Chapter 16 Commercial Fisheries

16.1 Introduction

1 This section of the Environmental Statement (ES) summarises the existing commercial fishing activities in relation to the Neart na Gaoithe offshore wind farm site and surrounding area. The chapter also describes the outcomes of the impact assessment on commercial fishing from construction, operation and decommissioning of the proposed development.

2 For the purpose of this study, commercial fishing is defined as any legal fishing activity (with the exception of salmon and sea trout fishing) undertaken for declared taxable profit. Due to the nature of the fishery, salmon and sea trout interests are assessed independently of marine commercial fishing within this chapter.

16.2 Guidance and Legislation

3 The following legislation and guidance has been taken into account when describing the nature, extent and features of the commercial fishing activities in relation to the proposed Neart na Gaoithe development:

- Part 4 of the Licence requirements (from the Marine (Scotland) Act 2010);
- Recommendations for fisheries liaison (British Wind Energy Association (BWEA), 2004);
- Guidance on licensing and environmental impact assessment (EIA) requirements for offshore wind farms (Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2004);
- Marine Scotland, Strategic Environmental Assessment (SEA) of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters (STW): Volume 1: Environmental Report Strategic Environmental Assessment (SEA) for Offshore Wind Energy in Scottish Territorial Waters (STW) (Marine Scotland, 2010);
- The Department for Energy and Climate Change (DECC), UK Offshore Energy – Strategic Environmental Assessment SEA (DECC, 2009);
- Recommendations for fisheries liaison from the Fisheries Liaison for Offshore Wind and Wet Renewables working group (FLOWW) (Department for Business, Enterprise and Regulatory Reform (BERR), BERR, 2008);
- UK Oil & Gas, Fisheries Liaison Guidelines (UK Oil & Gas, 2008);
- United Kingdom Offshore Operators Association (UKOOA), Guidelines to improve relations between Oil & Gas industries and near-shore fishermen (United Kingdom Offshore Operators Association (UKOOA), 2006);
- International Cable Protection Committee (ICPC) and United Nations Environment Programme (UNEP), Submarine cables and the oceans: connecting the world (ICPC and UNEP, 2009);
- Guidance on commercial fisheries mitigation and opportunities from offshore wind commissioned by Collaborative Offshore Wind Research into the Environment (COWRIE), (Blyth-Skyrme, 2010); and
- Scoping responses (refer to Appendix 6.1: Scoping Opinion).

16.3 Data Sources

4 The following technical reports support this chapter and can be found in Appendices 16.1 and 16.2:

- Commercial Fisheries Baseline Technical Report (Appendix 16.1); and
- Salmon and Sea Trout Fisheries Baseline Technical Report (Appendix 16.2).

5 The principal sources of data and information used for the collation of the commercial fisheries baseline were:

- International Council for the Exploration of the Seas (ICES);
- Marine Management Organisation (MMO);
- Marine Scotland;
- Marine Scotland Science;
- Association of Salmon Fishery Boards (ASFB);
- Salmon Net Fishing Association of Scotland (SNFAS);
- Relevant District Salmon Fishery Boards and Fisheries Trusts;
- Atlantic Salmon Trust (AST);
- Scientific papers and other relevant publications;
- European Commission – Fisheries (Europa); and
- Brown and May Marine in-house databases.

6 There are some uncertainties surrounding specific data and information used to inform the baseline. A full description of the sensitivities and qualifications of these data sources is given in Appendix 16.1: Commercial Fisheries Baseline Technical Report, and is summarised below:

- ICES rectangles: smallest spatial unit for the collation of fisheries statistics but large sea area relative to the offshore works area;
- MMO fisheries statistics: vessels under 10 m are not currently obliged to submit daily log sheets, although other schemes[1] started in 2005 have facilitated the collection of data for this fleet;
- MMO surveillance: relatively low frequency of flights in a given area and so cannot be used for quantitative assessment;
- MMO/Marine Scotland Vessel Monitoring System (VMS) datasets: Satellite tracking applies only to over 15 m vessels; and
- Information gathered during consultation: identification of fishing grounds was generally provided in paper format and so may lack detail and suffer from a degree of inaccuracy. Information was used as supplied and has not been amended.

[1] Shellfish Entitlement Scheme (2004), Registration of Buyers and Sellers of First Sale Fish and Designation Auction Site Scheme (2005).

16.3.1 Desk Study

16.3.1.1 Literature Review

7 The following reports were reviewed and relevant information included in the baseline:

- ICES Stock Assessment Reports and other publications of relevance;
- European Commission (EC), National and Local Fisheries Legislation;
- Marine Scotland and Marine Scotland Science publications;
- Oil & Gas UK publications;
- Cefas publications;
- District Salmon Fishery Boards and Fisheries Trusts publications;
- AST publications; and
- Other relevant research publications.

16.3.1.2 Statistical Datasets

8 The following statistical datasets were analysed for inclusion in the baseline:

- MMO Fisheries Statistics, landings values and effort datasets (species, fishing methods, vessel by length category, annual variations, seasonal variations and port);
- MMO Surveillance Sightings;
- MMO UK Satellite Tracking (vessel monitoring systems (VMS)) Data;
- Marine Scotland Satellite Tracking (VMS) Data;
- Marine Scotland Data Analysis;
- Marine Scotland Salmon and Sea Trout Catch Statistics by Salmon Fishery Region (1952-2009); and
- Marine Scotland Salmon and Sea Trout Catch Statistics by Salmon Fishery District (2000-2009).

16.3.2 Engagement and Commitments

9 The Neart na Gaoithe development has engaged the local and wider fishing industry since the beginning of the project development. Fishing Industry Representatives (FIRs) were recruited at an early stage to facilitate effective, ongoing dialogue with the fishing community. In addition, regular updates have been provided to the South East Inshore Fisheries Group Engagement (SE IFG), and open and advertised public meetings have been held with the fishing community in Fife, Angus and East Lothian to discuss the project and ascertain concerns. The same commitment to engagement will be applied throughout all future project stages.

10 In addition to the site-specific meetings, the Forth and Tay Offshore Wind Farm Developers Group (FTOWDG) (refer to Chapter 6: The Approach to Environmental Impact Assessment and Chapter 7: Engagement and Commitments) collaborated to hold joint fisheries meetings where all projects were discussed. The FTOWDG is committed to ongoing engagement with commercial fisheries interests during the development phases of the projects to ensure that a collaborative approach is continued. It is proposed that a regional Working Group is established to facilitate future engagement of the fishing industry and the FTOWDG. Members will include:

- FTOWDG;
- Marine Scotland;
- The Crown Estate;
- FIRs; and
- Nominated local fishermen or their representatives.

11 The objectives of the Working Group may include, but not necessarily be limited to, the development of collaborative mitigation options and defining aspects of construction management plans which can feasibly be standardised.

12 In addition to the Working Group, regular and advertised public fisheries meetings, open to all fishing interests, will be held.

16.3.2.1 Strategic and Site Level Requirements

13 There are a number of requirements and recommendations from strategic plans and through the project scoping opinion. Information on these and information on how they have been addressed in this chapter is detailed in Table 16.1.

16.3.2.2 Consultation

14 Consultation with commercial fisheries interests has been ongoing throughout the EIA process for the purpose of gathering additional information in support of statistical datasets. In addition to this consultation, liaison with stakeholders was undertaken to provide and share project information and to ensure that fisheries stakeholders' concerns are fully understood and addressed.

15 Fishing Industry Representatives (FIRs) were recruited at an early stage of the project development to assist with engaging the wider fishing community and facilitate the effective dissemination of project information. FIRs were identified in consultation with the Scottish Fishermen's Federation with the aim of recruiting individuals with local knowledge of the study area (refer to Section 16.4.5) and to act as a first point of contact for fisheries stakeholders.

16 Consultation was undertaken with commercial fisheries organisations listed below:

- Scottish Fishermen's Federation (SFF);
- Fishermen's Mutual Association (Pittenweem) (FMA);
- Anglo Scottish Fishermen's Association;
- Scallop Association;
- Arbroath Fishermen's Association;
- Cockenzie and Port Seton Fishermen's Association;
- Marine Scotland;
- South East Inshore Fisheries Group;
- Anstruther Fishery Office;
- Eyemouth Fishery Office;
- Aberdeen Fishery Office; and
- Individual fishermen and their representatives.

17 Salmon and sea trout fishery consultation was undertaken with the District Salmon Fishery Boards (DSFB), as listed below, and with representatives of the net fishery.

- Tweed District Salmon Fishery Board;
- Forth District Salmon Fishery Board;
- Tay District Salmon Fishery Board;
- Esk District Salmon Fishery Board; and
- Usan Salmon Fisheries Ltd (Montrose).

18 In addition to the above meetings, questionnaires were circulated to all the DSFBs in Scotland through the ASFB, and to netsmen through the SNFAS.

Source	Comment	Relevance/reference
Blue Seas Green Energy: A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters. Part A: The Plan Post Adoption Statement (Marine Scotland, 2011a)	The Scottish Government encourages offshore wind energy developers to actively engage with national and local fishing organisations to ensure that fishing activities can continue with minimal disturbance.	See Section 16.3.2: Engagement and Commitments.
	Developments should be fully assessed to identify, and where possible, mitigate their effects on fishing activity.	See Section 16.1: Impact Assessment and Section 16.7: Cumulative and In-Combination Impact Assessment
	Fishing grounds of particular economic importance to coastal communities, where known, should be avoided or the effects of development mitigated through appropriate positioning within the option boundary.	See Section 16.7: Cumulative and In-Combination Impact Assessment
	Cumulative effects on fishing and potential effects of displacement of fishing activity require further work at the project level.	See Section 16.7: Cumulative and In-Combination Impact Assessment Refer to Chapter 25: Summary of Mitigation
	There is an identified need for better information on the distribution of fishing activity, especially small vessels. The Scottish Government is working on mapping fishing activity with a plan to expand mapping nationwide. It is anticipated that roll out will be prioritised in consultation with Scottish fishing industry representative bodies. The fishing activity data gathered at the regional level will be used to inform the plan review and project level assessments.	Noted.
Economic Assessment of Short Term Options for Offshore Wind Energy in Scottish Territorial Waters: Costs and Benefits to Other Marine Users and Interests Blue Seas Green Energy - Economic assessment: Costs and Benefits to other marine users (Marine Scotland, 2011b)	The preferred method for site level assessments of economic impact on commercial fisheries uses accurate estimates of the number of boats from local ports visiting the area in question, by gear type, and proportion of year spent there or annual income derived from the site.	See Appendix 16.1: Commercial Fisheries Baseline Technical Report.
	Actual impacts on commercial fisheries will be sensitive to the outcomes of discussions between developers and fisheries representatives as to what types of activity could continue in the array/cable route.	See Section 16.7: Cumulative and In-Combination Impact Assessment
Scoping Opinion (Fife Council advice))	Impact should be assessed on operational fishing fleets from the East Neuk ports (Pittenweem) targeting the Wee Bankie.	See Section 16.1: Impact Assessment and Appendix 16.1: Commercial Fisheries Baseline Technical Report.
Scoping Opinion (Maritime and Coastguard Agency (MCA) advice)	Requested that the Commercial Fisheries chapter is extended in appendix.	See Section 16.5: Baseline Description and Appendix 16.1: Commercial Fisheries Baseline Technical Report.
Scoping Opinion (Scottish Natural Heritage (SNH) advice))	Recommend liaison and consultation with the South East Inshore Fisheries Group for baseline and impact information.	See Section 16.3.2: Engagement and Commitments.
	Many local vessels are <15 m (not covered by VMS). Recommend liaison with local industry associations and IFG.	See Section 16.3.2: Engagement and Commitments.
	Suggest a squid fishery could be in the development area. Assessment of this and potential interactions with marine mammals suggested.	See Section 16.1: Impact Assessment and Chapter 13: Marine Mammals.
	Suggested Nephrops, scallops and bivalves and associated fisheries may be present.	See Section 16.5: Baseline Description, Section 16.1: Impact Assessment and Appendix 16.1: Commercial Fisheries Baseline Technical Report.
	Commercial survey techniques should be agreed with Marine Scotland Science to ensure they are appropriate.	Addressed in Chapter 15: Fish and Shellfish Ecology.
	Spawning and nursery grounds are not geographically or temporally fixed. Consult Marine Scotland Science to check data and survey techniques are appropriate.	Addressed in Chapter 15: Fish and Shellfish Ecology.
	If impacts identified to spawning events/nursery grounds and the vicinity of the development site, mitigation should be used to minimise impacts (e.g., timing of works).	Addressed in Chapter 15: Fish and Shellfish Ecology.
	Benthos recovery will vary (e.g., turbine layout hydrodynamics). Suggested excluding mobile gear and the combined impact could aid recovery. Suggested that this could result in higher commercial stocks in area (including unexploited) and overspill to adjacent areas.	Addressed in Chapter 15: Fish and Shellfish Ecology.
Scoping Opinion (ASFB advice)	Consultation with local District Salmon Fishery Boards (Tay and Forth) is required for any impacts on salmon or sea trout.	See Section 16.3.2: Engagement and Commitments.
	Impacts on migratory fish should include assessment of direct effects of noise and vibration, water quality, and Electromagnetic Fields (EMF) and indirect effects of habitat changes and water quality changes.	Addressed in Chapter 15: Fish and Shellfish Ecology.
Scoping Opinion (Scottish Environmental Protection Agency (SEPA advice))	Require consideration of prevention and clean-up measures for construction, operation and decommissioning, to address impacts such as increased sediment loading, point source pollution, migration disturbance, spawning disturbance, drainage and water quality issues and contamination. Suggest consultation with IFG.	Will be addressed in Construction and Environmental Management Plans (CEMP).

Table 16.1: Strategic and site level commitments and requirements - commercial fisheries

16.4 Impact Assessment Methodology

19 The overall methodology to assess environmental impacts is outlined in Chapter 6: The Approach to Environmental Impact Assessment. This section describes the specific approach to assessing the impacts from the proposed project for commercial fisheries, including salmon and sea trout fisheries.

20 As a result of salmon and sea trout fisheries being either in-river or, to a lesser extent, coastal dwellers, only indirect impacts are assessed. A full assessment of the potential impacts on the species is therefore described in Chapter 15: Fish and Shellfish Ecology and summarised below.

16.4.1 The Rochdale Envelope

21 The engineering and design parameters given in Chapter 5: Project Description have been evaluated to identify the worst (realistic) case scenario specifically for commercial fisheries. This receptor specific Rochdale Envelope is considered to demonstrate the worst possible situation within the available construction parameters.

22 Commercial fishing activities in the area are considered to interact with, and be affected by, the proposed development in one of two ways:

- The wind farm and its associated infrastructure and operations have the potential to constitute a physical obstacle to the continuation of normal fishing activities, resulting in possible impacts on navigational safety of fishing vessels as well as impacts such as displacement; and
- The development results in a number of indirect impacts (refer to Chapter 15: Fish and Shellfish Ecology) to populations of fish and shellfish that are targeted commercially.

16.4.1.1 Rochdale Envelope for Physical Obstruction

23 In terms of physical obstruction, the worst case scenario for commercial fishing would be the highest density of turbines with the minimum spacing between devices, resulting in the largest loss of seabed area (grounds available to commercial fishing). For both inter-array and export cables, the worst case scenario would be having the cables laid directly onto the surface of the seabed and protected by scour protection (i.e., not buried).

24 The design parameters considered to illustrate the worst (realistic) case scenario for commercial fishing activities are summarised in Table 16.2 below.

25 Worst case parameters for fish and shellfish species, the impact of which has an indirect impact on commercial fisheries, is discussed in Chapter 15: Fish and Shellfish Ecology.

16.4.1.2 Rochdale Envelope for Indirect Effects

26 As the potential impacts from the development on commercial fish and shellfish populations are an indirect impact as a result of direct impacts on the species themselves, the scenarios to assess these potential impacts are discussed in Chapter 15: Fish and Shellfish Ecology.

Worst (realistic) case parameters	Specifications
Wind turbine layout	
Turbine rated output	3.6 MW
Total number of turbines	125 turbines in a possible 128 locations
Layout figure reference	Layout A
Minimum spacing between turbines	450 m
Foundations and substructure	
Foundation type	Gravity base
Footprint of individual turbine	1,134 m^2 (for 3.6 MW turbines of 30 m diameter, including associated scour protection of up to 8m)
Combined footprint (loss of area to commercial fisheries) of all turbine foundations (i.e., seabed loss for 125 turbines)	141,764 m^2 (0.14 km^2)(For 125 x 3.6MW turbines)
Inter-array cables	
Estimated total length	140 km
Post installation status	Buried where feasible and protected with scour protection elsewhere
Burial depth	Up to 1-1.5 m
Additional offshore infrastructure	
Maximum number of substations	2
Combined footprint (loss of area to commercial fisheries) of other infrastructure (substations)	1,000 m^2
Export cables	
Maximum number of cables	2
Cable type	High Voltage Alternating Current (HVAC)
Maximum route length	33 km
Maximum distance between cables	300 m
Post installation status	Buried or covered with scour protection
Burial depth	Up to 1-3 m
Schedule	
Maximum number of simultaneous construction events	2
Duration of wind farm construction activities	2 years
Duration of cable installation works	Several months

Table 16.2: Summary of worst (realistic) case parameters for commercial fisheries

16.4.2 Approach to Impact Assessment

27 In the absence of specific published guidelines from Marine Scotland regarding an assessment of the impacts of wind farm development on commercial fishing activities, the aspects requiring assessment for the proposed development are based on those described in the joint Cefas/Marine Consents and Environment Unit (MCEU) Guidelines (Cefas *et al*., 2004):

- Implications for fisheries during the construction phase;
- Implications for fisheries when the development is completed;
- Adverse impacts on commercially exploited fish and shellfish populations;
- Adverse impacts on recreational fish populations;
- Complete loss or restricted access to traditional fishing grounds;
- Safety issues for fishing vessels;
- Interference with fisheries activities;
- Increased steaming times to fishing grounds;
- Obstacles on the seabed post-construction; and
- Any other concerns raised by local fishermen and fishing organisations.

28 Responses included within the scoping opinion have also been considered as part of the impact assessment process.

29 In addition to the above, the following potential impact has been included as a result of consultation with fishing interests:

- Displacement of fishing activity into other fishing areas.

30 Impacts are assessed at each of the discrete phases of development; construction, operation and maintenance and decommissioning. Impacts arising in the construction and decommissioning phases are considered to be analogous and as such are assessed jointly.

31 In addition to the site-specific assessment, cumulative and in-combination impacts arising from the interaction with other marine developments are discussed in Section 16.8.

32 The assessment has primarily identified receptors on a fishery by fishery basis. In the case of commercial fishing, however, it is noted that certain individual vessels may spend more time in fishing grounds in the vicinity of the Neart na Gaoithe development than others.

33 Impacts relating to loss of fishing grounds or displacement from fishing grounds, navigation and steaming times, and safety issues for fishing vessels are considered for the fishing activities occurring within and in the vicinity of the offshore works area.

16.4.3 Significance Criteria

34 The significance matrix is as described in Chapter 6: The Approach to Environmental Impact Assessment and the parameters defined in the tables below. Impacts of offshore wind developments on commercial fishing activities cannot be easily categorised and as a result, the application of significance criteria to an assessment of impacts is necessarily subjective.

35 In the instances whereby the potential impact of the development poses a risk to the health and safety of a fishing vessel and crew, the significance criteria used for the assessment cannot be applied. Instead, the risk is assessed to be within or outside acceptable limits. A risk is considered to be outside of acceptable limits if it is greater than that incurred during the course of normal fishing operations. However, it is noted that skippers will make individual assessments of risk, which may vary.

16.4.3.1 Magnitude of Effect

36 The magnitude of an effect is considered for each predicted impact on a fishery by fishery basis. In each instance, the following characteristics are taken into account (effects on the ecology of commercial species are described in Chapter 15: Fish and Shellfish Ecology):

- Spatial extent: the area within which fishing vessels (by fishery) are unable to undertake normal fishing activities as a result of the construction/decommissioning and operation of the wind farm and export cables, relative to available fishing grounds;
- Duration: the temporal extent that fishing vessels (by fishery) are unable to resume normal fishing activities as a result of the construction/decommissioning and operation of the wind farm and export cables.
- Frequency: the number of times the effect occurs; and
- Severity: the degree of change.

37 Table 16.3 defines the parameters of each characteristic which contributes to the magnitude of effect.

Characteristic	Categories	Definition / description
Spatial Extent (S)	Negligible	Negligible; not in the proximity of fishing grounds, or very low intensity fishing grounds. Low spatial extent.
	Low	Low; in the proximity of low intensity fishing grounds. Low spatial extent.
	Medium	Medium; in the proximity of frequently targeted fishing grounds which are moderately important on a regional level. Moderate spatial extent.
	High	High; high intensity fishing grounds important on a regional and national level. High spatial extent.
Duration (D)	Negligible	Very short term, or in periods of very low fishing activities.
	Low	Short term or outwith of principal seasonal sensitivities.
	Medium	Temporary (i.e. during construction period).
	High	Permanent (for the operational life).
Frequency (F)	Does not apply to commercial fishing because it is assumed that works will be consistent throughout the construction/decommissioning periods. In the case of operation, the assessment considers the installed infrastructure.	
Severity (S)	Negligible	No discernible, or very low change in normal fishing practices.
	Low	Some amendment in fishing patterns but no significant change.
	Medium	Fishing practices have limited access and there is a discernible reduction of fishing activity in the area of the development.
	High	Fishing activities cannot resume in the area of the development.

Table 16.3: Magnitude of effect

16.4.3.2 Vulnerability of Receptor

38 The vulnerability of the receptor is considered for each predicted impact on a fishery by fishery basis. In each instance, the following characteristics are taken into account:

- Adaptability (the ability of the fishing vessels (by fishery) to avoid or adapt to the effect). High adaptability results in low vulnerability;
- Tolerance (the ability of fishing vessels to be temporarily and/or permanently affected). High tolerance results in low vulnerability;
- Recoverability (how well fisheries recover following exposure to an effect). High recoverability results in low vulnerability; and
- Value (the scale of importance, rarity and relative worth of the fisheries affected). High value results in high vulnerability.

39 Table 16.4 below defines the parameters of each characteristic which contributes to the vulnerability of the receptor:

Characteristic	Categories	Definition / description
Adaptability (A)	Negligible	Fishing vessels cannot adapt to fishing in the area of the development.
	Low	Fishing vessels are limited in their ability to adapt and there is a discernible reduction in activity in the area of the development.
	Medium	Fishing vessels are required to amend fishing practices slightly but no significant change.
	High	Fishing vessels are not required to avoid or adapt to an effect.
Tolerance (T)	Negligible	Fishing activities cannot resume.
	Low	During peak fishing period and discernible changes in normal fishing practices.
	Medium	Outside of peak fishing periods or low change in normal fishing practices.
	High	No discernible, or very low change, in normal fishing practices.
Recoverability (R)	Negligible	Permanent (for the operational life of the wind farm).
	Low	Temporary (i.e., during construction period).
	Medium	Short term or recoverability outwith the principal seasonal sensitivities.
	High	Very short term, or with recoverability within a period of very low fishing activity.
Value (V)	Negligible	Very low loss of economic value of fishery affected on a local level.
	Low	Low loss of economic value of fishery affected on a local level.
	Medium	Moderate loss of economic value of fishery affected on a regional scale.
	High	High loss of economic value of fishery affected on a regional scale.

Table 16.4: Characteristic parameters for vulnerability of receptor relevant to commercial fisheries receptors

16.4.4 Overall Significance

40 The magnitude of the effect and then vulnerability of the receptor combine to give the significance of the impact, as described in Chapter 6: The Approach to Environmental Impact Assessment.

41 Where an impact has been assessed as significant it is then appropriate to consider criteria for the validity of the inputs. Where the probability of the effect occurring as predicted is considered to be unlikely or the data are considered to be unreliable the influence of these on the outcome should be examined. Ultimately, the overall significance will not change, but the importance of the assessed impact can be placed in the wider project context.

16.4.4.1 Probability

42 The probability of most impacts occurring as predicted with respect to commercial fisheries is high. This is because many impacts relate to factors such as direct project parameters, numbers of wind turbines and construction periods.

43 The probability of indirect impacts on commercial fisheries as a result of direct impacts on fish and shellfish species is discussed in Chapter 15: Fish and Shellfish Ecology.

16.4.4.2 Certainty

44 A principal limitation of an assessment of impacts on commercial fishing activities is the potential of the established baseline to change over time. As a result, the scope of the impact assessment is limited by the baseline identified.

45 Furthermore, the limitations of the data and information sources should be taken into account: it is problematic to describe in detail the activities of fishing vessels within discrete areas such as offshore wind farms, particularly in the case of the under 15 m fleet, which is not currently monitored by VMS. As a result, a variety of data and information sources are required and are analysed and cross-referenced.

16.4.5 Study Area

46 The study area for commercial fisheries, with the exception of salmon and sea trout fisheries, is shown in Figure 16.1 below. The approach has been to provide a brief national overview (national study area) to provide context for the fishing grounds identified within the general area of the wind farm. The regional study area has subsequently been defined to ensure sufficient coverage of the areas surrounding the proposed development. The local study area is the smallest available spatial unit used for the collation of fisheries statistics. When possible, fishing activities within the offshore works area itself have been further described.

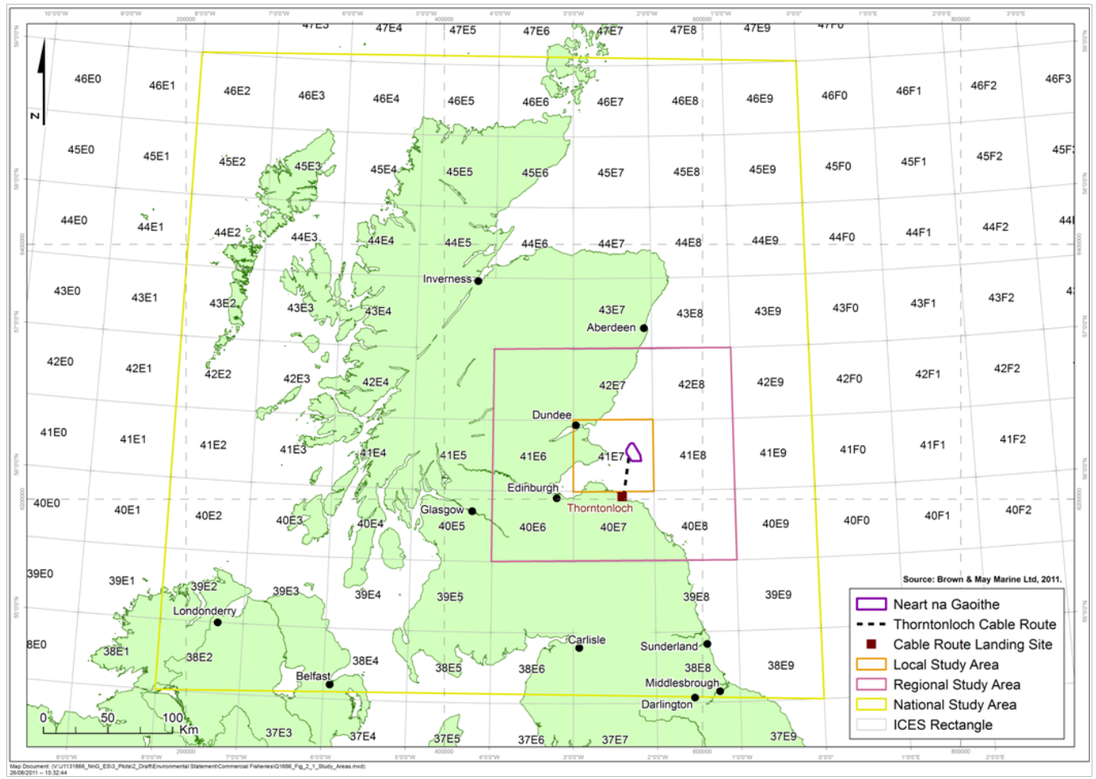


Figure 16.1: Commercial fisheries study area (not including salmon and sea trout fisheries)

47 For salmon and sea trout fisheries, the local study area is defined by the local DSFB. The regional area covers other DSFBs surrounding the Forth and Tay. Given the migratory behaviour of salmon and sea trout, data and information at a Scottish level have also been briefly described. The study area for salmon and sea-trout fisheries is shown in Figure 16.2.

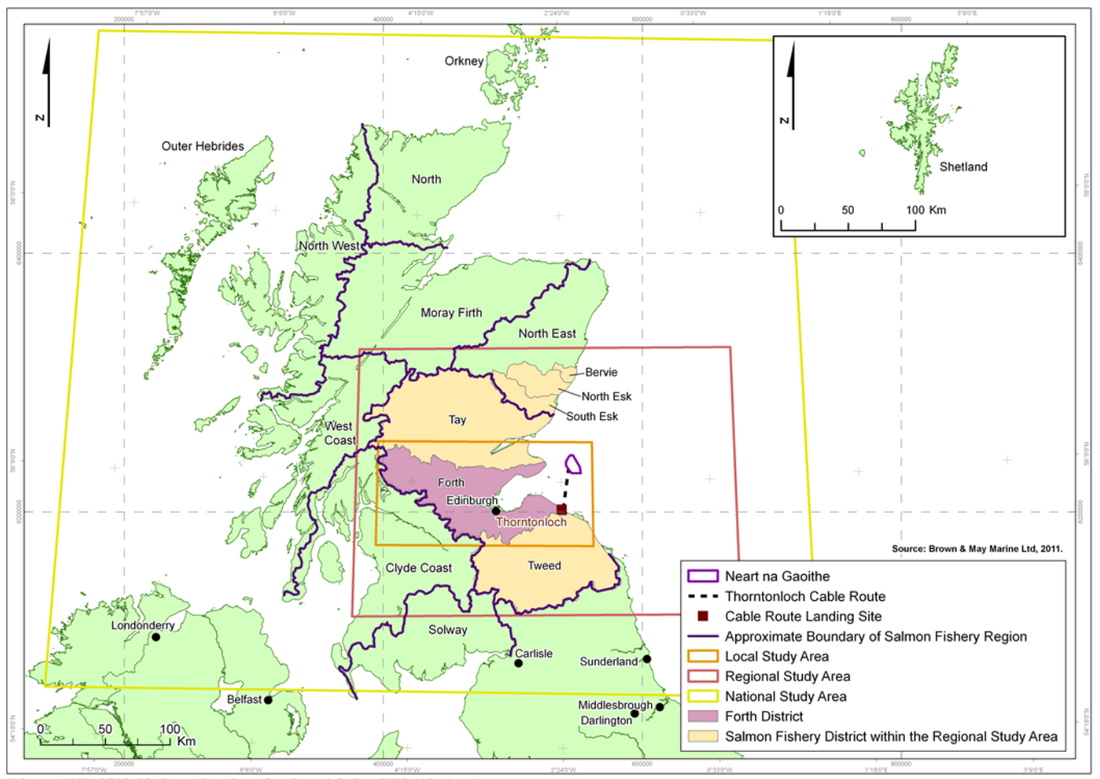


Figure 16.2: Salmon and sea trout fisheries study area

16.4.6 Cumulative and In-Combination Impact Assessment Approach

48 The methodology and assessment criteria for the assessment of cumulative and in-combination impacts are as described in Section 16.4.2.

49 The geographical scope of the assessment is as described above, and focuses principally on cumulative impacts in the Forth and Tay area from the Firth of Forth Round 3 Zone 2 and the Inch Cape offshore wind farm developments.

50 Exceptions to this are the potential impacts on the scallop fishery, a highly nomadic fleet. Due to the nomadic nature of the majority of the scallop fishery, and their ability to variously target grounds around the UK, it is necessary to consider development activities around the UK rather than local or regional vessels only.

51 The assessment of cumulative and in-combination impacts on commercial fishing activities arising from the consideration of Neart na Gaoithe, in conjunction with other planned development activities, takes into account the following elements:

- Firth of Forth Round 3 Zone 2 offshore wind farm and export cables;
- Inch Cape offshore wind farm and export cables (Scottish territorial waters (STW));
- Other offshore wind farms and renewable developments (outwith the Forth and Tay region);
- Shipping; and
- Marine Protected Areas (MPAs) and other closed or restricted areas.

52 The cumulative and in-combination impact assessment also takes into account the responses and concerns gathered during the stakeholder consultation process.

16.4.6.1 Cumulative Rochdale Envelopes

53 Collaborative work with the developers of other projects in the Forth and Tay region has resulted in development of a 'cumulative Rochdale Envelope' based on the project parameters for the proposed Neart na Gaoithe, Inch Cape and Firth of Forth Round 3 Zone 2 wind farm developments (see Chapter 5: Project Description and Chapter 6: The Approach to Environmental Impact Assessment for further information).

54 As with the site-specific Rochdale Envelope, the worst case scenario for fishing is a high density of turbines with the minimum spacing between devices, or other parameters that result in the worst case for restriction of access to fishing grounds.

55 It is important to note that since the assessment was completed the values for the Inch Cape offshore wind farm Rochdale Envelope (specifically the number of turbines and met masts) were refined. As the assessment had been completed for the larger number of turbines, the conclusions can be considered to be more conservative. The design parameters for each development indicate the following worst case parameters of wind farm design in terms of commercial fisheries.

56 The cumulative and in-combination impact assessment is presented in Section 16.8: Cumulative and In-Combination Impact Assessment.

Worst case parameters	Specifications
Maximum development area	150 km²
Maximum number of turbines	286 *(revised down to 213)*
Minimum spacing (crosswind)	600 m
Minimum spacing (downwind)	840 m
Foundation type	Floating structures (with moorings)
Footprint of individual mooring spread	Circa 1 km per turbine
Maximum number of offshore platforms	5
Maximum number of met masts	3 *(revised to 1)*
Export cable landfall	Unknown
Maximum export cable length	75 km
Cable burial depth	Buried where feasible, up to 1.5 m

Table 16.5: Inch Cape offshore wind farm development parameters

Worst (realistic) case parameters	Specifications
Phase 1 wind farm	
Maximum development area	390 km²
Maximum number of turbines	299 x 3.6 MW turbines
Minimum spacing (crosswind)	720 m
Minimum spacing (downwind)	960 m
Foundation type	Gravity base structure
Footprint of individual foundation including scour protection	7,281 m² per turbine
Maximum number of offshore platforms	5 (2 HVAC and 3 High Voltage Direct Current (HVDC)
Maximum number of met masts	3 x gravity base structures
Export cable landfall	Arbroath or Carnoustie
Maximum export cable length	208 km
Cable burial depth	Buried where feasible, up to 1.5 m
Phase 2 and 3 wind farms	
Maximum number of turbines	Phase 2: 304 x 6 MW turbines Phase 3: 132 x 6 MW turbines
Maximum spacing (crosswind)	726 m
Minimum spacing (downwind)	1,008 m
Foundation type	Gravity base structure
Footprint including scour protection	10,923 m² per turbine
Maximum number of met masts	3 x gravity base structures in each phase

Table 16.6: Firth of Forth Round 3 Zone 2 wind farm development parameters

16.5 Baseline Description

16.5.1 Overview of Commercial Fisheries

57 This section considers commercial fishing activities currently undertaken in the study area. Salmon and sea trout fisheries are separately discussed in Section 16.5.7 as a result of the different nature of this fishery and approach required for this assessment.

58 The Neart na Gaoithe offshore wind farm development is located in ICES rectangle 41E7. The landings values recorded here are of relative importance compared with those across Scotland and are the highest in the regional study area (see Figure 16.3).

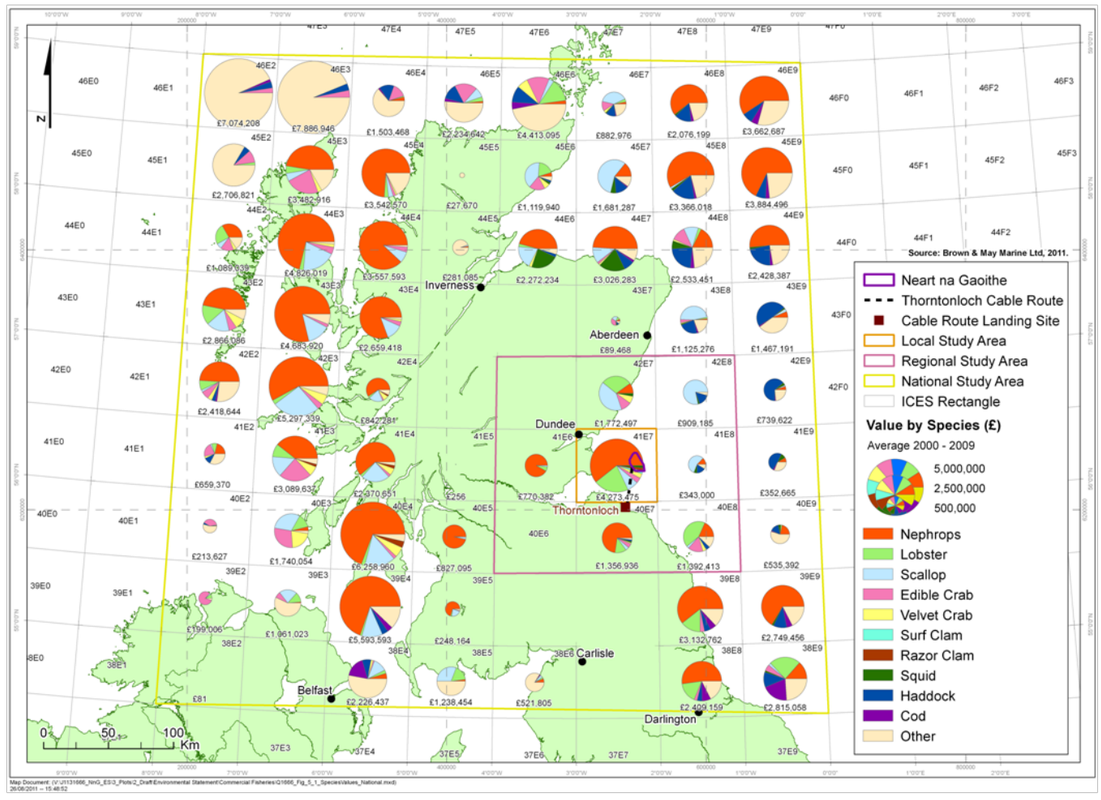


Figure 16.3: Landings values by species (average 2000-2009) in the national study area (Source: MMO)

59 The principal fishing activities in the regional study area are: bottom otter trawls targeting Nephrops; boat dredges targeting scallops; and creels targeting crustacean such as crab and lobster. To a lesser degree, squid is seasonally targeted, primarily by reconfigured bottom otter trawls.

60 The majority of vessels operating in rectangle 41E7 are based at local ports (see Figure 16.4). Pittenweem is the principal port in the area, with 53.3% of landings from ICES rectangle 41E7, followed by Dunbar (12.4%) and Eyemouth (6.2%). The remainder of vessels in the ICES rectangle 41E7 land their catches in smaller local ports such as Crail, Methil and Leven, Anstruther, St Andrews, and West Wemyss, and for each of these the landings represent a large proportion of each port's recorded annual total value (99.5%, 95.6%, 99.3%, 98.9% and 100%, respectively).

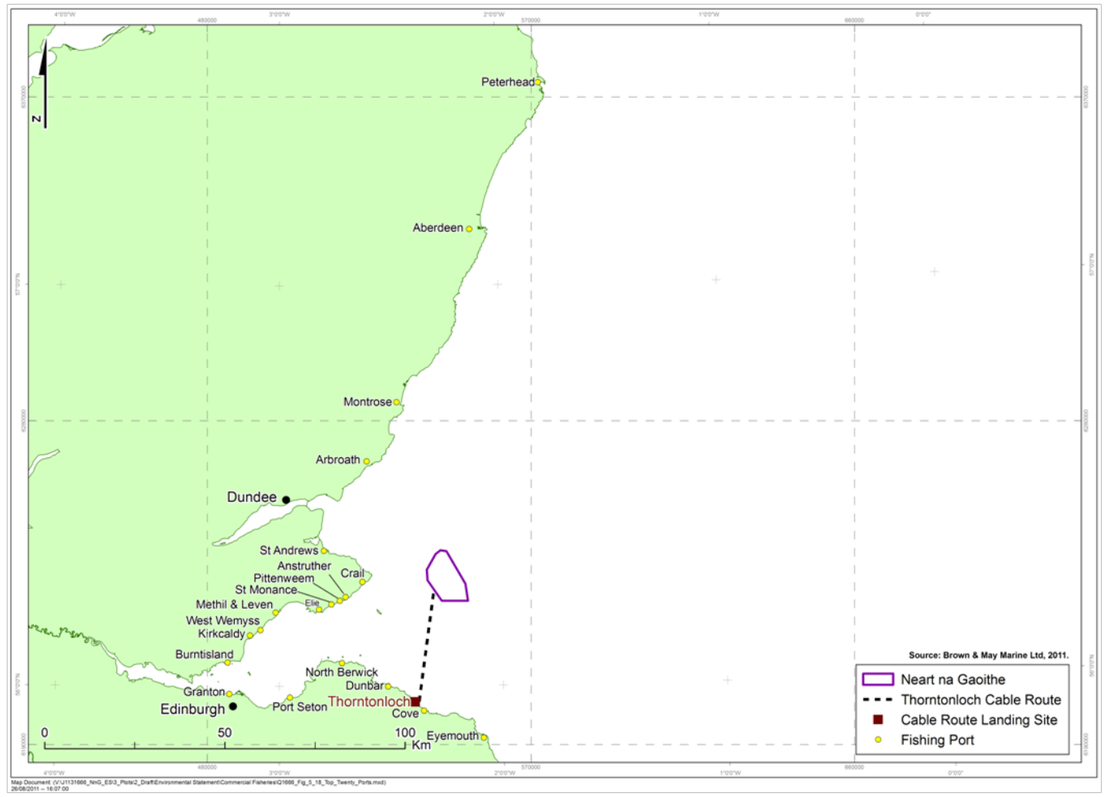


Figure 16.4: Top 20 fishing ports recording landings from ICES rectangle 41E7

61 The majority of vessels operating in the region are under 15 m in length (see Figure 16.5) and therefore the activity of these vessels is not included within VMS (VMS datasets as vessels of this size are not required to carry satellite tracking systems).

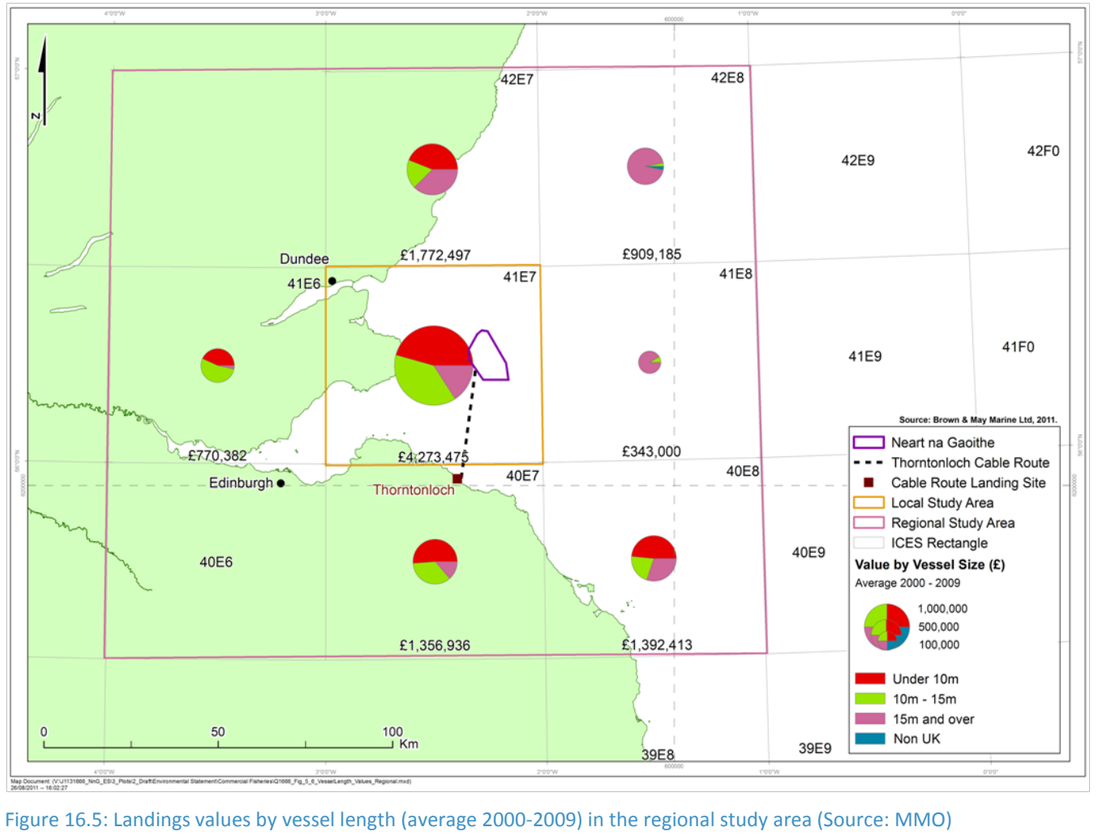


Figure 16.5: Landings values by vessel length (average 2000-2009) in the regional study area (Source: MMO)

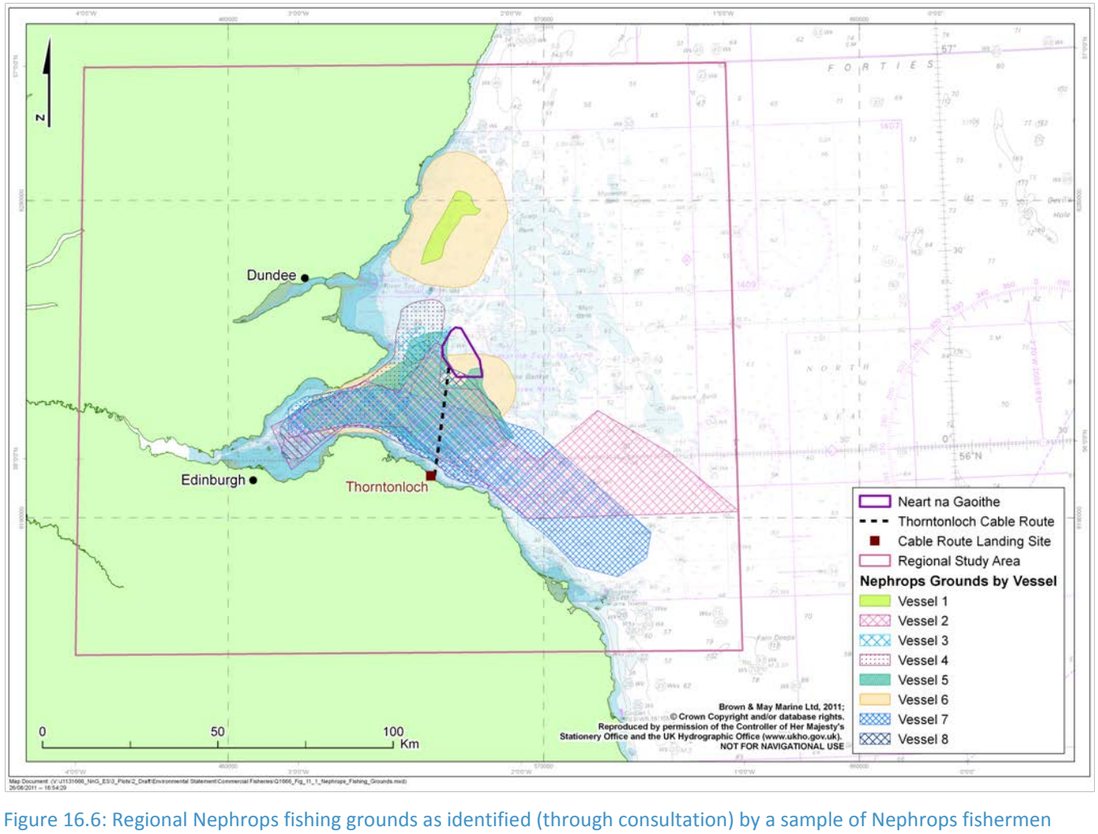


Figure 16.6: Regional Nephrops fishing grounds as identified (through consultation) by a sample of Nephrops fishermen

16.5.2 Nephrops Fishery

62 The principal species targeted in ICES rectangle 41E7 is Nephrops. Norway lobster (*Nephrops norvegicus,* commonly known as prawns or Nephrops) predominantly inhabit muddy substrates (refer to Chapter 15: Fish and Shellfish Ecology for information on the species' biology and habitat). ICES rectangle 41E7 records the highest Nephrops landings in the regional study area, with 60% of landings and a total value of £2,569,718 (averaged 2000-2009), representing an average value on a national scale (see Figure 16.5). Nephrops is subject to quota restrictions, which are further described in Appendix 16.1: Commercial Fisheries Baseline Technical Report.

63 Nephrops is principally targeted by demersal otter trawlers, although it is possible to set creels to target the species. Vessels can employ either single or twin rig demersal gear with 80 mm inside mesh cod-ends to target the species (see Appendix 16.1: Commercial Fisheries Baseline Technical Report for details of fishing gear types). Vessels target Nephrops all year although there are seasonal fluctuations in catches, with the highest landings values recorded during July and August (see Appendix 16.1: Commercial Fisheries Baseline Technical Report for details of seasonality). As a result of the limited size of vessels in the area, weather conditions are a factor in determining levels of activity in the winter months.

64 The majority of vessels targeting Nephrops in the regional study area are under 15 m in length (see Figure 16.5) and so satellite tracking (VMS) data are not available for much of the fleet. The principal Nephrops fleet local to the Neart na Gaoithe site is based at Pittenweem. Consultation with Nephrops fishermen suggested however that grounds are generally outside of the proposed offshore site, to the south, west and north of the study area (see Figure 16.6), and this broadly corresponds to VMS data for the over 15 m fleet (see Figures 16.7 and 16.8).

65 In addition to local vessels, there are a number of vessels that may berth at local ports to seasonally target Nephrops, principally arriving between June and December. Vessels are predominantly from northeast England and northeast Scotland, although there may additionally be several from the west coast of Scotland. The number varies annually but is not considered to generally exceed a dozen. Historically, vessels regularly visited from the west coast of Scotland, but effort restrictions (i.e., days at sea) and productivity of grounds have had the effect of reducing numbers (*pers. comm*., Anstruther District Fishery Office).

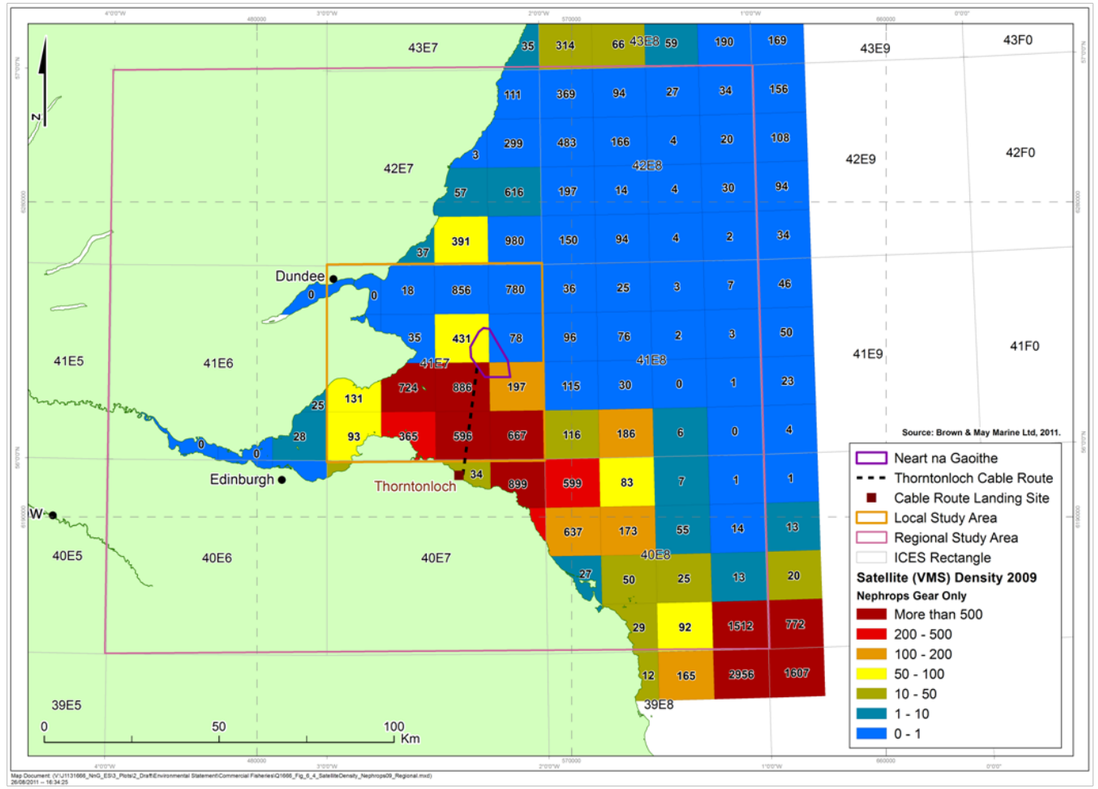


Figure 16.7: Satellite tracking (VMS) density (number of position plots) of UK over 15 m vessels in 2009, Nephrops gear only (Source: Marine Scotland)

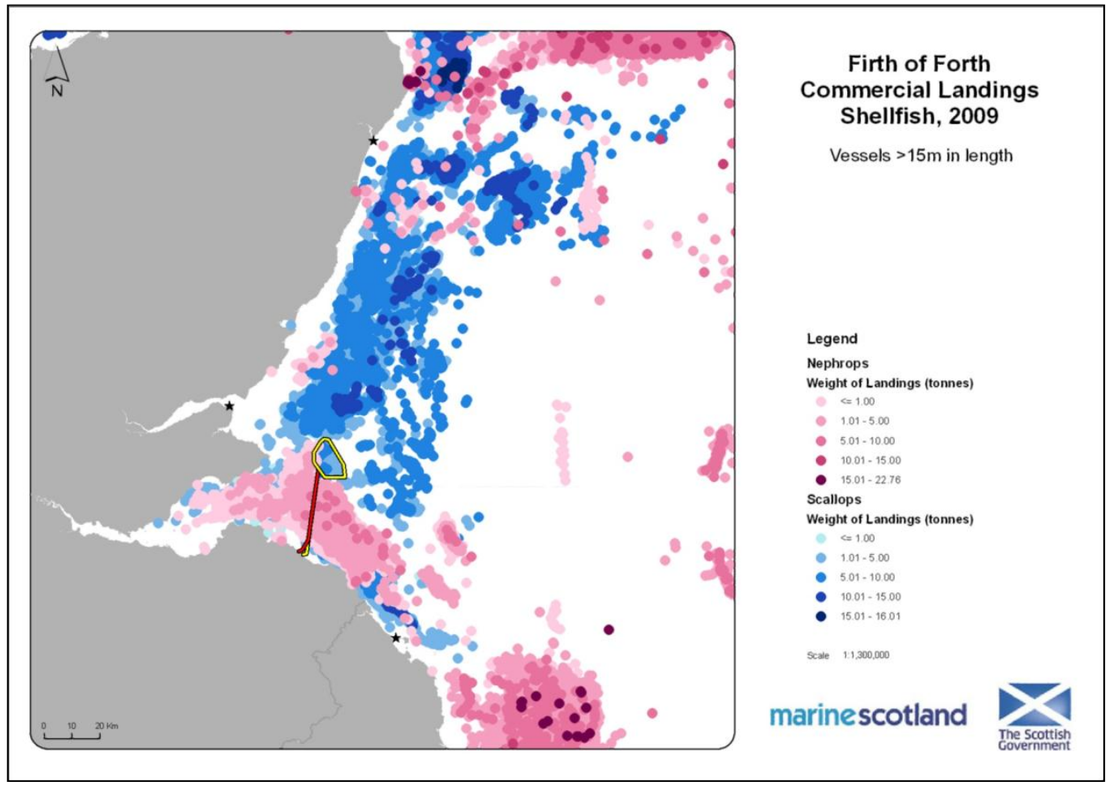


Figure 16.8: Commercial landings (including catch locations and weight) of shellfish (Nephrops and scallop) for vessels over 15 m, 2009 (Source: Marine Scotland)

16.5.3 Crab and Lobster Fishery

66 European lobster *Homarus gammarus* is the second most important species targeted in ICES rectangle 41E7. The rectangle records the highest landings for the species at a regional level, at £904,397 per year (averaged 2000-2009), 21% of the total value of landings of that rectangle (see Figure 16.3).

67 Crab is targeted on a variety of substrates, lobsters are targeted on rocky, uneven ground and around wreck sites (see Chapter 15: Fish and Shellfish Ecology). Crab and lobster are not currently quota restricted, although all vessels landing over a particular weight (200 kg of lobster, 750 kg of crab) must be licensed (see Appendix 16.1: Commercial Fisheries Baseline Technical Report for details on relevant licensing and Shellfish Entitlements).

68 Crab and lobster are principally targeted by full time static gear vessels setting creels (pots). The majority of vessels targeting lobsters in the Forth and Tay area are under 15 m in length. Consultation with creelers and sightings data suggest that the majority of activity occurs along the north and south coasts of the Firth of Forth and generally inshore of the development area though some are reported in deeper waters further offshore (see Figure 16.9).

69 Fishing for the species occurs throughout the year, although peak activity occurs between June and September (see Appendix 16.1: Commercial Fisheries Baseline Technical Report for details of seasonality). As a result of the limited size of vessels in the area, weather conditions are a significant factor in determining levels of activity in the winter months. In addition to full time vessels, there are also a number of part time vessels that will set a small number of creels in inshore areas during the summer months.

70 Consultation identified the growth of the newest sector of the crab and lobster fleet; larger vessels fishing the extent of the study area and potentially out to 25 nautical miles (NM) and employing relatively large amounts of gear (*pers. comm*., Fishing Industry Representative).

16.5.4 Scallop Fishery

71 Scallop is a relatively important commercial species targeted in rectangle 41E7, which records the third highest scallops landings in the regional study area, at £289,371 (averaged 2000-2009), 7% of the total value of landings of rectangle 41E7 (see Figure 16.3).

72 Scallop (principally king scallop *Pecten maximus)* is principally targeted by boat dredgers. Scallop dredge vessels tow one or two beams onto which a number of dredges (from three or four on small inshore vessels, and up to 14 outside 12 NM in Scottish waters) are attached, depending on dredge restriction, vessel size, engine power and winch capacity. Further information on the dredges and their operation is provided in Appendix 16.1: Commercial Fisheries Baseline Technical Report.

73 Scallop dredging is not currently restricted by quota or effort, although there are restrictions on the number of dredges that can be used (up to 8 dredges per side within 6 NM, up to 10 dredges per side between 6 and 12 NM). Certain scallop grounds around the UK, such as those located in Cardigan Bay and waters of the Isle of Man, have recently been subject to restrictions and closures as a result of concerns over scallop populations, although this is currently not the case in the Forth and Tay region.

74 The majority of vessels targeting scallop in the Forth and Tay area are over 15 m in length and so fishing activity can be analysed using VMS data. VMS data (Figure 16.10) and data from Marine Scotland (Figure 16.8) indicate that a relatively low level of activity was recorded in the northern section of the proposed development, with principal grounds being located outwith of the study area, in areas to the north. Scallop fishing activity is undertaken year round but activity is higher between April and September, inclusive (see Appendix 16.1: Commercial Fisheries Baseline Technical Report).

75 Scallop fishing is often cyclical: vessels generally target grounds intensively for a period, which are then left to recover (*pers. comm*., Scallop industry representative). For the nomadic fleet, scallop fishing grounds are located on the Scottish east coast, west coast, in the Irish Sea and the English Channel. The number of vessels dredging the Forth and Tay area will vary annually, depending on productivity and availability of grounds elsewhere. Annual fluctuations in landings should therefore be noted (see Appendix 16.1: Commercial Fisheries Baseline Technical Report). However, there are a number of locally based vessels that will spend the majority of time fishing along the east coast, as well as several smaller category, multi-purpose vessels that are limited in operational range by virtue of their size.

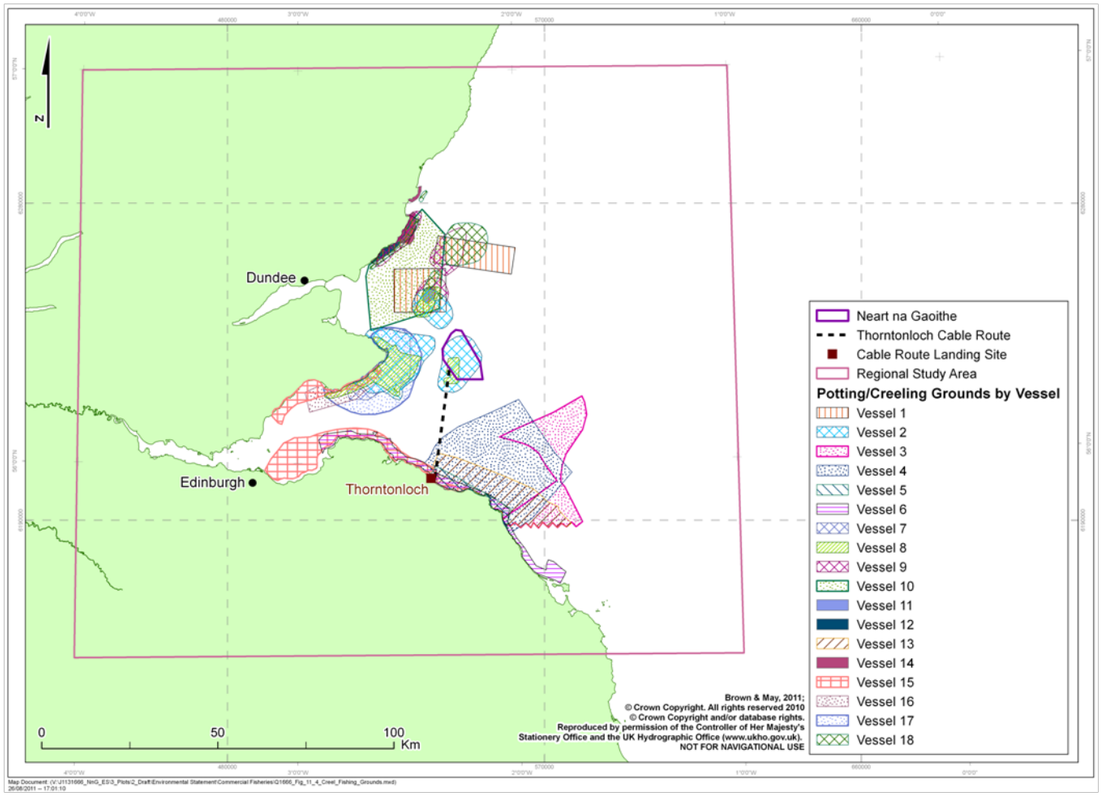


Figure 16.9: Principal creeling grounds in the regional study area as identified (through consultation) by a sample of creelers

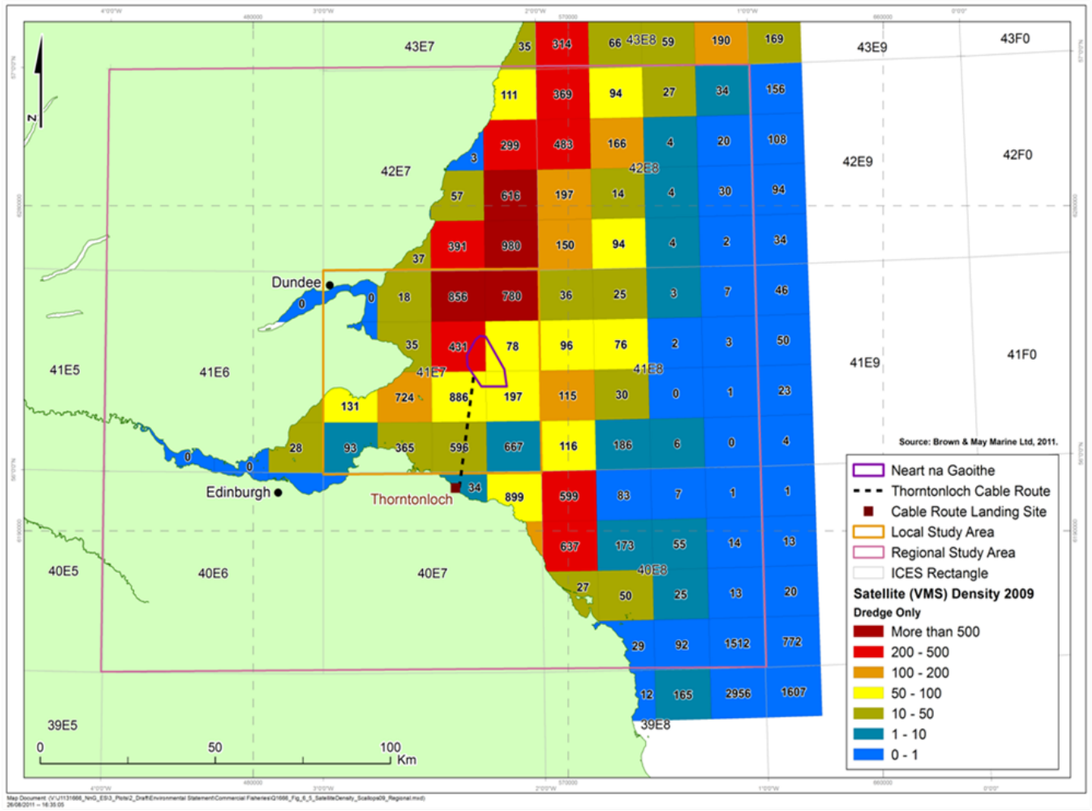


Figure 16.10: Satellite (VMS) density (no. of position plots) of UK over 15 m vessels in 2009, scallop dredge gear only (Source: Marine Scotland)

16.5.5 Squid Fishery

76 Consultation with fishermen's associations and fishermen identified the squid *Loligo forbesi* fishery as becoming increasingly important in the Forth and Tay area. The squid fishery currently provides an alternative to other quota restricted stocks, such as Nephrops. Annual landings values vary significantly as the fishery is dependent on the area's highly variable population (see Chapter 15: Fish and Shellfish Ecology). The fishery is currently unregulated and unrestricted, although there is the potential for management measures to be put in place in the future.

77 Peak landings for squid occur in August and September. Landings are generally low for the period of analysed data (2000-2009) although fishermen reported that 2010 saw an unusually long squid season, with activity continuing into November (*pers. comm*., squid fishermen, 2011).

78 Bottom otter trawlers targeting Nephrops reconfigure gear to target squid, operating nets with a smaller mesh size and a higher headline. The species is often targeted on rough ground and vessels may employ protective gear, such as rockhoppers (see Appendix 16.1: Commercial Fisheries Baseline Technical Report). As mentioned previously, the majority of Nephrops vessels are under 15 m in length and therefore not satellite tracked. Consultation with squid fishermen has identified squid grounds throughout the Forth and Tay area, including within the proposed development. Fluctuations in annual landings, as well as in the distribution of the species, should be noted.

16.5.6 Other Commercial Fisheries

79 As illustrated in Figure 16.3, there are other species commercially targeted and landed from the region surrounding the proposed project. There are currently small scale, inshore artisanal fisheries in the Forth and Tay area for bivalves and mackerel, targeted by under 15 m vessels, but these are not thought to occur in the proposed offshore wind farm site (refer to Appendix 16.1: Commercial Fisheries Baseline Technical Report).

80 Historically there was a whitefish fishery in the region, targeting species such as cod *Gadhus morhua* and haddock *Melanogrammus aeglefinus* using demersal otter trawl and Scottish seine netting fleets. Fisheries management policies and availability of resources have had the effect of making the fishery unviable in the local area, nor is it considered likely that vessels will resume activities in the future, largely due to ongoing restrictions on cod and other whitefish species.

81 Additionally, there was an historic sandeel *Ammodytes* spp. fishery in the regional area, targeted principally by the Danish fleet, in fishing grounds outside 12 NM. Sandeel fishing grounds in the North Sea were closed in 2000 as a result of concerns over stock populations and the impacts on predator species. Although parts of the North Sea fishery were reopened in 2009, there is still a moratorium on commercial trawling for sandeels along the east coast of Scotland. The Neart na Gaoithe development is not considered to be located on sandeel fishing grounds (refer to Appendix 16.1: Commercial Fisheries Baseline Technical Report).

16.5.7 Salmon and Sea Trout Fishery

82 Atlantic salmon *Salmo salar* and sea trout *Salmo trutta* are diadromous or migratory species of fish, with a life cycle that includes time in freshwater river environments and at sea (see Appendix 16.2: Salmon and Sea Trout Fisheries Baseline Technical Report and Chapter 15: Fish and Shellfish Ecology for further information). After a period spent in a riverine environment, the individuals undertake a marine migration to offshore feeding grounds, returning after a varying number of years to their natal river to spawn (refer to Chapter 15: Fish and Shellfish Ecology).

83 Rivers on the east coast of Scotland have nationally and internationally important populations of the salmon and sea trout, including rivers in the Forth and Tay area. Both species form an important part of Scotland's natural heritage and support and maintain the existence of commercial and recreational fisheries which are of importance to the Scottish economy (Scottish Executive Environment and Rural Affairs Department, 2004 – refer to Appendix 16.2: Salmon and Sea Trout Fisheries Baseline Technical Report, Section 5).

84 The principal salmon and sea trout fisheries are listed below and are discussed in greater detail in Appendix 16.2: Salmon and Sea Trout Fisheries Baseline Technical Report.

- Rod and line (including catch and release);
- Fixed engine (stake and bag netting); and
- Net and coble.

85 The fishery is managed through fishery districts, each of which has a DSFB. Salmon and sea trout catches are recorded under the following categories:

- Sea trout;
- Salmon (multi-sea winter fish); and
- Grilse (salmon that have only spent one year at sea).

86 Figure 16.11 shows the proportion of catch by fishing method in the regional study area. Rod and line (including catch and release) constitutes the overwhelming majority of catches in the Tay, Forth and Tweed districts, with fixed engine comprising the large majority of catches in the North and South Esk district.

87 The Esk (Bervie, North Esk and South Esk) and the Tweed are the principal districts in terms of total catch with annual catches (average 2000 to 2009) of 20,085 and 19,681 fish respectively, followed by the Tay with 10,255 fish caught in the same period. Catches in the local area (the Forth District) between these dates, are comparatively lower (3,328) (see Figure 16.12).

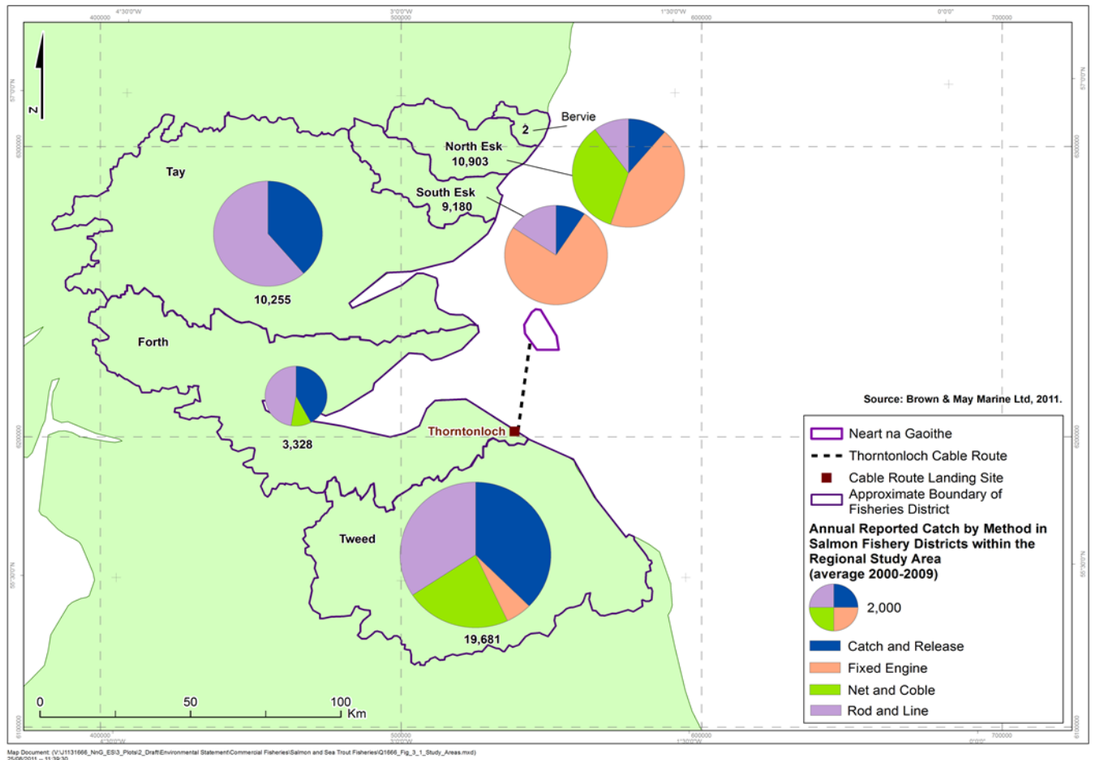


Figure 16.11: Annual reported catch of salmon and sea trout by method (average 2000-2009) (Source: Marine Scotland Science)

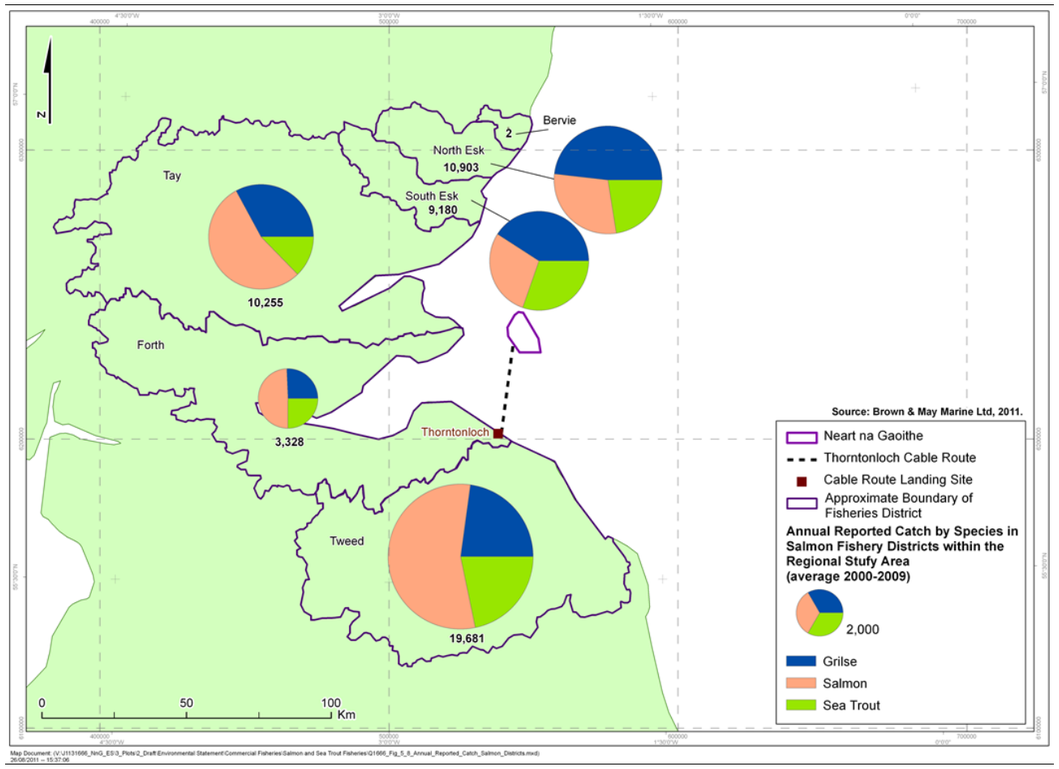


Figure 16.12: Annual catch (no. of individuals) by species in salmon fishery districts within the regional study area (average 2000-2009 (Source: Marine Scotland Science)

16.5.7.1 The Rod and line Fishery

88 Rod and line is the main fishing method in most districts within the regional study area. Catches vary throughout the year for salmon, grilse and sea trout (see Figure 16.13).

89 Salmon catches peak in September and October in most districts within the regional study area, with the Tweed also recording high catches in November. Whilst relatively lower, salmon catches are also of importance from March to July, particularly in the Tay and Tweed, reflecting the diversity of salmon runs in the regional area. Grilse are principally caught from July to October with peak catches recorded from August to October in most districts. In the Tweed, as for salmon, relatively high grilse catches are also recorded in November. Sea trout are principally caught from May to October, with highest catches being recorded in June, July and August.

90 Catches vary annually, as shown in Figure 16.14. In the Tweed, rod and line salmon catches peaked in 2004 and 2007. From 2007 onwards, there has been a decrease in the catch, with 2009 having catches similar to those of 2000, the year recording the lowest catch within the ten year period under consideration. Grilse catches have shown a similar pattern, with an overall increase from 2000 to 2007 and relatively lower catches in 2008 and 2009.

91 In the Tay, salmon catches have remained relatively stable, with the exception of the lows recorded in 2002 and 2003. Grilse catches, after a low in 2002 and 2003, increased to a peak of 5,603 individuals caught in 2006 before decreasing again in recent years.

92 In the Forth, salmon and grilse catches have fluctuated over the years, with salmon catches peaking in 2004 and grilse catches peaking in 2001, 2004 and 2008.

93 In the North Esk salmon catches have fluctuated over the years, whilst for grilse there has been a relative increase in the catch, with 172 grilse caught in 2000 compared to 1,144 in 2009. In the South Esk, salmon and grilse catches have remained relatively stable from 2000 to 2009, with relatively high values recorded between 2004 and 2008.

94 Sea trout catches have shown a general decline during the first years of the time series, with a low being recorded in most districts in 2003, after which the general trend has been one of an overall increase. An exception to this is the South Esk, where there has been a decline in the sea trout catch, with lows in 2005 and 2008.

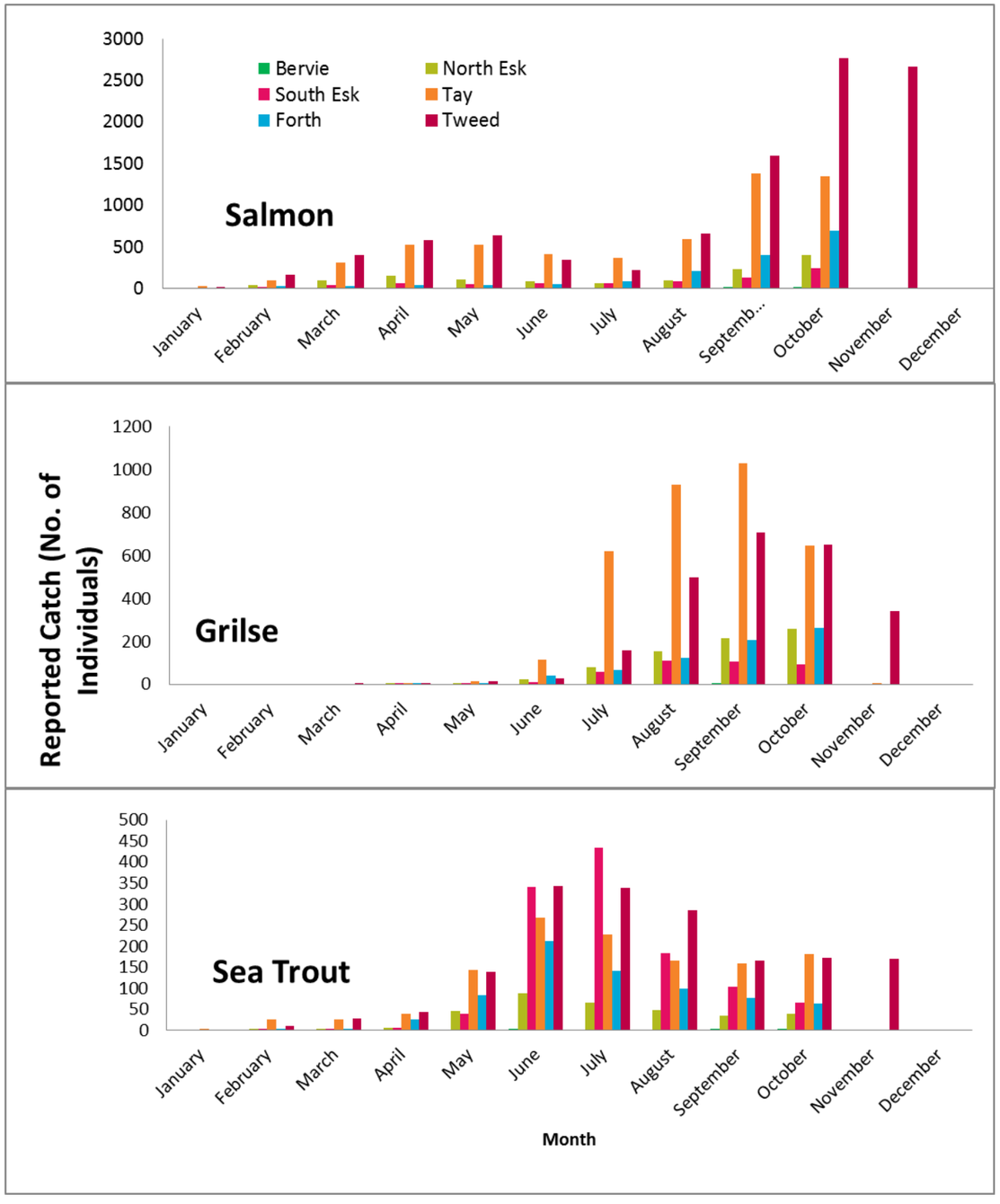
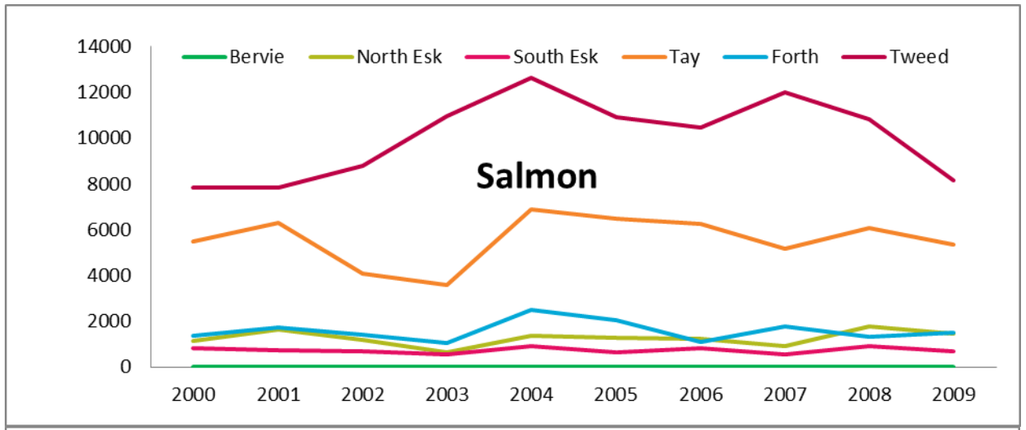
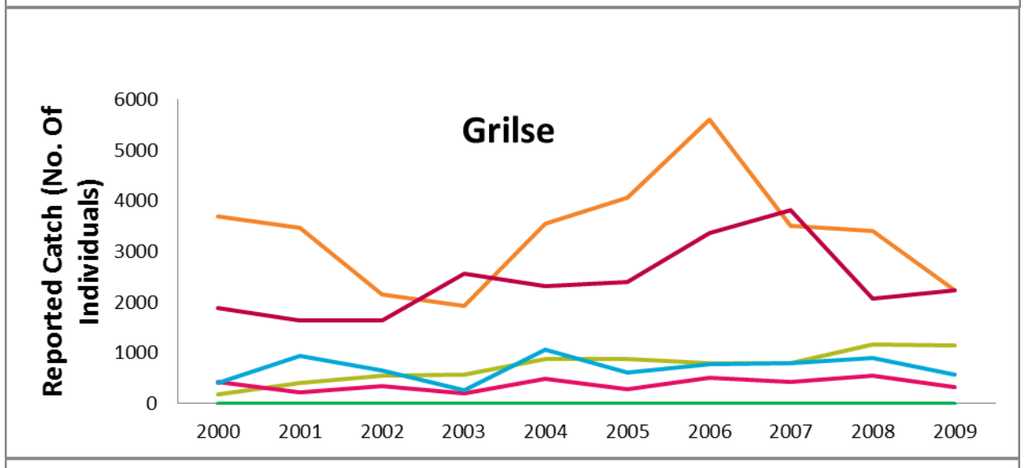


Figure 16.13: Seasonality of the catch (average 2000-2009) by the rod and line fishery (including catch and release) (Source: Marine Scotland Science)





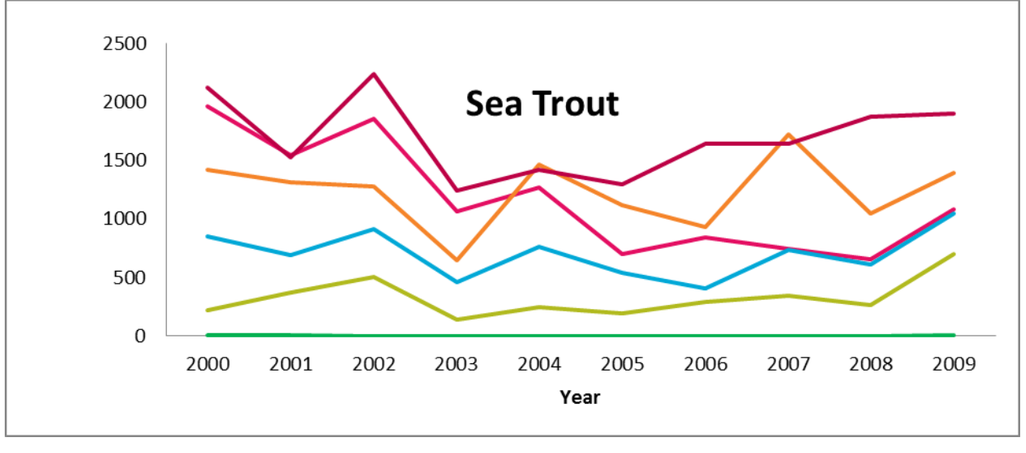


Figure 16.14: Annual variation (2000-2009) of catches by the rod and line fishery (including catch and release) (Source: Marine Scotland Science)

16.5.7.2 The Net Fishery

95 The net fishery (comprising net and coble and fixed engine methods, see Appendix 16.2: Salmon and Sea Trout Fisheries Baseline Technical Report for details) is the most common method in the districts in the north of the regional study area. However, it should be noted that net fishing for salmon and sea trout is generally in decline, as fishing rights have been bought or leased by conservation interests for the purposes of stopping netting operations (*pers. comm*., DSFBs). As a result, average values between 2000 and 2009 are likely to overestimate the current levels of net-and-cobble and fixed engine fisheries.

96 The northeast is the principal region in terms of netting activity in Scotland (see Figure 16.15). The majority of the catches in this region are in the Esk district (North and South Esk). The South Esk in particular, supports significant fixed engine fisheries. The principal fishery in that area is the Usan Salmon Fishery (Montrose).

97 The net fishery is also of relative importance in the east region, especially in the Tweed district where it is predominantly undertaken using net and coble. There are five active netting stations in the Tweed, all of which operate at varying degrees on a part time basis. In addition, there are five to six heritable rights along the Tweed's coastline, the majority of which are leased by the Tweed Trust from the heritable right holders (see Appendix 16.2: Salmon and Sea Trout Fisheries Baseline Technical Report for details).

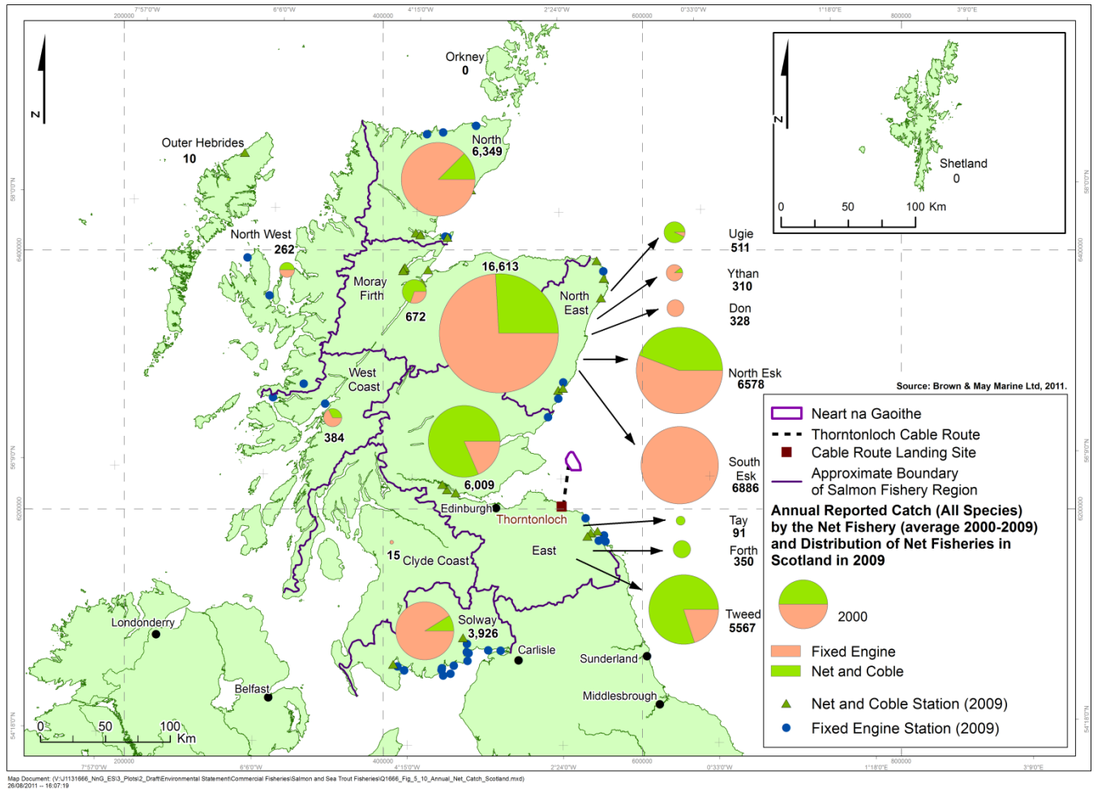


Figure 16.15: Annual net fisheries catch by region (average 2000-2009) and distribution of net fisheries in Scotland (Source: Marine Scotland Science)

98 In the Forth district there are over 60 netting stations, however, most of these are dormant and netting activity is limited. Six netting stations are currently active, of which only two (at Follen and Alower) are fully operational. No coastal netting by fixed engines is currently taking place.

99 In the Tay, netting is limited to several net and coble fisheries (which operate upstream of Dundee) and coastal nets in the northern reaches of the district where the Usan Fishery has salmon fishing rights ((see Appendix 16.2: Salmon and Sea Trout Fisheries Baseline Technical Report for details).

100 As with the rod and line fishery, catches are seasonal. There is also annual variation in catches, an overview of which is provided in Table 16.7.

Method	District	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net and coble	Forth	666	575	270	615	280	412	380	94	83	129
	North Esk	4,777	4,092	4,272	4,040	2,706	3,536	3,509	2,189	3,490	5,282
	Tay	300	333	103	90	49	25	10	0	0	0
	Tweed	6,372	4,526	3,618	3,615	4,146	3,938	5,152	6,176	2,656	4,378
Fixed engines	North Esk	8,176	8,877	4,921	9,394	5,927	5,075	3,956	1,054	458	48
	South Esk	5,690	10,130	5,436	8,811	7,051	8,814	9,092	4,608	5219	4,011
	Tay	0	0	0	0	0	0	0	0	0	2
	Tweed	1,369	897	1,157	1,229	817	675	986	1,006	1,161	1,795

Table 16.7: Annual variation in the net fishery catch (no. of individuals, all species combined) by districts (districts with no reported catches for the period 2000-2009 have been omitted in this table) (Source: Marine Scotland Science)

16.5.8 Commercial Fisheries in the Vicinity of the Cable Route

16.5.8.1 Overview of Commercial Fisheries

101 The offshore export cable route runs south from the proposed development area and passes through ICES rectangles 41E7 and 40E7, which record landings of regional importance for Nephrops, squid and crustaceans. Vessels targeting this area are predominantly located within the Anstruther and Eyemouth Fishery Districts.

102 The Eyemouth district fleet is predominantly comprised of demersal trawlers targeting Nephrops, with vessels principally operating from Eyemouth, Port Seton and Dunbar. Demersal trawlers target Nephrops in the south of the regional study area (Figure 16.6 and Figure 16.7) throughout the year, with a seasonal peak in landings in the summer months. Within this period, a pattern has been reported of vessels moving from grounds in the south to grounds further north, providing the fishing is productive. Vessels from the Anstruther district will principally target Nephrops in the vicinity of the northern section of the export cable route, with vessels principally operating from Pittenweem.

103 As mentioned in Section 16.5.2, Nephrops vessels are able to reconfigure their gear to target squid. The majority of vessels targeting Nephrops in the vicinity of the export cable route will also be able to target squid in the same area on a seasonal basis.

104 Creeling in the Eyemouth district is of less importance compared to creeling in the Anstruther district, although there are a number of vessels operating from North Berwick and ports between Eyemouth and the Scottish border. The grounds targeted by these vessels are generally within several miles of the coast, although a number of larger vessels are able to target grounds further offshore. There is some activity occurring in areas immediately adjacent to the landfall sites and proposed development (see Figure 16.9 for representative sample of creel grounds).

16.5.8.2 Salmon and Sea Trout Fisheries

105 The proposed cable landfall is located within the jurisdiction of the Forth Salmon Board District (FSBD). Fishing activity here is principally rod and line in-river.

106 Netting activity within the district is limited, with only two net and coble stations fully operational. Fixed engines are not used in the district and no netting stations in areas relevant to the export cable landfall area are known to be operational at present (see Figure 16.15).

16.6 Impact Assessment

107 For each potential impact, the implications for fisheries during the construction and operation and maintenance phase of the project and the installation and operation of the export cables are assessed separately, with the exception of adverse impacts on commercial fish and shellfish populations, which are described in Chapter 15: Fish and Shellfish Ecology and summarised below. In the absence of detailed methodologies and schedules, decommissioning works are considered analogous with construction.

108 Implications for fisheries during the construction phase and post-construction are considered within the framework of the impacts listed below:

- Adverse impacts on commercially exploited fish and shellfish populations;
- Adverse impacts on recreational fish populations;
- Complete loss or restricted access to traditional fishing grounds;
- Safety issues for fishing vessels;
- Interference with fisheries activities;
- Increased steaming times to fishing grounds;
- Obstacles on the seabed post-construction; and
- Displacement of fishing activity into other fishing areas.

109 Cumulative and in-combination impacts are separately assessed in Section 16.7.1.

16.6.1 Impact Assessment – Construction and Decommissioning Phase

16.6.1.1 Impacts on Commercially Exploited Fish and Shellfish Populations

110 The principal commercial species targeted by gear type in the vicinity of the wind farm and export cable route are: demersal trawling for Nephrops and squid, dredging for scallops, and creeling for crab and lobster.

111 Salmon and sea trout are also targeted by rod and line fisheries in rivers surrounding the Firths of Forth and Tay and some coastal netting stations in limited areas along the coast.

112 Predicted adverse impacts on commercially exploited fish and shellfish populations arising from the construction/installation of the proposed development and cable route are described in Chapter 15: Fish and Shellfish Ecology, and summarised in Table 16.8 below.

Offshore Site

113 Effects arising from the wind farm construction have the potential to impact directly on fish and shellfish species and their related habitats. This is particularly so if a species has specific requirements or if the habitat is vital for population survival (e.g., feeding, spawning and nursery grounds and migration routes).

114 The environmental effects arising from the construction period are likely to be temporary, lasting through development activities and a period after their completion. They encompass effects associated with the turbine foundation installation and the intra-turbine and transport cable laying. They are likely to include:

- Habitat disturbance (displacement, physical disturbance and abrasion);
- Increase in suspended sediment concentrations and turbidity;
- Increased sediment settlement (smothering); and
- Change to noise and vibration levels from construction operations.

115 The assessment scenarios and Rochdale Envelope parameters for each effect described below are detailed in Chapter 15: Fish and Shellfish Ecology.

Export Cable Route

116 The key impacts on fish and shellfish relating to export cable installation are similar to those from the offshore site, relating to loss of habitat through physical disturbance and increase in suspended sediment.

Source	Pathway	Receptor	Magnitude of effect (refer to Chapter 15)	Vulnerability of receptor (refer to Chapter 15)	Significance of impact	Qualification of significance
Installation of turbine and associated infra-structure foundations	Habitat disturbance	Commercially targeted fish and shellfish species such as Nephrops, scallops, squid, crab and lobster	Low	Low	Minor significance	Mobile species are expected to avoid disturbance and less mobile species are fairly widespread within the region.
	Increase in SSC		Low	Negligible	Minor significance	Suspended sediment concentrations (SSC) are not expected to reach levels higher than natural variability more than 10 m from the source. The increases in SSC predicted to occur during the construction phase (refer to Chapter 9: Physical Processes) are much lower than those reported to impair fish and shellfish species.
	Increase in sediment settlement/ smothering		Low	Negligible	Minor significance	Thick depositions of sediment are unlikely to occur on a wide enough area to impair fish and shellfish.
Installation of jacket foundations	Pile driving creating noise and vibration	Fish and Shellfish Species – Traumatic Hearing Loss	Low	Medium (though Low for some shellfish species and High for herring and cod)	Minor significance	It is recognised that most fish species will swim away from the noise source, though some may have specific habitat requirements or could have insufficient swimming speeds. Mortality or traumatic hearing loss is unlikely at a large population scale given the species characterising the wider region. Shellfish species sensitivities to traumatic hearing loss are much lower than those reported in fish species.
		Flatfish species - behavioural response (avoidance)	Low (strong avoidance behaviour) to Medium (significant avoidance behaviour)	Low	Minor to moderate significance	Dab are most affected by particle motion rather than sound pressure.
		Salmon and sea trout - behavioural response (avoidance)	Negligible (strong avoidance behaviour) to Low (significant avoidance behaviour)	Low	Minor significance	Salmon and sea trout are only predicted to be in the offshore area intermittently.
		Sandeel	Low (strong and avoidance behaviour)	Low	Minor significance	Sandeel are not predicted to occur in the vicinity of the offshore works area, and the radius of avoidance behaviour is of low extent.
Installation of export cables	Direct habitat disturbance	Fish and shellfish populations	Low	Negligible	Minor significance	The percentage of commercial species' habitat likely to be impacted is negligible by comparison to their extent within the region.
	Sediment re-suspension and smothering		Negligible	Negligible	Not significant	SSC levels likely to impair fish and shellfish are much higher than those predicted to occur during the construction phase.

Table 16.8: Impact assessment conclusions for construction phase for fish and shellfish receptors (continued).

16.6.1.2 Complete Loss or Restricted Access to Traditional Fishing Grounds

Offshore Site

117 There is generally a low level of commercial fishing activity within the offshore works area when compared to the wider region.

118 The principal commercial species targeted by gear type in the vicinity of the wind farm are: demersal trawling for Nephrops and squid, dredging for scallops and creeling for crab and lobster. As described in the baseline, there is a low level of Nephrops activity occurring in the western section of the offshore site, which constitutes a very small proportion of Nephrops grounds in the regional area.

119 There is also some scallop dredging activity occurring within the offshore site, which is of a low level on a regional scale, and a very low level when taken in the context of grounds available around the UK. There is limited creeling occurring within the offshore works area, with the principal creel grounds located in inshore areas outwith the development area. A seasonal squid fishery is reported to occur in the vicinity of the offshore works area, with high annual fluctuations in landings.

120 The principal effects of construction that could impact commercial fisheries through the complete loss of, or restricted access to, fishing grounds during the construction phase are:

- Safety zones around construction activities; and
- Installed infrastructure in addition to construction safety zones as construction progresses.

121 It is likely that safety zones of 500 m will be applied around construction works, from which all vessels will be excluded throughout the duration of the construction period (two years). Applications will be made for these zones to surround each turbine and construction vessels during the construction phase in order to minimise disruption to mariners and other users of the sea including recreational vessels. These 500 m safety zones would be applied for in line with DECC guidance (DECC, 2011) (see Chapter 17: Shipping and Navigation). Guard vessels may also be used to monitor passing vessels and warn/record any safety zone infringements.

122 Safety zones are likely to be established on a 'rolling' basis, covering only those areas of the offshore works in which such activities are actually taking place at a given time. Once that activity has been completed in that specific location, the safety zone will then 'roll on' to cover the next specific location within the site in which such activity is taking place.

123 In addition to 'rolling' safety zones, it is likely that completed infrastructure during the construction phase will have a recommended safety zone of 50 m for health and safety reasons.

124 Due to the seasonality of fishing activity in the region (broadly speaking, the summer months record the highest levels of fishing activity), the impact of these safety zones will vary depending on the time of year. However,

relative to the area of the site (105.1 km²), and the area of available fishing grounds in the Forth and Tay area, 'rolling' 500 m safety zones and 50 m safety zones around completed infrastructure constitute very discrete areas.

125 In addition to safety zones, which are for the protection of all mariners, the risks associated with fishing within the wind farm site outside of the safety zones are recognised. This principally relates to the installation of inter-array cables (a total of 220 km), but may also apply to completed infrastructure. Inter-array cables will be buried to between 1-1.5 m where possible, and protected elsewhere. It is considered that fishing activities, particularly bottom towed gear fishing activities, cannot safely occur in any area of the wind farm site where cable installation works have been undertaken because of the safety risks associated with changes to the seabed, and/or obstacles on the seabed as a result of installation activities. Prior to commercial fishing activity being able to recommence within the site, it is recommended that post-construction surveys are undertaken to ensure that the seabed is at a reasonable and acceptable standard for fishing activities to be safely resumed.

126 The construction of the wind farm will occur over two years and fishing opportunities within the wind farm site will become increasingly limited as the construction schedule advances, particularly with the installation of the inter-array cables. However, the relatively low level of activity occurring within the site should be noted. As a result, the effect of complete loss of or restricted access to traditional fishing grounds is considered to be of moderate magnitude, and the vulnerability of the receptor is low. The impact is therefore of ***moderate significance***.

Export Cable Route

127 The export cable route passes primarily through Nephrops trawling grounds, and to a lesser extent creel grounds for crab and lobster, and seasonal squid grounds. The seasonality of these fisheries should be considered relevant to the proposed installation schedule, which is estimated to last for a period of several months.

128 The cables will be buried to depths of between 1 m and 3 m where possible, and protected in sections where burial is not achieved. Safety zones of 500 m will be in place around cable installation works, from which all vessels would be excluded.

129 In addition to safety zones, risks to fishing along the export cable route outside of the safety zones are recognised. It is considered that fishing activities cannot safely occur in the area of the wind farm site due to the safety risks associated with changes to the seabed and/or obstacles on the seabed as a result of installation activities.

130 Prior to commercial fishing activity recommencing within the site, it is recommended that post installation surveys are undertaken to ensure that the seabed is at a reasonable and acceptable standard for fishing activities to be safely resumed.

131 In light of fishing vessels being excluded along the entirety of the cable route because of safety risks for the duration of cable installation and protection works (estimated to be several months), and taking into account the fisheries affected during this period, it is considered that the magnitude of the effect is medium, the vulnerability of the receptor is also medium, and the impact is therefore of ***moderate significance*** (refer to Table 16.9).

132 If cable installation and the necessary protection measures are undertaken during peak periods of fishing activity, the magnitude of effect is moderate, the vulnerability of the receptor is moderate, and the impact is therefore of ***moderate significance*** (refer to Table 16.9)..

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Offshore site construction activities	Loss or restricted access to fishing grounds.	Fishing vessels operating in the vicinity of the wind farm.	Medium	Low	Moderate significance	Although the spatial extent and duration of the impact are moderate, and it is considered that fishing activities cannot occur within the site during the construction period due to the associated safety risks, the fishing grounds impacted are low intensity on a regional scale.
Export cable installation activities	Restricted access to fishing grounds.	Fishing vessels operating in the vicinity of the cable route.	Medium	Medium	Moderate Significance	All fishing vessels are excluded from the length of the cable route during construction due to the associated safety risks. This will result in temporary loss of grounds for a number of locally based vessels targeting Nephrops, and to a lesser extent crab and lobster and squid. The seasonality of installation will potentially affect the sensitivity of the fishery.

Table 16.9: Impact assessment of complete loss or restricted access to fishing grounds during construction

16.6.1.3 Safety Issues for Fishing Vessels

Offshore Site

133 As described above and in Chapter 5: Project Description and Chapter 17: Shipping and Navigation, statutory and best practice safety zones will be applied throughout the construction process. In addition, partially and fully installed infrastructure (excluding inter-array cables) will be marked and it is likely that, once installed, safety zones of 50 m will be recommended around them for health and safety reasons.

134 Risks to fishing vessels in these areas would therefore only occur if infringements of these safety zones occurred. It should also be recognised that in line with standard maritime practice, the ultimate responsibility with regard to safety lies with the master of the vessel. Compliance with the safety zones would put the safety risk *within acceptable limits*.

135 Fishing vessels will be aware of construction works in the offshore site through Notices to Mariners (NtMs) and fisheries liaison. Vessels should be able to make deviations around the main construction works leading only to a partial loss of lower use navigable routes. Further information on navigational safety is provided in Chapter 17: Shipping and Navigation.

136 Although there is a relatively low level of recorded fishing activity within the offshore site compared with fishing grounds elsewhere in the regional area, there is the potential for offshore infrastructure outwith the designated safety zones to pose an additional risk to fishing vessels as a result of potentially hazardous interactions with fishing gear, particularly with regard to inter-array cabling and bottom towed fishing activities. A maximum of 220 km of inter-array cabling will be installed within the offshore site during the construction phase (two years). These cables will be buried to between 1-1.5 m where possible, and protected elsewhere. It is considered that fishing vessels will not be able to safely fish in the vicinity of these cables until these measures are complete. During the construction phase therefore, the risks posed to the safety of fishing vessels within the offshore site are considered to be *outside of acceptable limits*. Once cables are buried or protected to industry accepted levels, the risks will fall within acceptable limits.

Export Cable Route

137 As previously stated, it is likely that safety zones will be applied to cable laying vessels along the length of the cable route for the duration of installation works, which could result in an area along the route from which all fishing vessels will be excluded. Provided there are no infringements of this zone, the safety risk to fishing vessels is considered *within acceptable limits*.

138 Two 33 km export cables will be installed over an estimated period of several months. As with the inter-array cables in the offshore site, there is the potential for the export cables to pose an additional risk to fishing vessels, as a result of potentially hazardous interactions with fishing gear, particularly with regard to bottom towed gear.

139 The cable will be buried to depths of 1-3 m where possible and protected elsewhere. In terms of fishing activities occurring in the immediate vicinity of the cable route, the safety risks during the period required to bury and protect the cables to safe levels, particularly for vessels towing bottom gear, are considered to be *outside of acceptable limits*. Prior to commercial fishing activity recommencing within the site, it is recommended that post installation surveys are undertaken to ensure that the seabed is at a reasonable and acceptable standard for fishing activities to be safely resumed. Once these measures are complete, the safety risks will fall *within acceptable limits*.

140 In terms of the safety risks associated with potential navigational conflict during the construction phase of the offshore site, local fishing vessels will be aware of installation and cable laying vessels within the offshore works through NtMs and fisheries liaison. Non-local fishing vessels will become aware of the cable laying activities as they arrive at fishing grounds through day marks and lights used by the cable laying vessels to warn passing vessels of restrictions in manoeuvrability. Therefore, fishing vessels should be able to re-route around installation vessels in minor sensitive routes (i.e., coastal routes to local fishing ports), with a temporary loss or alteration to lower use routes.

16.6.1.4 Increased Steaming Time to Fishing Grounds

Offshore Site

141 The implementation of safety zones during the construction phase, as described above, could potentially result in diversions in route for fishing vessels and subsequent increases in distances to fishing grounds and steaming times, and therefore higher operational costs.

142 Applications for safety zones are likely to be made to surround each turbine and construction vessels and guard vessels may also be used to monitor passing vessels and warn/record any safety zone infringements. The baseline indicates that the Neart na Gaoithe offshore site lies to the east of the principal fishing grounds in the area, which are mainly targeted by vessels from ports in the regional study area. Surveys undertaken for Chapter 17: Shipping and Navigation also indicated that low numbers of vessels were recorded transiting the offshore site. In addition, there are relatively lower levels of fishing activity recorded in areas immediately to the east of the site. It can be concluded that construction works within the offshore site will not significantly impede transiting to grounds for these vessels.

143 Subject to vessels being able to safely navigate through the site during the construction phase (see Chapter 17: Shipping and Navigation), the magnitude of effect is low, the vulnerability of the receptor is low and the impact is therefore of ***minor significance*** (refer to Table 16.10).

Export Cable Route

144 The implementation of temporary safety zones around the length of the cable route during installation could result in short term increases in steaming distances and times. In terms of the increases to steaming times during the construction phase of the offshore site, local fishing vessels will be aware of installation and cable laying vessels within the offshore works through NtMs and fisheries liaison. Non-local fishing vessels will become aware of the cable laying activities as they arrive at fishing grounds through day marks and lights used by the cable laying vessels to warn passing vessels of restrictions in manoeuvrability. Therefore, fishing vessels should be able to re-route around installation vessels in minor sensitive routes (i.e., coastal routes to local fishing ports), with a temporary loss or alteration to lower use routes. The magnitude of impact is therefore low, the vulnerability of the receptor is low, and the impact is therefore considered of ***minor significance*** (refer to Table 16.10).

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Offshore site construction activities and associated safety zones	Increased steaming times to fishing grounds.	Fishing vessels operating in the vicinity of the wind farm.	Low	Low	Minor significance	Principal fishing grounds are located inshore of the development. Discrete location of safety zones.
Cable installation and associated safety zone	Increased steaming times to fishing grounds.	Fishing vessels operating in the vicinity of the wind farm.	Low	Low	Minor significance	Vessels will be able to re-route with minimal interference. Discrete location of safety zones.

Table 16.10: Impact assessment of increased steaming times to fishing grounds during construction

16.6.1.5 Interference with Fishing Activities

145 All of the potential impacts included in this assessment could cause interference to fishing activities. An additional impact considered is the potential for navigational conflicts arising between offshore site construction and cable route installation vessels transiting to and from site. This could include the fouling of static gear marker buoys and Dahn buoys, or towed gear vessels being required to alter towing direction. This interference has the potential to impact more fishing vessels than those operating in the vicinity of the offshore site or the export cable route, depending on the location of the construction port and the transit route to site. The number of works vessels during the construction/installation phase will also contribute to the scale of impact. However, it is expected that the developer will develop a CEMP, in consultation with the fishing industry, which will identify the appropriate procedures to minimise, where possible, interference to fishing activities. This is further discussed in Section 16.7: Cumulative and In-Combination Impacts.

146 The potential for interference to fishing activities as a result of navigational conflicts, taking into account the development of a CEMP, is assessed to be a low magnitude of effect with a low vulnerability of receptor is low, resulting in an impact of ***minor significance*** (refer to Table 16.11).

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Construction and installation vessels transiting to site	Fouling of static gear or changes to towing patterns.	All fishing vessels operating in the vicinity of the offshore works area.	Low	Low	Minor significance	Level of interference as a result of navigational conflict will depend on location of construction port and number of construction vessels. However, interference will be minimised by development of a CEMP.

Table 16.11: Impact assessment of interference with fishing activities during construction

16.6.1.6 Displacement of Fishing Vessels into other Areas

147 Concerns were raised during consultation and the scoping stage of EIA that any loss of or restricted access to fishing grounds as a result of development of the project could result in increased competition for grounds outside of the site. This could potentially result in either conflict between vessels competing for the same resource, or between different fishing methods (i.e., between static and towed gear).

Offshore Site

148 The construction of the wind farm will occur over a two year period, and fishing opportunities within the wind farm site will become increasingly limited as the construction schedule advances, particularly with the installation of the inter-array cables. However, the relatively low level of activity occurring within the offshore site should be noted. The scale of displacement will therefore be a function of the grounds temporarily lost. As a result, the displacement of fishing vessels is considered to be of moderate magnitude of effect, the vulnerability of the receptor is low, and the impact is therefore of ***moderate significance*** (refer to Table 16.12).

Export Cable Route

149 In light of the temporary exclusion along the length of the cable route (300 m corridor along the 33 km route) for the duration of cable installation and protection works (estimated to be several months), it is considered that fishing vessels will be displaced into grounds in proximity to the route. The scale of displacement will therefore be a function of the grounds temporarily lost. The magnitude of the effect is therefore medium, the vulnerability of receptor is also medium, and the impact is therefore of ***moderate significance*** (refer to Table 16.12).

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Offshore site construction activities	Displacement of fishing vessels into other areas	Fishing vessels operating in the general vicinity of the wind farm.	Medium	Low	Moderate significance	Although the spatial extent and duration of the impact is moderate, and it is considered that fishing activities cannot occur within the site during the construction period due to the associated safety risks, the fishing grounds impacted are low intensity on a regional scale.
Export cable installation activities	Displacement of fishing vessels into other areas	Fishing vessels operating in the general vicinity of the cable route.	Medium	Medium	Moderate significance	All fishing vessels are excluded from the length of the cable route during construction due to the associated safety risks. This will result in temporary loss of grounds for a number of locally based vessels targeting Nephrops, and to a lesser extent, crab and lobster and squid. The seasonality of installation will potentially affect the sensitivity of the fishery.

Table 16.12: Impact assessment of displacement of fishing vessels into other areas during construction

16.6.2 Impact Assessment – Operation and Maintenance

16.6.2.1 Adverse Impacts to Commercially Exploited Fish and Shellfish Populations

150 The principal commercial species targeted by gear type in the vicinity of the wind farm and export cable route are: demersal trawling for Nephrops and squid, dredging for scallops, and creeling for crab and lobster.

151 Salmon and sea trout fisheries are additionally located in-river and in limited areas along the coast.

152 Predicted adverse impacts on commercially exploited fish and shellfish populations arising from the operation and maintenance of the proposed development and cable route are described in Chapter 15: Fish and Shellfish Ecology, and summarised in Table 16.13 below. The environmental effects arising from the operation and maintenance of the project are long term, lasting through the operational phase of the wind farm and include:

- Permanent habitat loss directly under turbine foundations, scour protection and substation structures;
- Changes in hydrodynamics including scour and changes in sediment transport;
- Artificial reef effects;
- Changes in electromagnetic fields (EMF) due to the export and inter-array cables;
- Changes in ambient noise during operational period (i.e., the noise from wind turbines generated by the gearbox and generator and transferred into the water and sediment through the tower and foundations); and
- Heating effect from cable operation.

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Presence of turbine foundations and inter-array cabling with scour protection	Habitat loss	Fish and shellfish species such as Nephrops, scallops, squid, crab and lobster.	Low	Negligible	Minor significance	The permanent habitat loss is estimated to be 0.28 km^2 of the Neart na Gaoithe offshore site which is considered low.
	Tides, current speeds		Negligible	Low	Minor significance	The changes of water level and tidal currents following installation of wind turbines are predicted to be very small based on the output of the modelling study (Chapter 9: Physical Processes).
	New substrate materials		Low	Low	Minor significance	New substrates are unlikely to change the existing habitat dramatically as hard substrates are already present within the development area.
Gearbox and generator of wind turbines	Water column, seabed sediment	Fish and shellfish species such as Nephrops, scallops, squid, crab and lobster Migratory fish (salmon, trout, eels, shad, smelt).	Low	Low	Minor significance	To date there is no evidence that species capable of perceiving noise from operating wind turbines will be impaired in their biological activities.
Subsea cables (inter-array and export cables)	Seabed sediment heating		Negligible	Low	Not significant	To date there are no robust datasets from field studies that quantify the amount of heating generated by subsea AC cables.
	Electro-magnetic fields		Low	Low	Minor significance	To date there is no sufficient evidence that EMF can be detrimental to species capable of perceiving them.

Table 16.13: Impact assessment conclusions of operation and maintenance phase on fish and shellfish species

16.6.2.2 Complete Loss of or Restricted Access to Traditional Fishing Grounds

Offshore Site

153 In terms of complete loss of fishing grounds within the offshore site, the presence of the turbine foundations results in a direct loss of seabed (with the worst case for commercial fisheries being as a result of the highest density of turbines as described). The total footprint that the maximum number of gravity base turbines (125) and associated substation infrastructure comprises is approximately 0.14 km². In addition to this, it is recommended that vessels do not navigate, and fishing vessels do not operate, within 50 m of installed turbines for health and safety purposes. Nevertheless, the total area unavailable to commercial fishing compared to the area of the offshore site and in relation to wider fishing grounds in the regional area is considered to be of low spatial extent.

154 Inter-array cables will be buried throughout the site during operation, where feasible, and protected elsewhere. Prior to commercial fishing activity recommencing within the site, it is recommended that post installation

surveys are undertaken to ensure that the seabed is at a reasonable and acceptable standard for fishing activities to be safely resumed.

155 It is possible that the layout of turbines with the offshore site (minimum of 450 m spacing) may result in restricted access to grounds within the site, as a result of difficulties in safely conducting normal fishing operations. Furthermore, fishing vessel skippers may consider that the risks of fishing within the operational site are unacceptable, which would result in loss of fishing grounds within the site. However, it is considered that fishing activities will be able to resume to some degree within the operational site.

156 In light of the relatively low level of fishing activity occurring within the site, and the likelihood of some degree of fishing operations being able to be safely resumed, it is considered that the complete loss or restricted access to fishing grounds within the wind farm site will be of low magnitude of effect, low vulnerability and therefore of ***minor significance*** (refer to Table 16.14).

Export Cable Route

157 Prior to commercial fishing activity recommencing in the immediate area of cable installation works, it is recommended that post installation surveys are undertaken to ensure that the seabed is at a reasonable and acceptable standard for fishing activities to be safely resumed. Subsequent to this, it is not considered that the operational export cables will result in any loss or restricted access to fishing grounds along the export cable route. The magnitude of effect will therefore be negligible, the vulnerability of the receptor is also negligible, and the impact ***not significant*** (refer to Table 16.14).

Source	Pathway	Receptor	Magnitude of effect			Vulnerability of receptor				Significance of impact	Qualification of significance
			S	D	V	A	T	R	V		
Turbines and associated wind farm infrastructure	Loss of or restricted access to fishing grounds.	Fishing vessels	L	H	L	M	L	M	L	Minor significance	Fishing vessels will regain access to grounds ***within the site*** during the operational phase.
			Low			Low					
Export cables	Loss of or restricted access to fishing grounds.	Fishing vessels	N	H	N	H	H	H	N	Not significant	
			Negligible			Negligible					

Table 16.14: Impact assessment of complete loss or restricted access to fishing grounds during operation and maintenance

16.6.2.3 Safety Issues for Fishing Vessels

Offshore Site

158 Provided the appropriate measures are taken at the end of the construction and installation phase to ensure the safety of fishing vessels (i.e., appropriate cable protection measures and seabed rectification procedures), and there is no infringement of safety zones implemented within the site, it is considered that fishing vessels will be able to safely operate within the site once the wind farm is operational. The safety risks to fishing vessels will therefore be *within acceptable limits*.

159 It should be noted, however, that the layout of the turbines (minimum 450 m spacing) may cause individual fishing vessel skippers to consider that fishing within the operational offshore site offshore site is not acceptable, as a result of the risk of collision the turbines pose. The assessment undertaken for Chapter 17: Shipping and Navigation identified worst case fishing vessel to wind farm structure collision risk in the operational period as one every 57 years (refer to Chapter 17: Shipping and Navigation for additional information and a collision risk assessment). Although the safety risks would be theoretically acceptable, as defined above, the decision will also ultimately be the responsibility of individual vessel skippers.

Export Cable Route

160 In terms of fishing vessel safety, the main risk is related to gear snagging on unprotected cables or those running over spans. The predominant fishing activity in the vicinity of the offshore works is demersal trawling for Nephrops and to a lesser extent, squid, and some static gear activity for crab and lobster. It was confirmed during the navigational hazard workshop (refer to Chapter 17: Shipping and Navigation) that proposed export cables to shore will be protected via burial or scour protection, reducing the risk of fishing gear snagging. In addition, if a problem is identified with cable burial/protection during surveying (cable movement) best practice indicates this information should be reported to the fishing industry.

161 Provided the appropriate measures are taken at the end of the construction and installation phase to ensure the safety of fishing vessels (i.e., appropriate cable protection measures and seabed rectification procedures), it is considered that fishing vessels will be able to safely continue with normal fishing practices once the export cables are operational. The impact would therefore be considered to be *within acceptable limits*.

16.6.2.4 Increased Steaming Time to Fishing Grounds

Offshore Site

162 The navigation risk assessment (see Chapter 17: Shipping and Navigation) considers that there is good prospect for fishing vessels to navigate within the operational wind farm. As a result, the impact on steaming distances and times of fishing vessels will be of low magnitude of effect, low vulnerability and therefore of ***minor significance*** (refer to Table 16.15).

Export Cable Route

163 The operational export cables will not cause any impact to steaming times of fishing vessels. The impact of increased steaming times to fishing grounds will be of negligible magnitude of effect, negligible vulnerability and therefore ***not significant*** (refer to Table 16.15).

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Interference to transiting of fishing vessels	Increased steaming times to fishing grounds.	Fishing vessels	Low	Low	Minor significance	Good prospect for fishing vessels to navigate through the site.
Interference to transiting of fishing vessels	Increased steaming times to fishing grounds.	Fishing vessels	Negligible	Negligible	Not significant	No change to normal steaming patterns.

Table 16.15: Impact assessment of increased steaming times to fishing grounds during operation and maintenance

16.6.2.5 Interference with Fishing Activities

Offshore Site

164 As described above (see Section 16.6.1.5), vessels transiting to and from the offshore site could create navigational conflicts with fishing vessels and activity.

165 Activity by operations and maintenance vessels will be less than that incurred during the construction phase and furthermore, it is considered that codes of conduct between works vessels and fishing vessels will be well established by the completion of construction activities, irrespective of port used. Interference to fishing activities as a result of navigational conflict will therefore be of low magnitude of effect, low vulnerability and ***minor significance*** (refer to Table 16.16)**.**

Export Cable Route

166 The operational export cables will not cause any interference to fishing vessels as a result of navigational conflict. The impact will therefore be of negligible magnitude of effect, negligible vulnerability and ***not significant*** (refer to Table 16.16)

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Operations and maintenance vessels transiting to site	Fouling of static gear or changes to towing patterns.	Fishing vessels	Low	Low	Minor significance	Codes of conduct established during the construction phase will have addressed any navigational issues.
Export cables	Fouling of static gear or changes to towing patterns.	Fishing vessels	Negligible	Negligible	Not significant	

Table 16.16: Impact assessment of interference with fishing activities during operation and maintenance

16.6.2.6 Removal of Obstacles on the Seabed Post-Construction to Ensure Vessel Safety

167 There is the potential for offshore works such as construction vessel anchoring, jack-up legs or cable trenching to produce seabed obstructions or obstacles left on the seabed post-construction which could result in damage to or loss of fishing gear, as well as representing a safety hazard.

168 Offshore conventions, policy, legislation and standards (e.g., the London Convention[2]) prohibit the discarding of objects or waste at sea. The reporting and recovery of any accidentally dropped objects are also required. In addition, the developer will undertake necessary post-construction and installation seabed surveys, and if necessary, ensure the appropriate seabed rectification measures are completed.

169 Prior to commercial fishing activity recommencing in the immediate area of cable installation works, it is recommended that post installation surveys are undertaken to ensure that the seabed is at a reasonable and acceptable standard for fishing activities to be safely resumed. Provided there is compliance to these standards, fishing vessels will not be adversely impacted by objects or obstacles left on the seabed and the risks of fastening or damage to gear will be *within acceptable limits*.

16.6.2.7 Displacement of Fishing Vessels

Offshore Site

170 As discussed above, it is considered that fishing activities will be able to safely resume within the offshore site although it is noted that some individual skippers may choose not to. Nevertheless, considering the relatively low level of fishing activity recorded within the site and the potential opportunities for continued access to grounds within the site, the displacement of fishing vessels into other areas as a result of the operational offshore site will be of low magnitude of effect, low vulnerability and ***minor significance*** (refer to Table 16.17).

Export Cable Route

171 Operational export cables are not predicted to result in any displacement of fishing vessels. The magnitude of this effect will therefore be negligible, the vulnerability of the receptor is also negligible, and the impact therefore ***not significant*** (refer to Table 16.17).

Source	Pathway	Receptor	Magnitude of effect	Vulnerability of receptor	Significance of impact	Qualification of significance
Operational offshore site	Displacement of fishing vessels.	Fishing vessels	Low	Low	Minor significance	Access to grounds will limit any displacement, which was limited as a result of the relatively low level of activity.
Operational export cables	Displacement of fishing vessels.	Fishing vessels	Negligible	Negligible	Not significant	

Table 16.17: Impact assessment of interference with fishing activities during operation and maintenance

16.6.3 Mitigation and Residual Impacts

172 Dialogue will be ongoing throughout all stages of project development to ensure that project information is effectively disseminated to fishing interests, as well as allowing for issues to be raised.

173 It is proposed that a Working Group is established which assists in defining a CEMP, which may include but not be limited to:

- Dissemination of project information;
- Application of safety zones and implications for fisheries;
- Incorporation of fishing activities into risk assessments and identification of Emergency Response Procedures (ERP);
- Navigation of wind farm construction and works vessels to and from the site (i.e., agreement of transit lanes to minimise interference to fishing activities, agreement for 'holding' areas for vessels in the event of bad weather);
- Procedures in the event of interactions between wind farm construction and fishing activities (i.e., claims for lost and/or damaged gear);
- Burial and protection of inter-array and export cabling;
- Removal of seabed obstacles during and post-construction; and
- Post-construction surveys and seabed rectification procedures.

174 All infrastructure installed during the construction phase will be marked and lit, in line with standard industry practise, and as further described in Chapter 17: Shipping and Navigation. Relevant information will be distributed to fishermen through the agreed channels as defined in the CEMP and best practice.

175 The developer will likely apply for safety zones around installed infrastructure to prevent interactions with fishing vessels which could pose a safety risk.

176 Cables will be buried to a target depth of 0-1 m where it is reasonably practicable to do so. In instances where adequate burial cannot be achieved then the developers will seek to install cable protection.

177 Over trawl surveys will be carried out on inter-array cables to ensure that the cable burial and protection scheme has been successful.

[2] Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972

16.7 Cumulative and In-Combination Impact Assessment

178 This section provides an assessment of cumulative and in-combination effects on commercial fisheries arising from the offshore site and export cable route in conjunction with other existing or foreseeable development activities, as described in Section 16.4.6.

16.7.1 Cumulative Impact Assessment

179 The assessment of the potential cumulative impacts of offshore wind farm development focuses primarily on the Neart na Gaoithe wind farm in conjunction with the proposed Firth of Forth Round 3 Zone 2 development and the Inch Cape offshore wind farm development, as a result of their proximity to the proposed development.

180 As previously stated, in the absence of detailed methodologies and schedules, decommissioning works and the implications for commercial fisheries are considered analogous with construction.

181 It is recognised that fishing vessels may spend varying proportions of time fishing in areas outwith the Forth and Tay area and hence other offshore renewable development may also affect them. This is most apparently the case with the scallop fishery, as stated previously, and although individual vessels may spend more time in certain regional areas such as the Forth and Tay area, it is not possible within the scope of the assessment to consider the extent of an impact on a vessel by vessel basis. Instead, scallop grounds affected by the Neart na Gaoithe wind farm have been considered within the context of available scallop grounds around the UK, relevant to offshore renewable developments.

16.7.1.1 Adverse Impacts on Commercially Exploited Fish and Shellfish Populations

182 Predicted cumulative impacts on commercially exploited fish and shellfish populations arising from the operation and maintenance of the proposed developments in the Forth and Tay area are described in Chapter 15: Fish and Shellfish Ecology. Potential impact types are the same as those identified at a site-specific level for commercially important fish and shellfish species, relating to changes in habitat, suspended sediment, introduction of new substrate, underwater noise and heating and EMF effects, and the subsequent impacts on the species themselves at various life stages. Information on potential cumulative impacts on fish and shellfish species is provided in Chapter 15: Fish and Shellfish Ecology.

16.7.1.2 Complete Loss of or Restricted Access to Traditional Fishing Grounds

183 An assessment of fisheries in the region indicates that both the Firth of Forth Round 3 Zone 2 and the Inch Cape site are principally located in scallop grounds. There is a low level of scallop dredging activity occurring in the north of the Neart na Gaoithe offshore site, and the limited contribution of the proposed Neart na Gaoithe development to the overall cumulative impact on the scallop fishery should therefore be noted.

184 There is no Nephrops activity recorded in either the Inch Cape site or Firth of Forth Round 3 Zone 2, and as a result there is not considered to be a cumulative impact on the fishery.

185 Consultation with fishermen identified that fishing for squid occurs in a region encompassing the Inch Cape site and Firth of Forth Round 3 Zone 2 site. The annual variability of the squid fishery and the limited contribution of the proposed Neart na Gaoithe development to the overall cumulative effect should be noted.

186 There is some creeling for crab and lobster in the immediate area of the Inch Cape site, and to a much lesser extent in the area of the Firth of Forth Round 3 Zone 2 site. The majority of activity is located in inshore areas. It is considered that creeling for crab and lobster is predominantly undertaken by vessels from local home ports, and vessels operating gear in the area of the offshore site and cable route will not be the same as those vessels operating in the vicinity of the Inch Cape. There is not therefore considered to be a cumulative impact on the crab and lobster fishery.

187 There is the potential for the construction of the Neart na Gaoithe wind farm to coincide with construction works at both the Inch Cape and Firth of Forth Round 3 Zone 2 developments. The principal effects of construction considered to incur complete or restricted access to fishing grounds during the construction phase are:

- Safety zones around construction activities; and
- Installed infrastructure in addition to construction safety zones as construction progresses.

188 Access to fishing grounds within the wind farm sites will become increasingly limited as respective construction programmes advance. It is considered that fishing activities will not be able to safely resume until the appropriate post-construction surveys have been completed.

189 The extent of the impacts from wind farm developments during the operations and maintenance phase of developments in the Forth and Tay area depends on the access fishing vessels regain to grounds within the sites. The site-specific impact assessment concludes that fishing activities will be able to resume within the Neart na Gaoithe site (although it is noted that the decision ultimately rests with individual skippers). Similarly, it is at this stage considered that some level of activity will be able to resume within the Firth of Forth Round 3 Zone 2 and Inch Cape developments.

190 In the case of the scallop fishery, there are not currently any operational wind farms or wind farms under construction in the UK that are situated in scallop fishing grounds. There are, however, a number of proposed developments around the UK which are situated in the vicinity of scallop grounds, and may contribute to a cumulative impact:

- Moray Firth Round 3 Zone;
- Beatrice Offshore wind farm (STW);
- Argyll Array (STW);
- Rampion Round 3 Zone; and
- Irish Sea Round 3 Zone.

191 The cumulative impact on the scallop fishery is dependent on the productivity of grounds impacted and the scale of impact, which will in turn depend on respective construction schedules and the ability of the vessels to regain access to grounds once the sites are operational. The Neart na Gaoithe project will contribute to the cumulative impact or loss or restricted access to scallop fishing grounds as a result of offshore wind farm development around the UK. Despite this it should be noted the Neart na Gaoithe offshore site will have a limited contribution to such impacts due to the relatively low level and small proportion of activity occurring within the site.

16.7.1.3 Safety Risks to Fishing Vessels

192 The cumulative safety risks to fishing vessels as a result of offshore wind farm and renewable development are difficult to quantify as they are determined by the fishing patterns of individual vessels: vessels travelling greater distances to fishing grounds have the potential to be affected by multiple developments. However, it is recognised that the proximity of the Inch Cape and Firth of Forth Round 3 Zone 2 to the Neart na Gaoithe offshore site poses the greatest cumulative risk to the safety of fishing vessels in the area, and an assessment of the cumulative safety risks described below is limited to these developments.

193 There will be some overlap in the construction schedules of the developments. . There are likely to be several simultaneous construction events occurring at the same time as those within the Neart na Gaoithe site, including use of safety zones. Risks to fishing vessels would however only occur if there are infringements of these safety zones. It should also be recognised that in line with standard maritime practice, the ultimate responsibility with regards to safety lies with the master of a vessel. Compliance with safety zones would put the safety risks within acceptable limits in this instance.

194 All infrastructure installed in the Forth and Tay area will be required to be appropriately marked, in line with standard industry practice. It is assumed at this stage that fishing activities will be able to safely resume within both the Neart na Gaoithe and Firth of Forth Round 3 Zone 2 provided the appropriate post-construction surveys and, if necessary, seabed rectification procedures, are undertaken.

16.7.1.4 Increased Steaming Times to Fishing Grounds

195 There is the potential for the overlapping construction schedules of the developments in the Forth and Tay developments to result in safety zones that cumulatively contribute to an increase in steaming times to fishing grounds. The site-specific baseline indicates however that the Neart na Gaoithe site is largely situated outwith of the principal Nephrops fishing grounds in the area, and there are relatively lower levels of fishing activity recorded in areas immediately to the east of the site. Construction works within the offshore site will not therefore significantly impede transiting to grounds for these vessels and there will not be a discernible cumulative impact during the construction phase as a result.

196 The navigational risk assessment considers that there are good prospects for fishing vessels to navigate within the operational Neart na Gaoithe wind farm site. Bearing in mind the limitations of the information provided, it is considered at this stage that there will be good prospects for fishing vessels to also navigate within the operational Firth of Forth Round 3 Zone 2. Within the Inch Cape site, however, as a result of the catenary moorings of the floating turbines the majority of skippers would not be expected to steam through the operational site as a result of the safety risks in the event that they are required to drop anchor.

16.7.1.5 Removal of Obstacles on the Seabed Post-Construction to ensure Vessel Safety

197 Legislative measures control the discarding of objects or waste at sea. The reporting and recovery of any accidentally dropped objects is also required. In addition, the Neart na Gaoithe development will undergo the necessary post-construction seabed surveys, and, if necessary, ensure the appropriate seabed rectification measures are completed. Provided there is compliance to regulatory requirements, the impact is considered to be *within acceptable limits.*

16.7.1.6 Interference with Fishing Activities

198 With multiple developments in the region the magnitude of the effect of increased interference is likely to be greater than at a site-specific level. Therefore the cumulative effect of the Neart na Gaoithe wind farm and the Firth of Forth Round 3 Zone 2 and Inch Cape sites will be an increase in the scale of potential impact.

16.7.1.7 Displacement of Fishing Activity

199 In the case of the scallop fishery, which is the principal fishery to be cumulatively affected by offshore wind farm development in the region, there is the potential for displacement as a result of wind farms around the UK. The scale of displacement will depend on the area of fishing grounds lost as a result of construction and operation. As described, the Neart na Gaoithe offshore site overlaps with a very small proportion of total scallop fishing grounds in the region and nationally.

200 Within the Forth and Tay region there is not considered to be displacement of Nephrops fishing activity as a result of offshore wind farm development above that identified in the site-specific impact assessment. Similarly, considering the very low level of creeling activity in the immediate area of the developments, and the limited operational range of the fleet, there is not considered to be displacement of creeling activity as a result of offshore wind farm development above that identified in the site-specific impact assessment.

201 Although squid grounds have been identified in the vicinity of the proposed developments in the Forth and Tay area, the area is relatively large, and the recorded landings values are relatively low. Furthermore, the seasonality of the fishery is limited. The Neart na Gaoithe offshore works area overlaps with a very small proportion of the available area and displacement of this fishery will therefore be low.

16.7.2 In-Combination Impacts

16.7.2.1 Shipping

202 It is also recognised that the cumulative impact on shipping vessels as a result of the developments in the Forth and Tay area may result in these vessels being displaced into areas that are productive fishing grounds. This could have an impact of restricting the activities of fishing vessels targeting these grounds. The extent of displacement will be a function of the cumulative impact identified in Chapter 17: Shipping and Navigation.

16.7.2.2 Marine Protected Areas and other Closed or Restricted Areas

203 There are some areas which carry restrictions on certain fishing activities, including for fishery management, nature conservation, or defence reasons. A general term for these areas is 'Marine Protected Areas' (MPAs).

204 There are several drivers and evolving legislation to develop further MPAs for nature conservation purposes in Scotland and across the UK (see Chapter 11: Nature Conservation). As these develop and MPAs are designated this could result in future restricted areas for fisheries activities. Some current MPAs, for example Cardigan Bay Special Area of Conservation (SAC), formally a scallop dredging ground, restrict activities impacting the seabed (i.e., bottom towed gear such as scallop dredging). The development of the network of Nature Conservation MPAs in Scotland (through the Scottish MPA Project, see Chapter 11: Nature Conservation) may result in further closed areas that could have an impact in combination with impacts from the Neart na Gaoithe project. However, at the time of writing there are no planned further conservation management measures or any MPAs designated in the Forth and Tay region beyond those already in place.

205 In addition, there are fisheries management policies in place which also restrict or prohibit certain or all types of fishing activities. Such restrictions may be seasonal or annual and are subject to review. Currently there are no restricted or closed areas in the regional study area in addition to those identified in the Appendix 16.1: Commercial Fisheries Baseline Technical Report, which are located in discrete inshore areas and relate to the use of towed gear. There are management policies around the UK which have the potential to affect the nomadic scallop fleet, such as the closure in the Isle of Man waters. It is possible that additional closures or restrictions may come in to force in the future.

206 The in-combination impact of the Neart na Gaoithe project in conjunction with existing and proposed MPAs and restricted or closed areas is noted, although the contribution of the offshore works area will be relatively low.

16.8 Commercial Fisheries Monitoring

207 No monitoring is currently suggested for commercial fishing however, as part of the FTOWDG Fisheries Working Group and an agreement of a monitoring plan with Marine Scotland, the need and type of monitoring activities will be furthered discussed.

16.9 Summary of Impact Assessment

208 A summary of predicted impacts on commercial fisheries is presented in Table 16.18 below. This outlines predicted project level and cumulative impacts, as well as mitigating measures, for the construction, operation and maintenance and decommissioning phases of the project. For a summary of impacts on fish and shellfish species, refer to Chapter 15: Fish and Shellfish Ecology.

Source	Pathway	Receptor	Significance	Mitigation	Significance post-mitigation	Cumulative/in-combination impact significance	Qualification of significance
Construction							
Offshore site construction activities	Loss or restricted access to fishing grounds	Fishing vessels operating in the vicinity of the wind farm	Moderate significance	Several mitigation approaches suggested including the development of a working group, see Section 16.6.3 Mitigation and Residual Impacts.	Once mitigation measures are in place these could reduce the significance of the predicted impacts to minor.	Moderate significance	Fishing vessels will not be able to safely resume activities until the seabed is returned to an acceptable level for fishing activities to be safely resumed. Although the frequency and duration of the impact is moderate, the fishing grounds impacted are low intensity on a regional scale.
Export cable installation activities	Loss or restricted access to fishing grounds	Fishing vessels operating in the vicinity of the cable route	Moderate significance			Moderate significance	Fishing vessels will not be able to safely resume activities until the seabed is returned to an acceptable level for fishing activities to be safely resumed. The area is discrete and construction is relatively short term.
Offshore site construction activities and associated safety zones	Increased steaming times to fishing grounds	Fishing vessels operating in the vicinity of the wind farm	Minor significance	Several mitigation approaches suggested including the development of a working group, see Section 16.6.3 Mitigation and Residual Impacts.	Minor significance	Minor significance	Principal fishing grounds are located inshore of the development. Discrete location of safety zones.
Cable installation and associated safety zone	Increased steaming times to fishing grounds	Fishing vessels operating in the vicinity of the wind farm	Minor significance		Minor significance	Minor significance	Vessels will be able to re-route with minimal interference.
Construction and installation vessels transiting to site	Fouling of static gear or changes to towing patterns	All fishing vessels operating in the vicinity of the wind farm and cable route	Minor significance	Embedded mitigation: Cables will be buried to a target depth where it is reasonably practical to do so. In instances where adequate burial cannot be achieved, the developer will seek to install cable protection.	Minor significance	Minor significance	Development of a CEMP will help to minimise interference .
Offshore site construction activities	Displacement of fishing vessels into other areas	Fishing vessels operating in the general vicinity of the wind farm	Moderate significance	Several mitigation approaches suggested including the development of a working group, see Section 16.6.3 Mitigation and Residual Impacts.	Once mitigation measures are in place these could reduce the significance of the predicted impacts to minor.	Moderate significance	Fishing vessels will not be able to safely resume activities until the seabed is returned to an acceptable level for fishing activities to be safely resumed. Although the frequency and duration of the impact is moderate, the fishing grounds impacted are low intensity on a regional scale.
Export cable installation activities	Displacement of fishing vessels into other areas	Fishing vessels operating in the general vicinity of the cable route	Moderate significance			Moderate significance	Fishing vessels will not be able to safely resume activities until the seabed is returned to an acceptable level for fishing activities to be safely resumed. Fishing vessels operating in the immediate vicinity of the cable route will be displaced into other areas for the duration of installation works. However, the area is discrete and construction is relatively short term.

Table 16.18: Summary of impact assessment for commercial fisheries

Source	Pathway	Receptor	Significance	Mitigation	Significance post-mitigation	Cumulative/in-combination impact significance	Qualification of significance
Operation and Maintenance							
Turbines and associated wind farm infrastructure (met mast and two substations)	Loss of or restricted access to fishing grounds	Fishing vessels	Minor significance	Embedded mitigation: seabed to be returned to acceptable condition for fishing activities to be safely resumed.	Minor significance	Minor significance	Fishing vessels will regain access to grounds within the site during the operational phase.
Export cables	Loss of or restricted access to fishing grounds	Fishing vessels	Not significant		Not significant	Not significant	
Interference to transiting of fishing vessels	Increased steaming times to fishing grounds	Fishing vessels	Minor significance	Several mitigation approaches suggested including the development of a working group, see Section 16.6.3 Mitigation and Residual Impacts.	Minor significance	Minor significance	No discernible change to normal steaming patterns.
Interference to transiting of fishing vessels	Increased steaming times to fishing grounds	Fishing vessels	Not significant		Not significant	Not significant	
Operations and maintenance vessels transiting to site	Fouling of static gear or changes to towing patterns	All fishing vessels operating in the vicinity of the wind farm and cable route	Minor significance		Minor significance	Minor significance	Codes of conduct established during the construction phase will have addressed any navigational issues.
Export cables	Fouling of static gear or changes to towing patterns	Fishing vessels	Not significant		Not significant	Not significant	
Operational offshore site	Displacement of fishing vessels	Fishing vessels	Minor significance	Embedded mitigation: seabed to be returned to acceptable condition for fishing activities to be safely resumed.	Minor significance	Minor significance	Access regained to fishing grounds within the site will negate the displacement experienced during the construction phase.
Operational export cables	Displacement of fishing vessels	Fishing vessels	Not Significant		Not Significant	Not significant	

Table 16.18: Summary of impact assessment for commercial fisheries (continued)

16.10 References

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Appendices

Appendix 16.1: Commercial Fisheries Baseline Technical Report

Appendix 16.2: Salmon and Sea Trout Fishery Baseline Technical Report