11.9 Mackerel Fishery

158 Consultees suggested that since the relocation of quotas, some vessels have taken advantage of the mackerel fishery, such that landings values have been underestimated by ScotMap. With a number of vessels investing in specialised equipment, there is potential for this fishery to increase in future.

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Annex A

Organisations invited to the validation meetings. Those organisations who attended or provided feedback are highlighted in **bold** (individual fishermen are excluded)

- Aberdeen Fisheries Office
- Aberdeenshire IFA
- Anglo-Scottish Fish Producers Organisation
- Anglo-Scottish Fishermen's Association - St Abbs region
- Anstruther Fisheries Office
- Arbroath and Montrose Static Gear Association
- Burnmouth Fishermen
- Clyde Fisherman's Association
- Cockenzie & Port Seton Fishermen's Association
- Cove Harbour
- Dunbar Fisherman's Association
- Esk District Salmon Fishery Board
- Esk Rivers and Fisheries Trust
- Eyemouth Fisherman's Representative (Creel)
- Eyemouth Fisheries Office
- Fife Creel Fishermen's Association
- Fife Fish Producers Organisation
- Fife Fishermen's Mutual Association (Pittenweem) Limited
- Fisheries Management Scotland (Was Association of Salmon Fishery Boards)
- Forth District Salmon Fishery Board
- Mallaig and North West Fisherman's Association
- MS
- MS – LOT
- MSS
- North & East Coast Regional IFG
- North Berwick Fishermen
- Northern Producers Organisation
- Orkney Fisherman's Association

- River Tweed Commission
- Scallop Committee of Scottish White Fish Producers Association (formally Scallop Association)
- Scottish Creel Fishermen's Federation
- Scottish Fishermen’s Federation
- Scottish Pelagic Fishermen’s Association
- Scottish Scallop Divers Association
- Scottish White Fish Producers Association
- SFF
- Shetland Fisherman’s Association
- St Abbs Fisherman’s Representative (Creel)
- St Andrews Fishermen
- Tay District Salmon Fishery Board
- Ten Metre and Under Association, Pittenweem
- Usan Salmon Fisheries Ltd