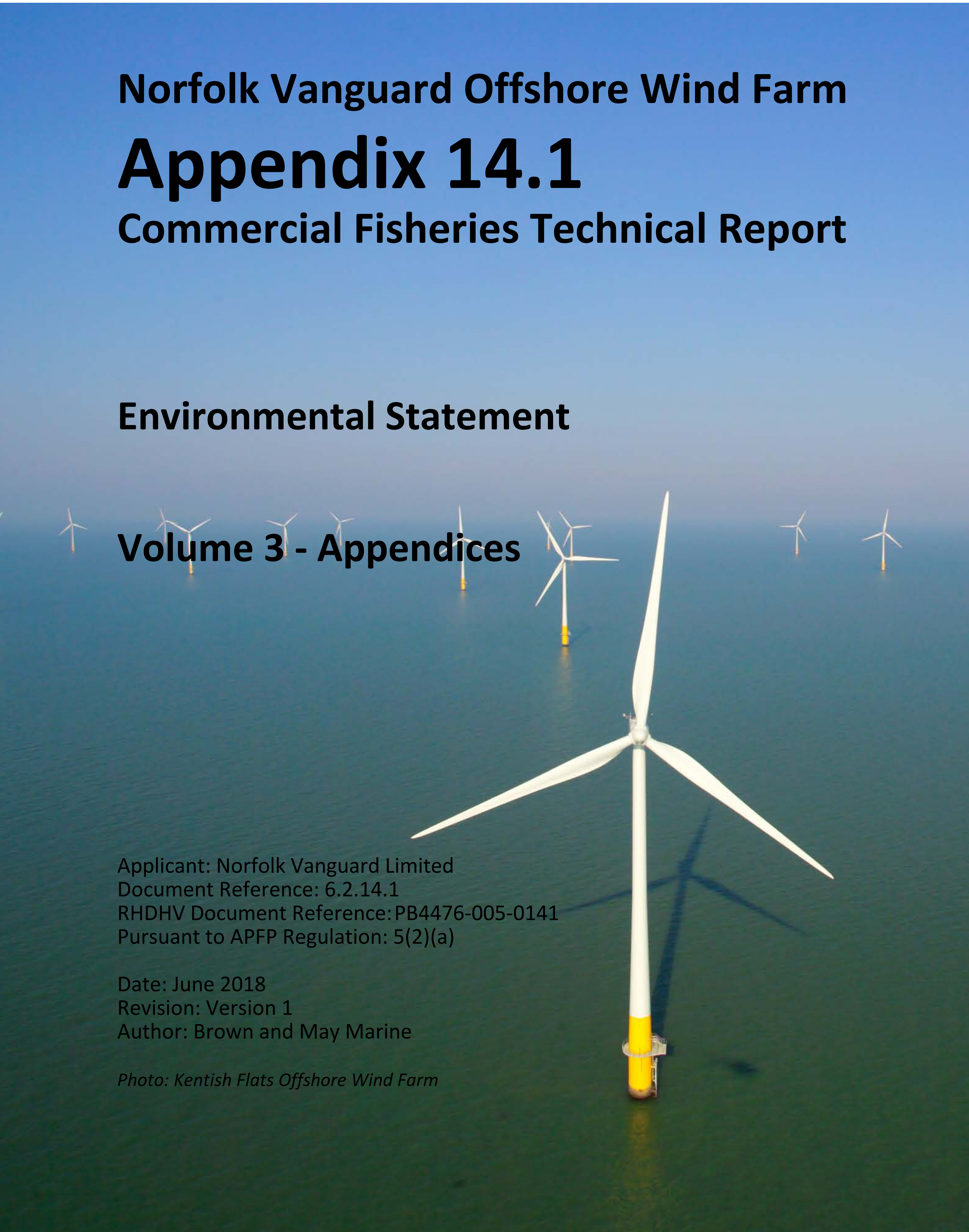
Norfolk Vanguard Offshore Wind Farm

Appendix 14.1

Commercial Fisheries Technical Report

Environmental Statement

Volume 3 - Appendices



Applicant: Norfolk Vanguard Limited
Document Reference: 6.2.14.1
RHDHV Document Reference: PB4476-005-0141
Pursuant to APFP Regulation: 5(2)(a)

Date: June 2018
Revision: Version 1
Author: Brown and May Marine

Photo: Kentish Flats Offshore Wind Farm

Environmental Impact Assessment
Environmental Statement

Document Reference: PB4476-005-0141

June 2018

For and on behalf of Norfolk Vanguard Limited
Approved by: Ruari Lean, Rebecca Sherwood
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Date: 8th June 2018

Vattenfall Norfolk Vanguard Offshore Wind Farm

Commercial Fisheries Technical Report

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Ref	Issue	Author	Checked	Issue Date
VNVCommFishTR	Draft 3	JK/SA/FB	SX/SA/FB	29/05/2018

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14.0 Commercial Fisheries

14.1 Summary

1. Commercial fishing within the Norfolk Vanguard Offshore Wind Farm site is undertaken by vessels from a number of EU states deploying a range of gear types.

2. Dutch beam trawling represents the majority of activity in the offshore wind farm sites, whilst within the offshore cable corridor, the predominant activity is by local UK vessels mainly deploying static fishing gears. The majority of the local inshore vessels are under 10m in length. Within the areas occupied by Norfolk Vanguard East and West, activity is also recorded for UK trawlers. From consultation, it is understood however that whilst these are UK registered vessels fishing UK quota, they are Dutch owned and operated beam trawlers.

3. Within the general area of the offshore wind farm sites, lower levels of activity have been recorded for Dutch seine netters, Belgian beam and otter trawlers and to a lesser extent, French demersal otter trawlers.

4. A review of the available surveillance and VMS data has confirmed minimal or negligible activity by Danish and German vessels and no activity by vessels from other member states.

5. Due to the absence of any historic rights in UK territorial waters, Dutch vessels can only target grounds outside of the UK's 12nm limit. The majority of Dutch beam trawlers deploy pulse wing trawl gear. This method is now subject to a voluntary Interim Spatial Separation Agreement off the East Anglian coast, whereby pulse wing trawling is prohibited in three localised areas. Despite moderate levels of Dutch beam trawling in the area of the proposed project, this fleet operates extensively over the Southern North Sea, focussing on grounds further to the east and south of Norfolk Vanguard.

6. The Belgian fleet focuses the majority of its fishing activity in areas outside of Norfolk Vanguard beyond the UK 12nm limit. Whilst the Belgian Eurokotter fleet (vessels under 300hp engine power) have historic fishing rights to operate between the UK's 6 to 12nm limit, it appears that this is rarely utilised in areas relevant to Norfolk Vanguard.

7. The grounds crossed by the offshore cable corridor are mainly worked by the local UK fishing fleet, primarily with pots and nets set within the 6nm limit. The majority of vessels undertake potting for lobster, edible crabs and whelks. Beyond the 12nm limit, there is occasional activity by under 10m UK vessels deploying longlines and nets.

8. Predicting future patterns of fishing activity is difficult and to an extent subjective. Changes to fisheries regulation in addition to the potential effects of “Brexit”, may impact commercial fishing within the North Sea. It is however possible that much of the current patterns of fishing activity may remain largely as they are, following the end of the “Brexit” transition phase. Furthermore, regardless of “Brexit”, the pattern of fishing in the last 30 years has been one of significant change in vessel and gear design, operating practices, species targeted and the levels of controls and regulations to which fishing vessels have to adhere.

14.2 Introduction

9. The following technical report for Vattenfall Wind Power Limited's (VWPL) Norfolk Vanguard Offshore Wind Farm provides the baseline description of commercial fishing relevant to the project. For the purposes of this report, commercial fishing is defined as the legitimate capture of finfish and shellfish for profit by a licensed fishing vessel.

10. The approach for evaluating the existing baseline starts by providing an overview, which identifies the nationality and fishing methods used by the fleets that operate within the vicinity of the project. Subsequently, the baseline examines a number of data sources including satellite tracking (VMS) data, effort and landings data and surveillance sightings for relevant nationalities.

11. International Council of the Exploration of the Sea (ICES) statistical rectangles have been used to provide a general indication of fishing activity levels and values in the area of the proposed project. ICES rectangles are the smallest spatial unit used for the collection and analysis of fisheries statistics by the European Commission (EC) and Member States. ICES rectangles cover approximately 900nm^2 and align to 30' latitude by 1° longitude. It is noted that fishing activity is not likely to be evenly distributed across ICES rectangles. Specific fishing grounds in the immediate vicinity of the proposed project have been identified where possible through consultation with stakeholders.

12. It should be recognised that commercial fishing is an industry subject to a variety of legislation and regulations, which can be altered and implemented at relatively short notice. Other factors, such as variations in target species, weather, fluctuations in market prices and operating costs, can influence commercial fisheries both spatially and temporally. Predicting future commercial fisheries baselines is therefore subject to a range of unpredictable variables.

14.2.1 Study Area

13. The study area for the assessment of commercial fisheries activities in the vicinity of the proposed project is shown in Figure 14.1. The proposed project is located in ICES Division IVc (Southern North Sea). The study area covers ICES rectangles 34F1, 34F2 and 34F3 providing appropriate coverage for the project. Rectangle 35F2 has not been included as part of the study area due to the very small area that Norfolk Vanguard West (NV West) occupies within this ICES rectangle. Including data for 35F2 could provide a disproportionate view of activity in relation to the offshore wind farm (OWF) site. The landfall site under consideration for the offshore cable corridor is located at Happisburgh South.

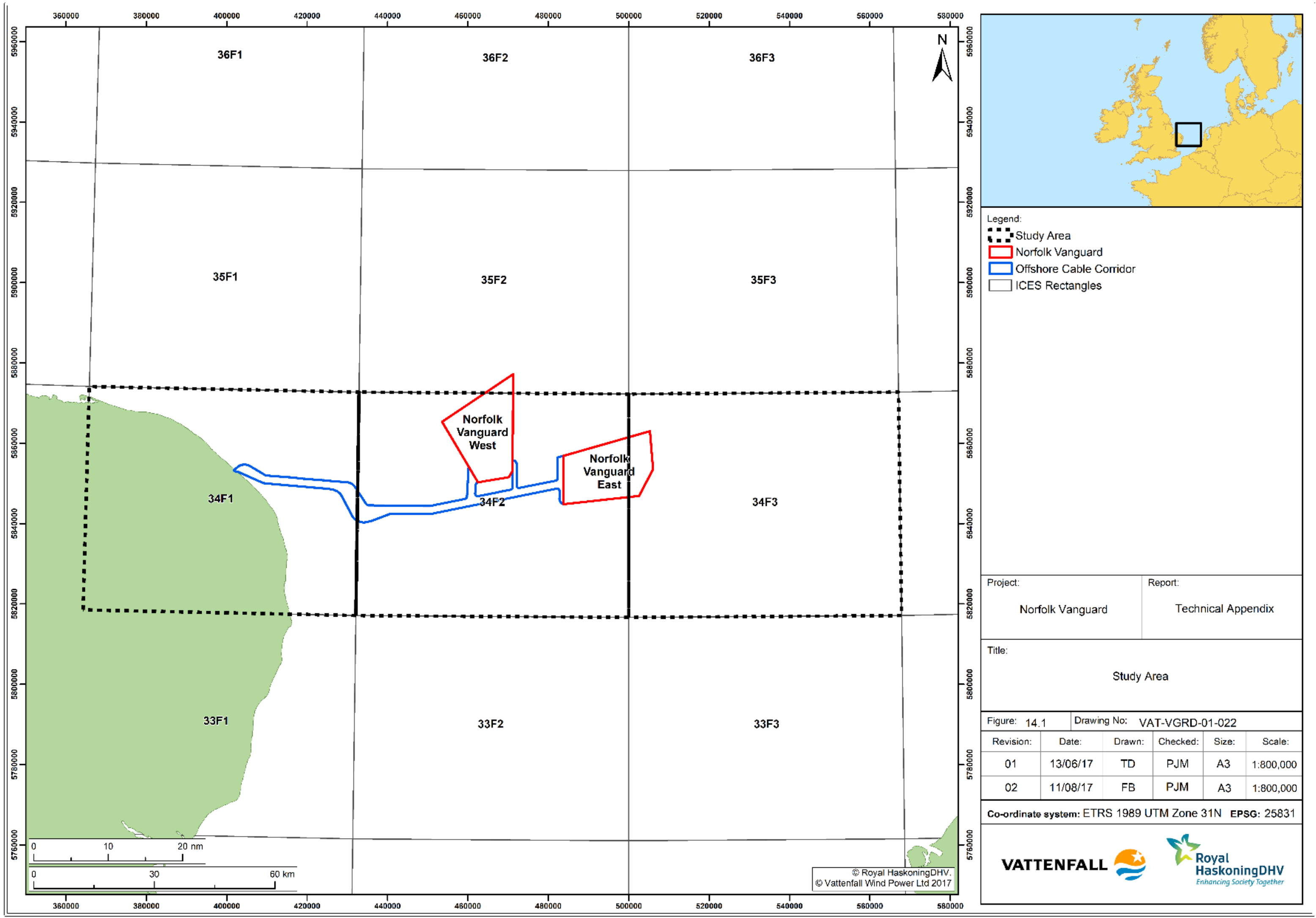


Figure 14.1 Study area in relation to the proposed project

14.2.2 Data Sources and Information Limitations

14. For the Norfolk Vanguard baseline, the following data and information sources have been used:

Table 14.1 Key datasets used to inform the baseline report

Data	Year	Coverage	Confidence	Notes
UK Marine Management Organisation (MMO) fisheries statistics	2007 to 2016	UK vessels landing into UK and European ports. Non-UK vessels landing into UK ports.	High	Landings data provided by value (£).
UK MMO Surveillance Sightings	2011 to 2015*	Sightings of vessels by gear type (all nationalities) recorded in UK waters on weekly surveillance fly overs during daylight hours.	Medium to High	May underestimate total extent of fishing activity due to flyover frequency and timing.
UK MMO Satellite Tracking (VMS) data	2012 to 2016	Aggregated VMS pings recorded in 0.05° by 0.05° grids from UK vessels only in European waters.	High	VMS provided by value (£) and effort (hours).
Belgian Institute for Agriculture, Fisheries and Food (ILVO) fisheries statistics (landings values and effort data)	2010 to 2014	All over-10m Belgian vessels recorded as actively fishing, irrespective of location.	High	Landings data provided by value (€).
Belgian ILVO VMS data	2010 to 2014	VMS data combined with logbook data by Belgian vessels. The data has been filtered by speed.	High	VMS is provided by value (€), effort (days) and gear type.
Netherlands Institute of Marine Research (IMARES), Landbouw Econmisch Instituut (LEI) VMS and integrated landings data	2012 to 2016	VMS data combined with logbook data by Dutch vessels in the North Sea. A grid is defined based on 1/16th of an ICES rectangle. The data is filtered by speed.	High	VMS is provided by value (€), effort (days) and gear type.
Netherlands IMARES fisheries statistics (landings values and effort data)	2012 to 2016	Dutch vessel landings into European ports.	High	Fisheries statistics (landings values and effort) available from 2012 to 2016 for method only.
Danish Ministeriet for Fødevarer, Landbrug og Fiskeri VMS data	2011 to 2015	VMS data for all UK waters by Danish vessels that can be split into gear categories. The data is filtered by speed.	High	VMS is provided by effort (days) and by gear type.
French L'Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) VMS effort data	2014	VMS charts provided for the Central (IVb) and Southern North Sea (IVc).	High	VMS provided by effort (days).

French Comité Régional des Pêches Maritimes et des Elevages Marins (CRPMEM) Nord-Pas-de-Calais Picardie VMS effort data	2009	VMS charts provided for the Nord-Pas-de-Calais Picardie fleet based on speed filtered VMS data and sales registered at French fish auctions.	Medium to High	Based on consultation with 89% of the fleet.
German Federal Office for Agriculture and Food VMS data	2007 to 2012	VMS provided by vessel density in the North Sea.	Medium	VMS provided by density.

*Given the limitations of the MMO 2016 surveillance sightings dataset (no sightings recorded in the study area for that year) surveillance sightings data have been analysed only up to 2015 (see Annex 1 for further details).

15. Requests were made to the German authorities for the most up to date VMS, effort and landings data, but unfortunately no data has been provided. Furthermore, in personal communication, VisNed confirmed that approximately 90% of the German vessels operating in the Southern North Sea are Dutch owned and operated (Pers. Comms: P. Visser, 26/04/2018).

16. Full details of the data sources used in this report, methods of data collection and data analysis can be found in Annex 1.

14.2.3 Consultation

17. Table 14.2 contains a summary of the consultation undertaken with relevant UK and non-UK commercial fishing stakeholders.

Table 14.2 Summary of local fisheries stakeholder consultation

Consultees	Role / Organisation	Consultation date
Ady Woods	Area Officer - Eastern IFCA	31/05/2016
Richard Clarke	Sea Palling Fishermen’s Association	31/05/2016
Richard Clarke, Paul Lines, Andy Williamson	Sea palling fishermen, Great Yarmouth fisherman	06/06/2016
Gavin Whatling	Sea Palling Fisherman	08/06/2016
Nicola Gaff	NNFS	10/06/2016
Billy Gaff, Andy Williamson, John Davies, Gavin Whatling	NNFS	13/06/2016
Stephen Sheales	Caister Fisherman	15/06/2016
Mark Wright	Sea Palling Fisherman	17/06/2016
Billy Gaff, Andy Williamson, John Davies	NNFS	05/07/2016
Stephen Sheales	Caister Fisherman	12/07/2016
Billy Gaff	NNFS	12/07/2016
Paul Lines	Great Yarmouth	12/07/2016
Richard Clarke	Sea Palling Fishermen	18/07/2016
Billy Gaff	NNFS	11/08/2016
Paul Tyack	MMO – Lowestoft	19/10/2016
Julian Gregory, Judith Stoutt	Eastern IFCA	21/10/2016
Sander Meyens, Jasmine Vlieninick, Jolien Goossens	Rederscentrale, Vlaanderen	29/11/2016

Henrik Lund	Danmarks Fisheriforening PO	30/11/2016
Harald Ostensjo	Fiskbat	30/11/2016
Pim Visser	VisNED	14/02/2017, 11/04/2018, 26/04/2018, 29/05/2018
Espen Jacobsen	Fiskbat	07/03/2017
Antony Viera, Olivier Lepretre	CRPMEM- Pas de Calais	14/03/2017
John Knights	Lowestoft	31/03/2017
Dale Rodmell, Alan Piggott	NFFO	05/04/2017
David Raas	VisNED	19/04/2017
John Knights, Steve Wightman, Terry Wightman, Ronnie Richards, Paul Mears, Paul Klyne, Ove Jinkerson.	Lowestoft Fishermen	16/05/2017
Secretary	Deutchser Fisherei Vernband	23/05/2017
Paul Williams	Caister Fisherman	06/06/2017
Jeffrey Melton	Lowestoft Beam Trawl Skipper	15/06/2017
Richard Clatterham	Caister Inshore Fishermen's Association	22/06/2017
Dean Ellis	Happisburgh Fisherman	09/08/2017

14.2.4 Fisheries Controls and Legislation

18. Commercial fishing in the North Sea is subject to a range of regulatory constraints and legislation set by the EC, UK government, MMO and local authorities. Many of the measures implemented have a direct impact on fishing activity and therefore on landings weights and values. Furthermore, many regulations are implemented at short notice with limited consultation, reducing confidence in predicting future trends.

19. The main bodies regulating the fisheries of relevance to Norfolk Vanguard are the EU through the Common Fisheries Policy (CFP), the MMO through national and local/regional regulations and Inshore Fisheries and Conservation Authorities (IFCAs) (whose jurisdiction is out to 6nm) through local byelaws and Regulating Orders. The coastal area in the vicinity of Norfolk Vanguard is managed by the Eastern IFCA.

20. It should be noted that current legalisation is likely to be reviewed as part of "Brexit" negotiations, although at present it is unclear what commercial fisheries policies and regulations will be in place following the end of the "Brexit" transition phase. In the meantime, it is understood that EU regulations, in particular the CFP, will be enforced up to the end of the transition period (31st December 2020).

21. Details of existing fisheries legislation can be found in Annex 2.

14.3 Overview of Fishing Activity

14.3.1 Surveillance Sightings

22. The distribution of fishing vessel surveillance sightings recorded in the area surrounding Norfolk Vanguard are shown by nationality in Figure 14.2. It should be noted that surveillance sightings do not accurately describe actual levels of fishing activity but give a general indication of the relative levels and distribution of activity by nationality and method.

23. Figure 14.2 shows that the majority of activity by the local UK fleet is nearshore and mainly relevant to the offshore cable corridor. Further offshore, the majority of sightings are of Dutch vessels, with lower levels of UK and Belgian vessels being recorded. Although French vessels have been recorded crossing the offshore cable corridor, it is understood that these vessels are in transit to grounds further north. The French fleet do not have historic rights to fish inside the 12nm limit, thus the vessels sighted could not be legally fishing in this area.

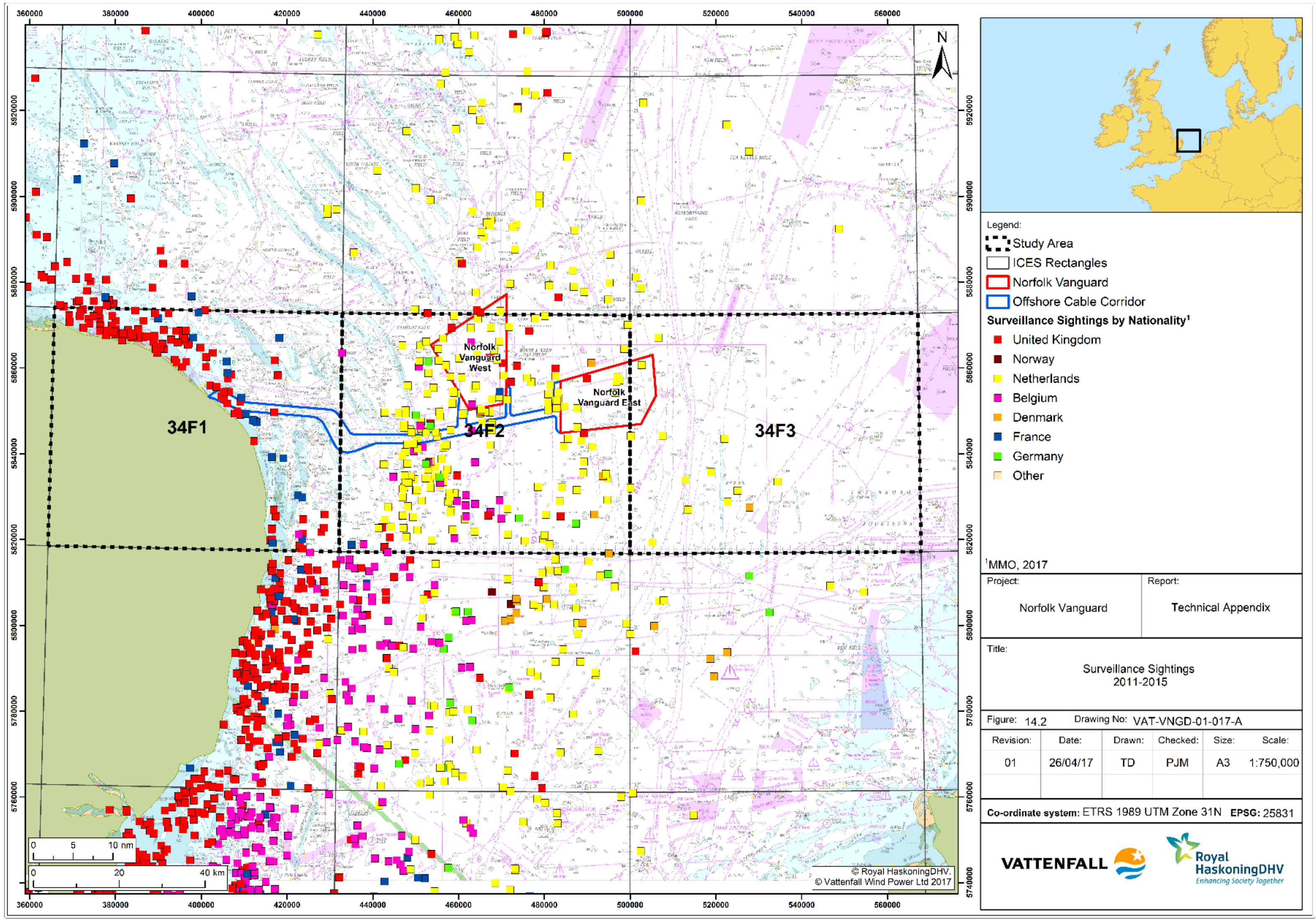


Figure 14.2 Surveillance sightings by nationality in the vicinity of the proposed project (2011-2015) (Source: MMO, 2017)

24. As shown in Table 14.3, 87.8 % of sightings in ICES rectangle 34F1, covering the nearshore section of the offshore cable corridor, are of UK registered vessels. The highest proportion of UK vessels are potters/whelkers at 62.4%, followed by beam trawlers at 6.8% and trawlers (all) at 5.6%. A range of other vessel types have been observed at lower levels.

25. Of the non-UK fleet, the majority of sightings in 34F1 are French vessels, comprising 9.0% of the observations. As previously stated however, these are primarily trawlers that transit through the area to fishing grounds further north.

26. Within 34F2, the area in which the OWF sites are located, the majority of sightings are of Dutch beam trawlers (73.0%), with Belgian trawlers at 13.8% and a range of UK fishing vessels also observed (7.9%) (Table 14.4).

27. Dutch vessels make up the majority of sightings within 34F3 (88.8%) with other nations recorded at low levels (Table 14.5).

Table 14.3 Surveillance sightings (2011-2015) in ICES rectangle 34F1 by nationality and method

Nationality	Method	% of total Sightings in 34F1
United Kingdom	Potter/Whelker	62.4
	Beam Trawler	6.8
	Trawler (All)	5.6
	Gill Netter	2.9
	Scallop Dredger (French/Newhaven)	2.5
	Unknown	2.0
	Long Liner	1.4
	Stern trawler	1.1
	Demersal Side Trawler	0.9
	Other Dredges (Including Mussel)	0.9
	Shrimper	0.9
	Pair Trawler (All)	0.5
	Rod and Line	0.5
	Stern Trawler (Pelagic/Demersal)	0.5
	Demersal Stern Trawler	0.2
	United Kingdom % Of Total Sightings (All Gears)	87.8
France	Trawler (All)	7.9
	Stern Trawler (Pelagic/Demersal)	0.9
	Pelagic Stern Trawler	0.2
	France % Of Total Sightings (All Gears)	9.0
Belgium	Beam Trawler	2.9
	Belgium % Of Total Sightings (All Gears)	2.9
Netherlands	Beam Trawler	0.2
	Netherlands % Of Total Sightings (All Gears)	0.2

Table 14.4 Surveillance sightings (2011-2015) in ICES rectangle 34F2 by nationality and method

Nationality	Method	% of total Sightings in 34F2
United Kingdom	Long Liner	1.6
	Potter/Whelker	1.6
	Beam Trawler	1.5
	Gill Netter	1.4
	Trawler (All)	1.3
	Bottom Seiner (Anchor/Danish/Fly/Scots)	0.1
	Demersal Stern Trawler	0.1
	Unknown	0.1
	UK % Of Total Sightings (All Gears)	7.9
France	Trawler (All)	1.8
	Stern Trawler (Pelagic/Demersal)	0.6
	Demersal Stern Trawler	0.2
	Beam Trawler	0.1
	France % Of Total Sightings (All Gears)	2.7
Belgium	Beam Trawler	13.6
	Trawler (All)	0.2
	Stern Trawler (Pelagic/Demersal)	0.1
	Belgium % Of Total Sightings (All Gears)	13.8
Denmark	Trawler (All)	0.8
	Beam Trawler	0.2
	Pair Trawler (All)	0.2
	Gill Netter	0.1
	Stern Trawler	0.1
	Denmark % Of Total Sightings (All Gears)	1.5
Germany	Beam Trawler	0.6
	Trawler (All)	0.2
	Pair Trawler (All)	0.1
	Demersal Stern Trawler	0.0
	Germany % Of Total Sightings (All Gears)	1.0
Netherlands	Beam Trawler	70.0
	Trawler (All)	2.1
	Pair Trawler (All)	0.5
	Unknown	0.2
	Bottom Seiner (Anchor/Danish/Fly/Scots)	0.1
	Netherlands % Of Total Sightings (All Gears)	73.0

Table 14.5 Surveillance sightings (2011-2015) in ICES rectangle 34F3 by nationality and method

Nationality	Method	% of total Sightings in 34F3
United Kingdom	Beam Trawler	1.7
	Gill Netter	1.7
	United Kingdom % Of Total Sightings (All Gears)	3.3
France	Trawler (All)	0.8
	Gill Netter	0.4
	Pelagic Stern Trawler	0.4
	Stern Trawler (Pelagic/Demersal)	0.4
	France % Of Total Sightings (All Gears)	2.1
Belgium	Trawler (All)	0.8
	Beam Trawler	0.4
	Side Trawler (Pelagic/Demersal)	0.4
	Stern Trawler (Pelagic/Demersal)	0.4
	Belgium % Of Total Sightings (All Gears)	2.1
Denmark	Gill Netter	1.2
	Beam Trawler	0.4
	Stern Trawler (Pelagic/Demersal)	0.4
	Denmark % Of Total Sightings (All Gears)	2.1
Germany	Beam Trawler	1.2
	Gill Netter	0.4
	Germany % Of Total Sightings (All Gears)	1.7
Netherlands	Beam Trawler	74.8
	Trawler (All)	9.5
	Bottom Seiner (Anchor/Danish/Fly/Scots)	1.2
	Stern Trawler (Pelagic/Demersal)	0.8
	Demersal Stern Trawler	0.4
	Gill Netter	0.4
	Pair Trawler (All)	0.4
	Potter/Whelker	0.4
	Purse Seiner	0.4
	Unknown	0.4
	Netherlands % Of Total Sightings (All Gears)	88.8

14.3.2 Dutch Fleet

14.3.2.1 Vessels, Gear and Operating Patterns

28. The Netherlands operates the largest fleet of fishing vessels in the Southern North Sea. The majority of vessels undertake beam trawling with a significantly lower number deploying otter trawls and seine nets. From consultation, it is understood that at present, up to fifty-seven Dutch beam trawlers fish the originally defined East Anglia Zone in which Norfolk Vanguard is located. Examples of the specifications of typical Dutch beam trawlers are detailed below (Table 14.6). In the interests of confidentiality, the names and registration numbers of the vessels have been removed.

29. Dutch vessels do not have historic rights within the UK's 12nm limit and therefore cannot fish over the inshore section of the offshore cable corridor.

Table 14.6 Specifications of Dutch vessels known to operating within the general area of Norfolk Vanguard (source: VisNed, 2017)

Vessel Number	1	2	3	4
Home Port	Oudeschildt	Oudeschildt	Stellendam	Stellendam
PO	Texel	Texel	Delta Zuid	Delta Zuid
Length	42.35	42.21	41.05	42.37
Beam	8.5	8.5	9	8.5
Draft	5.16	5.15	5.1	5.15
Engine HP	1529	1999	1999	1999
Fishing method	Pulse wing	Pulse wing	Pulse wing	Pulse wing
Typical fishing trip	4-5 days	4-5 days	4-5 days	4-5 days
Target species	Sole	Sole	Sole	Sole

14.3.2.1.1 Beam Trawling

30. Beam trawling targets flatfish species, predominantly sole and plaice. Other species are also caught but to a lesser extent.

31. The larger class of Dutch beam trawlers mostly operate pulse wing trawls. However, some vessels continue to use traditional beam trawls and it is understood from the chief executive of VisNed that between five and ten Dutch beam trawlers use Sumwing trawls, which as with traditional beam trawls involves the use of tickler chains (Pers comms: P. Visser, 29/05/2018).

32. A pulse wing involves a trawl net towed along the seabed attached to a hydrofoil. This method was first developed in the Netherlands and has increased in use steadily in the fleet having now largely replaced the use of traditional beam trawl gear. With pulse wings, the tickler chains and chain mats are removed and replaced with trailing electrodes. The removal of the tickler chains and chain mats reduces seabed contact (and therefore drag), disturbance and the levels of unwanted bycatch. It is also understood from VisNed that the fuel consumption of vessels deploying pulse wings is 40% lower than conventional vessels deploying beam

trawls. An example of a Dutch beam trawler with pulse wing gear is shown in Plate 14.1.

Plate 14.1 Dutch pulse wing trawler at port (Source: BMM, 2017)

33. Traditional beam trawls comprise a steel beam held above the seabed by shoes at each end, onto which a net is attached (Figure 14.3 and Plate 14.2). The beam is towed using chain bridles that attach to the shoes and gear and is towed from the vessel's outrigger booms on either side of the vessel.

34. Tickler chains disturb fish to rise off the seabed to be caught in the net. When operating in areas of hard, rocky substrate, chain mats are used comprising a lattice of chains attached to the beam across the mouth of the net.

35. Beam trawls can range in length from four to twelve metres. Fully rigged (in air) weights of beam trawls used in the area can vary from four to six tonnes, although there has been a move to reduce weights and therefore drag in light of increasing fuel costs.

36. Towing directions are influenced by a number of factors such as seabed contours, tidal flow direction, weather and the need to avoid fasteners. In the event of gears becoming fast, a number of tactics can be deployed in attempts to recover them. These can include increasing engine revolutions, hauling on the winch and manoeuvring the vessel. In the worst case, when gear is lost due to towing warps parting, the normal practice is to deploy a grapple and tow a search pattern over the area where the gear was lost.

37. It should be noted that the EU voted to prohibit electronic pulse fishing on 16th January 2018 as part of the overhaul of EU fishing regulations. This package was subsequently negotiated by the European Parliament, European Commission, the UK (NFFO) and the Netherlands (VisNed). It was agreed that from 15th February 2018, a voluntary Interim Spatial Separation Agreement would come into force between Dutch pulse fishermen and the English East Coast inshore fishermen, whereby Dutch fishermen would avoid using pulse methods in three designated areas (area 1 - Ramsgate/Thames; area 2 - Welland Area, Lowestoft; area 3 - East Lowestoft area, Lowestoft). These areas are illustrated in Figure 14.4.

38. In recent consultation, VisNed expressed the opinion that they would be successful in their negotiations with the EU and that within two years pulse wing fishing by the Dutch fleet would be able to resume as it occurred prior to 16th January 2018 (Pers Comms: P. Visser, 11/04/2018). It is however as yet not known how the UK government will address the issue of pulse wing fishing in respect of "Brexit".

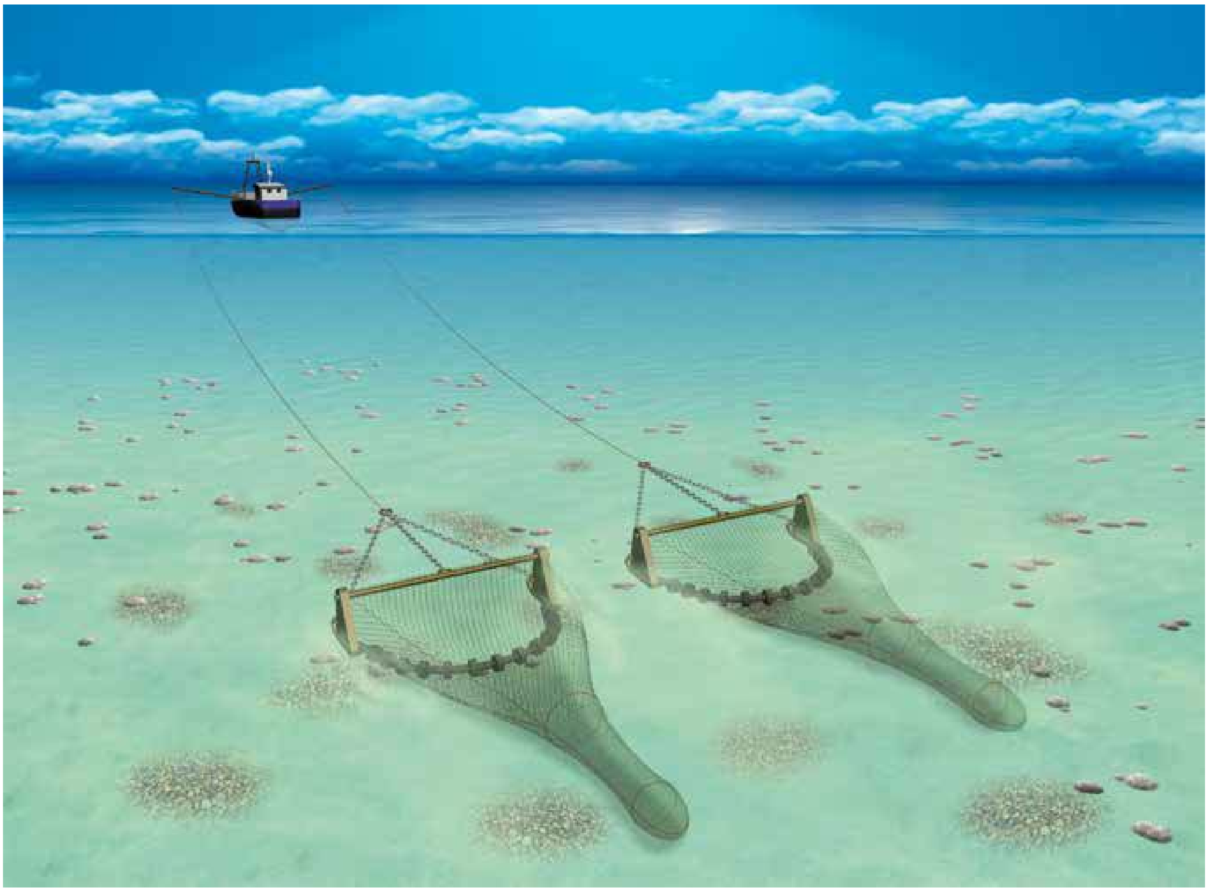


Figure 14.3 A beam trawl (Source: Seafish, 2015)

Plate 14.2 Traditional beam trawl with tickler chains and chain mat (Source: BMM, 2012)

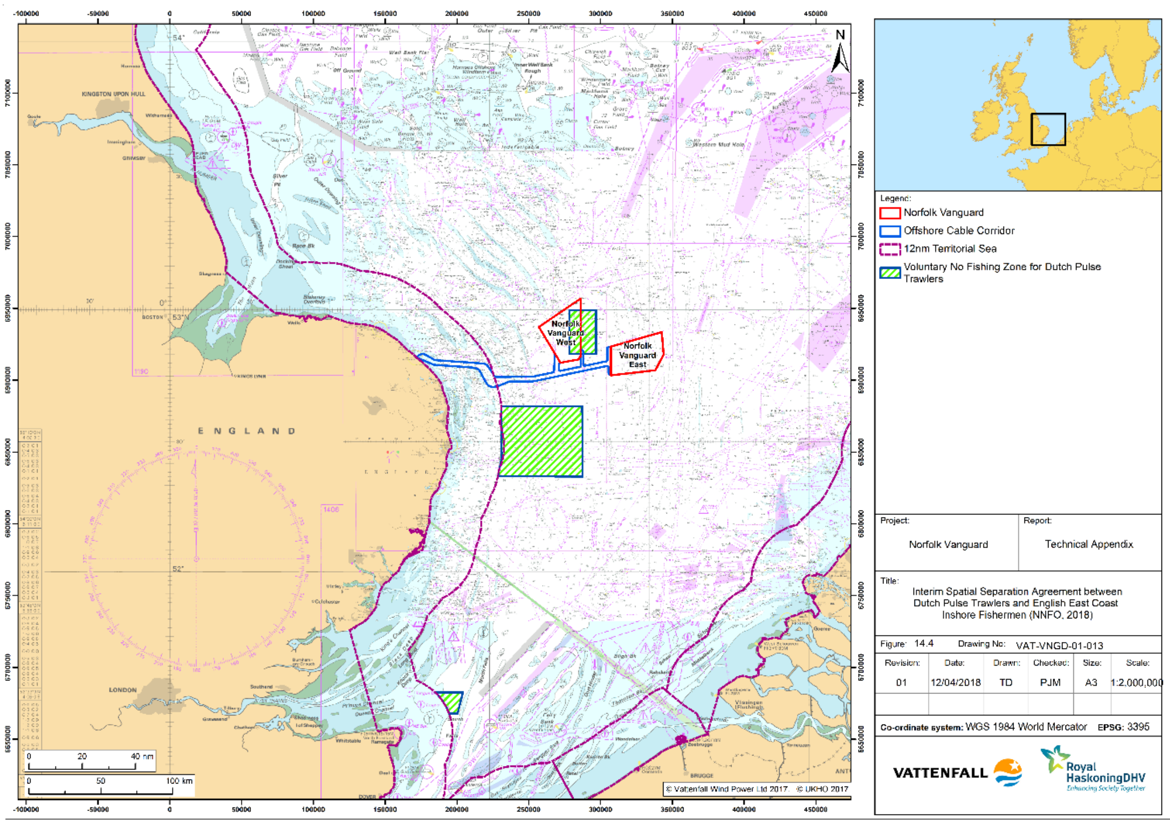


Figure 14.4 Interim Spatial Separation Agreement Areas for Pulse Fishing in relation to Norfolk Vanguard (NFFO, 2018)

14.3.2.1.2 Seine Netting

39. Seine nets are deployed over clean, obstruction free seabeds for the capture of a range of demersal species. As shown by Figure 14.5, the seine ropes are laid on the seabed in a triangular pattern with the net located in the middle of the base of the triangle. The initial hauling phase involves the winching in of the sein ropes so they are pulled together, which exploits the reaction of the fish to swim ahead of the ropes moving over the seabed. Once the ropes are approximately parallel, the hauling speed is increased and the net is hauled over the seabed capturing the fish that have been herded within its path. It is understood that the maximum lengths of ropes deployed each side of the net by the largest of the Dutch seine netters (Plate 14.3), can be as much as 3km (Pers. Comms: P. Visser, 11/04/2018).

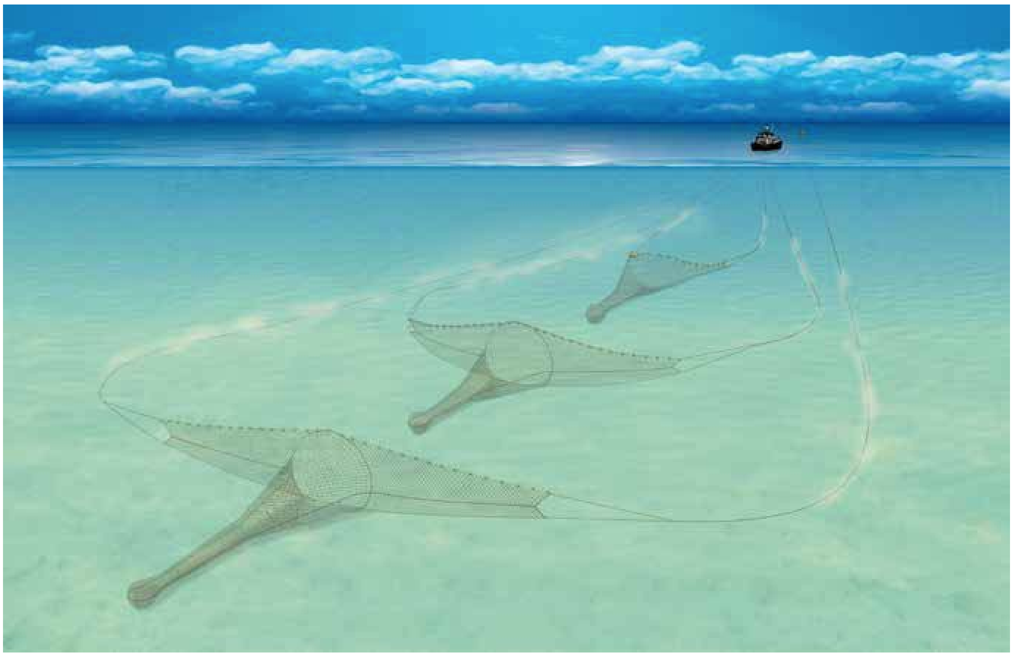


Figure 14.5 Seine nets (Source: Seafish, 2015)

Plate 14.3 Dutch seine netter (Source: Trawler Photos, 2018)

14.3.2.2 Satellite Tracking (VMS) Data

40. As illustrated by Dutch VMS data shown in Figure 14.6, Figure 14.7 and Figure 14.8, extensive Dutch beam trawling activity occurs over the Southern North Sea and to a lesser extent, in some parts of the Central North Sea. As shown by Figure 14.7 and Figure 14.8, the OWF sites and offshore cable corridor are within areas sustaining moderate levels of Dutch beam trawling effort. Areas displaying the highest effort and values are located outside of the study area.

41. The data illustrated in Figure 14.9, Figure 14.10 and Figure 14.11 demonstrate that Dutch seine netting, in comparison to beam trawling, occurs at significantly lower levels, and that the highest concentration of effort by this method occurs outside of the study area within the English Channel.

42. Figure 14.12, Figure 14.13 and Figure 14.14 illustrate that midwater trawling by Dutch vessels occurs at only very low levels in the vicinity of the project area. During consultation with VisNed, it was considered that Dutch pelagic vessels do not fish the project area to any significant extent (Pers. Comms: P. Visser, 11/04/2018). Furthermore, the majority of the full time Dutch pelagic vessels are of a size, typically 90-142m in length and operate gears of dimensions which would make it unviable to operate within the offshore project area.

43. With regards to other categories of Dutch fishing vessels, VMS data has been obtained for demersal trawls, purse seines, nets, traps and dredges (Figure 14.15,

Figure 14.16, Figure 14.17, Figure 14.18, Figure 14.19, Figure 14.20, Figure 14.21, Figure 14.22, Figure 14.23, Figure 14.24 and Figure 14.25). As shown, the levels of activity in the project area by demersal trawls and the activity classified as “nets” are at minimal levels. The Dutch activities of purse seines, traps and dredging are shown not to occur in areas relevant to Norfolk Vanguard.

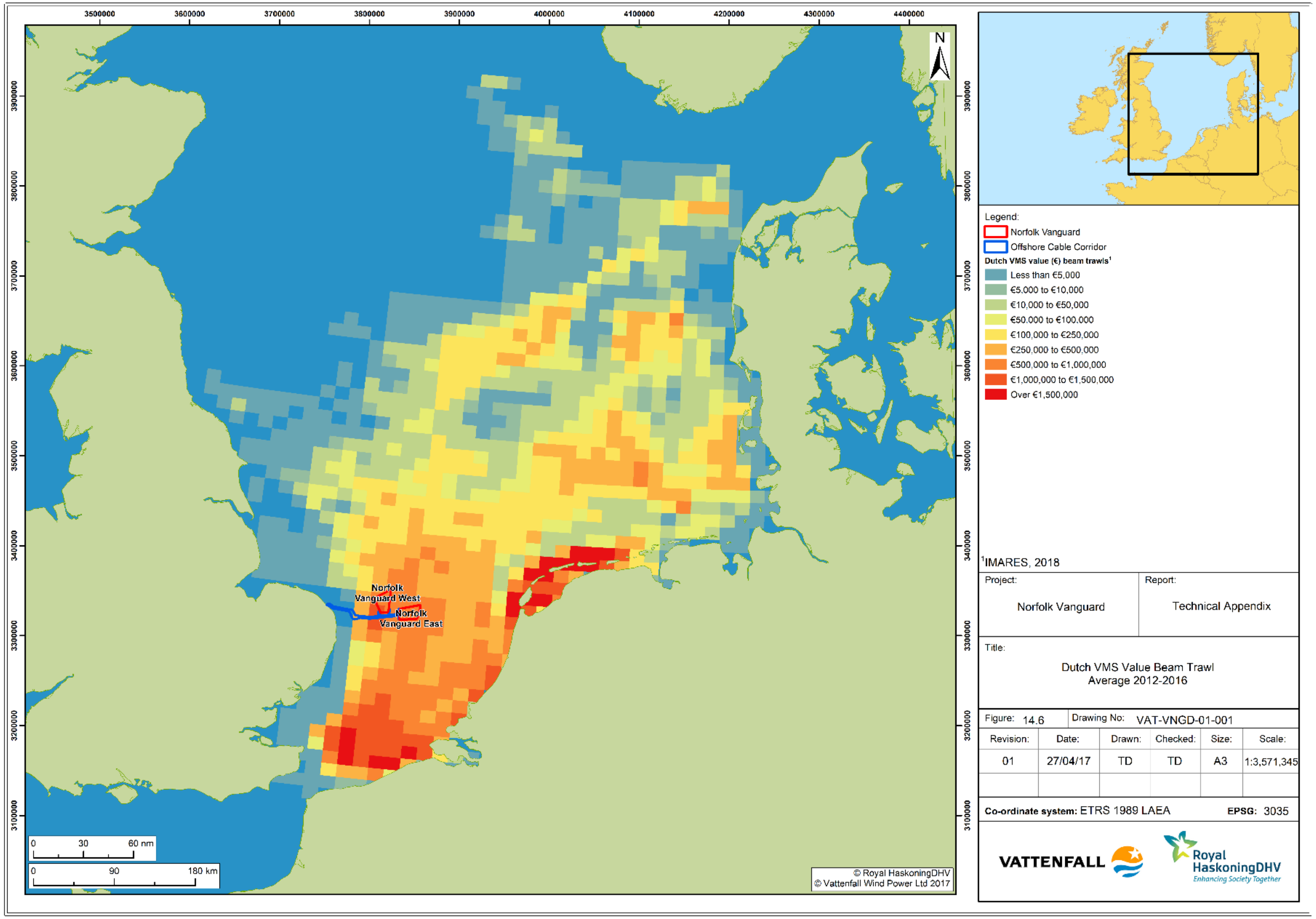


Figure 14.6 Dutch VMS value by beam trawl – wider region (average 2012-2016) (Source: IMARES, 2018)

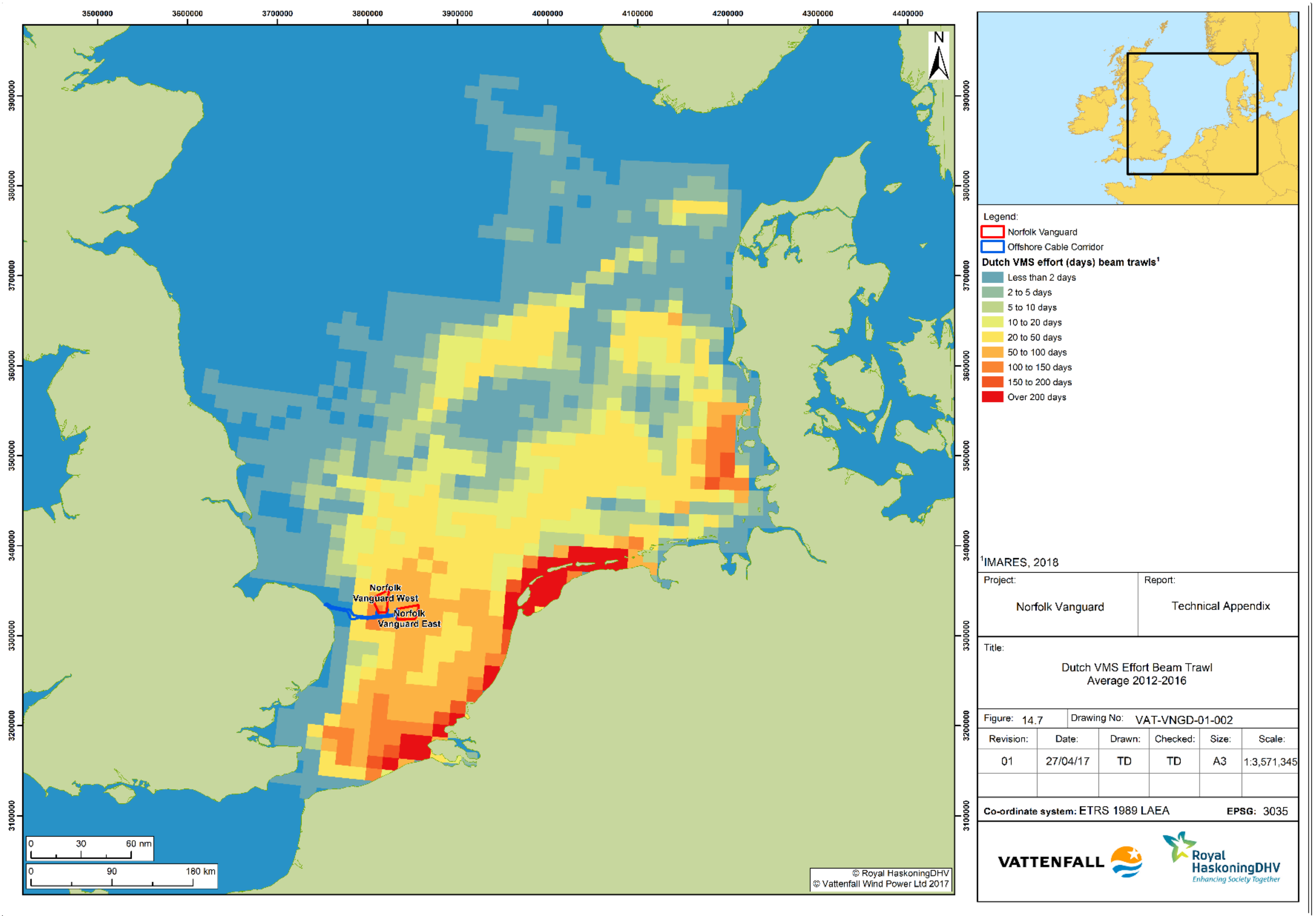


Figure 14.7 Dutch VMS effort by beam trawl – wider region (average 2012-2016) (Source: IMARES, 2018)

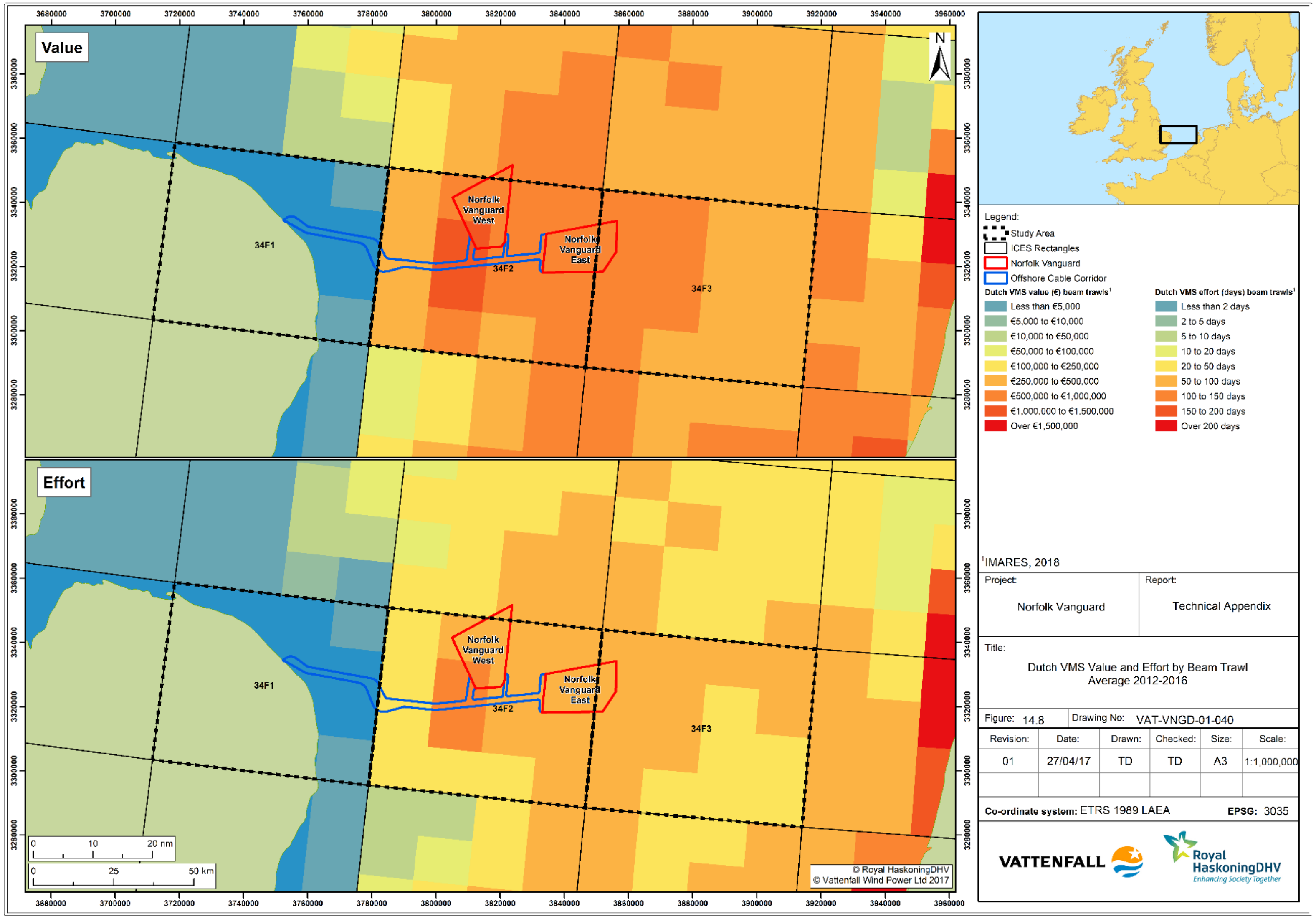


Figure 14.8 Dutch VMS value and effort by beam trawl (average 2012-2016) (Source: IMARES, 2018)

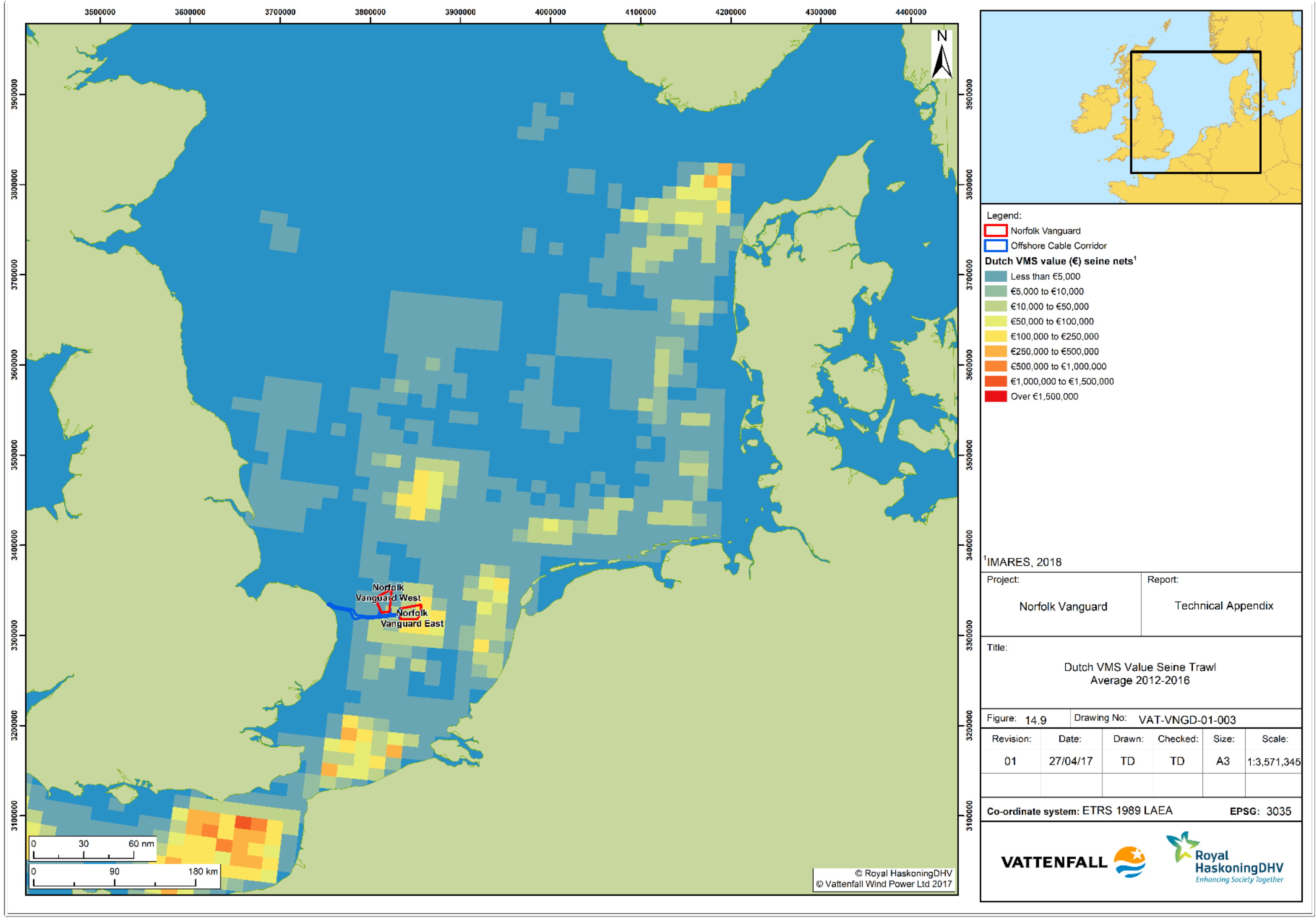


Figure 14.9 Dutch VMS value by seine net – wider region (average 2012-2016) (Source: IMARES, 2018)

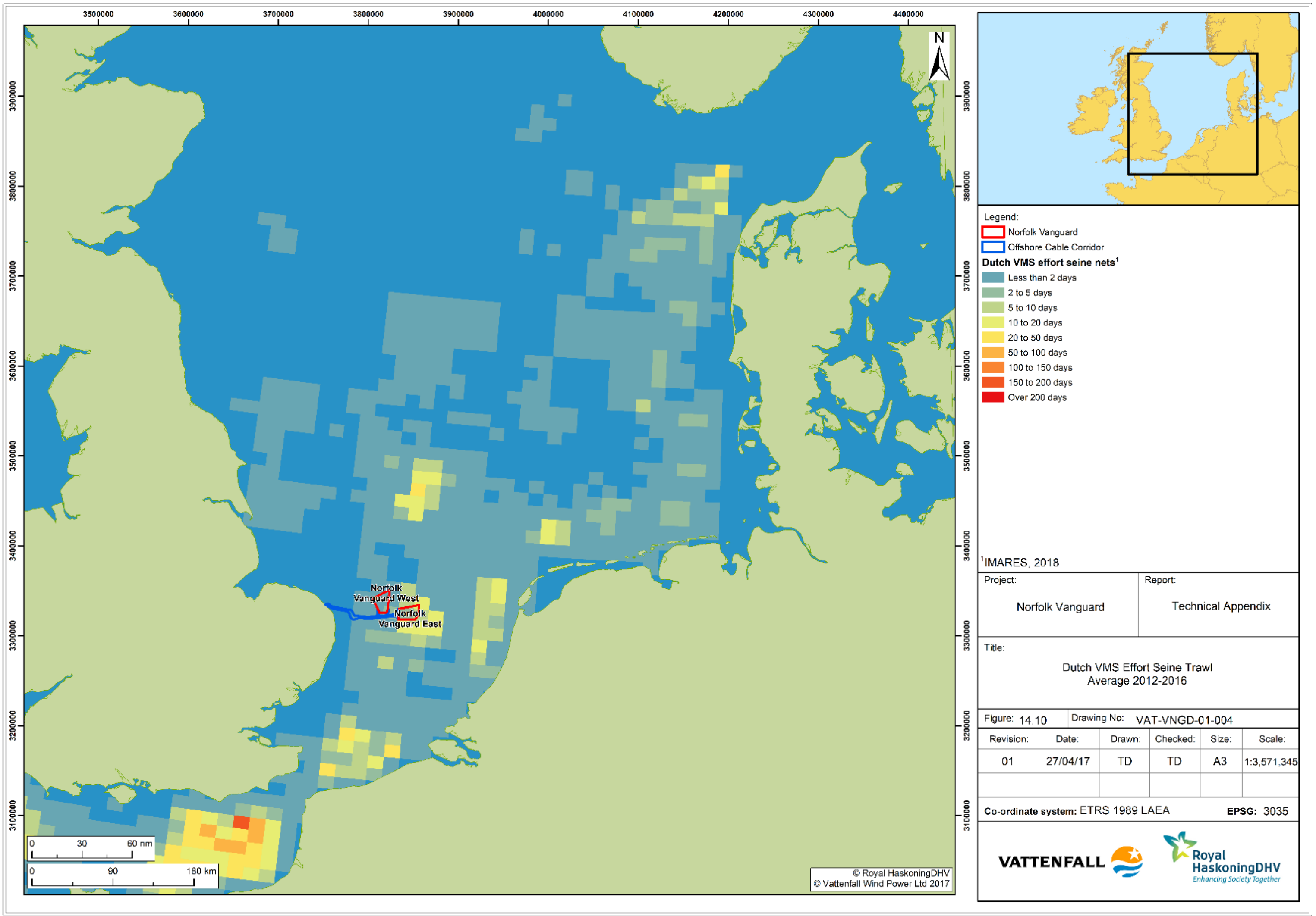


Figure 14.10 Dutch VMS effort by seine net – wider region (average 2012-2016) (Source: IMARES, 2018)

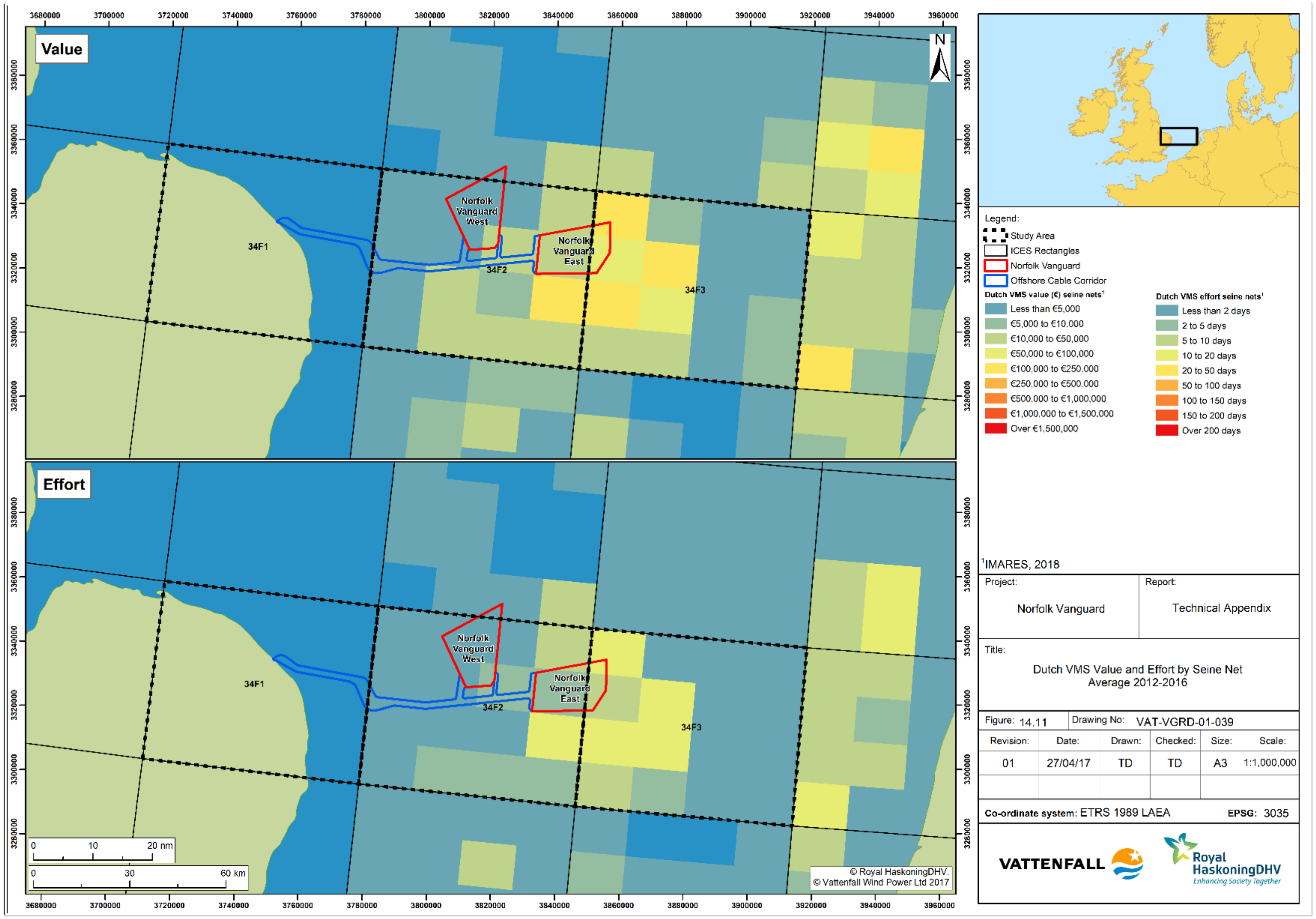


Figure 14.11 Dutch VMS value and effort by seine net (average 2012-2016) (Source: IMARES, 2018)

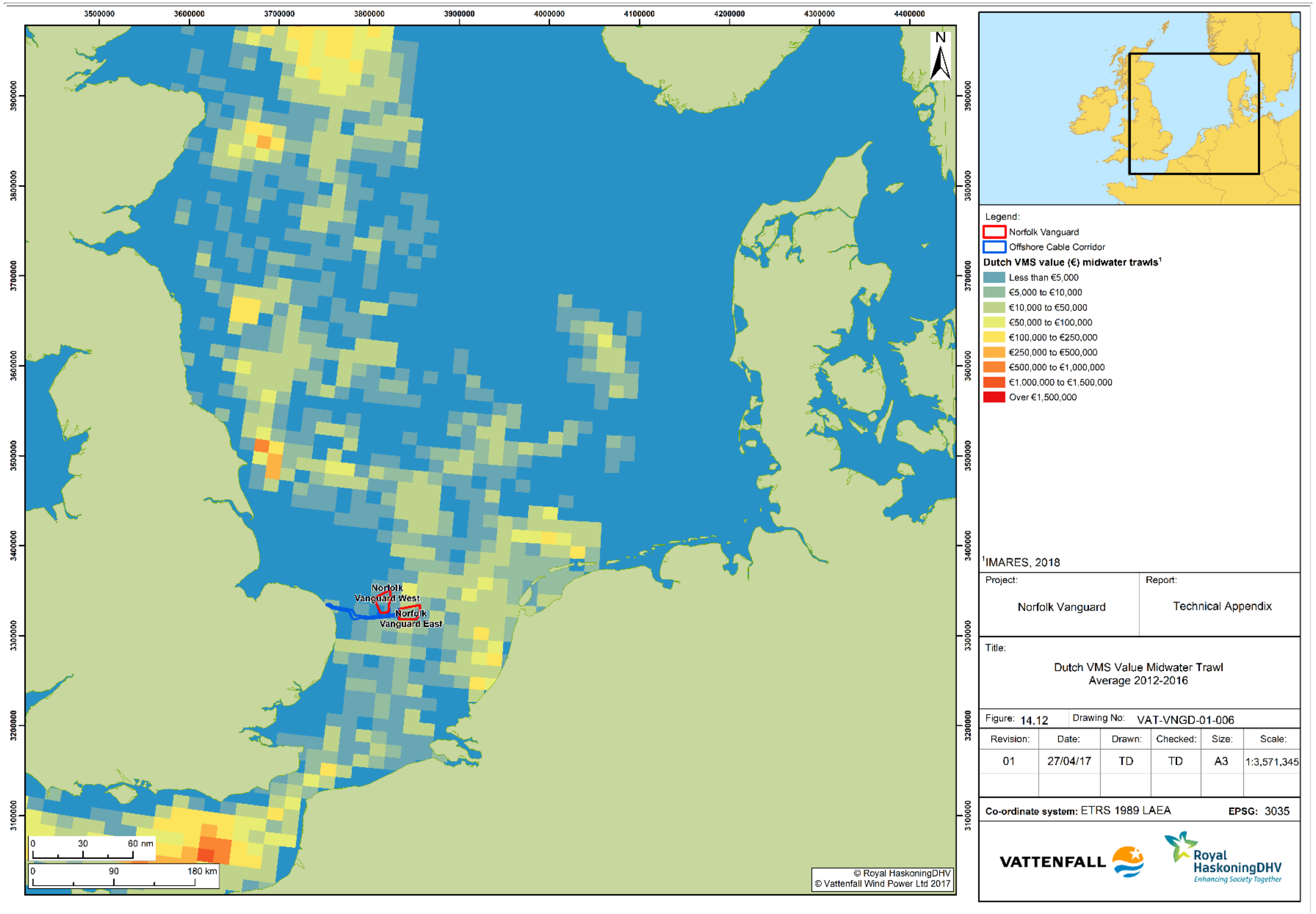


Figure 14.12 Dutch VMS value by midwater trawl – wider region (average 2012-2016) (Source: IMARES, 2018)

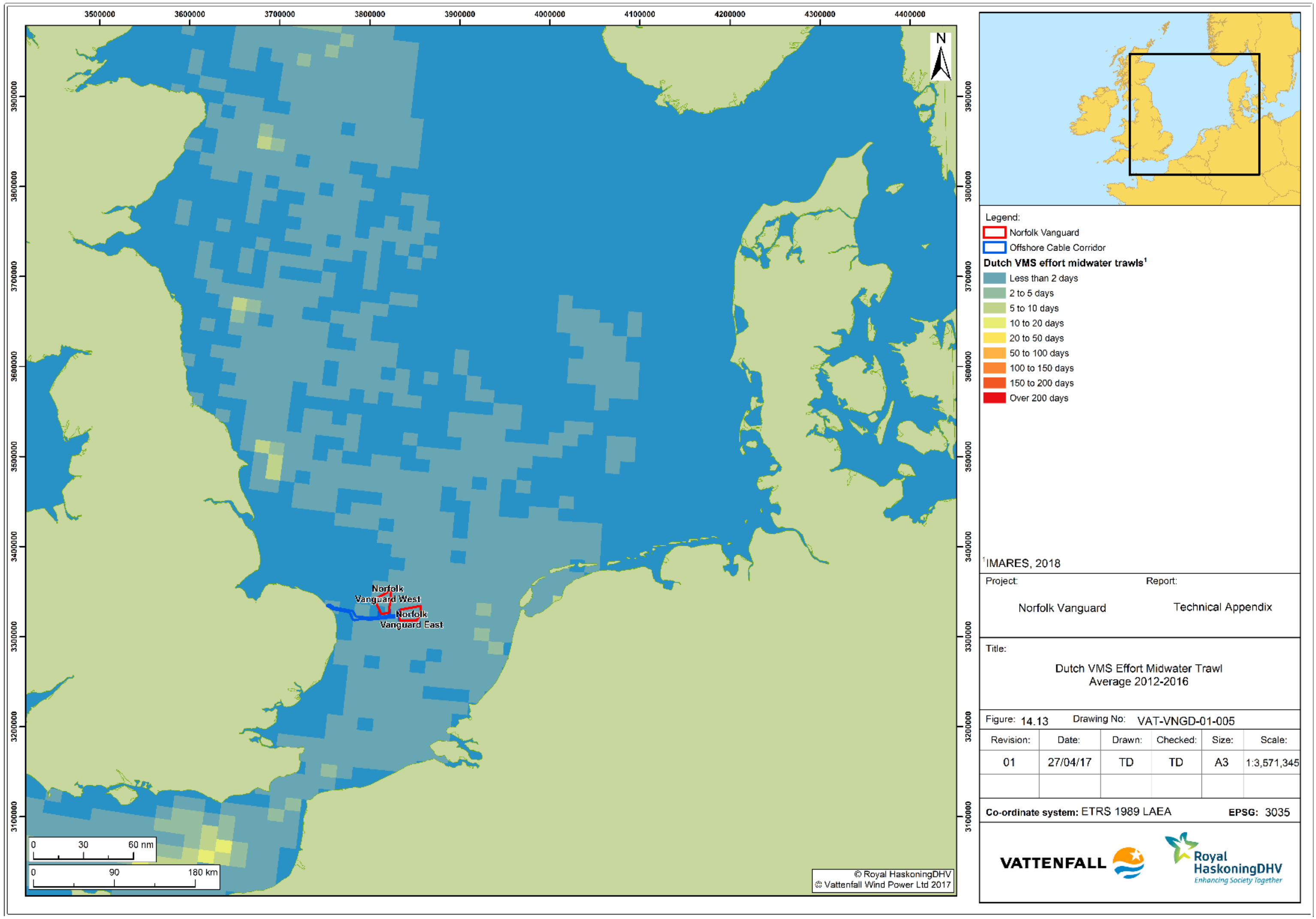


Figure 14.13 Dutch VMS effort by midwater trawl – wider region (average 2012-2016) (Source: IMARES, 2018)

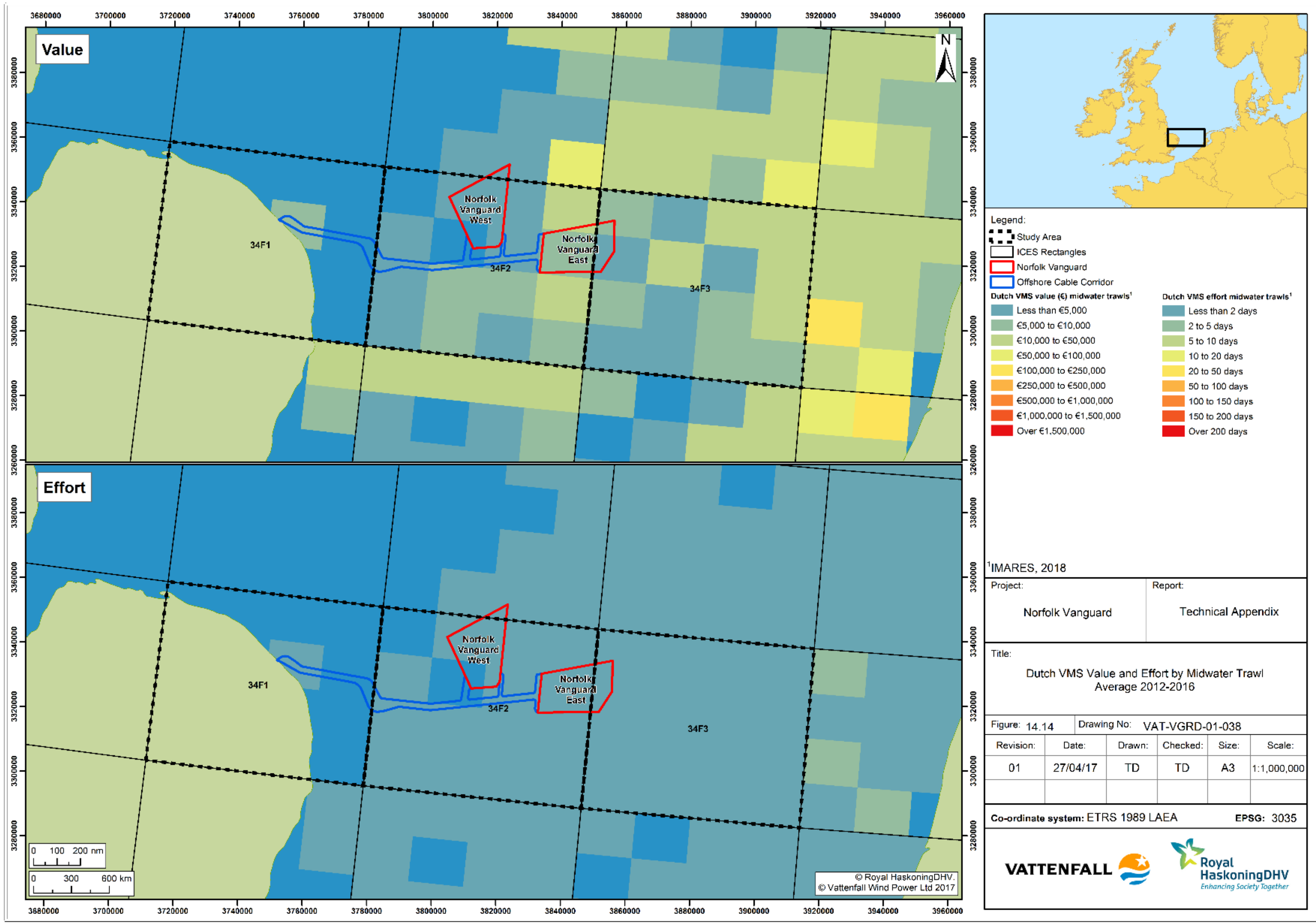


Figure 14.14 Dutch VMS value and effort by midwater trawl (average 2012-2016) (Source: IMARES, 2018)

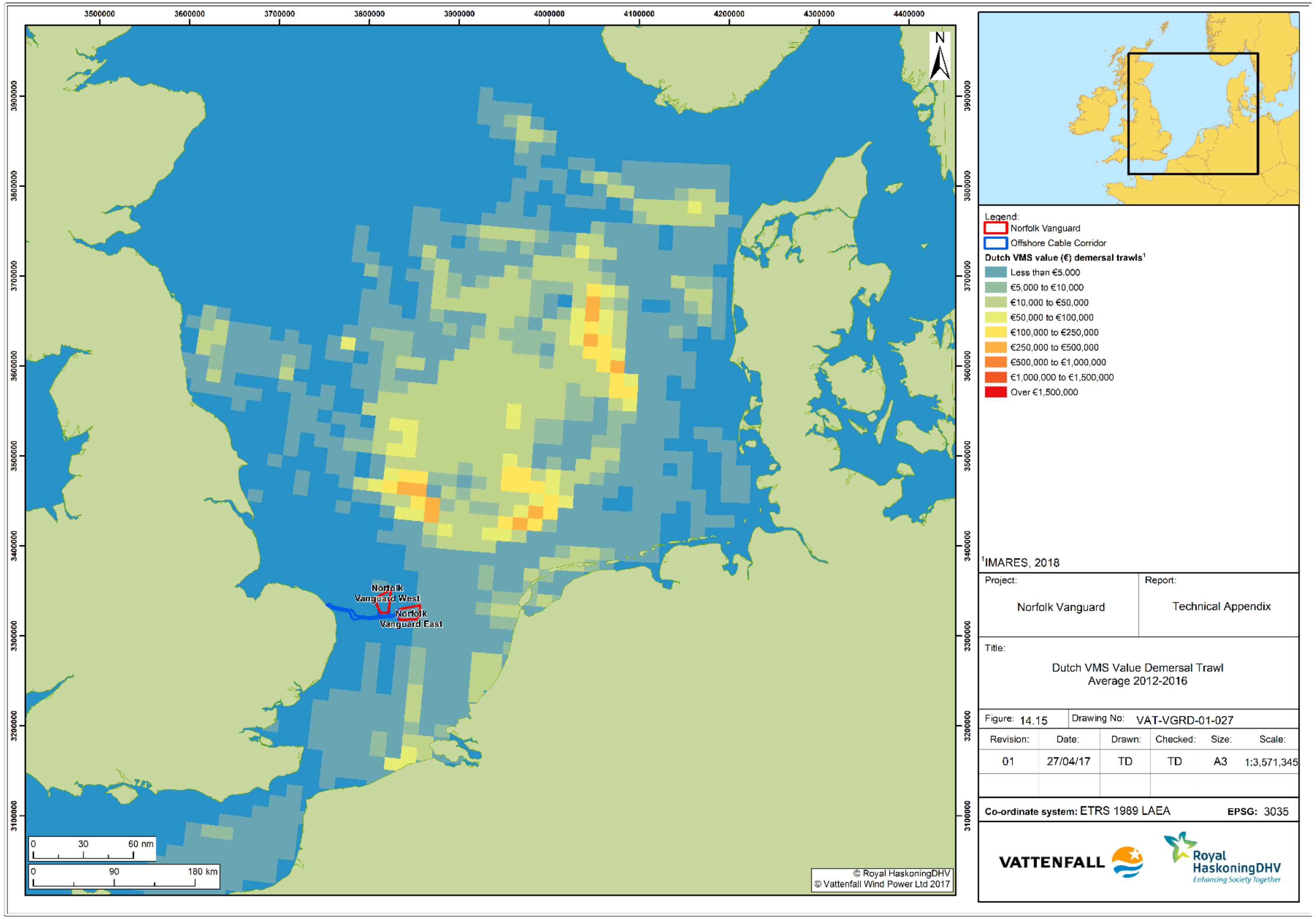


Figure 14.15 Dutch VMS value by demersal trawl – wider region (average 2012-2016) (Source: IMARES, 2018)

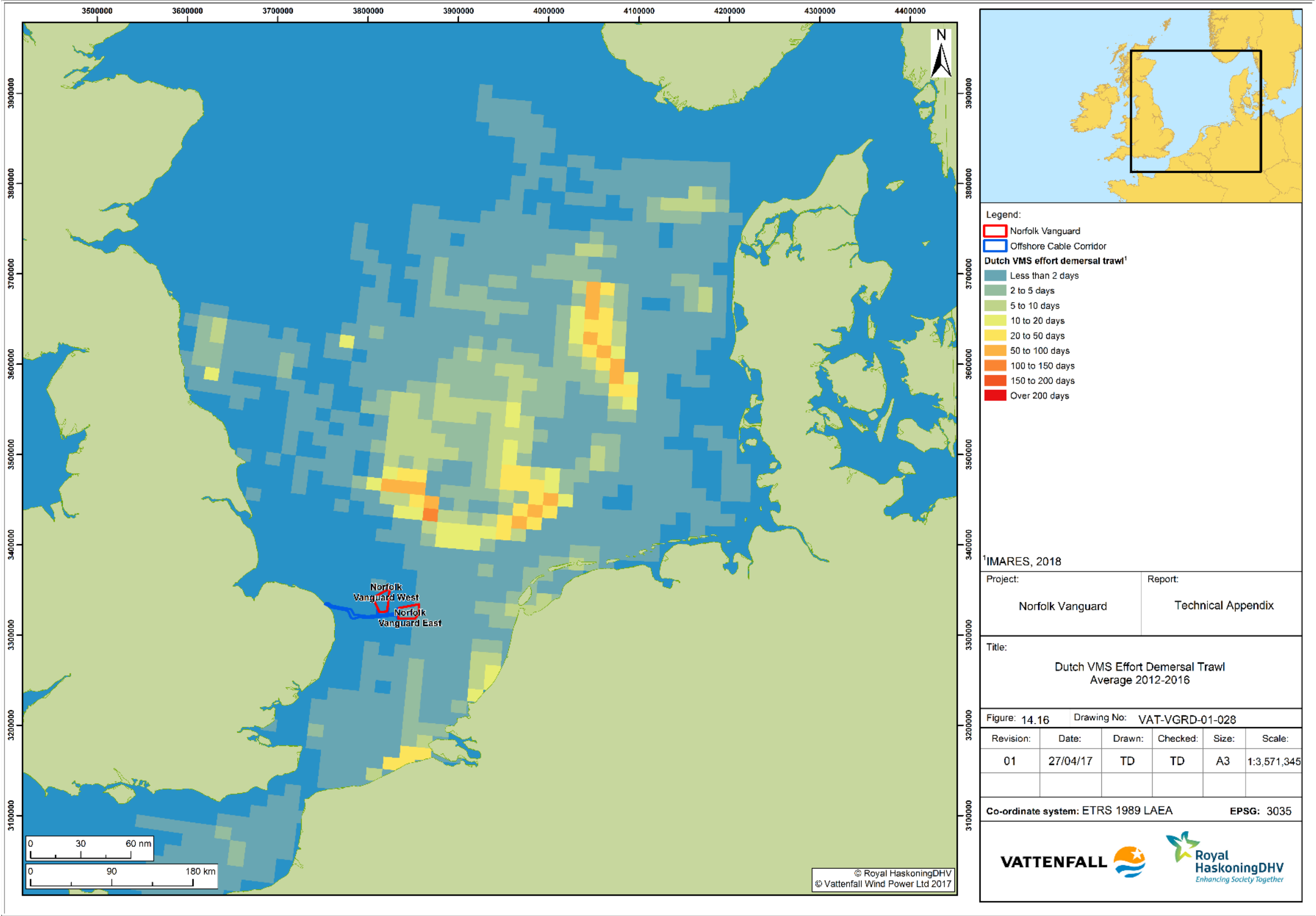


Figure 14.16 Dutch VMS effort by demersal trawl – wider region (average 2012-2016) (Source: IMARES, 2018)

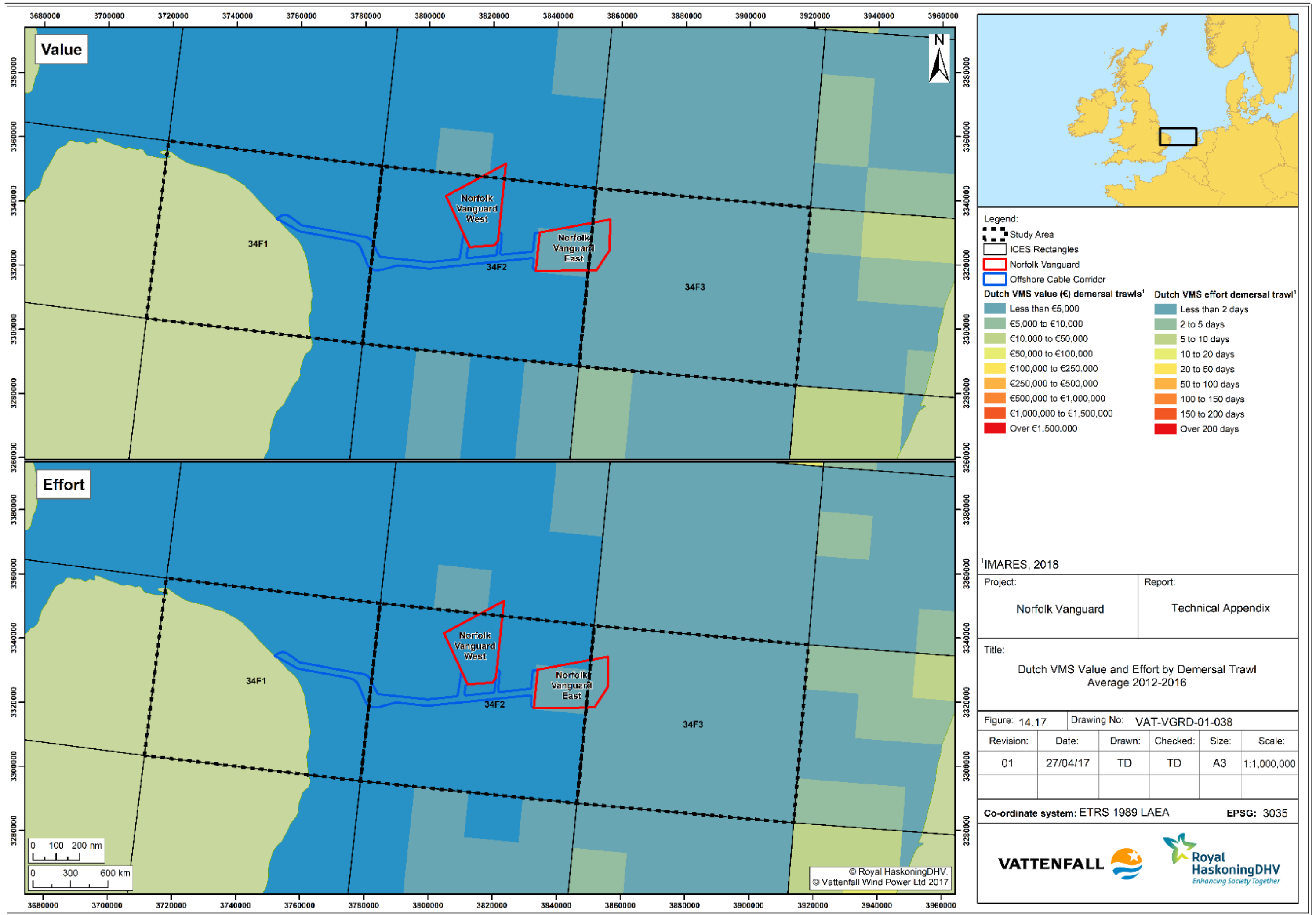


Figure 14.17 Dutch VMS value and effort by demersal trawl (average 2012-2016) (Source: IMARES, 2018)

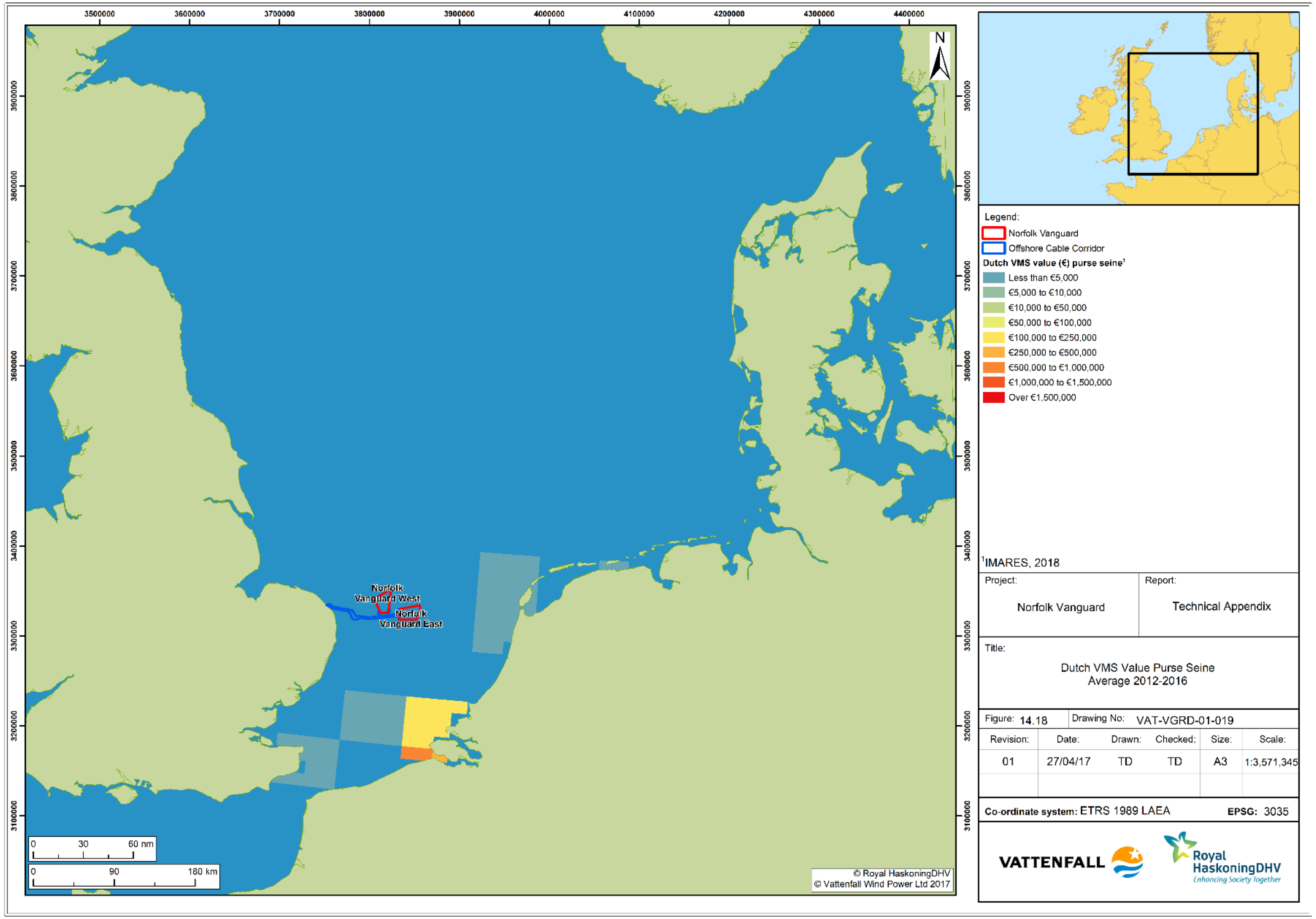


Figure 14.18 Dutch VMS value by purse seine – wider region (average 2012-2016) (Source: IMARES, 2018)

Figure 14.19 Dutch VMS effort by purse seine – wider region (average 2012-2016) (Source: IMARES, 2018)

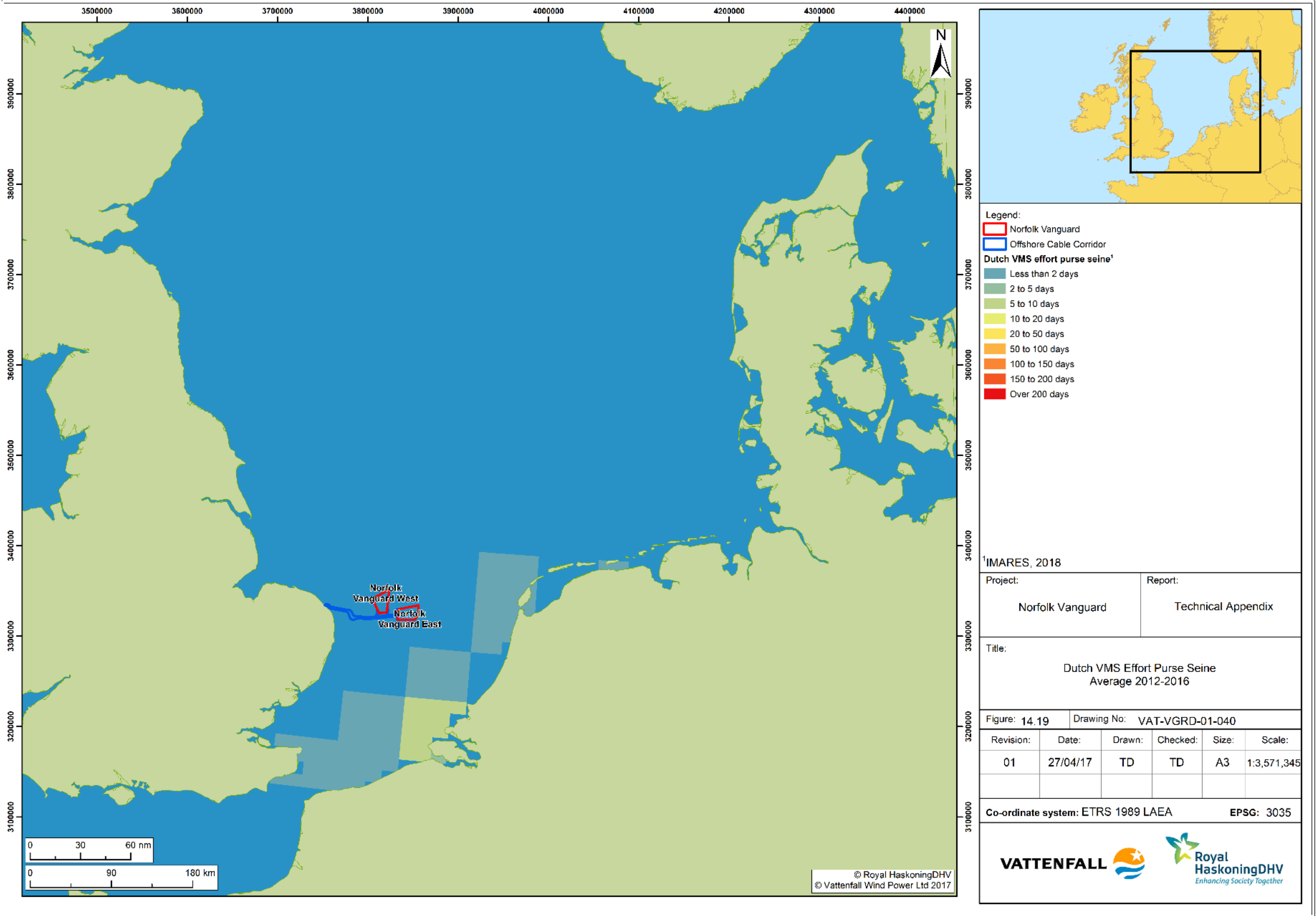


Figure 14.20 Dutch VMS value by net – wider region (average 2012-2016) (Source: IMARES, 2018)

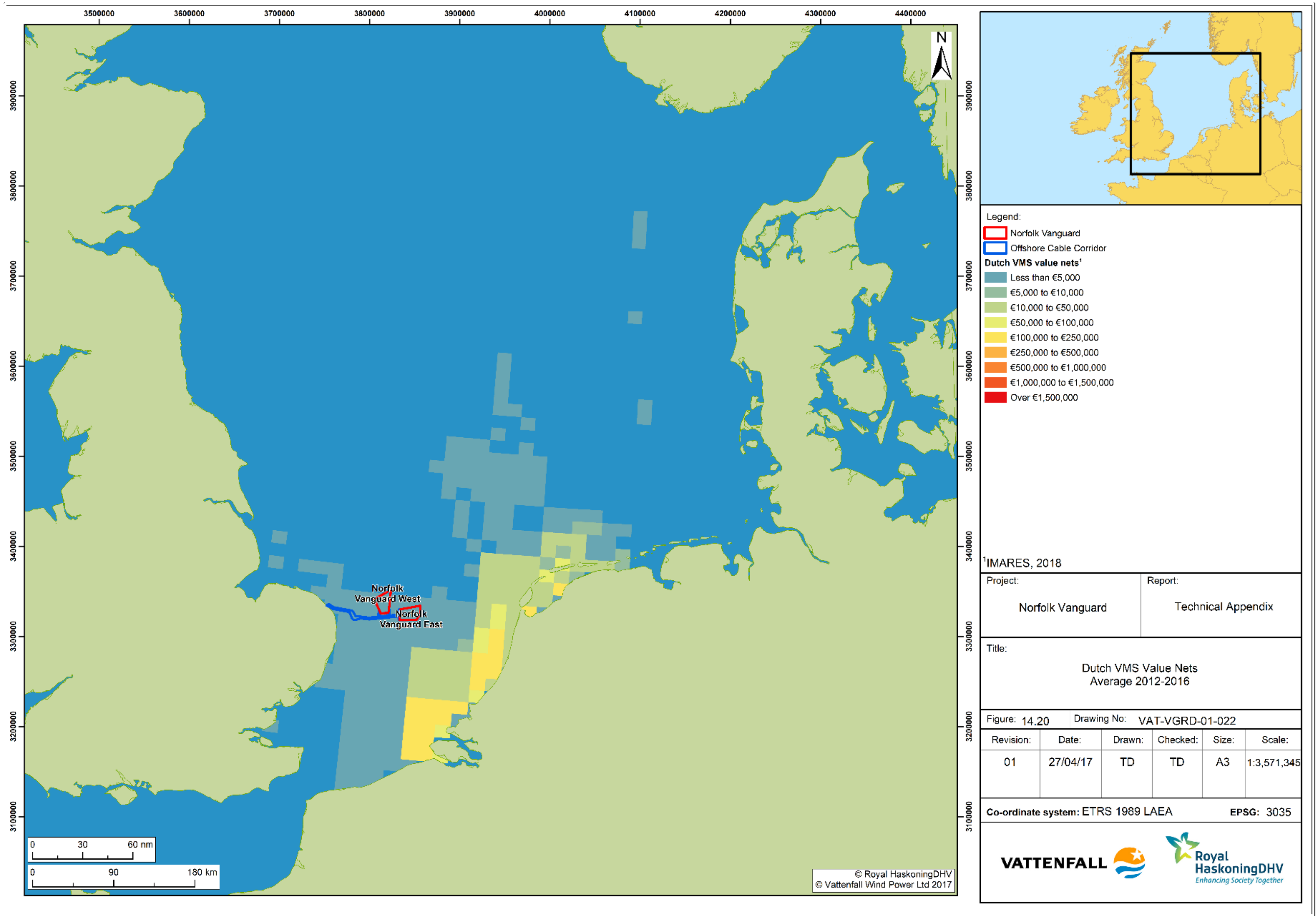


Figure 14.21 Dutch VMS effort by net – wider region (average 2012-2016) (Source: IMARES, 2018)

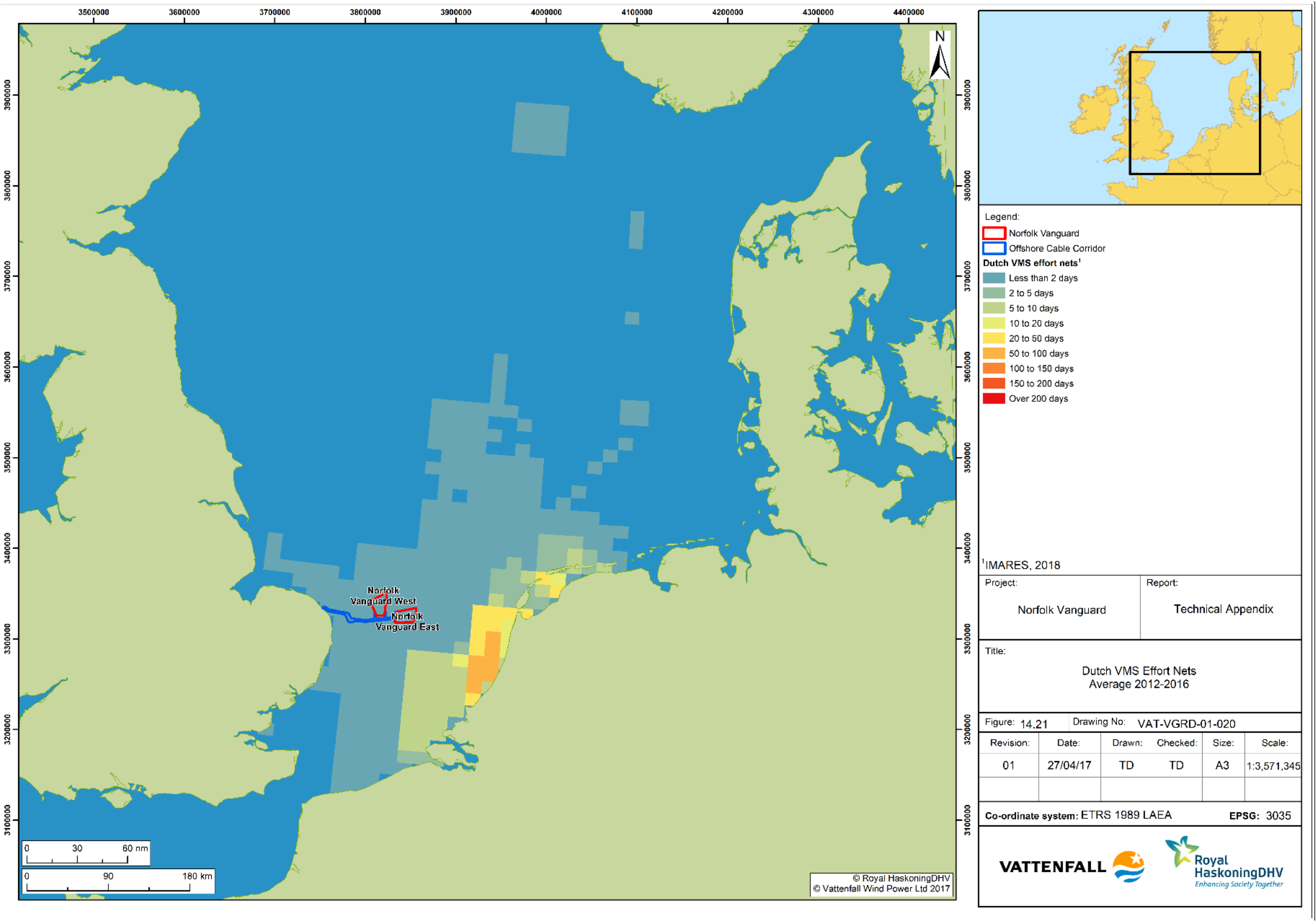


Figure 14.22 Dutch VMS value by trap – wider region (average 2012-2016) (Source: IMARES, 2018)

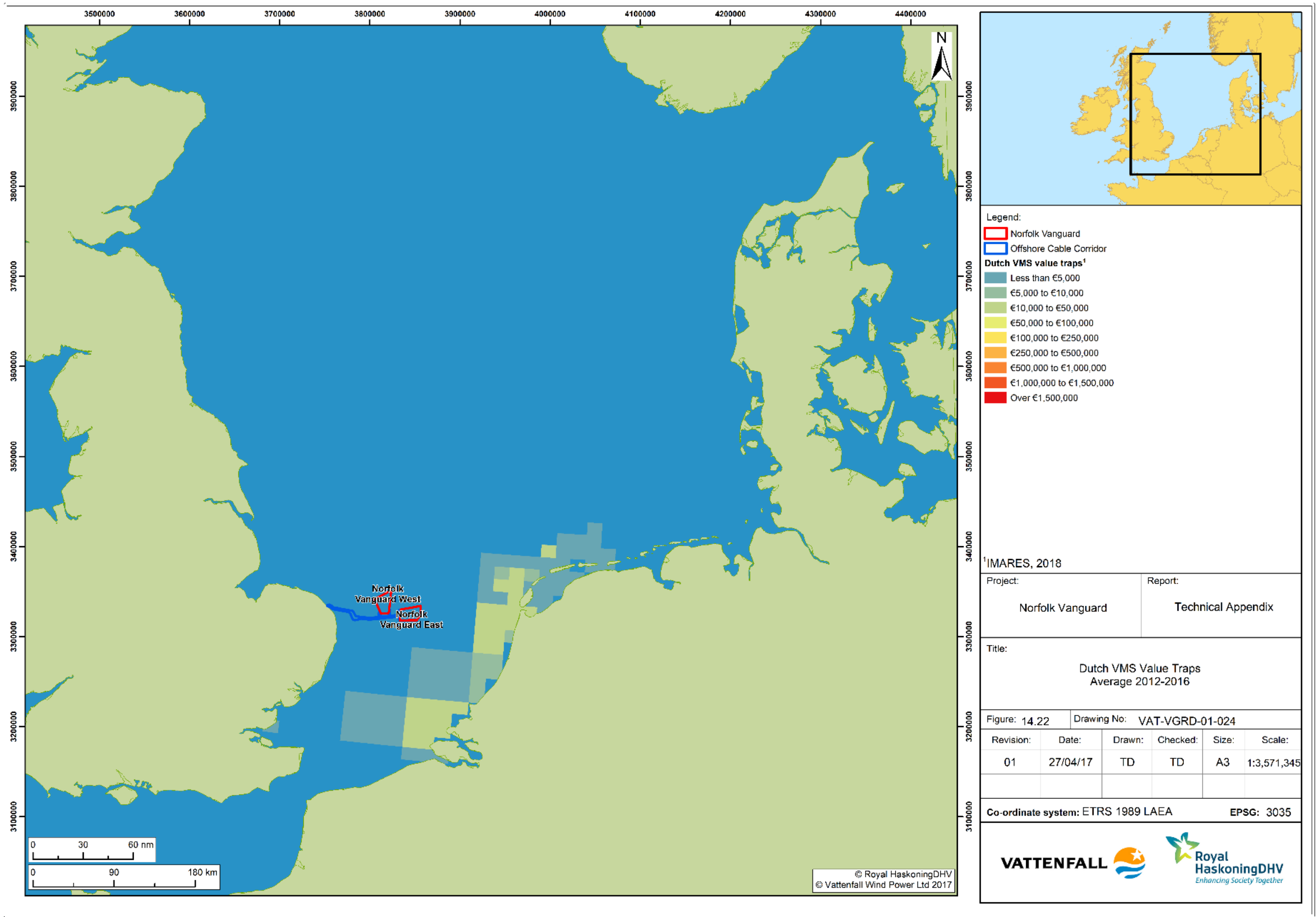


Figure 14.23 Dutch VMS effort by trap – wider region (average 2012-2016) (source: IMARES, 2018)

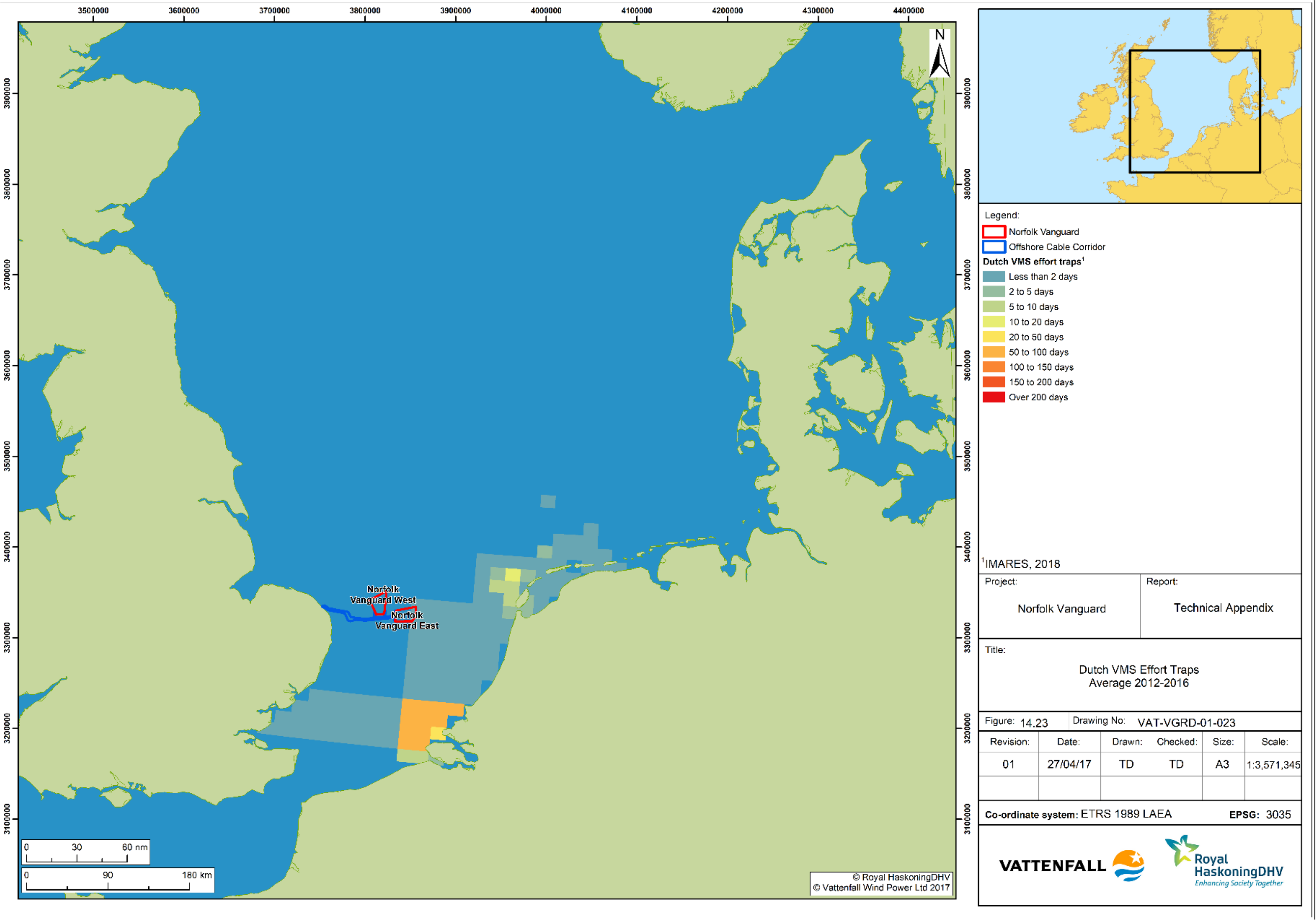


Figure 14.24 Dutch VMS value by dredge – wider region (average 2012-2016) (source: IMARES, 2018)

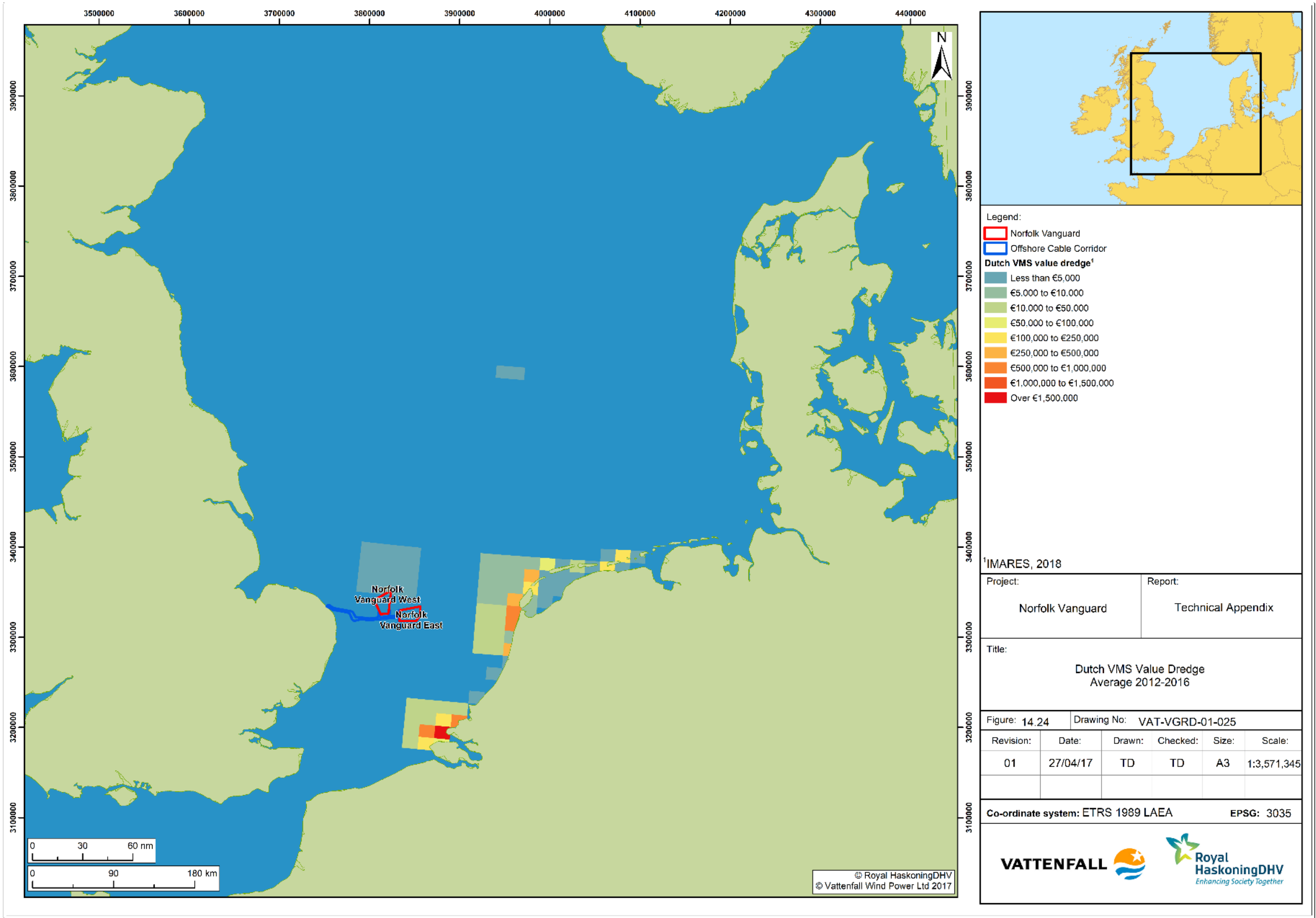
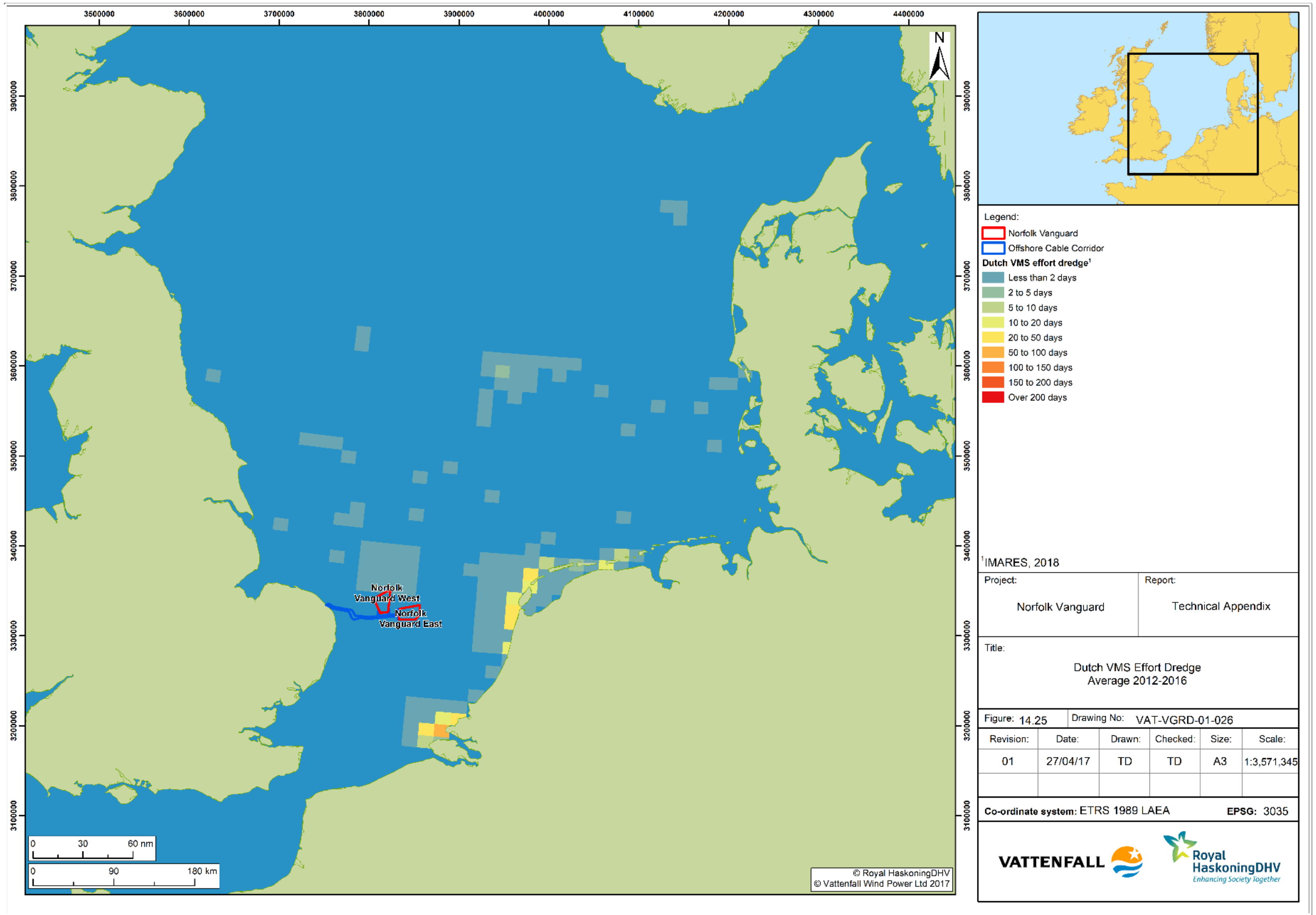


Figure 14.25 Dutch VMS effort by dredge – wider region (average 2012-2016) (Source: IMARES, 2018)



14.3.2.3 Dutch Effort and Landings Data

44. Effort values by vessel type clearly indicate that all Dutch vessels operating in 34F2, the area in which the OWF sites are located, are over 15m in length (Figure 14.26). Whilst in the regional context, the effort levels within 34F2 are comparatively high, in the wider national context, as previously discussed in respect of the distribution of VMS data (section 14.3.2.2), they are moderate.

45. Figure 14.27 also identifies that virtually all landings derived from 34F2 are from over 15m vessels and Figure 14.28 further confirms that the majority are from beam trawling. By contrast, seine netting accounts for a notably smaller proportion of landings.

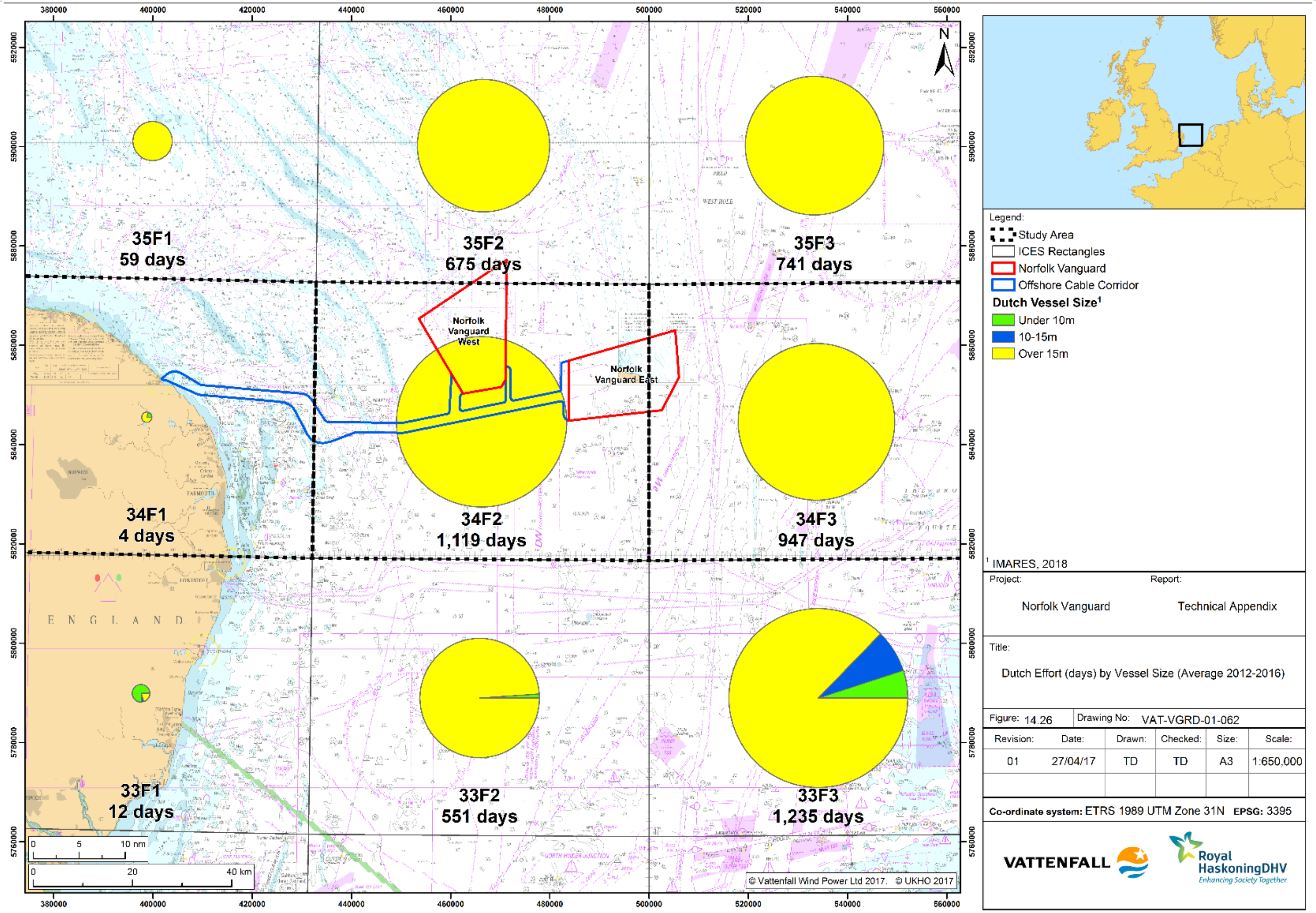


Figure 14.26 Dutch effort (days) by vessel size (average 2012-2016) (Source: IMARES, 2018)

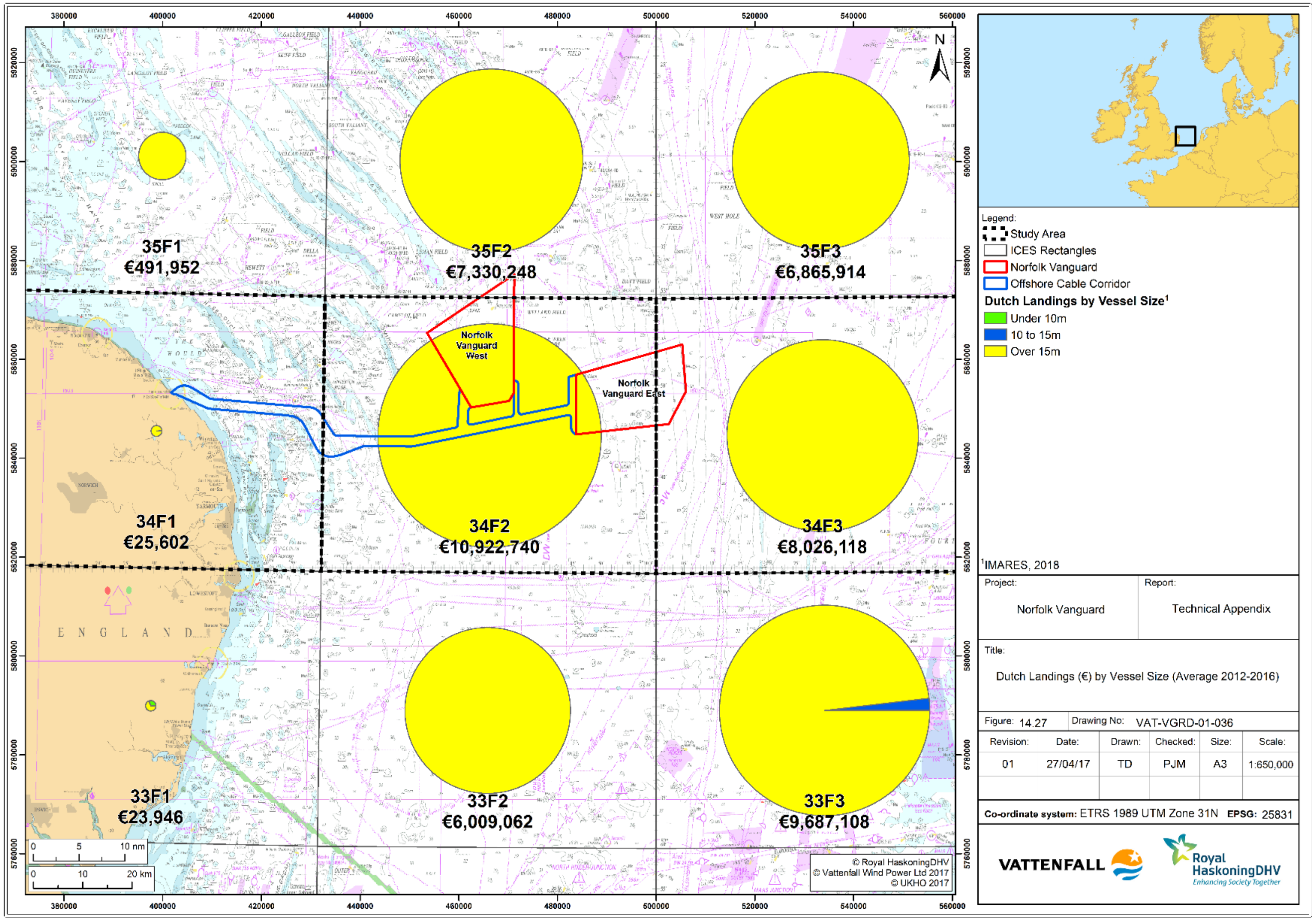


Figure 14.27 Dutch landings (€) by vessel size (average 2012-2016) (Source: IMARES, 2018)

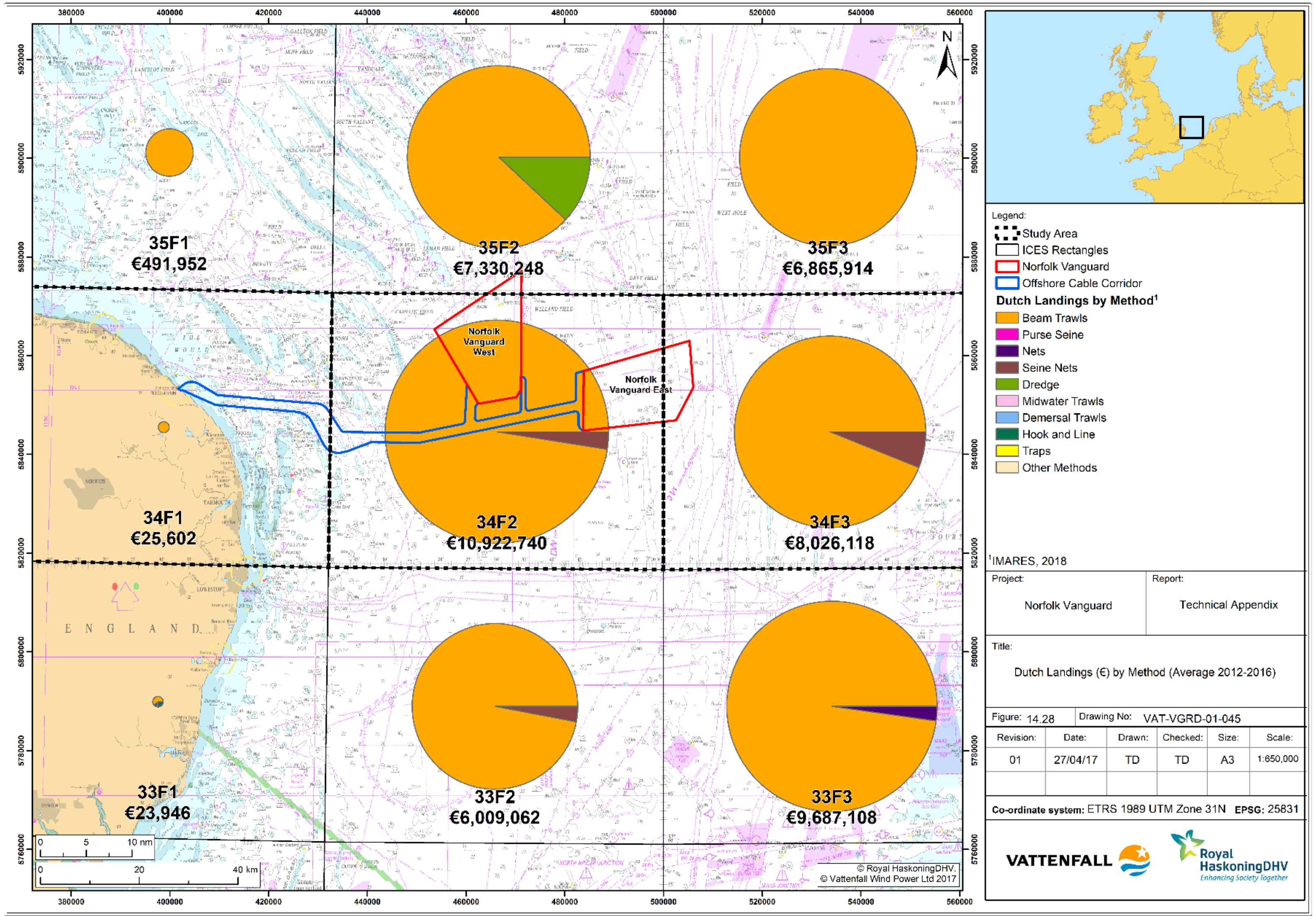


Figure 14.28 Dutch landings (€) by method (average 2012-2016) (Source: IMARES, 2018)

14.3.2.4 Surveillance Sightings

46. The areas around NV West and the central part of the offshore cable corridor have recorded the highest concentration of surveillance sightings in comparison to adjacent areas (Figure 14.29). Occasional sightings are recorded within the 12nm limit, but these vessels are likely to be steaming to port or alternative fishing grounds, rather than undertaking fishing activities. As is apparent in Figure 14.2, the surveillance sightings further confirm that the principal offshore fishing activity of relevance to the project is Dutch Beam trawlers.

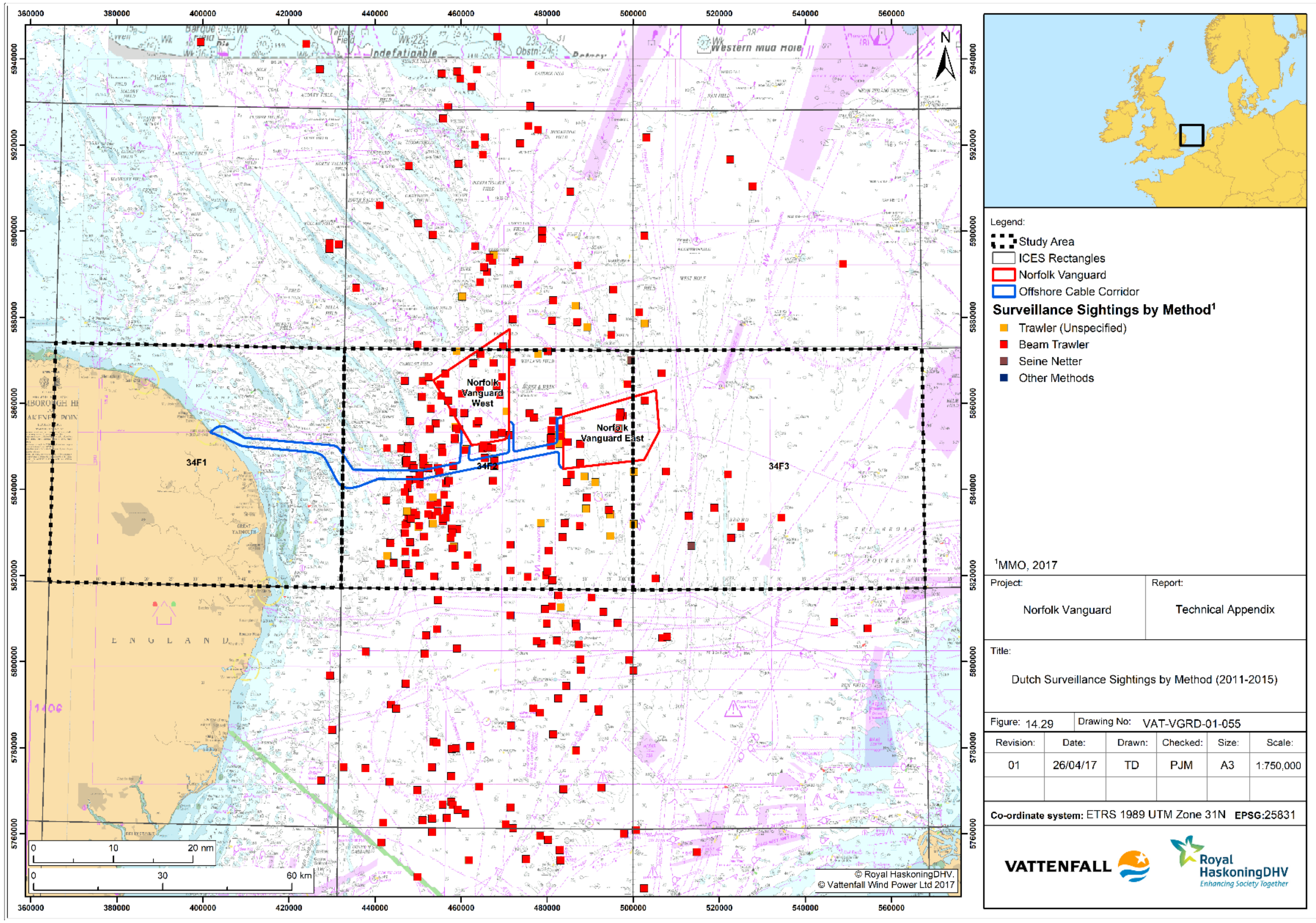


Figure 14.29 Dutch Surveillance sightings by method (2011-2015) (Source: MMO, 2017)

14.3.3 Belgian Fleet

14.3.3.1 Vessels, Gear and Operating Patterns

47. The Belgian fleet focuses its fishing activity mainly in the Southern North Sea and English Channel and comprises a total of approximately 65 vessels, the majority of which are beam trawlers (Table 14.7). Some vessels are also capable of operating both beam and otter trawls. A limited number of vessels utilise static gears and seine nets.

48. The Belgian fleet have historic fishing rights between the UK's 6 and 12nm limit, thereby allowing access to the offshore cable corridor (see Annex 2, section 14.7.2).

Table 14.7 Vessel numbers in Belgian fleet by type

Vessel type	Number of vessels	Percentage of fleet (%)
Beam trawler	47	72.30
Otter trawler	4	6.15
Static gear vessel	2	3.08
Flyshooter	2	3.08
Seine netter	2	3.08
Beam & otter trawler	8	12.31

49. The majority of vessels targeting the area around Norfolk Vanguard are classed as 'Eurokotters', which have main engines of just under 300HP. The majority of this class of vessel operate from Oostende, examples of which are shown in Plate 14.4 and Plate 14.5.

Plate 14.4 A Belgian Eurokotter (Source: BMM, 2017)

Plate 14.5 A Belgian Eurokotter in Ostende (source: BMM, 2017)

14.3.3.2 Satellite Tracking (VMS) Data

50. Analysis of the combined Belgian VMS data for all gears (Figure 14.30, Figure 14.31 and Figure 14.32) illustrates that the proposed project is located within an area of variable fishing intensity. The highest levels of activity are located over the offshore cable corridor to the south of NV West, where effort of up to 50 days per annum has been recorded. Figure 14.30 and Figure 14.31 showing the wider region demonstrate that the highest levels of effort and landings for the Belgian fleet are located in the English Channel and off the French coast.

51. As previously stated, Belgian beam trawlers operate in the southern section of NV West and along the offshore cable corridor for an average of up to 20 days per year (Figure 14.35, Figure 14.33 and Figure 14.34). Only low levels of activity occur in Norfolk Vanguard East (NV East), with the majority of Belgian beam trawl effort recorded to the south of the proposed project (Figure 14.33 and Figure 14.34).

52. Demersal trawling by Belgian vessels occurs at substantially lower levels than beam trawling (Figure 14.36, Figure 14.37 and Figure 14.38). As shown, demersal trawling

is focused on specific grounds in the Central North Sea and further south off the Essex coast.

53. Belgian seine netting occurs at a low level and is only occasionally recorded in the offshore project area (Figure 14.39, Figure 14.40 and Figure 14.41).

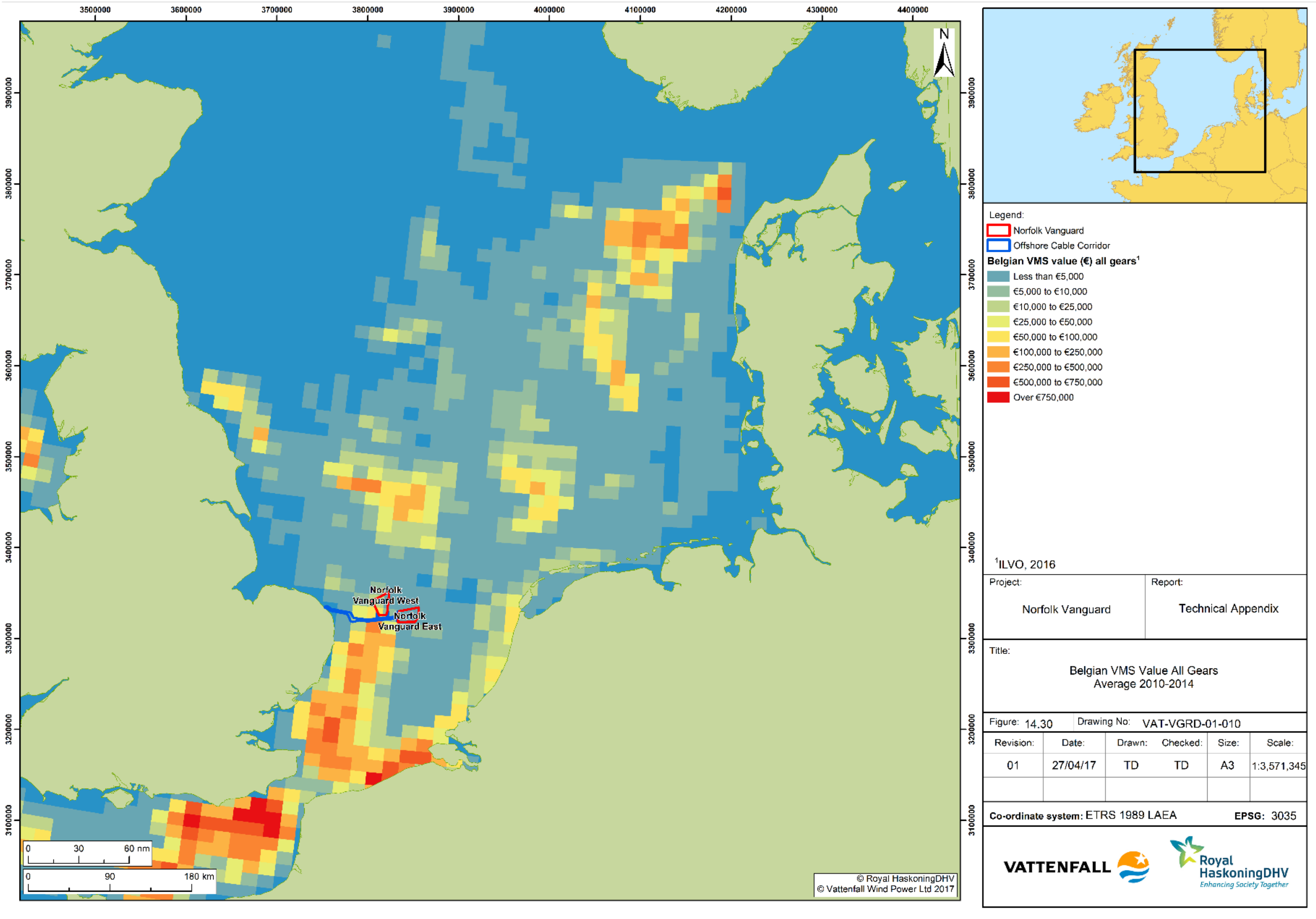


Figure 14.30 Belgian VMS value by all gear types – wider region (average 2010-2014) (Source: ILVO, 2016)

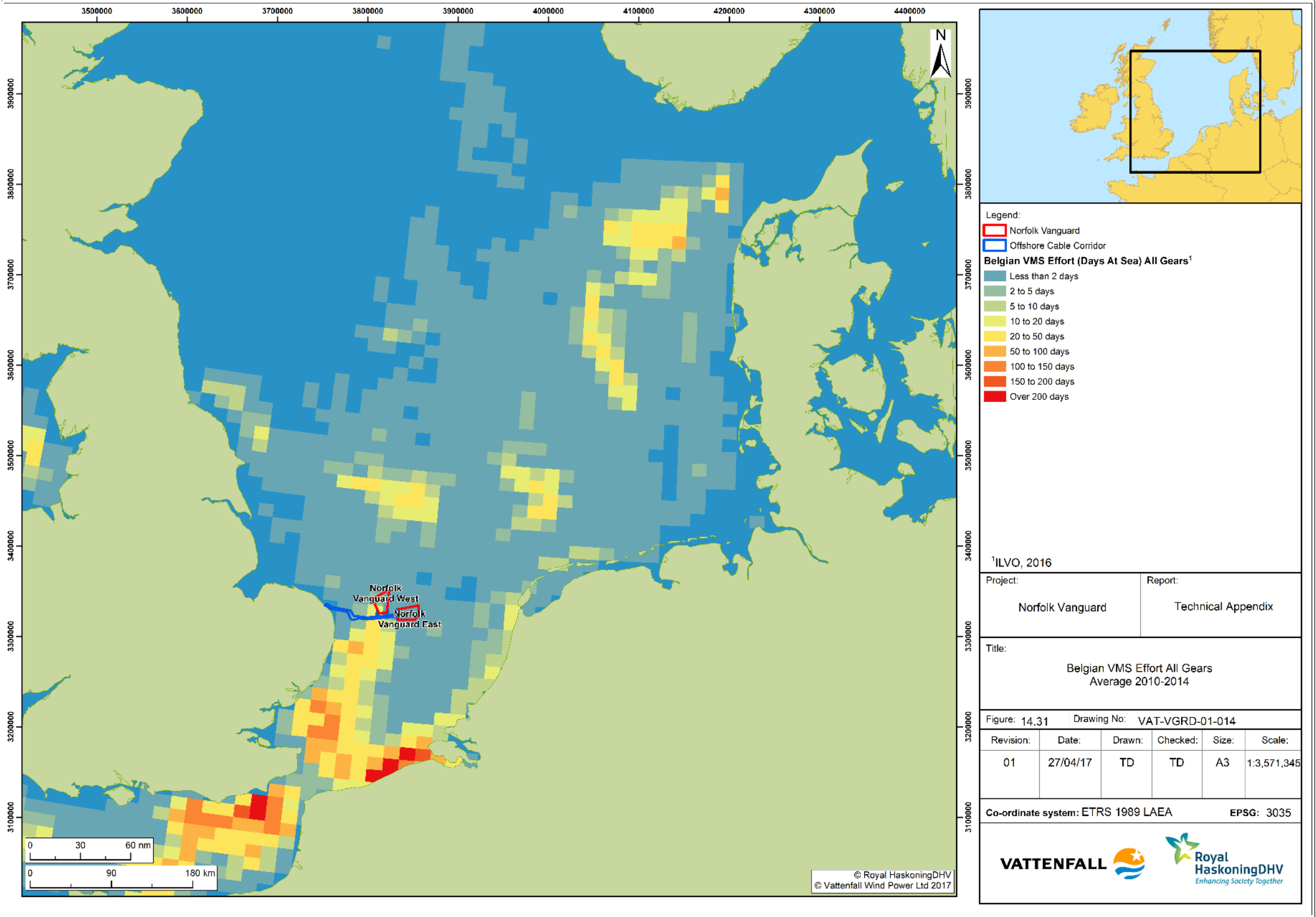


Figure 14.31 Belgian VMS effort by all gear types – wider region (average 2010-2014) (Source: ILVO, 2016)

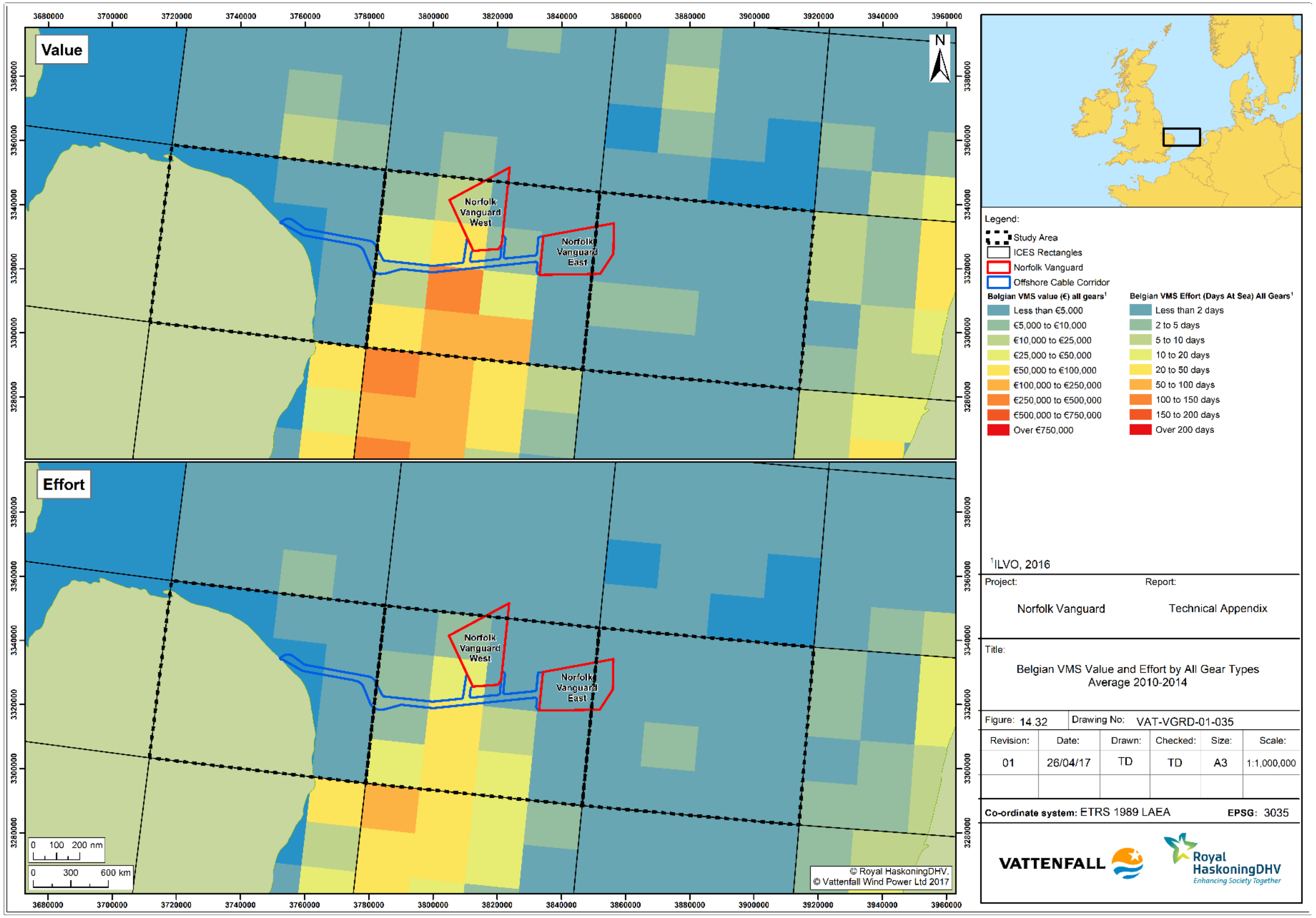


Figure 14.32 Belgian VMS value and effort by all gear types (average 2010-2014) (Source: ILVO, 2016)

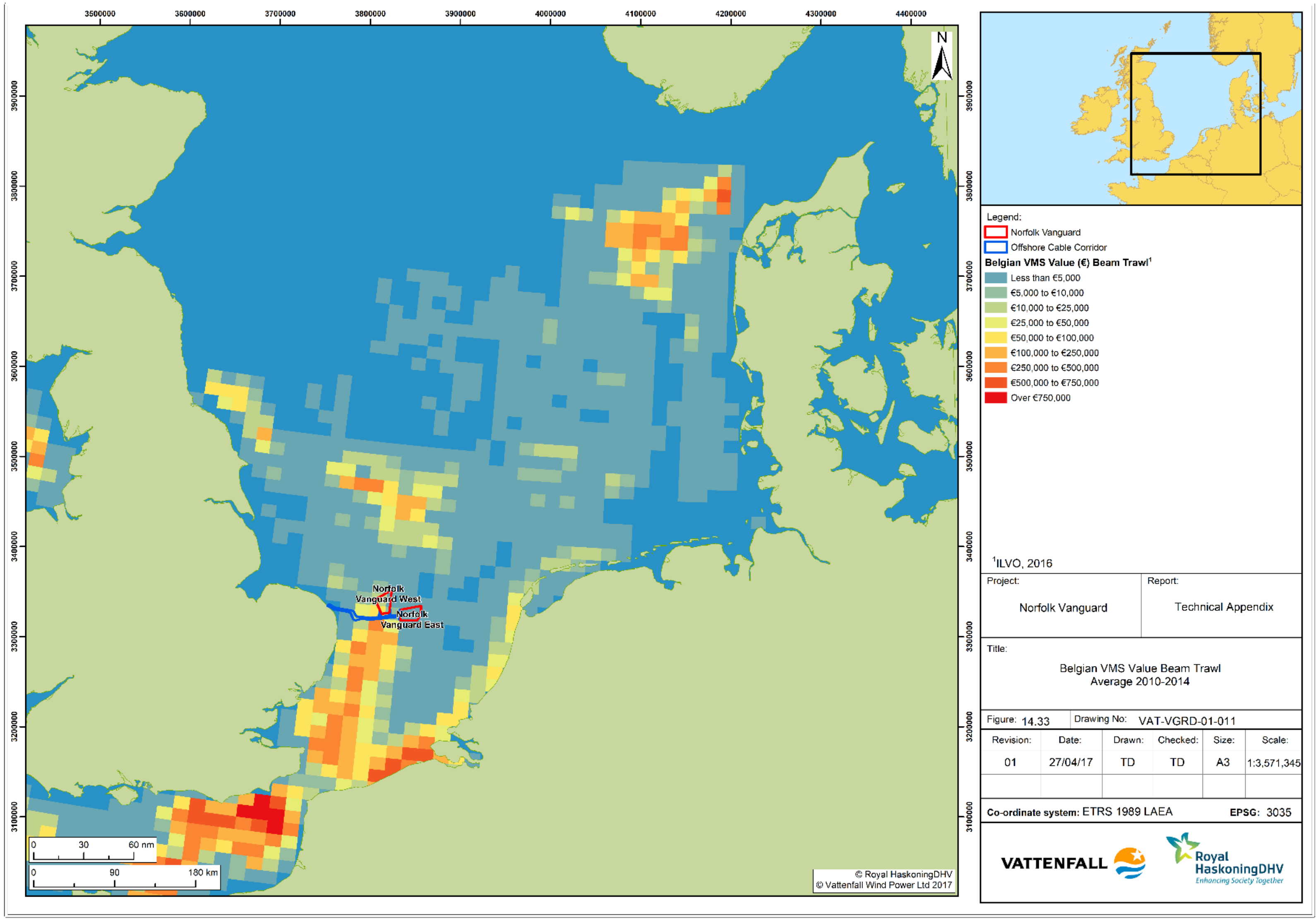


Figure 14.33 Belgian VMS value by beam trawl – wider region (average 2010-2014) (Source: ILVO, 2016)

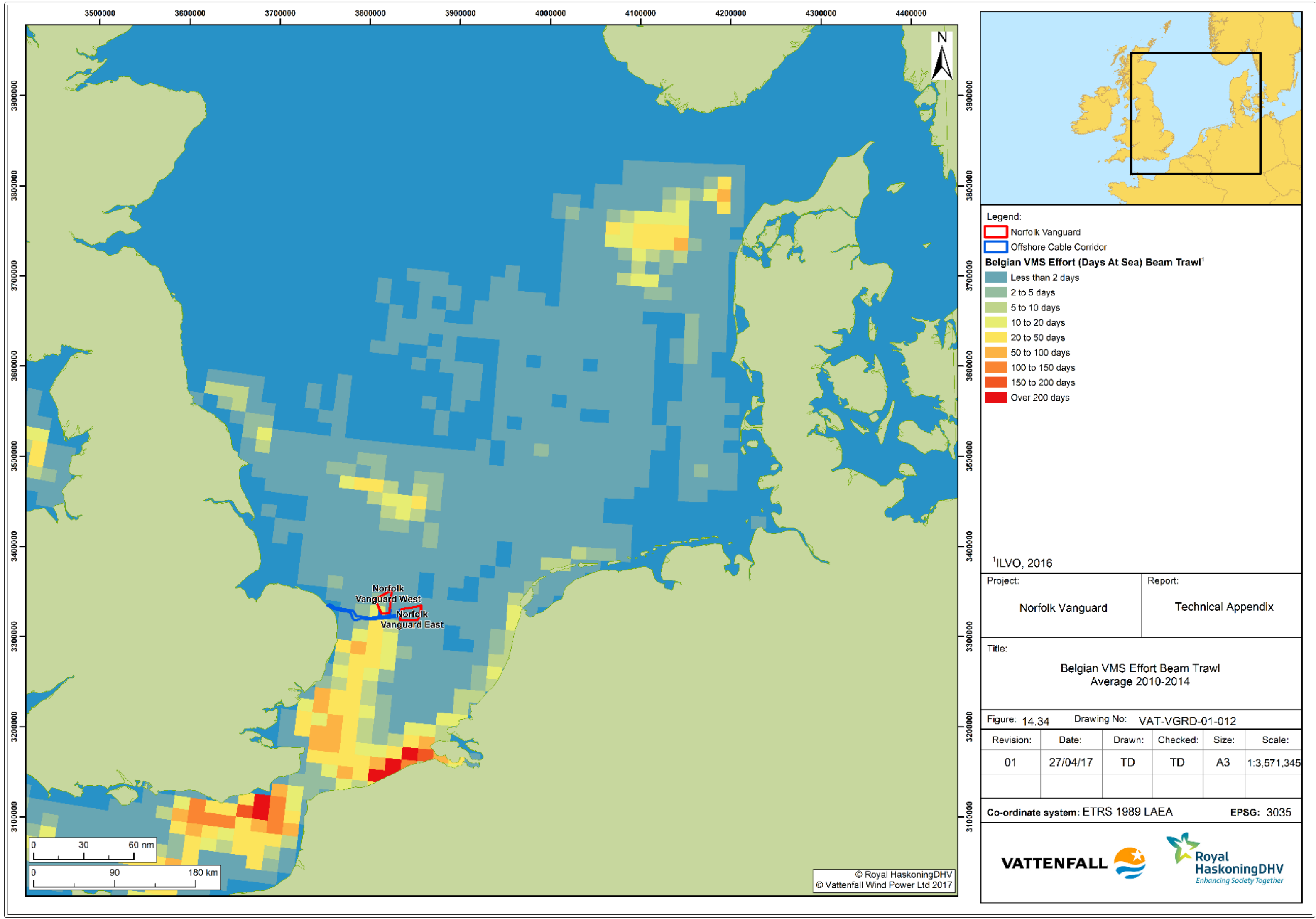


Figure 14.34 Belgian VMS effort by beam trawl – wider region (average 2010-2014) (Source: ILVO, 2016)

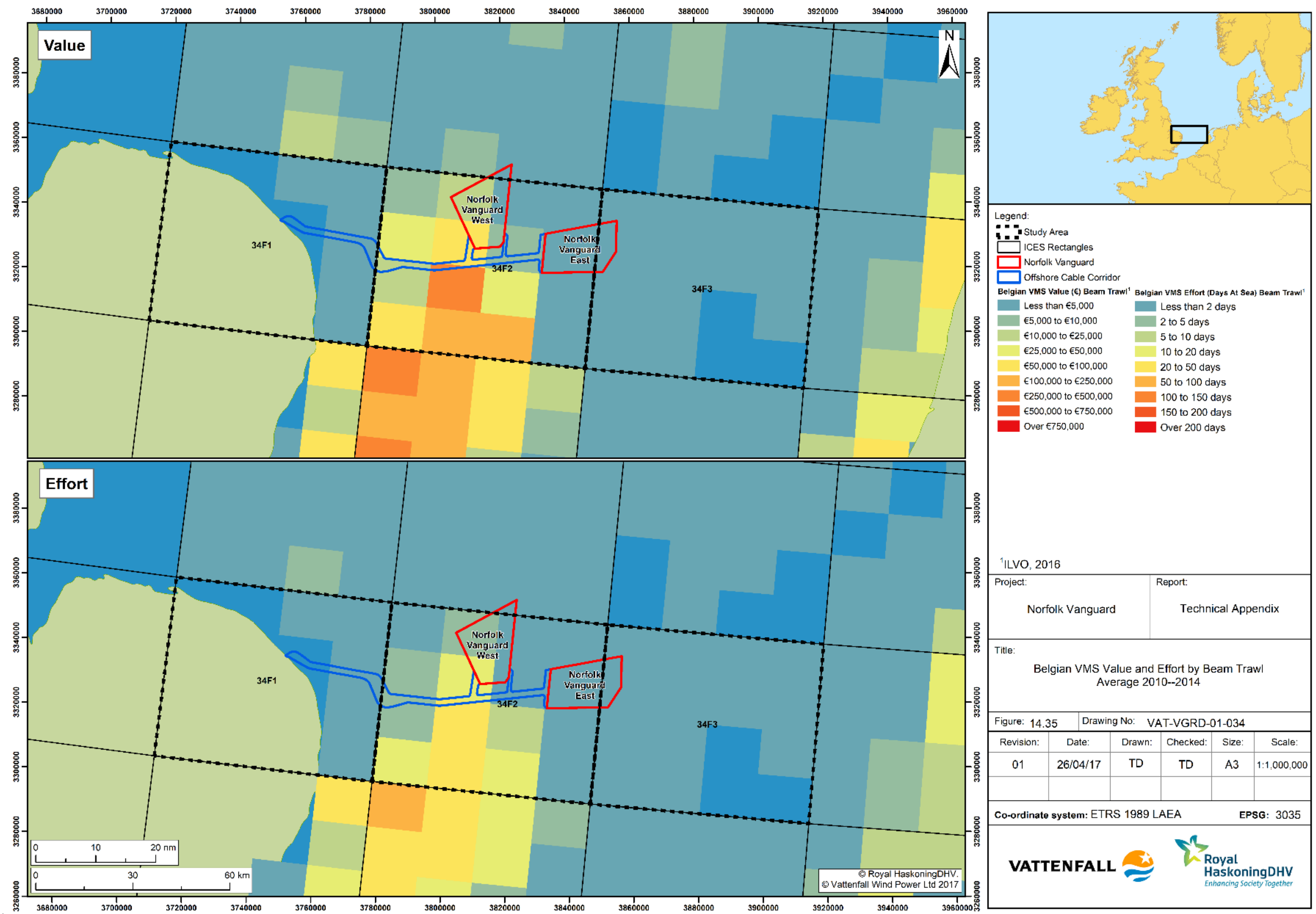


Figure 14.35 Belgian VMS value and effort by beam trawl (average 2010-2014) (Source: ILVO, 2016)

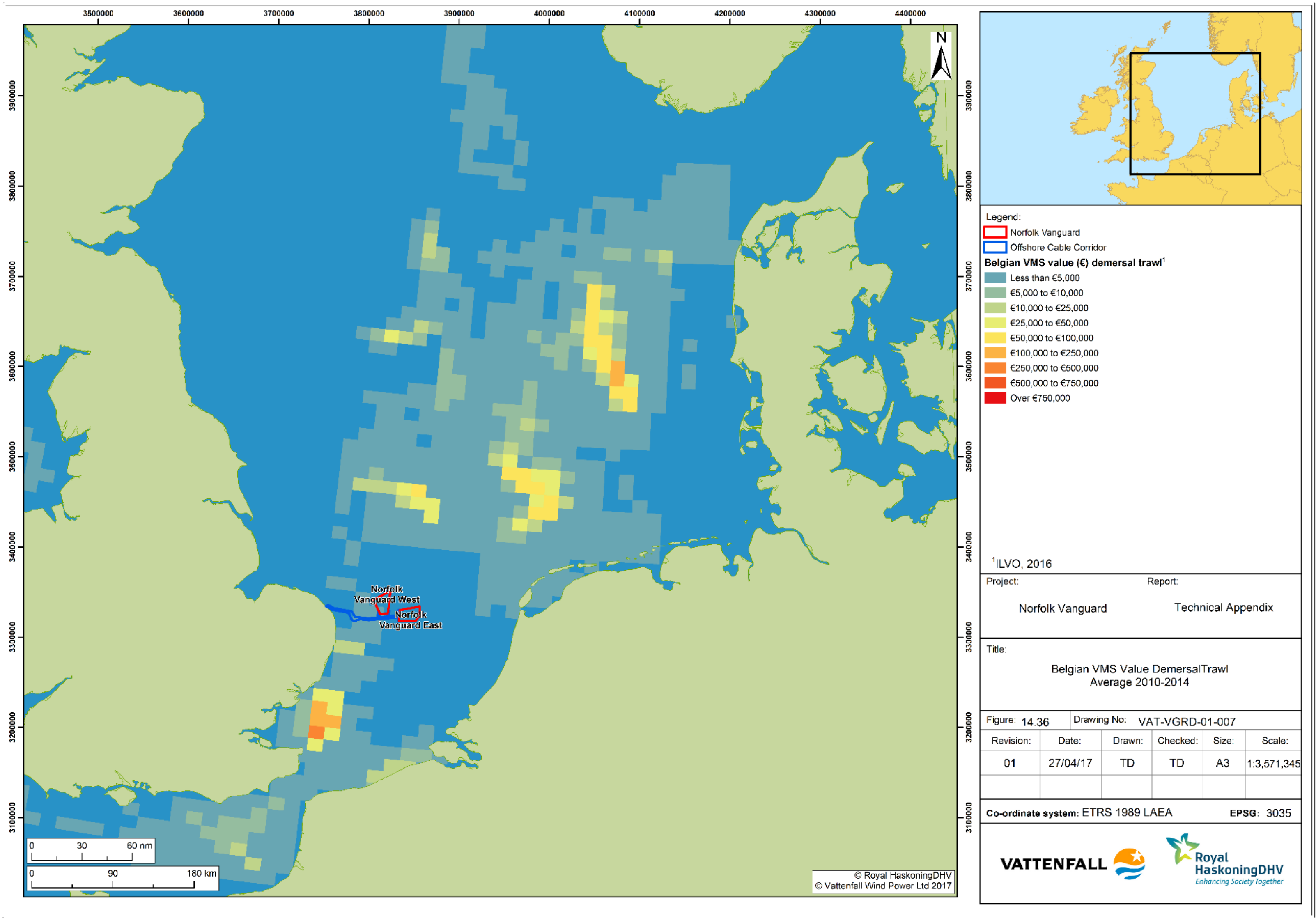


Figure 14.36 Belgian VMS value by demersal trawl – wider region (average 2010-2014) (Source: ILVO, 2016)

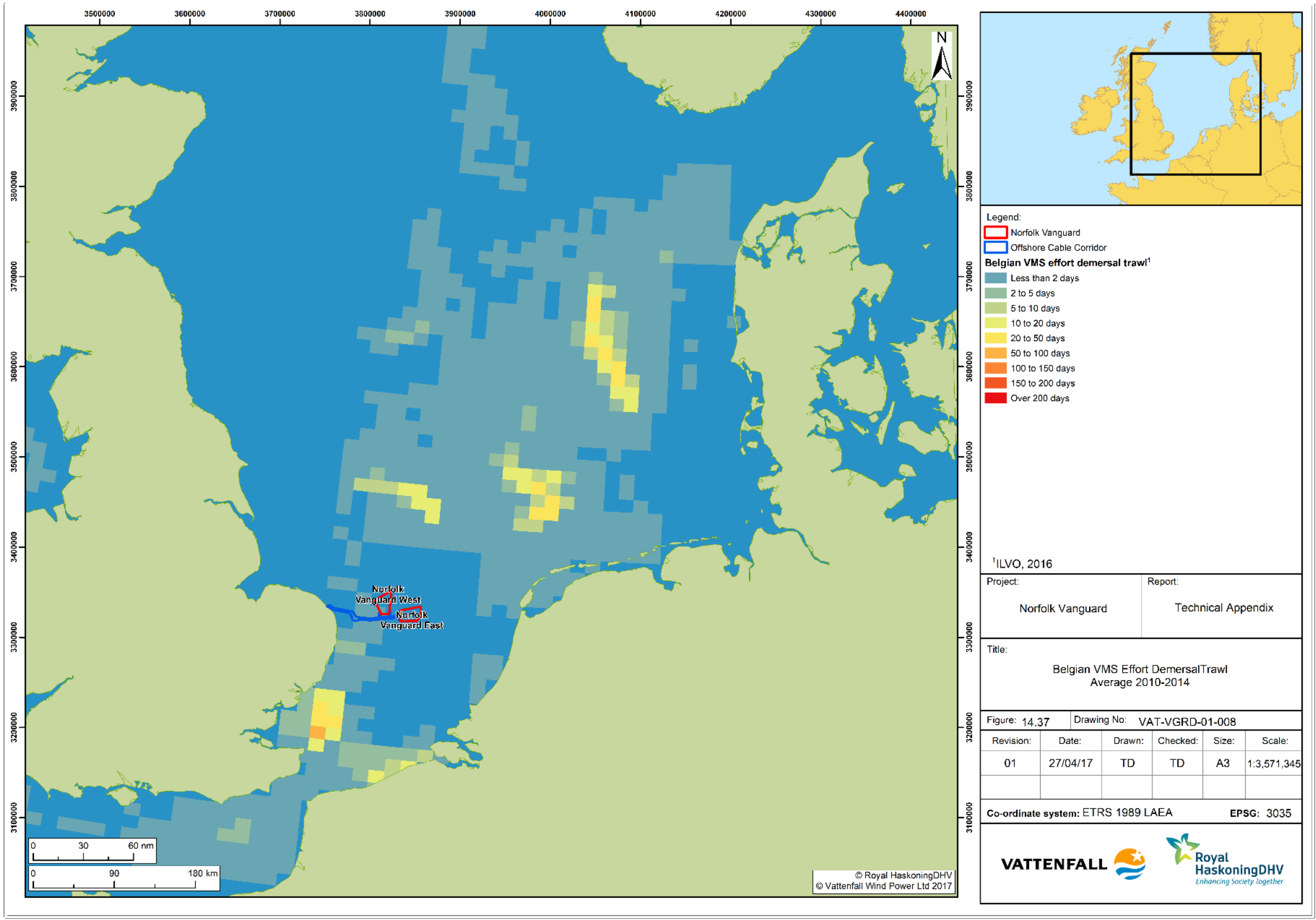


Figure 14.37 Belgian VMS effort by demersal trawl – wider region (average 2010-2014) (Source: ILVO, 2016)

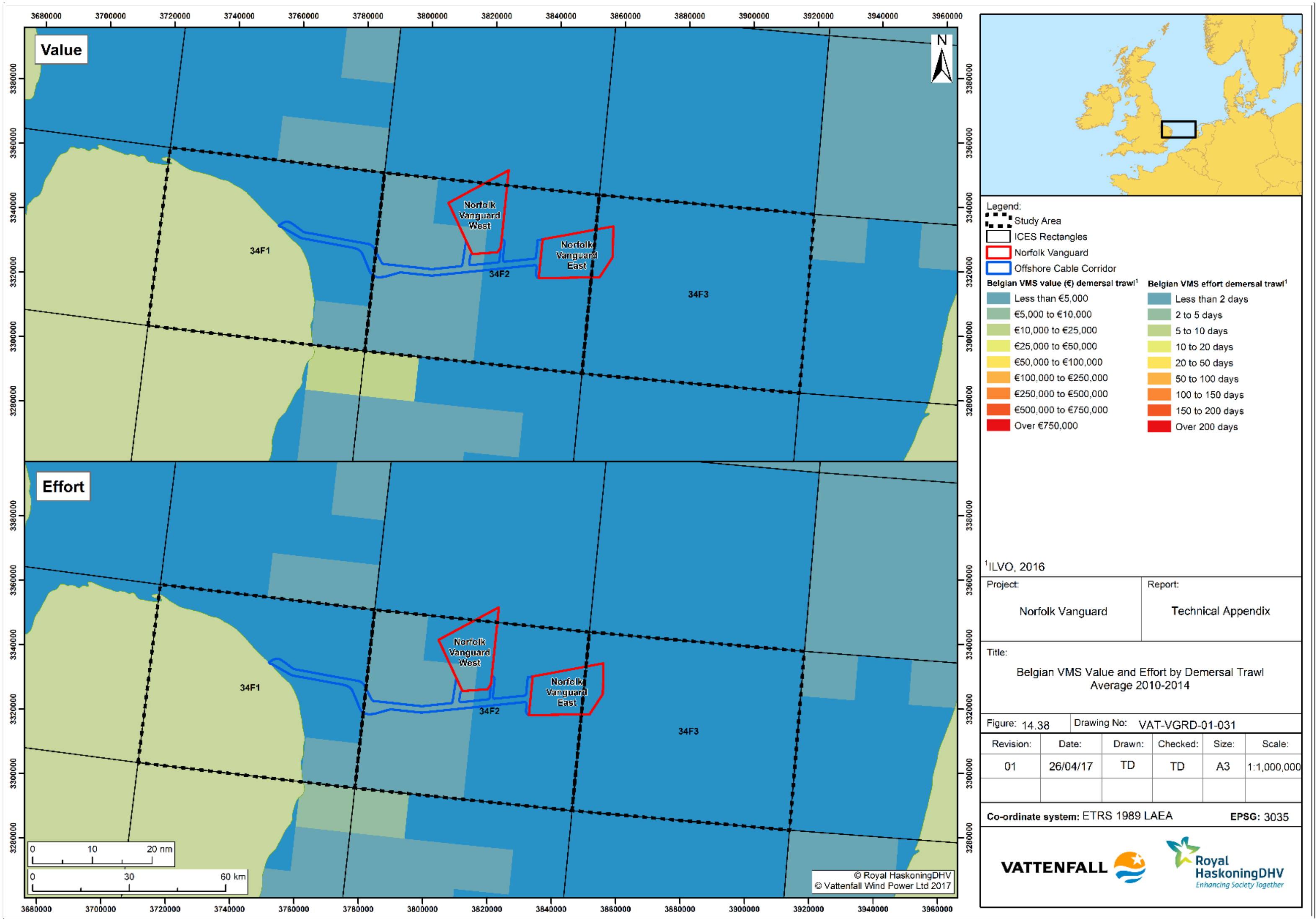


Figure 14.38 Belgian VMS value and effort by demersal trawl (average 2010-2014) (Source: ILVO, 2016)

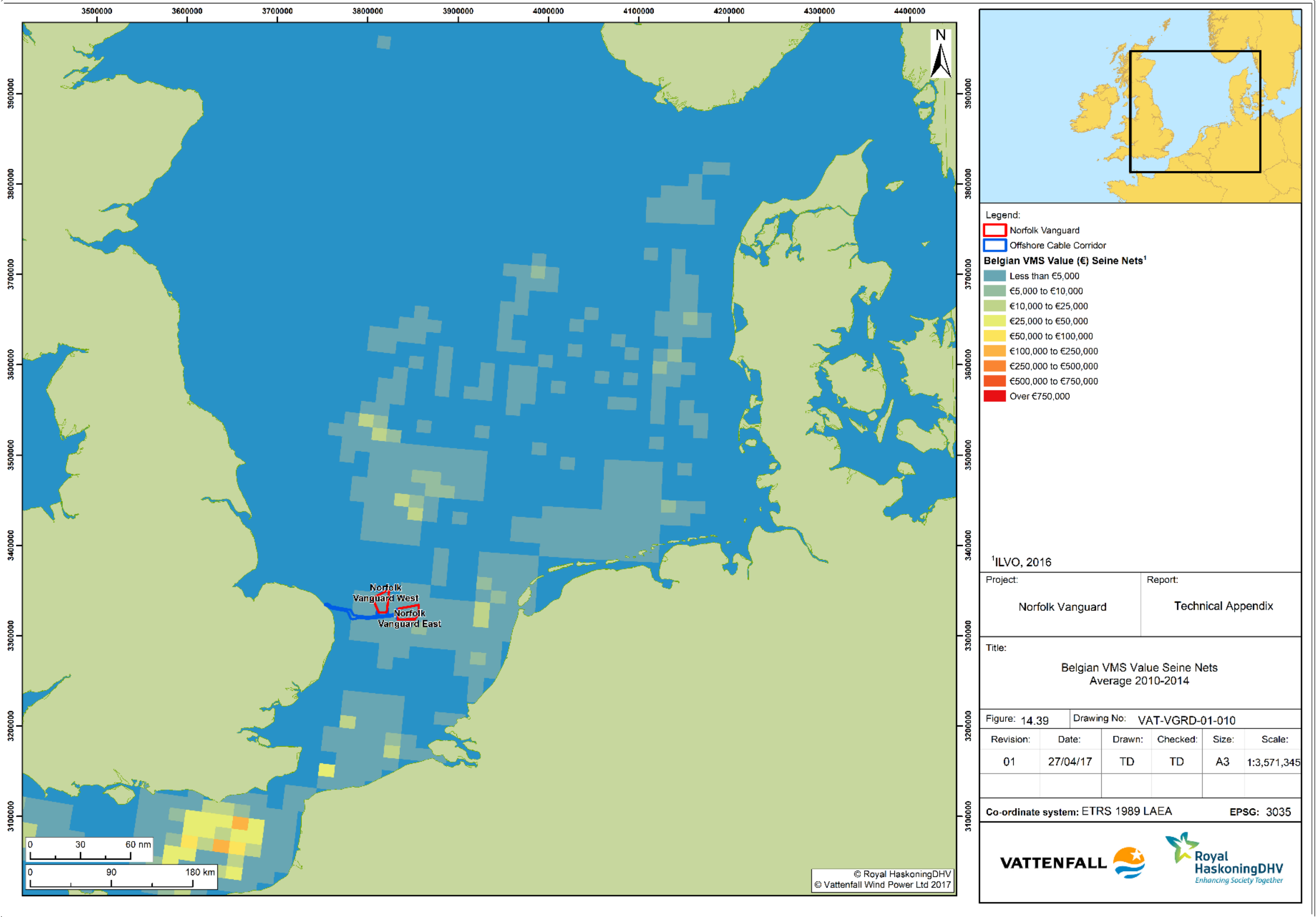


Figure 14.39 Belgian VMS value by seine net – wider region (average 2010-2014) (Source: ILVO, 2016)

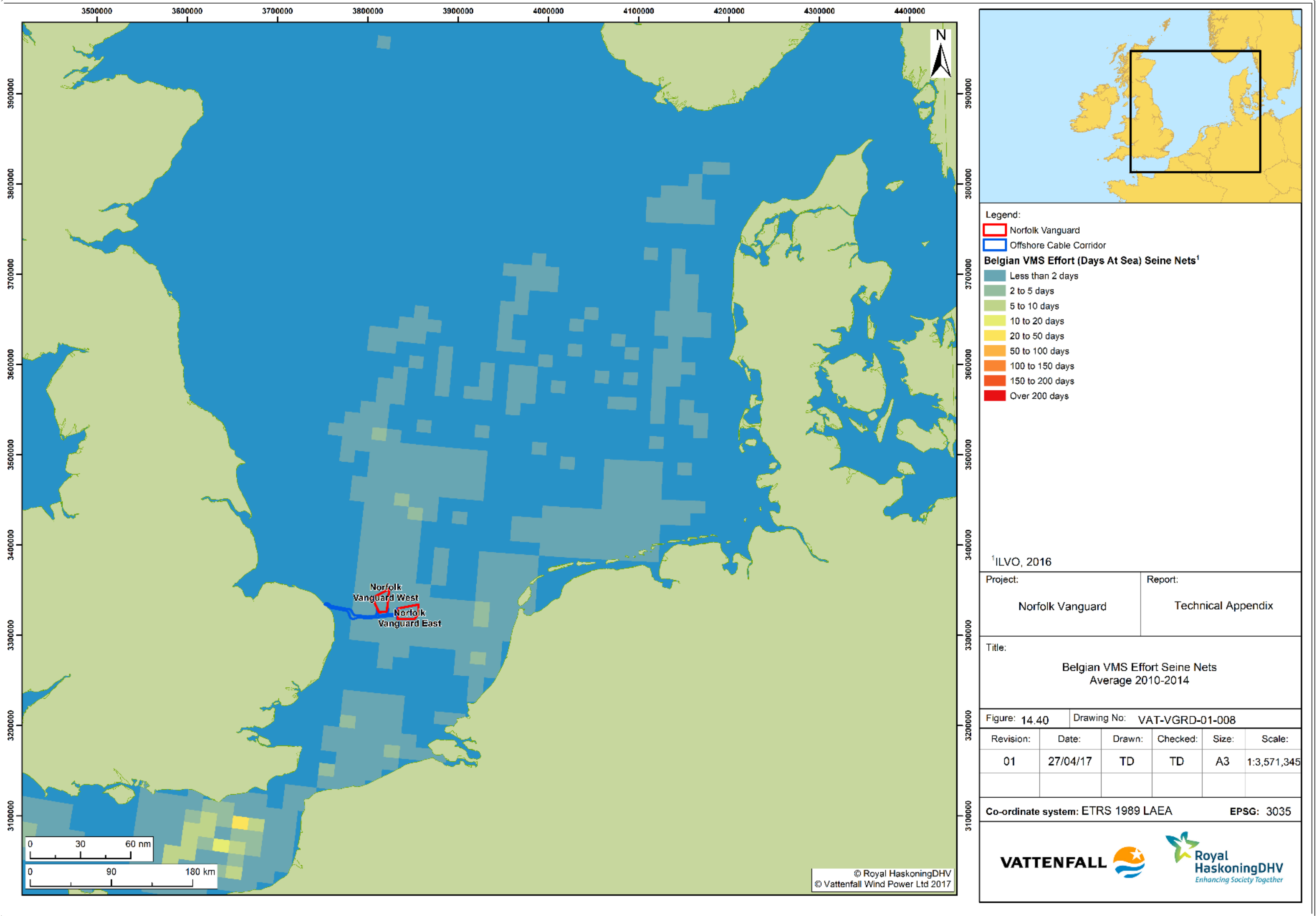


Figure 14.40 Belgian VMS effort by seine net – wider region (average 2010-2014) (Source: ILVO, 2016)

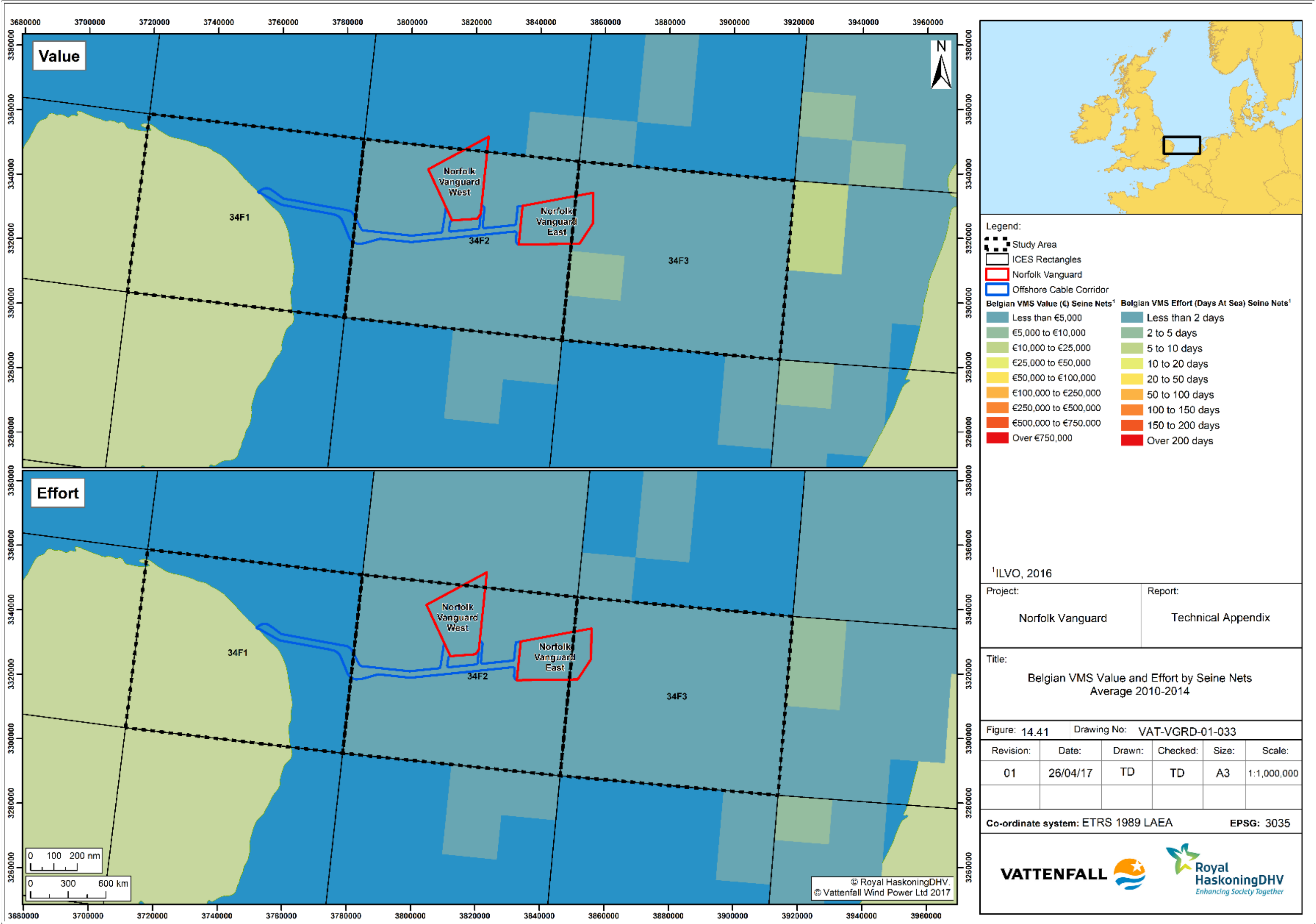


Figure 14.41 Belgian VMS value and effort by seine net (average 2010-2014) (Source: ILVO, 2016)

14.3.3.3 Belgian Effort and Landings Data

54. Effort data shown in Figure 14.42 indicates that Belgian vessels in the vicinity of the proposed project are predominately 24-40m in length. The average value of effort in 34F2 is 105 days with negligible effort recorded in the adjacent ICES rectangles. Within the local study area, the majority of effort is recorded for beam trawls and to a lesser extent seine nets (Figure 14.43).

55. The majority of Belgian landings values are recorded for the larger class of vessels of between 24m to 40m in length (Figure 14.44). The total average landings value from 34F2 is €715,539, of which the majority is derived from beam trawling with the remainder being from seine netting (Figure 14.45).

56. Figure 14.46 shows Belgian landings by species, the majority of which are Dover sole within 34F2. Plaice and a range of other species such as turbot and skate are also landed, but at lower values.

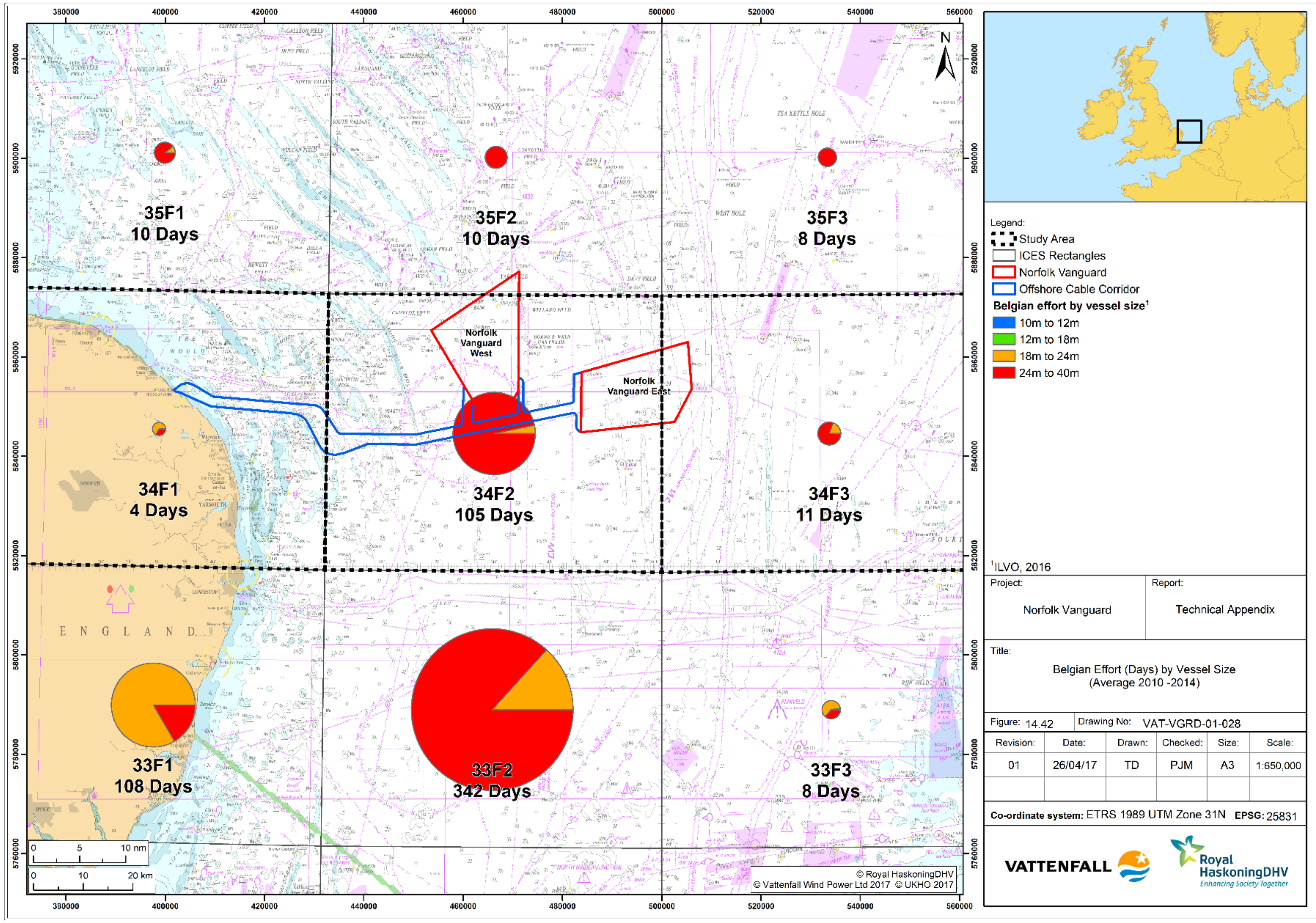


Figure 14.42 Belgian effort (days) by vessel size (average 2010-2014) (Source: ILVO, 2016)

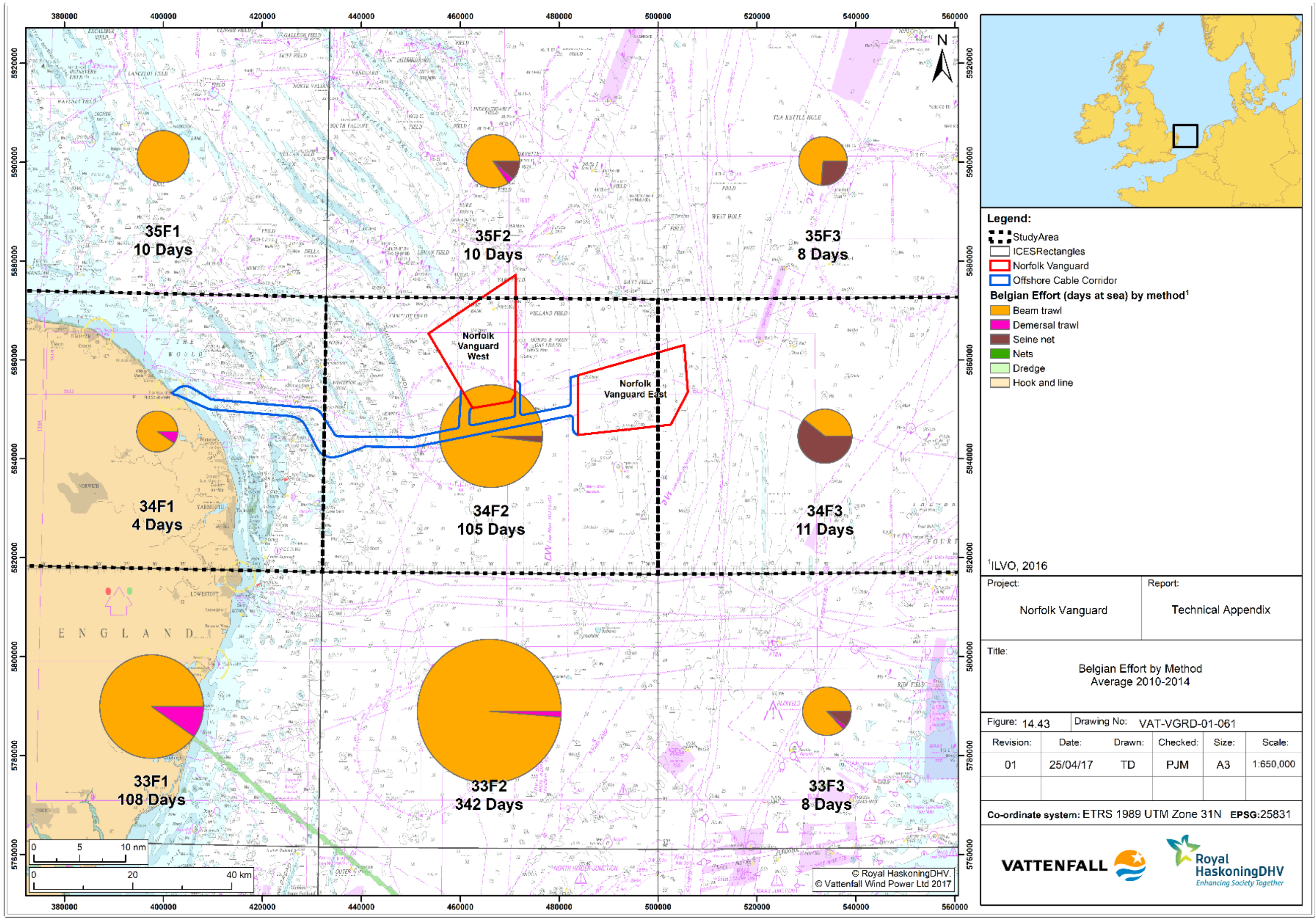


Figure 14.43 Belgian effort (days) by method (average 2010-2014) (Source: ILVO, 2016)

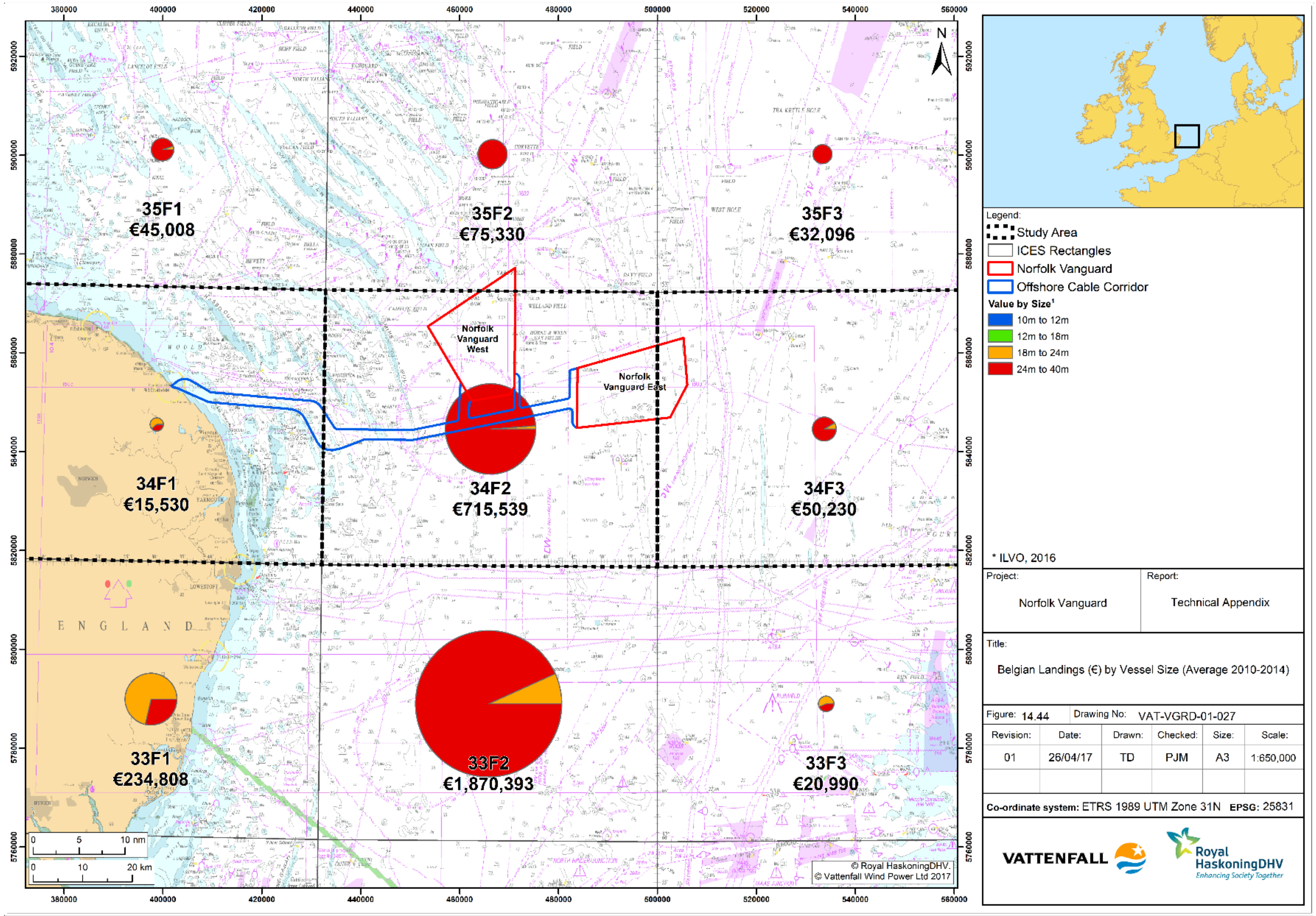


Figure 14.44 Belgian landings (€) by vessel size (average 2010-2014) (Source: ILVO, 2016)

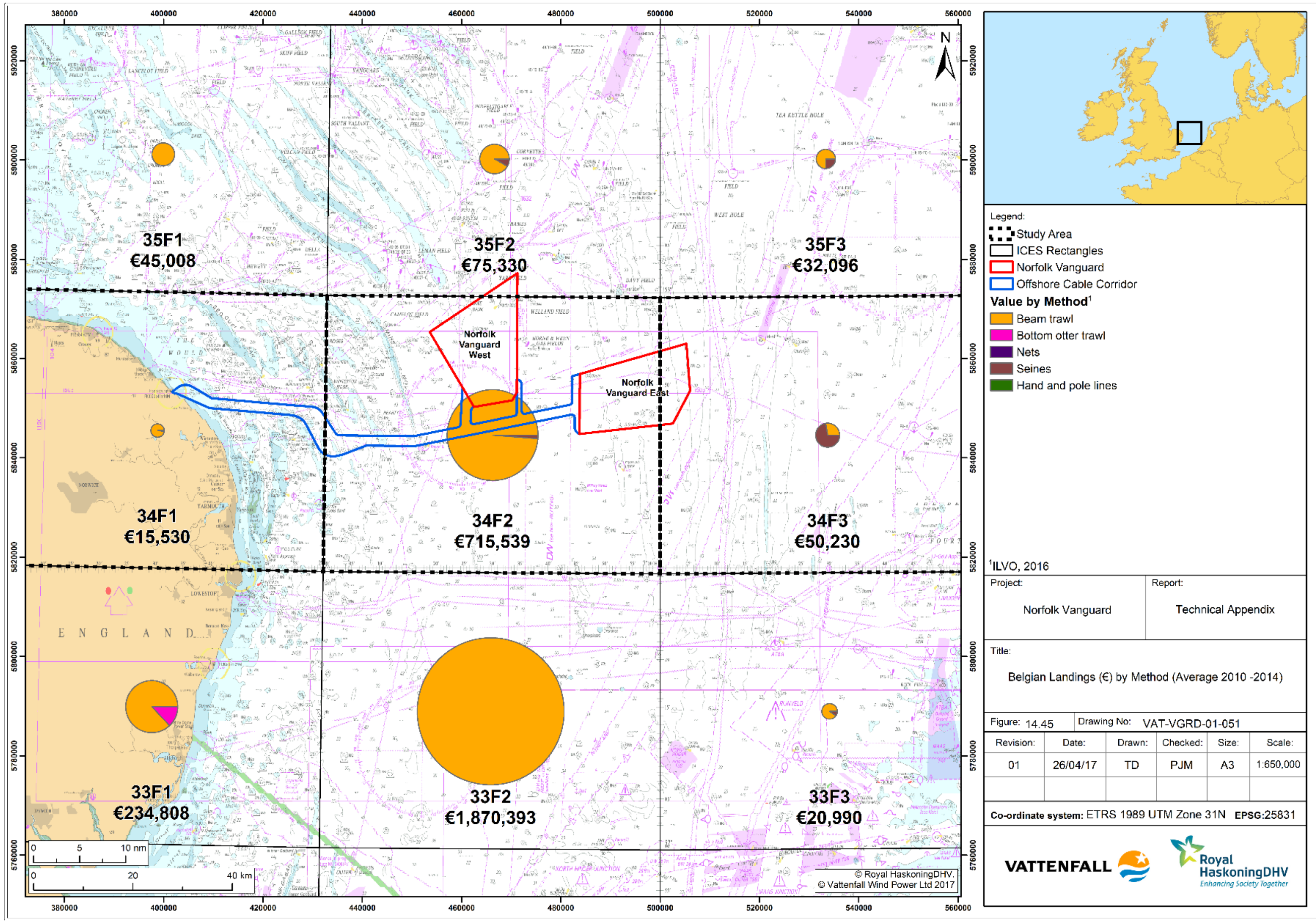


Figure 14.45 Belgian landings (€) by method (average 2010-2014) (Source: ILVO, 2016)

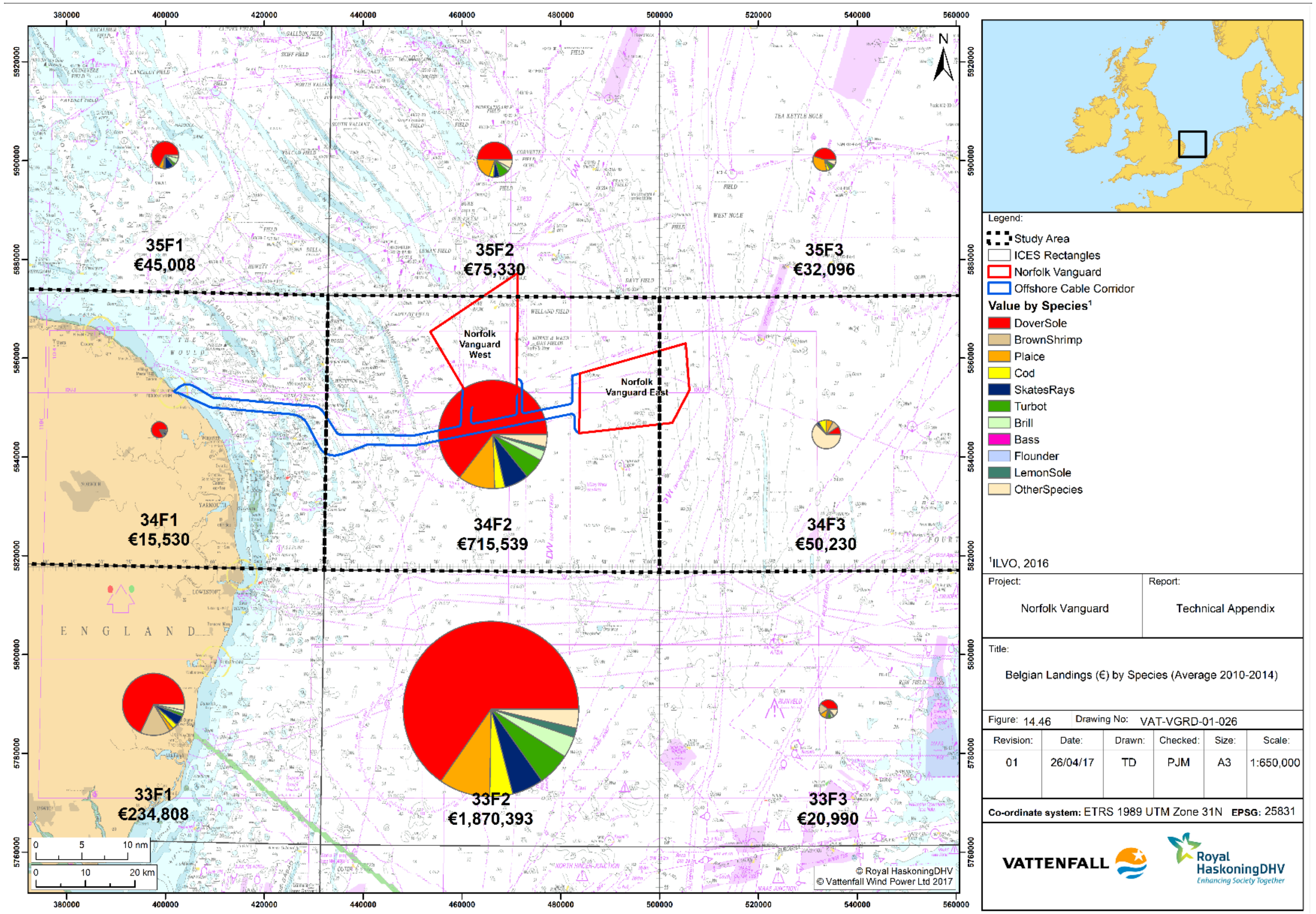


Figure 14.46 Belgian landings by species (average 2010-2014) (Source: ILVO, 2016)

14.3.3.4 Surveillance Sightings

57. Belgian surveillance sightings show vessel densities are higher in grounds to the southwest of Norfolk Vanguard, although some vessels have been observed within NV West (Figure 14.47). Whilst the Belgian fleet hold historic fishing rights to operate between the UK's 6-12nm limit in an area between Lowestoft and Cromer, it appears that this is rarely utilised (Annex 2, section 14.6.2).

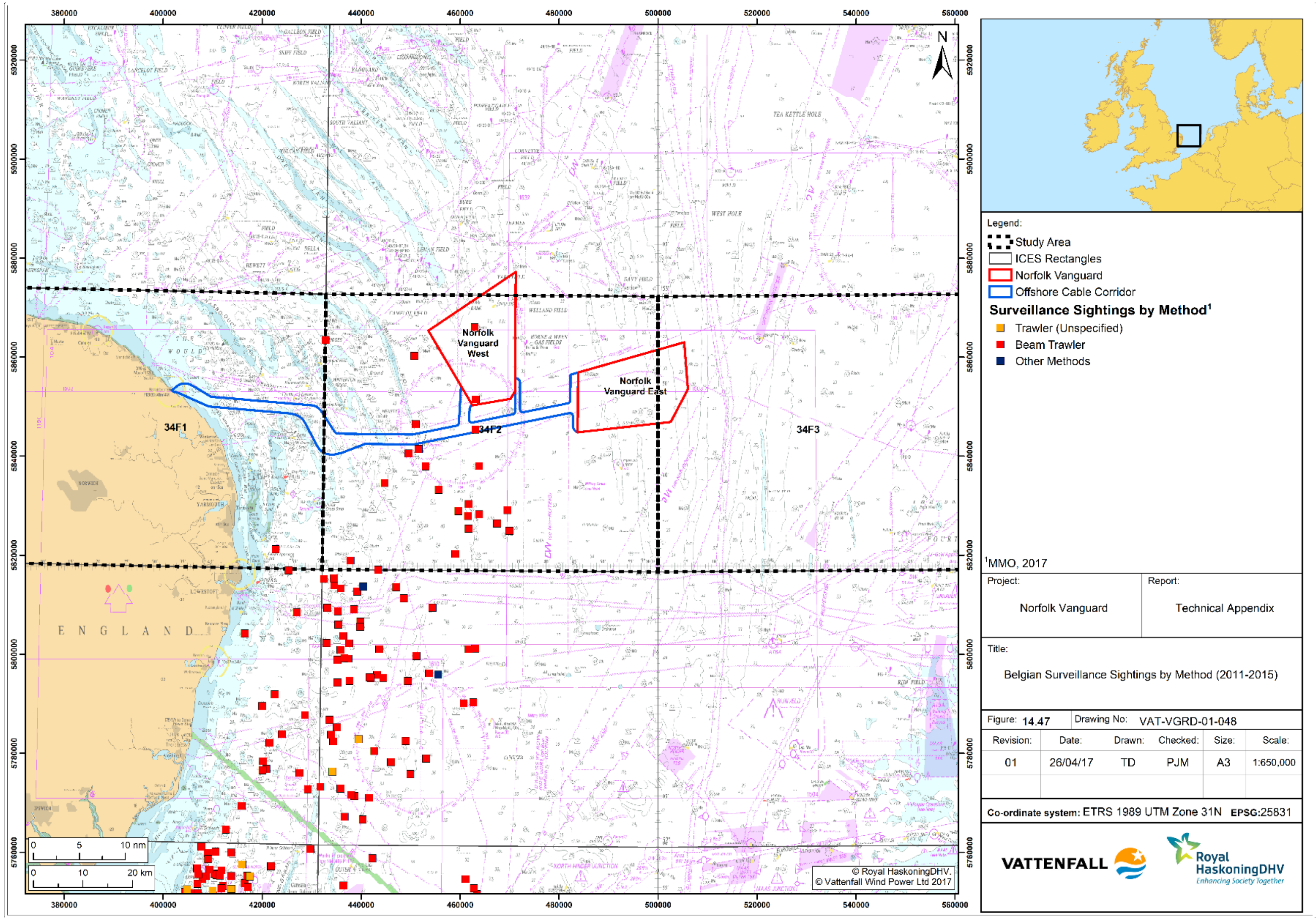


Figure 14.47 Belgian surveillance sightings by method (2011-2015) (source: MMO, 2017)

14.3.4 UK Fleet

14.3.4.1 Vessels, Gear and Operating Patterns

58. The principal bases of operation for local UK vessels operating within and around Norfolk Vanguard are beach launches at Sea Palling, Caister, and Cromer, and the ports of Lowestoft and Great Yarmouth.

59. A total of six over 10m vessels are registered at Lowestoft and one registered at Great Yarmouth. Two of the Lowestoft vessels, whilst on the UK register are Dutch owned and operated but with UK fishing licences, fishing UK quotas. The effort and landings of these vessels are therefore incorporated into UK fisheries statistics even though the vessels rarely land their catches into UK ports.

60. The numerically larger under 10m fleet, which primarily works inshore waters, has the following numbers of vessels as registered on the MMO monthly vessel lists for ports relevant to Norfolk Vanguard (Table 14.8).

Table 14.8 <10m Vessels registered on the MMO monthly vessel lists for ports close to the proposed project (source: MMO, 2017)

Port	Number of <10m Vessels Registered	Methods Used
Lowestoft	28	Potting, otter trawling, bottom drift netting, mussel dredging, shrimp trawling
Cromer	25	Otter trawling, bottom drift netting, static netting, potting, oyster dredging
Great Yarmouth	22	Netting, potting

61. It should be noted that a vessel’s port of registration and/or defined home port as specified in MMO vessel lists, does not always reflect the port from which a vessel operates.

62. Local vessels working from the key areas mentioned above (Sea Palling, Caister, Cromer, Lowestoft and Great Yarmouth) principally fish grounds within the UK’s 12nm limit and mostly within the 6nm limit both in light of their limited operational range and to reduce the risk of potential conflicts with trawl gears. A number of the vessels are multi-purpose with the ability to switch between gears on a seasonal basis. The main method employed along this part of the East Anglian coastline is potting for lobster, edible crabs and whelks.

63. . Fish species are targeted less frequently, mostly with the use of drifting and static nets and longlines. Target species are Dover sole, bass, skate, cod, plaice and herring.

64. Typical examples of the local inshore vessels relevant to the project are shown in Plate 14.6, Plate 14.7, Plate 14.8, Plate 14.9 and Plate 14.10 and discussed below.

65. FV Iceni (Plate 14.6) operates both static and drift nets in the local area. The vessel targets a range of fishing grounds along the East Anglian coast. Between March and May, the vessel operates in offshore areas including NV West to target cod.

66. FV Orkney Dolphin (Plate 14.7) launches from Sea Palling and undertakes potting up to 5nm from the shore, including areas through which the offshore cable corridor passes. The potting fleets deployed by this vessel are generally short comprising 15-20 pots per fleet. In addition, when quotas and conditions allow, the vessel will work trammel and drift nets targeting skate and other species.

67. Whelks are targeted by FV Sea Venture (Plate 14.8), which operates from Great Yarmouth. The owner of this vessel stated that it deploys twelve fleets of whelk pots within the offshore cable corridor.

68. FV Charlie George (Plate 14.9) targets whelks and works out of Caister. This is a multipurpose vessel that also undertakes potting for crabs and lobsters and seasonal netting for a range of species.

69. The FV Richard William (Plate 14.10) is one of the larger vessels based at Cromer with the capability to work grounds around the offshore cable corridor. Whilst the best crabbing grounds were stated to be within 2.5nm of the coast, larger vessels such as FV Richard William, do on occasions venture further offshore to target banks and wrecks.

Plate 14.6 FV Iceni (LT 175) - undertakes longlining and netting from Lowestoft (source: BMM, 2015)

Plate 14.7 FV Orkney Dolphin (LT 1022) - undertakes potting for lobsters and crabs from Sea Palling (source: BMM, 2016)

Plate 14.8 FV Sea Venture (YH 34) - whelking vessel operating from Great Yarmouth (source: Cefas, 2014)

Plate 14.9 FV Charlie George (YH 152) - multipurpose vessel undertaking potting and netting from Caister (source: BMM, 2017)

Plate 14.10 FV Richard William (YH 3) - undertakes potting for lobsters and crabs from Cromer (source: BMM, 2016)

14.3.4.1.1 Potting

70. Potting for crab, lobsters and whelks occurs throughout the Southern North Sea. In general, crab and lobster pots have one or more "funnel" shaped entrances (Plate 14.11). Pot designs can however vary depending on region and target species. Pots can be rigged in fleets of between 10 and 50 pots per fleet, depending upon vessel size and the area to be fished. The lengths of fleets of pots may range from 100 to 500m, secured at each end with either anchors or weights. A variety of surface markers are used including flagged dhans (marker flags), buoys and cans. Soak times (the time between baiting and deployment to emptying and harvesting) generally varies from approximately 12 hours to two days, although this can be longer during periods of adverse weather.

71. Whelks are generally harvested using a purpose designed pot or more often, a modified and weighted 25 litre plastic drum (Plate 14.11). The number of whelk pots in a fleet can be higher than for crab and lobster, with up to 80 pots per fleet. Whelk fleets are normally of similar lengths to those used for crab and lobster potting, but can be longer.

Plate 14.11 Whelk pots (left) and “parlour” pots (right) used to target whelks and lobsters (source: BMM 2016, 2013)

14.3.4.1.2 Longlining

72. Longlining involves a main line on to which a series of shorter lengths of line (snoods) are attached with baited hooks. Longlines can be up to several miles in length with anchors at regular intervals and at each end. This method can be used to catch both demersal and pelagic fish species but in the area under consideration it is used primarily for the capture of demersal species, particularly cod. It is known to be fuel efficient and is recognised as a selective method with minimal bycatch.

14.3.4.1.3 Gillnetting

73. Fleets of gillnets (Figure 14.48) usually comprise a series of four to six 500m monofilament nets joined together. Nets can be either fixed or drifting. As with fleets of pots, each end of the fleet of nets are marked by surface marker buoys. Gillnets can either be panels of monofilament nets, also called tangle nets or trammel nets, which consist of a smaller mesh inner net with larger mesh net panels on either side. Fixed nets are set normally only during neap tides. Drift nets are deployed across the tide and left for a period of three to six hours to drift with the tidal current.

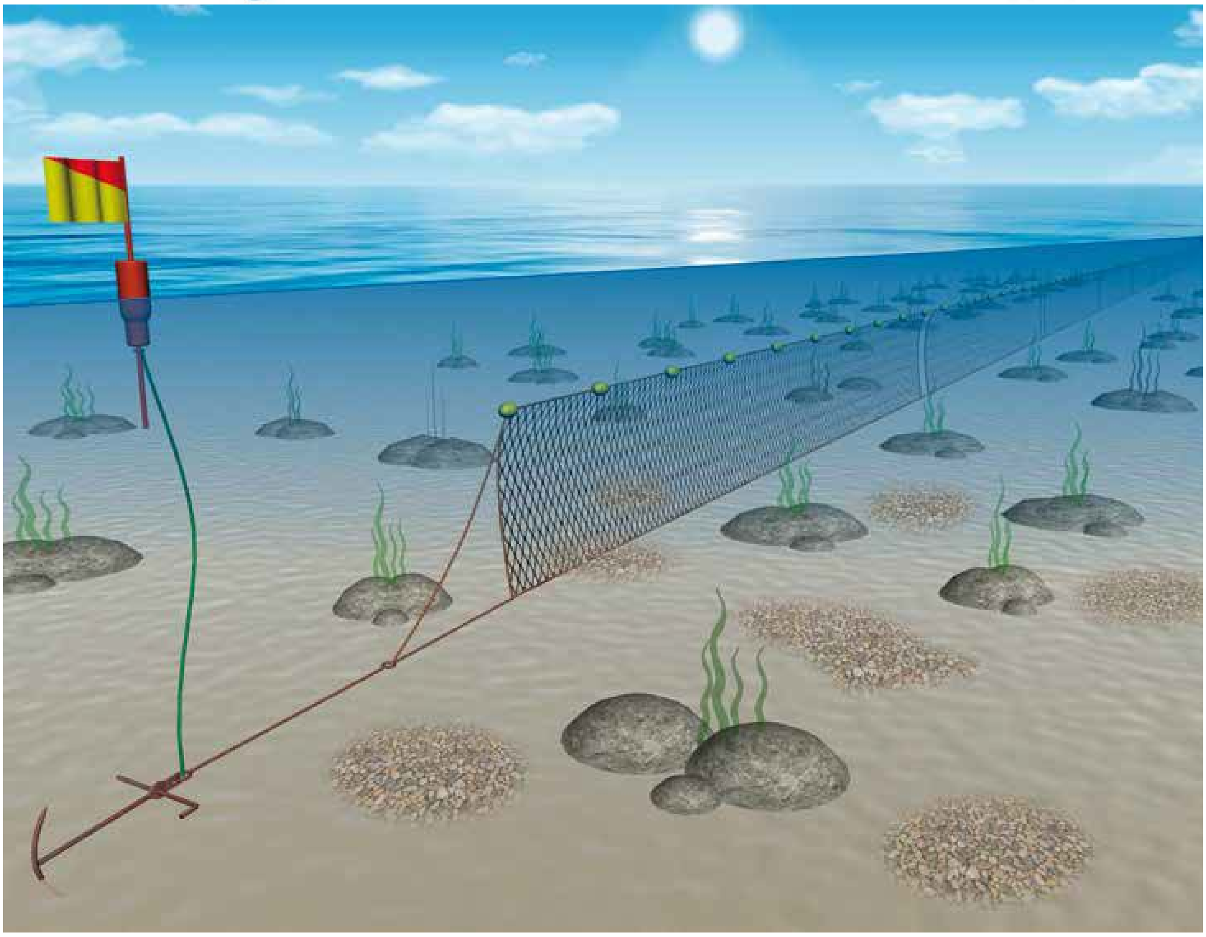


Figure 14.48 Fleet of bottom set gillnets (Source: Seafish, 2015)

14.3.4.2 Local Fishing Grounds

74. Following consultation with individual fisheries stakeholders, a general overview of targeted fishing grounds has been identified for local UK vessels.

75. The grounds crossed by the offshore cable corridor are mainly worked by the local fishing fleet of not more than twelve vessels, primarily operating pots and nets within the 6nm limit (Figure 14.49). Research undertaken by the Eastern Sea Fisheries Joint Committee (ESFJC) in 2000 indicated that potting activity is also known to extend to the north and south of the offshore cable corridor (Figure 14.50) with some larger vessels from Cromer having the capability to occasionally fish as far south as the landfall site (Pers Comms: NNFS, 2016; ESFJC, 2010). In addition, whelking is known to be undertaken in areas within and to the south of the offshore cable corridor, including off Winterton.

76. Further offshore, longlining and to a lesser extent netting, are undertaken on a seasonal basis and when weather conditions allow (Figure 14.51). A number of vessels that longline out of Lowestoft are known to fish large areas off the Norfolk and Suffolk coasts and are therefore less dependent on the development area than

for example the local potters. In addition, due to the distance offshore, the areas of the OWF sites will be fished much less regularly than further inshore areas.

77. One vessel from Lowestoft currently undertakes beam trawling for shrimp. The principal regional shrimp beaming fleet works out of Kings Lynn and Boston, with the fishery centred in grounds in the Wash and North Norfolk Coast (north of Cromer). It is understood that on occasions some activity by this vessel from Lowestoft may occur close to the offshore cable corridor.

78. Caister has a small fleet of beach launched vessels. The majority of these vessels are part-time and undertake netting within nearshore waters throughout the year for a range of species such as herring and cod. The two larger vessels from Caister are known to undertake a range of activities such as potting for crab, lobsters and whelks, in addition to netting for herring close to the shore and targeting cod beyond the 15m contour (Figure 14.52).

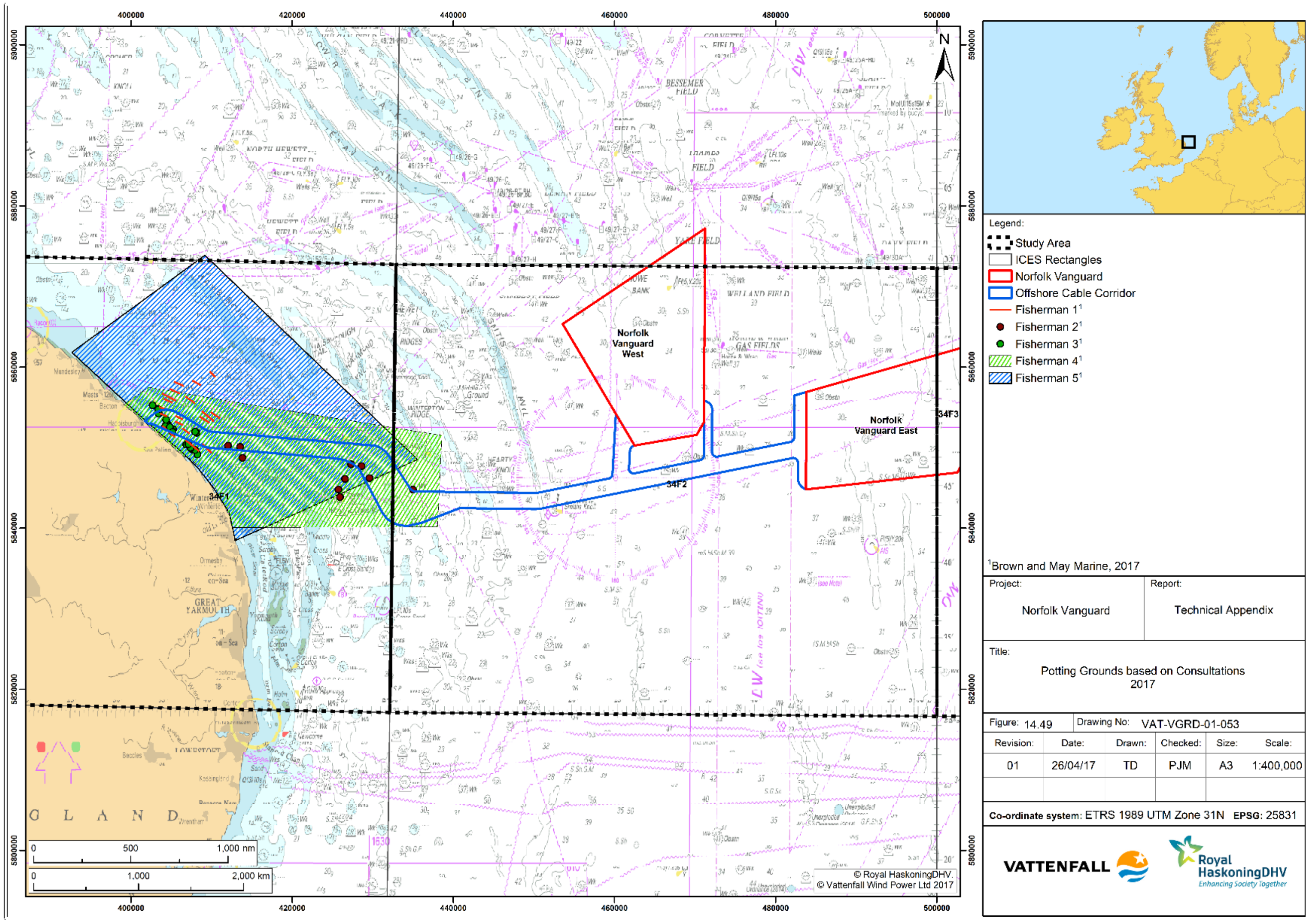


Figure 14.49 Potting fishing grounds based on UK consultation (Source: BMM, 2017)

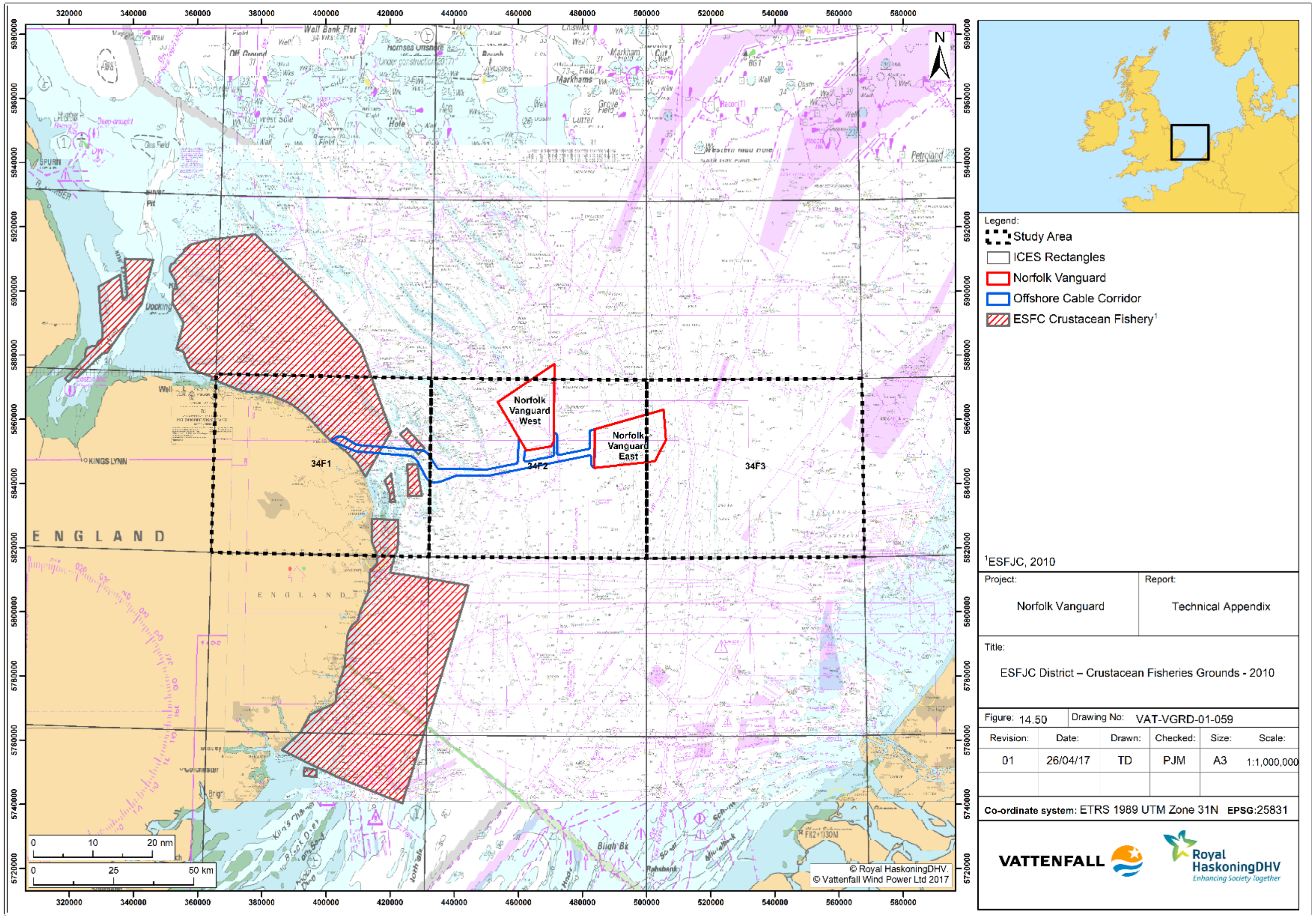


Figure 14.50 Extent of crustacean fisheries (UK) as described in ESFJC data and fisheries mapping project interviews (Source: ESFJC, 2010)

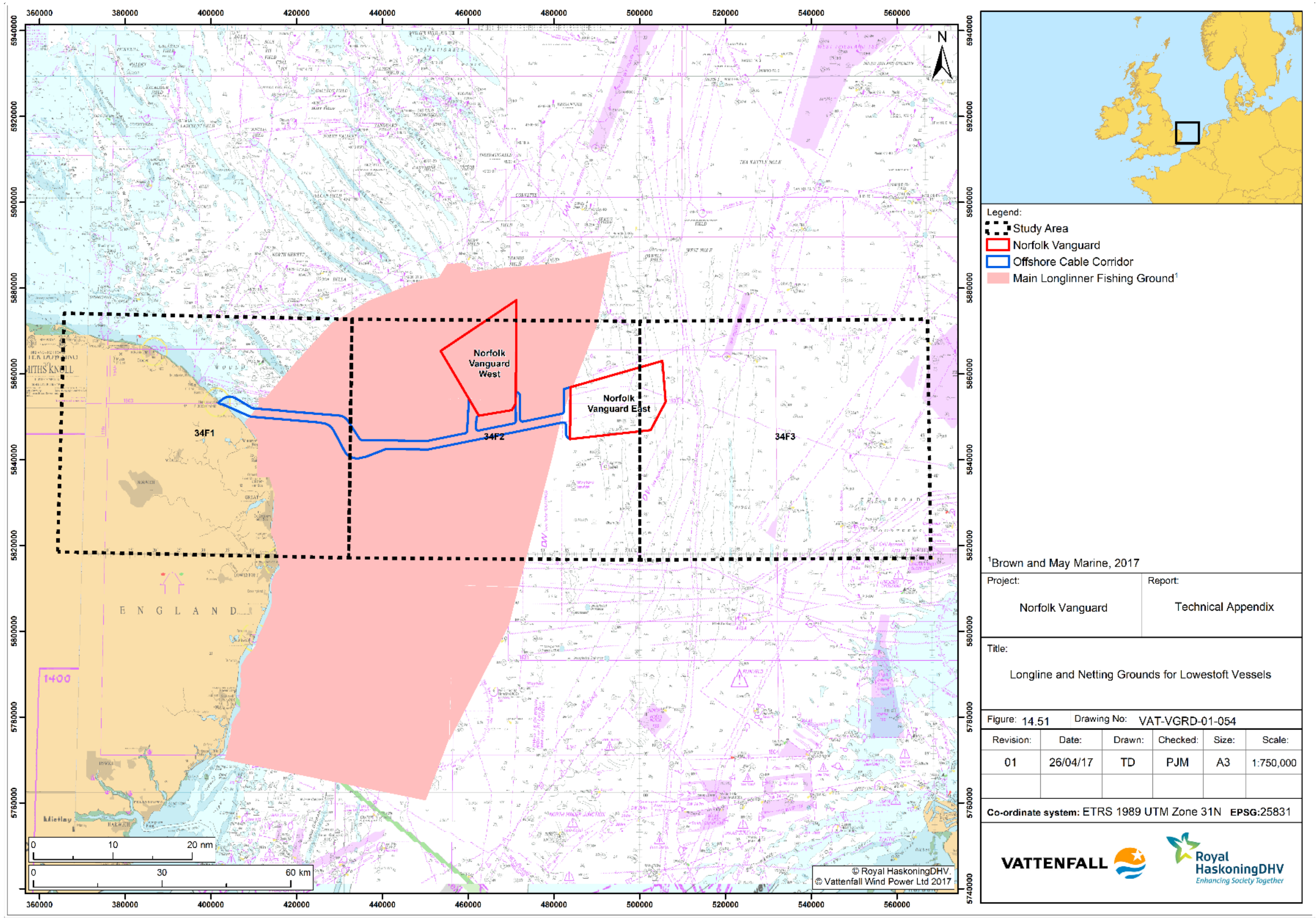


Figure 14.51 Longline and netting fishing grounds for Lowestoft (UK) vessels identified during consultation (Source: BMM, 2017)

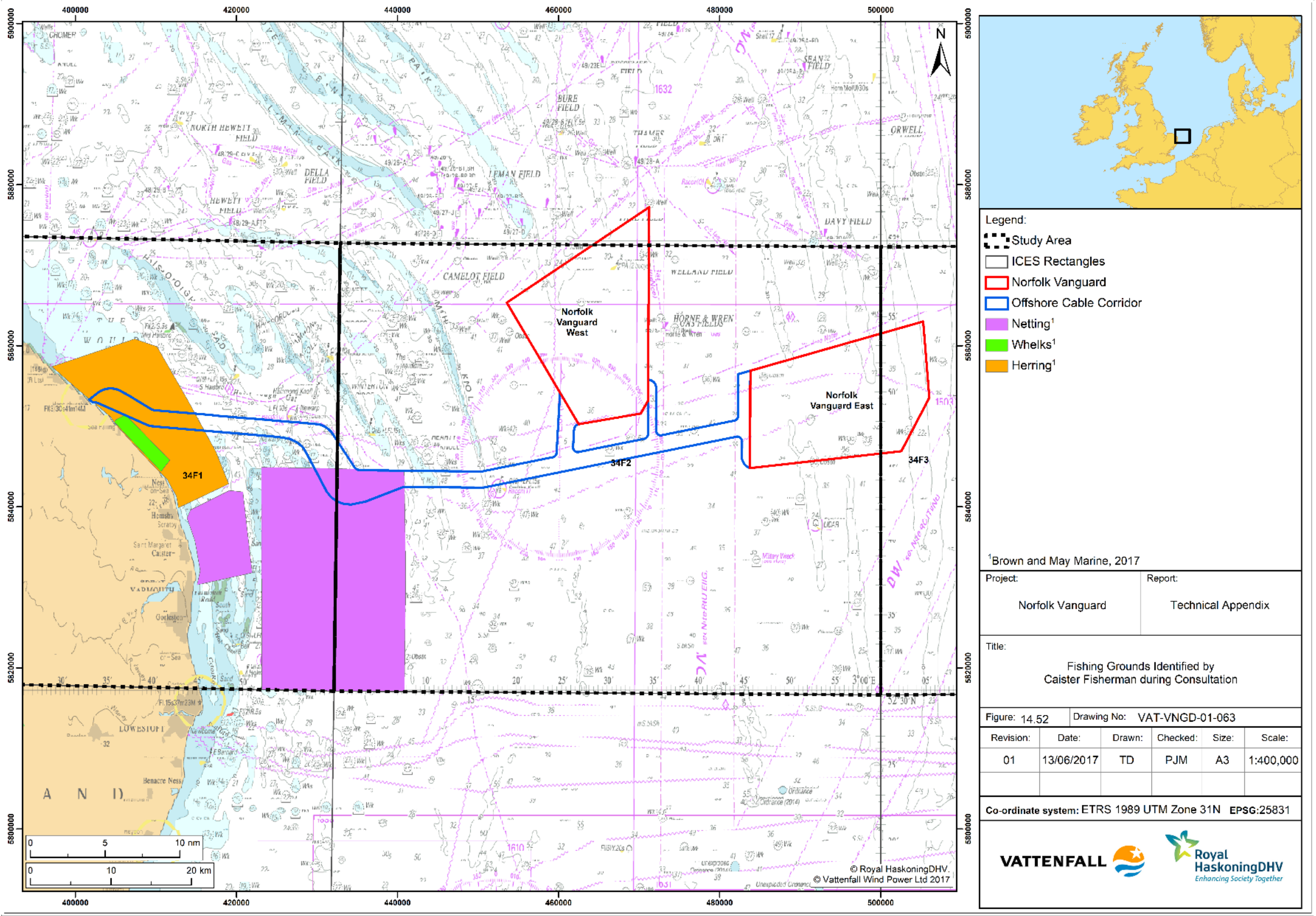


Figure 14.52 General fishing grounds as identified by Caister (UK) fisherman during consultation (Source: BMM, 2017)

14.3.4.3 Satellite Tracking (VMS) Data

79. VMS data does not take into account fishing activity by under 15m vessels. Therefore, fishing activity in some areas, particularly inshore areas where under 10m vessels operate, is not adequately represented. Consequently, the majority of vessels operating from local UK ports are not recorded by VMS.

80. Figure 14.53 and Figure 14.54 illustrate the distribution of activity recorded by VMS for UK pelagic vessels. As shown, levels of activity by pelagic vessels within the offshore project area are negligible.

81. Demersal trawling occurs throughout the vicinity of Norfolk Vanguard and within both OWF sites (Figure 14.55 and Figure 14.56). When the data for demersal trawls were separated, beam trawling (UK registered but Dutch owned and operated vessels) accounted for almost all demersal trawling activity within the Norfolk Vanguard site (Figure 14.57), while otter trawling, classed as ‘otter trawl’, ‘bottom otter trawl’ and ‘bottom otter twin trawl’, was negligible to absent (Figure 14.58, Figure 14.59 and Figure 14.60).

82. UK demersal trawling activity is significantly higher in areas of the Central and Northern North Sea.

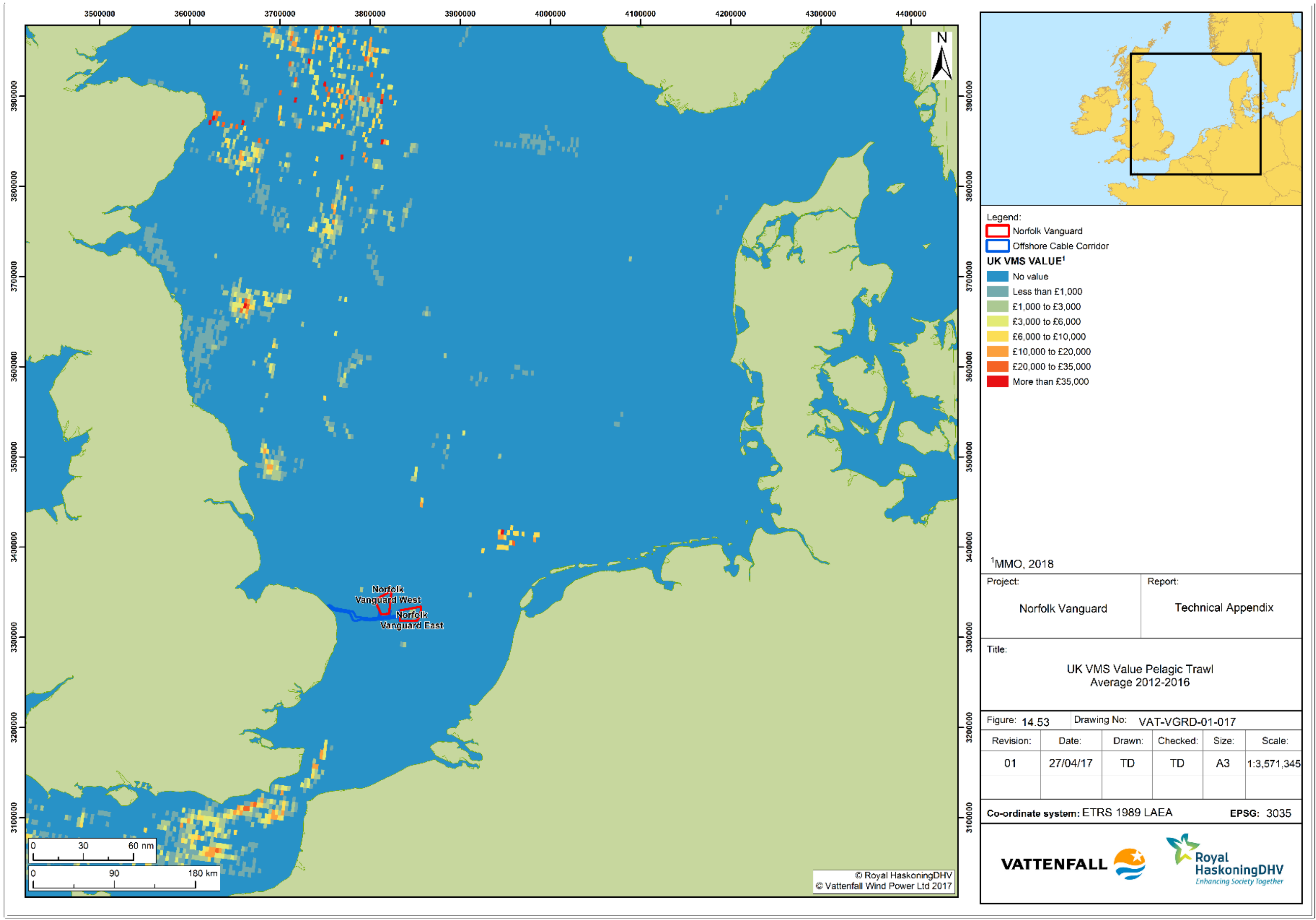


Figure 14.53 UK VMS value by pelagic trawl – wider region (average 2012-2016) (Source: MMO, 2018)

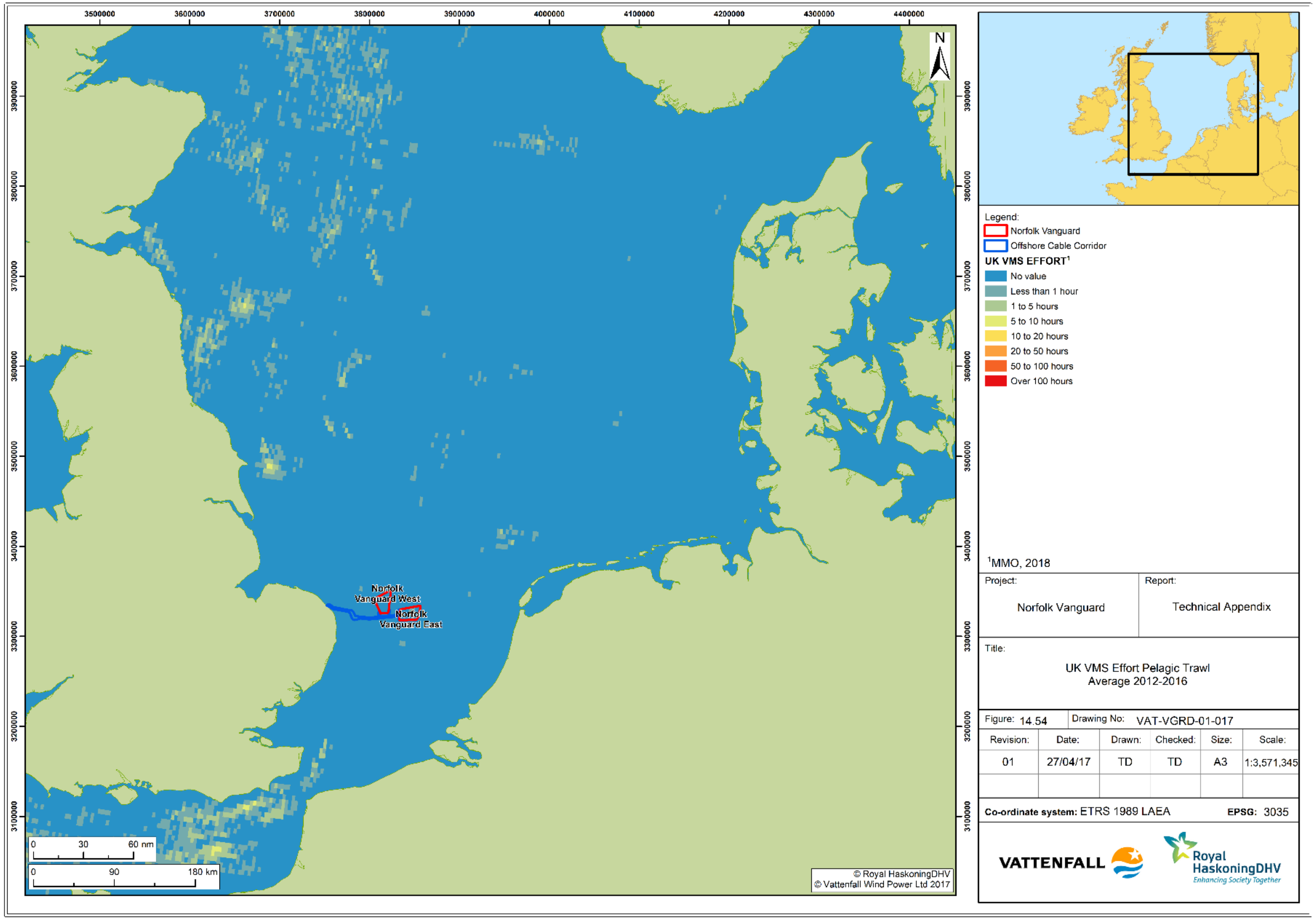


Figure 14.54 UK VMS effort by pelagic trawl – wider region (average 2012-2016) (Source: MMO, 2018)

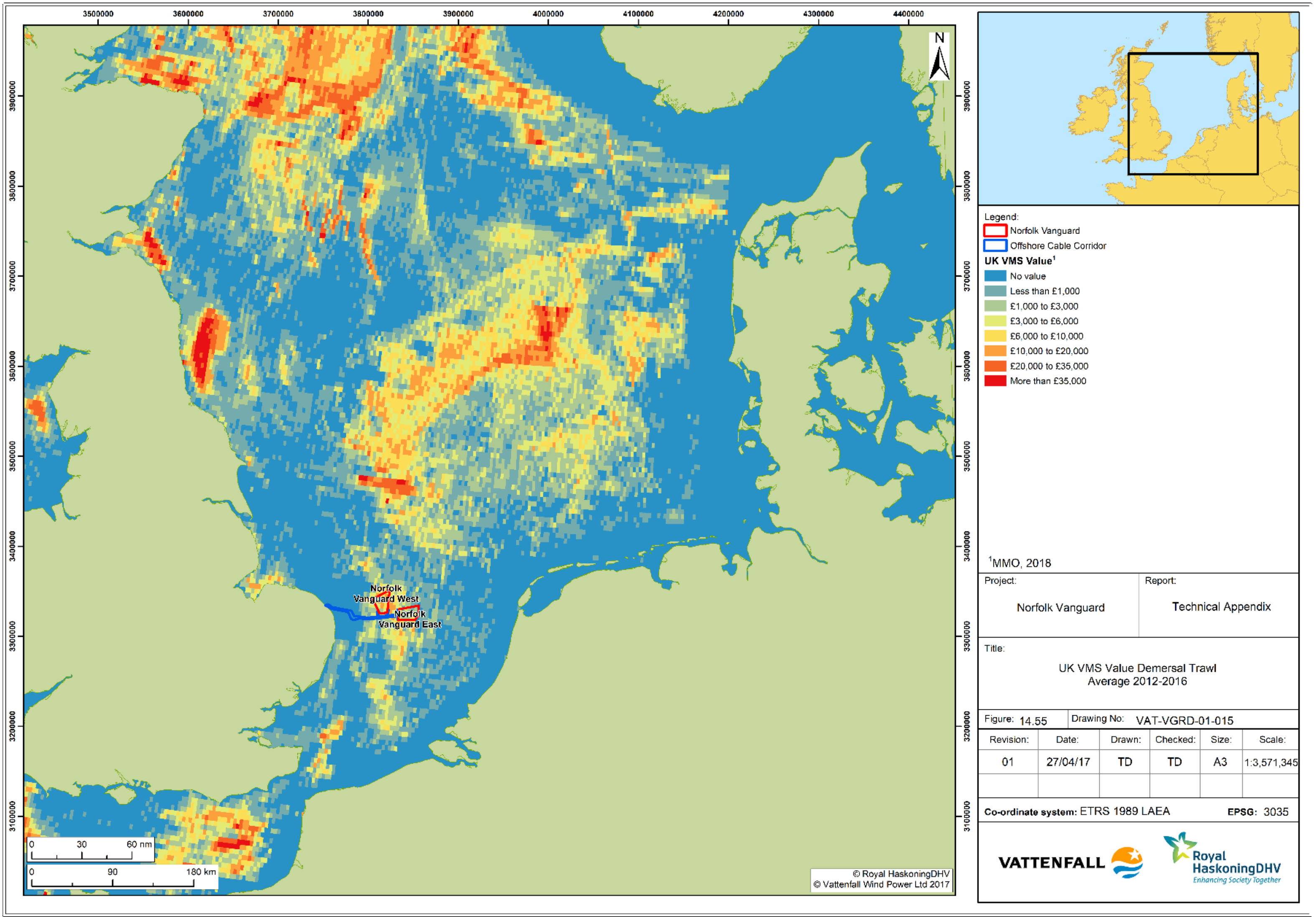


Figure 14.55 UK VMS value by demersal trawl – wider region (average 2012-2016) (Source: MMO, 2018)

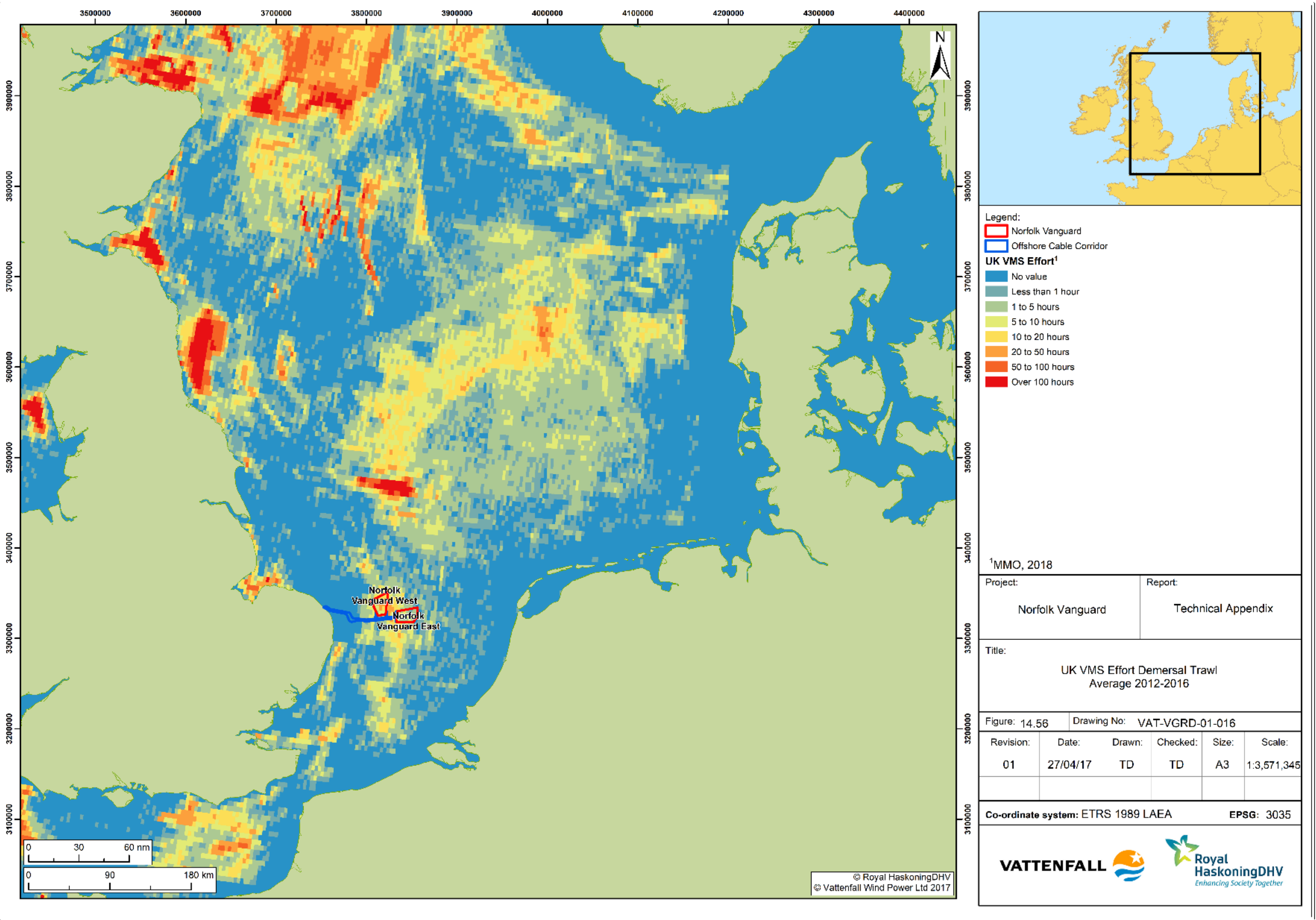


Figure 14.56 UK VMS effort by demersal trawl – wider region (average 2012-2016) (Source: MMO, 2018)

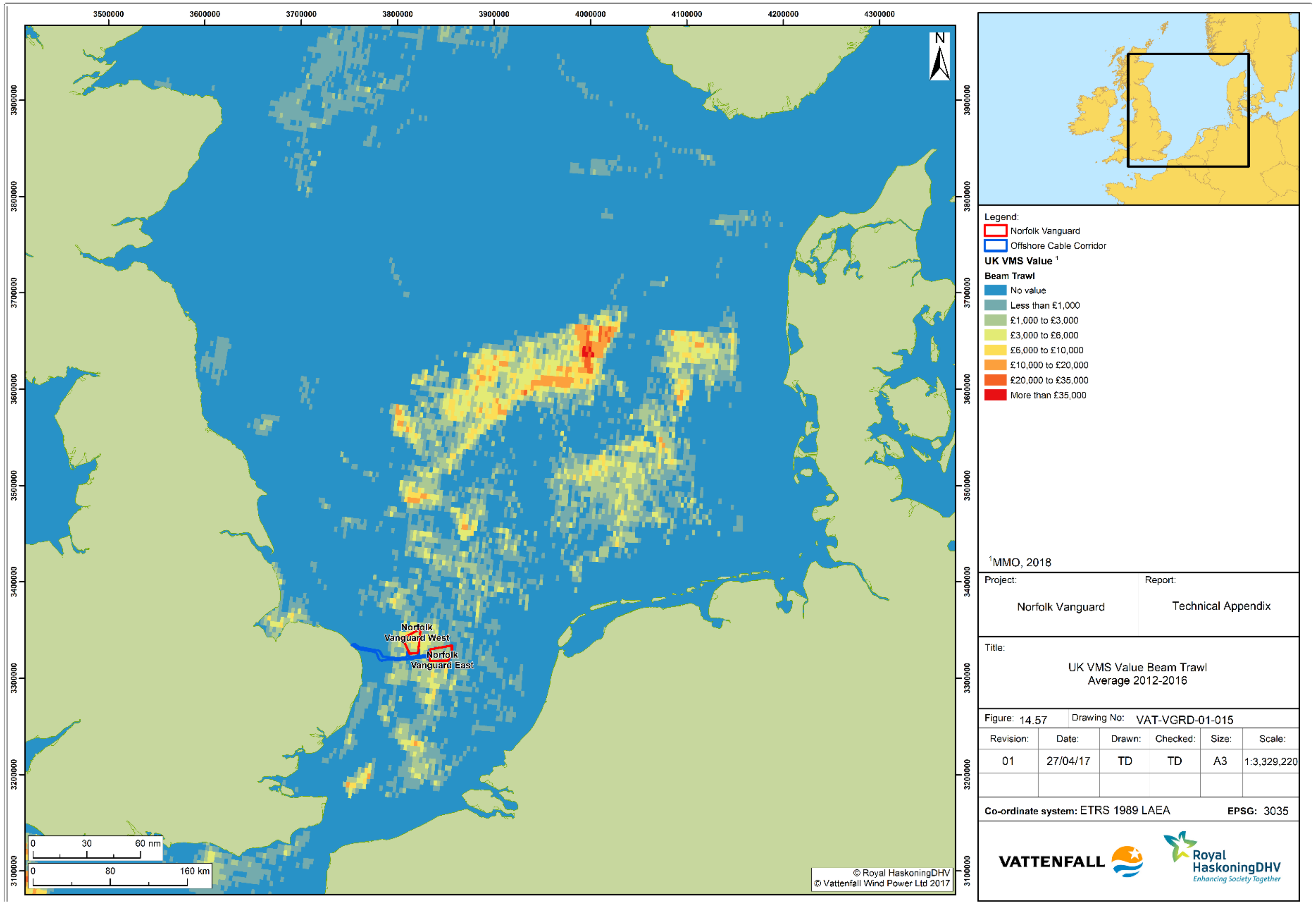


Figure 14.57 UK VMS value by beam trawl – wider region (average 2012-2016) (Source: MMO, 2018)

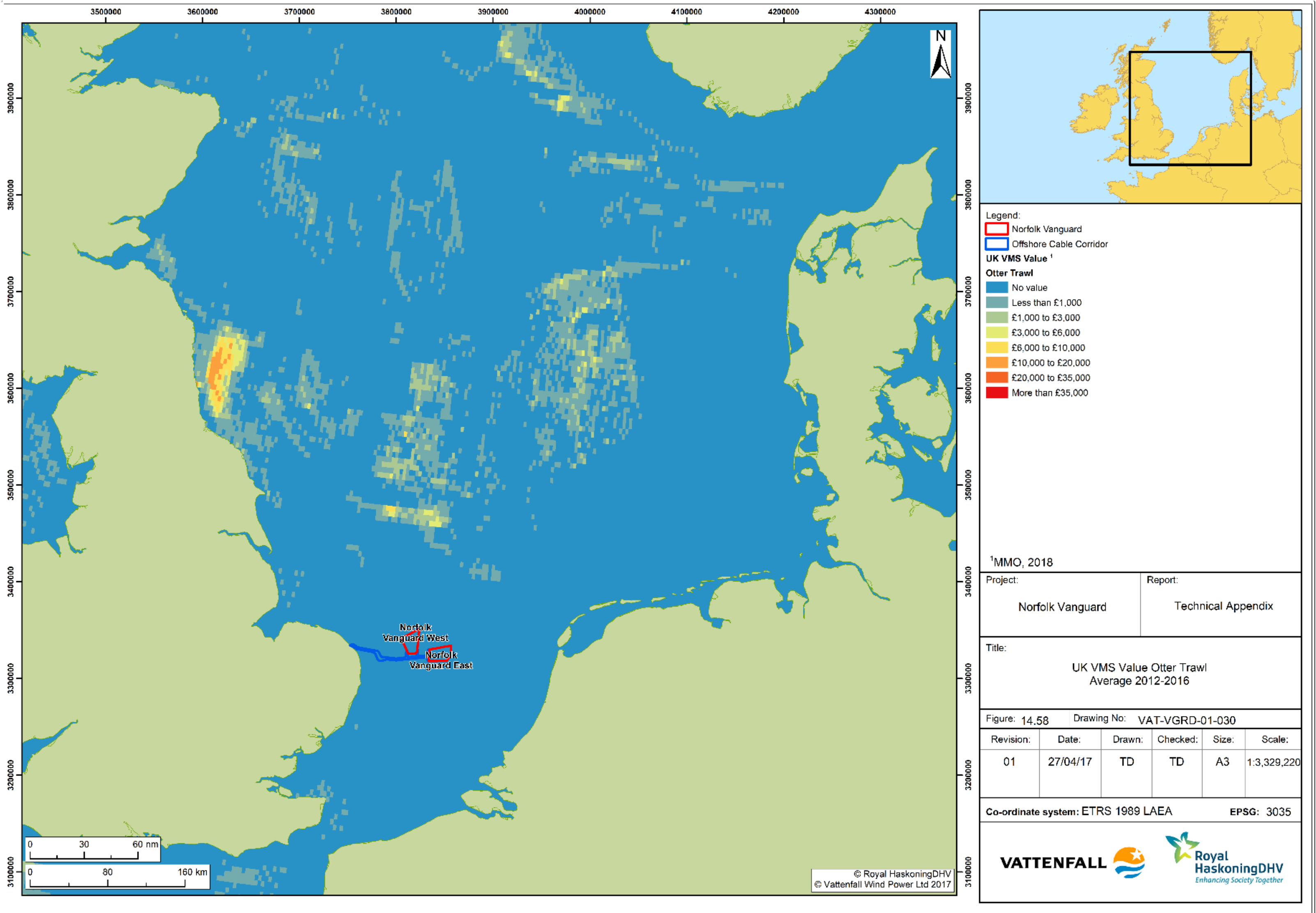


Figure 14.58 UK VMS value by otter trawl – wider region (average 2012-2016) (Source: MMO, 2018)

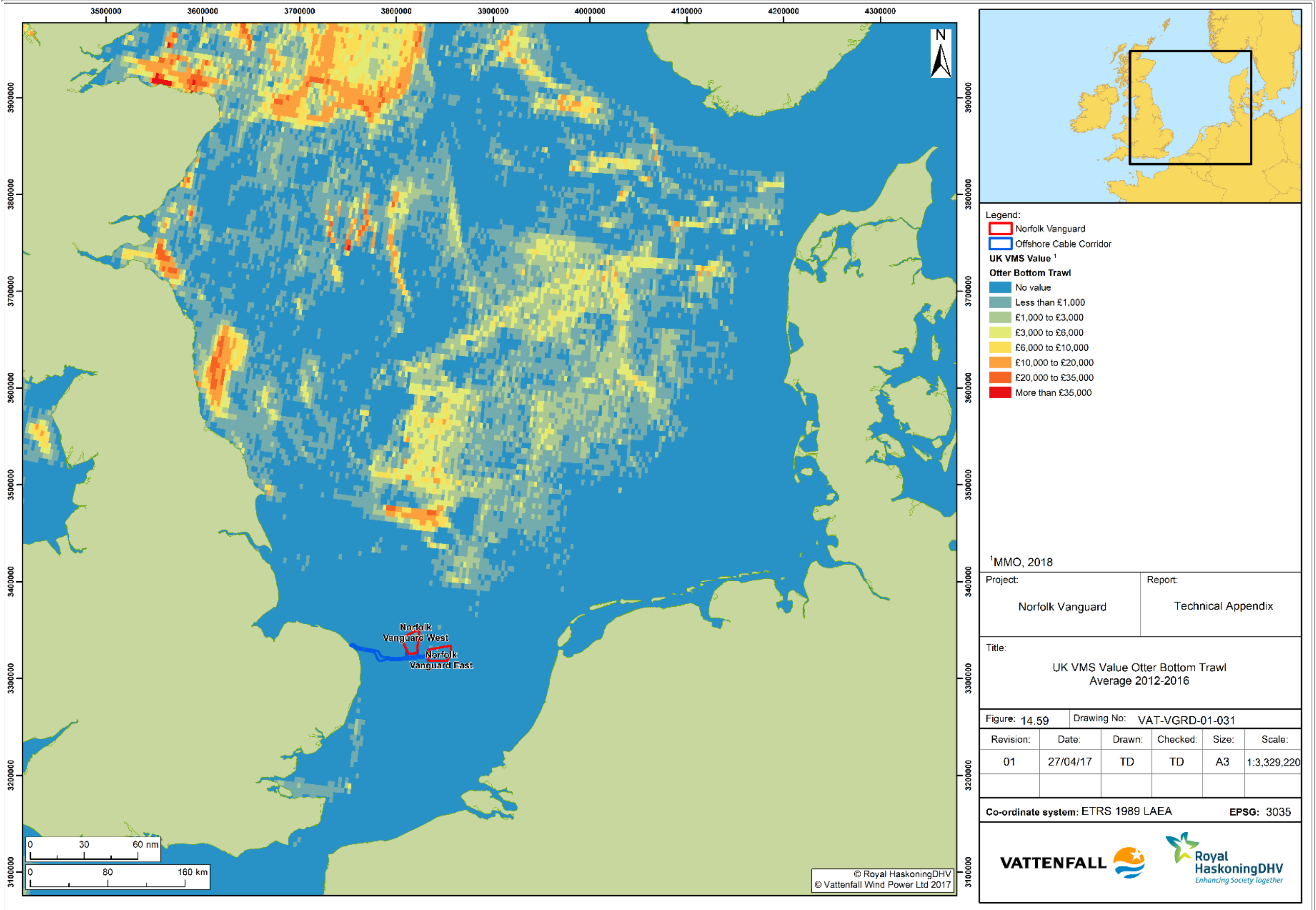


Figure 14.59 UK VMS value by otter bottom trawl – wider region (average 2012-2016) (Source: MMO, 2018)

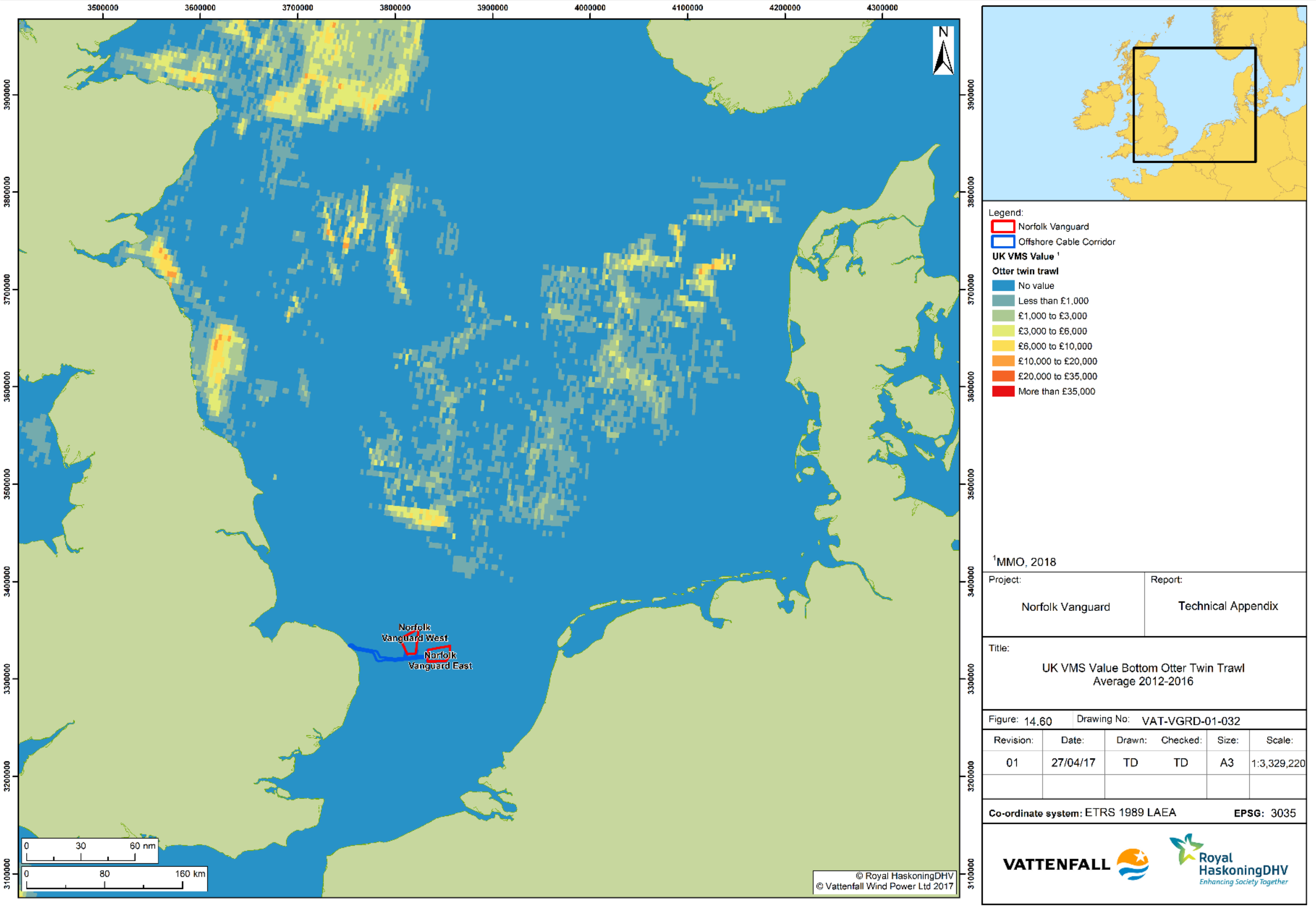


Figure 14.60 UK VMS value by bottom otter twin trawl – wider region (average 2012-2016) (Source: MMO, 2018)

14.3.4.4 UK Landings Data

83. Figure 14.61 shows UK landings by species by all methods combined for the local study area. Within 34F1, the inshore ICES rectangle, highest landings are for lobsters and edible crabs. However, in 34F2 and 34F3 in which the OWF sites are located, landings of Dover sole predominate. The majority of the Dover sole are however landed by UK flagged but Dutch owned and operated beam trawlers.

84. Figure 14.62 illustrates that the majority of UK landings from 34F1 are from potting. In contrast, landings from 34F2 are almost exclusively from beam trawlers, although a very small proportion is from longlining. Beam trawling represents all landings taken in 34F3 (Figure 14.62). This confirms the absence of otter trawl vessels from the Norfolk Vanguard site, as demonstrated previously by the VMS data in section 14.3.4.3.

85. Figure 14.63, Figure 14.64 and Figure 14.65 illustrate average annual landings values by species and method for 34F1, 34F2 and 34F3 respectively. The data shows that landings in the inshore rectangle (34F1) are predominantly shellfish, lobsters, crabs and whelks (Figure 14.63). The principle gear types employed are pots (both parlour and whelk pots). It is understood that several local fishermen are increasing their capacity to catch whelks in the area. In 34F2 and 34F3, which are located further offshore and outside of the 12nm limit, the principle method is beam trawling mainly targeting Dover sole and to a lesser extent plaice, turbot and brill (Figure 14.64 and Figure 14.65).

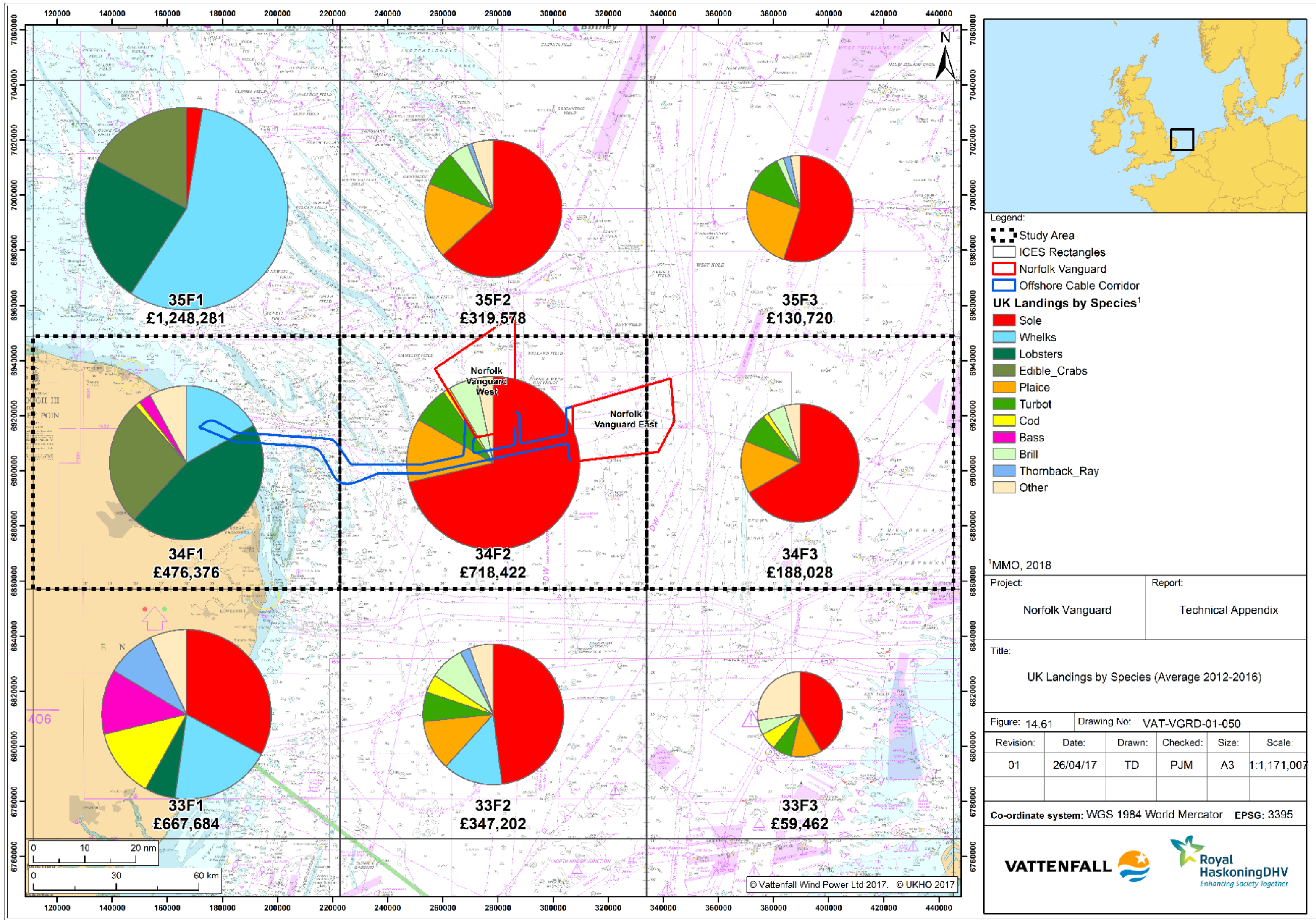


Figure 14.61 Average UK landings values by species (2012-2016) (Source: MMO, 2018)

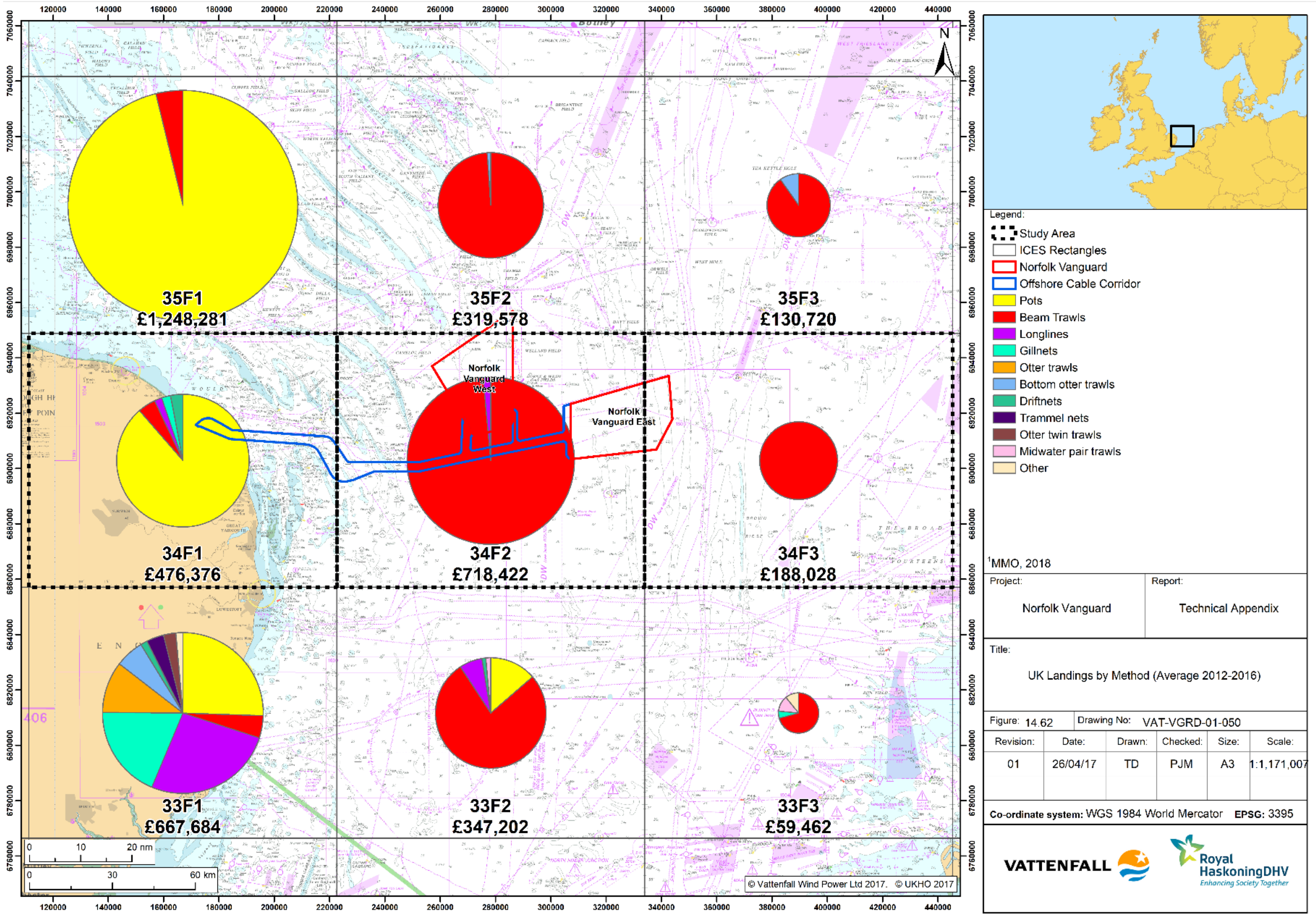
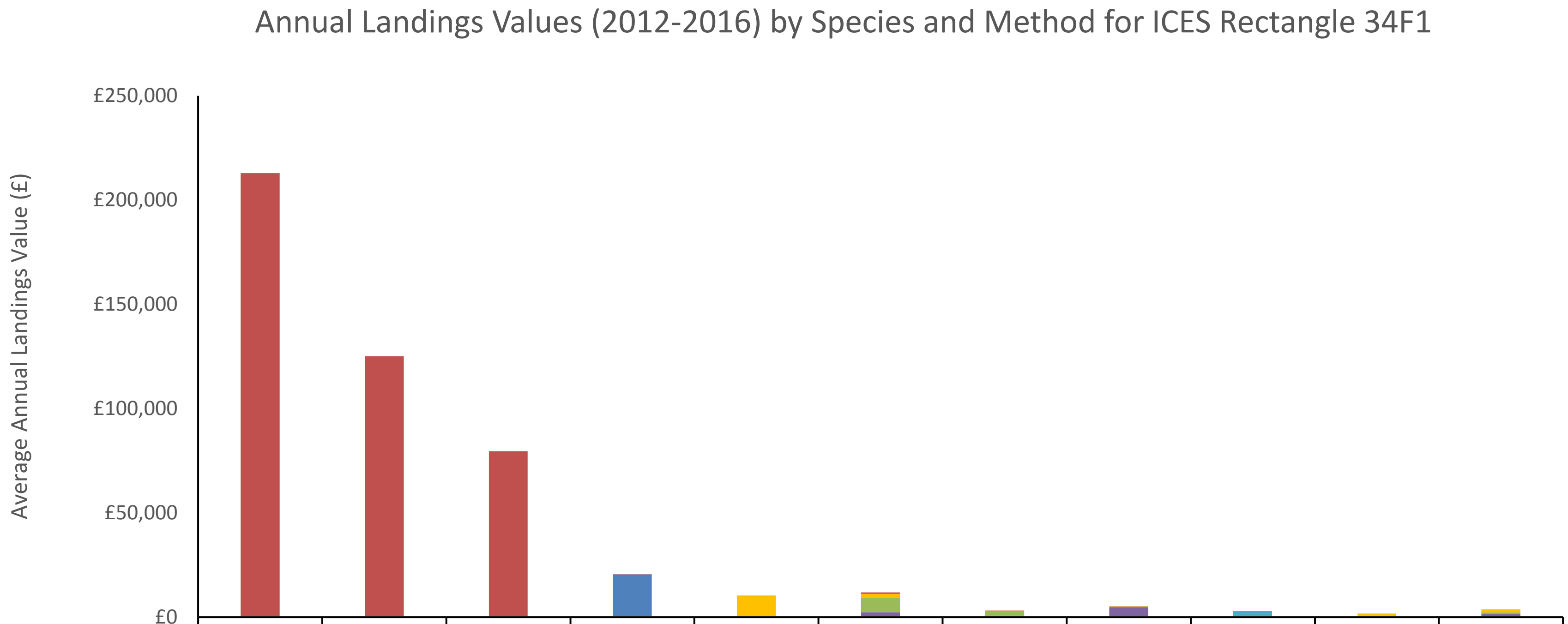
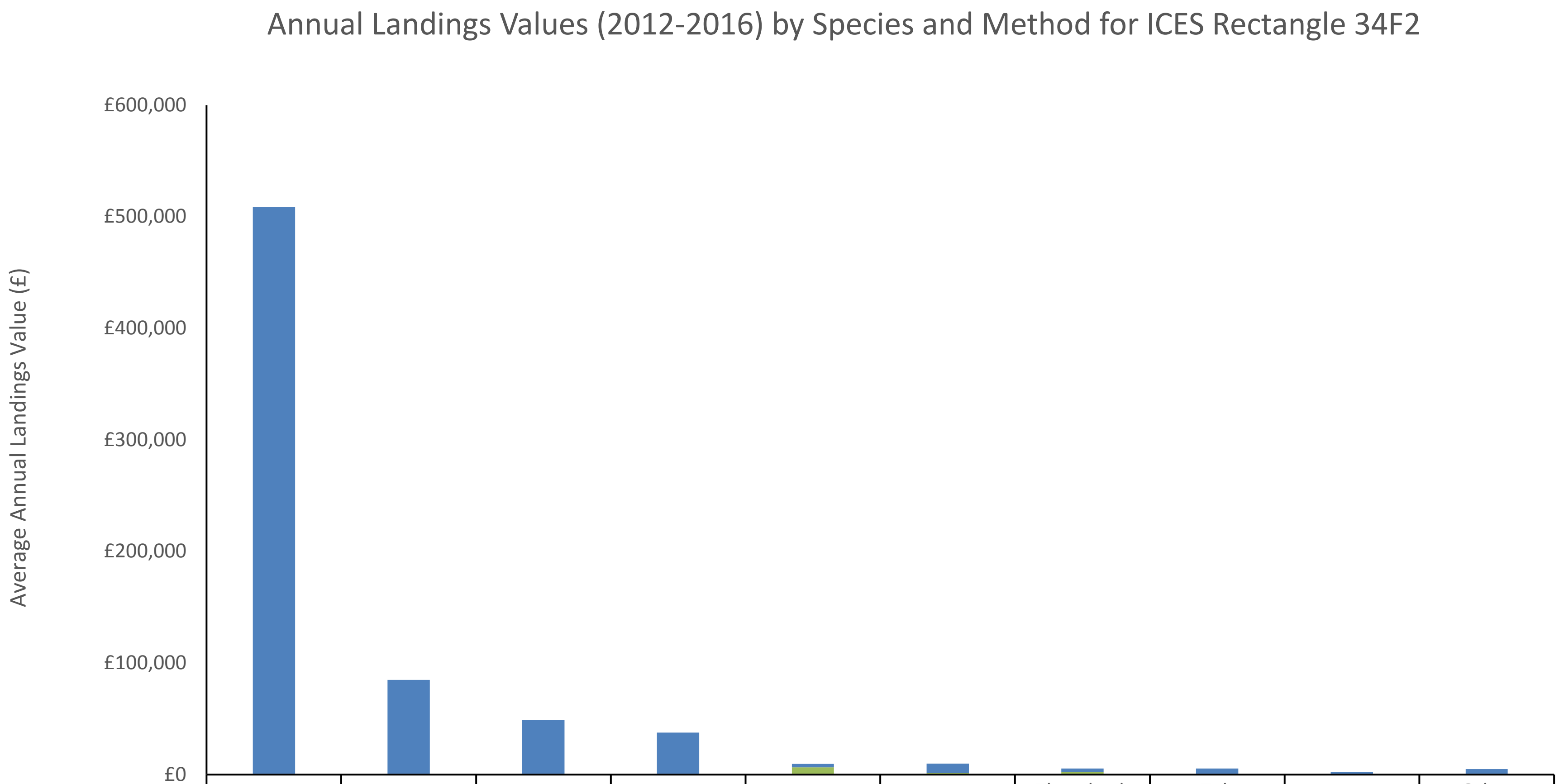


Figure 14.62 Average UK landings values by method (2012-2016) (Source: MMO, 2018)



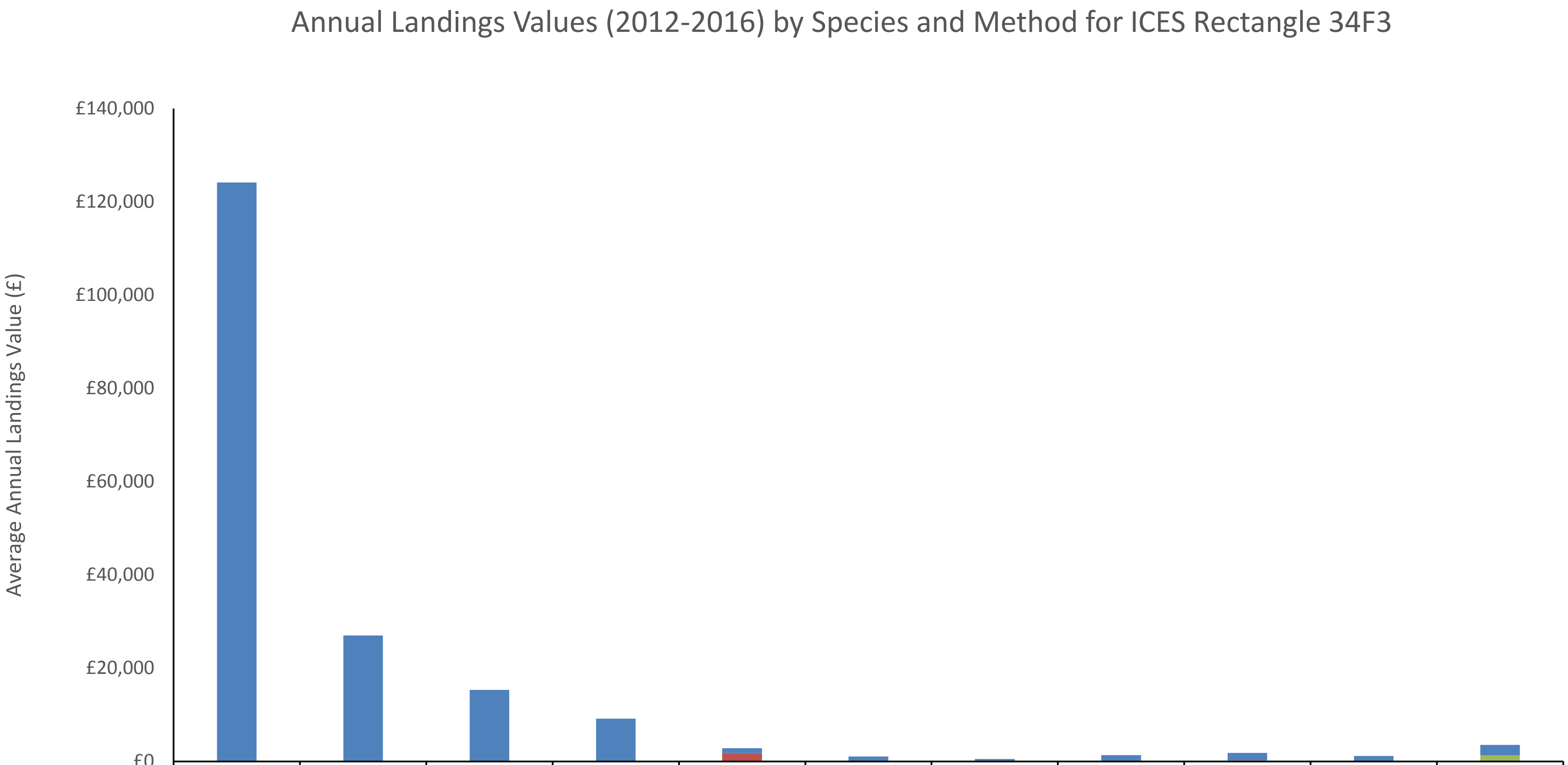
	Lobsters	Edible Crabs	Whelks	Brown Shrimps	Herring	Bass	Sole	Cod	Cockles	Mackerel	Other Species
Pots	£212,761	£124,983	£79,588	£25	£94	£710	£5	£24	£0	£5	£251
Beam trawls	£0	£0	£0	£20,469	£0	£0	£0	£0	£0	£0	£1
Driftnets	£0	£0	£0	£0	£9,764	£1,874	£78	£4	£0	£1,422	£1,124
Gillnets	£143	£45	£3	£0	£366	£6,820	£1,938	£243	£0	£75	£679
Longlines	£50	£0	£0	£0	£1	£2,364	£32	£4,815	£0	£0	£1,500
Miscellaneous gear	£0	£0	£0	£0	£0	£0	£0	£0	£2,901	£0	£0
Otter trawls (not specified)	£0	£0	£0	£0	£0	£28	£508	£3	£0	£0	£43
Otter twin trawls	£0	£0	£0	£0	£0	£28	£508	£3	£0	£0	£43

Figure 14.63 Average landing values (2012-2016) by species and method in ICES rectangle 34F1 (Source: MMO, 2018)



	Sole	Plaice	Turbot	Brill	Cod	Blonde Ray	Thornback Ray	Tub Gurnard	Dabs	Other Species
Beam trawls	£508,715	£84,835	£48,767	£37,594	£3,123	£8,494	£3,321	£5,479	£2,255	£4,220
Longlines	£0	£0	£0	£0	£6,412	£1,344	£1,995	£0	£0	£766
Bottom otter trawls	£3	£0	£0	£5	£0	£0	£238	£0	£0	£1
Otter trawls (not specified)	£0	£3	£0	£2	£10	£10	£5	£0	£0	£1

Figure 14.64 Average landing values (2012-2016) by species and method in ICES rectangle 34F2 (Source: MMO, 2018)



	Sole	Plaice	Turbot	Brill	Cod	Dabs	Flounder or Flukes	Thornback Ray	Tub Gurnard	Blonde Ray	Other Species
Beam trawls	£124,157	£27,004	£15,323	£9,166	£1,067	£1,042	£529	£1,359	£1,626	£1,199	£2,167
Gillnets	£0	£3	£3	£0	£1,783	£0	£0	£0	£0	£0	£88
Scottish seines	£0	£0	£3	£0	£0	£0	£0	£0	£227	£0	£1,283

Figure 14.65 Average landing values (2012-2016) by species and method in ICES rectangle 34F3 (Source: MMO, 2018)

14.3.4.5 Annual and Seasonal Variations

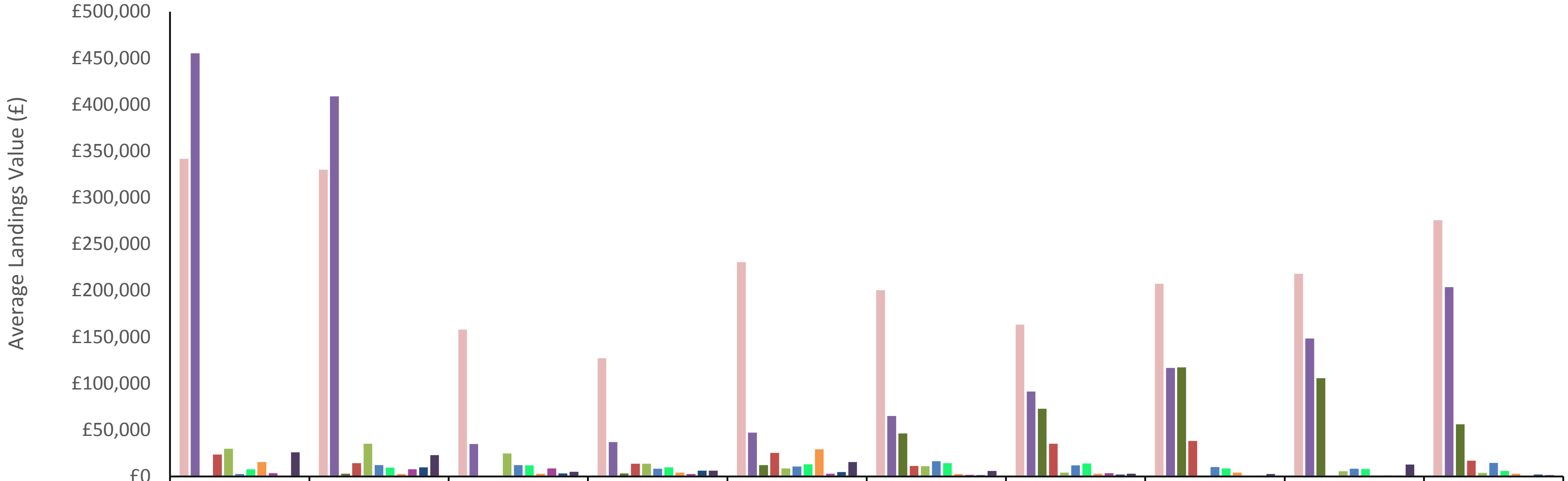
86. Figure 14.66 displays annual variation in landings by species for ICES rectangle 34F1 for the period 2007-2016. Lobsters peaked in 2007 at £341,854, then declining in 2010 to £127,203. In 2016, lobster landings were recorded at £275,614. Crab landings have decreased over this period from a peak value of £455,098 in 2007 to a low of £34,900 in 2009, before a steady recovery to £203,636 in 2016. Conversely, whelk landings have increased dramatically from £63 in 2007 to £56,033 in 2016. Brown shrimp landings have remained relatively constant throughout the period, reaching a peak of £38,211 in 2014, whilst landings of cod have steadily decreased from a peak of £35,166 in 2008.

87. In 34F2, catches are dominated by Dover sole, which have increased in recent years to a peak of £760,208 in 2014 (Figure 14.67). Plaice landings have remained stable throughout the period, reaching a peak of £130,789 in 2013. Turbot has seen a steady increase to £75,120 in 2014.

88. Further offshore, in 34F3, the principle target species are Dover sole and plaice (Figure 14.68). Dover sole values have fluctuated over the period from £59,635 in 2007, to a peak of £250,724 in 2010, which declined to a steady rate of approximately £150,000 in subsequent years. Plaice landings have followed a similar pattern, peaking in 2010 at £166,667. Turbot, cod and brill have continued to be landed at a low level throughout the period.

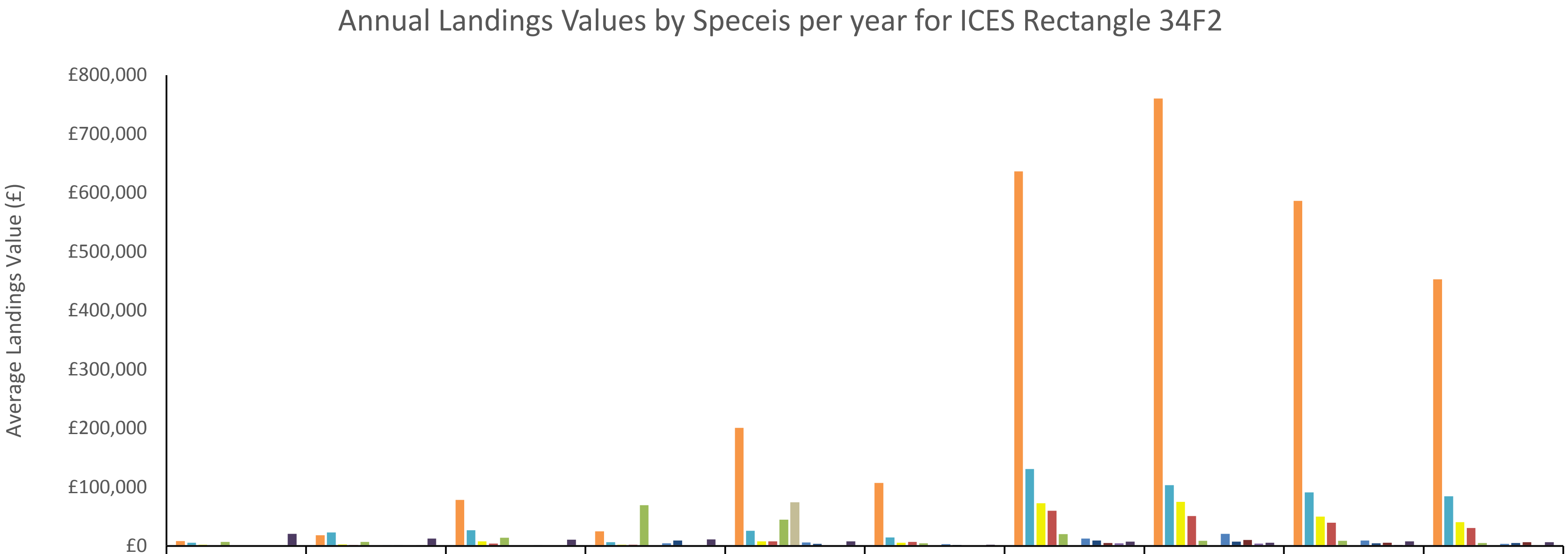
89. Monthly landings values by species are given in Figure 14.69, Figure 14.70 and Figure 14.71. Within 34F1, lobster and crabs are primarily targeted between March and November, peaking in July and April respectively. In 34F2, Dover sole are targeted between June and January with a peak in September and October, whilst in 34F3, the highest landings values for both Dover Sole and plaice occur in January.

Annual Landings Values by Species per year for ICES Rectangle 34F1



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Lobsters	£341,854	£329,914	£157,886	£127,203	£230,698	£200,510	£163,330	£207,311	£218,011	£275,614
Edible Crabs	£455,098	£409,032	£34,900	£37,036	£47,179	£65,130	£91,327	£116,692	£148,354	£203,636
Whelks	£63	£2,930	£230	£3,264	£12,126	£46,146	£72,784	£117,382	£105,609	£56,033
Brown Shrimps	£23,441	£14,314	£716	£13,726	£25,414	£11,338	£35,216	£38,211	£658	£17,046
Cod	£29,926	£35,166	£24,856	£13,857	£8,591	£11,116	£4,183	£731	£5,609	£3,857
Bass	£2,666	£12,174	£12,112	£8,359	£10,596	£16,365	£11,988	£10,074	£8,249	£14,566
Herring	£7,737	£9,624	£12,018	£9,711	£13,043	£14,404	£13,922	£8,776	£8,075	£5,946
Sole	£15,509	£2,689	£2,922	£4,091	£29,106	£2,679	£2,917	£4,026	£812	£2,834
Mackerel	£3,574	£7,846	£8,766	£2,534	£3,050	£1,826	£3,603	£645	£1,108	£333
Thornback Ray	£0	£9,729	£3,207	£6,356	£4,783	£1,507	£1,955	£809	£802	£1,927
Other Species	£25,892	£22,928	£4,993	£6,392	£15,393	£5,948	£2,886	£2,645	£12,937	£1,483

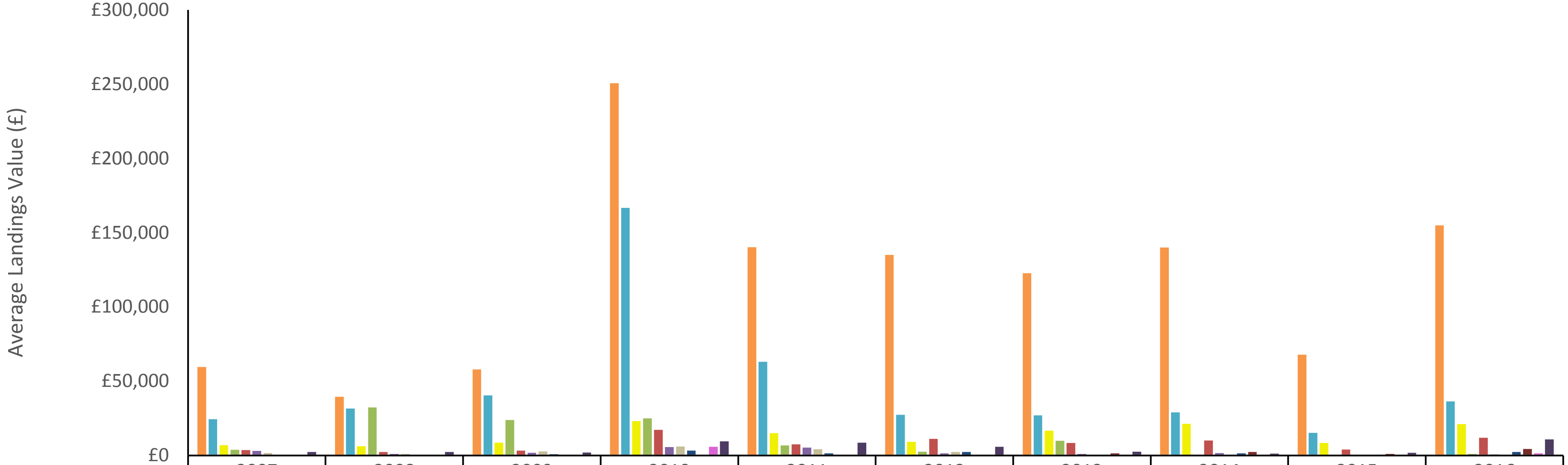
Figure 14.66 Annual landings values by species in ICES rectangle 34F1 (2007-2016) (Source: MMO, 2018)



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sole	£8,465	£18,435	£78,247	£24,697	£200,500	£107,299	£636,690	£760,208	£586,409	£452,987
Plaice	£5,297	£22,774	£26,613	£6,521	£26,009	£14,340	£130,789	£103,554	£91,229	£84,276
Turbot	£2,350	£2,709	£7,711	£2,307	£8,057	£5,558	£72,717	£75,120	£50,071	£40,367
Brill	£952	£1,767	£4,134	£2,110	£8,000	£6,823	£60,084	£51,057	£39,499	£30,535
Cod	£6,819	£6,814	£13,955	£69,390	£44,810	£4,682	£20,098	£8,930	£9,015	£4,996
Sprats	£0	£0	£0	£0	£74,028	£0	£0	£0	£0	£0
Blonde Ray	£0	£1,173	£683	£4,503	£5,893	£2,933	£12,542	£20,592	£9,332	£3,841
Thornback Ray	£0	£1,204	£1,391	£9,237	£3,561	£1,839	£9,139	£7,168	£4,629	£5,019
Tub Gurnard	£0	£0	£0	£0	£0	£51	£5,132	£10,353	£5,588	£6,270
Dabs	£339	£1,469	£845	£56	£896	£313	£4,591	£4,244	£1,530	£597
Other Species	£20,859	£12,614	£10,791	£11,048	£7,862	£1,988	£7,375	£5,649	£7,755	£6,306

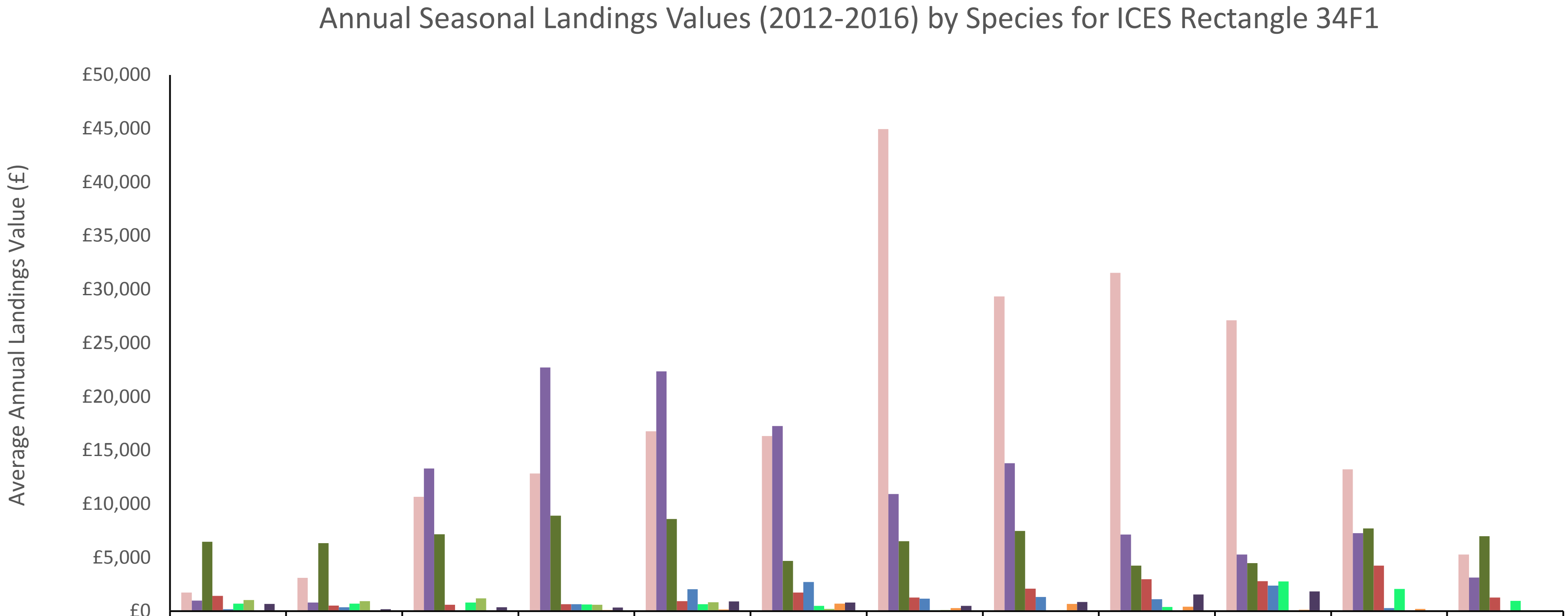
Figure 14.67 Annual landings values by species in ICES rectangle 34F2 (2007-2016) (Source: MMO, 2018)

Annual Landings Values by Species per year for ICES Rectangle 34F3



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sole	£59,635	£39,606	£57,888	£250,724	£140,206	£135,103	£122,763	£140,079	£67,962	£154,879
Plaice	£24,420	£31,717	£40,386	£166,667	£63,177	£27,360	£26,937	£29,012	£15,295	£36,428
Turbot	£7,011	£6,198	£8,644	£23,181	£15,020	£9,132	£16,720	£21,290	£8,374	£21,131
Cod	£3,755	£32,387	£23,951	£25,080	£6,795	£2,460	£9,927	£474	£345	£1,045
Brill	£3,606	£2,288	£3,198	£17,247	£7,582	£11,223	£8,515	£10,150	£4,068	£11,874
Dabs	£3,015	£1,126	£1,788	£5,697	£5,263	£1,496	£1,007	£1,707	£258	£741
Flounder or Flukes	£1,717	£1,151	£2,818	£5,972	£4,223	£2,316	£39	£253	£19	£19
Thornback Ray	£0	£61	£865	£3,353	£1,502	£2,316	£256	£1,386	£475	£2,360
Tub Gurnard	£0	£0	£0	£0	£0	£38	£1,401	£2,401	£1,052	£4,376
Red Mullet	£0	£0	£0	£5,895	£0	£0	£4	£14	£10	£1,373
Other Species	£2,364	£2,308	£2,026	£9,607	£8,635	£5,868	£2,564	£1,230	£1,838	£10,777

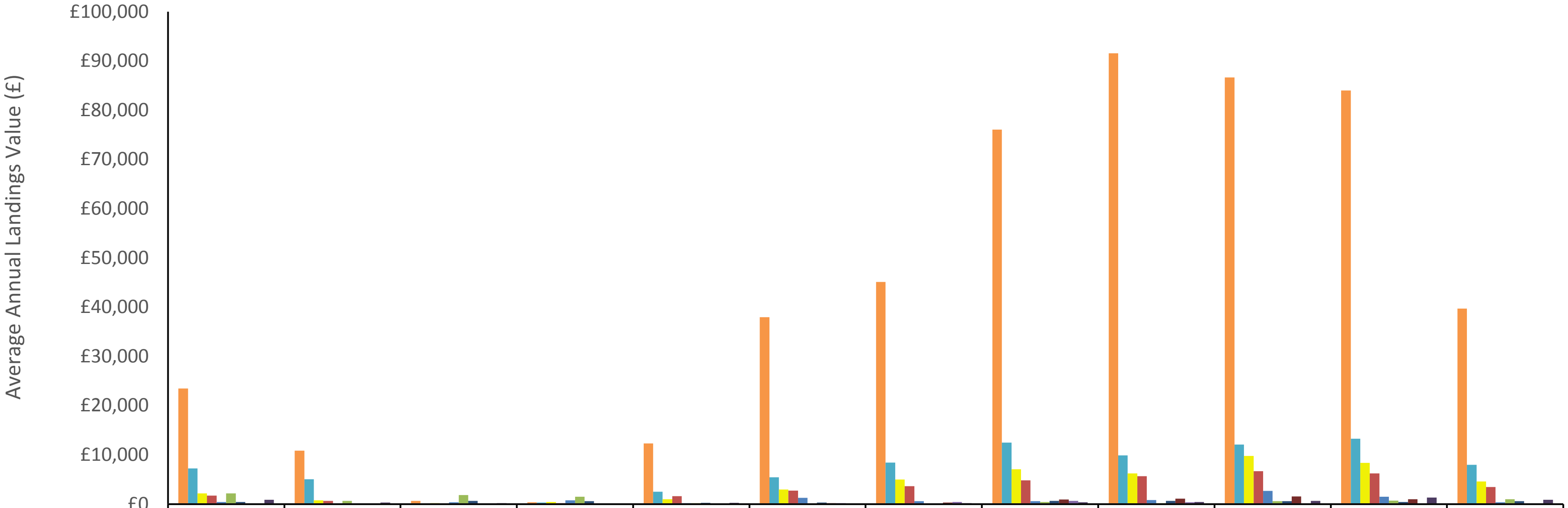
Figure 14.68 Annual landings values by species in ICES rectangle 34F3 (2007-2016) (source: MMO, 2018)



	January	February	March	April	May	June	July	August	September	October	November	December
Lobsters	£1,731	£3,101	£10,675	£12,846	£16,767	£16,333	£44,950	£29,359	£31,543	£27,126	£13,234	£5,291
Edible Crabs	£981	£794	£13,311	£22,724	£22,368	£17,253	£10,930	£13,803	£7,151	£5,291	£7,282	£3,141
Whelks	£6,463	£6,339	£7,179	£8,891	£8,602	£4,684	£6,533	£7,484	£4,253	£4,469	£7,700	£6,993
Brown Shrimps	£1,416	£527	£597	£657	£927	£1,732	£1,263	£2,096	£2,968	£2,794	£4,248	£1,268
Bass	£170	£360	£63	£641	£2,056	£2,712	£1,160	£1,316	£1,108	£2,374	£276	£14
Herring	£692	£707	£802	£615	£637	£492	£90	£0	£384	£2,767	£2,080	£958
Cod	£1,025	£935	£1,178	£599	£826	£205	£113	£88	£25	£17	£13	£76
Sole	£5	£3	£4	£95	£142	£691	£285	£675	£414	£119	£211	£12
Other Species	£685	£186	£358	£338	£898	£804	£499	£853	£1,548	£1,835	£35	£41

Figure 14.69 Average seasonal variation by species in ICES rectangle 34F1 (2012-2016) (source: MMO, 2018)

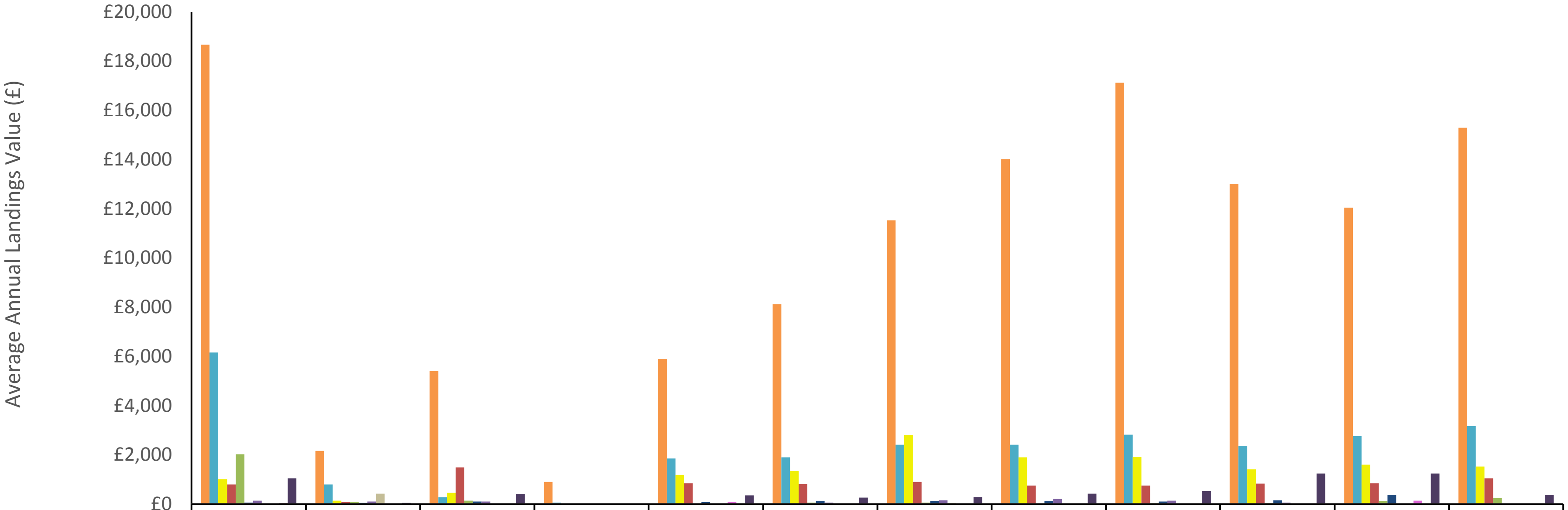
Annual Seasonal Landings Values (2012-2016) by Species for ICES Rectangle 34F2



	January	February	March	April	May	June	July	August	September	October	November	December
Sole	£23,475	£10,849	£647	£366	£12,355	£37,948	£45,127	£76,036	£91,532	£86,639	£84,014	£39,731
Plaice	£7,254	£5,046	£74	£304	£2,531	£5,456	£8,436	£12,511	£9,880	£12,079	£13,290	£7,976
Turbot	£2,208	£790	£207	£432	£1,007	£2,976	£5,022	£7,110	£6,226	£9,808	£8,386	£4,594
Brill	£1,730	£670	£36	£205	£1,636	£2,735	£3,662	£4,858	£5,674	£6,668	£6,252	£3,473
Blonde Ray	£433	£179	£399	£757	£192	£1,299	£587	£591	£817	£2,697	£1,494	£403
Cod	£2,213	£692	£1,867	£1,526	£225	£29	£70	£436	£228	£584	£698	£978
Thornback Ray	£419	£174	£647	£603	£249	£348	£179	£666	£656	£602	£430	£586
Tub Gurnard	£52	£6	£0	£0	£112	£233	£334	£948	£1,103	£1,567	£1,008	£115
Dabs	£180	£56	£3	£1	£10	£225	£441	£649	£396	£167	£78	£50
Other Species	£908	£332	£226	£19	£263	£126	£226	£411	£429	£647	£1,317	£911

Figure 14.70 Average seasonal variation by species in ICES rectangle 34F2 (2012-2016) (Source: MMO, 2018)

Annual Seasonal Landings Values (2012-2016) by Species for ICES Rectangle 34F3



	January	February	March	April	May	June	July	August	September	October	November	December
Sole	£18,661	£2,161	£5,408	£901	£5,903	£8,122	£11,533	£14,012	£17,120	£13,000	£12,043	£15,293
Plaice	£6,156	£795	£280	£67	£1,860	£1,904	£2,415	£2,416	£2,818	£2,365	£2,759	£3,170
Turbot	£1,017	£139	£458	£0	£1,182	£1,356	£2,806	£1,902	£1,928	£1,410	£1,609	£1,523
Brill	£805	£82	£1,489	£0	£841	£814	£898	£758	£753	£838	£843	£1,045
Cod	£2,027	£92	£138	£0	£27	£65	£65	£4	£34	£33	£118	£249
Thornback Ray	£65	£55	£107	£0	£86	£134	£116	£130	£108	£158	£379	£22
Dabs	£136	£104	£107	£0	£13	£61	£153	£212	£140	£62	£24	£29
Flounder or Flukes	£12	£424	£32	£0	£0	£0	£50	£1	£2	£8	£1	£0
Red Mullet	£0	£0	£0	£0	£101	£0	£7	£6	£2	£19	£144	£1
Spotted Ray	£34	£3	£0	£0	£6	£0	£4	£14	£0	£0	£0	£0
Other Species	£1,045	£47	£403	£32	£355	£263	£289	£419	£527	£1,239	£1,244	£382

Figure 14.71 Average seasonal variation by species in ICES rectangle 34F3 (2012-2016) (Source: MMO, 2018)

14.3.4.6 Landings Values by Port

90. The principal ports recording landings from 34F1, 34F2 and 34F3 and the proportion of each port's total income that this represents, are listed in Table 14.9, Table 14.10 and Table 14.11. These are based on five year averages from 2012-2016.

91. The highest UK landings value recorded for 34F1 is into Cromer at £321,827, followed by Great Yarmouth at £55,427 (Table 14.9). These values represent 67.7% and 11.6% of annual landings from 34F1 respectively. The average annual landings have been compared to the total average annual landings for each port, to identify their dependence on 34F1. The ports with the highest levels of dependence are Winterton (87.1%), Cromer (84.4%), Great Yarmouth (67.2%) and Sheringham (58.1%).

92. For 34F2 and 34F3, the principle landings ports are in the Netherlands, further suggesting that the majority of UK recorded landings are by UK flagged Dutch owned vessels (Table 14.10 and Table 14.11). The total average annual port values for the Netherlands ports are shown to be high and therefore, landings from 34F2 and 34F3 represent only a small proportion of the ports' total landing values.

Table 14.9 Top 14 ports by average annual landings (2012-2016) from ICES rectangle 34F1 by UK vessels (source: MMO, 2018)

Port	Average Annual Landings in 34F1	% of Annual Value in 34F1	Total Average Annual Port Value	% of Total Annual Port Value that 34F1 Represents
Cromer	£321,827	67.56%	£381,441	84.37%
Great Yarmouth	£55,427	11.64%	£82,516	67.17%
Lowestoft	£30,521	6.41%	£785,805	3.88%
Winterton	£23,150	4.86%	£26,586	87.08%
Sheringham	£19,415	4.08%	£33,413	58.11%
Wells	£12,106	2.54%	£1,107,403	1.09%
Kings Lynn	£7,489	1.57%	£2,338,284	0.32%
Southwold	£5,062	1.06%	£182,246	2.78%
Blakeney	£593	0.12%	£21,365	2.78%
Boston	£329	0.07%	£699,638	0.05%
West Mersea	£292	0.06%	£488,162	0.06%
Brancaster Staithe	£84	0.02%	£55,938	0.15%
Hastings	£72	0.02%	£843,568	0.01%
Great Wakering	£8	0.00%	£4,507	0.18%

Table 14.10 All ports by average annual landings (2012-2016) from ICES rectangle 34F2 by UK vessels (source: MMO, 2018)

Port	Average Annual Landings in 34F2	% of Annual Value in 34F2	Total Average Annual Port Value	% of Total Annual Port Value that 34F2 Represents
Ijmuiden	£414,269	57.66%	£13,465,259	3.08%
Scheveningen	£274,942	38.27%	£5,934,373	4.63%
Lowestoft	£10,546	1.47%	£785,805	1.34%
Stellendam	£9,541	1.33%	£91,639	10.41%
Harlingen	£8,138	1.13%	£21,567,706	0.04%
Great Yarmouth	£683	0.10%	£82,516	0.83%
Vlissengen	£301	0.04%	£320,588	0.09%
Milford Haven	£438	0.10%	£13,572,239	0.00%

Table 14.11 All ports by average annual landings (2012-2016) from ICES rectangle 34F3 by UK vessels (source: MMO, 2018)

Port	Average Annual Landings in 34F3	% of Annual Value in 34F3	Total Average Annual Port Value	% of Total Annual Port Value that 34F3 Represents
Ijmuiden	£120,122	63.88%	£13,465,259	0.89%
Scheveningen	£62,996	33.50%	£5,934,373	1.06%
Harlingen	£2,635	1.40%	£21,567,706	0.01%
Boulogne	£1,513	0.80%	£3,272,590	0.05%
Stellendam	£762	0.41%	£91,639	0.83%

14.3.4.7 Surveillance Sightings

93. Figure 14.72 shows the distribution of surveillance sightings of UK vessels by gear type.

94. As shown, the majority of UK vessels have been observed in inshore areas, further to the north and south of the offshore cable corridor. The main methods observed in these areas are recorded as potting/whelking, with limited records for other methods, including long lining.

95. In the proximity of the OWF sites located further offshore, the vessels sighted are primarily beam trawlers and some limited sightings of unspecified trawlers, again further suggesting the importance of beam trawling activity in the offshore project area.

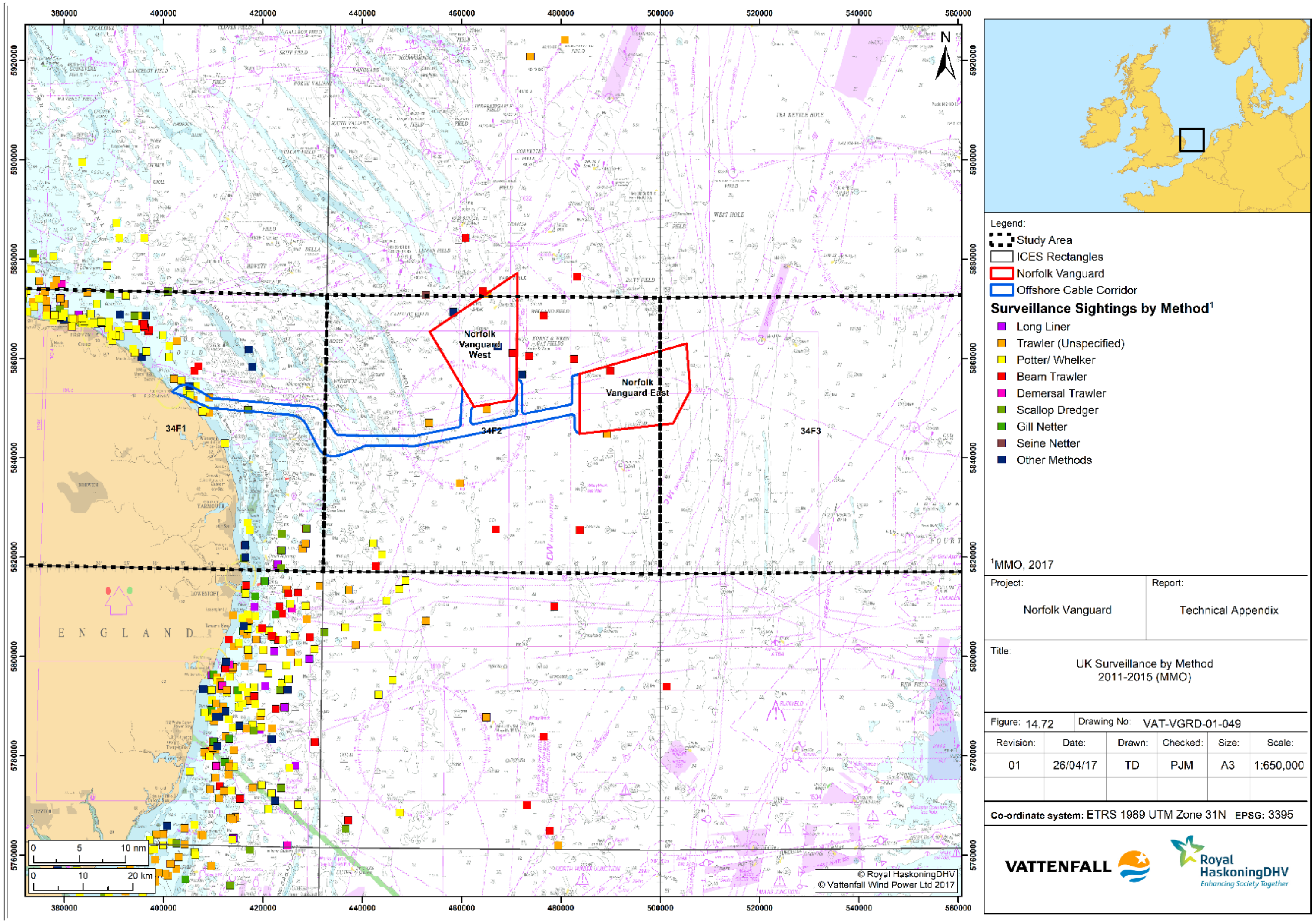


Figure 14.72 UK surveillance sightings by method in the vicinity of the proposed project (2011-2015) (Source: MMO, 2017)

14.3.5 French Fleet

14.3.5.1 Vessels, Gear and Operating Patterns

96. The principal methods deployed by French vessels in the offshore project area are bottom trawls targeting demersal and cephalopods species (Dover sole, red mullet, cuttlefish, whiting and plaice) and limited pelagic trawls targeting pelagic species such as herring, mackerel, horse mackerel and sardine.

97. The majority of French vessels are the larger class of demersal otter trawlers (>18m in length) operating from predominantly the port of Boulogne and to a lesser extent Dieppe. Plate 14.12 shows two such trawlers in Boulogne. During consultation with CRPMEM, it was stated that several of these vessels also undertake seine netting in order to target red mullet.

98. It was stated that French pelagic trawlers normally concentrate their fishing effort on grounds to the south of Norfolk Vanguard where they fish for herring.

Plate 14.12 French trawlers in Boulogne port (Source: BMM, 2017)

14.3.5.1.1 Otter Trawling – Single Rig

99. The otter trawls as used by French and indeed UK trawlers are essentially a funnel shaped net towed over the seabed, with the fish being retained within the cod end (Figure 14.73). The horizontal opening of the net is achieved by a combination of the hydrodynamic and ground sheer forces acting on the trawl doors. The vertical opening of the net is maintained by a series of floats along the net headline and the base of the net kept on the seabed by the weighted ground line, which for fishing

over rough ground can be fitted with a series of rubber disks known as “rock hoppers”. The effective gear width of demersal otter trawls is the distance between the trawl doors which can range from 25m for smaller vessels and up to 65m for larger vessels. Towing speeds are between 2.5 and 3.5 knots, depending on tidal state, seabed conditions and weather.

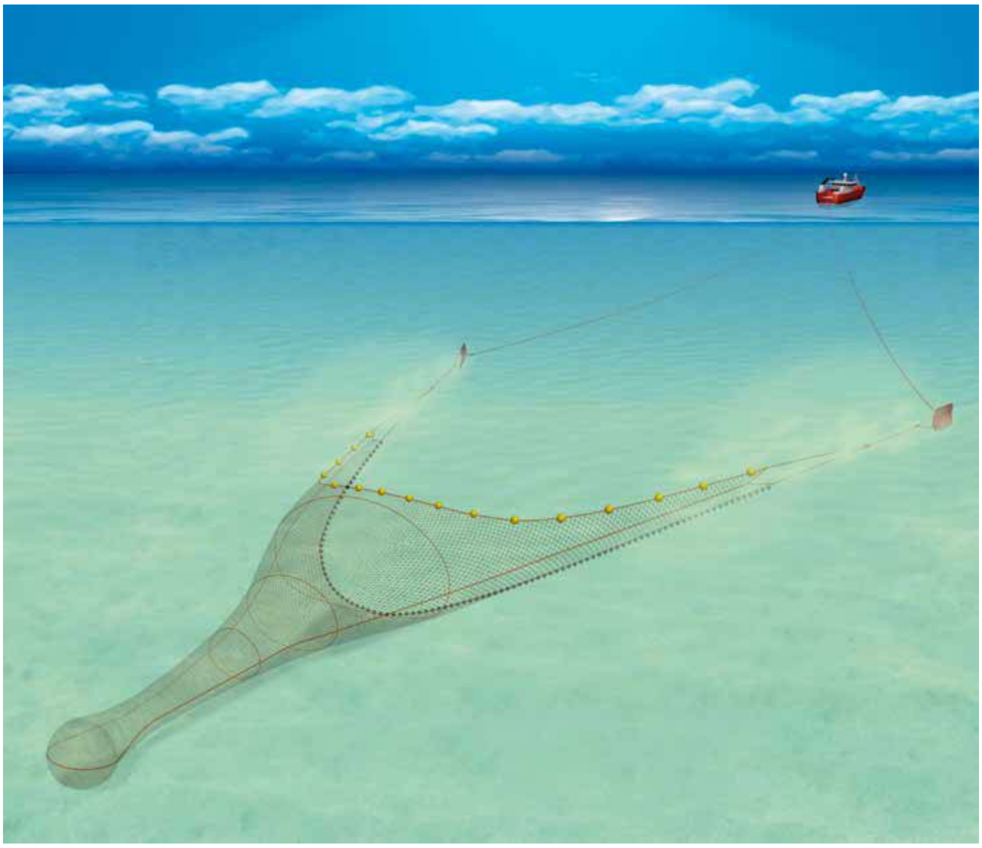


Figure 14.73 Single rig otter trawl (Source: Seafish, 2015)

14.3.5.1.2 Otter Trawling – Twin Rig

100. A more common type of demersal trawling is twin-rig trawling whereby two nets are towed side by side with trawl doors attached via sweep lines to the outer wing ends of each net (Figure 14.74). The inner wing ends of the net are attached to a central clump weight which is normally towed from a third towing warp. The advantage of twin-rig trawling is the increased area of seabed trawled. Towing speeds are generally the same as for single net trawling although the effective gear width can be as much as 110m.

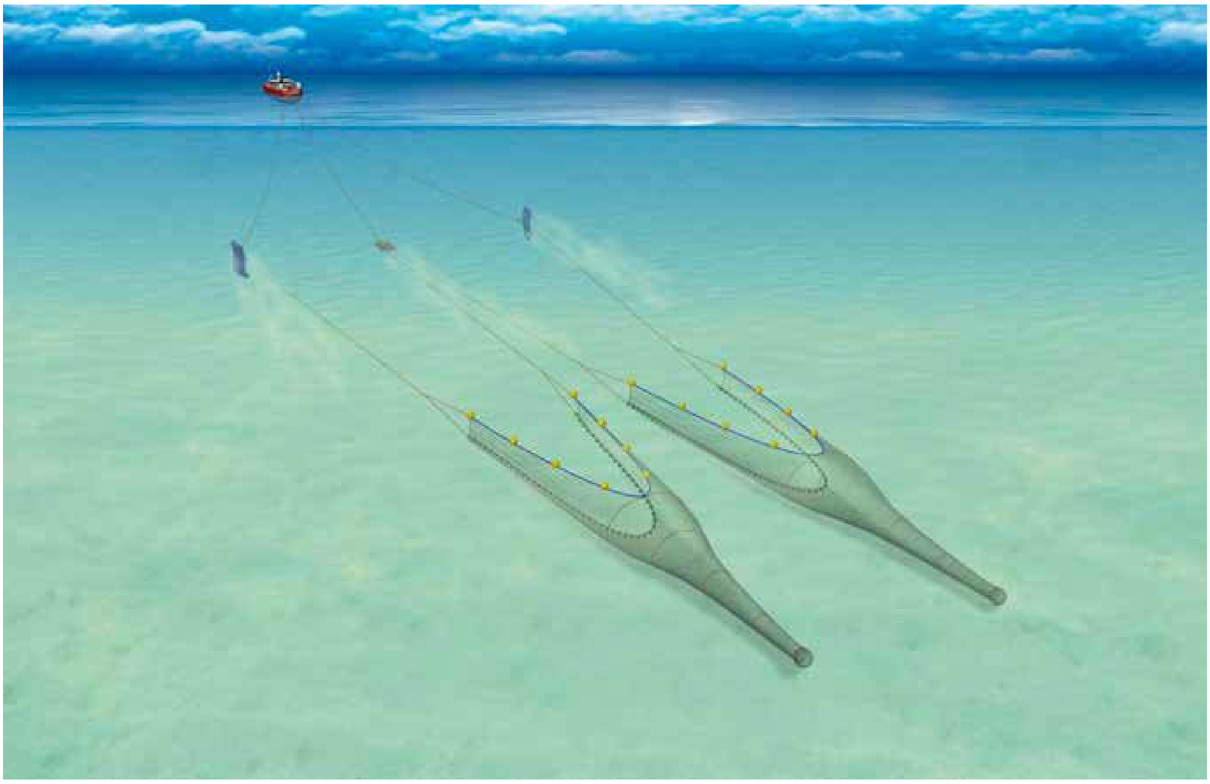


Figure 14.74 Twin rig otter trawl (Source: Seafish, 2015)

14.3.5.2 Satellite Tracking (VMS) Data

101. In response to initial consultation and the publication of the Round 3 Zone locations and boundaries, Comité national des pêches maritimes et des élevages marins (CNPMEM) in association with Institut Français de recherche pour l'exploitation de la mer (IFREMER), produced the document “French Answer to the Consultation on Round 3 UK Wind Farms Proposal 2009”. In 2012, the Comité Régional des Pêches Maritimes et des Elevages Marins (CRPMEM) produced a paper, also in association with IFREMER: “Components of Activity of French Vessels in 2008 to 2009 Near the East Anglia Offshore Wind farm Project Zone”.

102. The stated objective of the CNPMEM (2009) report was to assess the socio-economic impact of the Round 3 developments on French fishing activity. The results and charts produced are based on speed filtered VMS data and sales registered at French fish auctions. The data used however, were not made available nor were details given of the modelling methodology, although reference was made to the use of algorithms.

103. The premise of the CNPMEM (2009) report is that loss of fishing area equates to loss of fishing income. The final assessment is based on a single years’ worth of data (2008).

104. Despite numerous requests, up to date VMS data has not been forthcoming from French authorities. The CRPMEM have offered use of the Valpena system, but the data was not available at the time of writing.

105. Figure 14.75 illustrates that French fishing activity by demersal and pelagic trawls occurs in the eastern boundary of the proposed project and central section of the offshore cable corridor. These fleets primarily focus on grounds to the south of Norfolk Vanguard. A similar pattern is illustrated for bottom otter trawls (Figure 14.76).

106. A more recent source of data is from IFREMER’s 2014 annual report (Figure 14.77). This shows French fishing effort (days) for over 18m vessels deploying bottom otter trawls within large spatial units. As shown by the earlier CRPMEM data, the majority of effort is undertaken to the south of the proposed project.

107. No activity is recorded in the local study area for nets, although activity does occur to the north and south of the site (Figure 14.78).

108. Levels of effort recorded by French vessels utilising pelagic trawls are also low (Figure 14.79).

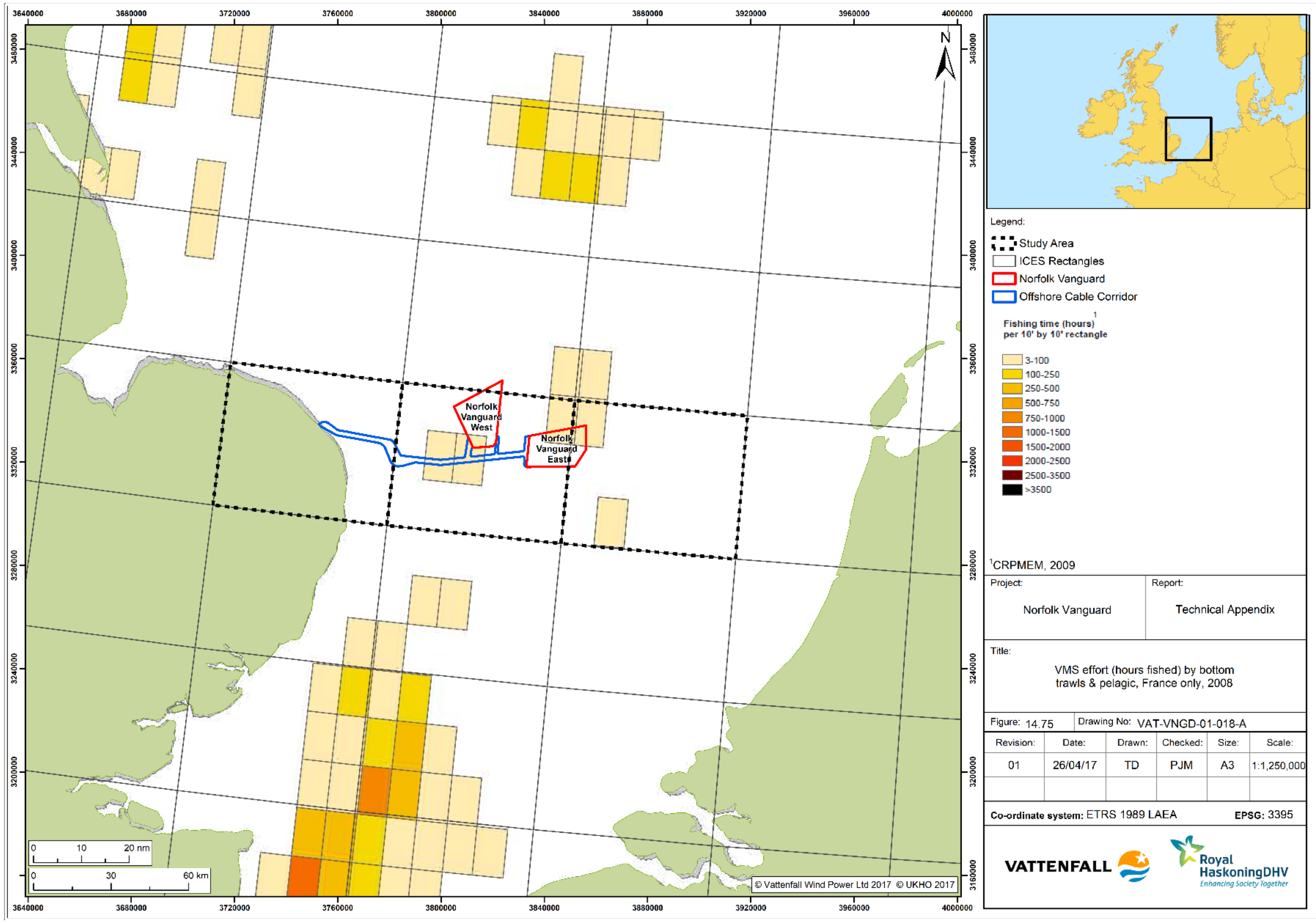


Figure 14.75 VMS effort data for bottom trawls and pelagic trawls (Source: CRPMEM, 2009)

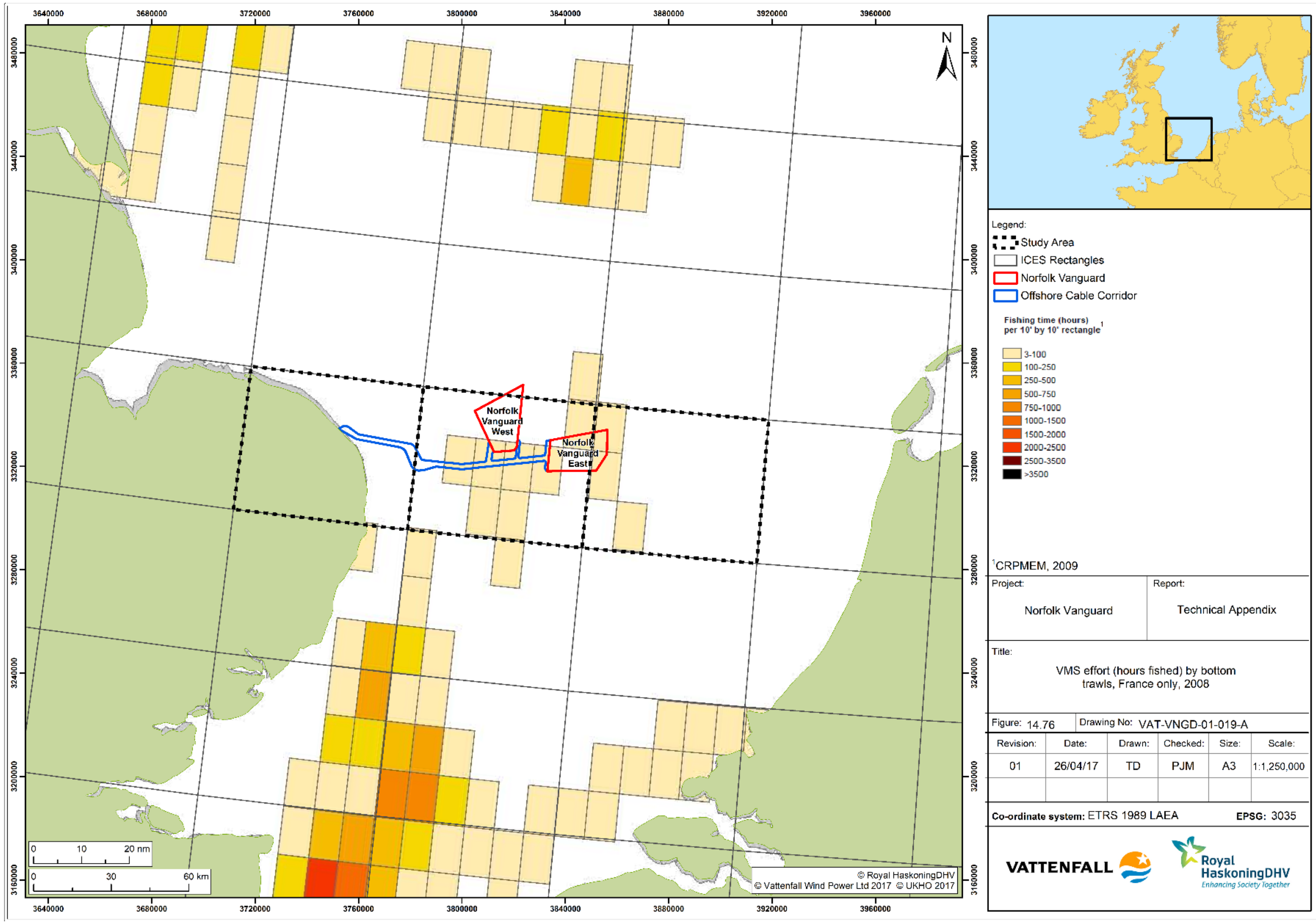


Figure 14.76 VMS effort by bottom otter trawls (Source: CRPMEM, 2009)

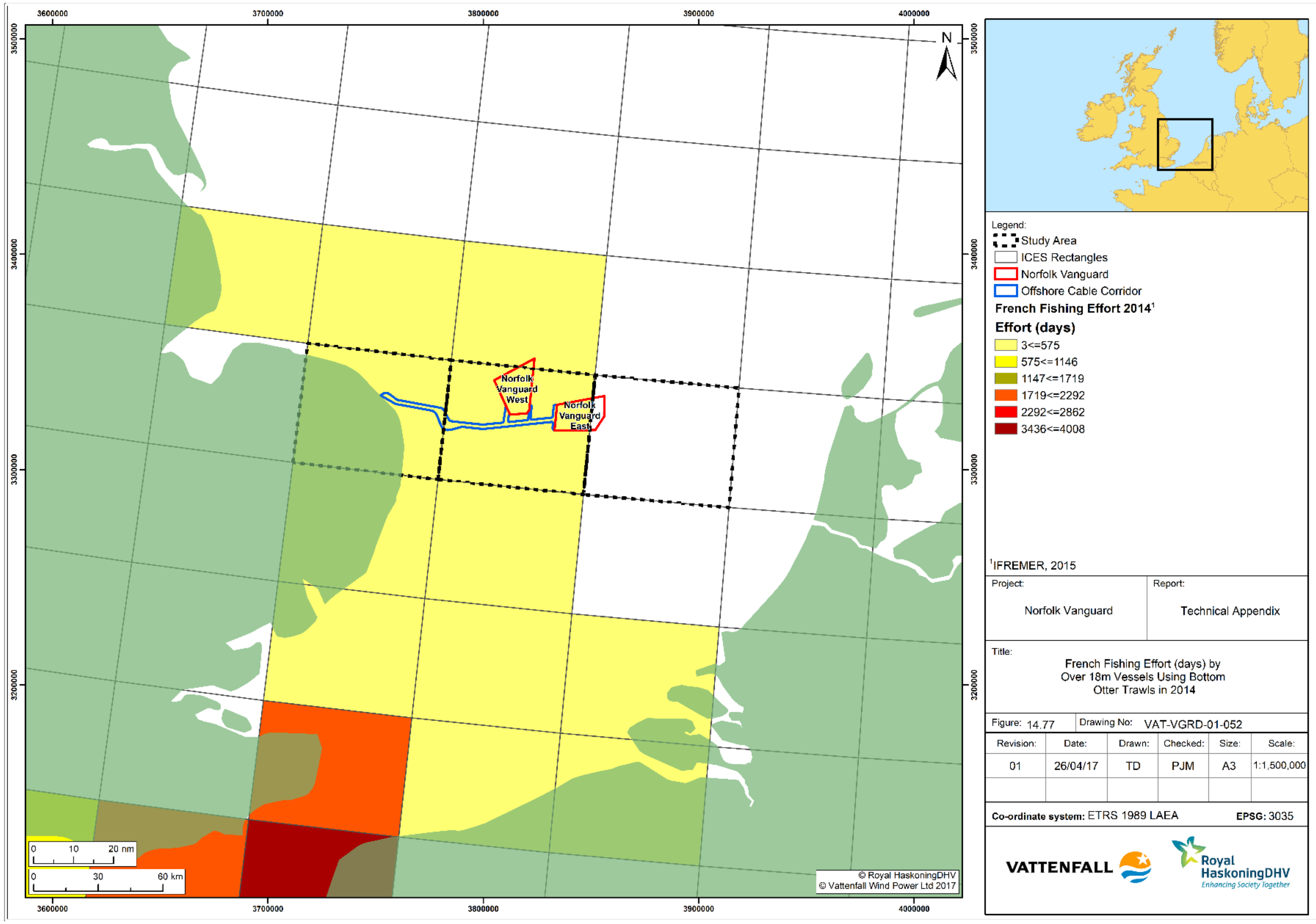


Figure 14.77 French fishing effort (days) by over 18m vessels using bottom otter trawls (2014) (Source: IFREMER, 2015)

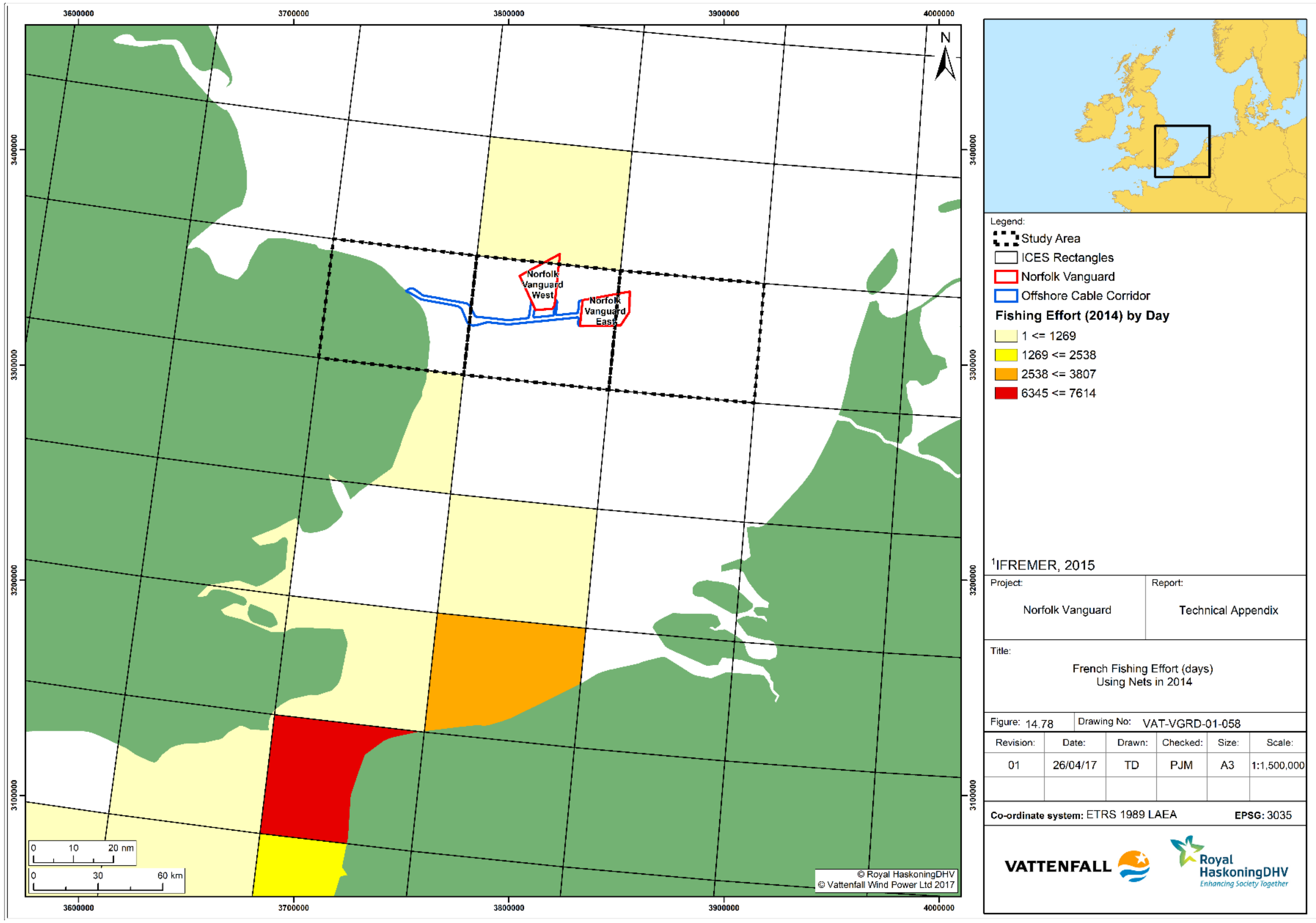


Figure 14.78 French fishing effort (days) by over 18m vessels using nets (2014) (Source: IFREMER, 2015)

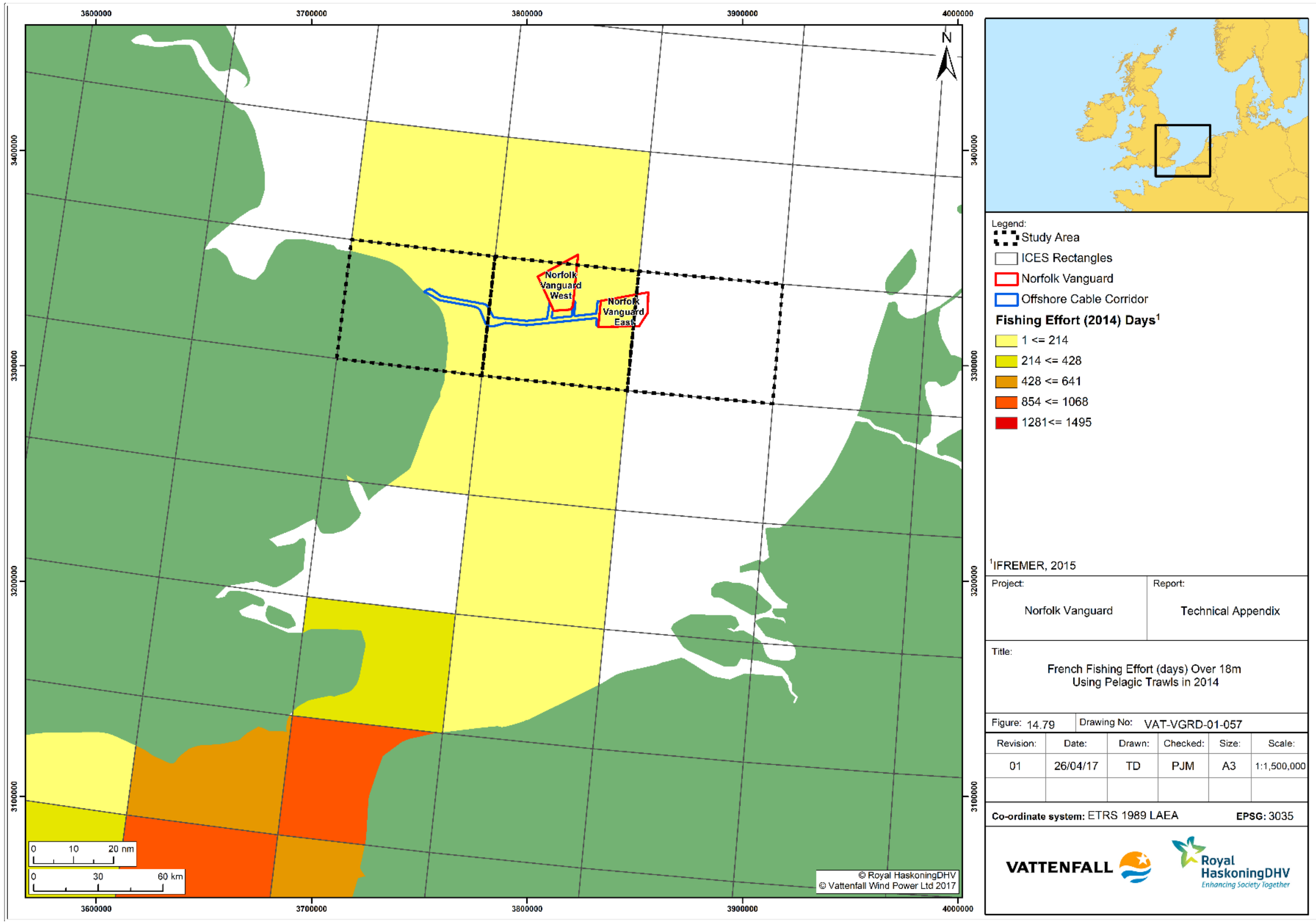


Figure 14.79 French fishing effort (days) by over 18m vessels using pelagic trawls (2014) (Source: IFREMER, 2015)

14.3.5.3 Surveillance Sightings

109. Surveillance sightings for French fishing vessels (Figure 14.80) illustrate very few sightings within the Norfolk Vanguard OWF sites. The majority of French vessels were observed close to the coast where they are understood to be transiting to fishing grounds located further north.

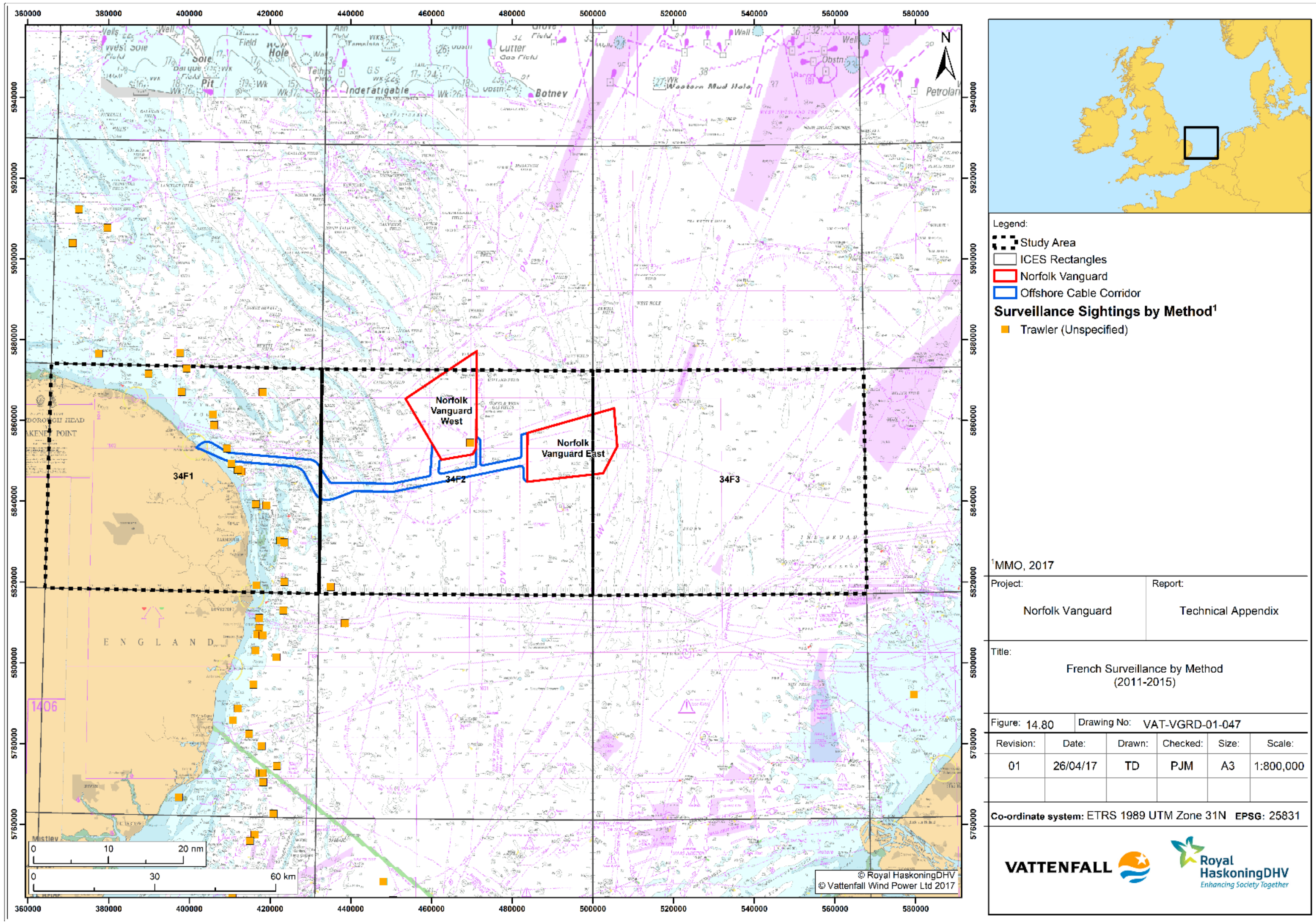


Figure 14.80 Surveillance sightings of French vessels by method (2011-2015) (Source: MMO, 2017)

14.3.6 Danish Fleet

14.3.6.1 Vessels, Gear and Operating Patterns

110. The Danish offshore fleet consists mainly of industrial sandeel trawlers, demersal trawlers, midwater trawlers and seine netters.

111. Danish sandeel trawling is undertaken by specifically designed industrial trawlers of up to 40m in length as well as occasionally by 65-80m pelagic trawlers whose principal fishing activity is the capture of higher value pelagic species, namely mackerel, herring and horse mackerel.

14.3.6.2 Satellite Tracking (VMS) Data

112. Activity by the industrial sandeel fleet is mainly concentrated in areas such as the Dogger Bank (Central North Sea) and Norwegian coast (Northern North Sea). Although not restricted to these areas, activity is considerably lower in the Southern North Sea, including the offshore project area (Figure 14.81).

113. Whilst sandeel fishing grounds are known to occur in the areas relevant to NV East, the Danish Fishermen Federation confirmed that activity in these areas has been at very low levels in recent years (Pers. Comms: H. Lund, 22/12/2016).

114. Similarly, activity by midwater trawlers in areas relevant to Norfolk Vanguard is also limited, with the highest levels of activity recorded to the west of the Danish coast (Figure 14.82).

115. Figure 14.83 and Figure 14.84 show that Danish demersal trawling and seine netting is focused on fishing grounds further north of the project area and does not occur in the area where Norfolk Vanguard is situated.

116. Furthermore, surveillance sightings further confirm that there is no pattern of significant activity by Danish fishing vessels with the project area (Figure 14.2).

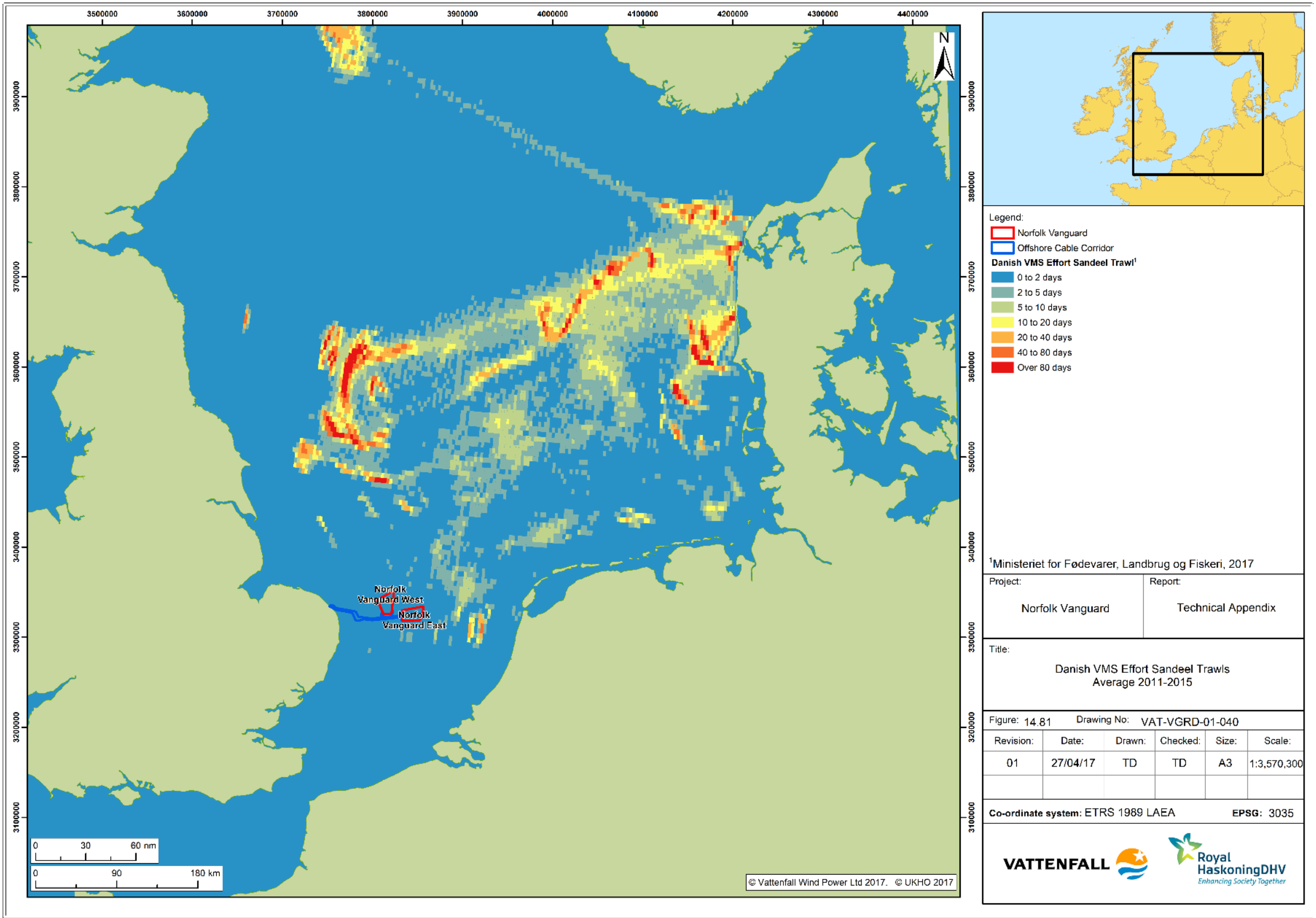


Figure 14.81 Danish VMS effort by sandeel trawl – wider region (average 2011-2015) (Source: Ministeriet for Fødevarer, Landbrug og Fiskeri, 2017)

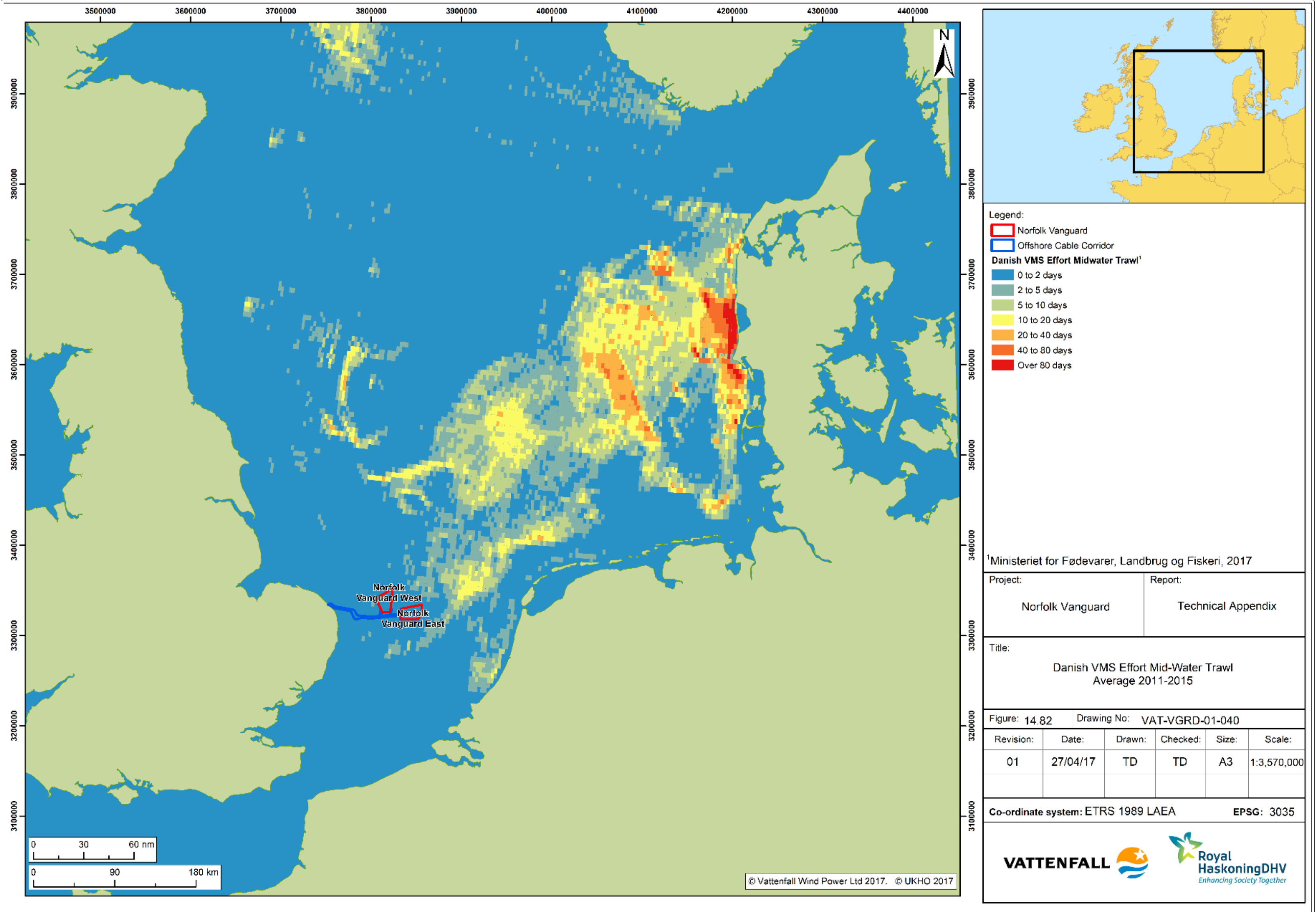


Figure 14.82 Danish VMS effort by midwater trawl – wider region (average 2011-2015) (Source: Ministeriet for Fødevarer, Landbrug og Fiskeri, 2017)

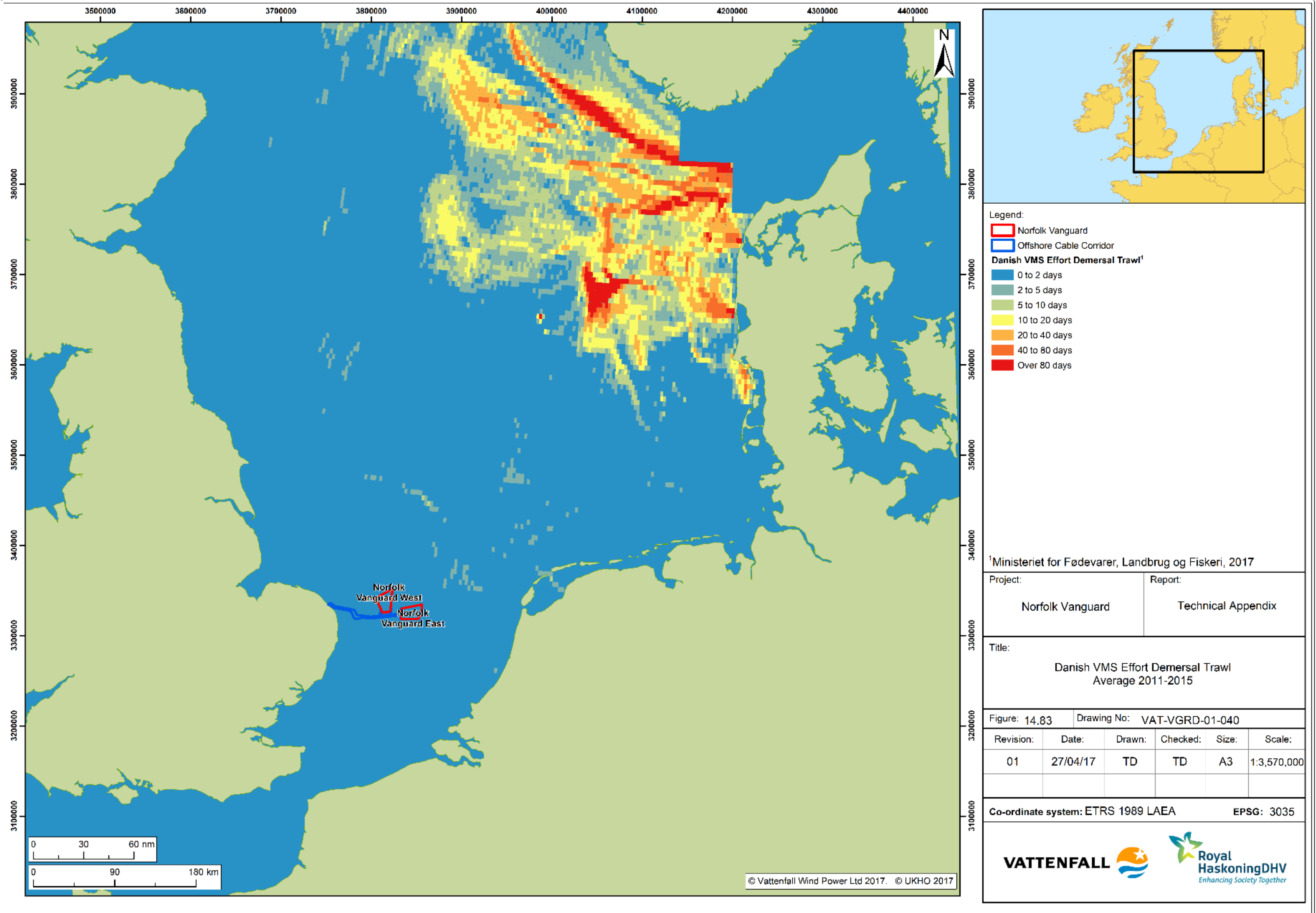


Figure 14.83 Danish VMS effort by demersal trawl – wider region (average 2011-2015) (Source: Ministeriet for Fødevarer, Landbrug og Fiskeri, 2017)

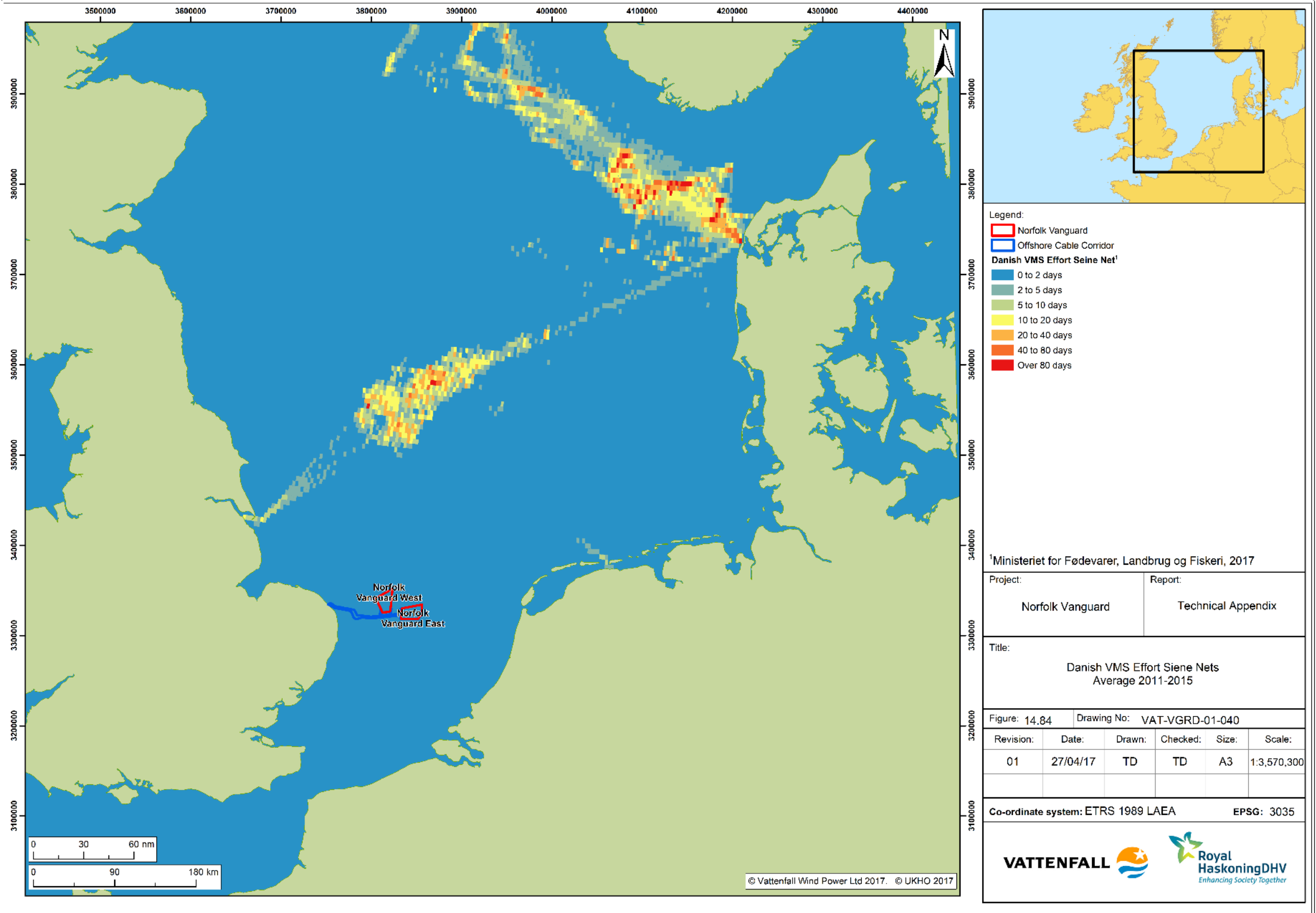


Figure 14.84 Danish VMS effort by seine net – wider region (average 2011-2015) (Source: Ministeriet for Fødevarer, Landbrug og Fiskeri, 2017)

14.3.7 German Fleet

117. Surveillance sightings shown in Figure 14.2, illustrate sporadic sightings of German vessels, the majority of which are recorded in amongst the areas of concentrated activity by Dutch vessels.

118. As previously stated, despite a number of requests to the German Federal Office for Agriculture and Food for VMS, catch and effort data, none has been forthcoming.

119. As shown by the currently available VMS data (2007-2012) (Figure 14.85), it appears that negligible activity by German registered fishing vessels occurs within the offshore project area, with effort being mainly concentrated in the Dutch and Danish sectors of the Central North Sea.

120. From consultation with VisNed (Pers. Comms: P. Visser, 26/04/2018), it is understood that a significant proportion of the German fishing fleet and particularly the beam trawling fleet, whilst being on the German register of fishing vessels, fishing German licences and quotas, is actually Dutch owned and operated.

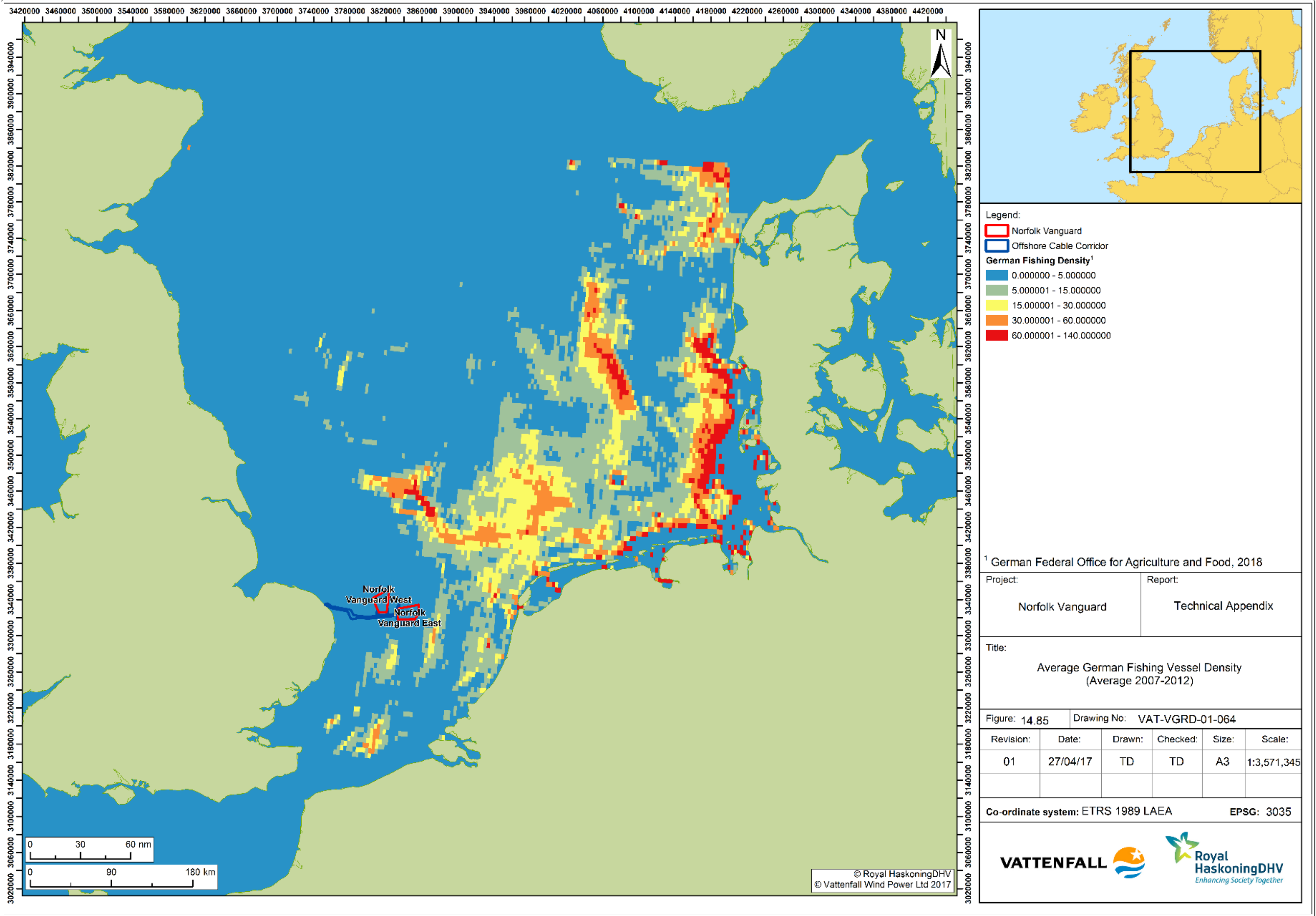


Figure 14.85 German VMS vessel density – wider region (average 2007-2012) (Source: German Federal Office for Agriculture and Food, 2018)

14.4 Future Fisheries

121. Changes to quota and effort allocation, fishing areas and gear restrictions make predicting future patterns fishing activity difficult and to an extent subjective. Furthermore, significant changes to the CFP which are applied to all fleets in addition to the potential effects of “Brexit”, are likely to have significant impacts on commercial fishing within the North Sea.

122. For foreign fishing fleets, “Brexit” may have a significant impact on quotas and accessibility to UK waters, as full fisheries independence within the UK’s exclusive economic zone has been postulated. At present, the final outcome in terms of foreign fleet’s access within UK territorial limits is therefore difficult to predict. Whilst as stated above, full independence has been suggested, it is possible that to a large extent the current patterns of access and effort and catch controls may largely remain as they are at present following the end of the “Brexit” transition phase (31st December 2020).

123. Furthermore, regardless of “Brexit”, the pattern of fishing in the last 30 years has been one of significant change in vessel and gear design, operating practices, species targeted and the levels of controls and regulations to which fishing vessels have to adhere.

124. Details of the existing and planned main elements of the Common Fisheries Policy affecting fisheries in the North Sea are given in Annex 1.

14.5 References

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14.6 Annex 1 – Data Sources

14.6.1 Surveillance Sightings Data

125. As a means of fisheries protection and to ensure the fishing industry complies with UK and EU law, aircraft and surface vessels are used to compile surveillance sightings of fishing vessels in UK waters. The data has been used to give a relative spatial distribution of fishing activity by method and nationality within a given area. It should be noted that, due to the low frequency of flights in an area, which are generally weekly and only occur during daylight hours, the sightings data should not be used to give a quantitative assessment of fishing activity. The MMO has provided sightings of all fishing vessels in UK waters by nationality and method between 2011 and 2015. It is known that this data includes sightings from KEIFCA patrol vessels.

126. Examination of surveillance sightings for 2016 showed no sightings recorded within the study area for that year. This was due to a modification in the MMO supplier's data collection system, which was recently changed to a call out basis (Pers. Comms: L. Conlon, 09/04/2018). As a result, 2016 sightings data have not been included for analysis.

14.6.2 Fisheries Statistics – Effort and Landings Data

14.6.2.1 UK

127. UK fisheries statistical data for the ten year period between 2007 and 2016 has been collected by the MMO by ICES rectangles for all UK and non-UK vessels landing into UK ports. The data details landings by value. This data set has been analysed to identify:

- Species targeted
- Fishing methods used
- Annual variations
- Seasonal variations
- Landings values by port

128. The main source of fisheries landing data is the EC daily log sheets that all vessels over-10m must complete and submit. Fishing vessels under-10m in length are not required to submit daily log sheets, although skippers can choose to do so. Dockside inspections are made on the under-10m fleet by local fisheries officers. The Shellfish Entitlement Scheme (2004) and the 'Registration of Buyers and Sellers of First Sale Fish and Designation Auction Site Scheme' (2005) further facilitate collection of fisheries data from the under-10m fleet. It should be noted that data collected prior to the introduction of these schemes may underestimate the true levels of activity from the under-10m fleet. It should also be recognised that under these schemes, fishermen are required only to identify the ICES sub-area within which catch was taken and not the specific ICES rectangle. Local MMO officers

however, allocated catches, effort and values by the under-10m fleet into ICES rectangles on the basis of best estimate.

14.6.2.2 The Netherlands

129. Dutch fisheries statistical data for the period 2012 to 2016 has been provided by IMARES, Netherlands. A grid is defined based on 1/16th of an ICES rectangle. The basic data for creating these files originate from VMS data combined with logbook data and information on fish value. Log book data is added to VMS records to indicate those records that are associated with fishing activity. Overall vessel speeds between 1.5 and 7.5 knots/mph are characterized as fishing. Dutch landings data has been provided in Euros (€) and effort in days at sea.

14.6.2.3 Belgium

130. Belgian landings values and effort data have been provided by ILVO for the years 2010 to 2014 in exactly the same method as the Dutch data. The data includes all over-10m Belgian vessels recorded as actively fishing during this period, irrespective of location. The landings values have been provided in Euros.

14.6.3 Satellite Tracking (VMS) Data

14.6.3.1 UK

131. VMS data is the most comprehensive fisheries data set currently available which shows the intensity of over-15m fishing vessel activity in the vicinity of the proposed project. Since January 2005, all EC vessels over-15m in length have been fitted with satellite tracking equipment which transmits the vessels' position at a minimum of every two hours to the relevant Member States' fisheries authority. The MMO monitors all UK vessels irrespective of location, and all foreign vessels within the UK Exclusive Economic Zone (EEZ). Information regarding non-UK vessels cannot be disclosed by the MMO without prior permission from the vessels national regulating body.

132. The satellite data has been cross-referenced with landings and effort data to give values in a 0.05° by 0.05° grid for the years 2012 to 2016. The disclosure of independent UK vessels' identities is restricted under the Data Protection Act (1998) and the coordinates of individual vessels are only available at the request of the vessels skipper/owner. Any rectangles that record less than five transmissions are not included in the data set. Specific fishing methods have been identified: pelagic trawls, demersal trawls, beam trawls, otter trawls (not specified), otter trawls (bottom), otter twin trawls. All vessels that are stationary in port have not been included in the data set and the VMS data does not differentiate between vessels fishing and steaming. As a result, the data has been filtered by speed, with vessels travelling at speeds of between 1 and 6 knots included (Lee et al., 2010).

133. Due to VMS only applying to vessels over-15m in length, activity by vessels under-15m will not be represented in the analysis. As of 2012, EU legislation required all Member State vessels over-12m in length to have VMS installed. Due to delays in the release of this data by the MMO however, this will not be included in this assessment.

14.6.3.2 The Netherlands

134. LEI Netherlands has provided BMM with VMS data for Dutch vessels fishing in all waters between 2012 and 2016, inclusive. This data integrates VMS with landings values for the fleet by gear type. This was made possible by the valuable assistance provided by VisNed in obtaining permission on behalf of their members for IMARES to provide the data requested. The VMS data is provided by value (€) and effort (days at sea) by method.

14.6.3.3 Belgium

135. VMS data has been provided by ILVO for the years 2010 to 2014. The data has been filtered by speed with all speeds of zero removed and the VMS data only applies to vessels over-15m in length. The VMS data is provided by value (€), and effort (days at sea). Value and effort have been provided by method.

136. Due to the distance from Belgian home ports, it is likely that there is negligible activity by small category vessels operating within the vicinity of the Project.

14.6.3.4 France

137. Despite a number of requests, the French authorities have yet to provide VMS data on French registered vessels. In the absence of this data, information published in a report by IFREMER in 2014 has been included to give an indication of the relative distribution of French fishing activity, in addition to 2009 VMS data for the Nord-Pas-de-Calais Picardie fleet, from CRPMEM.

14.6.3.5 Denmark

138. Ministeriet for Fødevarer, Landbrug og Fiskeri (Ministry of Food, Agriculture and Fisheries) has provided BMM with VMS density between 2011 and 2015, inclusive, in all waters. The data has been collected as previously described and can be split into gear categories.

14.6.3.6 Germany

139. VMS dataset for German vessels were provided by the Federal Office for Agriculture and Food, Germany (Bundesanstalt für Landwirtschaft und Ernährung, BLE) for 2007 to 2012. Only density has been calculated, filtered by speed with vessels travelling at speeds of between 1 and 6 knots presumed to be fishing (Lee et al., 2010).

14.7 Annex 2 – Fisheries Legislation

14.7.1 Fishing Vessel Licences

140. For a vessel to commercially fish (i.e. to catch and sell fish for profit) it must hold a valid licence. The current vessel licensing scheme was introduced to stabilise fleet numbers and reduce catching capacity through the use of vessel capacity units (VCUs). Successive decommissioning schemes have also reduced the size of UK and several other Member States' fleets over the past 20 years.

14.7.2 Territorial Limits and Fishing Rights

141. Under the United Nations (UN) Convention on the Law of the Sea (UNCLOS, 1982), the UK's territorial sea extends out to 12nm from the mean low water mark. With few exceptions, access within 6nm of the coast is restricted to the vessels of that country. Access to fishing grounds between the 6nm and 12nm limit is only granted to vessels from non-UK countries if they have historic fishing rights (Figure 14.86).

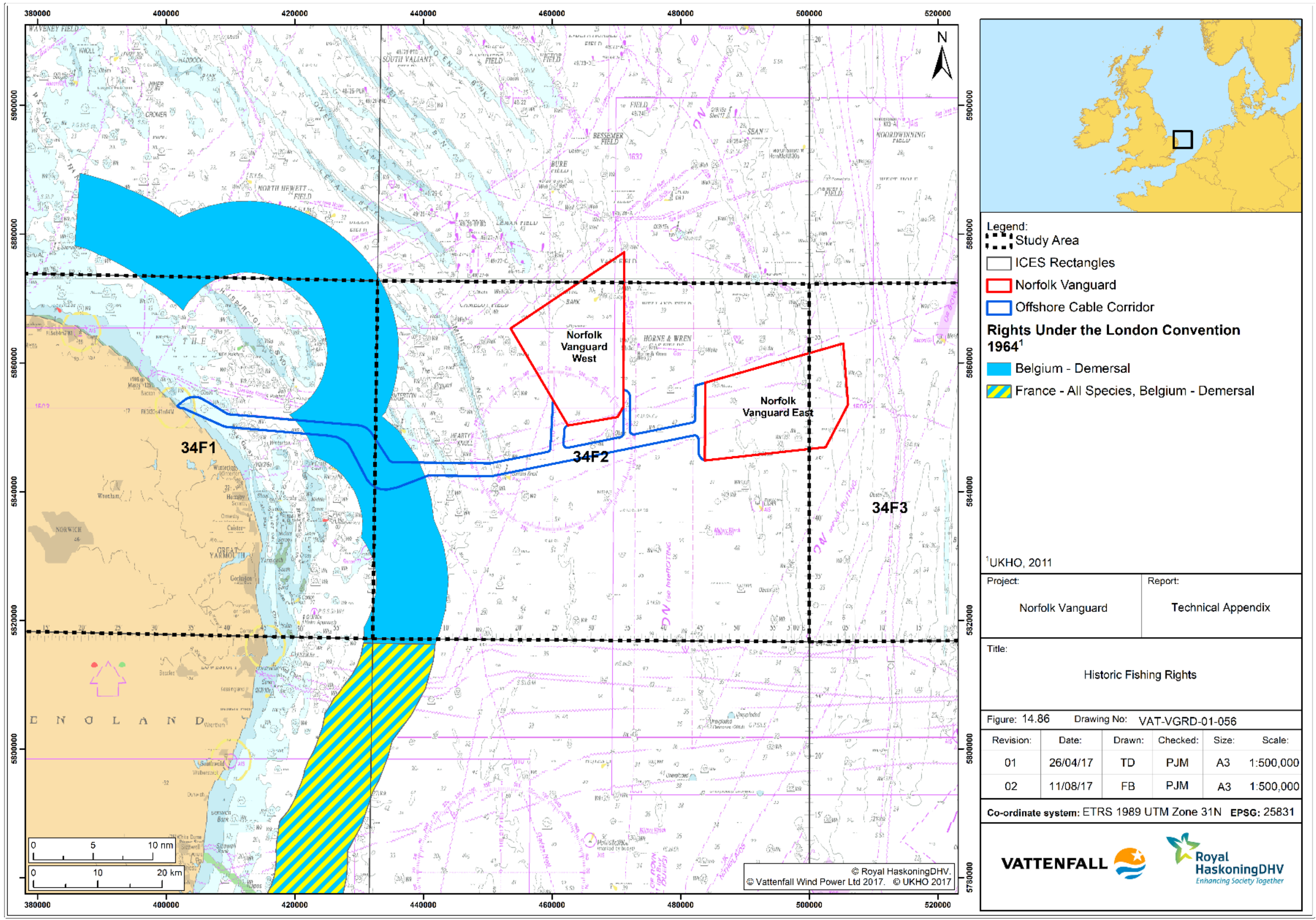

Figure 14.86 Historic fishing rights in relation to the Norfolk Vanguard (Source: UKHO, 2011)

14.7.3 Regional and Local Fishing Restrictions

142. Norfolk Vanguard falls within the jurisdiction of the Eastern IFCA, which enforces the local byelaws within 6nm of the coast. Byelaws include:

- Minimum Landing Sizes (MLS) for fish and shellfish species
- Prohibition of specific gear types in SAC designated area.
- Seasonal and temporary closures as deemed necessary
- Non-removal of “white footed” crabs, known to be soft following moult between 1st November and 30th June
- Fishing permits for shellfish species such as whelks within 6nm limit.

14.7.4 Quota Restrictions

143. In European waters, quota in the form of Total Allowable Catches (TACs) is allocated to EU Member States by ICES sub-area based on historic fishing rights. A quota is a permission to catch quota stocks that are allocated between non-sector vessels (those who own quota), Producer Organisations (who manage quota for their members) and the inshore fleet. The UK quota management system aims to ensure that the quota is shared fairly amongst the UK fishing industry and that fishing activity is managed to ensure that these quotas are not exceeded.

144. In recent years the quota system has been heavily criticised due to the volume of fish that are discarded at sea either because they are undersized or over-quota. The problems associated with quota allocation are planned to be addressed in the reform of the Common Fisheries Policy (CFP) has led to the introduction of discard ban regulation for pelagic fleet from 2015 and demersal ones from 2016.

14.7.4.1 Over-10 Metre Fleet

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

14.7.4.2 Under-10 Metre Fleet

146. Vessels under-10m in length represent 65% of the UK’s fishing fleet but are allocated 4% of the UK’s fishing quota. Half of the under-10m fleet have uncapped licences allowing them to catch more than 300kg of quota species per year (NUFTA, 2012).

14.7.5 Effort (Days at Sea) Restrictions

147. In addition to quota restrictions, the over-10m fleet is subject to days at sea restrictions. This is part of the EC policy of reducing fishing effort in EU waters. The regulation controlling days at sea (Annex V, EU Regulation 2287/2003) is somewhat complex, relating to species targeted, gear type, mesh size and elected management periods. In essence, vessels using demersal whitefish gears are restricted to the equivalent of 13 to 14 days a month (vessels catching less than 5%

cod by-catch gain an extra 2 to 3 days). Pelagic vessels are not effort restricted, being subject only to quota limits. As with the system of quotas, the review of the CFP is likely to alter the current effort restrictions.

14.7.6 The Common Fisheries Policy (CFP)

148. The main method the European Union (EU) uses to manage fishing activity in European waters is the CFP. The CFP provides a management strategy for fishing activities in order to prevent overfishing and provide economic and social stability to fishing communities.

149. The UK government remains a reserved power with regard to European fisheries negotiations, such as the setting of quotas. The implementation of fisheries regulations is undertaken by the Scottish Government in Scottish waters, the MMO in English waters and the Welsh Assembly Government in Welsh Waters.

150. As of 2009 the CFP has been under review and changes to the Policy came into legislation in 2014. The proposals are wide-ranging and cover all aspects of fisheries management and objectives. The key priorities of the reform are to ban discards, fish at sustainable levels and decentralise decision making, allowing Member States to agree the measures appropriate to their fisheries. A ban on discarding pelagic fisheries (such as mackerel and herring) started on 1st January 2015, with a ban on discards in all other fisheries to be phased in between January 2016 and 2019.

14.7.7 Shellfish Entitlements

151. National shellfish entitlement licences were introduced in 2004 for vessels targeting crabs and lobsters. The licence allows an unrestricted quantity of crab and lobster to be caught by vessels which have a historic record in the fishery. Vessels that are under-10m and have a valid shellfish licence must submit weekly log sheets for crab and lobster to the local Fishery Officer.

14.7.8 Marine Protected Areas

152. The aims of Marine Protected Areas (MPAs) are to protect species and habitats of EU and national importance through the management of sea areas. In the UK, there are various types of MPAs, which include in the area of the proposed project:

- Special Areas of Conservation (SACs) - designated to protect species and habitats under the EC Habitats Directive both inshore and offshore
- Special Protection Areas (SPAs) - areas where birds and their habitats are given protection under the EC Wild Bird and Habitat Directive. SPAs have little or no impacts on the commercial fisheries sector
- Marine Conservation Zones (MCZs) – designed to protect species and habitats of national importance under the Marine and Coastal Access Act (2009)

14.7.9 Future Regulations

14.7.9.1 Quotas and Effort

14.7.9.1.1 Changes in Quotas

153. Over the past ten years, the quotas for a number of species have shown a progressive decline due to concern over the condition of a number of fish stocks within the North Sea. For example, a number of beam trawl vessels previously targeting flatfish species with quota allocations have converted to targeting non-quota species such as scallops. It is possible that more vessels will switch to alternative species as quota allocations become more restrictive.

14.7.9.1.2 Community Quota

154. A number of fishing communities around the UK have signed up to community quota schemes. The community quota scheme has been established to find a long term solution for the under-10m fleet. The scheme will enable fishermen and other local businesses and organisations to manage their quotas flexibly and allow them to swap and purchase additional quota. The scheme may also introduce a rights based management scheme for shellfish, beginning with edible crab and lobsters (Defra, 2011).

14.7.9.1.3 Days at Sea

155. Over-10m vessels are restricted by the number of days per month they can spend fishing depending on species targeted, gear type and mesh size. Currently, vessels targeting whitefish are restricted to 14 to 15 days per month. The present days at sea system is under review in the CFP reform which may result in changes to the current restrictions.

14.7.9.2 Changes in Fleet Composition, Fishing Vessels and Gear

156. Vessels have generally increased in size and power over the past twenty years, however this is considered to be incremental and in line with normal advancement. There are several factors which could have the potential to affect the fishing method or gear a vessel employs:

14.7.9.2.1 Changes in Fleet Size

157. The current national fleet is considered to be proportionate with sustainable stock levels by those in the fishing industry and it is therefore considered that fishing practices will not alter considerably in the future. It is possible however, that reduction in quota allowance and cuts in effort could lead to a reduction in fleet size.

14.7.9.2.2 Increases in Fuel Costs

158. Increases in fuel costs have led to fishermen altering the configuration of their vessels, fishing gears and operating patterns to minimise costs. A number of fishing gear trials to assess the feasibility of modified and alternative gears are currently being undertaken.

14.7.9.2.3 Increased Restrictions upon Certain Fishing Methods

159. Restrictions on specific fishing methods have led to vessels utilising different gear types or becoming multi-purpose in order to target other, less restrictive fisheries. This is most likely to be the case for demersal towed gear, which is considered to be one of the more environmentally sensitive fishing methods. Static gear methods, such as gill netting and long lining, are not considered to have such an environmental impact but can still target demersal species. It is therefore possible that use of static gear to target demersal species may increase in the future as a result of increasing restrictions on demersal towed gear.

14.7.9.2.4 Change in Fishing Practices

160. Fuel can constitute up to 60% of a fisheries cost. It is predicted that increasing fuel costs will cause a decrease in fishing effort (Sumaila, Teh et al. 2008). As a result of increasing fuel costs, many fishermen have altered the configuration of their vessels, fishing gears and fishing patterns to reduce costs.

14.7.9.3 Sustainable Fisheries and Consumer Demand

161. The fishing industry is increasingly working in collaboration with fisheries scientists to adopt ecosystem-based approaches for increasing sustainability. Fishermen are increasingly aware of the requirements for environmental protection, to increase the resilience of the marine environment to increasing pressures including climate change. Increasingly the fisheries are to be managed sustainably with the industry recognising the need for maintaining a healthy marine environment for the benefit of the stocks which may generate higher return for reduced effort.

162. Changes in consumer demand, with increasing demand for fish and shellfish harvested in an environmentally responsible way, have resulted in changes to the fishing industry. Consumers are also more open to try different types of fish. There may be preference in the future towards more locally caught seafood with increasing benefits to coastal communities.

14.7.10 Potential Changes to Existing Fisheries

163. Commercial fishing activities are not constant and patterns of fishing activity fluctuate both annually and on a longer term basis. As a result, predictions of future fishing activity are complicated.

164. A summary of the potential changes which may occur to the fisheries previously identified is provided below. This is based upon current knowledge of fishing patterns and practices in the study area.

14.7.10.1 Demersal Whitefish Fisheries

165. During the 1960s and 1970s, abundances of whitefish species such as cod, haddock, whiting and saithe were particularly high. The demersal fleet also expanded rapidly throughout this period and fishing activity shifted towards towed demersal otter trawls as a result (Hislop, 1996).

166. The conservation credits scheme and RTCs were introduced in 2007 and 2008 in order to protect spawning aggregations of cod. Additional measures are in place under the EU long term cod management and these include a minimum mesh size for vessels targeting cod (and haddock) of 120mm, and gear must be equipped with square mesh panels (SMPs) to facilitate the escape of small, undersized fish. Days at sea are also limited by vessel engine size and TACs are agreed at levels which are likely to increase the size of the spawning stock.

167. There is evidence that since the initiation of the conservation credits scheme, cod discarding rates have decreased from 62% in 2008 to 24% in 2011. Despite this improvement, and in addition to measures aimed at promoting stock recovery, stocks appear to be recovering slowly and available cod quota remains low. For these reasons, these measures are considered by many to be largely unsuccessful. The existence of mixed demersal fisheries presents a particular problem as cod are difficult to avoid using demersal gear and RTCs and other measures under the EU cod recovery plan impact vessels targeting other fisheries including nephrops and other whitefish species such as haddock and saithe.

168. In 2009, 2010 and 2011, Danish, English and Scottish vessels took part in the closed-circuit TV (CCTV) and fully documented fisheries (FDF) trial schemes. In these programmes, UK vessels were not permitted to discard any cod at sea, while Danish vessels were permitted to discard cod which were less than the MLS. In all cases cod caught were counted against allocated quota and fishing was monitored by CCTV. Participating vessels were either allocated or granted access to additional quota. These trials were designed to encourage gear selectivity in order to reduce discards and maximise profit. The trials were largely successful, with rates of discards reduced and net revenue increased in some cases. It was noted, however, that this increase in revenue was offset against costs from factors such as elevated fuel costs. It is possible that such a scheme may be introduced under the CFP reform between 2015 and 2020, which would likely significantly alter levels and patterns of effort in the whitefish fleet (SeaFish, 2012).

14.7.10.2 Potting Fishery

169. Unregulated creel fishing can potentially lead to some crab and lobster stocks being fished close to, or above sustainable levels, and that a ‘race to fish’ can occur

where the numbers of pots deployed increase in response to competition and to secure and protect grounds.

170. Measures such as a blanket limit on the number of pots a single vessel can operate, (independent of size), or limits based on vessel size have both been proposed. The former measure is currently operational in the Northumberland IFCA and Isle of Man potting fisheries. In addition, the introduction of crab and lobster quotas managed independently of the EU TAC system has also been suggested. It is believed that such regulations could have a number of benefits such as reducing conflict both within and between (e.g. trawl and pot) fisheries, and improve market conditions by limiting the numbers of crustaceans for sale.

171. With respect to gear restrictions in the crab and lobster fisheries, measures are under consideration to introduce limits on the numbers of parlour pots operated by a single vessel. Parlour pots are double chambered and capable of retaining more catch than traditional pots, with less frequent lifting of fleets required. The use of this pot type has increased in recent years, and it is believed that this may be resulting in reduced catch rates in some areas.

172. In the event that the proposed regulations are implemented, significant changes could be expected in the crab and lobster fisheries, particularly within the inshore fleet operating within the 12nm limit.

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