Appendix G.1:
Shipping and Navigation Baseline

Co-financed by the European Union
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NorthConnect HVDC Offshore Cabling
Appendix G.1
Shipping and Navigation Baseline

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Abbreviations Table

Abbreviation	Definition
AIS	Automatic Identification System
AtoN	Aid to Navigation
DP	Dynamic Positioning
DWT	Deadweight Tonnage
EOWDC	European Offshore Wind Development Centre
FPSO	Floating Production, Storage and Offloading
GPS	Global Positioning System
GT	Gross Tonnage
HVDC	High Voltage Direct Current
ICES	International Council for the Exploration of the Sea
km	Kilometre
MHWN	Mean High Water Neaps
MHWS	Mean High Water Springs
MLWN	Mean Low Water Neaps
MLWS	Mean Low Water Springs
MOD	Ministry of Defence
m	Metre
NM	Nautical Mile
OWF	Offshore Wind Farm
PLN	Port Letter Number
RYA	Royal Yachting Association
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
VMS	Vessel Monitoring System
VTS	Vessel Traffic Service

1 Introduction

Anatec were commissioned by NorthConnect to produce the Environmental Report Shipping and Navigation Chapter for the HVDC offshore cabling.

This appendix to the chapter presents a detailed assessment of the Shipping and Navigation baseline conditions relevant to the NorthConnect HVDC offshore cabling. This includes analysis of navigational features, shipping activity, fishing activity and anchoring activity. The results of the analysis have been used to identify impacts significant to the HVDC offshore cabling, which have been considered within the impact assessment.

The baseline is primarily based on twelve months of Automatic Identification System (AIS) data for 2017, with longer term satellite (Vessel Monitoring System) data used to validate the fishing activity (2014-2017). The data have been assessed in terms of vessel numbers, types, sizes and densities.

2 Cable Overview

A general overview of the HVDC offshore cable consenting corridor from the UK HDD exit point, south of Peterhead, to the UK-Norwegian boundary line is presented in Figure 2.1. This is approximately 220km-230km in length from the UK coast. The water depth ranges from 26.5m at the HDD exit point to approximately 150m in the open North Sea (up to the UK median line).

A study area was defined to cover an area of 5 nautical miles (NM) around the HVDC offshore cabling for the baseline vessel activity review. Wider areas have been used (10NM or greater as appropriate) in the review of anchoring practises and navigational features.

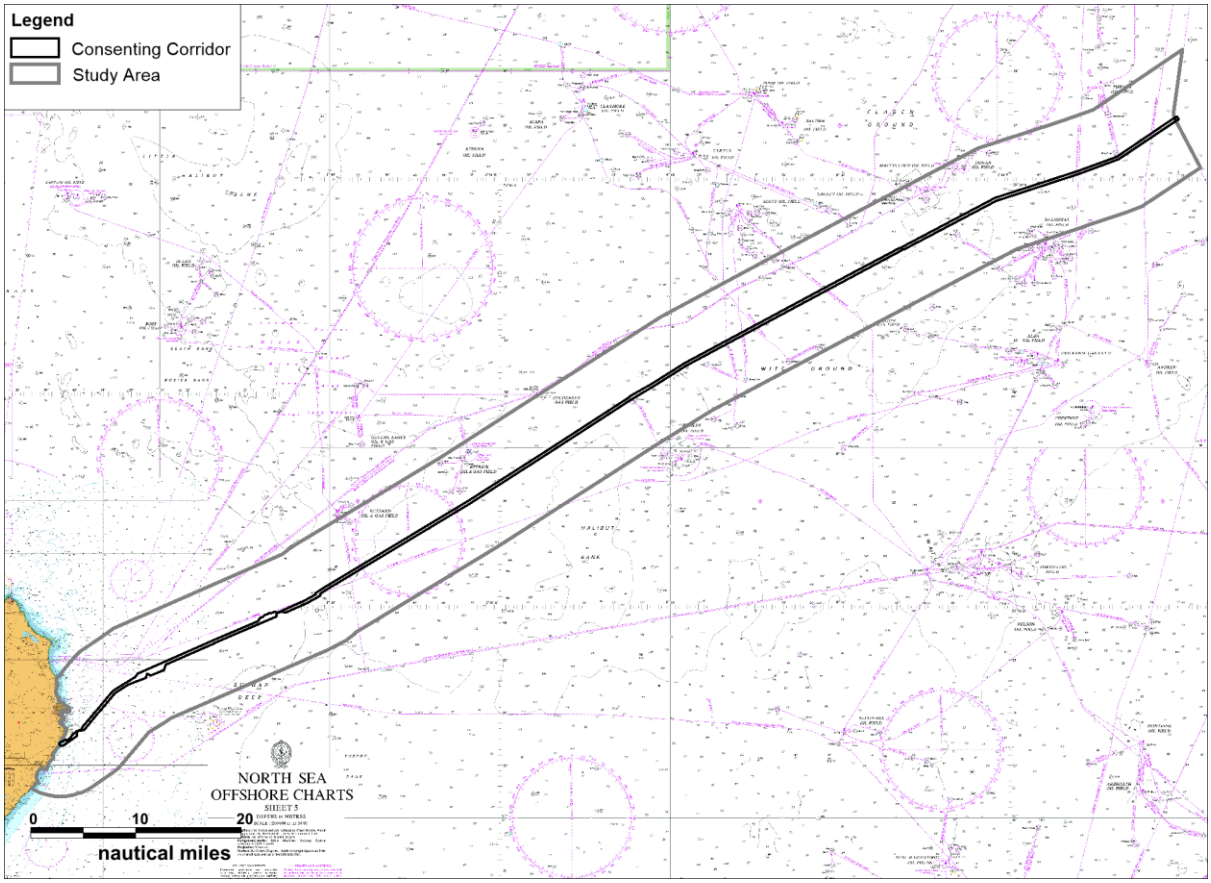

Figure 2.1 Study Area (5NM buffer of HDVC offshore cable corridor)

3 Data Sources

The main data sets used in this assessment are listed below, and described in detail in the following sections:

- Automatic Identification System (AIS) data;
- Vessel Monitoring System (VMS) data;
- Royal National Lifeboat Institution (RNLI) data;
- Marine Accident Investigation Branch (MAIB) data;
- UK Admiralty Charts;
- Admiralty Sailing Directions, North Sea (West) Pilot, 10th Edition, 2016; and
- Marine Scotland data.

3.1 AIS Data

The baseline shipping analysis is based on a data set consisting of 12 months of AIS data (1st January – 31st December 2017) providing excellent coverage of the area through a combination of terrestrial and offshore receivers. This ensured the data were up-to-date and took into account seasonal variation. For the baseline shipping and fishing analysis, the data is assessed within the 5NM study area surrounding the consenting cable corridor however this is extended to 10NM for the anchoring assessment.

AIS equipment is required to be fitted on all vessels of 300 gross tonnage (GT) and upwards engaged on international voyages, cargo vessels of 500GT and upwards not engaged on international voyages, and passenger vessels irrespective of size, built on or after 1st July 2002. All fishing vessels of length 15m and above are required to carry AIS equipment by EU Directive. Smaller fishing vessels (below 15m) as well as recreational craft are not required to carry AIS but a proportion do so voluntarily. However, these vessels will be under-reported within the AIS data.

The reporting interval between position reports for a given vessel is typically a few seconds up to three minutes, depending on its speed and navigational status (less frequent for anchored and moored vessels).

3.2 VMS Data

Longer term fishing vessel satellite tracking data was used to supplement the AIS data to identify fishing vessel behaviour. Vessel Monitoring System (VMS) satellite data covers all fishing vessels (UK and foreign) of 12m length and above. Vessel position reports are received approximately every 1-2 hours when at sea (the tracking devices may be switched off in port). VMS satellite data were obtained for four years (January 2014 – December 2017).

3.3 RNLI and MAIB Incident Data

The Royal National Lifeboat Institution (RNLI) logs details of incidents it responds to, including the cause of the incident. Data were available for 2005 to 2014.

All UK commercial vessels are required to report accidents to the Marine Accident Investigation Branch (MAIB). Non-UK vessels do not have to report unless they are in a UK port or are inside the UK 12 nautical mile (NM) territorial waters and carrying passengers to a UK port. There are no requirements for non-commercial recreational craft to report accidents to MAIB. The MAIB will record details of significant accidents of which they are notified by bodies such as the Coastguard, or by monitoring news and other information sources for relevant accidents. When reporting the location of incidents, the MAIB aim for 97% accuracy. Data were available from 2005 to 2014.

3.4 UK Admiralty Charts

Admiralty charts are nautical charts issued by the United Kingdom Hydrographic Office (UKHO). Charts have been used to identify navigational features in the area. The following are the main charts used in this study:

- 115 – Moray Firth
- 1409 – Buckie to Arbroath
- 213 – Fraserburgh to Newburgh
- 291 – North Sea Offshore Charts Sheet 4
- 278 – North Sea Offshore Charts Sheet 5

3.5 Admiralty Sailing Directions

Admiralty Sailing Directions, also known as Pilot books, are used by mariners to identify established routes when steaming on passage, as well as coastline features, anchorages, ports, etc. The North Sea (West) Pilot Book (UKHO, 2016), has been used in this assessment to identify the significant navigational features in the vicinity of the HDVC offshore cable consenting corridor.

3.6 Marine Scotland Data

Desktop sources, such as the NMPi layers published by Marine Scotland, have been used to supplement the recreational vessel activity levels identified on AIS within the study area.

3.7 Data Limitations

The main limitations associated with the data sets are outlined below.

- AIS equipment carriage is not mandatory for all vessels. Military vessels and smaller craft such as fishing vessels below 15m in length and recreational craft are not required to carry AIS, and therefore will be under-represented within the analysis.
- Trials carried out by Anatec in the North Sea found that a minority of fishing vessels do not broadcast on AIS at all times, especially when engaged in fishing, thus coverage of fishing vessels 15m length and under may be under-represented.

Longer term VMS data, which provide virtually 100% coverage for fishing vessels 12m length and over, have been used to supplement AIS and help overcome these limitations.

4 Navigational Features

4.1 Ports

Figure 4.1 presents the ports located within 10NM of the consenting corridor. It is noted that Aberdeen Harbour has been included due to its commercial significance, despite being beyond 10NM.

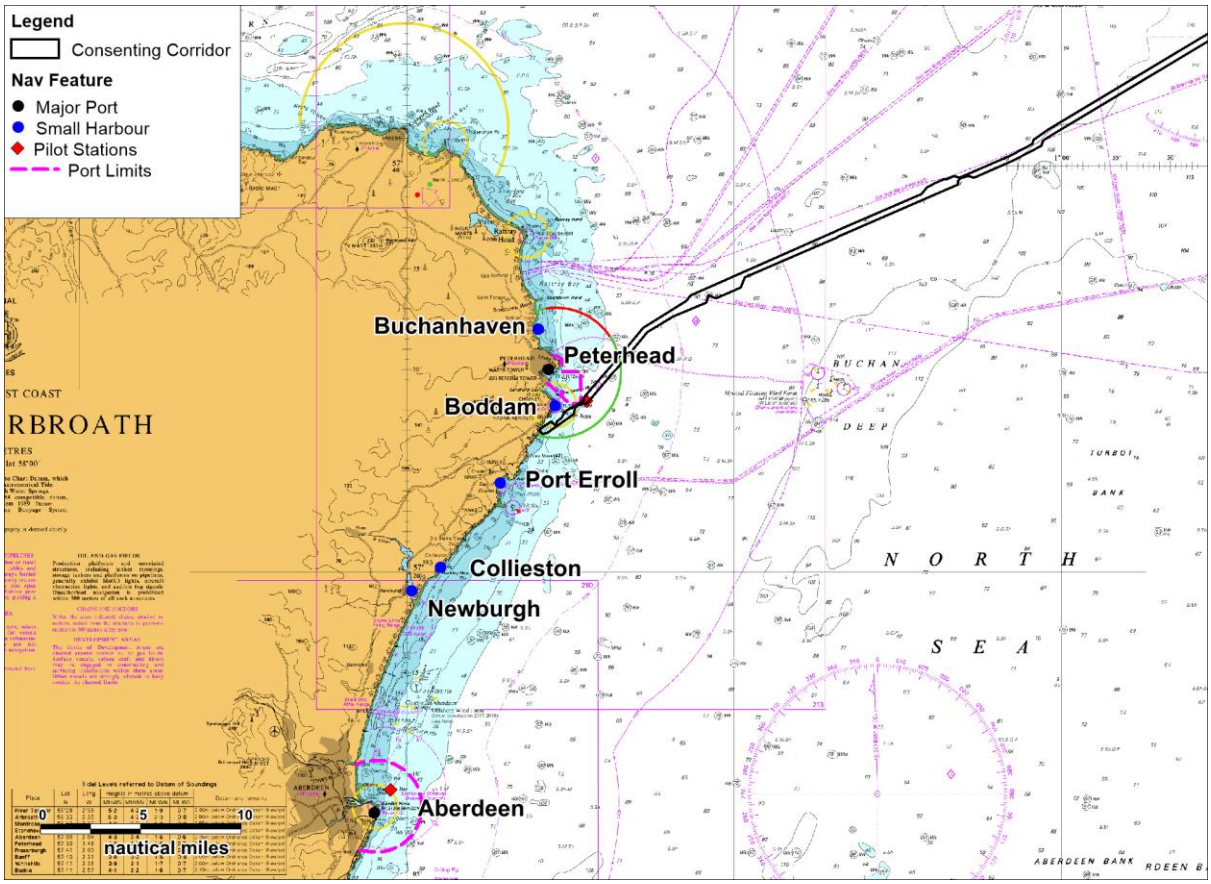

Figure 4.1 Ports

The closest major port to the consenting corridor is Peterhead, located approximately 3NM north of the corridor landfall. This port provides deep-water berthing facilities at depths of up to 14m to a broad range of industries including oil & gas, renewables and fishing. Peterhead Port is the UK's largest white and pelagic fish port; it also accommodates tankers, general cargo ships, cruise ships as well as recreational craft in Peterhead Bay Marina.

The Peterhead pilot station is located within the cable consenting corridor. Vessels wishing to enter Peterhead harbour should contact the Vessel Traffic Service (VTS) one hour prior to arrival and should also make contact when two miles from the breakwater. Pilotage is compulsory for the following vessels (unless the Master or Mate holds a Pilotage Exemption Certificate):

- Vessels exceeding 3,500 GT;
- Vessels carrying hazardous cargoes or dangerous goods in bulk or quantities of 100 tonnes or more;
- Vessels carrying more than one tonne of IMO Class 1 explosives;
- All vessels, which in the opinion of the Harbour Master or his appointed deputies, are defective, damaged or handicapped to such an extent that a pilot is required; and
- All vessels when, in the opinion of the Harbour Master or his appointed deputies, a pilot is required because there is an obstruction in Peterhead Bay Harbour.

All vessel movements in and out of Peterhead harbour are monitored, coordinated and recorded by the VTS. Two radars feed information into the 24-hour Port Control Tower, where there is an experienced VTS operator on duty at all times.

Further south (approximately 21NM south of the landfall) is Aberdeen Harbour. This port is of commercial significance and the most important base for the offshore oil and gas industry in NW Europe.

There are five small harbours located within 10NM of the landfall: Buchanhaven, Boddam, Port Errol, Collieston and Newburgh. Boddam Harbour is the closest, located approximately 1.3NM north of the cable landfall. This is the base for inshore creel boats as well as the Misty Angling sea angling/boat trips in the summer. Port Erroll is next closest at approximately 3.5NM SSW of the cable landfall and accommodates small boats (fishing and recreational) in a harbour at the north end of Cruden Bay.

4.2 Anchorages

Admiralty Charts and the North Sea (West) Pilot Book (UKHO, 2016) were used to identify any anchorage areas in proximity to the consenting corridor. It is noted that the anchor symbols shown in Figure 4.2 are indicative. (The anchoring assessment based on the AIS data shows where ships actually anchored during 2017.)

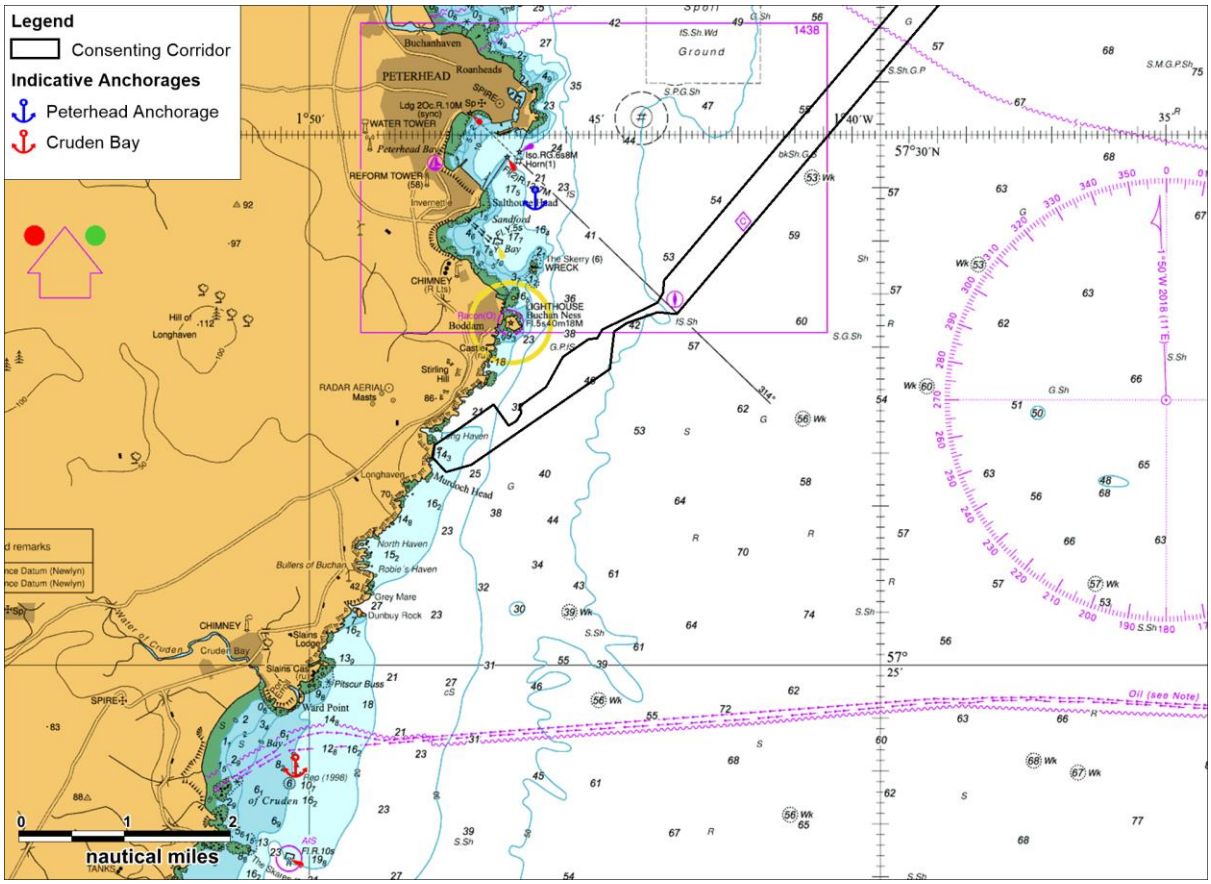

Figure 4.2 Indicative Anchorage Areas

There are two anchorage areas identified within 10NM of the landfall. Peterhead Bay offers anchorages in depths exceeding 11m with the best holding ground found SE of the South Breakwater where the seabed is fine sand over blue clay or mud with occasional boulders. It is noted that vessels anchored in Peterhead Bay have been known to drag anchor in bad weather. Cruden Bay is a charted anchorage which offers anchorage primarily for small vessels such as fishing and recreational craft.

4.3 Military Practice Zones

The UK Ministry of Defence (MOD) practice and exercise areas in proximity to the consenting corridor are presented in Figure 4.3.

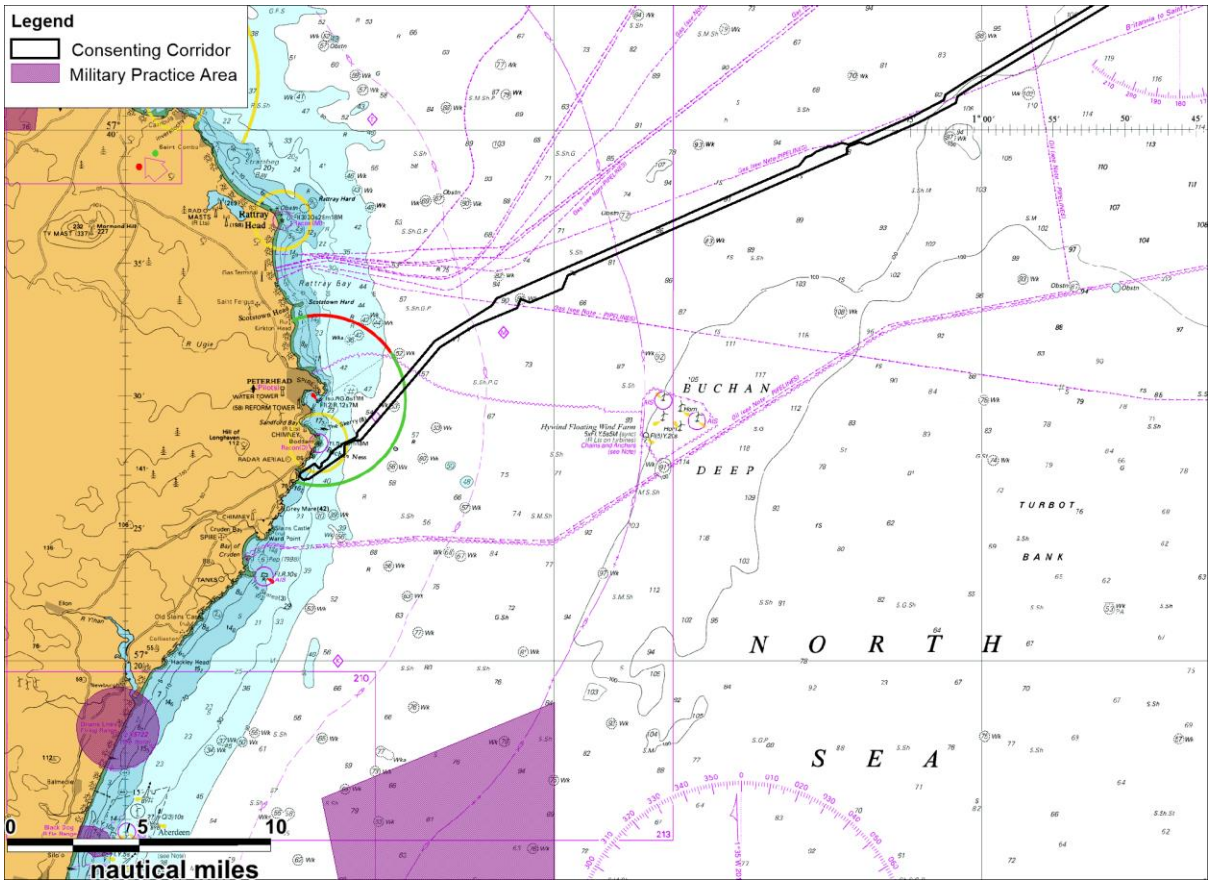

Figure 4.3 Military Practice Zones (UK MOD)

The closest area lies approximately 10NM south of the Long Haven landfall. It is noted that firing practice only takes place when these areas are considered to be clear of all shipping. There are no restrictions placed on the right to transit firing practice areas at any time.

4.4 Aids to Navigation

The Aids to Navigation (AtoN) within 10NM of the consenting corridor are presented in Figure 4.4.

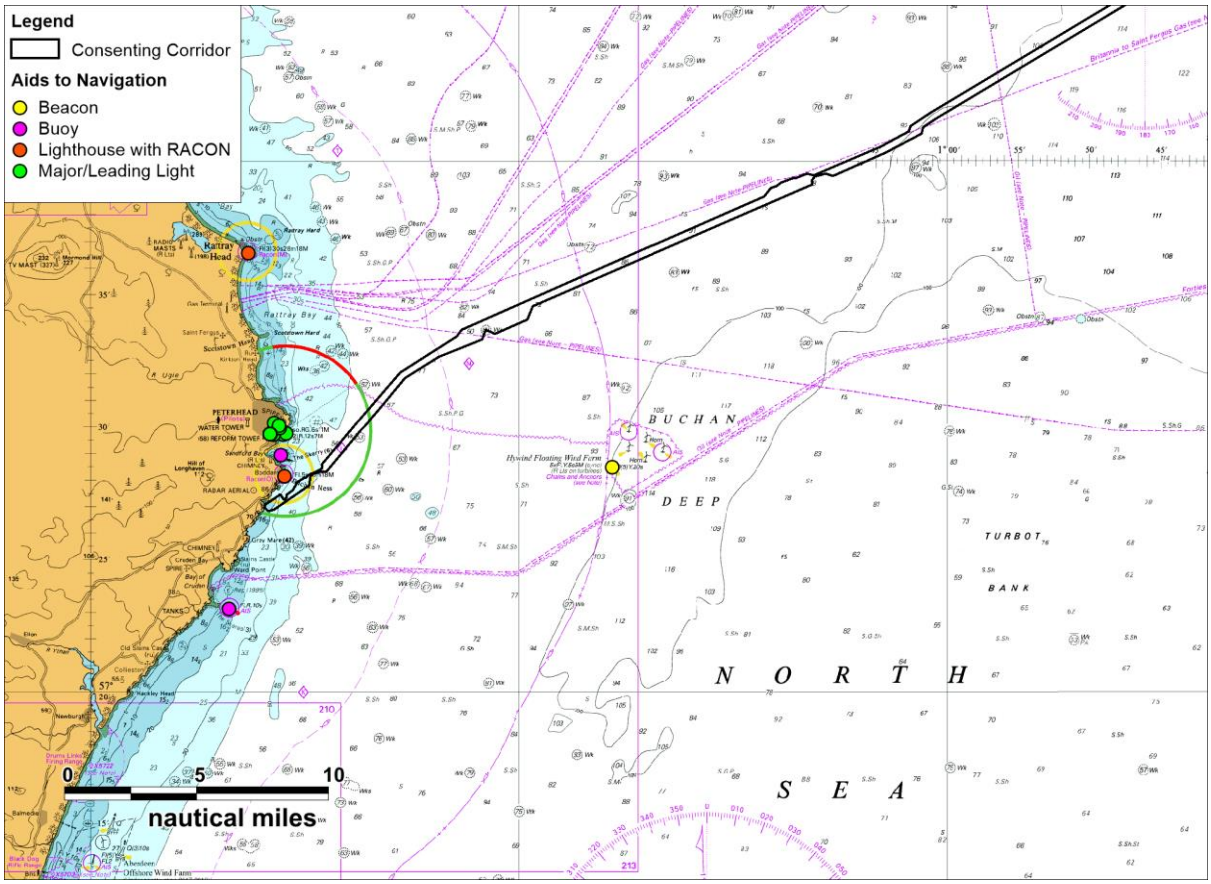

Figure 4.4 Aids to Navigation (AtoN)

The AtoN in the vicinity of the consenting corridor are mainly located along the coast, such as in the approaches to Peterhead Port, with the exception of a buoy at the Hywind Scotland Wind Farm. (It is noted that AtoN located farther offshore on oil & gas installations were excluded.)

4.5 Offshore Wind Farms

Figure 4.5 presents offshore wind farms (OWFs) that are within the vicinity of the consenting corridor.

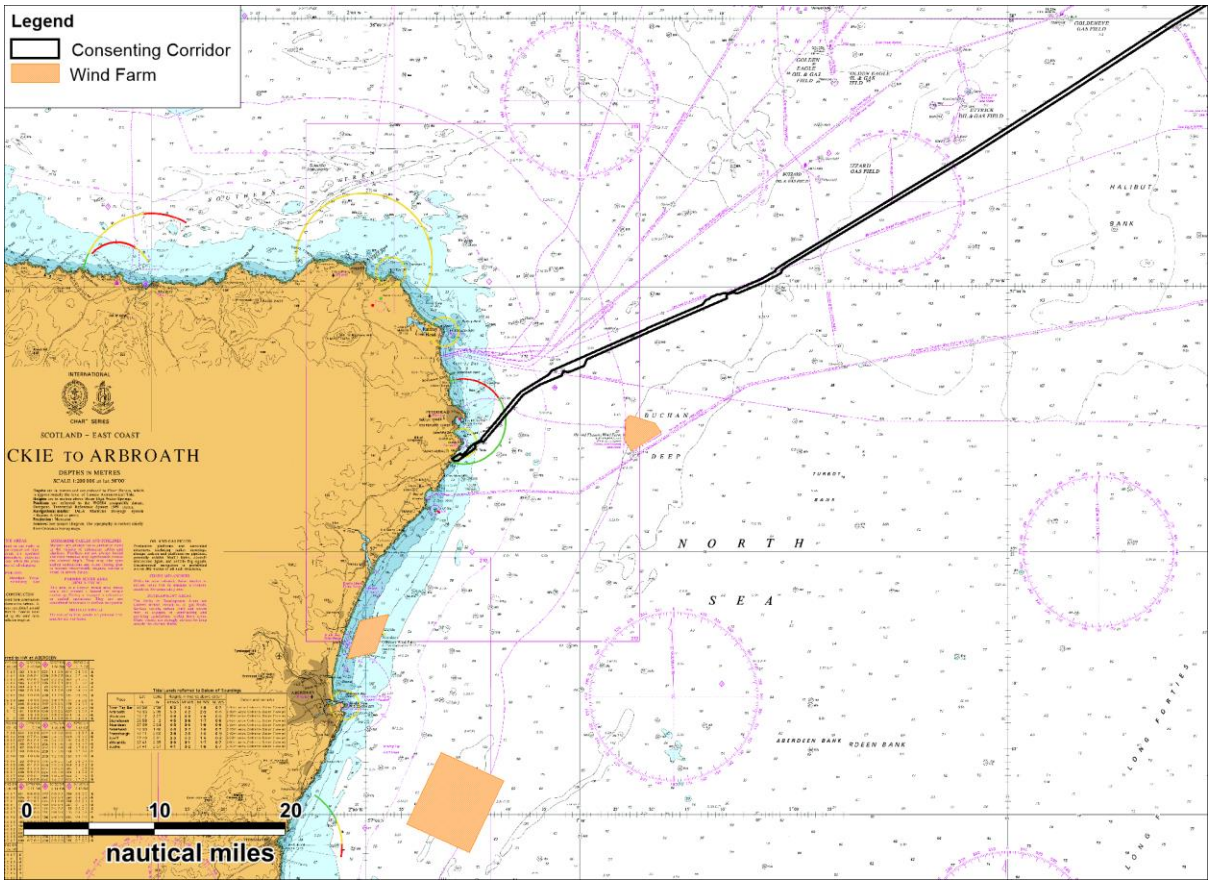

Figure 4.5 Offshore Wind Farms (OWFs)

There are three wind farms within the vicinity of the consenting corridor. The closest and only operational wind farm is Hywind Scotland which lies approximately 5-6NM (at its closest point) to the south of the corridor. This is comprised of five floating wind turbines.

The Aberdeen Offshore Wind Farm (otherwise known as the European Offshore Wind Development Centre (EOWDC)), located approximately 14NM away from the landfall, is currently under construction.

Finally, the Kincardine Offshore Wind Farm is located approximately 22NM south of the landfall and has been granted consent for the installation of seven floating turbines.

More remote Scottish wind farm projects being considered in the cumulative impacts assessment are listed below:

- Moray Firth East and West Offshore Wind Farms;
- Inch Cape Offshore Wind Farm;
- Beatrice Offshore Wind Farm;
- Neart na Gaoithe Offshore Wind Farm; and
- Seagreen Alpha and Bravo Offshore Wind Farms.

4.6 Oil & Gas Facilities

The oil and gas surface installations located within 10NM of the consenting corridor are presented in Figure 4.6.

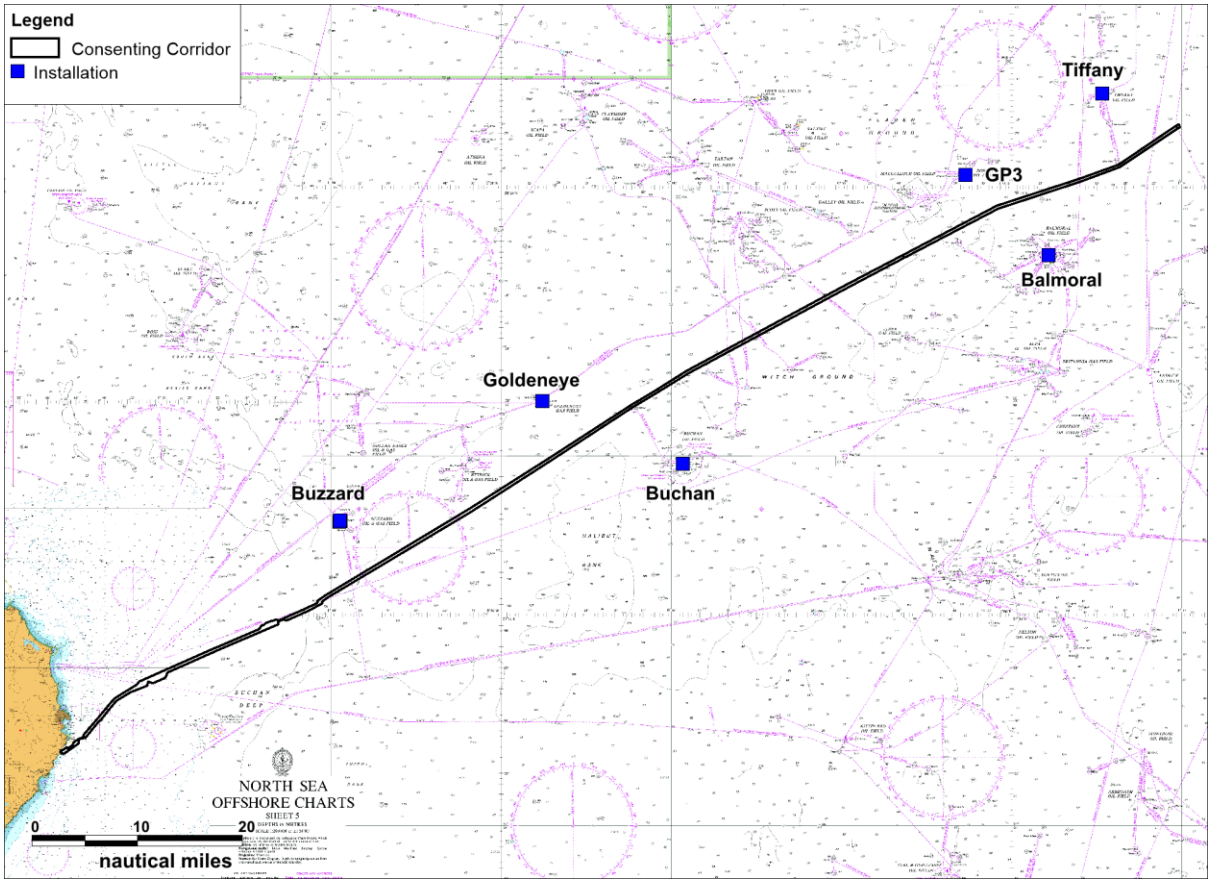

Figure 4.6 Oil and Gas Facilities

The closest offshore installation is the Global Producer III (GP3) Floating Production, Storage and Offloading (FPSO) facility located at the Dumbarton Oil Field approximately 4.1NM north of the cable corridor. The Goldeneye platform is next closest at 4.9NM; this platform has now ceased production.

4.7 Metocean Data

The following extract (UKHO, 2016) describes the general climate conditions off the east coast of Scotland:

> *The climate is generally mild for the latitude with winds most usually from between south and northwest. In winter, strong to gale force winds, cloudy to overcast skies and rain or snow are common, although precipitation amounts are not large. On occasion, easterly winds can bring exceptionally cold weather to the region. In summer, gales become less frequent than in winter although winds are often fresh or strong. There is*

little seasonal variation in the rainfall and the summer months are often cloudy and cool.

A description of the tidal streams in the general area off the east coast of Scotland is provided below, extracted from Admiralty Sailing Directions (UKHO, 2016):

The offshore stream runs generally N and S from Rattray Head to Bell Rock. The E-going stream out of the S part of the Moray Firth sets in the direction of the coast, that is gradually SE and S round Rattray Head before joining the S-going offshore stream. The N-going offshore stream divides N of Rattray Head, part of it sets NW and W into Moray Firth and part of it continues N.

The change from the S-going to the N-going stream is through W and from the N-going to the S-going stream through the E.

The mean tidal levels presented on Admiralty Chart 213 for Peterhead are presented below (heights in metres above chart datum):

- MHWS – 4.0m
- MHWN – 3.2m
- MLWN – 1.6m
- MLWS – 0.7m

Historically, visibility has been shown to have a major influence on the risk of vessel collisions. Fog (or haar) occasionally affects the east coast, particularly in the north. Over the open sea, fog is not especially frequent.

5 Maritime Incidents

This section presents a historical incident review of RNLI and MAIB data from 2005 to 2014 within the study area.

5.1 RNLI

The incidents recorded by the RNLI in the study area, between 2005 and 2014 are presented in Figure 5.1. Following this, a more detailed view of the incidents recorded within coastal waters is presented in Figure 5.2.

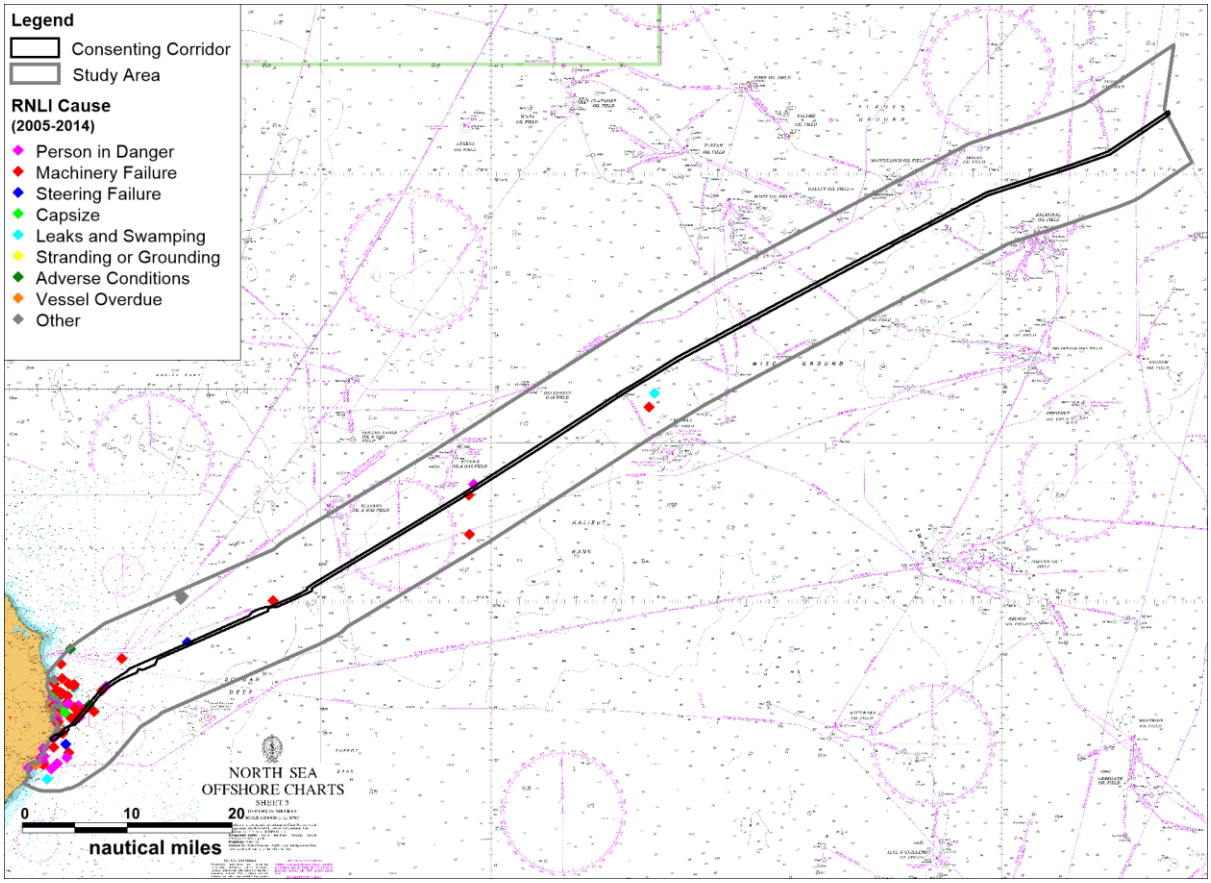

Figure 5.1 RNLI Incident Data by Cause (2005-2014)

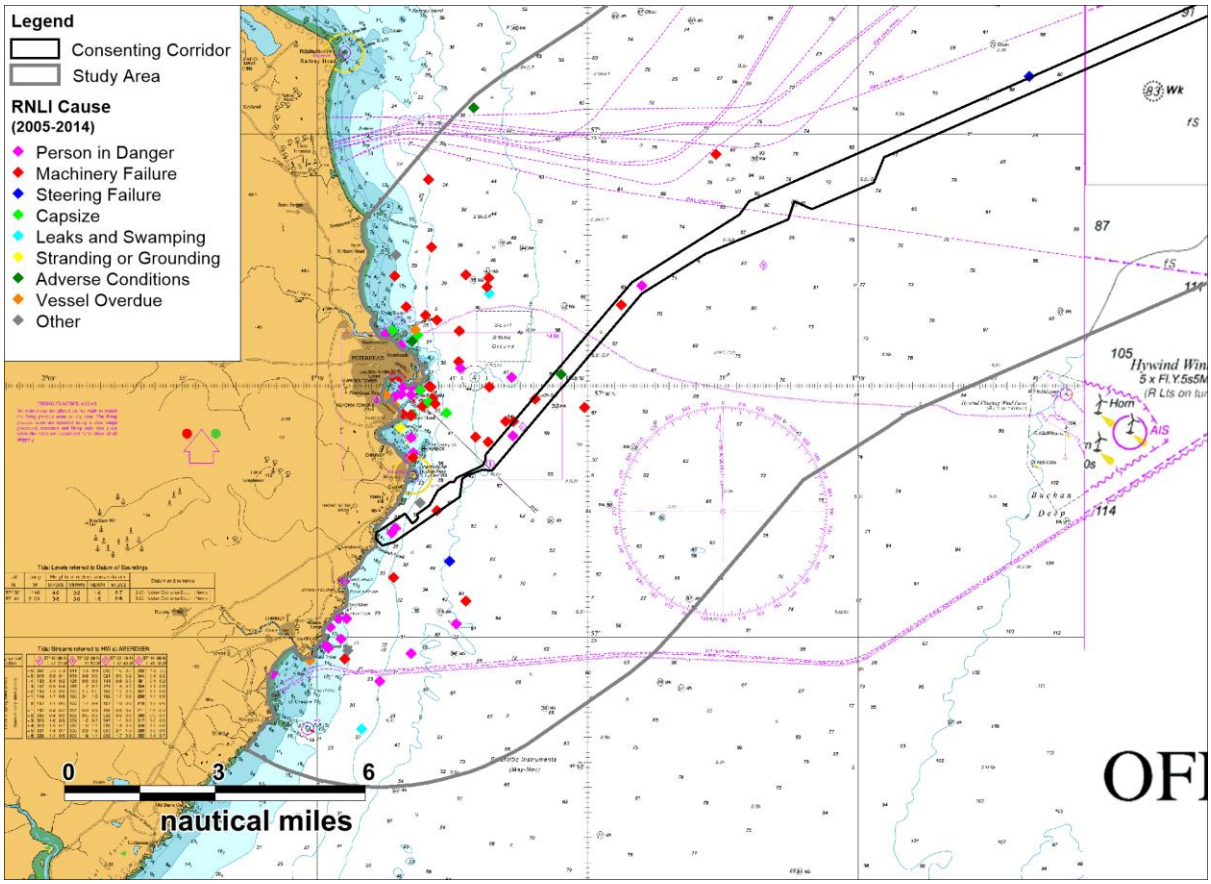

Figure 5.2 Detailed View of Coastal RNLI Incidents by Cause (2005-2014)

Over the ten years of recorded incidents, a total of 97 incidents occurred within the study area, the vast majority of which occurred near the coast, including approximately one-fifth within the Peterhead Port limit. The most common causes of incidents reported to the RNLI during 2005 and 2014 were “machinery failure” (40%) and “ill crewman” (31%).

The total number of incidents per year is presented in Figure 5.3. An average of ten incidents per year were recorded between 2005 and 2014.

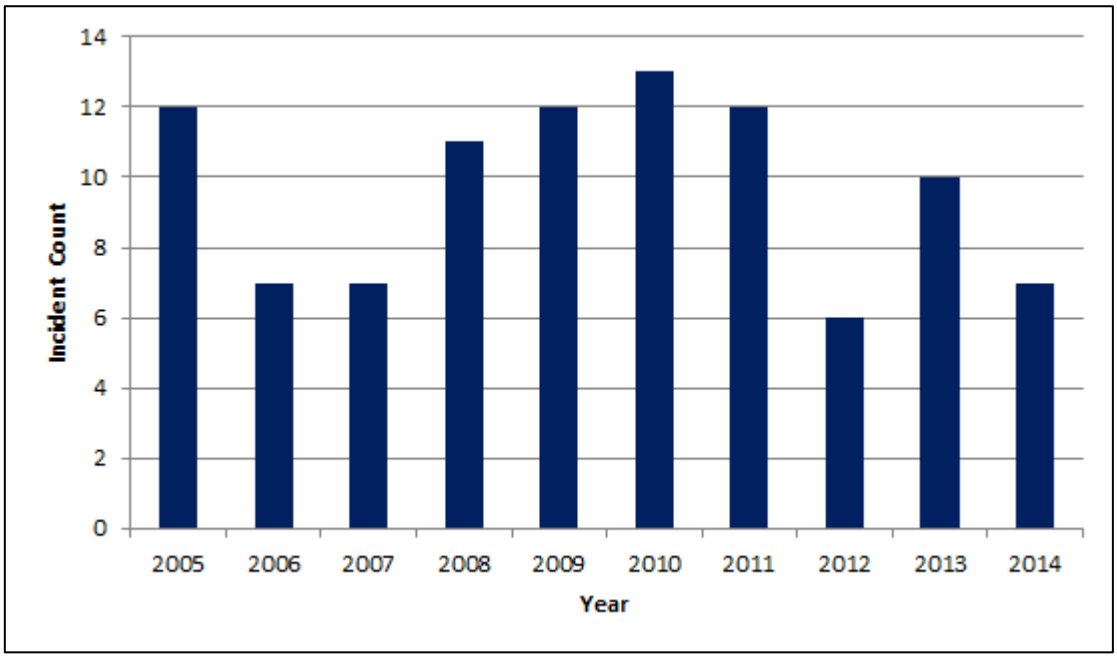

Figure 5.3 RNLI Incident Numbers per Year (2005 to 2014)

There were eight incidents within the cable consenting corridor: four classified as persons in danger, three machinery failures and one 'adverse condition'.

5.2 MAIB

The incidents recorded in the MAIB data between 2005 and 2014 are presented in Figure 5.4.

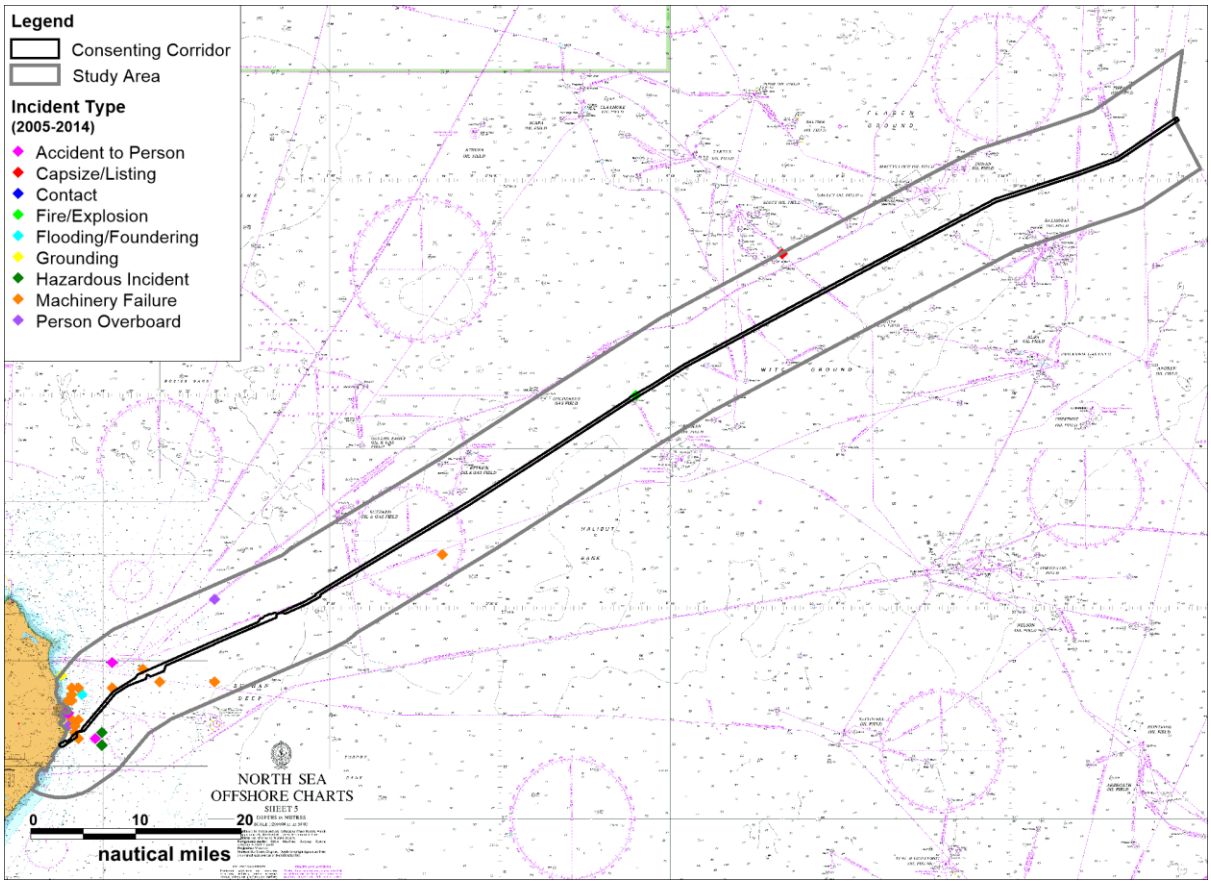

Figure 5.4 MAIB Incident Data by Type (2005-2014)

Over the ten year study period, a total of 56 incidents were recorded within the study area, a minority of which were within the RNLI data set. The most common types of incident reported to MAIB between 2005 and 2014 were “machinery failure” (27%) and “accident to person” (23%). Again, the majority of incidents were recorded in coastal waters including around half within Peterhead Port limits.

The number of incidents recorded per year is presented in Figure 5.5. The average number of incidents recorded per year was five to six.

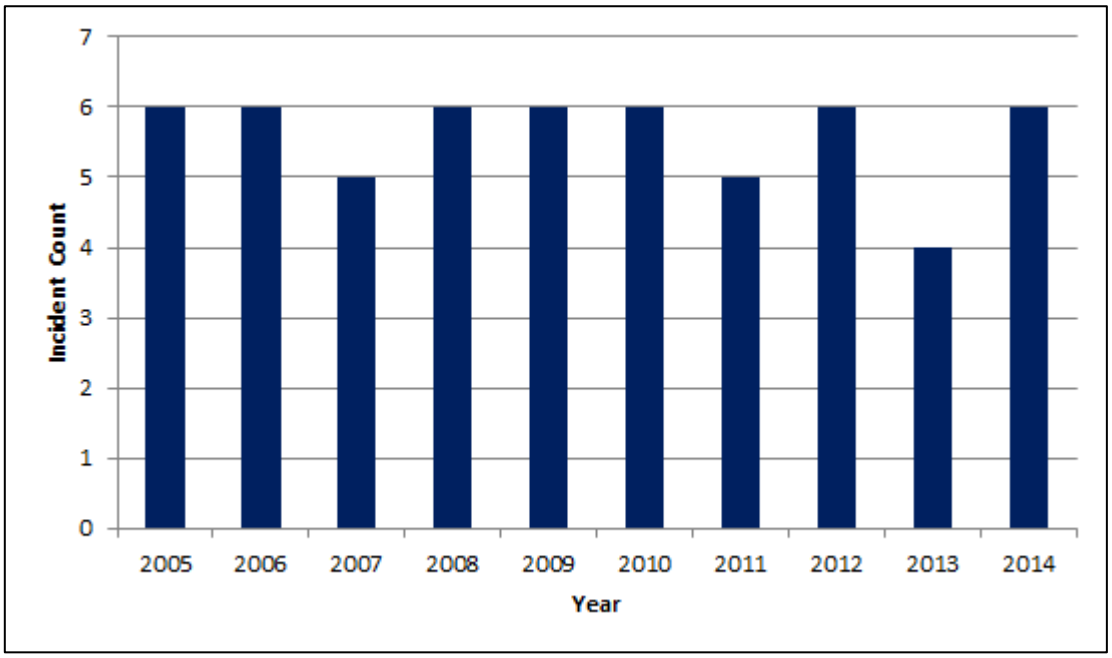

Figure 5.5 MAIB Incident Numbers per Year (2005 to 2014)

There was one incident (fire/explosion) recorded within the consenting cable corridor during the 10-year period. This occurred further offshore between KP119 and KP120 (approximately). There were three machinery failures that occurred close to the cable consenting corridor (within 500m).

6 Baseline Shipping Analysis

6.1 Introduction

This section presents the analysis of the AIS shipping data. Assessments of vessel numbers, types, sizes and densities are provided below. An AIS data set consisting of 12 months from January-December 2017 was considered adequate to provide up-to-date coverage of the study area as well as account for any seasonal trends. Vessels that were moored in Peterhead port were removed from all analysis however, vessels transiting into or exiting the port have been included.

It is noted that tracks associated with temporary (non-routine) operations such as those from vessels carrying out surveys, cable work, or fishing vessels carrying out guard duties (e.g., at Hywind during installation works) have been removed from the remaining analysis.

6.2 Vessel Type

Figure 6.1 presents the AIS tracks recorded within the study area, colour-coded by vessel type. Following this, Figure 6.2 presents the main vessel type distribution in the study area based on unique vessels per day (excluding unspecified types; less than 1%).

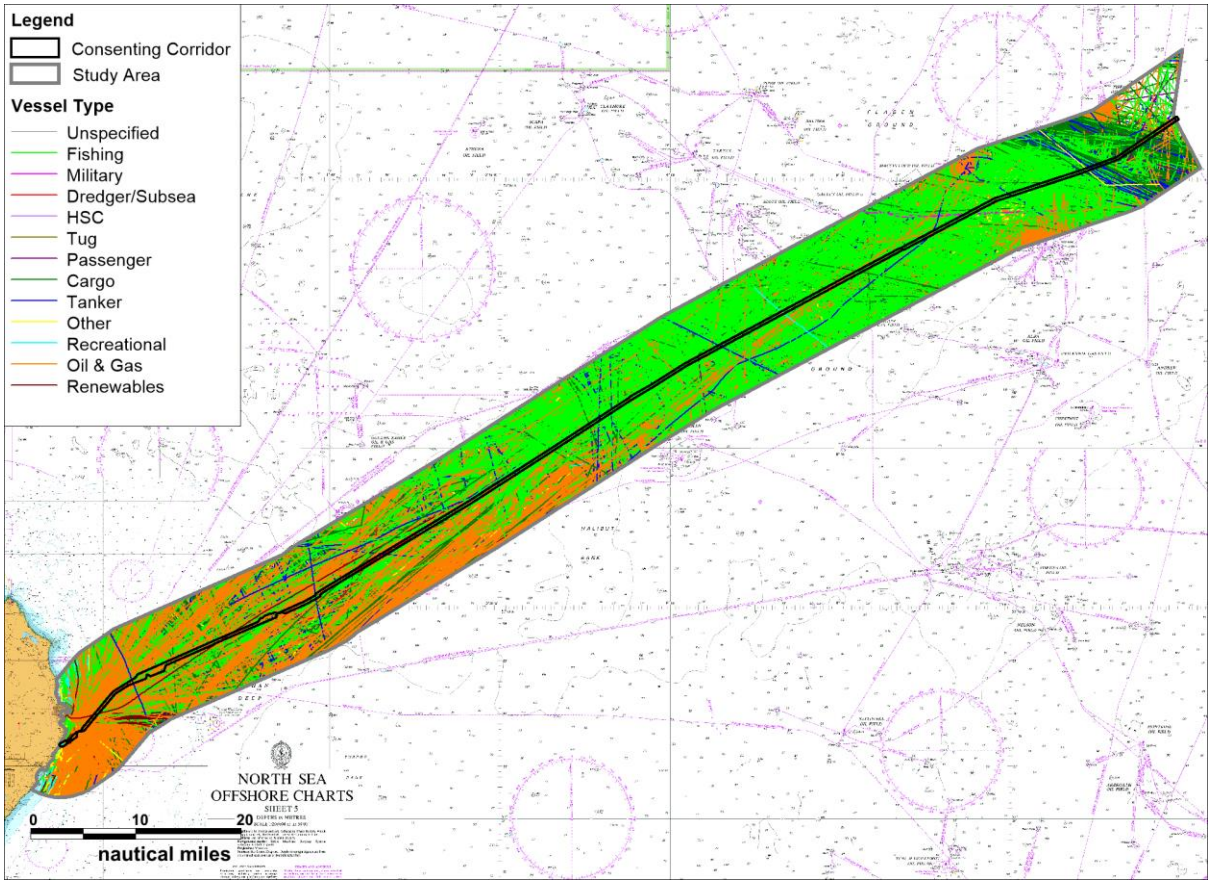

Figure 6.1 AIS Tracks by Vessel Type (2017)

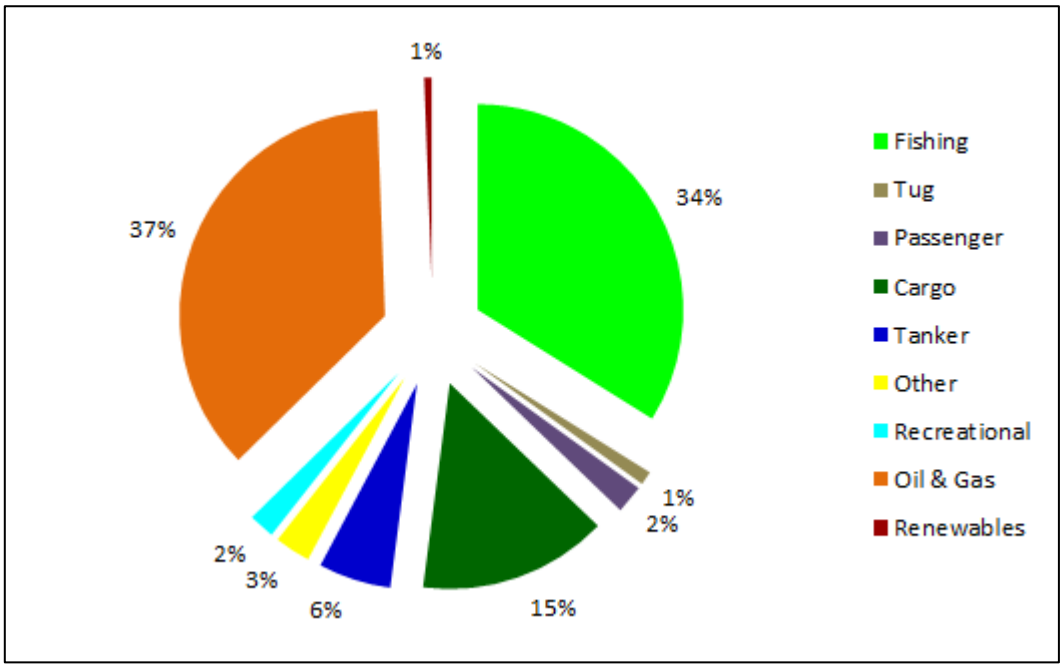

Figure 6.2 AIS Main Vessel Type Distribution (2017)

The most frequently recorded vessels in the study area were vessels related to the oil and gas industry accounting for 37% of the distribution, followed by fishing vessels (34%). Commercial vessels (cargo ships and tankers) accounted for approximately 21% of the total distribution whilst all other vessel types contributed no more than 3%. Examples of vessels included in the 'other' category are pilot vessels and RNLI lifeboats.

Individual plots of the main vessel types are presented in Figure 6.3 to Figure 6.5. (Fishing vessels are analysed further in Section 7.)

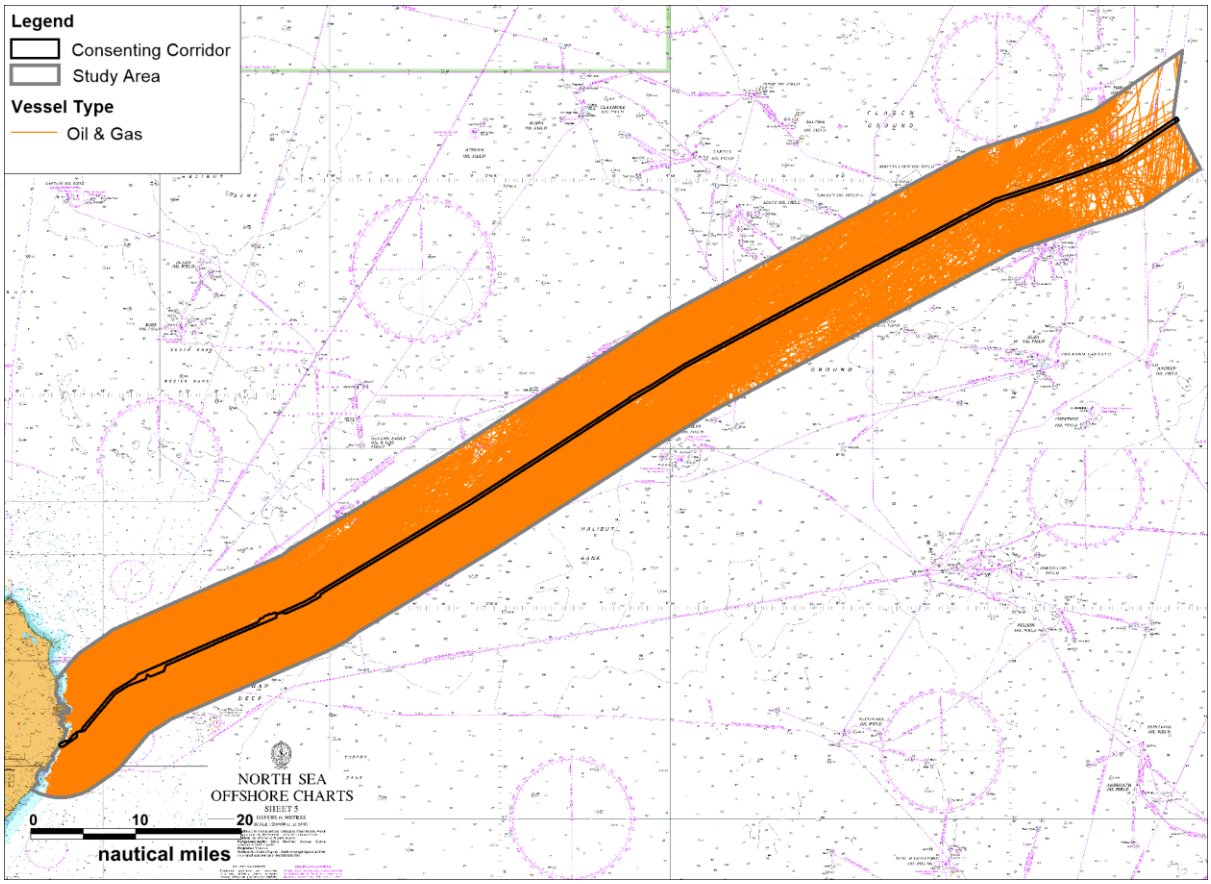

Figure 6.3 AIS Tracks of Oil & Gas Related Vessels (2017)

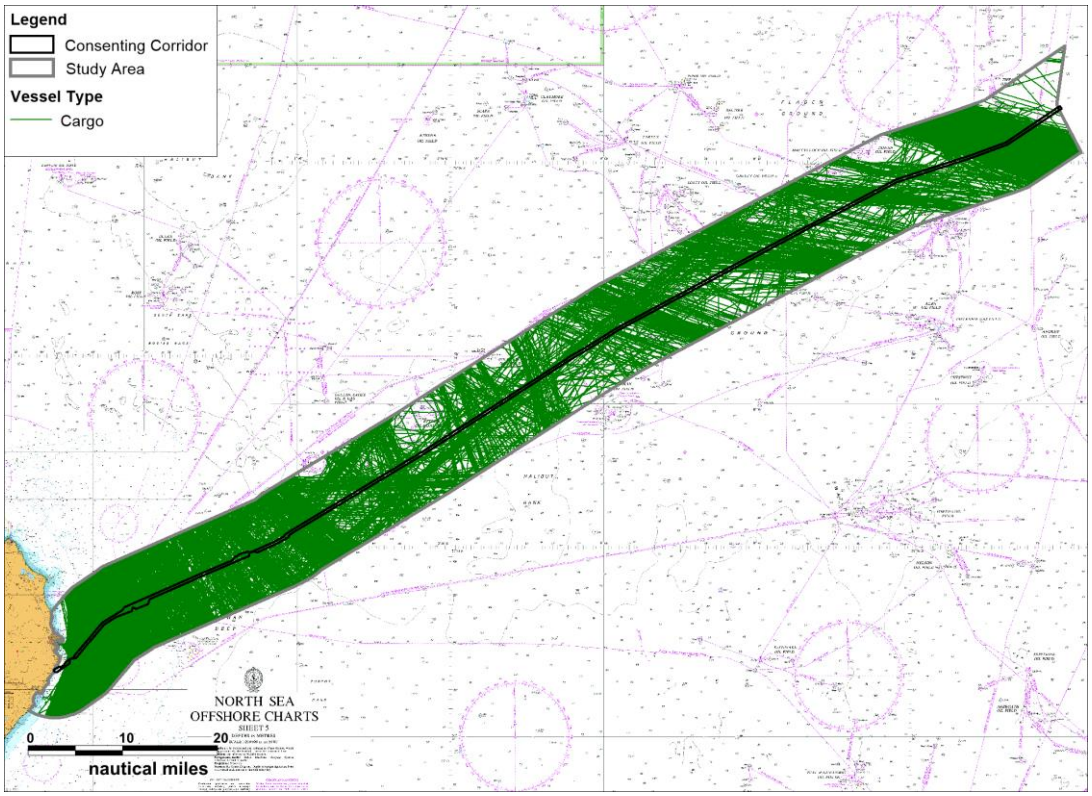

Figure 6.4 AIS Tracks of Cargo Vessels (2017)

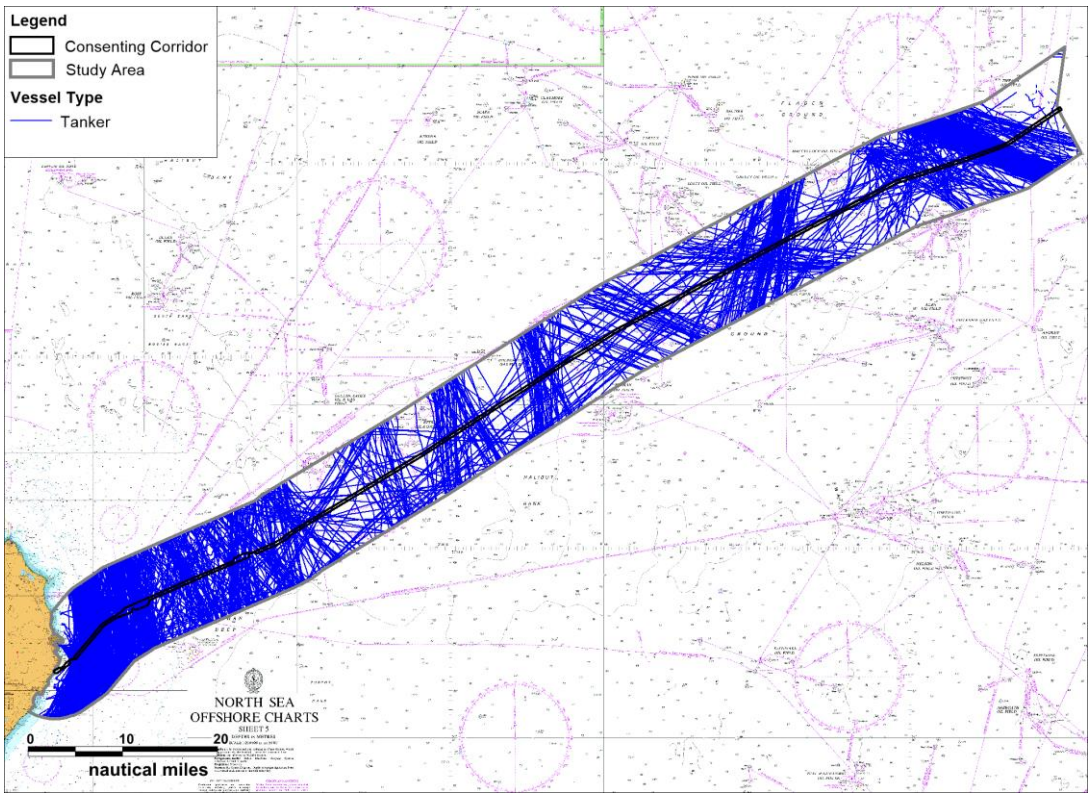

Figure 6.5 AIS Tracks of Tankers (2017)

6.3 Vessel Numbers

Figure 6.6 presents the average daily unique vessel count per month during 2017.

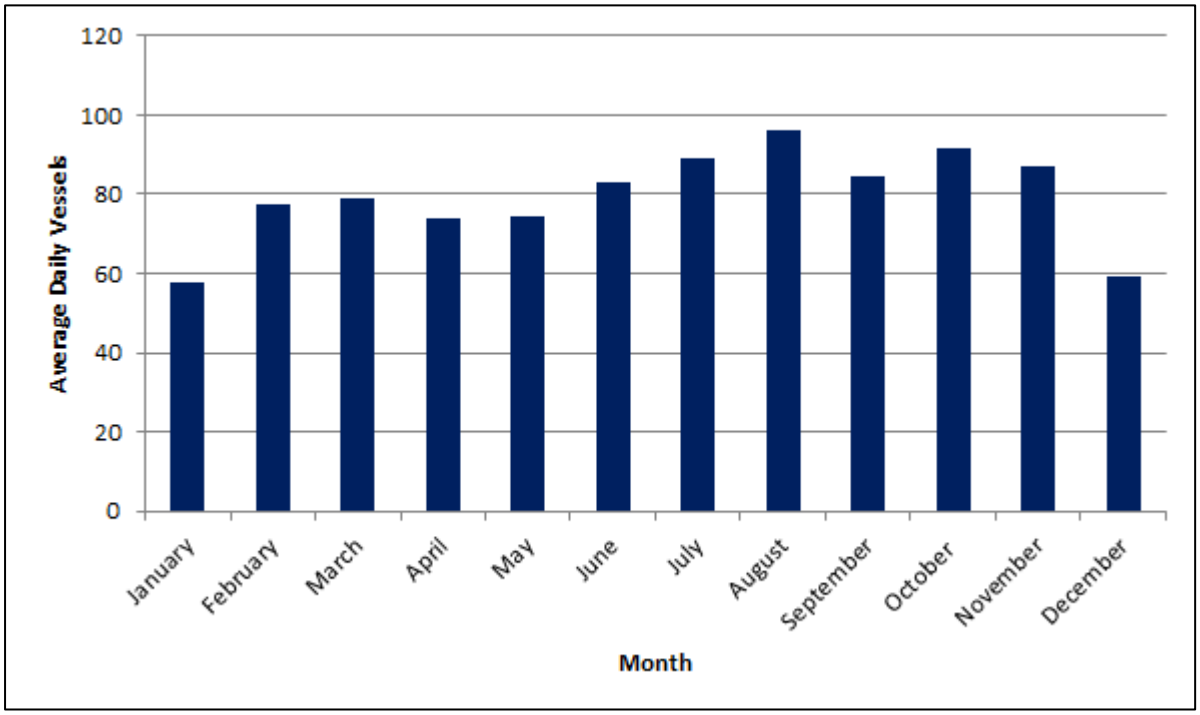

Figure 6.6 Average Daily Vessels per Month (2017)

Throughout the entire twelve month period, there was an average of 79 unique vessels recorded per day in the study area. August was the busiest month with an average of 96 unique vessels per day whilst January was the quietest with 58 unique vessels recorded per day. The busiest month is shown in Figure 6.7.

The busiest day overall was the 8th August when 128 unique vessels were recorded in the study area. The quietest day was the 9th January when 25 unique vessels were recorded. Plots of the vessel tracks recorded on the busiest and quietest days are presented in Figure 6.8 and Figure 6.9, respectively.

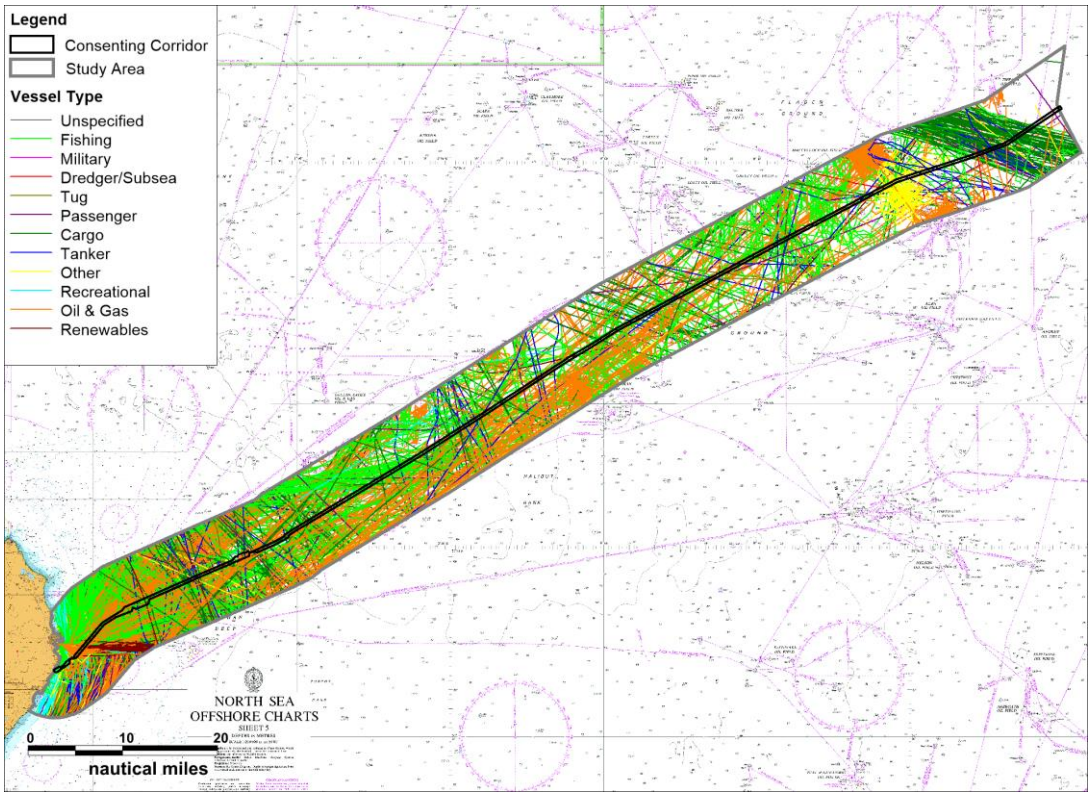

Figure 6.7 AIS Tracks on Busiest Month – August 2017

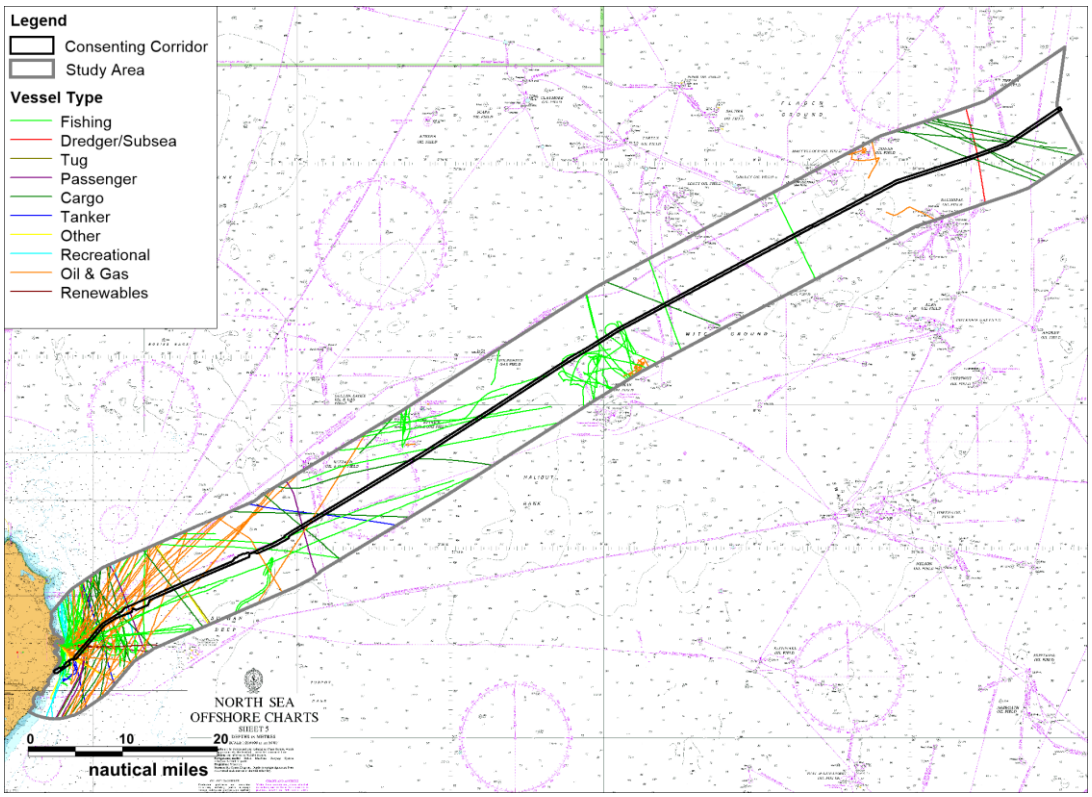

Figure 6.8 AIS Tracks on Busiest Day - 8th August 2017

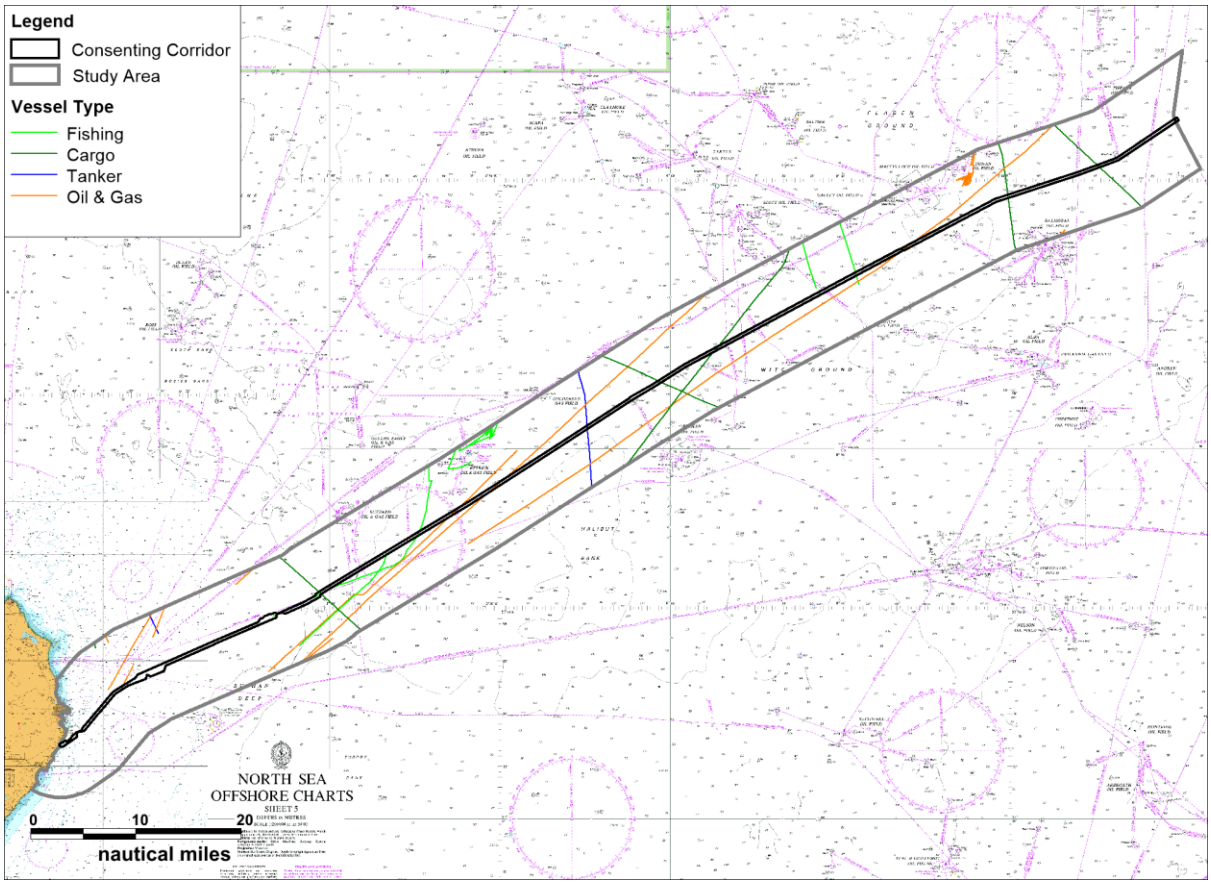

Figure 6.9 AIS Tracks on Quietest Day – 9th January 2017

6.4 Vessel Density and Coastal Traffic

Figure 6.10 presents the vessel density within the study area based on the number of track intersects per 1 x 1km grid cell.

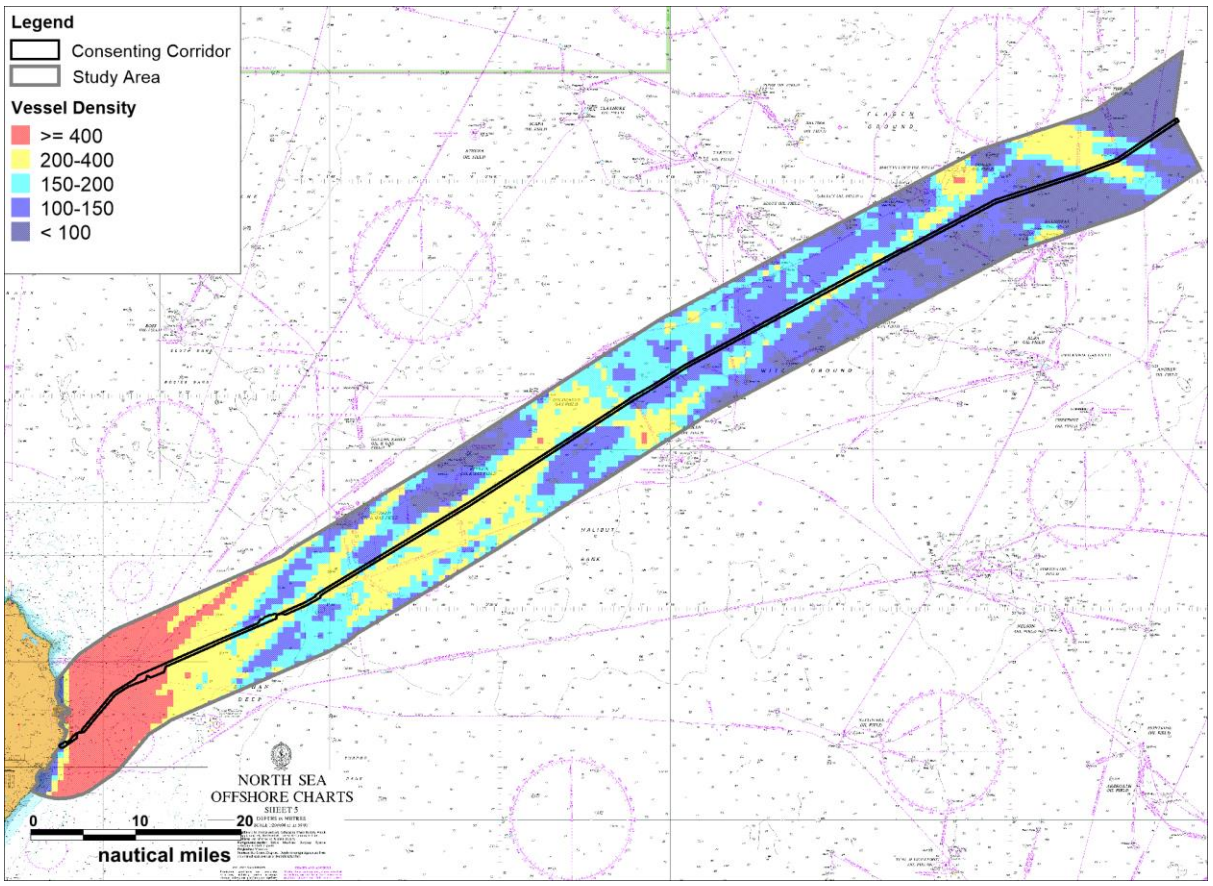

Figure 6.10 AIS Vessel Density (2017)

The highest vessel densities were in the coastal waters off Peterhead from Kilometre Point (KP) 2 to KP24 (approximately). Relatively low densities are seen farther offshore particular at the far NE of the study area.

A more detailed view of the AIS tracks recorded off the coast is presented in Figure 6.11.

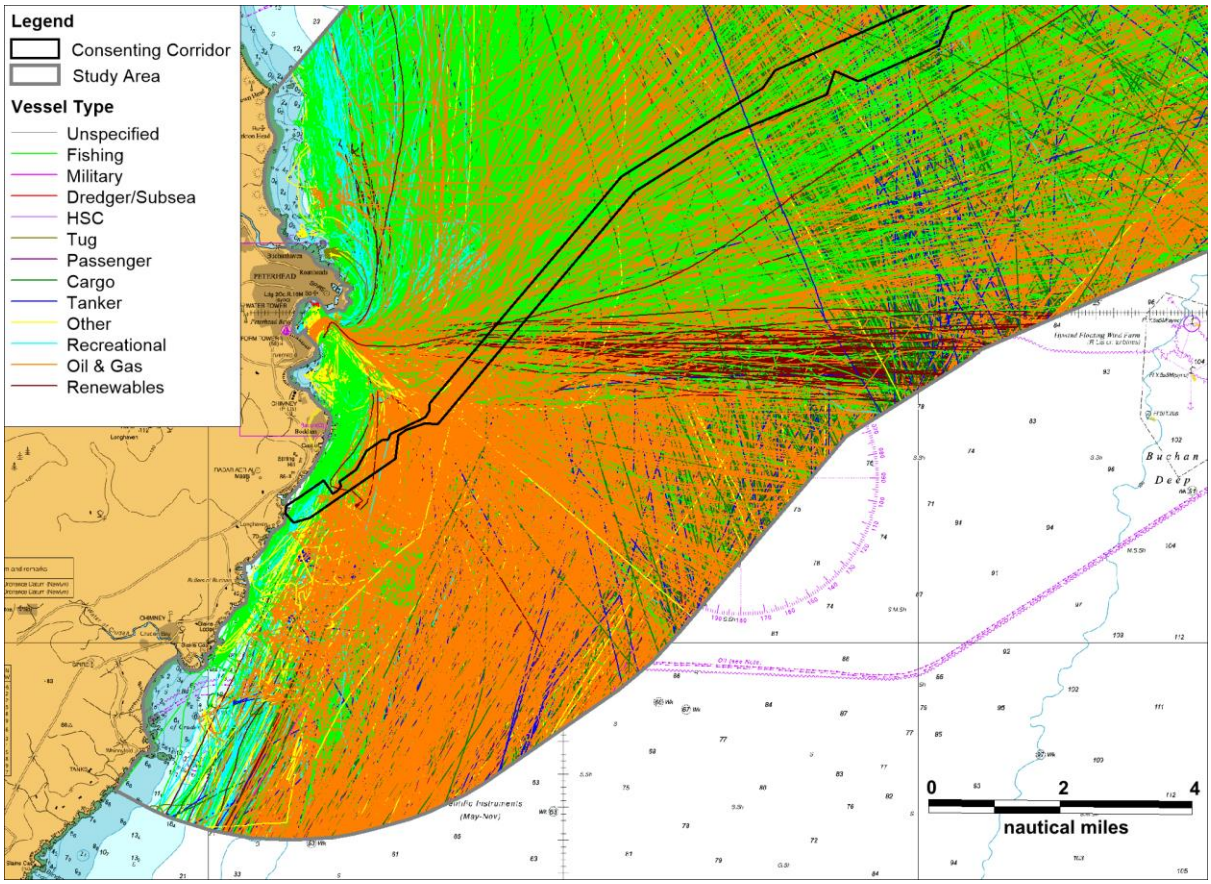

Figure 6.11 AIS Tracks by Vessel Type near Cable Landfall (2017)

6.5 Vessel Sizes

6.5.1 Vessel Length

Figure 6.12 presents the AIS vessel tracks recorded in the study area, colour-coded by vessel length. The vessel length distribution, excluding 1% unspecified, is then presented in Figure 6.13 based on unique vessels per day.

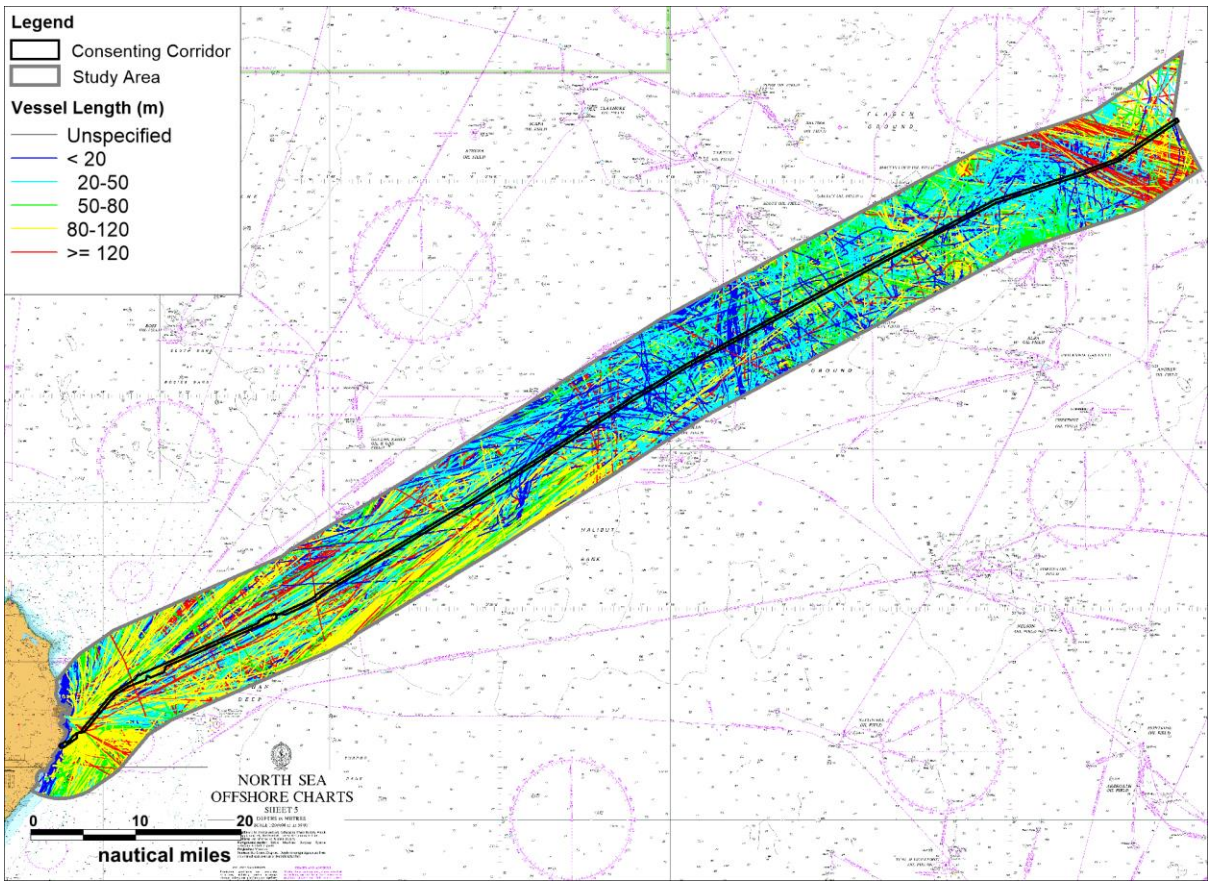

Figure 6.12 AIS Tracks by Vessel Length (2017)

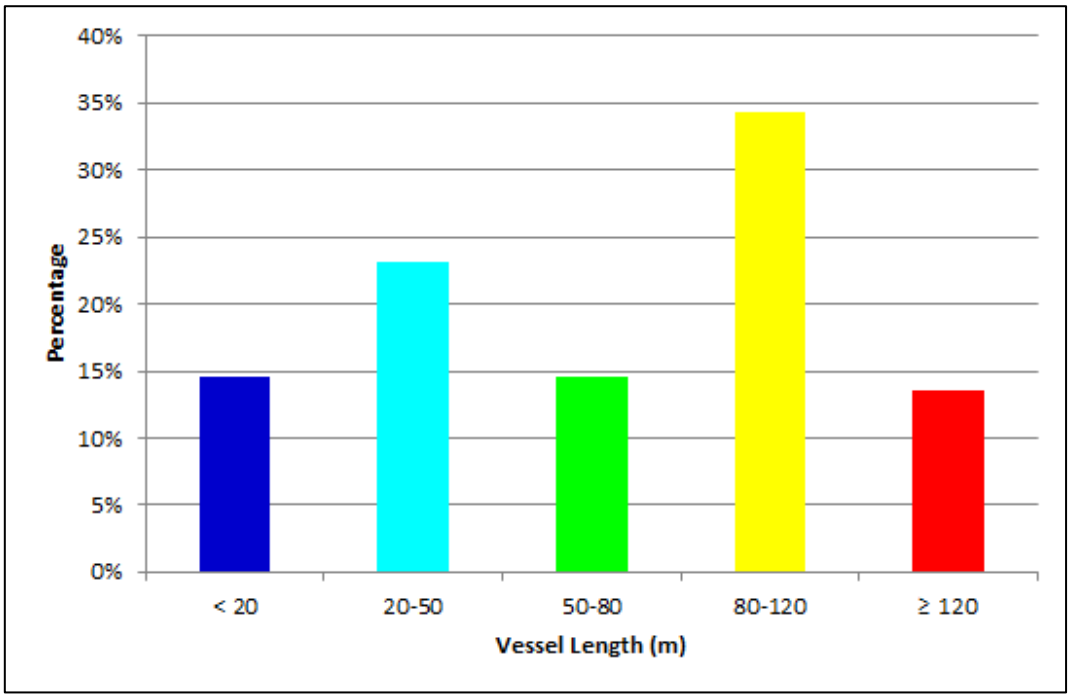

Figure 6.13 AIS Vessel Length Distribution (2017)

Excluding unspecified, the average vessel length recorded in the study area was 73m. The largest proportion of vessels (approximately 34%) had lengths between 80 and 120m, which is fairly typical for offshore support vessels. Of all vessels recorded in the study area, approximately 4% were less than 15m. The majority of these were fishing and recreational craft which were voluntarily carrying AIS.

The longest vessel recorded in the study area was the 382m crane vessel, *Pioneering Spirit*. This vessel was recorded transiting to Hartlepool through the study area on the 29th April 2017.

6.5.2 Vessel Draught

The AIS tracks recorded within the study area, colour-coded by vessel draught, are presented in Figure 6.14. Following this, Figure 6.15 presents the vessel draught distribution, excluding 18% unspecified. The majority of vessels not broadcasting a draught were smaller vessels such as pilot vessels, fishing vessels and recreational craft.

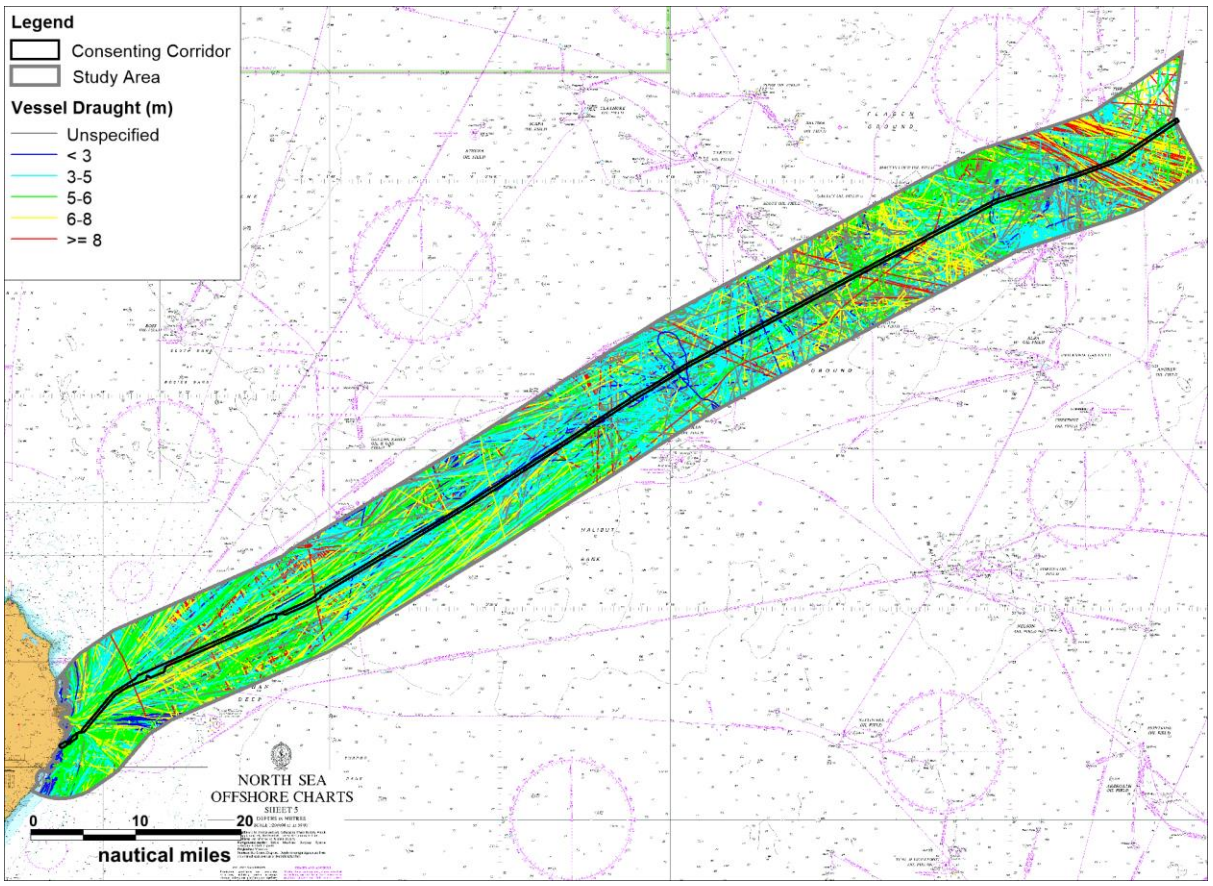

Figure 6.14 AIS Tracks by Vessel Draught (2017)

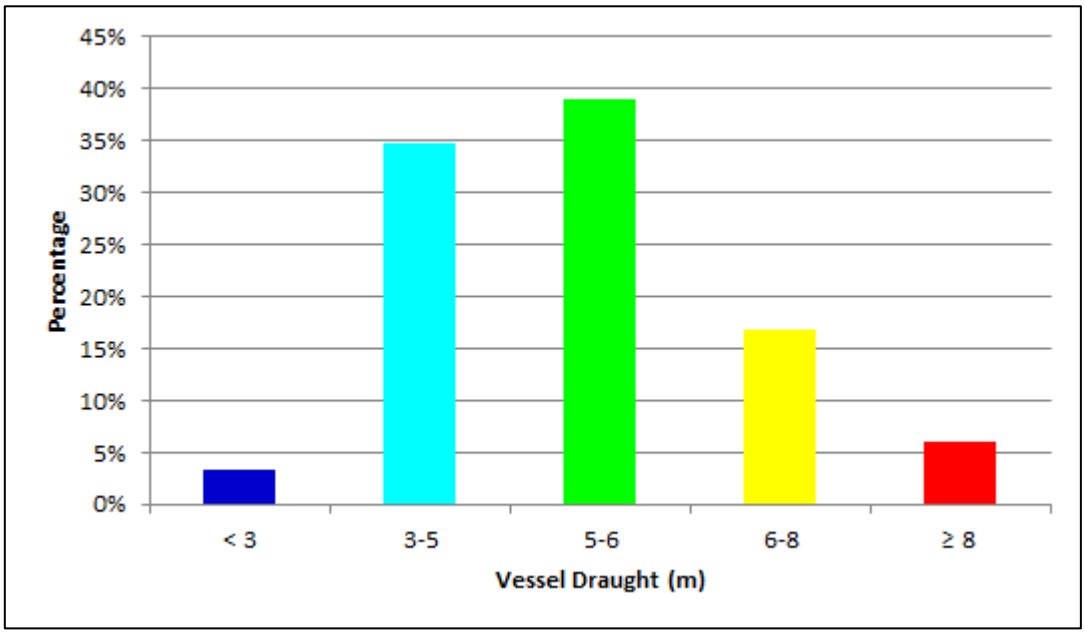

Figure 6.15 AIS Vessel Draught Distribution (2017)

Excluding unspecified, the average vessel draught recorded in the study area was 5.3m. The majority of vessels (approximately 74%) recorded had draughts between 3 and 6m. Only a small percentage of vessels (6%) had draughts greater than 8m.

The deepest draught of 24.2m was recorded from the *Safe Boreas* platform, transiting through the eastern half of the study area at water depths between 80 and 120m, on the 24th April 2017.

6.5.3 Vessel DWT

Figure 6.16 presents the AIS tracks recorded in the study area, colour-coded by vessel Dead Weight Tonnage (DWT). This is not broadcast on AIS and, where possible, has been researched separately by Anatec based on the ship identity information, or in some cases approximated based on the vessel type and dimensions (mainly for small fishing vessels and recreational craft estimated to be less than 500 DWT).

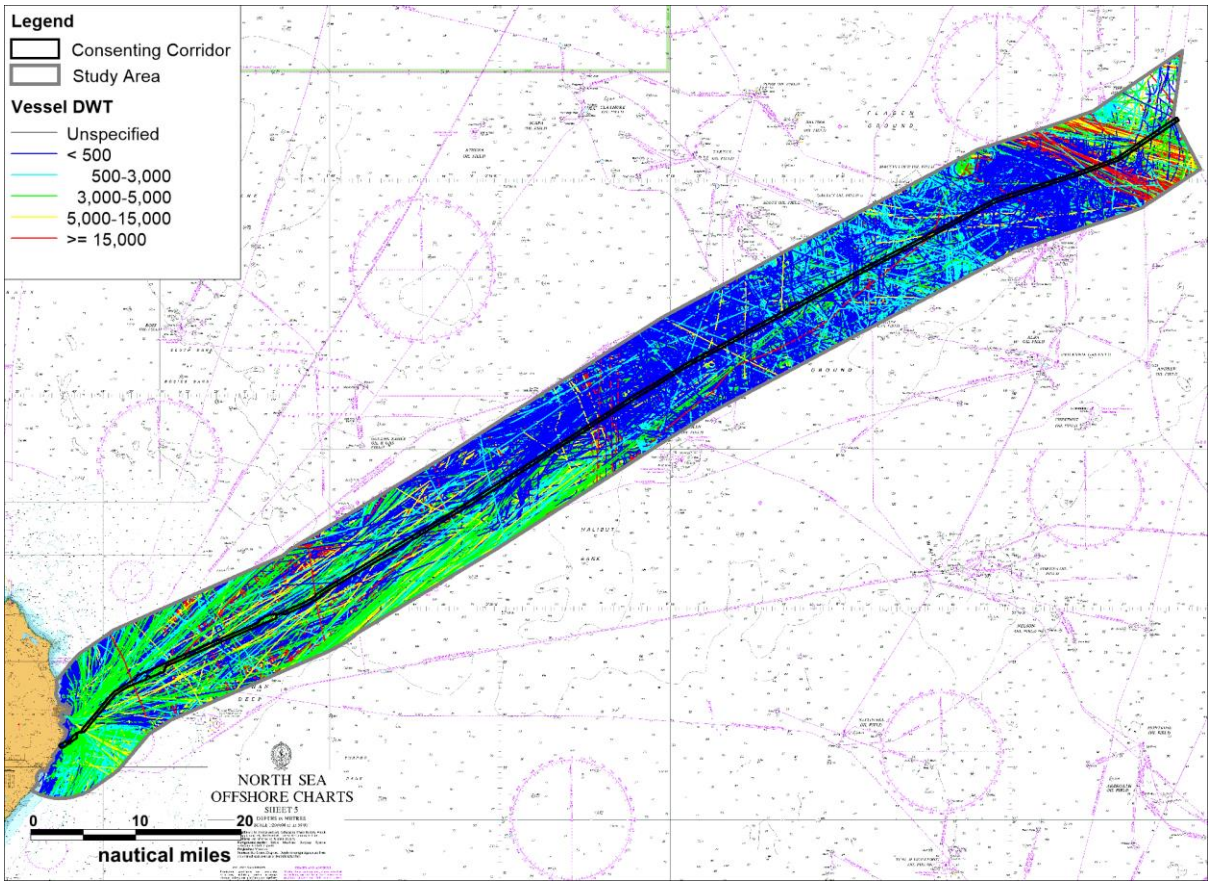

Figure 6.16 AIS Tracks by Vessel DWT (2017)

The vessel DWT distribution, based on unique vessels per day, is presented in Figure 6.17 (excluding 1% unspecified).

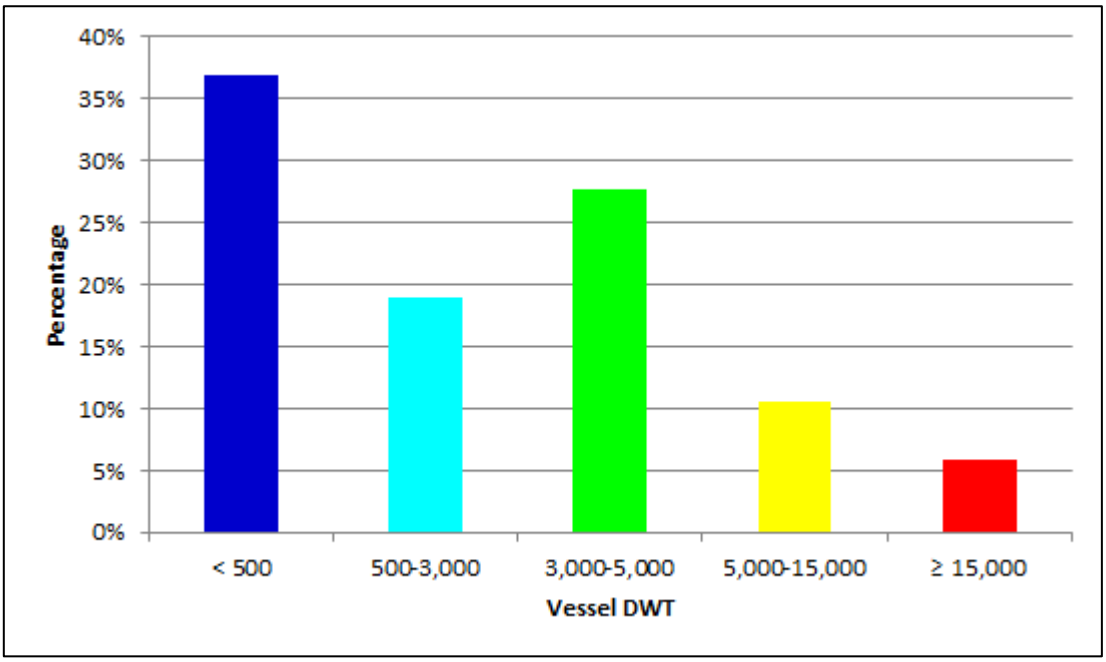

Figure 6.17 AIS Vessel DWT Distribution (2017)

The most common size category was small vessels, below 500 DWT. The largest DWT recorded in the area was 499,125 from the crane vessel *Pioneering Spirit*.

6.6 Vessel Speed

The AIS tracks recorded in the study area, colour-coded by average track speed, are presented in Figure 6.18. Following this, Figure 6.19 presents the average speed distribution excluding 10% unspecified.

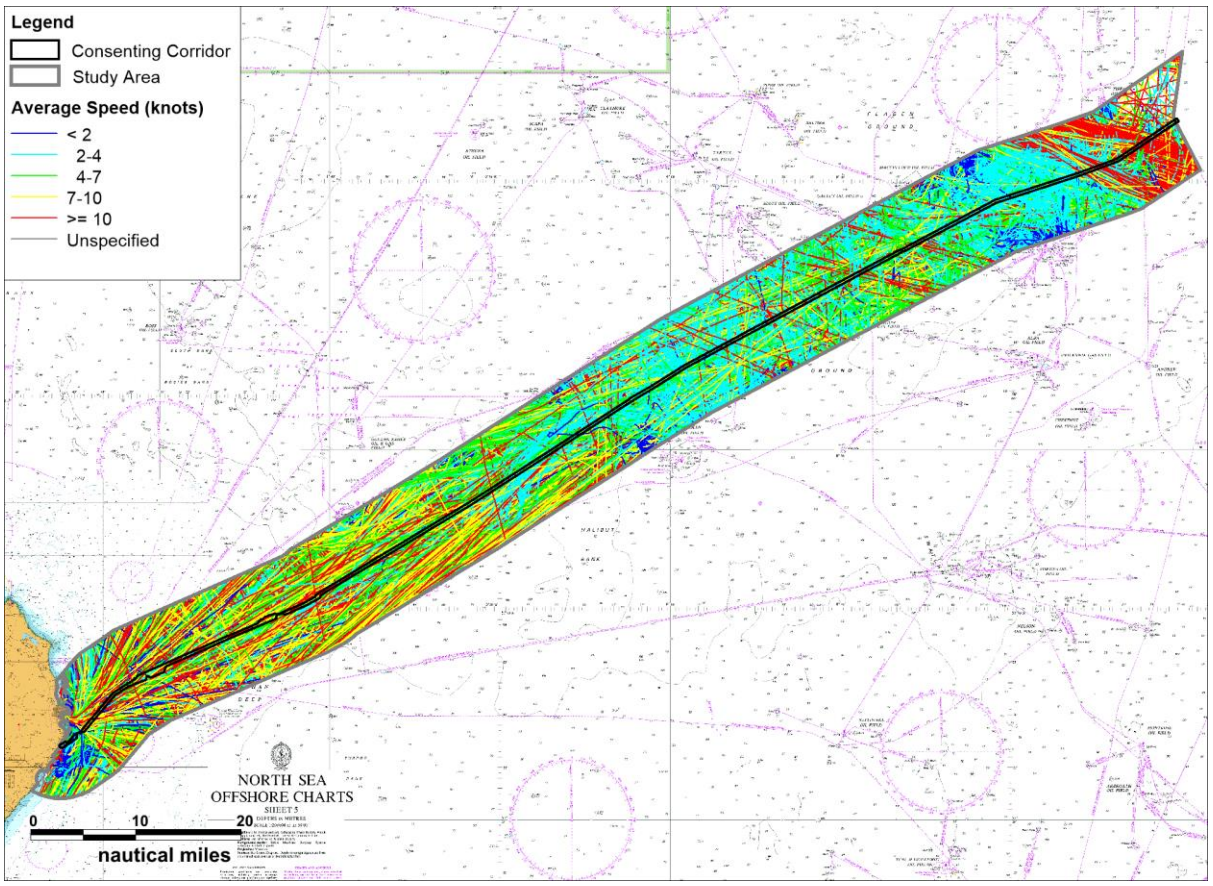

Figure 6.18 AIS Tracks by Average Speed (2017)

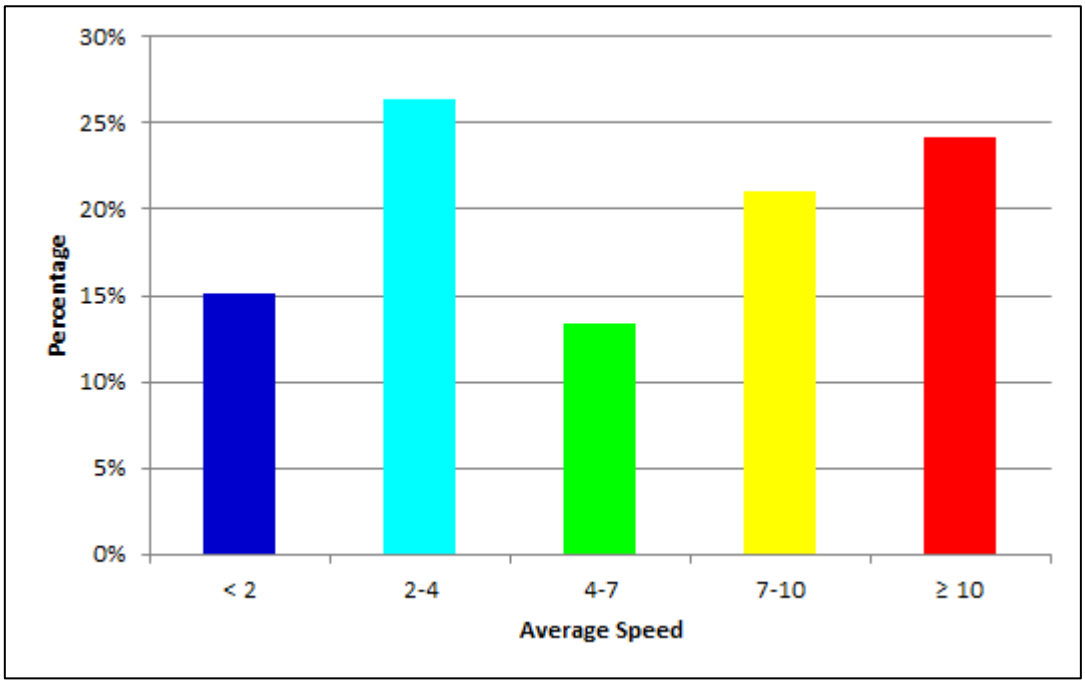

Figure 6.19 AIS Average Speed Distribution (2017)

Excluding unspecified, the average track speed recorded in the study area was 6.5 knots. Approximately 26% of vessel tracks recorded speeds between 2 and 4 knots within the study area whilst approximately 24% had speeds greater than 10 knots. The fastest speed of 30 knots was recorded from the crew transfer vessel, *Umoe Rapid*.

6.7 Vessels at Anchor

This sub-section presents all vessels deemed to be at anchor within 10NM of the cable consenting corridor.

Vessels can broadcast their navigation status as 'At Anchor' via AIS; however they do not always keep this up-to-date. In order to produce a reliable set of anchored vessels within 10NM of the consenting corridor, all AIS tracks from vessels within the AIS data that transmitted their navigation status as 'At Anchor' were checked to ensure their behaviour matched that of an anchored vessel. In addition, AIS tracks from vessels which transmitted a navigation status other than 'At Anchor' were used as input to Anatec's Speed Analysis model. The program uses a predefined set of parameters to detect any tracks that may be from an anchored vessel based on their speed and course. This output was then manually checked, and any tracks confirmed as being from an anchored vessel were added to the tracks from the first step.

Vessels were also recorded broadcasting "Dodging" or "DP Trials" as their destination. It appeared these vessels were holding position by other means instead of anchoring. For example, oil industry vessels may be using Dynamic Positioning (DP). Figure 6.20 presents the locations of vessels holding position alongside those deemed to be at anchor within 10NM of the consenting corridor.

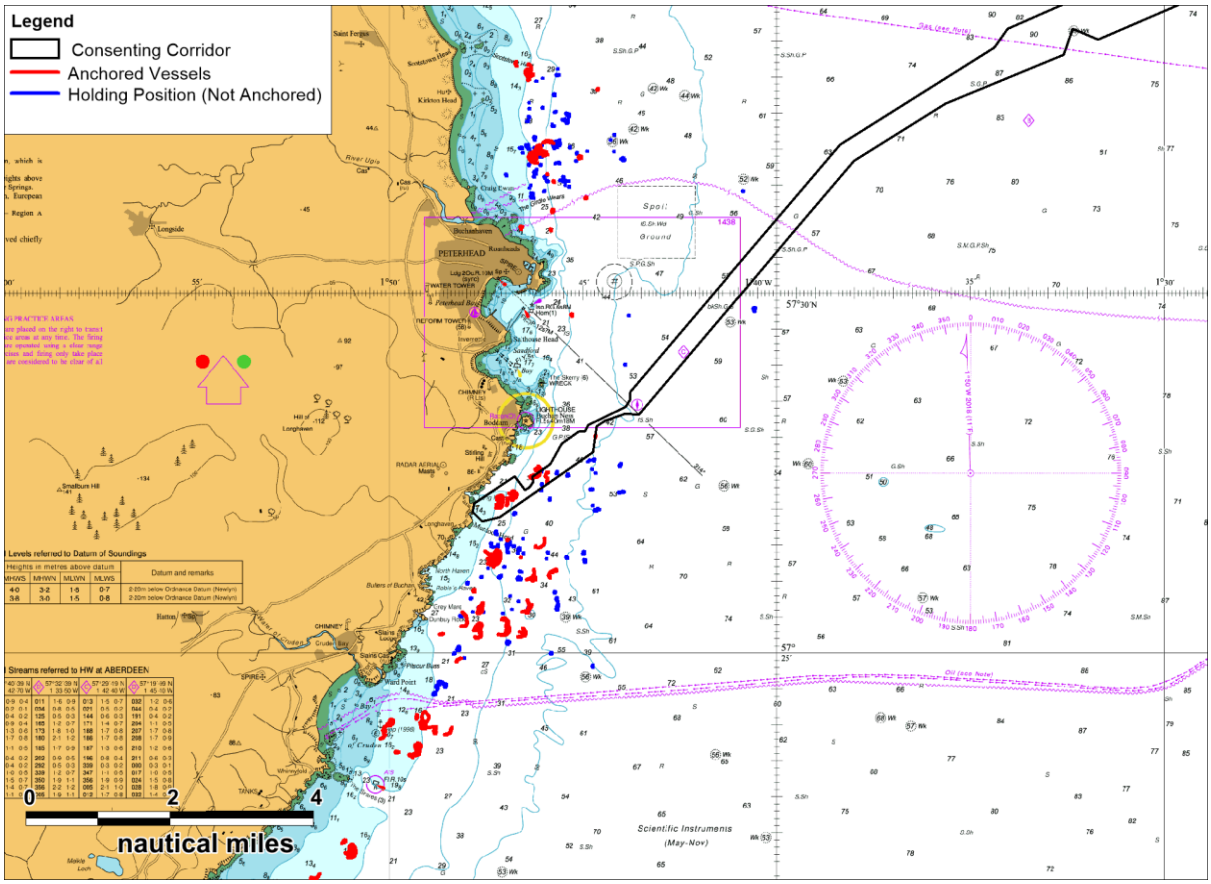

Figure 6.20 Vessels Holding Position and all Anchored Vessels (2017)

Figure 6.21 and Figure 6.22 present depictions of a vessel deemed to be at anchor within the study area and one deemed to be holding position using other means, e.g., DP.

Figure 6.21 Example Vessel at Anchor

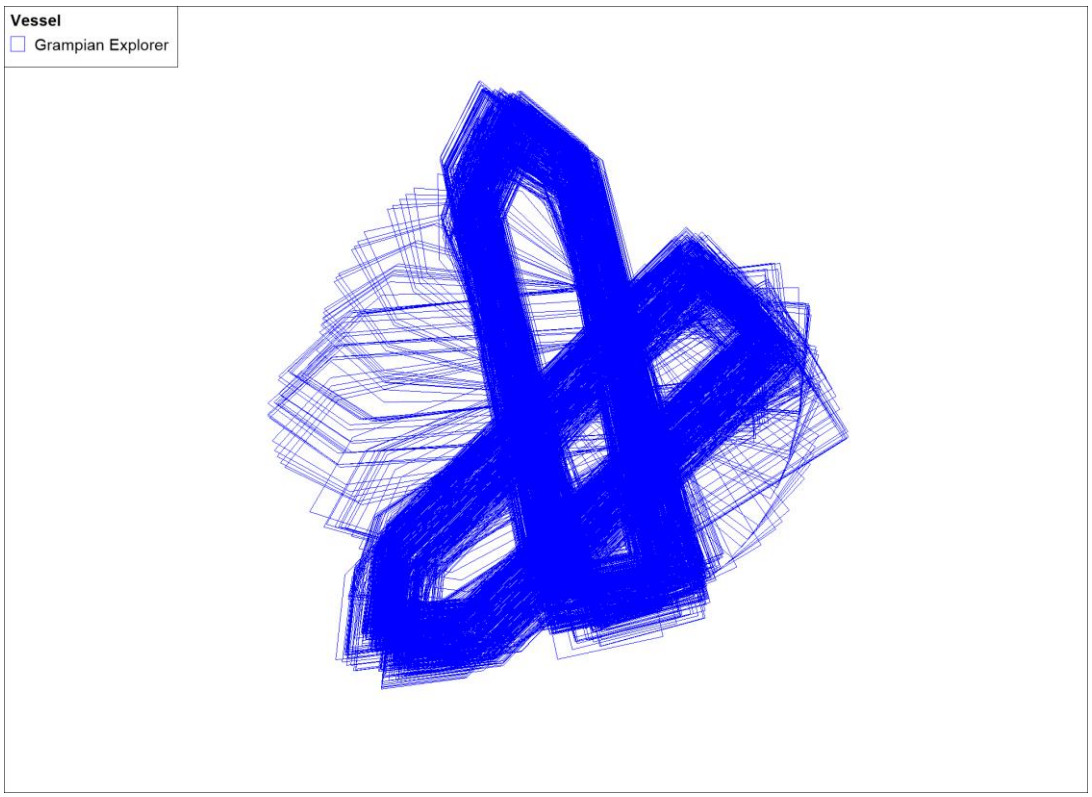

Figure 6.22 Example Vessel Holding Position (e.g. using DP)

A general overview of the vessels anchored within 10NM during 2017 is presented in Figure 6.23. (No vessels were recorded at anchor farther offshore.)

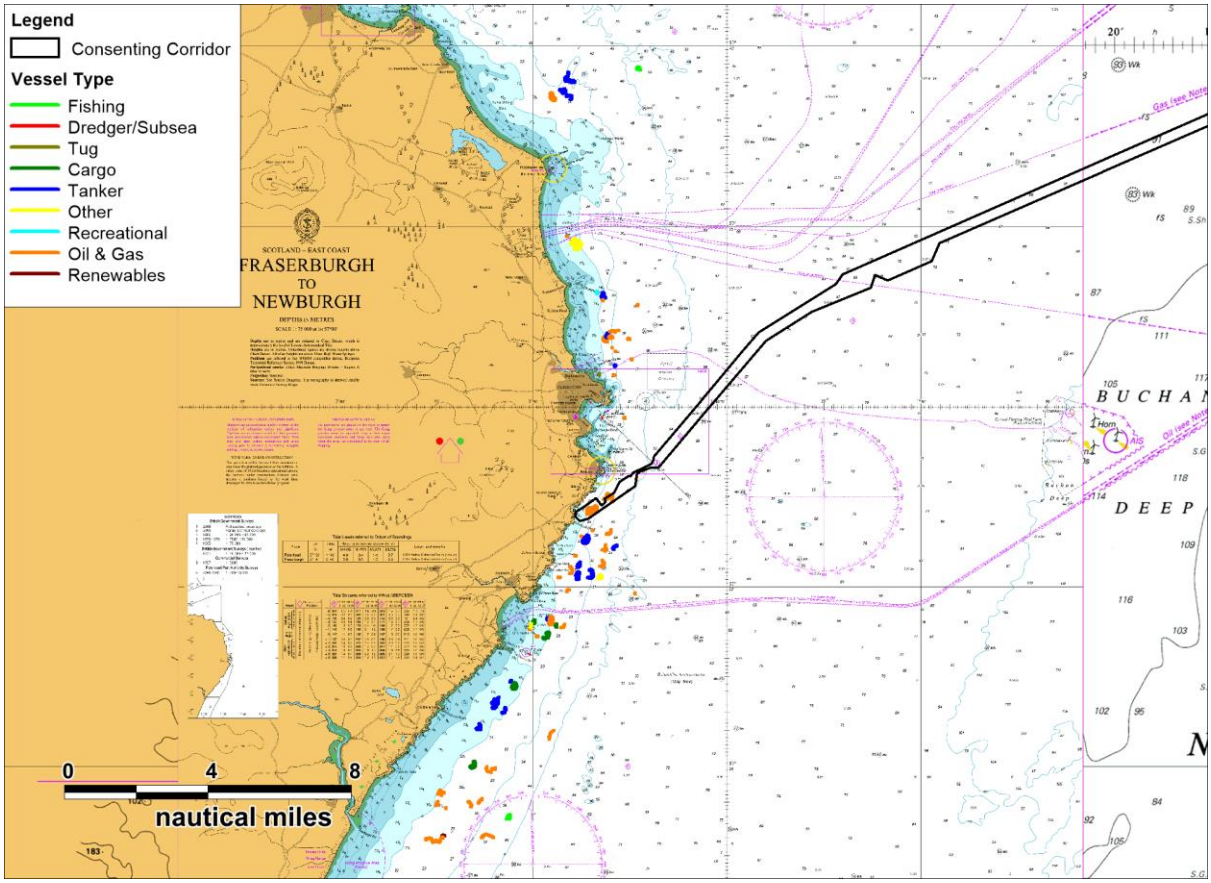

Figure 6.23 General Overview of Anchored Vessels within 10NM (2017)

The majority of anchored vessels within 10NM were associated with the oil and gas industry (approximately 55%). Other common vessel types were tankers (23%) and cargo vessels (10%).

Most anchored vessels had tonnages in the range 3,000-5,000 DWT. The largest vessel recorded at anchor was the 145m oil & gas supply vessel *Seven Atlantic,* with a DWT of 11,885.

A more detailed chart of vessels anchoring close to the cable corridor is presented in Figure 6.24.

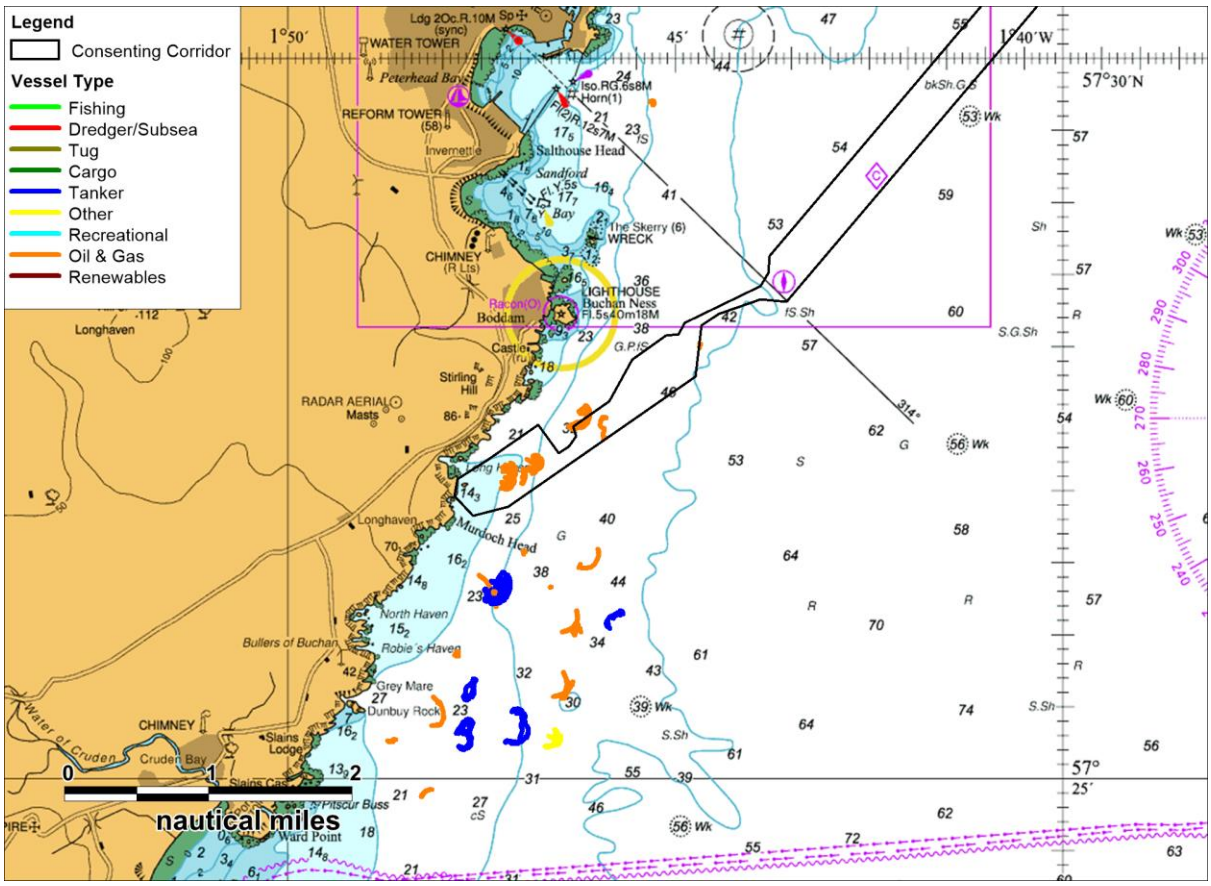

Figure 6.24 Detailed View of Anchored Vessels near Cable Corridor (2017)

Details of the three unique vessels recorded at anchor within the cable consenting corridor, one of which was recorded on three separate occasions, are presented in Table 6.1. It should be noted that the position is based on the vessel's GPS broadcasts, whereas the actual deployed anchor position will be offset from this

Table 6.1 Details of Vessels Anchored Closest to Cable Consenting Corridor

Vessel	Length (m)	DWT	Date(s) at Anchor
Grampian Sovereign	83	2,515	11th – 12th January 2017
Olympus	80	4,000	26th July 2017
Vestland Cetus	86	4,260	11th January 2017 12th – 13th January 2017 8th – 9th December 2017

One other anchored vessel was recorded within 100m. This was the oil and gas vessel *Olympic Bibby*, recorded on the 12th December 2017 with a DWT of 3,100.

7 Baseline Fishing Analysis

This section presents a more detailed analysis of the fishing activity recorded within the study area during 2017.

7.1 AIS Analysis (Jan-Dec 2017)

7.1.1 Vessel Gear Type

Figure 7.1 presents the AIS fishing vessel tracks recorded in the study area, colour-coded by gear type. A detailed view of fishing tracks within 12NM of the Scottish coast is presented in Figure 7.2. Following this, Figure 7.3 presents the main gear type distribution based on unique vessels per day, excluding 2% unspecified.

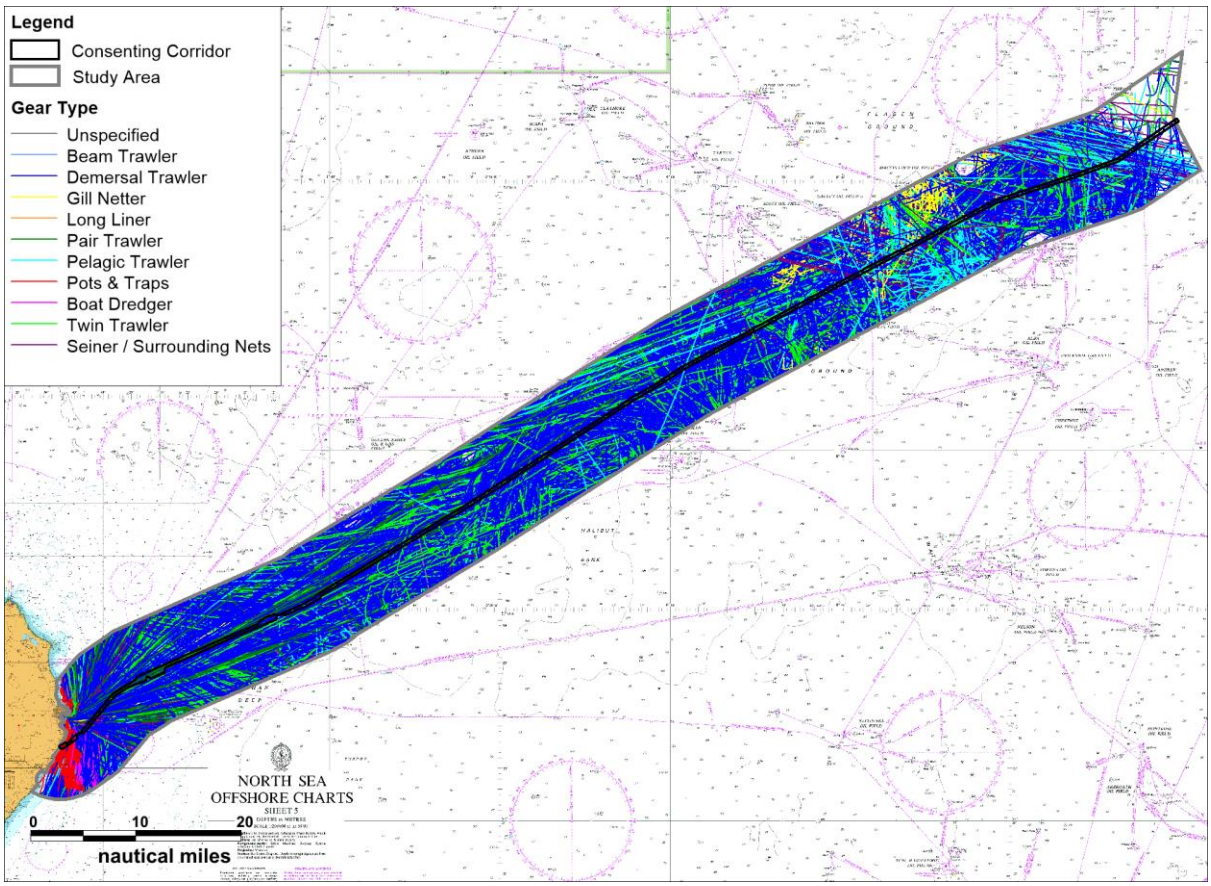

Figure 7.1 AIS Fishing Tracks by Gear Type (2017)

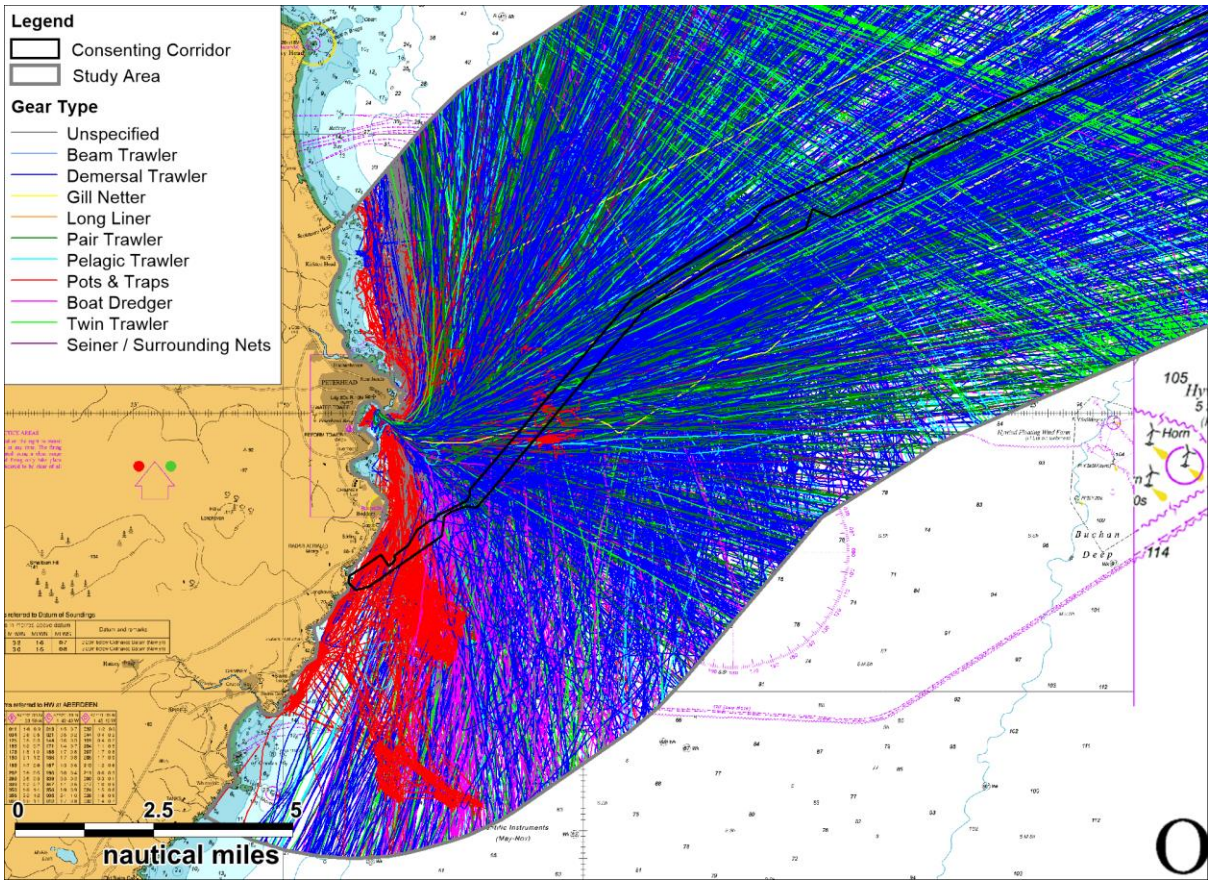

Figure 7.2 AIS Fishing Tracks by Gear Type near Cable Landfall (2017)

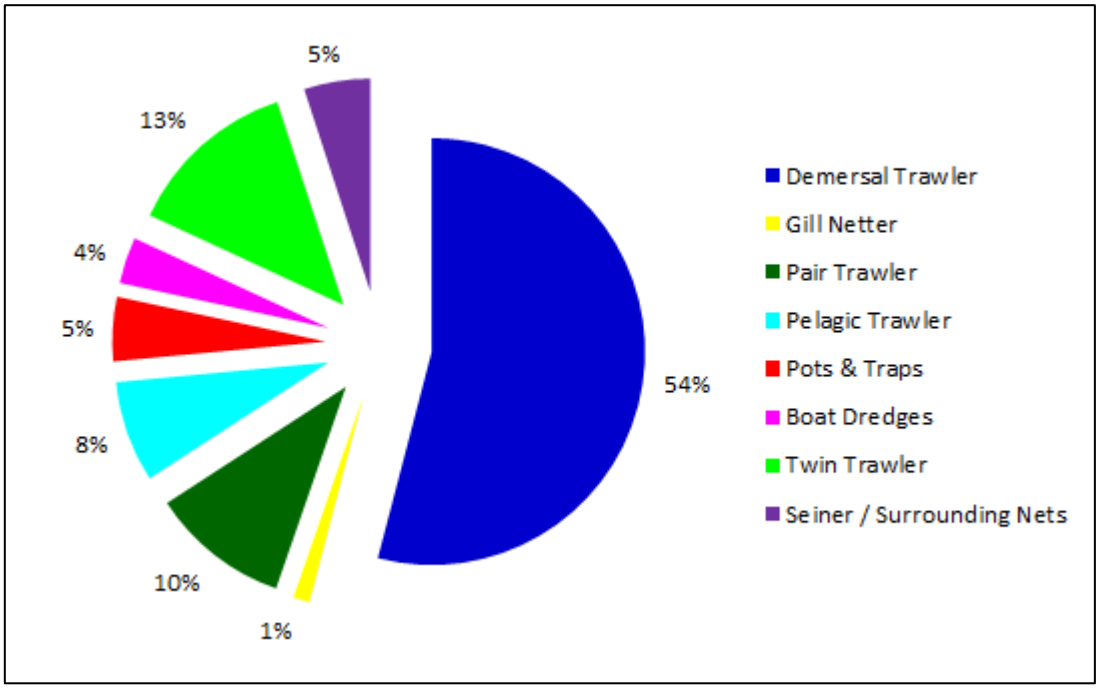

Figure 7.3 AIS Fishing Main Gear Type Distribution (2017)

It can be seen that the most frequently recorded gear type (54%) in the study area are demersal (single otter) trawlers. Other trawlers recorded include twin (13%), pair (10%) and pelagic (8%).

Overall, approximately two-thirds of gear types in the area were demersal, i.e., towed along the seabed. This includes demersal single otter and pair trawlers as well as boat dredges.

Pots and traps (including creels) accounted for only 5% of gears overall but it can be seen from Figure 7.2that these were concentrated nearshore close to the Scottish landfall.

7.1.2 Vessel Numbers

Figure 7.4 presents the average daily fishing vessel count per month for January to December 2017.

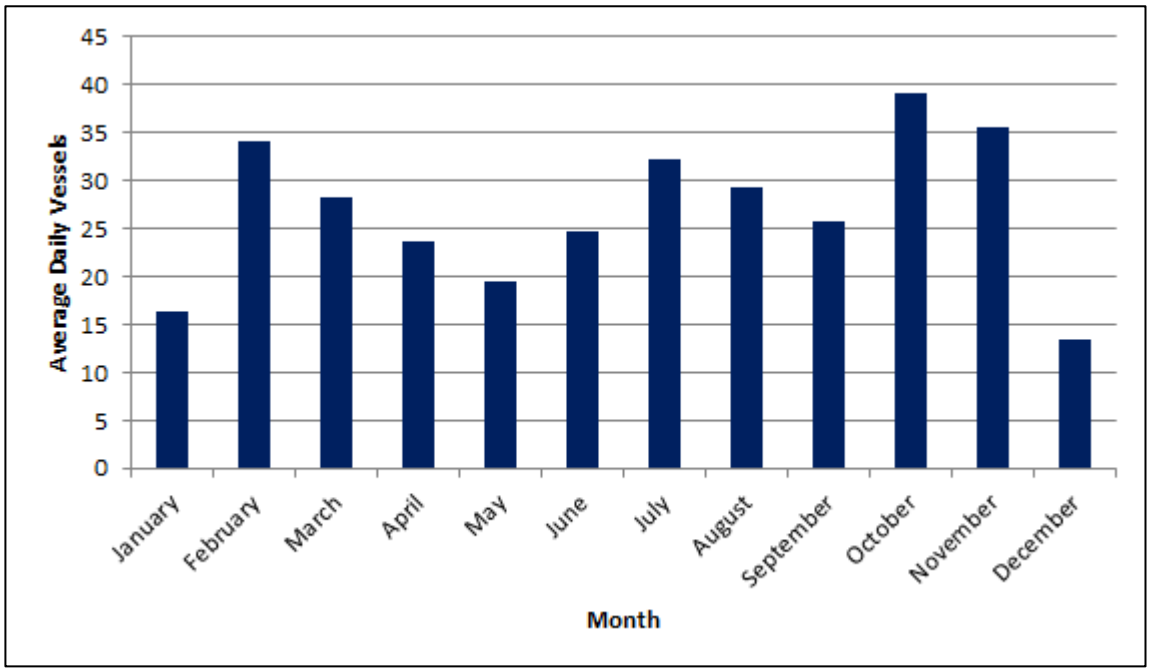

Figure 7.4 Average Daily Fishing Vessels per Month (2017)

Over the entire twelve month study period there was an average of 27 unique fishing vessels per day recorded in the study area. October was the busiest month with an average of 39 unique vessels per day whilst December was the quietest month with 14 unique vessels per day recorded.

7.1.3 Vessel Length

Figure 7.5 presents the AIS fishing tracks recorded within the study area colour-coded by vessel length. Following this, Figure 7.6 presents the fishing vessel length distribution (excluding 2% unspecified) based on unique vessels per day.

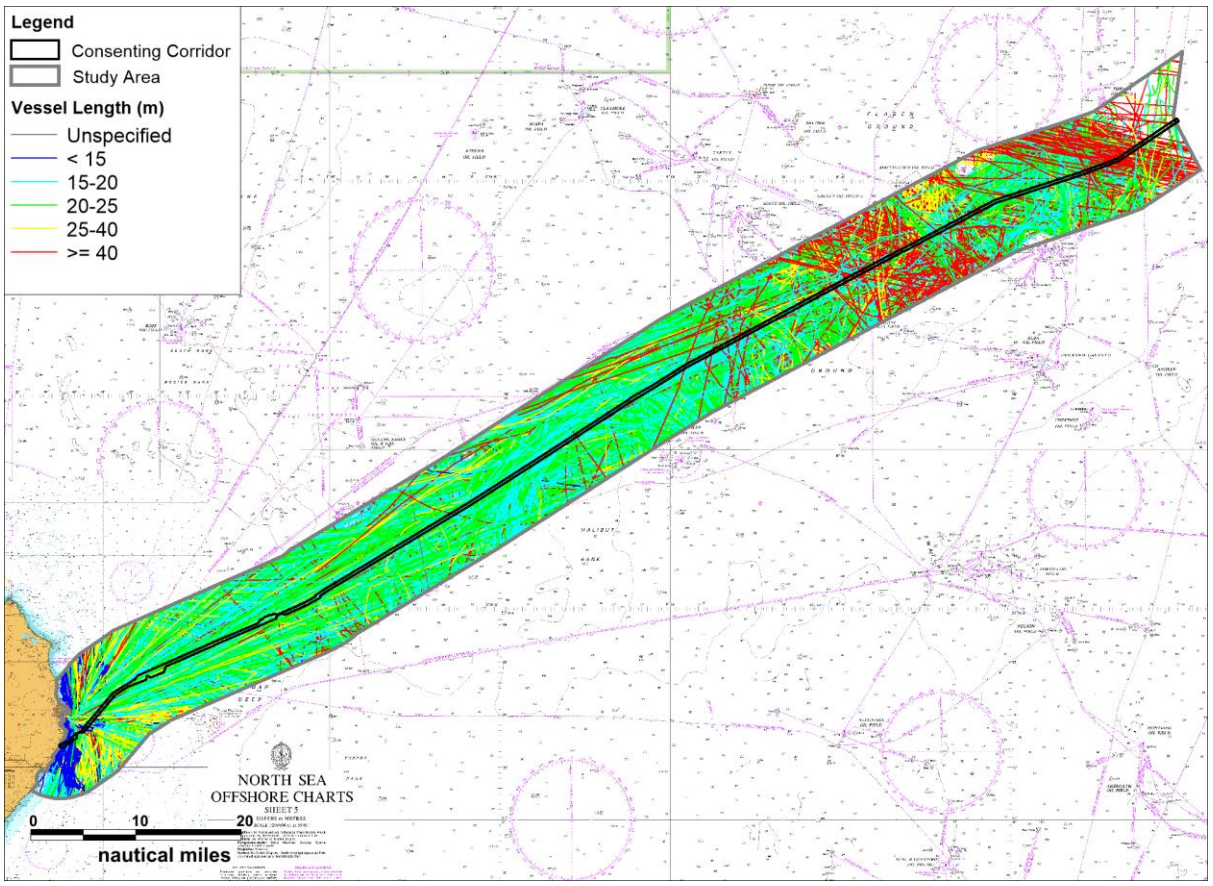

Figure 7.5 AIS Fishing Tracks by Vessel Length (2017)

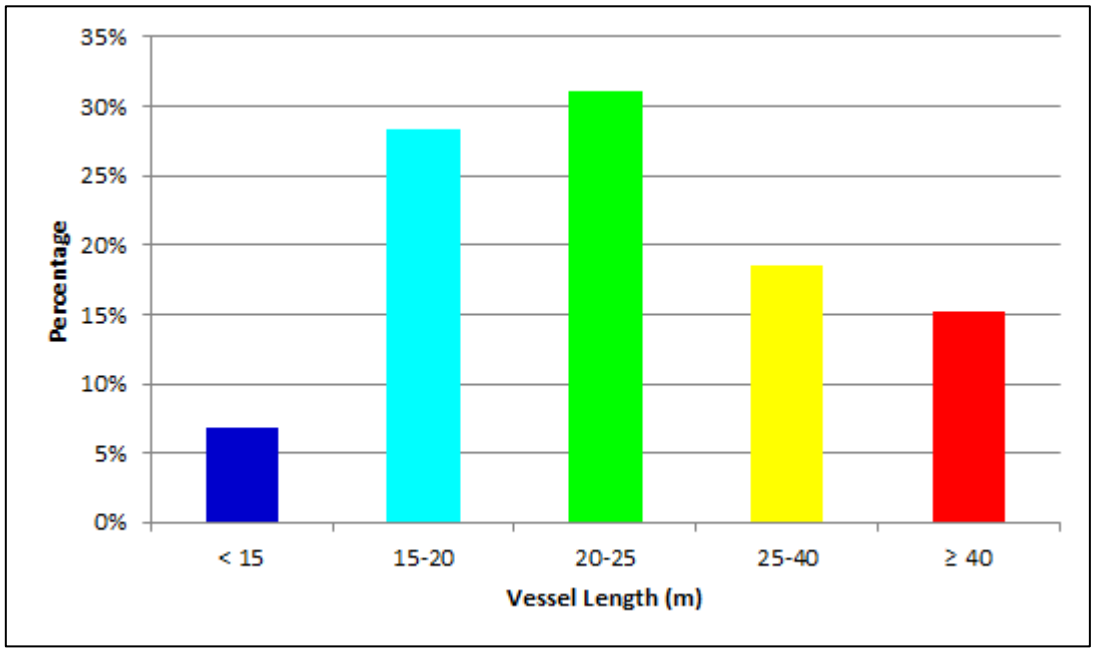

Figure 7.6 AIS Fishing Vessel Length Distribution (2017)

Excluding unspecified, the average fishing vessel length recorded in the study area was 28.5m. The majority of vessels (approximately 59%) were recorded with lengths between 15 and 25m. Approximately 7% of vessels were below 15m in length and hence carrying AIS voluntarily. Around three-quarters of sub-15m length vessels were potters/whelkers (creelers) operating within the 6NM fishery limit. It is again noted that vessels less than 15m are likely under-represented particularly within inshore waters. The longest vessel recorded in the study area was the 144.6m Dutch pelagic trawler, *Annelies Ilena*.

7.1.4 Vessel Speed

Figure 7.7 presents the AIS fishing tracks recorded in the study area, colour-coded by average track speed. Following this, Figure 7.8 presents the average speed distribution.

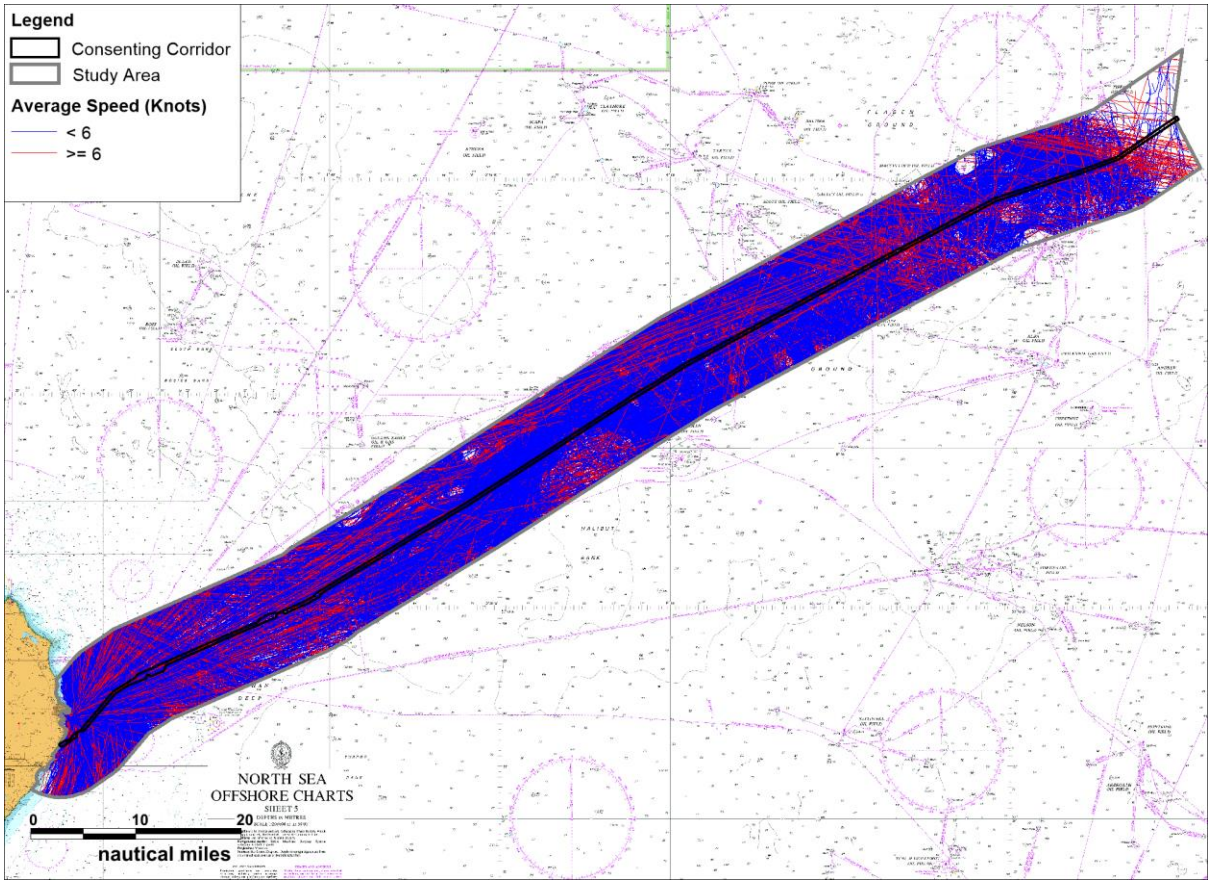

Figure 7.7 AIS Fishing Tracks by Average Speed (2017)

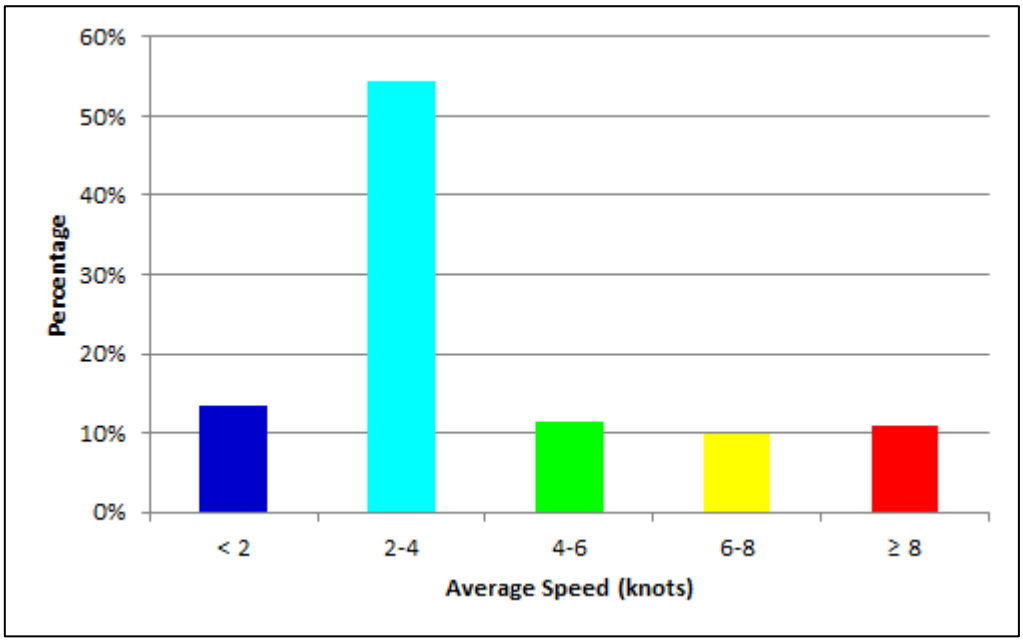

Figure 7.8 AIS Fishing Average Speed Distribution (2017)

The average fishing vessel speed recorded in the study area was 4.1 knots. Vessels with speeds less than 6 knots (approximately 79%) may potentially be engaged in fishing activities as opposed to transiting on passage through the area.

A detailed plot of fishing tracks within 12NM of the Scottish coast, colour-coded by average speed is presented in Figure 7.9.

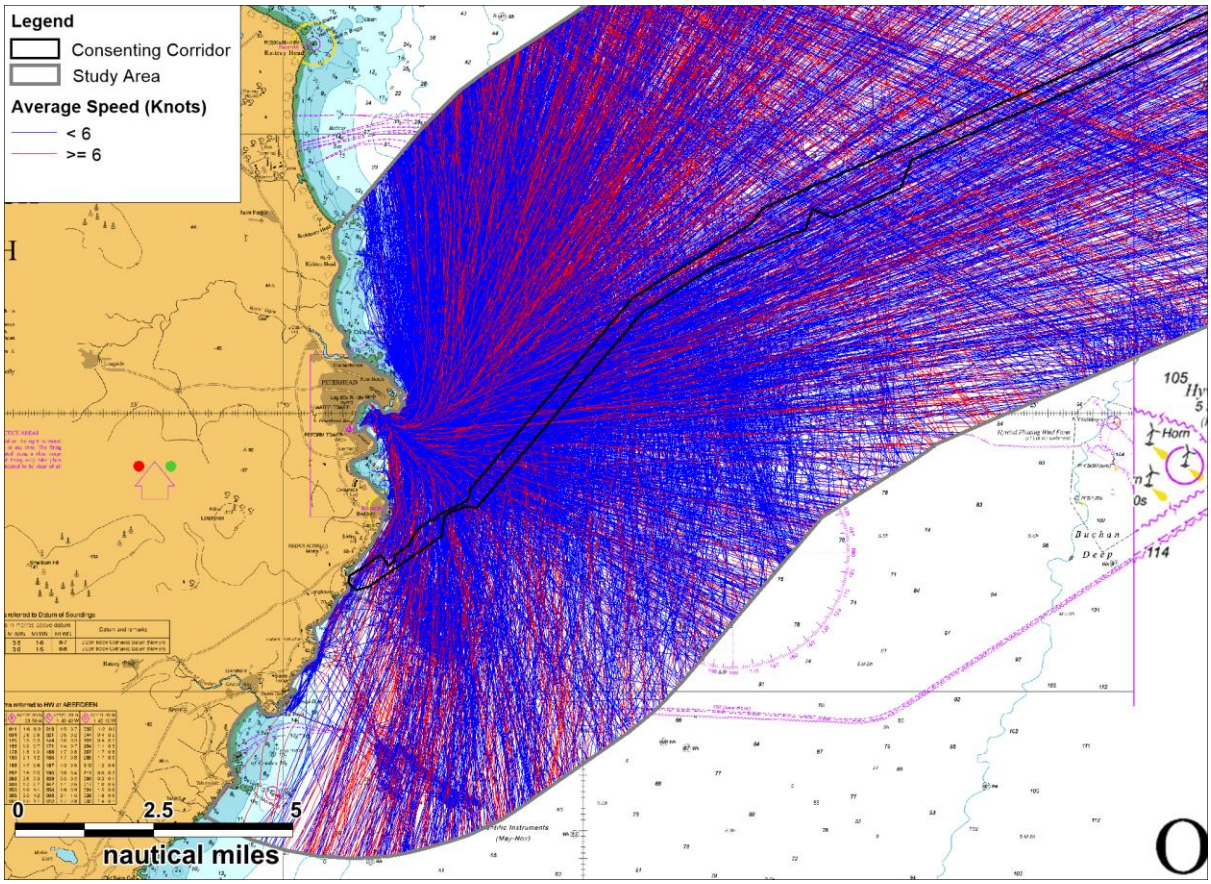

Figure 7.9 AIS Fishing Tracks by Average Speed near Cable Landfall (2017)

7.1.5 Vessel Density

Figure 7.10 presents the fishing vessel density in the study area based on the number of track intersects per 1 x 1km grid cell.

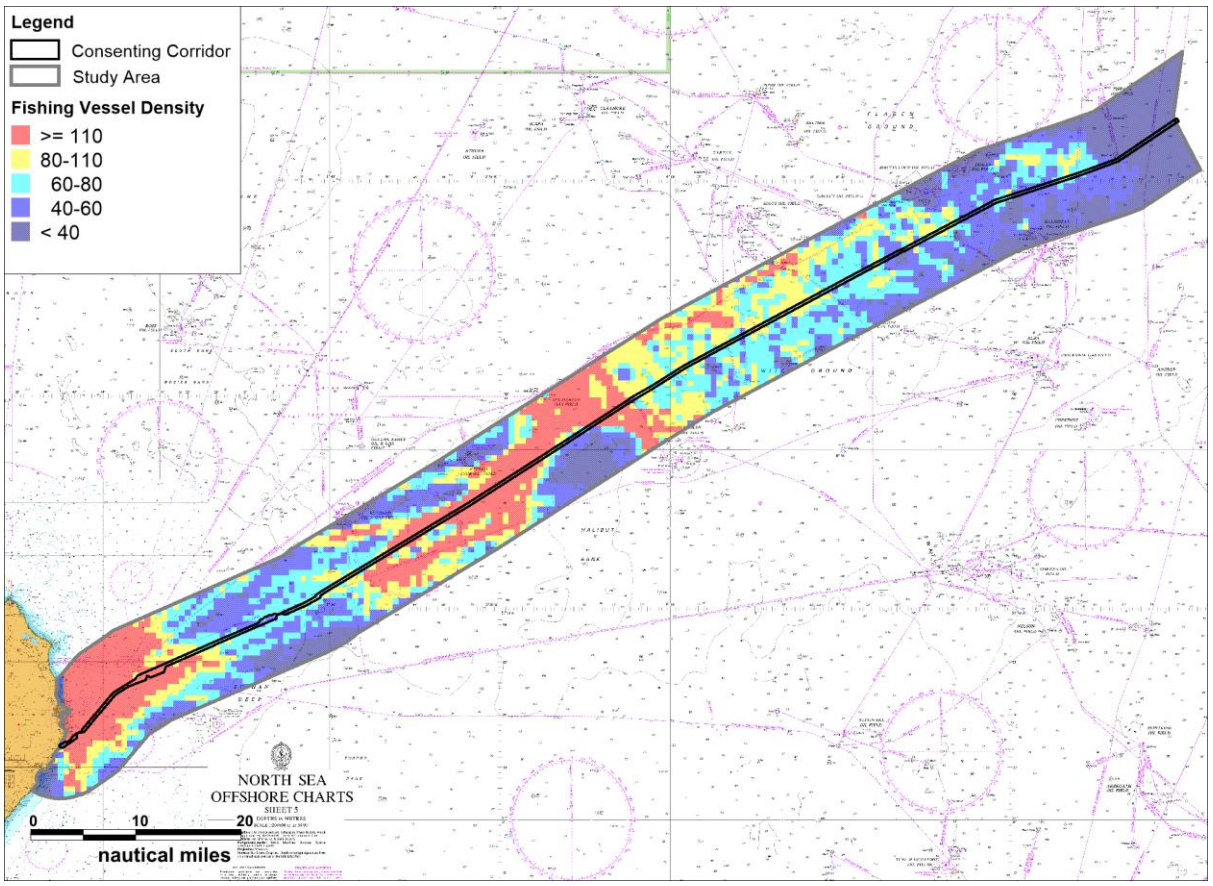

Figure 7.10 AIS Fishing Vessel Density (2017)

The highest density areas included coastal waters off Peterhead out to approximately KP25 and waters surrounding the consenting corridor from KP66 – KP118 (approximately).

As demersal gear poses the greatest risk to the HVDC offshore cabling from snagging incidents, an analysis was undertaken to identify tracks of demersal vessels actively engaged in fishing, as opposed to transiting through the area. Within the AIS data, vessels can change their navigation status to “engaged in fishing” where appropriate, although it is noted that fishing vessels do not always keep this reliably updated. The analysis was therefore based on a combination of navigation status, destination, speed and course (e.g., consistent course or several turns).

The density of demersal vessels estimated to be actively fishing is presented in Figure 7.11. The ranges of cell intersects have been kept the same as seen in Figure 7.10 above.

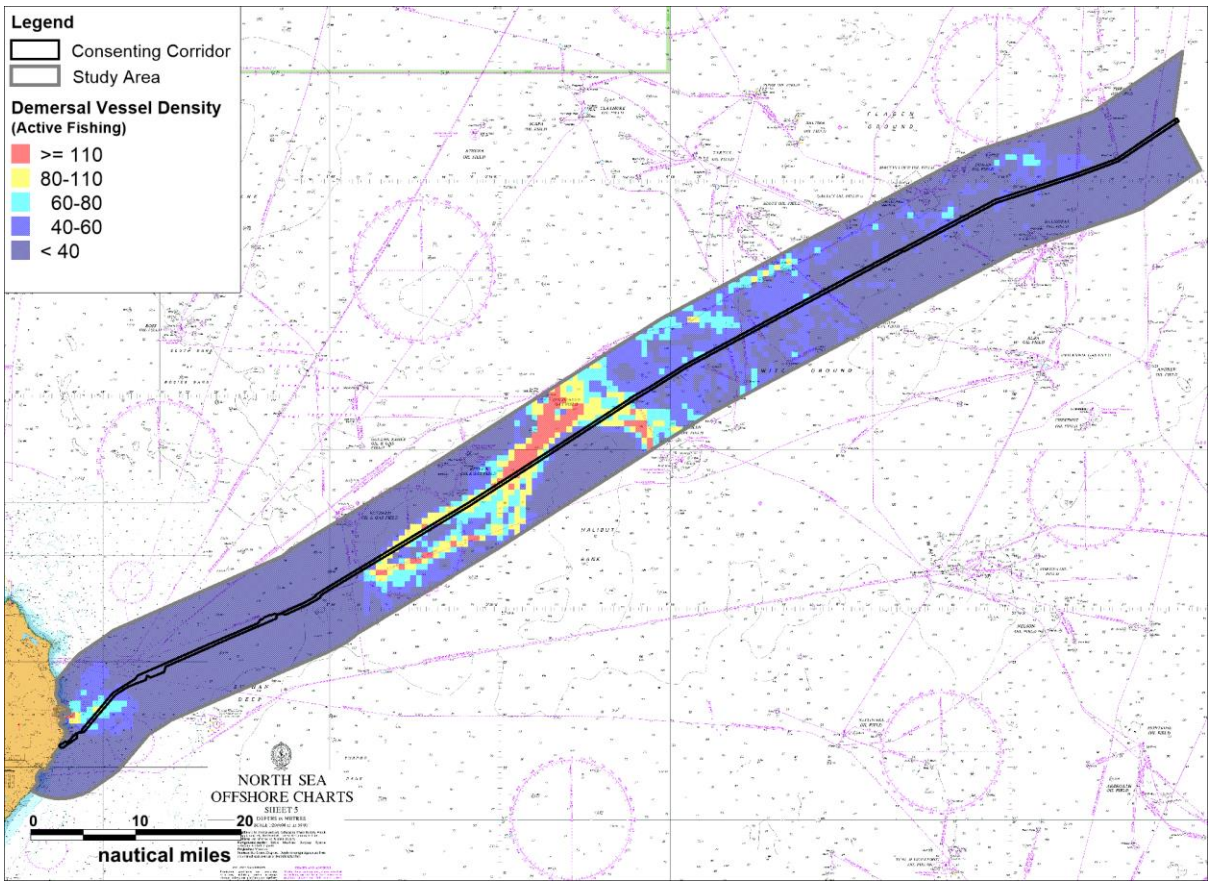

Figure 7.11 AIS Demersal Vessel (Actively Engaged in Fishing) Density (January – December 2017)

The highest density of demersal vessels estimated to be actively fishing was from approximately KP67-KP118.

7.2 VMS Analysis (2014-17)

Four years of Vessel Monitoring System (VMS) satellite data were analysed to help validate the AIS data and identify longer-term trends. Vessel positions are received approximately every one to two hours for vessels of 12m length and above.

Most of the vessel information, including name and gear type, is redacted to ensure the vessel remains anonymous. This means that fishing vessels carrying out temporary guard duties cannot be filtered out of the VMS data set as was done for AIS.

7.2.1 Vessel Numbers

The total number of points recorded in the study area for each year is presented in Table 7.1.

Table 7.1 Yearly Count of VMS Points

Year	Number of Points
2014	41,166
2015	33,529
2016	45,013
2017	55,409

It can be seen from the table above that 2017 had the highest number of points recorded from all four years. There was an approximate increase of 23% of points recorded in 2017 compared to the second highest year, i.e. 2016. This may be due to an increase in guard vessel activity within the North Sea.

The distribution of VMS points per month for each year in the study area is presented in Figure 7.12.

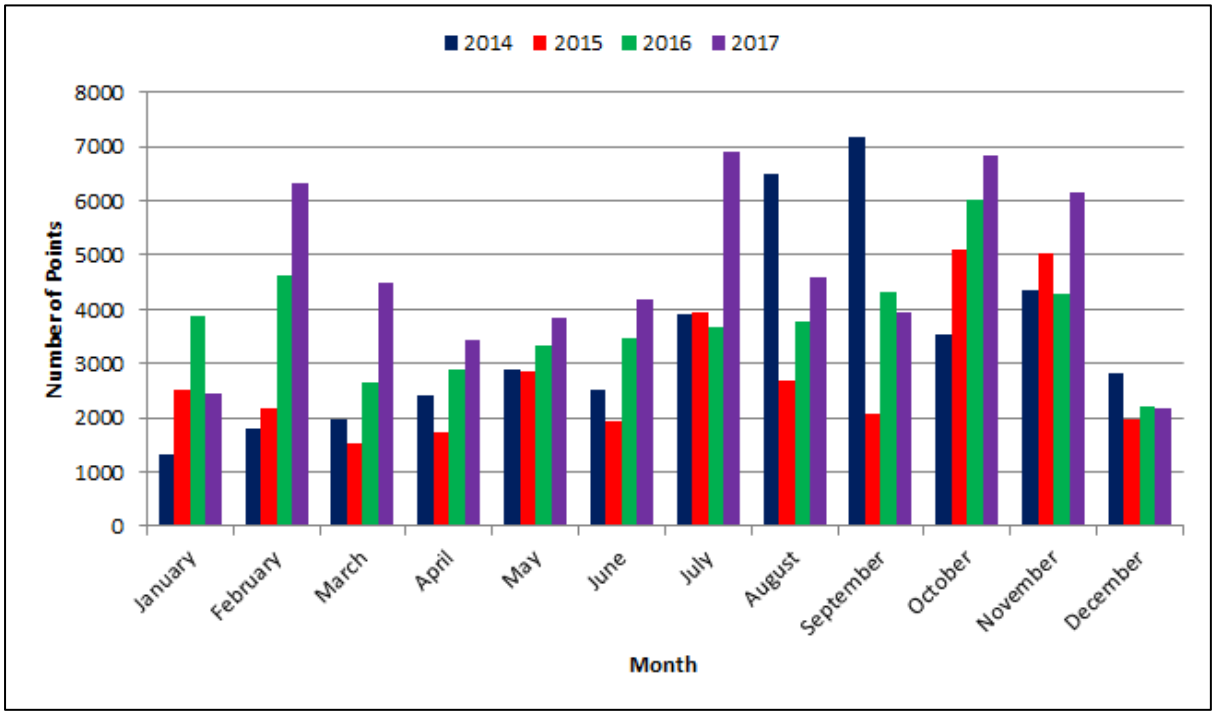

Figure 7.12 VMS Point Distribution by Month and Year

In general, a higher number of vessel points were recorded in the later months of the year in particular October and November. October recorded the highest number of points for years 2015-2017, whilst September was highest in 2014.

7.2.2 Vessel Speed

The VMS points recorded in the study area, colour-coded by vessel speed, is presented in Figure 7.13.

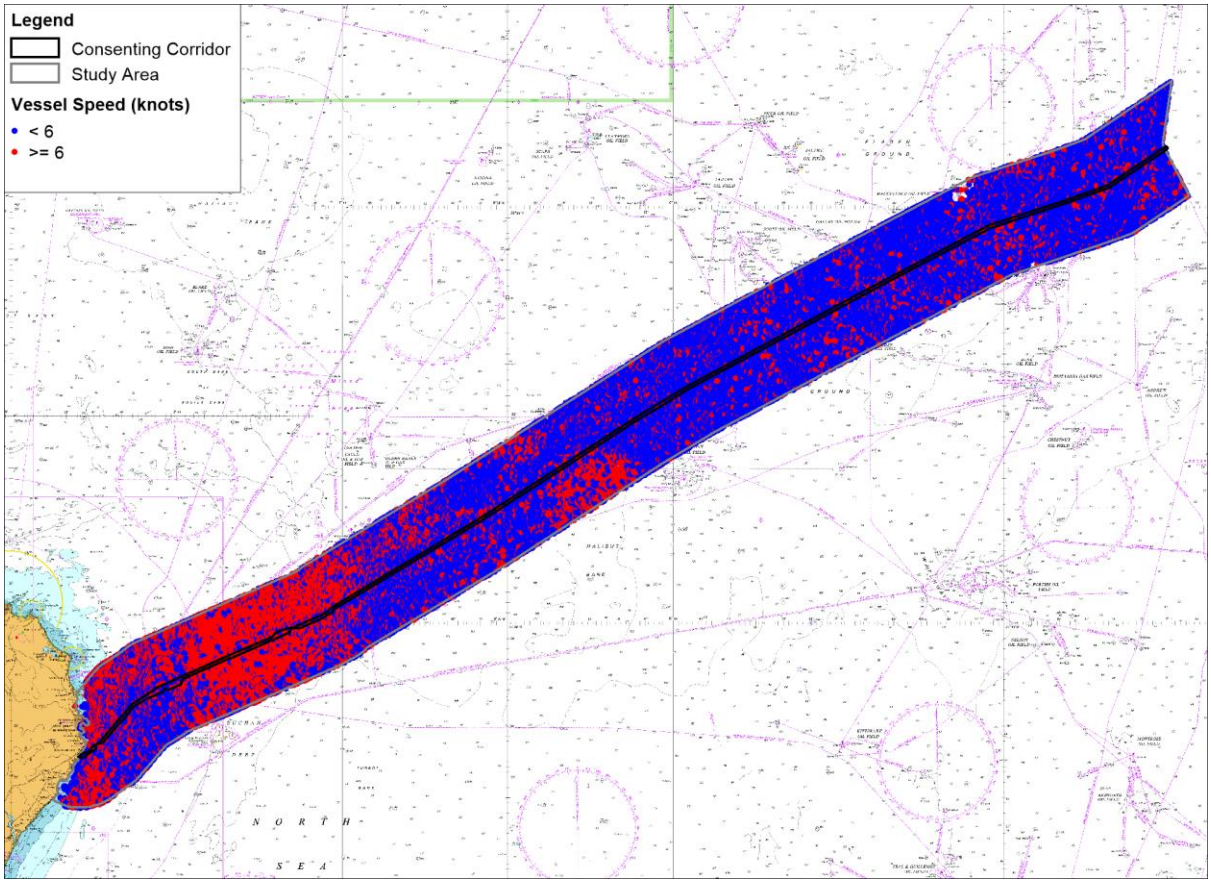

Figure 7.13 VMS Data by Vessel Speed (2014-2017)

Approximately 72% of points had speeds less than 6 knots which may mean vessels were actively engaged in fishing as opposed to transiting through the area or undertaking guard work.

7.2.3 Vessel Density

The density of VMS positions for 2014-17 within a 1km x 1km grid covering the study area is presented in Figure 7.14.

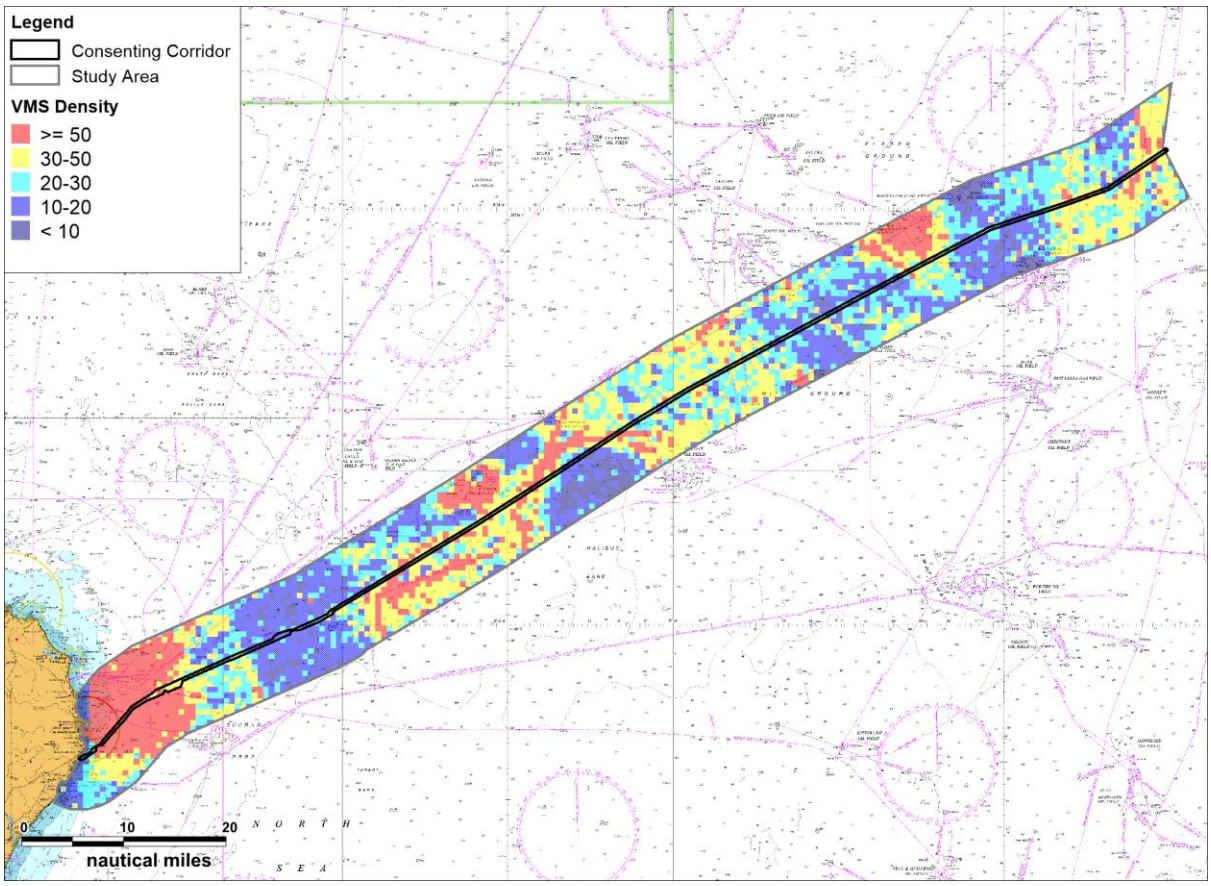

Figure 7.14 VMS Data Density (2014-2017)

It can be seen that the area with the highest density is the coastal waters near Peterhead. This is expected as Peterhead is a major fishing port. Other high density areas can be seen along the length of the cable corridor with a particular cluster near the MacCulloch Oil Field. This is likely due to fishing vessels carrying out temporary guard work that were filtered out of the AIS analysis. In general, the high density areas correspond well with the high density areas identified by the AIS data (see Figure 7.10), despite the longer time period on VMS, inclusion of vessels 12-15m length and the inclusion of guard vessels.

As mentioned previously, it is not possible to identify gear types from the VMS data so no comparison of demersal gear activity is possible.

8 Recreational Vessels

This section reviews the baseline recreational vessel activity and facilities in the vicinity of the HVDC offshore cabling based on the AIS survey and other available desktop information and consultation.

8.1 Activity Data

The AIS tracks of recreational vessels recorded in the study area during the 12 month study period are presented in Figure 8.1. Following this, Figure 8.2 presents the density of recreational vessels based on the number of track intersects per cell of 1km x 1km grid.

It is noted that the carriage of AIS equipment is not compulsory for recreational vessels and it is estimated by RYA Scotland in consultation that only about 20% of recreational craft transmit an AIS signal. These will generally tend to be larger, better equipped vessels.

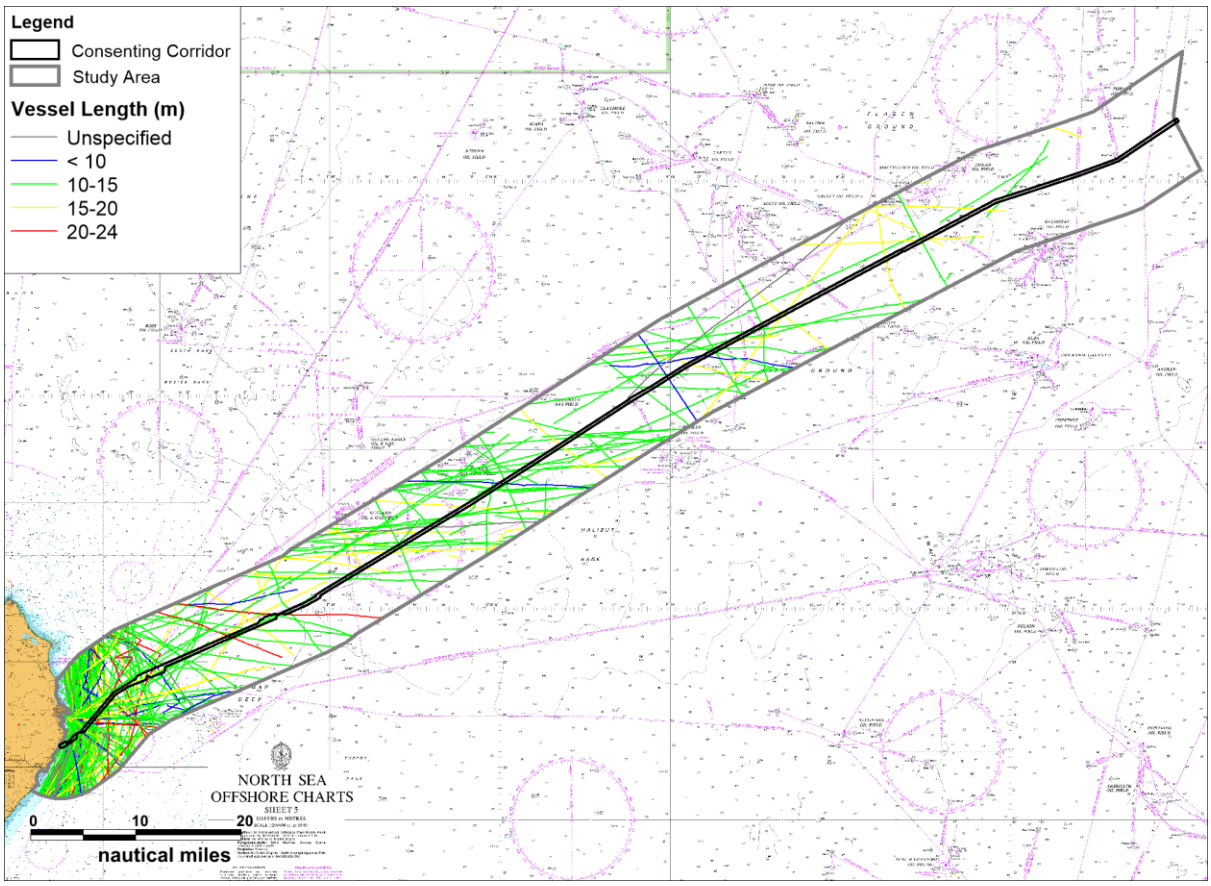

Figure 8.1 AIS Recreational Tracks by Vessel Length (2017)

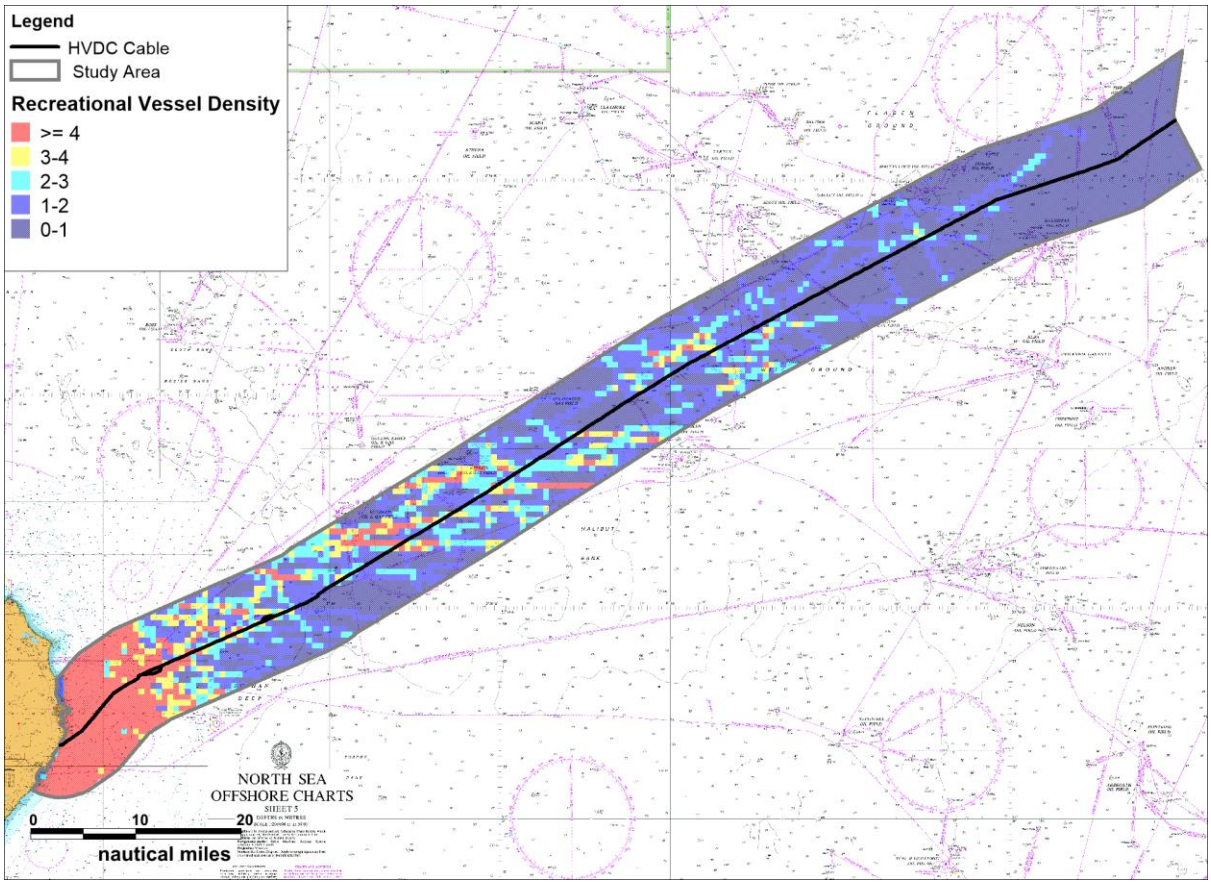

Figure 8.2 AIS Recreational Vessel Density (2017)

It can be seen that the highest density of recreational traffic was in coastal waters with fewer crossings of the cable corridor farther offshore. A more detailed view of the busier coastal area is presented in Figure 8.3.

This agrees well with the recreational AIS intensity grid available on NMPi (MarineScotland, 2018), which showed the highest density in the approaches to Peterhead harbour (based on AIS analysis provided by Anatec to the RYA for summer periods from 2011 to 2013).

It is noted that the consenting corridor is outside of indicative areas of general recreational boating identified by the RYA, which mainly relate to club training and racing areas.

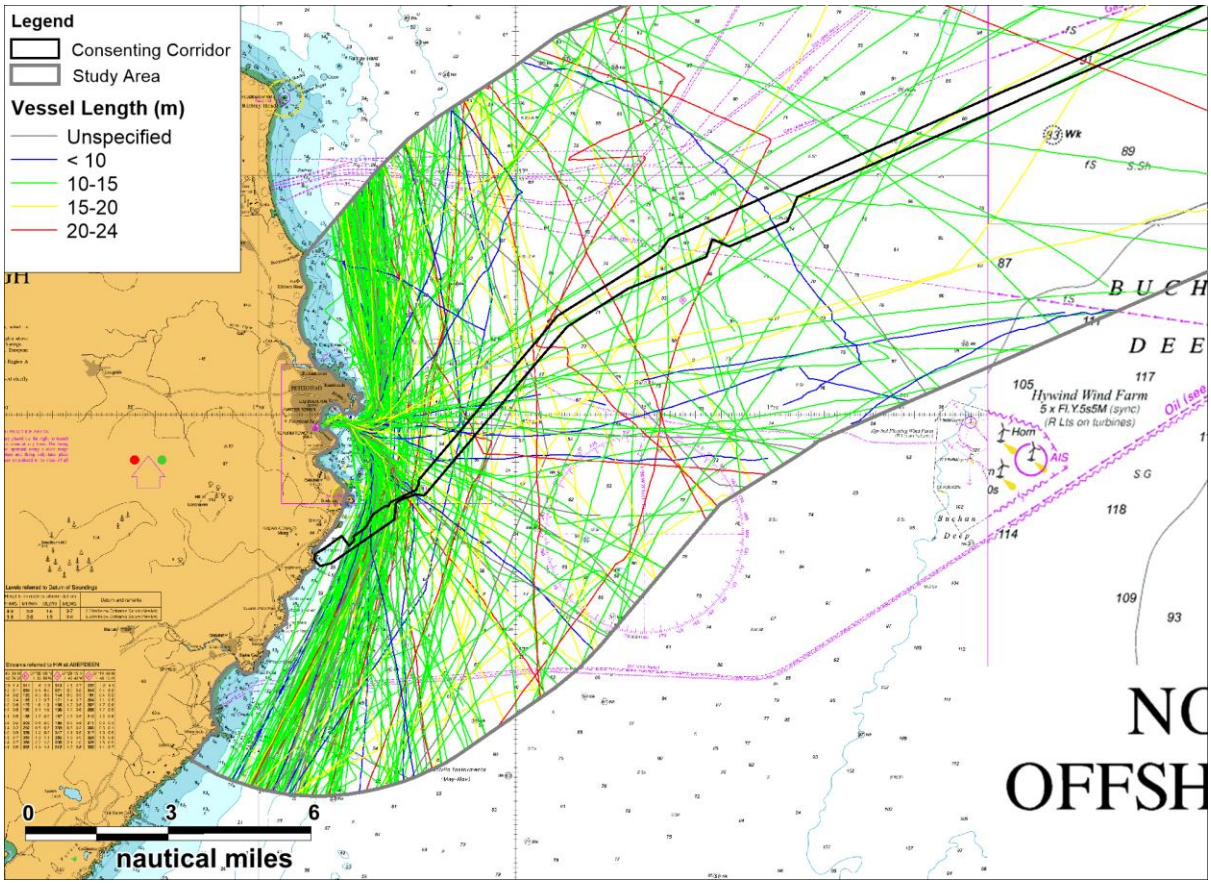

Figure 8.3 AIS Recreational Tracks by Vessel Length near Cable Landfall (2017)

The length distribution of recreational vessels recorded in the study area, excluding 6% of unspecified length, is presented in Figure 8.4.

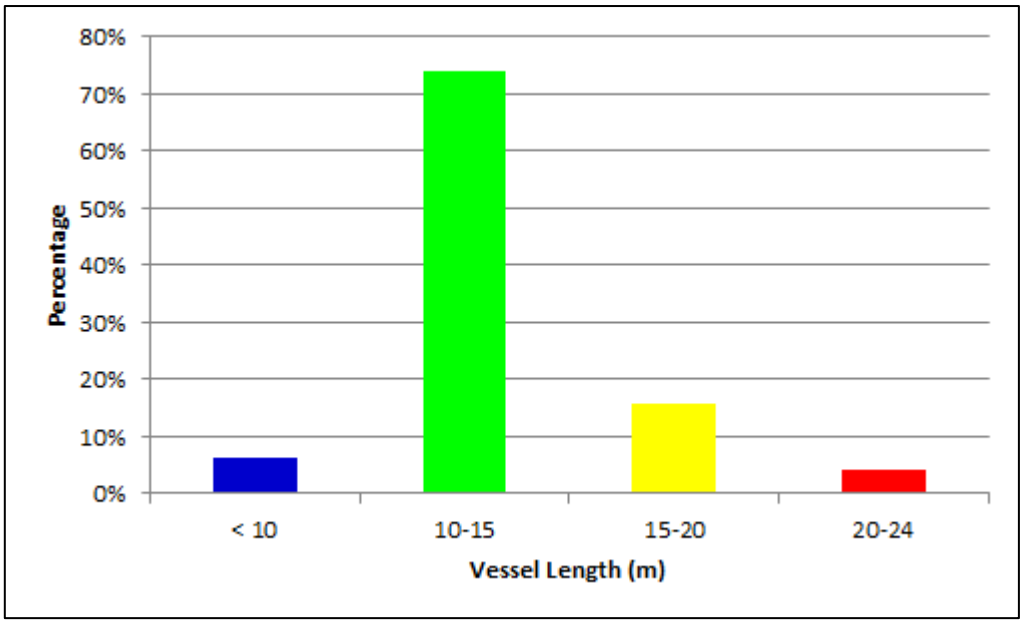

Figure 8.4 Recreational Vessel Length Distribution (2017)

The average vessel length recorded in the study area was 13m. The largest recreational vessel was a 24m motor yacht. The majority of vessels recorded in the AIS data were sailing yachts however, small power boats were also recorded.

The average number of unique recreational craft per day for each month in the study period (2017) is presented in Figure 8.5.

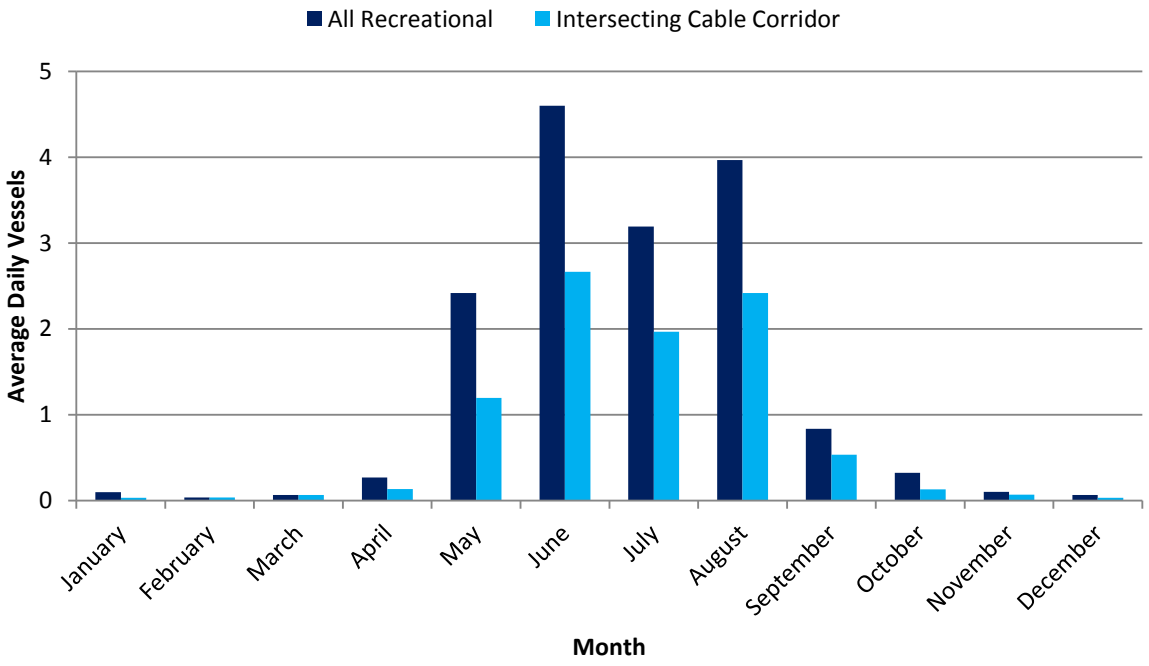

Figure 8.5 Average Daily Recreational Craft per Month (2017)

It can be seen that the summer months (May – August) recorded the largest number of recreational craft. June was the busiest month with an average of 4-5 unique vessels recorded per day in the study area and an average of 2-3 per day intersecting the consenting cable corridor. There were limited recreational sailings between January-April and October-December 2017. The most common vessel was recorded 12 times during 2017, a 14m length UK yacht.

The nationality distribution of all recreational vessels recorded in the study area is given in Figure 8.6.

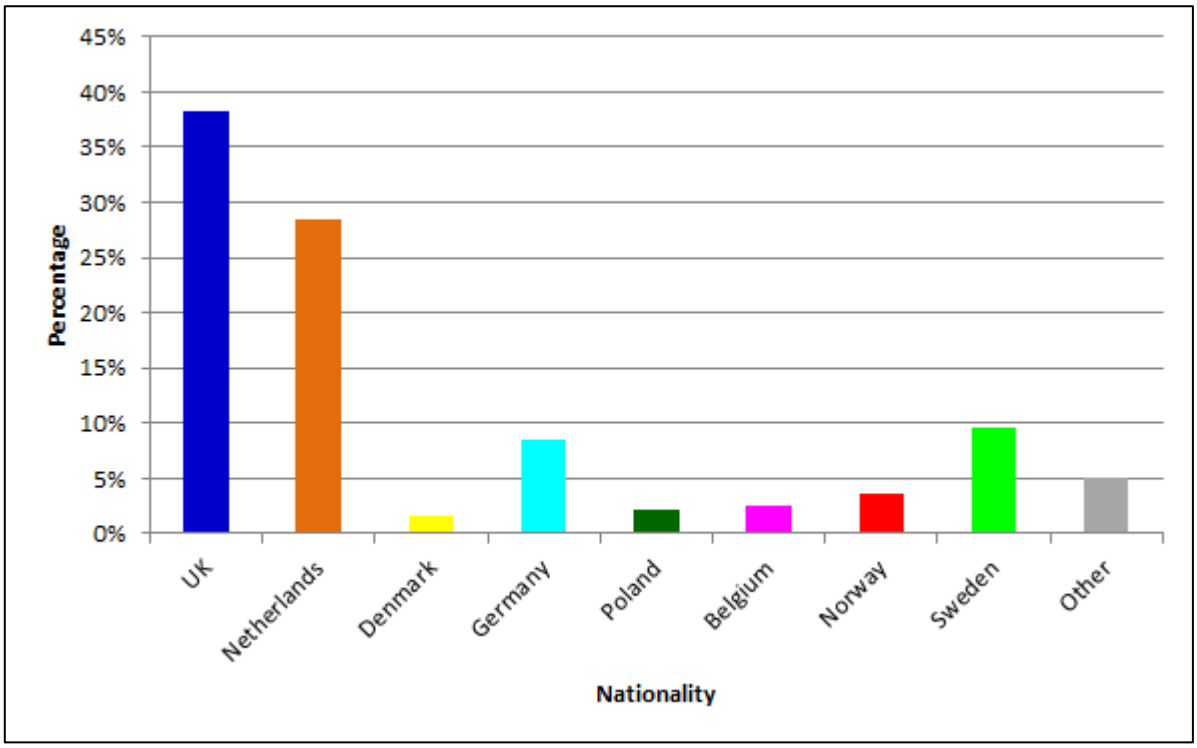

Figure 8.6 AIS Recreational Vessels Nationality Distribution (2017)

The most frequently recorded recreational vessels were UK-registered (38%), followed by Dutch (28%) and Swedish (10%) vessels. The 'other' category includes Austrian, Swiss, Irish and French vessels.

8.2 Shore-based Facilities

There are a variety of recreational vessels used in Peterhead including yachts, power boats and small personal watercraft. The harbour, including marina, offers excellent shelter in all weathers. The extensive breakwaters make the harbour accessible in all but the most severe conditions. Due to the amount of commercial, oil, and fishing traffic, all vessels must contact Harbour Control on VHF channel 14 when entering or leaving.

In the south-west section of Peterhead Bay (see Figure 8.7), protected by two stone mound breakwaters is a marina and sailing club. Peterhead Bay Marina is owned and operated by Peterhead Port Authority.

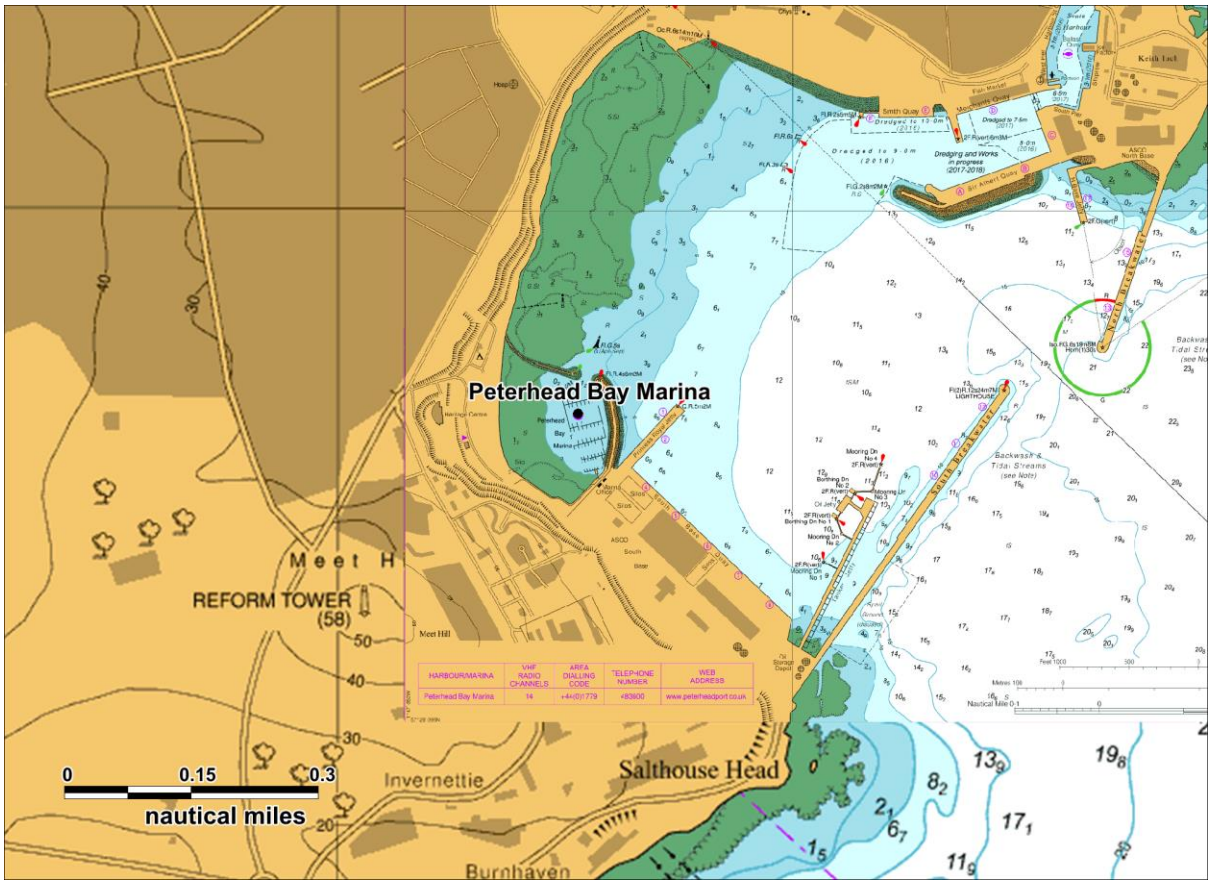

Figure 8.7 Peterhead Bay

It is widely regarded as one of the best-equipped leisure harbours in East Scotland for local and visiting recreational users. Due to its easterly position, the marina is ideally located to serve as a safe stopover point for vessels heading to and from Scandinavia. It is also used extensively by recreational vessels heading along the east coast to the Caledonian Canal and the popular sailing areas on the west coast of Scotland.

The marina accommodates vessels of up to 22m in length. At the entrance, the available depth of water is 2.3m below Chart Datum however, vessels with draughts up to 2.8m can lie afloat at the deepest berths. There are 150 fully serviced berths, and ample berths for visiting yachts. The marina usually records over 1,000 visitor nights per year.

Peterhead Sailing club belongs to its members. Activities range from learning to sail, racing and cruising. Most activity takes place in the sheltered waters of Peterhead Bay, with occasional activity further afield in the North Sea.

Three Royal Yachting Association (RYA) training centres are also located within Peterhead (MarineScotland, 2018) operated by the Sea Cadets, the North East Scotland College and Falck Safety Services.

8.3 Sailing Directions

The Clyde Cruising Club Sailing Directions for the north east coast of Scotland (Clyde Cruising Club, 2010), which was compiled with local knowledge, includes information for recreational sailors in the vicinity of Peterhead. These note that on approach, the rocky headlands north and south of Peterhead Bay must be given a berth of at least four cables (approximately 745m). The entrance between the outer breakwaters should be approached on a westerly heading to pick up the leading line of 314°. In strong to gale northeast and southeast winds the backwash from the breakwaters causes much turbulence. Accordingly early acquisition of the leading line at a distance of not less than five cables (approx. 900m) off the entrance is advised.

From the AIS track analysis, the average recreational vessel kept approximately 4-5 cables from the headlands, with a proportion of vessels passing closer than this, In the vicinity of the cable landfall at Long Haven, the closest vessel was around 400m off the coast, a 12m UK yacht.

The Directions also note that anchoring in Peterhead Bay is permitted only with the consent of Harbour Control. Sandford Bay 1NM south and subject to swell provides temporary anchorage in 4m in sand.

9 Baseline Summary

Twelve months of AIS data from January to December 2017 was analysed for a study area of 5NM around the HVDC cable consenting corridor. This ensured the data used was up-to-date and accounted for any seasonal variations in shipping. In addition, four years of VMS data was used to validate the fishing analysis within the study area.

Excluding temporary vessel activity, vessels associated with the oil and gas industry were the most frequently recorded in the study area (37%) followed by fishing vessels (34%). August was the busiest month with an average of 96 unique vessels per day recorded in the study area whilst January was the quietest with 58. Over the 12 month study period there was an average of 79 unique vessels recorded in the study area.

The average vessel length recorded in the study area was 73m and the average draught recorded was 5.3m. Vessels with DWT less than 500 were the most frequently recorded (37% of distribution) whilst only 6% of vessels recorded had a DWT greater than 15,000. The vessel with the largest DWT (499, 125) was the crane vessel, *Ocean Pioneer*. The average track speed recorded in the area was 6.4 knots.

The highest density area overall within the study area was the coastal waters of Peterhead. All anchoring activity recorded in the study area was coastal with oil and gas related vessels being the most frequently recorded (approximately 53%). The largest vessel recorded at anchor was the *Seven Atlantic* with a DWT of 11,885. Three oil and gas related vessels were identified at anchor within the consenting corridor during 2017, one of which anchored on two occasions in the area.

Demersal trawlers were the most frequently recorded (54%) gear type on AIS within the study area, followed by twin (13%) and pair trawlers (10%). Overall, there was an average of 27 unique fishing vessels per day recorded on AIS in the study area. October was the busiest month and December was the quietest. The average fishing vessel length was 28.3m. The highest density fishing area was also recorded off the coast of Peterhead, however other high density areas were recorded along the entirety of offshore cable consenting corridor.

The highest density of recreational vessels recorded on AIS was in coastal waters with less activity recorded in waters farther offshore. Peterhead has a marina and sailing club.

10 References

Clyde Cruising Club (2010). Sailing Directions and Anchorages. *N & NE Scotland and Orkney Islands.* Glasgow. Clyde Cruising Club Publications Ltd.

MarineScotland (2018). Marine Scotland Maps NMPi – Leisure and Recreation: Recreational AIS intensity. [online] Available at: <https://marinescotland.atkinsgeospatial.com/nmpi/> [Accessed 30 April 2018].

UKHO (2016). Admiralty Sailing Directions – North Sea (West) Pilot, NP54, 10th Edition. Taunton: UKHO.